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What is the most effective strategy to identify HBV-infected pregnant women eligible for antiviral prophylaxis in Burkina Faso ?

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Introduction

- To prevent mother-to-child transmission (MTCT) of hepatitis B (HBV), WHO recommends: i) tenofovir (TDF) prophylaxis in HBV-infected pregnant women with an HBV DNA $\geq 5.3 \log_{10}$ IU/mL or in those positive for hepatitis B e antigen (HBeAg) from the 28th week of pregnancy until at least birth, ii) and 3-4 doses of hepatitis B vaccination (HepB3) in all infants, including a timely birth dose (HepB-BD)¹.
- However, HBV DNA testing is not widely available in Burkina Faso and rapid diagnostic tests (RDTs) to detect HBeAg lack sensitivity².
- Alternative strategies could be to treat pregnant women positive for hepatitis B core-related antigen (HBcrAg) RDT (82.6% sensitivity and 95.4% specificity to detect HBV DNA $\geq 5.3 \log_{10}$ IU/mL in Burkina Faso)³ or all pregnant women positive for hepatitis B surface antigen (HBsAg) without any additional tests.

Aim

To assess the epidemiological impact, the cost, and cost-effectiveness of different testing strategies to identify HBV-infected pregnant women who should receive TDF prophylaxis in Burkina Faso.

Method

We analysed five strategies to be implemented at antenatal care in Burkina Faso. The baseline strategy was HepB-BD + HepB3 (current policy). The four other strategies additionally considered **screening pregnant women for HBsAg using a RDT, and providing TDF prophylaxis to HBsAg+ women if they had: 1) HBV DNA $\geq 5.3 \log_{10}$ IU/mL, 2) positive HBeAg using RDT, 3) positive HBcrAg using RDT, or 4) without additional test.**

We used a deterministic compartmental model (Figure1) to estimate the number of chronic infections over the period 2023-2100. We introduced TDF prophylaxis in 2023 in the model. We considered a linear scale up of HepB-BD, screening tests, and TDF prophylaxis to achieve 90% over 5 years.

We estimated the economic costs using a micro-costing study and considering a health system perspective. We discounted costs and chronic HBV cases at 3% per year for the cost-effectiveness analyses.

Conclusions

The treat all strategy may be the dominant strategy for implementing TDF prophylaxis at antenatal care in Burkina Faso although its feasibility and acceptability are unknown. HBcrAg RDT might be an alternative option to the treat all strategy depending on its unit cost. Further analyses, including the impact of the strategies on HBV-related complications, will better assess their cost-effectiveness.

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Results

Figure 2: Impact of Tenofovir prophylaxis in HBV-infected pregnant women on a) the number of new cases of chronic HBV infection per year until 2100, b) the number of new cases of chronic HBV infection due to MTCT per year until 2100, according to the five strategies, in Burkina Faso

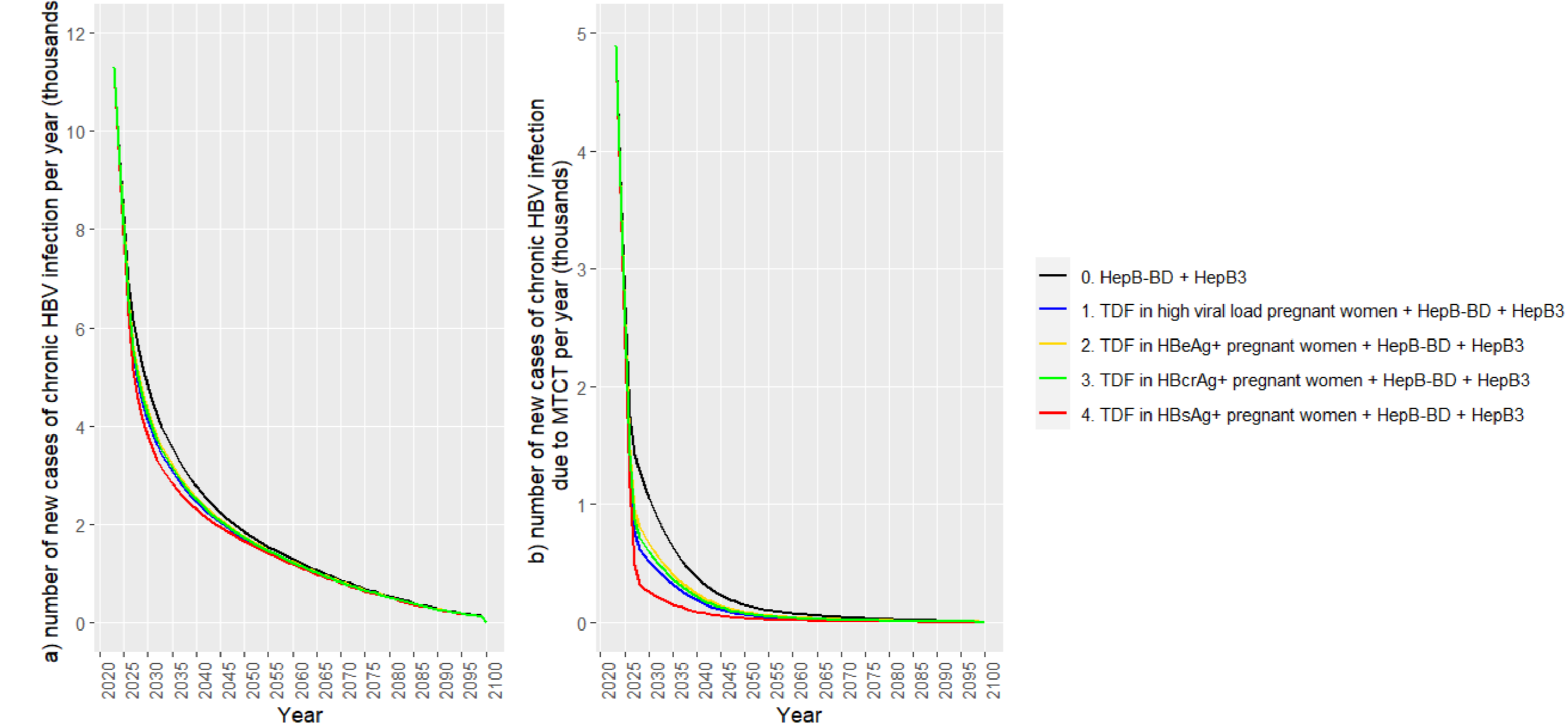


Table 1: Economic costs of implementing each of the four testing strategies to identify HBV-infected pregnant women eligible for Tenofovir prophylaxis in Burkina Faso (national level) over the period 2023-2100 using a health system perspective

Cost component	1. TDF in high viral load pregnant women (N= 28,781) US \$ in thousands (%)	2. TDF in HBeAg+ pregnant women (N= 48,369) US \$ in thousands (%)	3. TDF in HBcrAg+ pregnant women (N= 53,890) US \$ in thousands (%)	4. TDF in HBsAg+ pregnant women (N= 715,558) US \$ in thousands (%)
Pre-introduction	70.9 (0.01)	70.9 (0.01)	70.9 (0.03)	70.9 (0.03)
Social mobilization	19,279.7 (2.65)	19,279.7 (3.99)	19,279.7 (7.80)	19,279.7 (7.93)
Supervision & monitoring	47,578.6 (6.54)	47,578.6 (9.85)	47,578.6 (19.25)	47,578.6 (19.57)
Training	103,890.6 (14.29)	103,890.6 (21.51)	103,890.6 (42.03)	103,890.6 (42.73)
Transportation & storage	2,056.7 (0.28)	2,072.5 (0.43)	3,656.4 (0.38)	943.9 (1.50)
Screening	547,862.4 (75.36)	303,545.8 (62.86)	62,097.3 (24.51)	60,574.6 (25.54)
Treatment	360.8 (0.05)	606.4 (0.13)	675.6 (3.63)	8,971.3 (0.28)
Health information system	5,855.8 (0.81)	5,857.1 (1.21)	5,856.5 (2.37)	5,853.7 (2.41)
TOTAL	726,955.6 (100.00)	482,901.7 (100.00)	243,105.7 (100.00)	247,163.4 (100.00)

- In 2023-2100, the addition of TDF prophylaxis would allow to avert 12,453 new chronic infections (-8.1%) in the high viral load strategy, 8,961 (-5.8%) in the HBeAg strategy, 10,526 (-6.9%) in the HBcrAg strategy, 18,218 (-11.9%) in the treat all strategy compared to the current situation (Figure 1).
- In 2023-2100, the total number of pregnancies requiring TDF treatment would be 28,781 in the high viral load strategy, 48,369 in the HBeAg strategy, 53,890 in the HBcrAg strategy, and 715,558 in the treat all strategy.
- With a total cost of US\$243,105,718 for the period 2023-2100, **the HBcrAg strategy is the least expensive strategy for treating HBV-infected pregnant women** (Table 1), due to the lower number of pregnant women requiring TDF and a screening test that provides immediate results without the need to send samples to laboratories for analysis.

- In the cost-effectiveness analysis, **the treat all strategy dominates with an ICER of US\$1,231 per chronic HBV infection averted** (Table 2).

Table 2: Results of the cost-effectiveness analysis of the four testing strategies to identify HBV-infected pregnant women eligible for Tenofovir prophylaxis, compared to the current situation, in Burkina Faso (national level) over the period 2023-2100

	Total cost (US\$ in millions)*	Total number of chronic HBV infections*	Incremental cost (US\$ in millions)	Number of chronic HBV infections averted	Cost per chronic HBV infection averted (US\$)
0. HepB-BD + HepB3 (current situation)	5,152.6	20,988,028	-	-	-
1. TDF if high viral load + HepB-BD + HepB3	3,736.0	20,863,226	714.4	124,802	5,724.5
2. TDF if HBeAg+ + HepB-BD + HepB3	3,495.4	20,898,169	473.9	89,859	5,273.5
3. TDF if HBcrAg+ + HepB-BD + HepB3	3,254.1	20,883,270	232.6	104,758	2,220.5
4. TDF if HBsAg+ + HepB-BD + HepB3	3,250.0	20,802,389	228.5	185,639	1,231.0

*discounted at a rate of 3%

