

Research Article

Epidemiology of Febrile Illnesses in Three Hospitals in Southern Benin

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Abstract

Background: Fever remains one of the most frequent reasons for medical consultation. In low and middle resource settings, particularly in Benin, it is often presumed to be of infectious origin—most commonly malaria—due to the endemicity of the parasite. However, the gradual decline in malaria prevalence and the growing diversity of potential etiologies warrant a re-evaluation of the epidemiological profile of febrile illnesses in this context. This study aimed to describe the epidemiology of febrile illnesses in three hospitals located in southern Benin. **Methods:** A prospective descriptive study was conducted from October 9, 2023, to January 15, 2024, in the pediatric, internal medicine, and emergency departments of the National University Hospital Centre Hubert Koutoukou Maga (CNHU-HKM) in Cotonou, the Abomey-Calavi District Hospital, and the Ouidah District Hospital. The study included patients 308 presenting with fever upon admission or developing fever during hospitalization, defined as a temperature $\geq 38^{\circ}\text{C}$ in individuals under 18 years and $\geq 37.6^{\circ}\text{C}$ in those aged 18 years and older. For each participant, detailed interviews and complete clinical examinations were performed to collect sociodemographic and clinical data. Relevant laboratory findings were extracted from medical records. **Results:** A total of 308 febrile patients were enrolled. Males were predominant (54.22%), and the most represented age group was 31–40 years. The most common functional symptoms were asthenia (73.05%), anorexia (56.16%), and headache (51.30%). Neurological manifestations were the most frequent (38.69%), followed by pleuropulmonary (21.10%) and cutaneous signs (17.86%). Anemia was observed in 40.91% of patients, while leukocytosis occurred in 30.19%. Infectious diseases accounted for 79.22% of identified etiologies, dominated by malaria (50%), followed by bacterial infections. Acute cerebrovascular accidents were the leading non-infectious causes (5.84%). The main treatments included antimalarial and antibiotic therapies. The outcome was favorable in 78.57% of cases, while the case fatality rate was 10.06%. **Conclusion:** In southern Benin, fever remains predominantly of infectious origin, with malaria still representing the leading cause. However, the increasing proportion of bacterial and neurological etiologies highlights the need to strengthen diagnostic capacities for more accurate and effective management of febrile illnesses.

Keywords

Febrile Illness, Infection, Malaria, Benin

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1. Introduction

Fever remains a common clinical symptom reflecting the body's response to an aggression, most often of infectious origin. In sub-Saharan Africa, where the burden of communicable diseases remains high, febrile illnesses constitute a major cause of outpatient visits and hospital admissions [1, 7]. For a long time, malaria—caused by *Plasmodium falciparum*—was considered the predominant etiology, leading to systematic presumptive treatment before the introduction of rapid diagnostic tests (RDTs).

Since the World Health Organization (WHO) recommended in 2010 the systematic use of RDTs to confirm malaria diagnosis [1, 2], many cases previously attributed to malaria have been identified as non-malarial, underscoring the importance of a broader diagnostic approach [3, 4].

In Benin, the diagnostic workup of fever remains limited by the high cost of complementary laboratory investigations [5]. Similar challenges have been documented in other low-resource settings [4], where the lack of accessible diagnostics complicates patient management. The decline in malaria morbidity, due to the distribution of insecticide-treated nets, the widespread use of RDTs, and the availability of artemisinin-based combination therapies (ACTs) [6], has been accompanied by the emergence of other infectious etiologies, such as respiratory infections, septicemia, meningitis, and acute viral infections [7, 8].

The lack of knowledge regarding the current profile of non-malarial febrile illnesses poses a challenge for clinicians, leading to diagnostic uncertainty, irrational prescriptions, and worsening of infectious morbidity [9]. A better understanding of the causes of fever, their epidemiological patterns, and the most affected populations is essential to improve hospital case management. This study therefore aims to describe the epidemiology of febrile illnesses in three health facilities in southern Benin: the CNHU-HKM of Cotonou, the Abomey-Calavi District Hospital, and the Ouidah District Hospital.

2. Materials and Methods

2.1. Study and Population Area

This was a prospective descriptive study conducted from October 9, 2023, to January 15, 2024, in the pediatric, internal medicine, and emergency departments of three hospitals: the Hubert Koutoukou Maga National University Hospital Center (CNHU-HKM) in Cotonou, the Abomey-Calavi District Hospital, and the Ouidah District Hospital. These facilities were selected to ensure representativeness of the southern region of Benin, combining a top-tier national referral center (CNHU-HKM) with peripheral district hospitals covering semi-urban and rural populations.

The study included patients presenting with a febrile episode during hospitalization or admitted for fever to the emergency, internal medicine, or pediatric wards of the selected hospitals.

Inclusion criteria were: age ≥ 1 year, hospitalization in one of the targeted departments, and fever defined as $\geq 38^\circ\text{C}$ in patients under 18 years and $\geq 37.6^\circ\text{C}$ in those aged 18 years or older. Patients who did not provide informed consent were excluded.

2.2. Data Collection

Each participant underwent a detailed interview and a comprehensive physical examination to collect sociodemographic and clinical data. Laboratory and biological information were extracted from medical records.

2.3. Variables

The dependent variable was the presence of fever. Independent variables included: sociodemographic, clinical, paraclinical, physical, therapeutic and outcome data.

2.4. Data Analysis

Data were analyzed using Microsoft Excel 2019. Qualitative variables were expressed as frequencies and percentages, while quantitative variables were summarized as means $\pm$ standard deviation (SD).

2.5. Ethics

The study adhered to principles of anonymity and patient confidentiality. Participants were informed about the study objectives and data handling procedures and gave free and informed consent. Administrative authorization was obtained from the relevant authorities of the three hospitals prior to data collection.

3. Results

3.1. Sociodemographic Characteristics of the Study Population

A total of 308 patients were included in the study. The study population was predominantly male (54.22%), corresponding to 1.18 sex ratio M/F. The mean age of participants was 30 ± 18 years, with a median of 28 years and a range from 1 to 95 years. The 31–40-year age group was the most represented (31.42%) (Table 1).

Table 1. Characteristics of the study population (N= 308).

Characteristics	N (%)
Sex	
Female	141 (45.78)
Male	167 (54.22)
Age (years) (mean $\pm$ SD)	30 $\pm$ 18

3.2. Clinical and Paraclinical Characteristics of Patients

The most common medical histories were hypertension (20.13%), diabetes mellitus (7.79%), and sickle-cell disease (6.17%). Among surgical histories, digestive (6.17%) and gynecological (4.87%) conditions were the most frequent. Other medical histories (asthma, Human Immunodeficiency Virus [HIV], stroke, hepatitis, rhinitis) and surgical histories (cardiac, urological, dermatologic) were less frequent, each accounting for fewer than 5% of cases. At admission, nearly half of the patients consulted within 24 hours after the onset of symptoms. The predominant functional signs were asthenia, anorexia, and headache. The mean body temperature at admission was 38.5 °C, ranging from 37.6 °C to 40.7 °C. Tachycardia was observed in 50.6% of patients and tachypnea in 37.66%. The most frequently observed physical signs were neurological (38.9%), followed by pleuropulmonary (21.10%) and cutaneous (17.86%) manifestations.

Anemia was the most common hematological abnormality (40.91%), followed by hyperleukocytosis (30.19%). Among the etiological investigations, thick blood film and malaria rapid diagnostic test (RDT) were the most frequently performed (51.95% and 35.39%, respectively), with positivity in the majority of tested patients. Blood culture and HIV serology were positive in 3.57% of cases.

3.3. Etiology of Febrile Conditions

Infectious diseases were the leading causes of fever (79.2%), followed by acute stroke (5.8%), tumoral diseases (4.9%), and non-infectious inflammatory diseases (4.6%) (Table 2). Among the identified infectious diseases, malaria predominated (50%), followed by respiratory infections (18.5%) and digestive infections (10.7%). The most frequently isolated bacteria were *Klebsiella pneumoniae* (4.63%) and *Escherichia coli* (3.70%). Among non-bacterial pathogens, *Plasmodium falciparum* (29.63%), HIV (10.19%), and *Cryptococcus neoformans* (0.93%) were the most frequently identified.

Table 2. Etiology of febrile illnesses (N=308).

Diagnose	N (%)
Infectious diseases	244 (79.22)

Diagnose	N (%)
Malaria	154 (50.00)
Respiratory tract infections	57 (18.51)
Gastrointestinal infections	33 (10.71)
Acute stroke	18 (5.84)
Neoplastic diseases	15 (4.87)
Non-infectious inflammatory diseases	14 (4.55)

3.4. Therapeutic Management and Clinical Outcomes

The most prescribed therapeutic classes were antimalarial agents (51.6%) and antibiotics (47.7%). Among antibiotics, third-generation cephalosporins, particularly ceftriaxone, were the most commonly used (Table 3). The mean duration of hospitalization was 8.4 days, ranging from 1 to 83 days. The most frequently observed complication was respiratory distress; other complications, such as coma and neurological sequelae, occurred in less than 1% of cases. The clinical outcome was favorable in 78.57% of patients, while the case fatality rate was 10.06%, and 5.52% of patients were lost to follow-up.

Table 3. Treatment and clinical outcomes of patients (N = 308).

Treatment and clinical outcomes	N (%)
Treatment	
Antimalarial drugs	159 (51.62)
Antibiotic therapy	147 (47.73)
Others	29 (9.42)
Outcome	
Favorable	242 (78.57)
Death	31 (10.06)
Lost to follow-up	35 (11.36)

4. Discussion

The median age of the patients was 28 years (range: 1-95 years), reflecting the significant contribution of young individuals to febrile morbidity. This predominance of youth in the study population corroborates the findings of Mariko [10], who reported a median age of 30 years. This observation can be explained by the country's demographic structure characterized by a predominantly young population as well as by the increased susceptibility of children and young adults to infections in low- and middle-income countries [7].

The male predominance observed (54.22%) is consistent with data from Akelew *et al.* [8]. However, such variation may reflect the composition of hospital wards and the higher exposure of men to occupational or environmental risks in certain African contexts [12].

Regarding consultation delay, nearly half of the patients (48.70%) sought medical care within 24 hours of symptom onset. Although relatively short, this delay remains longer than that reported by Moutsinga [11] (22.7% before 24 hours). This sociodemographic behavior is critical for clinical outcomes, as delays often result in more severe presentations upon admission. These differences may reflect disparities in healthcare access, perception of illness severity, or patients' financial capacity [5]. Improving early care-seeking behavior remains a key strategy for reducing infectious complications.

The most frequent medical histories included hypertension (20.13%), diabetes mellitus (7.79%), and sickle-cell disease (6.17%). These proportions, slightly lower than those reported by Hounkonnou [5], may be explained by the diversity of hospital wards and the broader age range in our study. The notable prevalence of sickle-cell disease reflects the persistence of this genetic disorder in West Africa [13]. Meanwhile, the high rates of hypertension and diabetes illustrate the country's ongoing epidemiological transition, where non-communicable diseases now coexist with infectious pathologies.

The most frequently reported clinical symptoms were asthenia, anorexia, and headache, non-specific yet common manifestations in febrile infectious syndromes. The mean temperature (38.52 °C) is comparable to that reported by Hounkonnou [5], confirming the moderately febrile nature of most cases. From a clinical examination standpoint, neurological involvement (38.96%) was predominant, followed by pulmonary and dermatological manifestations. These findings are consistent with those of Mariko [10], although the proportions differ. The neurological signs observed may reflect the substantial contribution of infectious neuropathologies and acute cerebrovascular accidents in our cohort [14].

Anemia (40.91%) and hyperleukocytosis (30.19%) were the most frequent hematological abnormalities. These rates are lower than those reported in a previous Beninese study (54% and 36%, respectively) [5]. This discrepancy could be attributed to limited diagnostic resources and the high cost of laboratory investigations. Nonetheless, these abnormalities remain typical of systemic infections, particularly malaria and bacterial sepsis [15].

The most frequently performed biological tests were thick blood film (Giemsa-stained blood smear), rapid diagnostic test (RDT) for malaria, HIV serology, and blood culture. This pattern aligns with Hounkonnou [5], underscoring the persistent centrality of malaria in the etiological assessment of fever in African hospitals. The limited use of blood cultures reflects constraints related to access to advanced laboratories and the high cost of bacteriological investigations [5].

Infectious diseases represented the dominant etiology

(79.22%), a proportion higher than the 60% reported in a Moroccan study [16]. This finding illustrates the predominance of infectious pathologies in tropical regions, where hygiene conditions, parasite density, and immunization coverage strongly influence febrile morbidity [7]. Cerebrovascular diseases ranked second (5.84%), confirming the increasing burden of non-communicable diseases in African hospital settings.

Malaria remained the leading identified cause (50%), followed by respiratory infections (18.51%), consistent with Mariko [10]. This persistence underscores the continuing burden of malaria despite control efforts and the growing contribution of respiratory infections related to domestic and urban pollution [17]. At the microbiological level, the most frequently isolated bacteria were *Klebsiella pneumoniae* and *Escherichia coli*, followed by *Staphylococcus aureus* and *Mycobacterium tuberculosis*. These opportunistic agents are typical of severe nosocomial and community-acquired infections, as also reported by Maamar *et al.* [16]. The most frequently detected virus was HIV, followed by dengue virus and cytomegalovirus, confirming the endemic circulation of dengue in Benin despite its underdiagnosis. The predominant parasite was *Plasmodium falciparum*, consistent with Maamar [16].

Non-infectious inflammatory diseases accounted for 4.55% of cases, a rate higher than the 1.5% reported in an Ivorian study [20]. This difference may reflect diagnostic challenges due to limited access to specialized imaging and laboratory testing in many African facilities. Neoplastic diseases accounted for 4.87% of cases, slightly below the 5.9% reported by Agbodande *et al.* [18]. These findings highlight the growing recognition of cancer cases in African hospitals, likely due to improved diagnostic capabilities and increased public awareness.

Regarding therapeutic variables, more than half of the patients (51.62%) received antimalarial treatment, and 47.73% were treated with antibiotics. These rates are similar to those reported in a Burkinabe study [19], reflecting the frequent use of combined therapies in a syndromic diagnostic context. However, the empirical use of antibiotics remains a concern, exposing populations to the heightened risk of antimicrobial resistance [9].

In terms of outcome data, results were favorable in most cases (78.57%), but the case fatality rate reached 10.06%, mainly associated with infectious diseases and acute strokes. African studies have reported fatality rates of 12.53% for cancers [5] and 8% for infectious diseases [16]. These discrepancies may reflect differences in case mix and disparities in access to intensive care, particularly given that some patients were managed in internal medicine wards where oncologic cases are also handled.

5. Conclusion

Fever poses a genuine diagnostic challenge for clinicians

due to its broad etiological spectrum. Infectious diseases remain the principal cause of febrile conditions, with malaria leading the list. The associated mortality is non-negligible, underscoring the need to strengthen early management of febrile syndromes in Africa and to develop more efficient diagnostic capacities to improve survival outcomes.

Abbreviations

ACTs	Artemisinin-based Combination Therapies
CNHU-HKM	National University Hospital Centre Hubert Koutoukou Maga
HIV / AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
NMCP	National Malaria Control Programme
RDTs	Rapid Diagnostic Tests
SD	Standard Deviation
WHO	World Health Organization

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Author Contributions

Padonou Setondji Geraud Romeo: Conceptualization, Formal Analysis, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing

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Conflicts of Interest

The authors declare no conflict of interest.

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