

Morbidity and Mortality of Inpatients in the Department of Infectious Diseases of the University Hospital of Bobo-Dioulasso, Burkina Faso

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Abstract

Background: Infectious Diseases are responsible for nearly 17 million annual deaths worldwide. Burkina Faso, like the majority of poor countries, remains vulnerable to infectious diseases. The objective of the present study was to analyze the profile of inpatients, including the mortality and causes of death, in the Infectious Diseases Department of Sourou Sanou teaching hospital (Bobo-Dioulasso, Burkina Faso). **Methods:** We carried out a cross-sectional study based on medical records of all inpatients from 2011 to 2015. **Results:** We included 1169 patients. The gender ratio was 0.8. The age group 30 to 39 was more represented (30.2%) as well as housewives and farmers (73.7%). Over one-thirds of the patients (35.3%) were consulted within an average of 7 days. The most common reason for consultation was fever (65.1%). Around 62.0% of inpatients were infected by the Human Immunodeficiency Virus (HIV). Digestive diseases ranked first (21.8%) followed by nervous system disorders (19.4%) and tuberculosis (17.8%). Overall morbidity rate was 31.3%. About 42% were admitted to the emergency ward while 83.3% already arrived with poor health condition. And 82.1% of deaths occurred on pathological grounds of which 66.7% were related to HIV. Main causes of death included

nervous system diseases (28.6%), tuberculosis (21.9%) and gastrointestinal diseases (18.3%). **Conclusion:** Infectious diseases remain a major public health issue. Further efforts are needed to improve their management in Burkina Faso.

Keywords

Morbidity, Mortality, Infectious Diseases, Causes of Deaths, Burkina Faso

1. Introduction

In 2016, infectious diseases represented 27.8% of deaths in developing countries against 1.8% in industrialized countries [1]. These diseases remain more lethal in countries like Burkina Faso. In Burkina Faso, the final report of multisectorial survey a high morbidity level in 2014 with 10% [2], mainly caused by infectious diseases. These diseases are therefore a crucial issue despite the various strategies to control them (immunization campaigns, communication for continuous behaviour change, and provision of insecticide-treated mosquito nets). In the absence of an infectious diseases department in Bobo-Dioulasso, morbidity and mortality studies carried out in Burkina Faso in internal medicine departments have shown a significant weight of infectious diseases [3] [4] [5]. The infectious diseases department of Sourou Sanou teaching hospital (Centre Hospitalier Universitaire Sourou Sanou, CHUSS, in French) has been created in 2009. It has quickly turned into a reference centre for suspected or confirmed cases of infection-related diseases in the area. Yet, no morbidity-mortality study has been carried out for pathologies as a whole. The various studies carried out in other countries showed a high proportion of HIV inpatients in infectious diseases departments [6] [7]. The objective of the study was to describe their epidemiological, clinical, and progressive aspects within the Infectious Diseases' department of CHUSS in Bobo-Dioulasso from 1st January 2011 to 31st December 2015.

2. Methods

This is a cross-sectional retrospective study focusing on a review of records of all patients admitted in the infectious diseases department during the study period, *i.e.* from 1st January 2011 to 31st December 2015. Patients covered were of at least 15 years old, both male and female consulted in the infectious diseases department of the Sourou Sanou University Hospital. A questionnaire was designed and the following information on patients was collected: age, sex, occupation, residence area, method of admission, time limit for consultation, and length of stay in hospital, main and/or secondary diagnosis noted, treatment administered and progress achieved by the patient. The main diagnoses have been grouped into diseases of the various organs. The main diagnosis was the diagnosis when exiting the patient or the diagnosis which motivated the hospitalization. The secondary diagnosis was any associated condition discovered during hospitaliza-

tion that required or was not required for therapeutic intervention. Without the autopsy results, the principal diagnosis was considered as the cause of the death. The data were collected as part of routine care. The collection forms were anonymous in order to ensure the protection of the patient identity during the study and during the results dissemination.

Data were processed using Epi-data software and analysed by 12.0 stata version software. The characteristics of the study population were described by their numbers and percentages for the qualitative variables, and by the means for the quantitative variables. The proportions comparison was made using Chi-square test. All statistic tests were fit for a significance level of p-value less than 5%.

3. Results

3.1. Characteristics of the Study Population

During the study period, 1234 admissions were registered. We included 1169 medical files representing 94.7%, met the inclusion criteria. Incomplete and non-informative medical files represented 5.3% of the cases.

The percentage of admissions in 2013, 2011, 2015 and 2012 was respectively 21.6%, 21.3%, 19.2% and 12.5% with an increase (25.4%) in 2014. The average age was 40.95 ± 13.8 years with extremes of 15 to 95 years. The most represented age group was [30 - 39 years] (**Table 1**). The sex ratio was 0.8. Most patients were housewives with a total of 531 (45.5%) (**Table 1**). Monogamous and polygamous couples were the most represented with 57.4% and 16.8% respectively followed by singles (16%) (**Table 1**). More than half of the patients (60%) lived in urban area.

3.2. Clinical Aspects

For medical histories, most of our patients (90.4%) had never been hospitalized before. Only 9.6% of patients had a hospitalization history with over half (55.3%) HIV positive related cases. Half of them (48.9%) had an opportunistic infection history.

The most common reason for consultation was fever (65.1%) followed by vomiting (37.4%), asthenia (37.1%), and deterioration of the general health condition (32%), coughing (29.5%), and diarrhoea (25.32%).

The average consultation time was 22.18 days \pm 29.29 days with extremes varying from 1 to 250 days. The median time was 14 days with a 29.29-day standard deviation.

The majority of patients came from the emergency department (40.98%), 36% were referred from another health facility; 21% of the consultation and 2% transferred from another department of the hospital. The majority of patients, 70.06%, had been received in poor general condition and 28.4% had a fairly good general condition. Only 1.54% of patients had a good general condition at admission.

For syndromes and clinical signs, infectious syndrome was most common in 61.8% cases followed by anaemia syndrome (48.6%). Almost one-thirds of the

Table 1. Socio demographic characteristics of inpatients between 2011 and 2015 at the Department of Infectious Diseases, in Souro Sanou University Hospital, Bobo-Dioulasso, Burkina Faso.

Characteristics	Number	Percentage
Age group (years)		
[15 - 19]	53	4.5
[20 - 29]	178	15.2
[30 - 39]	353	30.2
[40 - 49]	291	24.9
[50 - 60]	171	15.1
>60	118	10.1
Gender		
Female	654	55.9
Male	515	44.1
Matrimonial situation		
In couple	868	74.2
Single	187	16
Widower	99	8.5
Divorced	15	1.3
Profession		
Employees	104	8.9
Private	60	5.1
Farmers	330	28.2
Housewives	531	45.5
Others*	144	12.3

*Others: shopkeepers (71), students (17), butchers (6), retired (10), laborers (2), bricklayers (8), unemployed (11), carpenters (5), gold digger (7), car drivers (7).

patients (30.7%) were dehydrated, 27.8% had a pulmonary condensation syndrome, and 26% had a thrush.

Only one major diagnosis was noted for consulting patients. The main diagnoses have been grouped into diseases of the various organs (**Table 2**). On the overall study population, most diseases relate to diseases of the digestive system (21.8%), followed by diseases of the nervous system (19.4%), and respiratory diseases (19.2%). In HIV positive (HIV+) patients, diseases of the digestive system were the most frequent ones with 27.8% cases followed by other diseases of the respiratory system (23.9%) and diseases of the nervous system (14.8%). Whereas in HIV-patients, the most frequent disorders included nervous system diseases (27.11%) followed by severe malaria which was different from the neurological form (14.35%), and diseases of the digestive system (11.8%).

The most common main disease were gastroenteritis (15.7%), bacterial pneumonia

Table 2. Distribution of patients according to pathological entities and HIV serological status of inpatients between 2011 and 2015 at the Department of Infectious Diseases, in Sourou Sanou University Hospital, Bobo-Dioulasso, Burkina Faso.

Pathologies entities	HIV positive n = 730 (%)	HIV negative n = 439 (%)	Total n = 1169 (%)
Diseases of the digestive system	203 (27.8)	52 (11.8)	255 (21.8)
Tuberculosis*	91 (12.5)	42 (9.6)	133 (11.4)
Diseases of the respiratory system	175 (24)	50 (11.4)	225 (19.2)
Diseases of the nervous system	108 (14.8)	119 (27.1)	227 (19.4)
Ill-defined morbid conditions	43 (5.9)	13 (3)	56 (4.8)
Severe malaria	29 (4)	63 (14.4)	92 (7.9)
Diseases of the urogenital system	21 (2.9)	9 (2.)	30 (2.6)
Disseminated infections	17 (2.3)	42 (10)	59 (5)
Iatrogenic anaemia	16 (2.2)	0	16 (1.4)
Skin diseases	11 (1.5)	12 (2.7)	23 (2)
Tumour disorders	7 (1)	1 (0.3)	8 (0.7)
Others**	9 (1.2)	36 (8.2)	45 (3.8)

*concerns tuberculosis other than pulmonary tuberculosis; **envenomation by snake bite, measles.

(13.5%) and tuberculosis (12.9%) (Table 3). Concerning tuberculosis infection, multifocal tuberculosis was the main clinical form and representing of 36.50%. Among the extra-pulmonary forms of tuberculosis, the most clinical form was lymph node with 33.30% of the cases. The most frequent locations in multifocal tuberculosis were pulmonary (75.0%), and pleurisy (28.60%). The main secondary diagnoses were malaria (7.90%), disseminated infections (5.0%), and urinary infection (2.6%).

3.3. Biological Aspects

Complete blood cells account was the most conducted biological examination (97.7%) followed by blood sugar, creatinine examination, and azotemia with 95.80% each. HIV serology was conducted for 40.5% of patients admitted mainly those whose serological status was unknown or negative prior to admission. Few patients, 143 out of the 730 HIV infected patients had their lymphocyte T CD4 rate available representing an achievement rate of 19.6%. The average CD4 rate was 133.96 cells/ μ l of blood \pm 166.78 cells/ μ l of blood with extreme percentages varying from 1 to 864. The cysto-bacteriological examination of Cerebrospinal fluid was carried out in 13.3% of patients. Faeces parasitological examination was carried out in 8.9% of patients. The most frequently encountered germs are yeasts (25.8%), *Blastocystis* (16.5%), *Amoebae* (8.3%), and leukocytes (8.3%). Cytobacteriological exam of the urine was carried out in 7.9% of patients. The most frequently isolated germ was *Escherichia coli* (61.4%); other encountered germs were *Klebsiella pneumoniae* (11.4%) and *Candida albicans* (4.5%). Blood

Table 3. Main diseases among the 1169 inpatients between 2011 and 2015 at the Department of Infectious Diseases, in Souro Sanou University Hospital, Bobo-Dioulasso, Burkina Faso.

Diagnoses	Number	Percentage
Tuberculosis	151	12.9
Gastroenteritis	184	15.7
Bacterial pneumonia	158	13.5
Oral and oesophageal candidiasis	55	4.7
Bacterial meningitis	136	11.6
Anaemia from undetermined aetiology	16	1.4
Cerebral toxoplasmosis	30	2.5
Severe malaria	92	7.9
Iatrogenic anaemia	16	1.3
Septicaemia	40	3.4
Stroke	22	1.9
Viral encephalitis	12	1.0
Hepatic abscess	11	0.9
Cryptococcal meningitis	8	0.7
Urinary infection	15	1.3
Typhoid fever	15	1.3
Drug-induced dermatitis	6	0.5
Others conditions*	202	17.5

*others conditions = misbranded fever (7), Chronic kidney disease (11), Acute Kidney disease (10), Kaposi disease (4), cerebral abscess (4), cardiac disease (2), cirrhosis (5), anemic heart (2), erysipelas (2), cervical neoplasia (2), pellagra (2), primary liver cancer (1), vasoocclusive crisis (1), hepatonephritis (1), herpes (1), acute renal failure (1), cutaneous leishmaniasis (2), lymphangitis (1), tetanus (1), ophthalmic shingles (1), endophthalmitis (1), Progressive multifocal leukoencephalopathy (3).

culture was carried out in only 3.8% of patients. Germs encountered included *Escherichia coli* (*E. coli*), Group D streptococcus, and *Salmonella* spp.

3.4. Therapeutic Aspects

The majority of patients, 89.13% had received antibiotics as treatment (**Figure 1**). The most commonly used antibiotics were ceftriaxone (56.14%), cotrimoxazole (20.44%), ciprofloxacin (19.38) and amoxicillin clavulanic acid (14.49%). The most used antiparasitic agents were metronidazole (50%), albendazole (35.63%) and quinine (20.18%). Fluconazole was the most used antimycotic (81.59%).

3.5. Evolving Aspects

The average length of hospital stay for patients was 12.4 days \pm 9.5 with extremes varying from 0 to 84 days. The average stay in the medical emergency ward was 1 day \pm 2 with extremes varying from 0 to 27 days. On a total of 1169 patients 56.3% were cured before leaving hospital whereas, 31.3% died, 8.3% left against

medical advice. 2013 and 2015 registered the highest mortality rates respectively with 35.2% and 33.9% followed by 2012 (31.5%), 2014 (30%), and 2011 (26.5%). Mortality rates were even higher in February (42.5%), November (36.5%), and June (34.7%) (**Figure 2**).

The deaths recorded were distributed as follow, 53.3% corresponding to 195 women, and 46.7% corresponding to 171 men.

Most deceased patients lived in couple: monogamous couples represented 56.29% and polygamous ones 20.2%. Over half of the deceased patients have no income generating activity (57.9%). Mortality among patients with no income generating activity (31.5%) was higher than among those with an income generating activity (40%), but the difference is not statistically significant. Patients in a general poor health condition represented 83.3% of the overall death rate against 16.7% in a general good health condition when they were admitted. The proportion

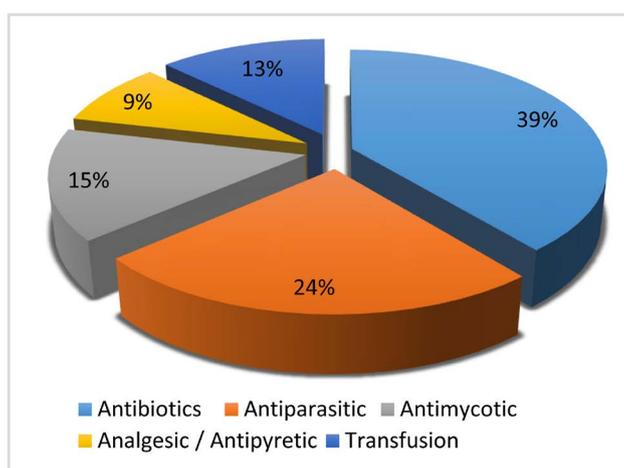


Figure 1. Proportion of medications received in hospital among the 1169 inpatients between 2011 and 2015 at the Department of Infectious Diseases, in Sourou Sanou University Hospital, Bobo-Dioulasso, Burkina Faso.

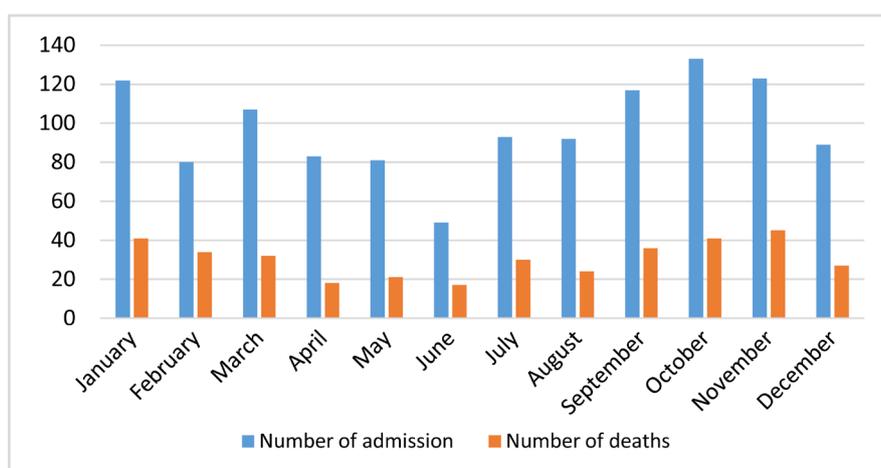


Figure 2. Distribution of mortality according to months for inpatients between 2011 and 2015 at the Department of Infectious Diseases, in Sourou Sanou University Hospital, Bobo-Dioulasso, Burkina Faso.

of deaths was significantly higher among patients in a poor clinical condition prior to admission (37.2%). Over half of the patients (59.3%) died during on-call duty. Death rates recorded were respectively 22.4% in the morning and 18.3% on permanency time. Mortality significantly differs depending on pathological entities ($p < 0.001$) (**Table 4**). Pathologies with the highest mortality rates included nervous system disorders (28.9%), tuberculosis (21.8%), and diseases of the digestive system (18.3%) (**Table 4**).

4. Discussion

Like any cross-sectional studies based on retrospective recruitment, information bias due to incomplete items in report forms should be noted. However, the data collected need to be discussed and commented.

The 40-year-old average in our study could be justified by the large-based structure of the population pyramid in Burkina Faso, which is predominantly young. Also the most active groups of the population are challenged by some factors like prostitution, sexual vagrancy, and drug abuse, making them more vulnerable. This result is different in most studies where a predominance of men was noted [3] [4] [5] [6]. However, our results can be compared to those of Mali whose study targeted most women (55.6%) [7]. This can be explained by the fact that in our city, with mother-child transmission prevention programmes, women are mostly HIV screened and followed up.

The distribution of patients by occupation was similar to that of Drabo *et al.* [5] in which 75% of the patients were housewives, farmers, pastoralists, informal sector workers, schoolchildren and retirees, and “unprofessional”. Our results

Table 4. Distribution of mortality and lethality according to pathological entities for in-patients between 2011 and 2015 at the Department of Infectious Diseases, in Sourou Sanou University Hospital, Bobo-Dioulasso, Burkina Faso.

Pathologies	Admission n (%)	Deaths	Mortality rates %	Lethality rates %
Diseases of the nervous system	227 (19.44)	106	28.9	46.7
Tuberculosis	208 (17.8)	80	21.9	38.5
Diseases of the digestive system	255 (21.8)	67	18.3	26.3
Diseases of the respiratory system	225 (19.2)	62	16.9	27.6
Ill-defined morbid conditions	56 (4.8)	21	5.7	37.5
Disseminated infections	59 (5)	20	5.5	33.9
Diseases of the urogenital system	30 (2.6)	12	3.3	40
Severe malaria	92 (7.9)	09	2.5	9.8
Skin diseases	23 (2)	06	1.7	26.0
Iatrogenic anaemia	16 (1.4)	00	00	00
Tumour disorders	8 (0.7)	04	1.1	50
Others	45 (3.8)	12	3.3	26.6

were also comparable to those of Lengane *et al.* [8] in Bobo-Dioulasso, where the majority of patients (74.31%) were of low socioeconomic status. The low literacy rate and the importance of farmers and housewives in the population of Burkina Faso could partly explain this result.

In city hospitals, nearly 40% of patients live in rural areas [4] [8] [9]. This could be justified by the inadequacy of the technical platform in rural areas and the presence of reference structures at the level of large cities.

The consultation time in our study is lower than that of Déguénonovo *et al.* [10], who found an average consultation time of 40 ± 57 days. In our context, the delay in consultation could be explained by the use of traditional first-line therapy, the inadequacy of financial resources, and care in health care facilities only taking the last place.

The most common reason for consultation is below the findings from Gabon [11] in which fever accounts for (82%), loss of weight (75.6%), coughing (26.6%), and diarrhoea (16.3%). HIV infection was the most common in the study of Ouedraogo *et al.* [3] from Burkina Faso and below that of Kra *et al.* [6] from Côte d'Ivoire and from Mali [7].

HIV infection remains the morbidity features in Sub-Saharan countries including Burkina Faso. Our results were below that of Ouedraogo *et al.* [3] in which digestive diseases and diseases of the nervous system ranked 2nd and 3rd with respectively 19.5% and 18.07%.

As far as Kyelem *et al.* [4] was concerned, tuberculosis was the first opportunistic disease (31.4%). The mortality rates of our study matches that of Ouedraogo *et al.* [3] who indicated 53.9% for recovery rates against 33.3% for mortality rates. Lengane *et al.* [8] indicated a 34.7% mortality rate. The high rates in mortality stem from patients consulting in advanced stages of illness, lack of reanimation ward in the emergency service, insufficient health staff, poor technical equipment, and incompetency of some health workers. Lengane *et al.* [8] and Bah *et al.* [9] also noted over 60% of deaths during on-call duty. This could be due to the lack of health workers on-call duty thus reducing patients' follow-up, the emergency actions to perform and the quality of treatments.

Drabo *et al.* [5] noted that diseases of the nervous system (40.7%) represent the first cause of death. According to Lengane *et al.* [8], diseases of the nervous system ranked 3rd (16.4%) in terms of mortality whereas Sore [4] ranked second with 20.9% cases.

The high mortality rate can be explained by the fact that patients consult at advanced stages of the disease, the absence of a reanimation unit in the infectious diseases department, the deficiency in quality and number of staff of health, the inadequacy of technical equipment, the incompetence of some health workers and the lack/non-use of care protocols. The high mortality of young adults is probably related to the high mortality of HIV/AIDS. Mortality, however, remained high in subjects over 60 years of age. This could be explained by the great fragility of these patients requiring special attention in their care.

For early mortality, Bah *et al.* [9] found 45.4% in less than five days of hospitalization, Drabo *et al.* [5] found 80.8% of deaths in less than 10 days of hospitalization. This early mortality could be explained by the seriousness of the pathologies, the delay in consultation, the poverty of the patients, the modestness of the effective means of resuscitation, the absence of emergency kits and also the references of riddance, the absence of emergency, the lack of intensive care unit in the emergency room, the difficulty of transferring patients to intensive care. The deaths of patients occurred most often during the hours of care as mentioned in several other studies [4] [5]. This situation could be explained by the insufficient number of health workers during the care, thus limiting the supervision of the patients, the emergency acts to be carried out and also the quality of the care and the difficulties encountered by the accompanying persons of the patients to obtain the products. A study on the quality of care during care could shed more light on this problem. Tuberculosis-related mortality could be explained by the resurgence of tuberculosis with the advent of HIV. The place of tuberculosis as the leading cause of death by opportunistic infections has been reported by Kra *et al.* [6]. In Burkina Faso the prevalence of HIV among new TB patients all forms being 20% in 2009 [2]. In 2017, the prevalence of HIV was 0.8% in Burkina Faso with 94,000 people living with HIV according to UNAIDS estimates [12] this means that HIV-TB co-infection remains a real public health problem for our people. The lethality of poorly labeled fevers was also important in other studies [4] [5]. This mortality would result from the weakness of the technical platform which did not always allow certain diagnostic tests to be carried out.

From 2011 to 2015, gastroenteritis (15.7%) was the leading cause of hospitalization at the department of infectious disease in Souro Sanou University Hospital. This is due to the fact that in our developing countries water-related diseases represent a real public health problem [13] [14]. The lack of drinking water and sanitation [15], as well as the low level of education of our populations, are the main causes. In addition, antibiotic resistance is becoming more and more frequent [16] [17].

Limitations of the study: our study by its retrospective nature presented limits and constraints. Among other things, we had, the incompleteness related to the incomplete information of certain items of medical files, the insufficiency of the technical platform which limited the investigations to have precise diagnoses, for a diagnostic purpose, the loss of some files related to natural nuisance and lack of organized archiving but also the bad practice of users. No autopsy was done to determine the exact cause of death. To overcome these limitations, 65 medical records were excluded from our study. We conducted a second “search” of files to complete missing items. Some diagnoses have been readjusted according to the different signs, syndromes and paraclinical examination data by the service physicians. The main diagnoses were retained as cause of death for the deceased patients.

5. Conclusion

In developed countries, scientific progress has led to a dramatic decline in morbidity and mortality due to infectious diseases. In developing countries such as Burkina Faso, considerable resources have been mobilized to fight infectious diseases. In particular, the implementation of the activities of the communicable disease control program and the creation of several health infrastructures have been carried out. However, in this study HIV infection remains a major cause of death. Late consultations, exposure to multiple potentially opportunistic pathogens in the tropical environment could be implicated. Efforts are needed in terms of communication for continuous behavior change for the early detection and early management of infectious diseases.

Conflicts of Interest

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

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