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An optimal strategy for eliminating mother-to-child transmission of hepatitis B in Burkina Faso

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Introduction

The high prevalence of hepatitis B (HBV) in West Africa (6%-17%)¹ requires effective prevention of mother-to-child transmission (MTCT), and Hepatitis B birth dose (HepB-BD) alone is not sufficient to completely prevent MTCT^{2,3}. Identification of HBV-infected pregnant women in antenatal care and provision of tenofovir prophylaxis to those eligible is essential to achieve elimination of MTCT. However, access to HBV screening and antiviral prophylaxis is very limited in West Africa.

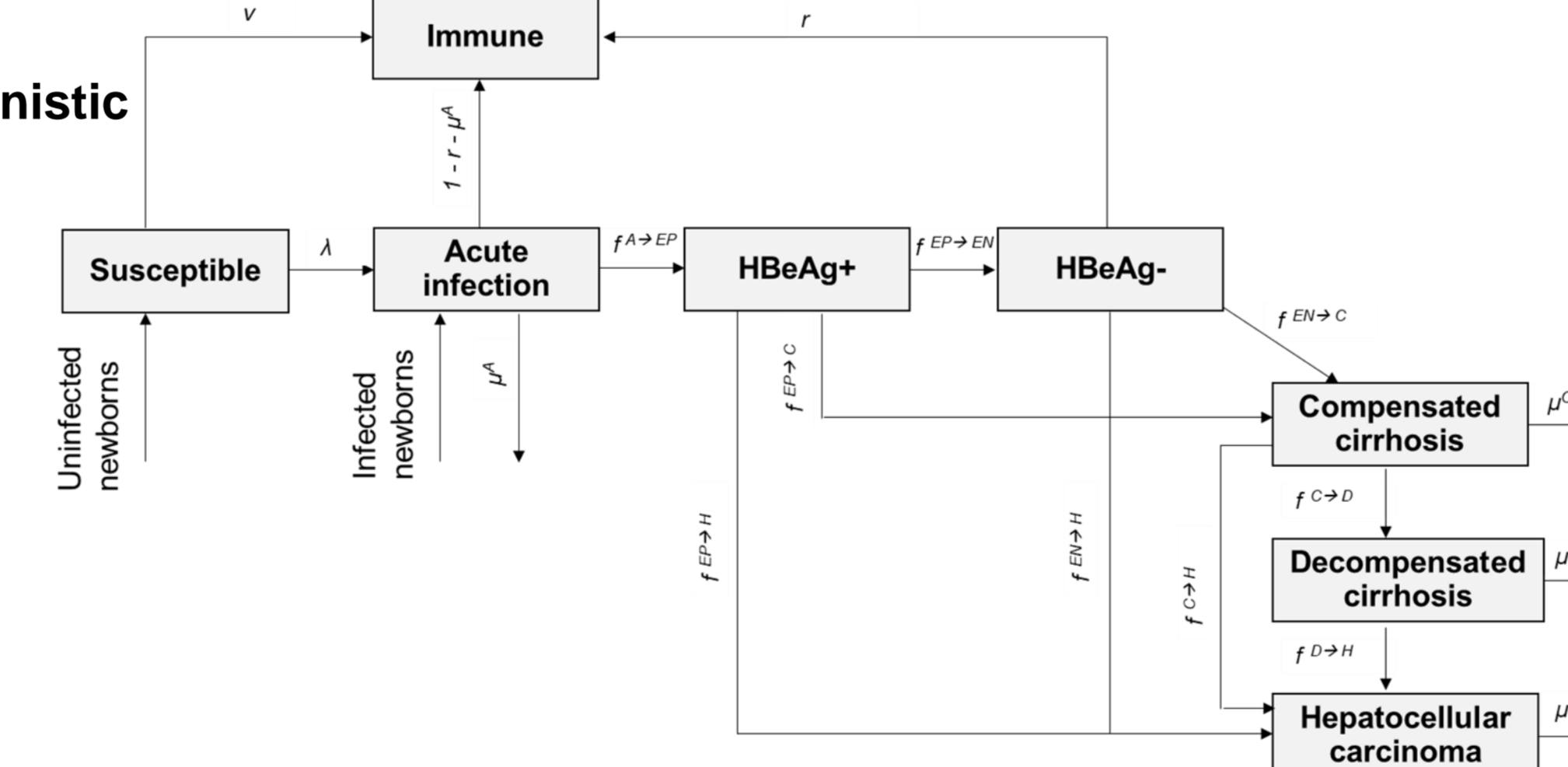
Aim

Assessing the health impact and cost-effectiveness of antenatal HBV screening and tenofovir prophylaxis in primary healthcare centres (PHCs) in Burkina Faso, considering four strategies for identifying hepatitis B surface antigen (HBsAg)-positive pregnant women eligible for tenofovir prophylaxis: **1) HBV DNA $\geq 200,000$ IU/mL, 2) HBeAg-positive, 3) positive for an alternative rapid diagnostic test (RDT) to detect HB core antigen (HBcAg), and 4) Treat all HBsAg-positive women.**

Method

The baseline strategy was the current situation where HepB-BD is administered alongside HepB3. Costs were assessed from the Burkina Faso government's perspective, including costs of intervention strategies, HBV vaccination with the birth dose (HepB-BD), and care for advanced HBV disease. A deterministic compartmental dynamic model stratified by age, sex, and transmission mode was used. An epidemiological model implemented the strategies from 2024 to 2124, while a cost-effectiveness model included strategy implementation in 2024 with a health impact assessment over a 100-year horizon. The cost-effectiveness threshold was half of 2022 GDP per capita (US\$416.5) and the discount rate was 3%. Deterministic and probabilistic sensitivity analyses were conducted.

Figure 1: Natural history of hepatitis B in the deterministic compartmental model



Results

In the cost-effectiveness model, the Treat All strategy strongly dominated the other strategies and the status quo scenario, with an incremental cost-effectiveness ratio of US\$60.9 per DALY averted. This finding was most sensitive to transition rates to decompensated cirrhosis and HepB-BD efficacy in mothers with high viral load. The Treat All strategy had a 91.8% probability of being cost-effective. Implementing the Treat All strategy from 2024 to 2124 could eliminate HBV MTCT by 2034, and reduce chronic HBV cases, deaths, and DALYs attributable to MTCT by 12.1% [4.9%; 13.9%], 10.0% [4.1%; 13.2%], and 11.4% [5.6%; 16.0%], respectively.

Table 1: Cost-effectiveness results of the HBV screening and tenofovir prophylaxis strategies in antenatal care in Burkina Faso, compared to the current situation

	Total cost (US\$)	Total DALYs	Incremental cost [95%CI], US\$	Number of DALYs averted [95%CI]	Cost per DALY averted [95%CI], US\$
Current situation	1,260,063,006	9,546,861	-	-	-
HBV DNA strategy	1,264,414,626	9,524,936	4,351,620 [48,070; 7,798,362]	21,925 [3,771; 64,090]	198.5 [Cost-saving; 1,311.5]
HBeAg strategy	1,262,609,200	9,527,974	2,546,194 [-1,370,965; 4,756,972]	18,887 [3,188; 53,529]	134.8 [Cost-saving; 1,156.6]
HBcAg strategy	1,262,383,233	9,527,204	2,320,227 [-1,551,738; 4,452,467]	19,657 [3,248; 53,219]	118.0 [Cost-saving; 1,021.2]
Treat all	1,261,788,532	9,518,539	1,725,526 [-3,913,515; 4,442,448]	28,322 [3,961; 76,174]	60.9 [Cost-saving; 868.7]

Figure 2: Cost effectiveness plan showing discounted incremental costs and DALYs averted at a 3% discount rate, and dominance of the intervention strategies

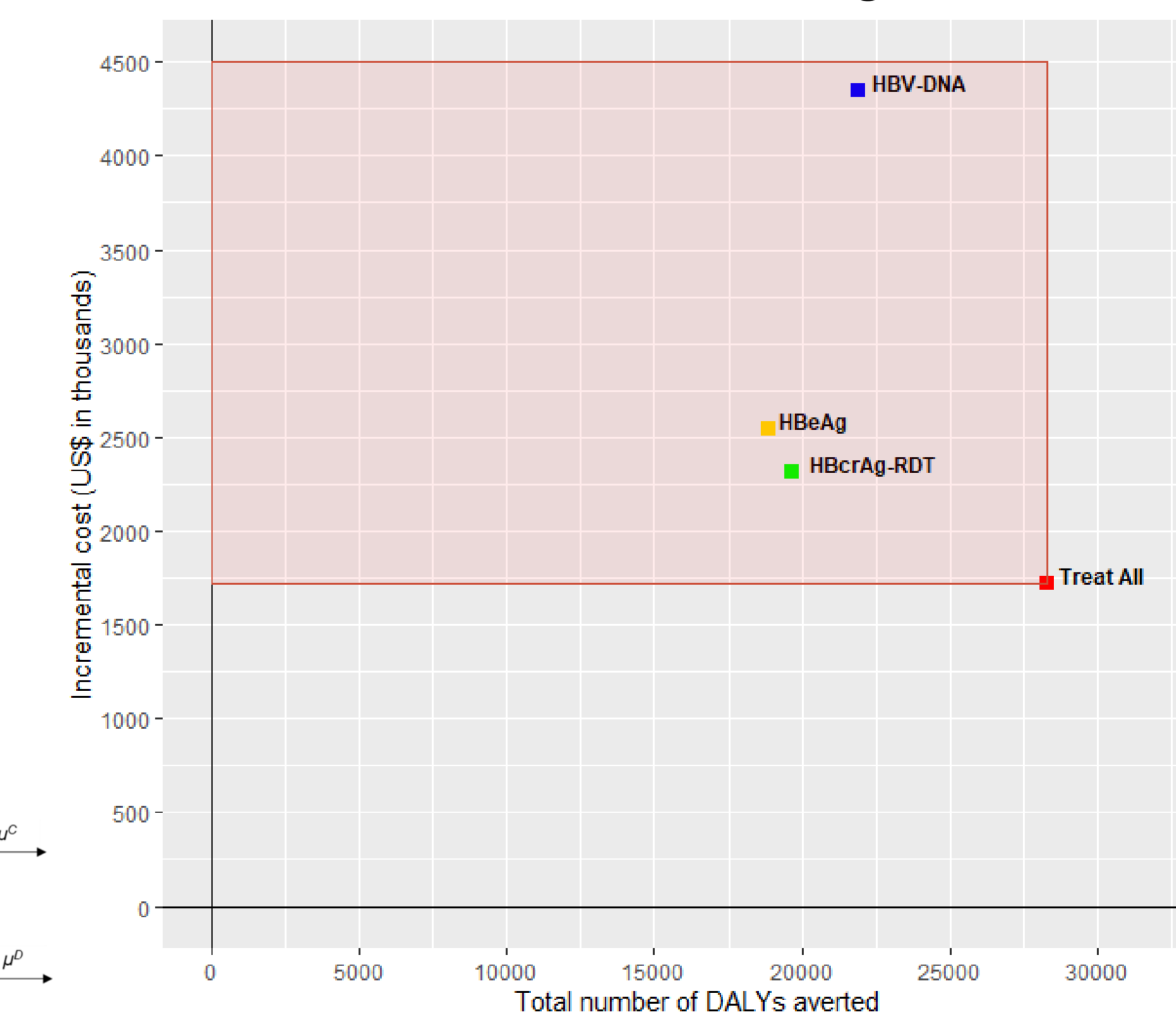
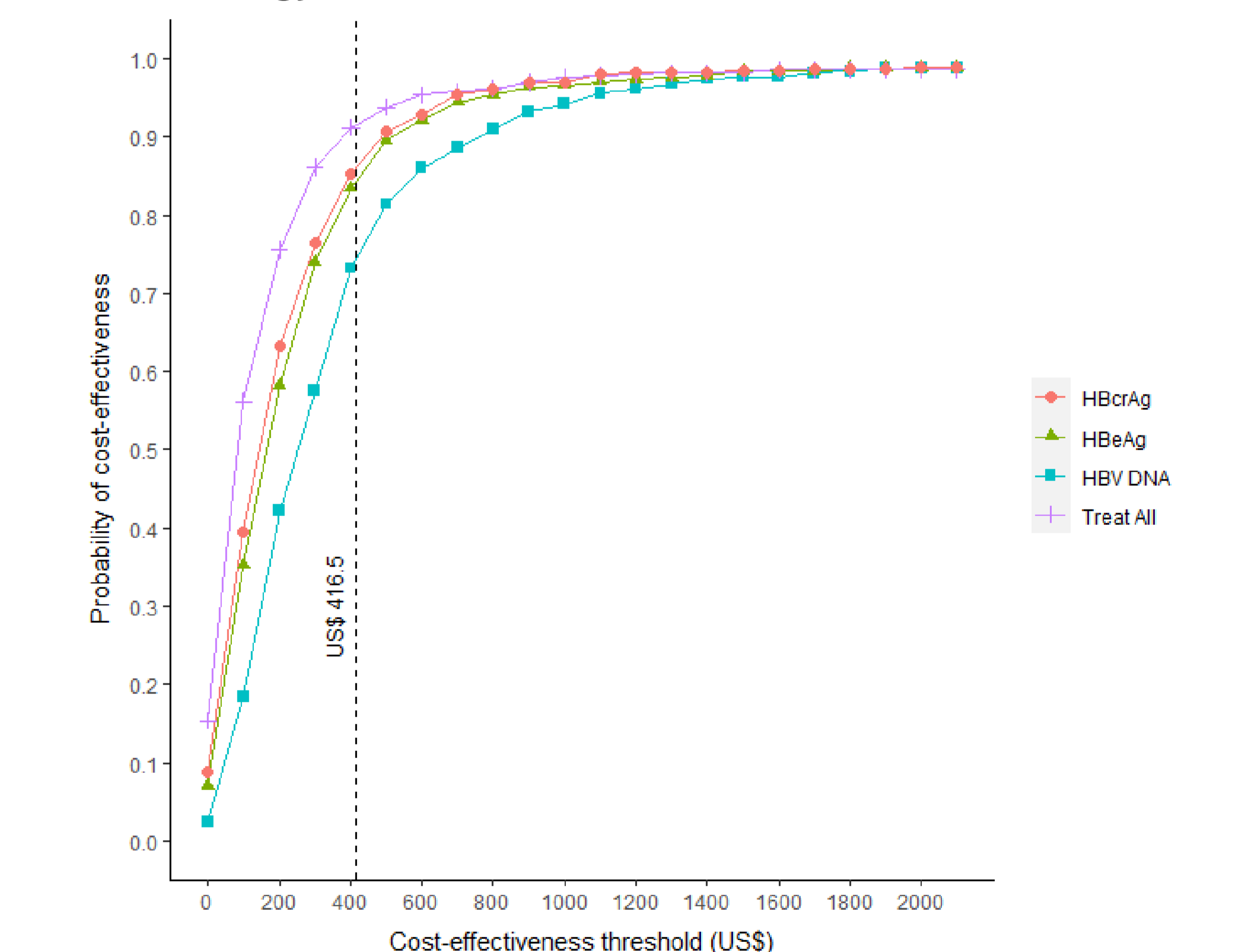


Figure 3: Cost-effectiveness acceptability curves comparing each strategy with the current situation in Burkina Faso



Conclusions

The Treat All strategy was the optimal strategy to eliminate HBV MTCT as quickly as possible.

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Treating all HBV-infected pregnant women is cost-effective and may eliminate mother-to-child transmission by 2034 in Burkina Faso

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