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Hepatitis B Virus Seroprevalence in Burkina Faso: A National Population-Based Assessment Fifteen Years after Introduction of the HBV Vaccine

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Abstract

Introduction: Viral hepatitis, particularly hepatitis B (HBV), remains a major public health issue, especially in low- and middle-income countries. In Burkina Faso, HBV prevalence was estimated at 9.1% based on 2010 Demographic and Health Survey (DHS) data. This study aimed to update the national estimate of HBV surface antigen (HBsAg) prevalence and evaluate sociodemographic and regional disparities, fifteen years after the vaccine's introduction in the expanded immunization Program. **Methodology:** We conducted a secondary analysis of serum samples from a 2021 national household survey on COVID-19 seroepidemiology across Burkina Faso's 13 regions. HBsAg was detected using the Determine HBsAg 2 rapid diagnostic test (Abbott Diagnostics) (Abbott Diagnostics). **Results:** Among 6,115 participants, the overall prevalence of HBsAg was 9.3% (95% CI: 7.29 - 11.86). Prevalence was slightly higher in men (9.8%) than in women (8.9%), though not statistically significant ($p = 0.503$). No significant differences were observed by age group, education level, marital status, or urban/rural setting. However, regional disparities were marked, with the highest prevalence in Boucle du Mouhoun (15.1%), while the lowest rates were observed in the Sahel (4.2%) and Centre-Ouest (6.5%) regions. **Conclu-**

sions: Our findings demonstrate that despite national vaccination efforts, HBV remains highly prevalent in Burkina Faso. These results underscore the urgent need for targeted public health strategies to address regional disparities and reduce the disease burden.

Keywords

HBV, HBsAg, Prevalence, Disparities, Burkina Faso

1. Introduction

Viral hepatitis remains a major public health challenge, particularly in low and middle-income countries. In 2022, around 304 million people were living with hepatitis B and C worldwide. Among them, an estimated 254 million people were infected with the hepatitis B virus (HBV), with 6,000 new infections occurring daily [1]. Between 2019 and 2022, viral hepatitis-related deaths rose to 1.1 million annually, with HBV accounting for 83% of these fatalities. According to the World Health Organization (WHO), the African region accounts for 63% of new HBV infections [1]-[3]. HBV is the leading cause of acute hepatitis, chronic liver disease, and hepatocellular carcinoma (HCC) in sub-Saharan Africa, where it is responsible for 44% of cirrhosis cases and 47% of HCC cases [4] [5].

HBV is primarily transmitted vertically from mother to child during childbirth, a mode of transmission that perpetuates the virus within the population [6]-[9]. This route significantly increases the risk of long-term complications, such as cirrhosis and HCC, which account for 96% of hepatitis B- and C-related mortality [10] [11].

The WHO has identified vaccination as a cornerstone of HBV prevention [12]. However, in 2022, only 45% of infants globally received a hepatitis B vaccine within 24 hours of birth, with coverage in the African region as low as 18% [1] [12]. Although routine childhood HBV vaccination coverage in Africa reached 72% in 2021, this remains below the global target of 90% global target of 90% [12] [13]. Diagnosis and treatment are even more concerning, with only 2% of infected individuals diagnosed, and fewer than 0.1% received treatment in 2021 [13]. Continuous monitoring of prevalence trends is therefore essential for optimizing HBV prevention and managing strategies.

In Burkina Faso, a national study conducted in 2018 by Nicolas *et al.* estimated HBV prevalence at 9.1% using data from the 2010 DHS [14]. Additionally, local studies in Ouagadougou, in 2014, reported higher rates (14.47%) [8], while prevalence among high-risk groups, such as HIV-positive individuals (12%) [15], blood donors (14.96%) [16], and pregnant women (11.11%) [17], further underscores the country's high endemicity. Despite the introduction of the HBV vaccine into Burkina Faso's Expanded Program on Immunization (EPI) in 2006, challenges persist. Until 2020, the first vaccine dose was administered at 8 weeks of age rather than within 24 hours of birth, as recommended by the WHO for high-endemicity settings [18].

This delay increases the risk of vertical transmission, which is the dominant mode of HBV spread in Burkina Faso [19]. Given the lack of recent post-vaccination data, this study aimed to assess the seroprevalence, sociodemographic disparities, and geographic heterogeneity of HBV infection in Burkina Faso's general population, fifteen years (2006-2021) after the vaccine's introduction into the EPI.

2. Materials and Methods

2.1. Study Design and Setting

We conducted a secondary analysis using archived serum samples collected by the Institut de Recherche en Sciences de la Santé (IRSS) during a national seroepidemiological survey on COVID-19 conducted in Burkina Faso between October 5 and October 31, 2021.

The country is located in the heart of West Africa, and shares borders with Mali, Niger, and several other countries. With a land area of 274,000 km^2, it is administratively divided into 13 regions, 45 provinces, and 8228 villages [20] (**Figure 1**). According to the 2019 General Population and Housing Census, the population was approximately 20.5 million, with 45.3% under the age of 15 and 32.6% aged between 15 and 34 years; 75% of the population resided in rural areas [20]. Despite progress in health indicators, the country continues to face a high mortality rate (9.2%) due to infectious diseases, maternal and infant mortality, and a growing burden of non-communicable diseases. In response, strategic initiatives have been implemented to improve healthcare access, including vaccination campaigns and disease prevention programs.

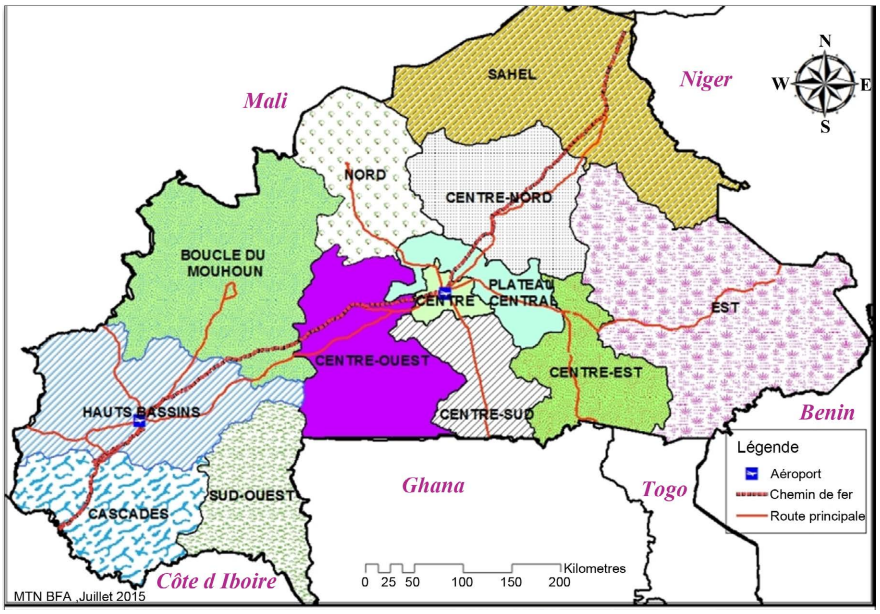

Figure 1. Mapping of the 13 regions with the main communication route.

2.2. Sampling Strategy

This study used a multistage, stratified cluster sampling design based on the sam-

pling frame from the 2019 General Population and Housing Census (RGPH) [20]. In each of the thirteen administrative regions, four municipalities were selected: the regional capital was automatically included, a second urban municipality was randomly selected from the remaining urban communes using probability proportional to size (PPS), and two rural municipalities were also selected using PPS. Exceptions occurred in three regions: in the Centre, only one urban commune (Ouagadougou) exists, thus no second urban commune was selected; in the Sahel and Est regions, only the regional capitals were included due to security constraints. Within each selected municipality, 16 enumeration areas were randomly selected using PPS. Ten households per enumeration area were then selected using GPS coordinates, totaling 160 households per commune with equal representation from urban and rural zones. In each household, one eligible individual aged 5 years or older was randomly chosen to participate and provide a blood sample.

2.3. Data and Sample Collection

Data collection was conducted using digital tablets running CSPro software. Sociodemographic information, including age, sex, education level, marital status, geographical setting (urban or rural), and administrative region, was obtained through structured questionnaires. Blood samples (5 mL) were collected via venipuncture and put into dry tubes. Each sample was labeled with a unique participant ID, centrifuged to obtain serum, aliquoted in duplicate, and stored at −80˚C at the IRSS biobank for subsequent testing.

2.4. HBV Testing

All archived serum samples were tested for the presence of hepatitis B surface antigen (HBsAg), the primary marker of current HBV infection. The Determine HBsAg 2 test (Abbott Diagnostics, Japan), a high-sensitivity and easy-to-use rapid diagnostic assay, was used for HBsAg detection.

2.5. Statistical Analysis

Statistical analyses were performed using Stata software version 18 (StataCorp, College Station, TX, USA). Descriptive statistics were calculated in terms of proportions with 95% confidence intervals for categorical variables, and means with standard deviations for continuous variables. Analyses were stratified by sex, age group, education, marital status, urban or rural residence, and region. All estimates were weighted according to the participants' sampling probabilities. Statistical significance was set at $p < 0.05$.

2.6. Ethical Considerations

The study protocol received approval from the Health Ethics Committee of Burkina Faso (Resolution No. 2021-01-016 of January 13, 2021) and was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants. Additional consent was secured for the storage and

reuse of serum samples for future research, including the current analysis.

3. Results

3.1. Sociodemographic Characteristics

A total of 6115 individuals were enrolled. The sample was balanced by sex (53% female) and diverse in terms of age, education, and residence. The majority of participants (60%) were married, and nearly half had no formal education (46.5%). Furthermore, the largest proportion of participants belonged to the 25 - 35 age group (24.0%) (Table 1).

Table 1. Sociodemographic characteristics of study participants.

Characteristics	Number (n = 6115)	% Unweighted	% Weighted
Sex			
Female	2907	47.5	53.0
Age Group (Years)			
[5 - 15[	525	8.6	15.0
[15 - 25[	1307	21.4	21.1
[25 - 35[	1624	26.6	24.0
[35 - 45[	1274	20.8	18.7
[45 - 55[	743	12.2	10.4
55 years and more	642	10.5	10.8
Educational Level			
None	2946	48.2	46.5
Primary	1387	22.7	25.2
Secondary	1425	23.3	22.4
University	357	5.8	5.9
Marital Status			
Married	3888	63.6	60.0
Single	1388	22.7	22.8
Divorced/Widowed	404	6.6	4.9
Child	435	7.1	12.3
Geographical Setting			
Urban	3470	56.8	46.4

Continued

Region			
Boucle du Mouhoun	591	9.7	15.2
Cascades	473	7.7	3.5
Centre	289	4.7	7.5
Centre-Est	639	10.6	6.9
Centre Nord	452	7.4	5.0
Centre Ouest	475	7.8	8.3
Centre Sud	456	7.5	3.0
Est	447	7.3	4.5
Haut Bassins	550	9.0	22.2
Nord	511	8.4	11.1
Plateau Central	581	9.5	6.0
Sahel	292	4.8	3.2
Sud-Ouest	359	5.9	3.6
Total	**6115**	**100**	**100**

3.2. HBs Antigen Prevalence

The overall HBsAg seroprevalence was 9.3% (95% CI: 7.3 - 11.9). Men exhibited a slightly higher prevalence (9.8%) than women (8.9%). The 5 - 15 age group exhibited a seroprevalence of 9.3% (95% CI: 3.4 - 23.2). The seroprevalence was 10.6% (95% CI: 8.4 - 13.4) among participants aged 15 - 25 years and 7.9% (95% CI: 5.9 - 10.6) among those aged 45 - 55 years. HBV prevalence was 9.5% among married individuals, 8.5% among single individuals, and 8.59% among those who were divorced or widowed. Marked regional disparities were identified. Boucle du Mouhoun recorded the highest prevalence, 15.1% (95% CI: 9.4 - 23.3), followed by the Sud-Ouest, 14.0% (95% CI: 11.6 - 16.7). In contrast, the lowest prevalence was observed in the Sahel 4.2% (95% CI: 4.2 - 4.2) and Centre 6.2% (95% CI: 5.5 - 7.1) regions (Table 2).

Table 2. HBs antigen prevalence by characteristics.

Characteristics	Number (n = 6115)	HBV Prevalence [95% CI]	*p*-value
Sex			0.503
Man	3.208	9.8 [7.2 - 13.1]	
Age Group (Years)			0.813
[5 - 15[born after 2006	525	9.3 [3.4 - 23.2]	
[15 - 25[	1.307	10.6 [8.4 - 13.4]	

Continued

[25 - 35[	1.624	8.2 [6.1 - 11.0]	
[35 - 45[	1.274	9.5 [7.3 - 12.2]	
[45 - 55[	743	7.9 [5.9 - 10.6]	
55 years and more	642	10.5 [4.8 - 21.6]	
Educational Level			0.321
None	2946	10.2 [7.8 - 13.3]	
Primary	1387	7.94 [5.0 - 12.3]	
Secondary	1425	9.32 [7.2 - 12.1]	
University	357	8.2 [6.6 - 10.3]	
Marital Status			0.807
Married	3888	9.5 [7.9 - 11.4]	
Single	1388	8.5 [5.3 - 13.5]	
Divorced/Widowed	404	8.6 [5.5–13.1]	
Child	435	10.2 [5.4 - 18.4]	
Geographical Setting			0.898
Rural	2645	9.5 [6.2 - 14.2]	
Urban	3470	9.2 [7.5 - 11.1]	
Region			0.005
Boucle du Mouhoun	591	15.0 [9.4 - 23.3]	
Cascades	473	11.5 [7.6 - 16.9]	
Centre	289	6.2 [5.5 - 7.1]	
Centre-Est	639	12.6 [10.2 - 15.4]	
Centre Nord	452	7.8 [5.5 - 10.9]	
Centre Ouest	475	6.5 [3.4 - 12.2]	
Centre Sud	456	12.0 [9.0 - 16.1]	
Est	447	8.0 [8.0 - 8.0]	
Haut Bassins	550	7.6 [4.9 - 11.6]	
Nord	511	8.5 [5.0 - 14.1]	
Plateau Central	581	6.4 [3.9 - 10.1]	
Sahel	292	4.2 [4.2 - 4.2]	
Sud-Ouest	359	14.0 [11.6 - 16.7]	
Total	**6115**	**9.3 [7.3 - 11.9]**	

4. Discussion

This study assessed the seroprevalence of hepatitis B virus (HBV) in Burkina Faso's general population, using a nationally representative, population-based sampling design. The overall HBV seroprevalence was 9.3%, confirming the country's high endemicity status (>8%) and underscoring the persistent risk of HBV infection despite control efforts.

Our findings are statistically comparable to those reported by Meda *et al*. (2018), who estimated a 9.1% seroprevalence based on samples from the 2010 Demographic and Health Survey (DHS) [14]. This similarity suggests that HBV prevalence has remained stable over the past decade, despite ongoing efforts by the government and health partners to reduce disease burden. One likely explanation is the suboptimal implementation of neonatal immunization. While the standard HBV vaccination schedule includes a birth dose followed by two additional doses within the first year of life, in Burkina Faso, the first dose was administered at 8 weeks from 2006 to 2022. This delayed initiation leaves neonates born to HBV-infected mothers vulnerable during the critical first four weeks of life, when vertical transmission is most likely.

Compared to other countries in the region, our results show both similarities and differences. In Togo, a screening campaign conducted in Lomé during World Hepatitis Day found an HBV prevalence of 16.36% among 1213 individuals [21]. In Nigeria, a systematic review and meta-analysis by Musa *et al*. (2015) [22] estimated HBV prevalence at 13.6%. These higher rates are partly attributed to lower vaccination coverage and insufficient national programs for HBV prevention and control. Conversely, lower seroprevalence has been reported in countries with more robust immunization strategies. In Benin, Kpossou *et al*. (2020) [23] reported a prevalence of 6% during a mass screening campaign. Morocco has achieved even lower rates: Sbai *et al*. (2012) [24] reported a 1.66% prevalence among working adults. These inter-country comparisons highlight the critical importance of early and widespread vaccine coverage in curbing HBV transmission.

In terms of sex-specific distribution, men had a slightly higher seroprevalence (9.8%) than women (8.9%), although the difference was not statistically significant. However, other studies have reported stronger gender disparities. For example, Yanogo *et al*. (2022) [25] found that men were 2.5 times more likely to be HBsAg positive than women. Meda *et al*. (2018) also reported a significantly higher prevalence in men (10.5%) than in women (7.8%), as did Sanou *et al*. (2025) [26], with 10.7% in men versus 7.0% in women. The influence of sex hormones on immune function has been suggested as a possible explanation: androgens and estrogens modulate the immune response, particularly cytokine secretion, antigen presentation, and lymphocyte activity. Notably, female patients have been shown to achieve higher HBeAg and HBsAg clearance rates than males.

Age-specific analysis showed no statistically significant differences in HBV seroprevalence. The highest prevalence (10.6%) was observed among individuals aged 15 - 25 years, while the lowest (7.9%) occurred in those aged 45 - 55 years.

Among children aged 5 - 15 years—born after HBV vaccine introduction in 2006—seroprevalence was 9.3%, which is unexpectedly high for a birth cohort eligible for vaccination since 2006. This observation suggests possible issues in vaccine coverage, vaccine efficacy, or cold chain management, and highlights the need for renewed attention to HBV control in this age group. This age group is the most vulnerable to developing chronic hepatitis B infection, especially children who have never received the vaccine, with a risk as high as 90%. Vaccination remains one of the most effective public health interventions for preventing HBV-related morbidity and mortality, particularly in newborns and children. While age was not associated with infection in our study, other contexts have shown age-related differences: in India, Ravindra *et al.* (2019) [27] found a higher HBsAg prevalence among adults than children.

Regarding marital status, HBV seroprevalence was 9.5% among married individuals, 8.5% among singles, and 8.6% among divorced or widowed persons. Although prevalence was slightly higher among married individuals, the differences were not statistically significant. Similar findings were reported by Tao *et al.* (2014) [8], who found comparable HBV prevalence among married (15.52%) and unmarried (14.95%) individuals. Nevertheless, previous literature has suggested that women may be more susceptible to sexually transmitted infections due to greater biological exposure and differences in sexual behavior [27].

A major finding of this study is the substantial regional heterogeneity in HBV prevalence. The highest rates were observed in Boucle du Mouhoun (15.1%) and Sud-Ouest (14.0%), both significantly above the national average. These findings caution against assumptions of epidemiological homogeneity across the country; a limitation often encountered in meta-analyses. Conversely, the Sahel region showed the lowest prevalence (4.2%). However, data collection in this region was limited to the regional capital due to security concerns, potentially leading to underestimation.

Previous studies have also highlighted regional disparities. Meda *et al.* (2018) [14] found the highest prevalence in the Est region (11.0%). Local studies have reported even higher rates: 27.6% in Dano (Sud-Ouest) [26], and 14.1% in Tiéfora (Cascades) (Sanou *et al.*, 2025), 14.5% in Ouagadougou (Centre) (Tao *et al.*, 2014), and 14.3% in Nouna (Boucle du Nouhoun) [28]. These variations underscore the need for region-specific interventions, including tailored communication strategies, localized vaccination efforts, and targeted screening programs to effectively combat HBV transmission in Burkina Faso.

Fifteen years after HBV vaccination was introduced into the national immunization schedule, hepatitis B remains highly prevalent in Burkina Faso. The persistently high seroprevalence among children suggests gaps in the early administration of the vaccine. Strengthening routine immunization—particularly ensuring the timely birth dose—along with targeted regional interventions, is critical to controlling HBV transmission.

5. Conclusion

Despite sustained government efforts, Burkina Faso continues to face a high burden

of hepatitis B virus (HBV) infection, with persistently elevated prevalence (9.3%) even among the post-vaccine generation. This underscores critical gaps in perinatal prevention, as the HBV vaccine was historically administered at 8 weeks of age rather than within the WHO-recommended 24-hour birth window in high-endemicity settings. The 2022 policy shift to universal timely birth dosing (within 24 hours of delivery in health facilities) marks a pivotal opportunity to disrupt vertical transmission. However, achieving impact will require strengthened health systems to ensure birth dose access for facility and home births, community engagement to address vaccine hesitancy, and integrated HBV screening in antenatal care to identify high-risk pregnancies. While our study lacked birth dose coverage data, future monitoring should evaluate this intervention's effect on HBV seroprevalence trends in children under 5 years.

6. Study Limitations

This study utilized serum samples originally collected for COVID-19 seroprevalence surveillance, which limited the availability of HBV-specific risk factor data such as vaccination status, exposure history, and behavioral practices. The absence of individual vaccination data prevents the study from distinguishing between vaccine failure and a failure to be vaccinated as the cause of the continued high prevalence in the younger cohort. Additionally, field accessibility constraints necessitated prioritizing data collection in secure urban centers in certain regions, affecting geographic coverage. Despite these limitations, the study's large, nationally representative sample size and robust weighted sampling strategy ensure the reliability of HBV prevalence estimates at the national level.

Conflicts of Interest

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

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