

Dengue Seroprevalence in the Community Setting of Sikasso (Mali)

TRAORE Madou¹
DOUMBIA Sekou²
BAH Nafissatou²
GOITA Drissa³
Luka DIARRA²
DEMBELE M¹
Drissa DEMBELE²
KEITA Bakary S⁴
KONATE Issa⁵
DIARRA Ousmane⁶

¹Infectious and Tropical Diseases Department, Sikasso Hospital, Mali.
²Laboratory Service Blood Bank, Sikasso Hospital, Mali
³Department of Medicine, University Hospital Center "Mother Child" Luxembourg of Bamako, Mali
⁴National Institute of Public Health, Bamako, Mali
⁵Department of Infectious and Tropical Diseases, Point-G University Hospital, Bamako, Mali
⁶Institute of Applied Sciences (ISA)

Summary

Introduction : Dengue is a viral disease transmitted by mosquitoes of the genus *Aedes*, it represents a growing public health challenge in West Africa, including our country Mali, which has experienced a growing outbreak of dengue cases. 1411 positive cases and 38 deaths, i.e. a lethality of 2.69% and 21 health districts were affected in 6 health regions between August 2023 and April 2024. We initiated this study in order to assess the seroprevalence of dengue fever in the urban commune of Sikasso. **Materials and Methods:** This was a descriptive cross-sectional study conducted at the Medical Biology laboratory of Sikasso Hospital from June to October 2024. The Dengue Day-1 Test kit (Lot No./ Reference:) was used for the detection of NS1 antigen, differential detection of IgM and IgG antibodies in human plasma collected in EDTA tube. Thick drop and thin smear were performed to diagnose cases of malaria associated with dengue fever. The community health centers (CSCOM) of Mancourani, Hamdallaye, Sanoubougou I and II served as collection sites. **Results:** We enrolled 201 samples in total, of which 19 samples were in contact with the virus, representing a prevalence of 9.46%. The female gender was predominant with a percentage of 63.16% against 36.84% of male gender. The age group [20 – 40] years was the most affected, i.e. 44.28%. The CSCOM of Mancourani recorded more positive cases. Among the clinical manifestations, fever or the notion of fever was the most reported with 83%. We had a co-infection of 31.58% between malaria and dengue.

Conclusion : Dengue fever remains a major public health problem in Mali, particularly in Sikasso, due to its considerable seroprevalence and the harmful consequences it causes.

Keywords : Seroprevalence ; Dengue ; Urban commune, Sikasso.

Summary

Background: Dengue fever is a viral disease transmitted by mosquitoes of the genus *Aedes*. It represents a growing public health challenge in West Africa, including Mali, which has experienced an increasing outbreak of dengue fever, with 1,411 positive cases and 38 deaths (a case-fatality rate

Article Information

Article Type: Research Article
Subject/Topic: Medical/Public Health
Volume: 2
Issue: 2
Publisher: OpenScopePublications
Received Date: 25th August 2025
Accepted Date: 29th August 2025
Published Date: 10th September 2025

*Corresponding author

Dr Madou TRAORE

Research Professor in Infectious and Tropical Diseases. Email: samanierga1975@gmail.com, Phone: 223 76198384

Citation

Madou T, Sekou D, Nafissatou B, Drissa G, Diarra L, M Dembele, D Drissa, S Bakary K, Ousmane D (2025). The Dengue Seroprevalence in the Community Setting of Sikasso (Mali), OSPublications. 2025 September; 2(2): 49-53.

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of 2.69%) in 21 health districts in 6 health regions between August 2023 and April 2024. **Materials and Methods:** This was a descriptive cross-sectional study conducted at the Sikasso Hospital Medical Biology Laboratory from June to October 2024. Test Dengue Day-1 kit (batch No./Reference:) was used for the detection of NS1 antigen and the differential detection of IgM and IgG antibodies in human plasma taken from an EDTA tube. Thick drop and thin smear tests were used to diagnose cases of malaria associated with dengue fever. The community health centers (CSCOM) of Mancourani, Hamdallaye, Sanoubougou I and II were used as collection sites. **Results:** We enrolled a total of 201 samples, 19 of which had been in contact with the virus, giving a prevalence of 9.46%. Females predominated with a percentage of 63.16% against 36.84% males. The [20-40] age group was the most affected, at 44.28%. The Mancourani CSCOM recorded more positive cases. Among the clinical manifestations, fever or the notion of fever was the most frequently reported (83%). We had a co-infection rate of 31.58% between malaria and dengue fever.

Conclusion: Dengue remains a major public health problem in Mali, particularly in Sikasso, due to its considerable seroprevalence and the harmful consequences it causes.

Keywords: Seroprevalence; Dengue fever; Urban district, Sikasso

I. Introduction :

Dengue fever is a viral disease re-emerging in tropical and subtropical regions, transmitted to humans by the bite of mosquitoes of the genus *Aedes* (most commonly *Aedes aegypti* but also *Aedes albopictus* (tiger mosquito) and *Aedes polynesiensis*).^(1,2)

The global incidence of dengue fever has increased significantly in recent years with approximately 390 million cases per year, of which 96 million present clinical manifestations, with more than 25,000 deaths recorded annually, thus constituting a public health problem.^(3,4) However, WHO reports a recent and dramatic outbreak of over 13,860,025 reported cases with 9,990 deaths by mid-2024 (5, 2)^(3,5) Southeast Asia and the Americas bore the brunt of the global burden.⁽⁵⁾ The epidemiology of dengue in the African environment is characterized by a complex vector ecology and environmental determinants thus favoring an increased growth of dengue epidemics, with a 9.42-fold increase in reported cases between 2019 and 2023.^(2,5) In West Africa, the diagnosis of dengue fever remains complicated due to other diseases with similar symptoms.⁽⁴⁾

The clinical manifestations are extremely polymorphic with an acute fever and pain syndrome (dengue-like syndrome), complicated depending on the case, by hemorrhages (hemorrhagic fever), hepatitis and/or encephalitis.⁽⁶⁾ Mali today is suffering from a multidimensional crisis both in terms of security and health which could

encourage the proliferation of the virus through displaced people. war. According to the Dengue fever situation report in Mali, The cumulative situation of dengue cases since the start of the epidemic (S34_2023 to S18_2024) is 8,774 suspected cases, 1,411 positive cases and 38 deaths, i.e. a lethality of 2.69%, 21 health districts are affected in 6 health regions of Mali.⁽⁷⁾

Despite these few studies, there is little data in the literature and dengue remains underdiagnosed throughout the country. The Sikasso region located in southern Mali is particularly vulnerable due to its climatic conditions favorable to the proliferation of vector mosquitoes.

This study aims to shed light on the seroprevalence of dengue fever occurring in the community setting in Sikasso.

II. Materials and Methods

The Medical Biology Laboratory of Sikasso Hospital served as the study setting. This was a prospective, descriptive cross-sectional study, which took place over a period of three (3) months from June to September 2024.

Our target population consisted of patients over 18 months of age presenting with fever or flu-like symptoms at the various collection sites in the urban commune of Sikasso. This was an exhaustive sampling of patients meeting the inclusion criteria which allowed us to evaluate, process and determine the seroprevalence of 201 samples.

Informed consent or assent was obtained prior to patient inclusion in the study. All information collected was kept anonymous and confidential.

A survey form was completed based on questions and answers from each patient or their guardian. The information collected was: identity, age, sex, profession, residence, history, clinical signs and biological variables (Dengue IgM –IgG–AgNS1 serology and thick smear). These data were entered into Excel software version 2016, then analyzed using Epi Info software version EPI INFO™ version 7.2.6.0.

Collection and sampling sites

The choice was made on four community health centers (CSCOM) in the city, namely those of Hamdallaye, Mancourani, Sanoubougou 1 and Sanoubougou 2, all equipped with a mini medical biology laboratory. The venous sample was taken using 5 ml EDTA tubes homogenized by slow inversion. The samples were stored in a cooler equipped with accumulators and then sent to the Medical Biology laboratory of Sikasso hospital to carry out serological tests for dengue (NS1, IgG and IgM) from the blood plasma obtained after centrifugation at 2500 rpm for 5 minutes. The Dengue Day-1 Test Kit (Lot No./Reference:) was used for the detection of NS1 antigen, differential detection of IgM and IgG antibodies in human plasma according to the procedure indicated in the manufacturer's instructions. Simultaneous thick smear and thin smear stained with Giemsa have been used for the diagnosis of malaria.

III. Results :

During this study period, we enrolled a total of 201 patients, the female gender was the majority with 63.16% (Table I). The age group [21; 40] was the most frequent with 57.89%. Housewives were the most exposed to the virus, i.e. 42.11% (Table II). The seroprevalence of dengue during this study was estimated at 9.45% (Table III), among the positive cases of dengue, 12 were positive to NS1, i.e. 5.97% of all samples. The notion of fever, the notion of vomiting (vomiting, nausea) were the clinical signs most encountered in patients suffering from dengue with respectively 83%, 16.67% (Figure I). Malaria-dengue coinfection was 6/19 of the positive cases, i.e. 31.58% (Table IV).

IV. Discussion :

Dengue fever is now classified as a “re-emerging” disease and is one of the main neglected tropical diseases.(6) In recent times, the number of dengue cases has increased significantly worldwide due to demographic changes, aging, urbanization, global warming and greater mobility.(8,9)The study population consisted of 141 women (63.16%) and 60 men (36.84%) with a sex ratio F/H = 1.71. These data are confirmed by Mberkadji in Mali in 2022 which found a female predominance of 69.1%, this may be due to their vulnerability(6)They also agree with a 2019 global report that indicated 27.4 million cases of dengue fever in men compared to 29.3 million in women.(10)This female predominance is however not found by Traore et al in Mali in 2019, he found a male proportion of 55.8%(11) In Burkina Faso, OUANGRE Abdourahmane et al also had a male predominance of 51.76%.(12)Male predominance has been reported in several studies.(3,8,9).

The age group [21; 40] was the most affected with a frequency of 57.89% which can be translated by their activity. It is also approximate to the study of Salou et al in Togo in 2017 who found a median age of 36 years, interval of [23.5-51.5](13)On the other hand, Sidiki and Mariko had the age group [41-60] with 20.3% and [26-35] respectively.(11,14)Housewives were the most exposed to the virus, at 42.11%. The number of positive cases was also higher, at 78.94, among people using treated mosquito nets. This could be explained by the fact that dengue is transmitted during the day, and thus housewives are at their workplace during this time of day.

The seroprevalence of dengue fever during this study was estimated at 9.45%. This rate was significantly lower than that found by Youbare et al in Burkina Faso, i.e. 25.98% (53/204) of patients(15)This could be explained by the small sample size. Among the positive cases of dengue, 12 were positive for NS1, or 5.97%. This low detection of the NS1 antigen was also found by Mberkadji with 4.9% of dengue cases(6). On the other hand, Sidiki et al found a higher rate of 71.05%(11), this is due to the failure to perform PCR. The IgM antibody was 2.99% among dengue

cases, this result is slightly lower than that of Mariko who found 5.71%(16).

Although the majority of dengue cases are asymptomatic or present with mild symptoms. In our series, the symptomatology of the majority of patients would have started 0 to 5 days before the consultation. The notion of fever, the notion of vomiting (vomiting, nausea) were the clinical signs most encountered in patients suffering from dengue with respectively 83%, 16.67%. These clinical signs were also observed in Pédwinde et al in 2016 in Ouagadougou(17)There is no statistically significant link between dengue and other febrile cases. Malaria-dengue coinfection was 6/19 of the positive cases, or 31.58%. This rate was higher than that found in 2019 in Burkina Faso by Youbare, 5/34 of the cases, or 2.94%.(15)On the other hand, malaria-dengue co-infection was 12.6% found by Mberkadji in 2022(6). Hence dengue fever and malaria are two different pathologies. The results of our study showed that dengue is endemic in Sikasso, meaning that 94.74% of positive cases did not travel during the year.

V. Conclusion :

At the end of this work, despite a small sample, we note that the seroprevalence of dengue in the urban commune of Sikasso remains considerable and even in association with malaria, hence the interest in conducting other large-scale studies to have an even better projection on the entire population. However, in the face of any feverish picture, we must think of dengue.

Table I: Distribution of the study population by sex.

Sex		Staff Percentage (%)
Female	141	63.31
Male	60	23.62
Total	201	100.00

Table II: Distribution of the study population according to profession.

Occupation	Staff	Percentage
Civil servants	4	1.99%
Housewives	58	28.86%
Students and pupils	74	36.82%
Traders	15	7.46%
Farmers	2	1.00%
Pensions	1	0.50%
Others	47	23.38%
Total	201	100.00%

Table III: Dengue seroprevalence.		
Serology	Staff	Percentage (%)
AgNS1	12	5.97
AgNS1+IgM	1	0.50
IgM	6	2.99
Negative	182	90.55
Total	201	100.00

	AgNS1	%	AgNS1+IgM	%	IgM
■ NOTION DE CONSULTATION PRENATALE	0	0.00%	0	0.00%	0
■ NOTION DE FIEVRE	10	83.33%	1	100.00%	6
■ NOTION DE MALADIE RESPIRATOIRE AIGUE	0	0.00%	0	0.00%	0

Figure 1: Distribution of seroprevalence according to clinical signs.

Table IV: Representation of co-infection between malaria and dengue fever.			
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Dengue Serology Positive	Negative	Positive	Total
AgNS1	9	3	12
%	75.00%	25.00%	100.00%
AgNS1+IgM	0	1	1
%	0.00%	100.00%	100.00%
IgM	4	2	6
%	66.67%	33.33%	100.00%
TOTAL	13	6	19
%	68.42%	31.58%	100.00%

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