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## Burkina Faso and the Global Goal of Eliminating Hepatitis B Virus By 2030

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### Abstract

Burkina Faso is categorized as a high endemicity area for the hepatitis B virus (HBV) infection with a national prevalence of 9.1% for HBsAg carriage. In 2014, the WHO African regional committee adopted a resolution to control hepatitis B through the reduction to < 2% of the HBV chronic infection prevalence among children less than five in the member countries by 2020. WHO targets an HBV prevalence reduction to 1% and 0.1% among the under-five by 2020 and 2030, respectively; and a reduction of 90% and 65% in HBV incidence and related mortality rate respectively. We aimed to analyze the progress of Burkina Faso toward this goal and to identify the pitfalls to indicate ways the country may choose to accelerate its achievements.

The main challenges include non-coordinated interventions due to a missing coordinating team, a crucial need of capacity building with regard to HBV cases management, together with a multiplication of reference centres, the high costs of the lab analyses and treatment, and a lack of immunization strategy. The PMTCT of HBV requires specific focus. The expanded

program on immunization, the blood transfusion and injections safety as well as the harm reduction interventions appear to be on the right track.

An emergency plan to catch up the delay may opt to immunize first all the 31 000 country-wide health care workers and integrate the PMTCT of HBV into the HIV program and services with the aim to test, immunize or treat pregnant women and introduce the birth dose.

**Keywords:** Burkina Faso; Hepatitis B infection; Prevention and Control

### List of abbreviations

**AIDS:** Acquired Immuno-deficiency syndrome  
**CBO:** Community based organization  
**CI:** Confidence interval  
**DNA:** Desoxyribonucleic acid  
**EPI:** Expanded program on immunization  
**GDP:** Gross domestic product  
**HBeAg:** Hepatitis B e-Antigen

<b>HBsAg:</b>	Hepatitis B surface antigen
<b>HBV:</b>	Hepatitis B virus
<b>HCV:</b>	Hepatitis C virus
<b>HIV:</b>	Human Immuno-deficiency virus
<b>MSM:</b>	Men who have sex with men
<b>PITC :</b>	Provider initiated HIV testing and counselling
<b>PMTCT :</b>	Prevention of mother to child transmission
<b>RDT :</b>	Rapid diagnostic test
<b>SARA :</b>	Service Availability and Readiness Assessment
<b>STI :</b>	Sexually transmitted infection
<b>UNICEF :</b>	United Nations Children Fund
<b>USD :</b>	United States Dollars
<b>WHO :</b>	World Health Organization

## Introduction

The hepatitis viruses A, B, C, D and E are responsible of most of the global burden of viral hepatitis in human beings. In 2015, these viruses were responsible for 1.34 million deaths in the world [1]. These deaths were mainly related to liver cirrhosis and cancer, and to acute hepatitis in less than 10%. Still in 2015, globally, it was estimated that 257, 80 and 15 million people were living with chronic hepatitis B, C and delta infection, respectively. In addition 10–15% of the individuals with chronic hepatitis B virus (HBV) infection were co-infected with the hepatitis C virus (HCV) [1, 2]. Prevalence of hepatitis B surface antigen (HBsAg) are conventionally categorized as high endemicity ( $\geq 8\%$ ), high intermediate endemicity (5-7%), low intermediate endemicity (2 – 4%) and low endemicity (< 2%) [3]. The HBV can be transmitted through sexual, blood and vertical routes.

The mother-to-child transmission of HBV can occur in-utero, during labour and delivery and through breastfeeding [4]. This vertical transmission represents between 1-28% of the infections [5]. Early infection carries a higher risk; around 70-90% of children infected in their first year of life will develop chronic hepatitis compared to 20-50% of those acquiring the virus between 1-5 years of age and a mere 5-10% of children infected after 5 years [6, 7]. Around 90% of babies born to HBsAg and HBeAg positive mothers will become chronic carriers compared to 35% of infants born to HBeAg negative mothers. Furthermore perinatal transmission of HBV is associated with a higher risk of severe liver disease [8].

Around 100 million people suffer from HBV infection in the World Health Organization (WHO) Afro region. All the countries of the West African region have elevated prevalences, either intermediate or high with regard to endemicity [4, 7]. The majority of chronic infections in the population are due to vertical transmission and to early infection in childhood. The horizontal transmission defined as a transmission occurring without parental or perinatal

exposure) would be more frequent among children in Sub Saharan Africa, contrasting to Asian countries [4, 9].

The main routes of transmission for teenagers and adults in Burkina Faso may be dependent on sexual, traditional, cultural and therapeutic practices such as unprotected sex, multiple sex partners, therapeutic and ethnic scarification, female genital mutilation, traditional circumcision, blood transfusion and sharing of contaminated objects [10].

Eliminating HBV and HCV as a public health concern is one of the key objectives in the agenda of the 2017 World Health Organization's Global Hepatitis Report [1]. Anti-HBV therapies suppress HBV DNA replication but to date no highly efficacious cure exists for hepatitis B infection. Therefore, the prophylaxis of HBV transmission is the mainstay towards eliminating hepatitis B virus infection.

In 2014, the WHO African regional committee adopted a resolution to control HBV through the reduction to < 2% of the HBV chronic infection prevalence among children < 5 years of age in the member countries by 2020 [2, 7]. Our objective was to analyze the progress of Burkina Faso toward this goal and to identify the pitfalls to indicate pathways the country may choose to accelerate and catch up its achievements.

## Main Text

### The landscape of the hepatitis B endemic in Burkina Faso

The prevalence of hepatitis B infection in Burkina Faso have been explored in several studies. In 2015, a systematic review of data published between 1965 and 2013, estimated the HBsAg seroprevalence in Burkina at 12.05% (95% confidence interval (CI) 11.7–12.4). The estimate was inferred from a sample of 39 082 participants from 7 studies [2]. A systematic review with meta-analysis considering peer-reviewed papers published between 1996 (before the introduction of HBV vaccine in the expanded program on immunization in 2006) and 2017, estimated an overall prevalence of 11.21% from 22 peer-reviewed papers including 99,672 participants. After adjustment, the prevalence in the general population was 9.41%, among pregnant women, 11.11%, among blood donors 11.73% and among HIV-positive persons 12.61%, respectively. It was significantly higher before the implementation of HBV universal vaccination (12.80% between 1996 and 2001) than after (11.11% between 2012 and 2017,  $p=0.0219$ ). The prevalence was also higher in rural areas (17.35%) than in urban ones (11.11%), in the Western regions (12.69%) than in the Central ones (10.57%) and culminated in the Boucle du Mouhoun and the Center-West Region (14.66% and 14.59% respectively [11]). Data from the blood banks and sensitization campaigns showed similar results (Table 1) [12].

	Blood banks donors	Participants in the HBV sensitization campaign		
	Number of blood samples screened	Percentage of infected samples	Number of screened participants	Proportion of infected participants
2008	37591	12,39	-	-
2009	50044	11,50	-	-
2010	57975	10,20	-	-
2011	57152	9,54	-	-
2012	49321	8,34	294	16,7
2013	59969	10,07	700	13,4
2014	71337	9,70	1406	17,6
2015	76062	8,55	343	20,69
2016	75609	8,66	2304	12,5

**Table 1:** The proportion of HBV-infected people among blood donors and people screening for HBV infection during sensitization campaigns from 2008 to 2016 [12].

The most recent and probably the most accurate study on the prevalence of the HBV infection was the population-based survey from Meda et al from a representative sample of the Burkina Faso population, drawn from the 2010 DHS survey database [13]. The seroprevalence of the HBV was estimated at 9.1% (95% CI: 8.5–9.7) [13]. This prevalence still ranks Burkina Faso among the countries of high endemic zones. It was also higher in men (10.5%; 95% CI: 9.6–11.4) than in women (7.8%; 95% CI: 7.1–8.6). The HBsAg prevalence estimates were roughly uniformly distributed across the geographic regions. Yet, the prevalence was highest in the Gourmantche (12.3% (95% CI: 9.9–14.7) in Eastern Region) and Senoufo (12.5% (95% CI: 9.8–15.1) in Western Region) ethnic groups, respectively. The prevalence was significantly lower among the Mossi group (8.2% (95% CI: 7.4–9.0) in the Central Region). Among men, the older they were, the lower the seroprevalence.

### WHO’s targets regarding HBV infection

#### The main challenges identified in the Burkina Faso strategic plan against viral hepatitis

The Burkina Faso strategic plan against viral hepatitis infection identifies six main gaps with the objective to fill them by 2021 [12]. In summary, a coordinating team is missing and the interventions are fragmented and not sustained. In general, the health care workers lack basic knowledge and capacity to manage HBV cases. The country has just adopted (June 2019) its first guidelines and treatment protocols to manage HBV cases. The reference centres are few which means long travel distances to access them. Currently, all laboratory and treatment costs fall on the patient’s pocket and are not affordable. No clear strategy is set to immunize the population and there is no PMTCT of HBV program nor a birth dose of hepatitis B vaccine.

The donated blood is not safe enough with respect to HBV infection. A recent study found a prevalence of 1.5% of occult

HBV infection among blood donors [14]; meaning that for the year 2015 alone, of the 101,102 transfused blood products, 1537 were at risk of being contaminated by HBV. Another study assessed the residual risk (false negative tests during the seroconversion or “window” period) of HBV transmission through blood transfusion at 1 in 408 donations for HBV [14]. Thus, in 2019 an estimated total of 1800-1900 blood recipients were likely to be infected because of either the occult infections or the residual risk [15].

Funding is key in establishing a strong program to fight HBV infection in Burkina Faso. To date, the country is missing a funding source, specific to HBV infection and the national program for free access to health care for pregnant women and the under-5-year-old children does not include the hepatitis B infection testing and case management in the list of eligible care.

#### The way to go: building on the organization and experience acquired in HIV programs

Burkina Faso’s hepatitis program needs a coordinating team and a centre. The HIV/STI institution has got a huge experience in the work against HIV/AIDS since its inception in 2001. It also acquired important infrastructure that may be leveraged to implement actions in the field of HBV. Opting to merge HBV and HIV programs may be even easier, knowing that both diseases share lots of aspects in common, from the mode of transmission, to the treatment.

Considering that the Burkina Faso population was estimated in 2018 at 20 million and an HBV prevalence of 9.1%, the WHO’s case report estimated that 1.84 million persons were living with HBV. Knowing that only 2567 HBV patients were registered in the reference hepatitis treatment centres, it means that only a minute fraction of hepatitis patients were diagnosed in the country. The same is true for HBV treatment. In 2018, 46% of the population in Burkina Faso were 0-14 year-old and almost all have benefitted from the HBV vaccination through the EPI. Setting the objective of

30% for the remaining >15 year-old who know their status by 2021 would lead to testing 3 280 000 people by 2021. Integrating HBV testing in HIV prevention activities alone, large numbers could be reached per year; an estimated 720,000 pregnant women, 115,000 blood donors, 190,000 patients tested for STIs, 125,000 from key- and vulnerable populations and 200,000 adolescents and young adults aged 15-24 years. By integrating HBV testing in the provider-initiated HIV testing and counselling (PITC for HIV) in health care facilities, 200 000 additional test opportunities per year would be created [16]. Community-based organizations (CBO) in the field of HIV may be involved and combined RDTs (including HIV/HBV or HIV/HBV/HCV) could be provided to the health care facilities and CBOs to accelerate the progress to the targets.

Regarding the health care workers, in 2018, nationwide, there were 3674 midwives, 11065 nurses, 1954 medical doctors, dentists and pharmacists and 8956 other health professionals including lab technicians, mobile health care workers and caregivers [15]. To achieve the target of 90% of the hepatitis B virus vaccine coverage among health workers a national “screen and immunize campaign” may be designed on the short term. The supplies of rapid diagnosis tests may be assured with the contribution of all stakeholders including the private sector of pharma marketing companies doing business in the country. Then the three doses of vaccines can be negotiated at a subsidized cost involving the Burkina Faso government and private health sector and relevant donors. Then, this screen and immunize campaign may be the starting block from which all candidates may be required to provide an HBV testing and vaccination certificate while applying to a health care worker position.

After the screen and immunize campaign for health care workers, a similar program for the general adult population may be planned over years with the health sector’s partners. Other alternatives may be a mass campaign of immunization of the general population or a campaign focused on key population such as sex professionals, men who have sex with men and injecting drug users whichever strategy will be deemed more cost-effective. The ministry of health may consider initiating these mass vaccination campaigns, regardless of the HBV status of each inhabitant, in case the economic models demonstrate that it is more cost-effective to do so and all related ethical issues are addressed. The current EPI’s performance needs to be kept up while introducing a timely birth dose. The main challenge in this scenario would be how to treat and follow-up the infected people.

Tenofovir is available in the country at a subsidized cost of 4.5 USD/month. Merging both HIV and HBV program would once again ease the provision of this drug completely free of charge for HBV patients too. The initial case assessment minimum cost sums to 50 USD/6 month meaning 8 USD/month. This may constitute a big obstacle for a population with a GDP of \$685/inhabitant/year [17] and a minimum monthly revenue of 60 USD. Cost effectiveness analysis and clinical research to establish an affordable score

as a surrogate to the DNA analysis and to reschedule the frequency and the minimum list of the treatment monitoring lab analyses may provide evidence-based answers to the economic issues.

In 2018, 1 118 519 pregnancies were expected with 759 084 live births [15]. Therefore, an estimated 69 075 new-born were at risk of HBV infection from vertical route. Clear PMTCT of HBV guidelines need to be inspired from the national PMTCT of HIV program as well as the WHO’s PMTCT of HBV guidelines. Still in 2018, 84 370 HBV tests were implemented for the same registered number of blood donors [15, 18]. Introducing a genomic detection of HBV, immunizing repeated donors and implementing policies that retain blood donors in the blood testing algorithms and improving the reference scheme for all HBsAg positive donors to initiate a treatment and follow-up will reinforce the current blood safety system and address most of the challenges related to the HBV occult infection and residual risk. A confirmation test for HBsAg positive donors needs to be thought of.

In the SARA study, 99% of injections were administered with single-use syringe. The appropriate storage and elimination rates of used syringes were 86% [19]. The number of injecting drug users was estimated in 2011 at 5% of all drug users [20], showing that this was a marginal phenomenon in the country. A more recent study conducted in 2018 (unpublished data) found a fast-growing number of injecting drug users in the country. Preventive measures need to be thought of and anticipated so that in the future the number of injecting drug users do not raise into a public health issue. Although a dying phenomenon, female genital mutilation and traditional scars need to be assessed and addressed as risk factors of HBV transmission.

#### **An emergency agenda to reach the 2030 targets**

What is urgent and can still be implemented by 2021 to catch up the WHO agenda?

Firstly the immunization of all health professionals including health programs’ students is not out of reach. To test all the 26 000 health professionals plus an estimated 5000 students and to provide all of them with the 3-dose HBV vaccine, will cost around \$264 000 for the most expensive scenario; which means that we have considered that nobody in this group knows his HBV status and has never been vaccinated for HBV. This could go together with the adoption of regulatory text establishing the condition of HBV testing and immunization before any recruitment of health professionals. Then the HBV screening could be integrated in the HIV services, with the aims to i) implement the PMTCT of HBV by the antenatal screening of the mothers followed by the immunization of the mothers in need and the implementation of the birth dose; ii) immunize the key population including the MSM and sex workers.



Secondly the country could deeply assess how to set up an efficient program of mass screening and immunization or treatment keeping in mind the 2030 deadline.

## Conclusion

Regarding the impact targets of the strategic plan to eliminate viral hepatitis infections by 2030, Burkina Faso seems late in the run. The EPI, the blood safety, the injections safety as well as the harm reduction interventions appears to be on the right track. The PMTCT of HBV requires specific focus. Including HBV program into the existing HIV program is a natural step to take to achieve more cost-effective and impact-driven interventions. There is still hope to catch up by 2030, where we are lagging behind. The condition is to stand up now.

## Declarations

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## Authors' contributions

ENS: Conceptualization; Methodology; literature review, Supervision; Project administration; Writing - Original Draft; Writing - Review & Editing

JK: Conceptualization; Methodology; Writing - Review & Editing

CK: Writing - Review & Editing

SS: Writing - Review & Editing

RS: Writing - Review & Editing

PS: Writing - Review & Editing

RS: Conceptualization; Methodology; Supervision; Project administration; Writing - Review & Editing

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