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Clinical and Epidemiological Aspects of Certain Diseases with Weekly Notification in the Democratic Republic of Congo (DRC): Case of Three Hospitals in Lubumbashi

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Abstract

Introduction: In popular opinion, costs are equated with expenses, in other words, by costs we mean amounts that have to be spent on something. So, we often talk about health costs, when in fact we mean health expenditure, that is, all monetary expenses incurred in the framework of the health system. **Methodology:** This is a descriptive cross-sectional study with an analytical aim on the cost and the clinical and epidemiological aspects of diseases with weekly notification in children aged 0 - 5 years at the Chrina Medical Center, at the General Referral Hospital of Kamalondo and at the Katuba General Referral Hospital on 203 children aged 0 - 5 years during the first quarter of 2019. **Results:** The average cost of treating malaria at Chrina Medical Center is $60.2, it is $69 at Kamalondo General Referral Hospital and $77.6 at Katuba General Referral Hospital. Compared to clinical signs, all patients (100.0%) presented with Fever, 75.0% presented with Rash and only 50.0% presented with physical asthenia. Out of 203 cases identified malaria (88 cases), typhoid fever (78 cases), acute respiratory infections (33 cases) as well as measles (4 cases). **Conclusion:** Prevention is the best way to fight most of the communicable diseases which cause enormous damage both individually and collectively. There is an urgent need for health education to inform and educate the population on individual and collective hygienical measures as well as the risks related to the immediate environment, in particular, the lack of access to drinking water, sanitation, decent housing and a healthy living environment is among the factors behind the poor health of children under five in devel-

oping countries.

Subject Areas

Public Health

Keywords

Clinical, Epidemiological, Aspects, Diseases, Weekly Notification, Lubumbashi, Democratic Republic of the Congo

1. Introduction

In popular opinion, costs are equated with expenses, in other words, by costs we mean amounts that have to be spent on something. So, we often talk about health costs, when in fact we mean health expenditure, that is, all monetary expenses incurred in the framework of the health system. In this case, it is all the cash flows that are generated in a country for services and goods for the purpose of prevention, treatment, rehabilitation and care of illnesses and accidents [1].

In the case of illness, it is a loss of benefit that occurs because a worsening of the normal state of health has occurred. This loss of profit translates into different costs, not all of which are monetary payments or expenses. These include the resources that must be committed to fight the disease or the opportunity costs that arise because the sick person is disabled in their performance of work. Likewise, pain and suffering caused by an illness should be included in the economic notion of cost [2].

To calculate the cost of illness, therefore, in health economics assessments, three basic categories of costs can be distinguished: direct costs, indirect costs and intangible costs [2].

Direct costs correspond to monetary expenses which become indispensable because of the disease. They are directly quantifiable in monetary units and occur both inside and outside the health system [2].

The success of disease prevention and control programs depends on the resources devoted to detecting targeted diseases, assessing laboratory confirmation of cases and using action thresholds at the health district level. This is why the regional office of the World Health Organization, WHO AFRO in acronym, has proposed integrated disease surveillance. This office even proposed a response approach to improve health surveillance and response in the African region. This strategy involves communities and health facilities at all levels of the health system [3].

In addition, the cost of the component devoted to the prevention of the importation of cases, their early management and their monitoring is not available. The resources devoted to vector control increased further after the 2006 chikungunya epidemic. In 2012, its total annual cost of around 14.6 USD per capita appears disproportionate compared to the 2.4 USD per capita spent by the is-

land. It should however be noted that the part intended specifically for the fight against malaria represents only a small part, because the anti-vector control mainly targets the vectors of arboviruses. Thus, the activity linked to the risk of malaria mobilizes only eight staff out of the 160 staff in the service. Study conducted on the elimination of malaria on Reunion Island [4].

In the DRC, current health expenditure is borne by households (40%) and international cooperation (45%), and carried out by direct payment without cost sharing (93.7%). Hospitalization is justified to treat nutritional deficiencies (34%), malaria (12%) and mental disorders (10%). In 82% of cases, outpatient care concerns malaria (71%) and mental disorders (12.5%). The finding that 71.58% of hospital expenses, 96.49% of outpatient center expenses, 98.48% of medical and diagnostic laboratory expenses, 72.42% of pharmacies expenses are borne by households exposed to "Out-of-pocket" pleads for the establishment of mechanisms to consolidate health risk. The fact that malaria absorbs 71% of outpatient spending calls for the strengthening of prevention, treatment and monitoring of the progress made. The nutritional deficiencies are the primary cause for going to hospital suggests that efforts should be made to improve the living conditions of households. The mental disorders are the third reason for hospitalization argues for the integration of this pathology in the minimum and complementary packages of activities [5]. Diseases with weekly notification in the Democratic Republic of the Congo constitute a major challenge in terms of suffering for the majority of households.

2. Methodology

We carried out a cross-sectional descriptive study on diseases with weekly notification in the city of Lubumbashi, specifically at the Chrina medical center, the General Reference Hospital of Kamalondo as well as the General Reference Hospital of Katuba in the province. of Haut Katanga in the Democratic Republic of Congo during the first quarter of 2019 (from 03/01/2019 to 03/31/02019).

Our study population consists of children who have suffered from a weekly notifiable disease and whose age is between 0 and 5 years (Malaria, typhoid fever, infections.

The data was collected on a form based on patient files as well as hospitalization registers. SPSS version 23 software was used for the data analysis.

3. Results

3.1. Malaria

In view of Table 1, it emerges that the sex most affected is the male sex with 47 cases (53.4%).

Table 2 shows us that the most affected age group is 12 to 24 months with 42.0% (37 cases), with an average age of 27.5 months; a Standard Deviation of 17.3; a minimum age of 5 months and a maximum age of 60 months.

The results of Table 3 show us that the most frequent length of stay is greater

than or equal to 5 days with 84 cases (95.5%).

According to Table 4, most of the patients (73.9%) were admitted without referral to the various structures.

As shown in Table 5, the month most affected is the month of January with 55 cases (62.5%), followed by that of February 23 cases (26.1%) and finally the month of March 10 cases (11.4%).

t emerges from Table 6 that, Fever is the most frequent clinical sign with 70 cases (79.5%).

Table 1. Distribution of cases by sex.

Gender	Frequency	Pourcentage
Female	41	46.6
Male	47	53.4
Total	88	100.0

Table 2. Distribution of respondents according to age group.

Ages (In month)	Frequency	Pourcentage	Means and standard deviation	Minimum	Maximum
<12	16	18.2	27.5 (17.3)	5	60
>24	35	39.8			
12 to 24	37	42.0			
Total	88	100.0			

Table 3. Distribution of patients according to length of stay.

Duration of stay	Frequency	Pourcentage
≤5 Days	84	95.5
>5 Days	4	4.5
Total	88	100.0

Table 4. Distribution of respondents by mode of admission.

Referral	Frequency	Pourcentage
No	65	73.9
Yes	23	26.1
Total	88	100.0

Table 5. Breakdown of children by month of onset.

Month of occurrence	Frequency	Pourcentage
February	23	26.1
January	55	62.5
March	10	11.4
Total	88	100.0

Table 6. Distribution of cases according to clinical signs.

Clinical signs	Frequency	Pourcentage
Fever		
Yes	70	79.5
No	18	20.5
Asthenia		
Yes	9	10.2
No	79	89.8
Vomiting		
Yes	18	20.5
No	70	79.5
Anorexia		
Yes	20	22.7
No	68	77.3

3.2. Thyphoid Fever

The results of Table 7 show that the male sex was the most affected by typhoid fever with 41 cases (52.6%).

3.3. Acute Respiratory Infections

As shown in Table 8, acute respiratory infections have been found much more in male children (51.5%) against 48.5% in female sex.

As shown in Table 9, children aged 12 to 24 months were the most affected age group (45.5%). With an average age of 17.2 months; a Standard Deviation of 13.9; a minimum age of 3 months and a maximum age of 54 months.

As shown in Table 10, fever was more common among cases of Acute Respiratory Infections, 18 cases (54.5%).

3.4. Measles

As shown in Table 11, the most dominant age group was the one under 24 months who had 50% of measles cases. With an average age of 29 months, a Standard Deviation of 17.1; a minimum age of 8 months and a maximum age of 48 months.

As shown in Table 12, of the three months that made up our study period, March had a high number of cases (75.0%) of Measles and 25.0% in January.

In relation to the clinical signs, it appears from Table 13 that all the patients (100.0%) presented with Fever, 75.0% presented with Skin rashes and only 50.0% presented with physical asthenia.

3.5. Analysis of the Costs of Diseases in the Different Structures

As shown in Table 14, the cost of treating malaria was different between the three hospitals and Chrina Hospital was expensive ($60.2) compared to the two hospitals ($F > 1$, $P < 0.005$).

Table 7. Distribution of patients by sex.

Gender	Frequency	Percent
Male	41	52.6
Female	37	47.4
Total	78	100.0

Table 8. Distribution of respondents by sex.

Gender	Frequency	Percent
Male	17	51.5
Female	16	48.5
Total	33	100.0

Table 9. Distribution of patients by age group.

Age	Frequency	Percentage
<12	12	36.4
12 to 24	15	45.5
>24	6	18.2
Total	33	100.0

Table 10. Distribution of cases according to clinical signs.

Clinical signs	Frequency	Pourcentage
Fever		
Yes	18	54.5
No	15	45.5
Asthenia		
Yes	1	3.0
No	32	97.0
Vomitting		
Yes	2	6.1
No	31	93.9
Anorexia		
Yes	5	15.2
No	28	84.8

Table 11. Distribution of respondents according to age group.

Age group	Frequency	Percentage
<12	1 25.0	1 25.0
12 to 24	1 25.0	1 25.0
>24	2 50.0	2 50.0
Total	100.0	100.0

Table 12. Distribution of respondents according to the month of occurrence.

Month	Frequency	Percent
January	1	25.0
March	3	75.0
Total	4	100.0

Table 13. Distribution of patients according to clinical signs.

Clinical signs	Frequency	Pourcentage
Fever		
Yes	4	100.0
No	0	0.0
Asthenia		
Yes	2	50.0
No	2	50.0
Rashes		
Yes	3	75.0
No	1	25.0
Anorexia		
Yes	0	0.0
No	4	100.0

Table 14. Cost of coverage by disease category.

MALARIA	AVERAGE COST	F	SIGNIFICATION
CHRINA	96431.0 (60.2$)	3.858	**0.023***
KAMALONDO GENERAL REFERRAL HOSPITAL	110466.7 (69$)		
KATUBA GENERAL REFERRAL HOSPITAL	124097.1 (77.6$)		
TYPHOID FEVER			
CHRINA	77766.7 (48.6$)		
HGR KAMALONDO	94,291.7 (58.9$)		
HGR KATUBA	85638.9 (53.6$)	2.481	0.09
ACUTE RESPIRATORY INFECTIONS			
CHRINA	64846.2 (40.5$)	3.528	**0.042***
KAMALONDO GENERAL REFERENCE HOSPITAL	83285.7 (52.0$)		
KATUBA GENERAL REFERENCE HOSPITAL	55730.8 (34.8$)		
MEASLES		7.157	0.256
CHRINA	138000 (86.3$)		
KAMALONDO GENERAL REFERENCE HOSPITAL	150000 (93.8$)		
KATUBA GENERAL REFERENCE HOSPITAL	61500 (38.4$)		

*: Significant.

There is also a difference in the direct cost of care for acute respiratory infections. The Kamalondo General Referral Hospital was expensive ($52.0) than the other two structures (F > 1, P < 0.0.005).

There is no difference in the cost of care between the three hospitals for the management of measles and typhoid fever (F > 1, P > 0.0.005).

4. Discussion

4.1. Malaria

Sex

Concerning malaria, the sex most affected is the male sex with 47 cases (53.4%) against the female sex. Our results are similar to those found by Mutombo et al. in a study conducted in Sendwe in 2016 where out of 452 cases of severe malaria in children aged 0 to 5 years, 53.54% were male [6].

In Cameroon, a study carried out in a general pediatric ward reveals that boys are as affected as girls [7]. The predominance of the male sex has also been observed at the Brazzaville University Teaching Hospital by OKOKO which shows that out of 4762 hospitalized children, 232% or 60.7% were male against 150 girls (39.3%) [8].

Age

The most affected age group is 12 to 24 months with 42.0% (**Table 2**), with an average age of 27.5 months (17.3); a minimum age of 5 months and a maximum age of 60 months. Our numbers differ from those in Likasi where the ages of the children most affected by severe malaria were between 2 and 3 years old [6].

Duration of stay

Our results show that the most frequent length of stay is greater than or equal to 5 days with (95.5%) an average duration of 2.3 days and a maximum duration of 9 days.

These results do not corroborate those found by Matondo at the Kenya General Reference Hospital in Lubumbashi, [9] where the average length of stay was 3.4 ± 1.8 with a minimum of 1 and a maximum of 23 days then. that OKOKO found that in Brazzaville, the average length of hospital stay at the CHU was 2.2 days with a high number of children having stayed between 1 and 5 days for severe malaria [8].

These results corroborate those found by Matondo at the Kenya General Reference Hospital in Lubumbashi, [9] where the average length of stay was 3.4 ± 1.8 with a minimum of 1 and a maximum of 23 days while OKOKO found that in Brazzaville, the average length of hospital stay at the CHU was 2.2 days with a high number of children having stayed between 1 and 5 days for severe malaria [8].

Mode of admission

Most of the patients (73.9%) were admitted without referral to the different structures. Our results are similar to those of Burkina, where 88.3% of children suffering from severe malaria had resorted to self-medication [10].

Month of occurrence

The month that recorded more cases of malaria is the month of January with 55 cases (62.5%), followed by that of February 23 cases (26.1%) and finally the month of March 10 cases (11.4 %). Our results do not come close to those found at the Kenya General Reference Hospital where, MATONDO [9] found that there were several cases of severe malaria in January, *i.e.* 31.6 %, but are different from those found by Mutombo in Likasi, where the months of April and May recorded more admissions than the others with 16.6% [11].

Clinical signs

We observe that Fever is the most frequent clinical sign with 70 cases (79.5%). Our results corroborate those of Matondo at HGR Kenya where fevers were the main cause of admission to HGR Kenya for severe malaria in 63.8% of cases, followed by chills at 17.7%.

Seizures were present in 9.9% of cases and decreased consciousness in 9.5%. This finding seems to be unanimous among many authors [6] [12].

Overage costs

The average cost of treating malaria at Chrina Medical Center were $60.2, it were $69 at Kamalondo General Referral Hospital and $77.6 at Katuba General Referral Hospital.

In Bamako Mali, the treatment of malaria in children under 5 in the seven public health facilities in the commune of Boukombé will have cost a total of 14,635,411 FCFA in 18 months [13].

A study carried out in 2014 in the Rural Health Zone of Miti-Murhesa resulting from the division of the former Katana Health Zone (operational since 2005), the highest direct cost for the treatment of malaria is hospitalization with an average of 10.7 ± 5$ followed by that of the consultation with an average of 1.7 ± 1.3$ [14].

For our study, these different costs were influenced by the different health structures (F3, 9; P-value 0.023).

4.2. Thyphoid Fever

The prevalence of measles was 38.4%. This result is different from that of Cameroon where an epidemiological survey found a prevalence of 8.8% [15].

Gender and age

Our results show that the male sex was the most affected by typhoid fever with 41 cases (52.6%). The most affected age group is over 24 months (51.3%). With an average age of 29.2 months (15.9) a minimum age of 3 months and a maximum age of 60 months. In Antananarivo in Madagascar, the sex distribution of typhoid fever among 1680 children hospitalized in the department gives 47.8% of men against 52.2% while the 5 to 10 group was in the majority with 47.8%, or nearly half of the population studied. [16]. These results diverge from ours.

Overage cost

The costs of treating typhoid fever in the three health structures concerned by our study were distributed as follows: $48.6 for Chrina, $58.9 for the HGR Ka-

malondo and $53.6 for the HGR Katuba. These costs were really different in the three health structures (F: 2.481. P = 0.0090).

4.3. Acute Respiratory Infections

Gender and Age

Acute respiratory infections have been found much more in male children (51.5%) against 48.5% in females. Children aged 12 to 24 months were the most affected age group (45.5%). With an average age of 17.2 months; a Standard Deviation of 13.9; a minimum age of 3 months and a maximum age of 54 months. In Mali, a study carried out in five health districts on acute respiratory infections in children under 5 years old indicates that the age group 12 to 59 months was the most represented (78.7%).

Girls represented 50.13% of children surveyed with a sex ratio of 1.005 in favor of girls [17]. These results are different from ours. Over 949 admissions during a study conducted in Mali, the disease frequency was 24.8% and the mean age 9.1 ± 14.8 months [18].

Kabamba also reported a predominance of the male at the University Clinics of Lubumbashi/DR Congo [19].

Acute respiratory infections occurred much more in the month of February with 18 cases (54.4%). According to KABAMBA, the monthly distribution peaks in March and October. [19] The heavy rainfall in February would explain the peak during our study period.

Clinical signs

Fever was more common among cases of Acute Respiratory Infections, 18 cases (54.5%).

In Benin [18], the clinical symptomatology associated with ARIs was cough (p = 0.0001), vomiting (p = 0.0041), diarrhoea (p = 0.0180) and convulsions (p = 0.0064).

4.4. Measles

Age

The female sex was the most affected by Measles (75.0%). The most dominant age group was the one under 24 months who had 50% of measles cases. With an average age of 29 months, a Standard Deviation of 17.1; a minimum age of 8 months and a maximum age of 48 months. In Benin, out of 236 cases of Acute Respiratory Infections 135 (57.2%) were male and 101 (42.8%) female girls with a mean age of 19.1 ± 14.8 months [18].

Month of occurrence

In the three months that made up our study period, March had a high number of cases (75.0%) of Measles and 25.0% in January. In the tropics, transmission increases at the end of the rainy season and intensifies throughout the dry season [20]. These results are similar to those found in Niger where an increase in cases was observed in March [21].

The measles epidemic in Niamey began in November 2003 (defined by a sharp increase in the number of cases reported over a 3-weeks period), with the most significant cases reported in March 2004. The epidemic began to weaken at the end of April 2004.

Clinical signs

In relation to clinical signs, our results show that all patients (100.0%) presented with fever, 75.0% presented with rashes and only 50.0% presented with physical asthenia. Our results are similar to those of the study carried out by Boushab on 36 cases of measles in the emergency department of the regional hospital of Aioun in Mauritania where fever and rashes were also characteristic signs [22]. Results are different from those found by Peuni in Ouagadougou where eye and skin disorders were the main signs observed in children under five [23].

Support cost

In Chrina, the average cost of care was $86.3, in Kampemba $93.8 while at HGR Katuba it was $38.4. These costs are statistically linked to these three health facilities (F = 7, 1 and P = 0.256).

5. Conclusions

We carried out a cross-sectional study on diseases with weekly notification in three hospitals in Lubumbashi, one private hospital and two general referral hospitals, namely: Chrina Hospital, Kamalondo General Referral Hospital and the General Hospital of Katuba reference.

We have identified 203 cases including malaria (88 cases), typhoid fever (78 cases), acute respiratory infections (33 cases) as well as measles (4 cases). The death rate was 1.9% overall and the costs of care were statistically influenced by the health facilities.

There is an urgent need for health education to inform and educate the population on individual and collective hygiene measures as well as the risks related to the immediate environment, in particular the lack of access to drinking water, sanitation, decent housing and a healthy living environment is among the factors behind the poor health of children under five in developing countries.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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