

Original Research Article

Payment of Medical Invoices by Inpatients at the Mangobo General Referral Hospital in Kisangani (DR Congo) from 2016 to 2020.

ABSTRACT

Introduction: The study looked at the problem of payment of healthcare bills by hospital patients. It was conducted at the Mangobo General Referral Hospital in Kisangani (DR Congo) during the period from 2016 to 2020. It aimed to identify the proportion of medical bills paid and not paid by inpatients.

Methodology: This study was carried out using an inductive method based on documentary analysis. We used the general trend technique, which concerned all the medical bills paid and not paid by patients hospitalised at the Mangobo General Referral Hospital.

Results: The total amounts of paid and unpaid medical care bills were respectively US\$15,250,500.92 and US\$17,200.00 with a proportion of 99.89% for the former, against 0.11% for the latter. All the amounts of the paid and unpaid health care bills had an upward trend.

Comment [F11]: Please add implications

Keywords: Payment, Invoices, Medical care, Inpatients.

1. INTRODUCTION

Health is now higher than ever on the agenda of both the national and international community, and the health of the poor is becoming a key focus for growth and development. Countries agree that the enjoyment of the highest attainable standard of health is a fundamental right of every human being, irrespective of race, religion, political belief, and social and economic status. Apart from its intrinsic value for each individual, health is essential for human development in general and for poverty reduction in particular. Poor people are the most vulnerable to disease [1].

Health is a critically important asset for the poor, the key to their survival. It remains the major concern of governments in all circumstances because there is evidence of a direct relationship between health and productivity, and health status improves with economic growth. Improving people's health conditions leads to fewer lost work days and longer working lives. This increases the volume and quality of labour supply [2, 3].

The use of health services and access to care become very limited or even impossible. This situation gives rise to a variety of behaviours, sometimes perverse, with regard to health services, even public ones [4].

To improve the health status of the poor, a government-supported approach to health is needed. The nature of this support and the definition of priorities depend on the context of each country concerned. The priority is to increase financial resources for health, both in country budgets and in external aid received. Countries also need to make a stronger commitment to improving their management and better focus their policies on the problem of poverty [5].

In the United States, the Manhattan Public Hospital had a 35% shortfall in billings from 2000 to 2004. This necessitated the creation of health insurance through mutual health insurance [6].

Rosenweg in 2018, in his book "Reste à charge: vos soins vous coûter 7 euros sur 100 euros dépensés" wanted to show the importance of the mutual health insurance for the sick in France in the coverage of medical care. According to him, perhaps the patient did not realise it, but when he consumes medical care, the final sum remaining at his expense decreases. It represented 7.5% of expenditure in 2017 and, according to official figures presented to the Commission des Comptes de la Santé, in 2018, this 'remaining out-of-pocket', after reimbursement by the health insurance and supplementary health insurance, fell to 7%. This policy has influenced the evolution of the average rate of reimbursement, etc. It is now 78.1% compared to 76.1% in 2011. However, for example, only 65.1% of the cost of urban care is reimbursed on average and 72.7% of the cost of drugs. As for hospital expenses, many of which concern long-term illnesses, 91.6% of them are covered [7].

In 2001, African countries committed themselves to spending at least 15% of their budget on health care. But today, only six of them (Botswana, Burkina Faso, Malawi, Niger, Rwanda and Zambia) have reached this target without all their populations having access to decent care [8].

User fees for health care in sub-Saharan Africa are helping to overcome the shortcomings of state funding. Very few countries have health insurance systems, which in any case only cover a part of the population: civil servants and employees in the modern sector. Seeing a doctor or being admitted to a hospital remains out of reach for hundreds of thousands of people. In many countries, patients who cannot afford to pay their medical bills are kept in hospitals until they are paid in full [9].

Also in Africa, statistics kept by Burundian hospitals show that they have struggled with this problem of unpaid bills for years, and that detaining patients is not a new or appropriate measure. Cash-strapped hospitals began detaining patients unable to pay their bills in the 1990s when fee collection was introduced in some facilities, and have done so with increasing frequency since the widespread introduction of fee collection in 2002 [10]. In different hospitals in Burundi, Burundian public hospitals have detained hundreds of patients who were unable to pay their bills. They were kept by security personnel, either in the hospital wards or in a separate room [11].

In contrast, in neighbouring Rwanda, Bayege noted the importance of mutual health insurance schemes in facilitating members' access to health care. The government has committed itself to paying part of the health care bills through mutual health organisations that are recognised and have signed contracts for care in public hospitals. This has somewhat reduced the problem of recovery of health care costs and has facilitated access to health care [12].

In the Democratic Republic of Congo, specifically in Bukavu, Kamanzi P. [13] reported in 2016 that to address the problem of non-payment of health care bills, hospitals often record the financial losses they encounter, but usually do not note the number of patients detained. Most statistics show how many bills have gone unpaid, and provide information on patient records, as well as on benefactors. Hospitals also sometimes refuse treatment to patients who cannot afford it, probably because they want to avoid expenses that they cannot recover.

The majority of health care is paid for by individuals, instead of the collective financing systems that exist in the so-called developed countries [14]. This situation limits access to care for around 70% of Congolese living in extreme poverty [15] and thus exposed to serious health problems. Prevention and screening are much less widespread among the poorest people [16, 17].

Several initiatives have been put in place in the DRC to address the low accessibility of care by the population, including community financing of care, pooling of the risks of impoverishment in the event of illness through pre-payment of care and performance-based financing [18, 19, 20].

Given this state of affairs, our problematic has revolved around the following fundamental question: What is the proportion of medical bills paid and unpaid by inpatients at the RGH/Mangobo during the period 2016 to 2020?

Given that the socio-economic conditions of the Congolese people remain precarious and that the majority of Congolese live on less than a dollar a day, we estimate that the proportion of medical care bills paid by patients hospitalised at the HGR/Mangobo would decrease and that the amounts of unpaid bills would also decrease.

The payment of health care bills by patients is an important and non-negligible factor for the proper functioning of a health facility. The main purpose of this study is to identify all the problems related to the non-payment of health care bills by patients in order to propose to the hospital management effective strategies to curb this situation.

Specifically, this study aims to identify the proportion of medical bills paid and not paid by patients hospitalised at the HGR/Mangobo during the period from 2016 to 2020.

2. METHODOLOGY

2.1 Study setting

The Mangobo General Referral Hospital was chosen as our research site. It is a public sector health institution operating under the technical and administrative supervision of the DR Congo Ministry of Public Health.

2.2 Population and sample

For our purposes, the study population consists of all the amounts of healthcare bills paid and unpaid by patients admitted and treated at the Mangobo General Referral Hospital. Since this study concerns a specific period, we worked with a sample consisting essentially of the amounts of bills of patients admitted, treated and hospitalised at the Mangobo General Referral Hospital during the period from 2016 to 2020.

2.3 Method and techniques

2.3.1 Type of study

In our methodological approach, we used the inductive method, which starts from the specific facts to the overall facts. The starting point is observation and experimentation with the facts. It is supported by the ordinary least squares technique.

2.3.2 Data collection technique and instrument

In this study, we used a literature review to collect data. The documentary analysis enabled us to consult the various accounting documents in the hospital's financial department, such as invoices, cash receipts and the breakdown book.

Comment [F12]: I suggest using secondary data from hospital database, not literature review

We then drew up a survey sheet which served as a scorecard for data collection. This form contained the variables sought and which were the subject of the study, i.e. the amounts of bills paid and unpaid by patients hospitalised at the Mangobo General Reference Hospital.

2.3.3 Data analysis

For this study, we used the general trend technique in data processing and analysis. Also known as "*Trend*", the general trend can be defined as the study of the development of a phenomenon over time. The use of this technique is based on two main ideas: the past shows an orderly development and the future appears as an extrapolation of the past.

However, it should be noted that general trends are either linear or non-linear. The former are studied using the method of least squares through linear fitting, while the latter can be exponential. In this study, we use the ordinary least square technique by linear fitting.

This involves fitting a point cloud $\{Y_i, X_i\}$ $i = 1, \dots, n$ according to a linear relationship, taking the form of the matrix relationship $Y = X\beta + \epsilon$, where ϵ is an error term.

According to Terraza [21], "the ordinary least squares method consists in minimizing the sum of the squares of the weighted deviations in multidimensional cases, between each point of the regression cloud and its projected, parallel to the y-axis, on the regression line."

Thus, we used the following equation: $Y = ax + b$.

With :

- Y = endogenous (dependent) variable ;
- a and b = parameters to be estimated;
- x = special time variable.

Thus, to estimate the parameters, we use the following formulas:

$$a = \frac{\sum XY}{\sum X^2} (1)$$

$$b = \bar{y} - a\bar{x} (2)$$

$$\bar{Y} = \frac{\sum Y}{N} \quad (3)$$

Where \bar{Y} = Arithmetic mean of Y ; N = Number of observations ; a and b = Parameters to be estimated.

Based on this study, we try to determine the evolution, i.e. the general trend of the amounts of paid and unpaid health care bills by patients during the study period.

2.4 Ethical aspects

This study was conducted in an ethical manner, i.e. the data collected will not be disclosed under any circumstances and will be kept strictly anonymous. There is therefore no conflict of interest between the researcher and the research field.

3. RESULTS

3.1 Presentation of the amounts of healthcare bills paid

In the table below, we present the amounts of invoices collected by the Mangobo General Referral Hospital during the period from 2016 to 2020.

Table 1: Amount of healthcare bills paid (in US dollars)

Year	Amounts of invoices paid
2016	3,475,980.00
2017	3,104,962.50
2018	3,377,040.65
2019	2,670,602.77
2020	2,604,715.00
Total	15,233,300.92

Source: Our research at RGH/Mangobo

From this table, it appears that the total amount of healthcare invoices paid by patients admitted and hospitalised at the Mangobo General Referral Hospital amounted to US\$15,233,300.92. As can be seen, these invoices amounts had been on a downward trend with a peak in 2016 at US\$3,475,980.00, while 2018 ranked second at US\$3,377,040.65 and 2017 at US\$3,104,962.50. The year 2020 had a low amount compared to the other years at US\$2,604,715.00.

This situation is illustrated in the graph below, which shows the evolution of the amounts of bills paid by patients to the Mangobo General Referral Hospital during the study period.

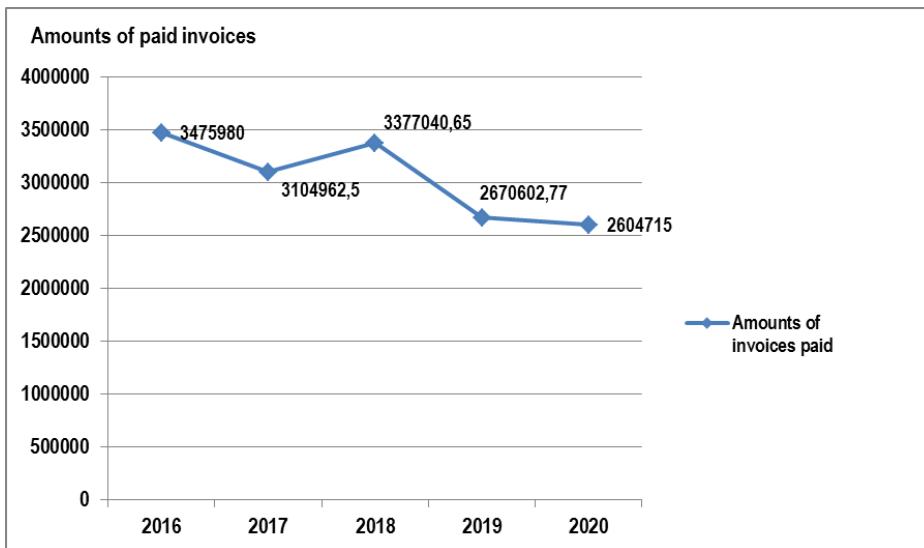


Figure 1: Evolution of the amounts of bills paid by patients at the Mangobo General Referral Hospital.

3.2 Presentation of the amounts of unpaid healthcare bills

In the table below, we present the amounts of uncollected invoice by the Mangobo General Referral Hospital during the period from 2016 to 2020.

Table 2: Amount of unpaid healthcare invoices (in US dollars)

Year	Amounts of unpaid invoices
2016	3,940.00
2017	3,430.00
2018	2,520.00
2019	3,310.00
2020	4,000.00
Total	17,200.00

Source: Our research at the Mangobo General Referral Hospital

The data in this table shows that the total amount of uncollected health care invoice at the Mangobo General Referral Hospital was US\$17,200.00. In contrast to the amounts of recovered bills, we observed that the amounts of uncollected bills had evolved in a sawtooth pattern, with a peak in 2020 at US\$4,000.00, followed by 2016 at US\$3,940.00, 2017 at US\$3,430.00 and 2019 at US\$3,310.00. The year 2018 had billed a low amount compared to the other years, at US\$2,520.00.

This situation is illustrated in the graph below, showing the evolution of the amounts of uncollected bills by Mangobo General Referral Hospital during the study period.

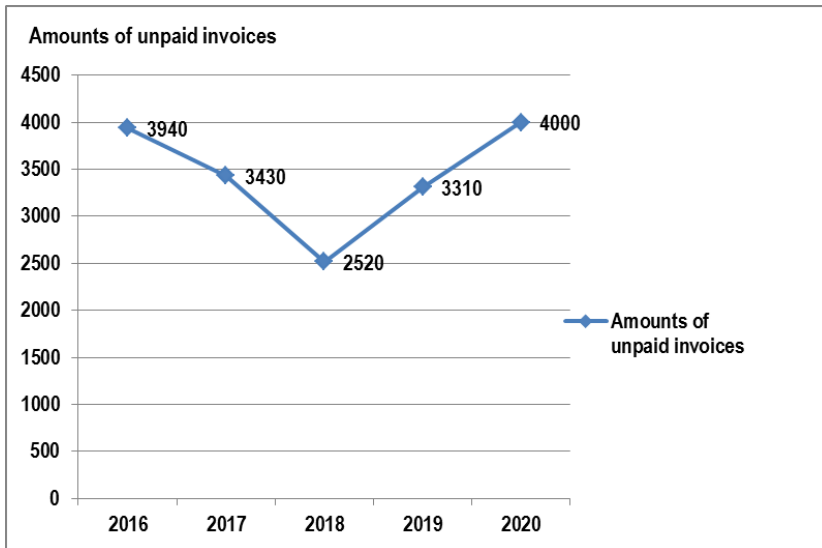


Figure 2: Evolution of the amounts of uncollected invoices by the Mangobo General Referral Hospital.

3.3 Proportion of paid and unpaid healthcare bills

In the table below, we present the proportion of paid and unpaid health care bills in percentage terms.

Table 3: Proportion of paid and unpaid health care bills (in US dollars)

Year	Amounts of invoices paid	Proportion (%)	Amounts of unpaid invoices	Proportion (%)	Total
2016	3,475,980.00	22.79	3,940.00	0.03	3,479,920.00
2017	3,104,962.50	20.36	3,430.00	0.02	3,108,392.50
2018	3,377,040.65	22.14	2,520.00	0.02	3,379,560.65
2019	2,670,602.77	17.51	3,310.00	0.02	2,673,912.77
2020	2,604,715.00	17.08	4,000.00	0.03	2,608,715.00
Total	15,233,300.92	99.89	17,200.00	0.11	15,250 500.92

Source: Our calculations on Tables 1 and 2

The result recorded in this table shows us that the total amounts of paid and unpaid health care bills amounted to US\$15,250,500.92 of which paid bills accounted for 99.89% and unpaid bills accounted for 0.11%.

The graph below clearly illustrates the proportions of paid and unpaid health care bills by patients at the Mangobo General Referral Hospital from 2016 to 2020:

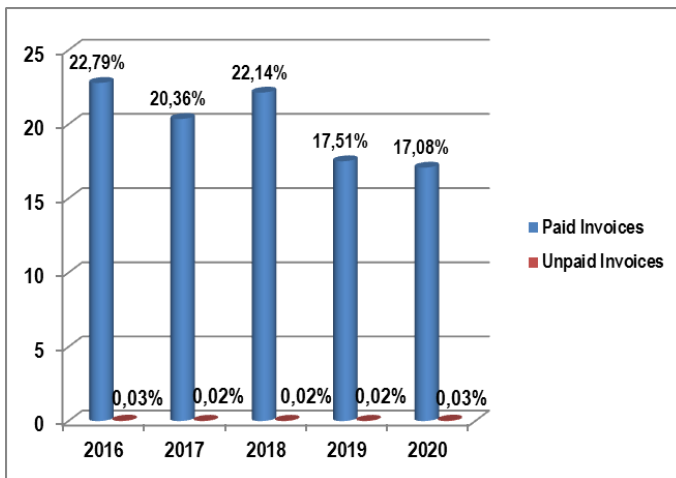


Figure 3: Proportion of invoice amounts paid and not collected by patients from 2016 to 2020.

3.4 Economic analysis of results

3.4.1 Theoretical aspect

The economic analysis of results is based on the quantitative methods used in the preparation of forecasts with the aim of projecting revenue and expenditure forecasts. Quantitative methods are based on the mathematical processing of time series, with the aim of eliminating transitory movements (seasonal variations, economic accidents, etc.) in order to discover "pure" trends and extending them by extrapolation to forecast sales.

It is of course a question of analysing all the economic parameters of different branches with the aim of comparing the economic phenomena that have occurred in the past and confronting them with the economic realities of the moment and extrapolating them into the future.

As far as this study is concerned, it consists of analysing the amounts of healthcare bills paid and unpaid by patients admitted and hospitalised at the Mangobo General Referral Hospital during the period from 2016 to 2020.

As a reminder, we made use of the general trend method, also called "Trend", which is one of the methods used in quantitative data methods.

3.4.2 Practicality

The aim here is to define the general trend of the economic variables, namely the amounts of health care bills paid and unpaid by patients admitted and hospitalised at the Mangobo General Referral Hospital during the period from 2016 to 2020.

1) Equation of the trend in the amounts of bills paid by patients

The equation of the general trend of the amounts of healthcare bills paid by patients at the Mangobo General Referral Hospital is determined in the ordinary least square statistical table below:

Table 4: Statistical calculations

Year (x)	Invoices paid (y)	$X = x - \bar{x}$	$Y = y - \bar{y}$	XY	X^2
1	3,475,980.00	-2	429,319.82	- 858,639.64	4
2	3,104,962.50	-1	58,302.32	- 58,302.32	1
3	3,377,040.65	0	330,380.46	0.00	0
4	2,670,602.77	1	-376,057.41	- 376,057.41	1
5	2,604,715.00	2	-441,945.18	- 883,890.36	4
10	15,233,300.92	-	-	- 2,176,889.73	8

Source: Our field calculations (see data in Table 1).

$$\bar{y} = \frac{\sum y}{n} = 3,046,660.18 \quad ; \quad n = 5$$

$$\bar{x} = \frac{\sum x}{n} = 3$$

$$a = \frac{\sum xy}{\sum x^2} = - 272,111.22$$

$$b = \bar{y} - a\bar{x} = 2,230,326.52$$

If $a = -272,111.22$ and $b = 2,230,326.52$; then the equation of the linear adjustment line of the amounts of care bills paid by patients at the Mangobo General Referral Hospital from 2016 to 2020 becomes $Y = ax + b$, i.e. $Y = -272,111.22 x + 2,230,326.52$.

The equation $Y = -272,111.22 x + 2,230,326.52$ means economically that the amounts of health care bills paid by patients at the Mangobo General Referral Hospital from 2016 to 2020 decreased by an annual average of 272,111.22 with a corresponding constant of 2,230,326.52.

2) Graphical representation

In the graph below, we represent the evolution or general trend of the amounts of bills paid by inpatients from 2016 to 2020, starting from the equation $Y = -272,111.22 x + 2,230,326.52$. Thus, we look for this general trend from the following calculations:

$$Y_1 = -272,111.22 (1) + 2,230,326.52 = 2,502,440.74$$

$$Y_2 = -272,111.22 (2) + 2,230,326.52 = 1,686,104.04$$

$$Y_3 = -272,111.22 (3) + 2,230,326.52 = 1,413,992.86$$

$$Y_4 = -272,111.22 (4) + 2,230,326.52 = 1,141,881.64$$

$$Y_5 = -272,111.22 (5) + 2,230,326.52 = 869,770.42$$

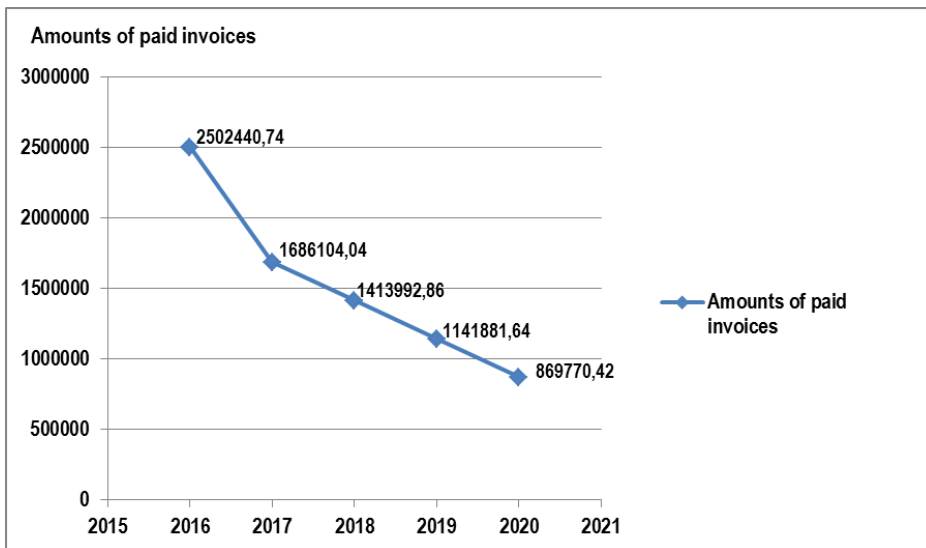


Figure 4: Adjustment line: Overall trend in invoice amounts paid from 2016 to 2020.

As this figure shows, the slope of the adjustment line is downward, i.e. the amounts of invoices paid by patients at the Mangobo General Referral Hospital from 2016 to 2020 had indeed evolved downward.

3) Trend equation for unpaid patient bill amounts

The equation for the overall trend in unpaid patient invoices is determined in the ordinary least square statistical table below:

Table 5: Statistical calculations

Year (x)	Unpaid invoices (y)	$X = x - \bar{x}$	$Y = y - \bar{y}$	XY	X^2
1	3,940.00	-2	500	- 1,000	4
2	3,430.00	-1	- 10	10	1
3	2,520.00	0	- 920	0	0
4	3,310.00	1	- 130	- 130	1
5	4,000.00	2	560	1,120	4
10	17,200.00	0	0	0	8

Source: Our field calculations (see data in Table 2).

$$\bar{y} = \frac{\sum y}{n} = 3440 \quad n = 5$$

$$\bar{x} = \frac{\sum x}{n} = 3$$

$$a = \frac{\sum xy}{\sum x^2} = 0$$

$$b = \bar{y} - a\bar{x} = 3,440.$$

If $a = 0$ and $b = 3,440$; then the equation of the linear adjustment line of the amounts of unpaid care bills by patients at the Mangobo General Referral Hospital from 2016 to 2020 becomes $Y = ax + b$, i.e. $Y = 0x + 3,440$.

The equation $Y = 0x + 3440$ means economically that the amounts of unpaid patient care bills at the Mangobo General Referral Hospital from 2016 to 2020 decreased significantly by an annual average of 0 with a corresponding constant of 3,440.

Given that the parameter $a = 0$, it is impossible for us to represent the adjustment line, especially since the exogenous variable designated by the amounts of unpaid bills by patients at the Mangobo General Referral Hospital did not show either an increase or a decrease, i.e. it is zero.

This would be justified by the fact that the proportion of unpaid bills was 0.11% of the total amount of bills for care payable by patients admitted and hospitalised in this hospital during the study period.

4. DISCUSSION

The result of this series shows that the total amount of paid and unpaid medical bills by patients at the Mangobo General Referral Hospital was US\$15,250,500.92, of which US\$15,233,300.92 was paid, i.e. 99.89%, compared to US\$17,200.00, i.e. 0.11% of unpaid medical bills.

For a health institution such as the Mangobo General Referral Hospital, which does not benefit from any operating subsidy from the Congolese state, having a debt to clients (patients admitted and hospitalised) of US\$17,200.00, i.e. the amounts of unpaid care bills from patients, constitutes a significant loss of income for the hospital.

This situation has also occurred in various hospitals in Burundi where, according to Ebofé Bola [10], in recent years public hospitals in Burundi have detained hundreds of patients who were unable to pay their bills. Patients were usually detained for several weeks or months, and in one case for more than a year. They were kept by security staff, in the hospital wards or in a separate room. Those who had no money were often starved if they were not fed by the charity of others. Some were forced to vacate their beds for patients who could afford to pay and had to sleep on the floor. Often, if the bill reached a certain amount, the poorest did not receive any further treatment, even if they needed additional care, including basic post-operative care such as stitch removal after a caesarean section.

To address the problem of non-payment of health care bills, hospitals often record the financial losses they incur, but usually do not record the number of patients detained. Most statistics show how many bills have gone unpaid, and provide information on patient records and benefactors. Some hospitals only show the number of patients who have run away. There is no standard for hospitals to follow in this respect and statistics vary in detail and format. Hospitals also sometimes refuse treatment to patients who cannot afford it, probably because they want to avoid expenses that they cannot recover [11, 19, 20].

Collecting bills from patients is a bottleneck for a public health facility where there is not enough revenue to cover all the costs involved in running the facility.

This situation should challenge the health authorities in particular, and government authorities in general, to take appropriate measures to try to raise the level of public hospitals, which have been given the mission of providing care to the population with a view to access to care for all.

For Kana Kiwe, the economic, political and social context of sub-Saharan African countries has been characterised over the past decade by a constant deterioration. Both internal and external causes have led to this precarious situation. Internally, unfavourable political conditions, poor governance and the weakness of the administrative and institutional framework, as well as the narrowness of the internal market, have created an environment that is detrimental to the development process of these countries in general, and the Democratic Republic of Congo in particular [22].

More generally, the government needs to ensure that the health budget is able to reach the population most at risk and take action against corruption in the health system.

In Bukavu in the Province of South Kivu, Kamanzi [13] in his study notes that for some time, patients have been complaining about overcharging for care at the Provincial General Reference Hospital in Bukavu and criticizes the care given to them, showing that some patients are surprised by the overcharging of which they are the victims, even though the drugs used by the hospital for their care are purchased by the patient himself, while others are granted by the government. Other patients, on the other hand, complain that once they have not paid their bills, they are neglected and do not have access to care, as one of them complains.

In contrast to the general situation of public hospitals in the Democratic Republic of Congo, Bayege [12] in his study on "Contribution of mutual health insurance to the accessibility of the population to health services", noted the importance of mutual health insurance in facilitating the accessibility of members to health care in Rwanda. The government is committed to paying part of the health care bills through mutual health organisations that are recognised and have signed contracts for care in public hospitals. This has reduced the problem of cost recovery to some extent and has facilitated access to health care.

Rwanda has meanwhile moved towards compulsory health insurance, which will have to find its place in financing systems adapted to the characteristics of low-income countries [23]. Although the mutual insurance movement has been growing steadily in Africa, the percentage of the population covered is generally little more than 1%.

We believe that the creation of affiliated mutual health insurance schemes in public hospitals would contribute to improving the payment of health care bills by patients and could enable hospitals to mobilise funds in time to cope with budgetary constraints.

In the Democratic Republic of Congo, the majority of health care costs are covered by individuals, instead of collective financing systems as is the case in so-called developed countries [14]. This situation limits access to healthcare for around 70% of Congolese living in extreme poverty and thus exposed to serious health problems [15].

CONCLUSION

This study looked at the payment of medical bills by patients hospitalised at the Mangobo General Referral Hospital in Kisangani (The Democratic Republic of Congo).

In approaching this study, we set ourselves the specific objective of identifying the proportion of medical bills paid and not paid by patients hospitalised at the Mangobo General Referral Hospital during the period from 2016 to 2020;

To achieve these objectives, we used the inductive method based on documentary analysis and supported by the general trend technique, which concerned all the medical bills paid and not paid by patients at the Mangobo General Referral Hospital from 2016 to 2020.

At the end of our analyses, we arrived at the following results:

- the total amount of paid and unpaid health care bills amounted to US\$15,250,500.92, of which the former represented 99.89% and the latter 0.11%.

- All the amounts of paid and unpaid care bills had increased during the study period.

In view of these results, we consider that the objectives pursued have been achieved. Indeed, given that health establishments in the Democratic Republic of Congo in general, and the Mangobo General Referral Hospital in particular, do not benefit from state subsidies for their operation, we suggest that

Comment [F13]: Please add implication study

To the Congolese government : To provide financial and material support to public health establishments to enable them to function normally in order to offer quality health care to patients; to facilitate access to care for the poor.

To the leaders of the Mangobo General Referral Hospital: to apply a good policy for collecting invoices for patient care in order to avoid the hazards associated with maximising revenue.

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