

Hepatitis B testing coverage and positivity rates among pregnant women attending antenatal clinics, Efate Island, Vanuatu, 2018–2020

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Objective: The World Health Organization has set a target for 95% of pregnant women to be tested for hepatitis B virus at their first antenatal care visit. This study assessed testing coverage and test positivity at the first antenatal care visit among pregnant women between 2018 and 2020 on Efate Island, Shefa province, Vanuatu.

Methods: This cross-sectional study used unlinked first antenatal care consultation and hepatitis B surface antigen testing data, where consultation data were extracted from the Vanuatu Ministry of Health's Health Information Management System and District Health Information System 2, and hepatitis B virus test data were extracted from the Vila Central Hospital Serology Unit registry. Data were restricted to the period of 1 January 2018 to 31 December 2020. Testing coverage and positivity rates were calculated for each year, and Poisson regression models were used to assess changes over time.

Results: First antenatal care visits were reported for each year, with the hospital providing 79.3% (7943/10 020) of consultations. Average hepatitis B virus testing coverage was 89.2% (8942/10 020) over the study period. Of 8942 first antenatal care hepatitis B virus tests performed, 621 (6.9%) were positive. Poisson regression indicated that test coverage and positivity did not change significantly over time.

Discussion: Although hepatitis B virus testing coverage at first antenatal care visits was high, it did not reach the World Health Organization target of 95%, and more recent data suggest a decline since 2020, highlighting the need for ongoing monitoring. A hepatitis B virus positivity rate of 6.9% reflects intermediate endemicity, indicating a substantial risk of mother-to-child transmission. Strengthening such testing and birth-dose vaccination delivery is critical to reducing perinatal transmission in Vanuatu.

Hepatitis B is a viral infection of the liver caused by the hepatitis B virus (HBV), a double-stranded enveloped DNA virus.¹ HBV is primarily transmitted through contact with blood or other body fluids of an infected person, with vertical mother-to-child transmission (MTCT) during birth and horizontal transmission during early childhood being the most common routes of transmission.² The global burden of HBV infection is significant, with an estimated 240 million people living with chronic hepatitis B infection in 2024 and 1.2 million new infections occurring each year.³ In the World Health Organization (WHO) Western

Pacific Region, an estimated 102 million people are living with chronic HBV infection.³

Antenatal HBV testing through routine antenatal care (ANC) is required to identify HBV-infected pregnant women for further management to prevent MTCT, including antiviral prophylaxis during pregnancy.² WHO has set regional targets in Asia and the Pacific to test more than 95% of pregnant women for HBV, alongside HIV and syphilis (the triple elimination targets), recommending that testing occurs during the first antenatal care (ANC-1) visit.⁴ HBV testing is conducted through testing for the

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hepatitis B surface antigen (HBsAg). A recent systematic review of coverage and progress towards the triple elimination targets, including hepatitis B, found that coverage-related data were limited across the Pacific and, where available, indicated that most countries were not on track to meet elimination targets, including ANC-1 HBV testing targets.⁵

The prevalence of chronic HBV infection, defined as testing positive for HBsAg for more than 6 months, in the Pacific island nation of Vanuatu is high, with an estimated 9% (approximately 27 000 people) of the population living with chronic HBV infection.⁵ The population of Vanuatu was estimated to be 300 019 in 2020, with approximately 49 034 people (16%) living in the capital, Port Vila, located on Efate Island, Shefa province.⁶ Vanuatu is classified as a low-middle-income country by the World Bank, with a gross domestic product per capita of US\$ 3959.90 in 2025.⁷ Laboratory testing is centralized, with rapid diagnostic tests (Abbott Determine HBsAg 2, a lateral flow immunochromatographic test) used primarily in hospital-based laboratories and additional tests, such as viral load and liver function tests, available only at Vila Central Hospital (VCH; officially renamed Vanuatu National Hospital) (Tassiets A, personal communication, 20 December 2025).

In April 2022, the Vanuatu Ministry of Health (MOH) implemented partial decentralization of ANC services, moving them from hospitals to community-based clinics, while laboratory services remained centralized.⁸ Prior to decentralization, ANC-1 HBV testing coverage in Vanuatu was unknown. This study aimed to calculate ANC-1 HBV testing coverage and positivity on Efate Island between 2018 and 2020 to inform programmatic strategies for reducing HBV transmission and MTCT.

METHODS

Study design and setting

A retrospective cross-sectional study was conducted using routinely collected, aggregated ANC-1 data from Efate Island, Shefa province, between 2018 and 2020. ANC services were provided at VCH (centralized), three government-run community clinics (Paunagisu, Erakor and Imere) and one government-affiliated clinic (Vanuatu Family Health Association [VFHA], Port Vila). Government ANC services charged 300 vatu (~US\$ 2.48) per ANC-1

visit, while ANC HBV testing was free; VFHA charged 500 vatu for consultation and 300 vatu for testing. Private clinics were excluded.

Study population

All pregnant women attending for ANC-1 at participating facilities or presenting for ANC-1 HBV testing at VCH between 1 January 2018 and 31 December 2020 were included in the study. Records were restricted to women aged 10–50 years. Most were assumed to be Indigenous Vanuatu people. Due to incomplete data, it was not possible to include more recent data in the analysis.

Data collection

Individual-level records (paper-based or electronic) are not collected in any of the government-run health services in Vanuatu. Aggregated data on the total number of ANC-1 visits on Efate Island were extracted from the Health Information Management System used by the Vanuatu MOH and District Health Information System 2 (DHIS2, University of Oslo, Norway) for the period from 1 January 2018 to 31 December 2020. DHIS2 is a free, open-source software platform for collecting, managing, analysing and sharing data. It is used in Vanuatu for the monthly collation of data about health facility-level engagement, and includes aggregated data on the number of health facility interactions and some limited information on health outcomes. Data collected in monthly reports that were used in this study include the total number of ANC-1 visits per month per facility. Data were cross-checked with paper-based logbooks at each health facility to confirm accuracy. Individual-level ANC-1 HBV testing data were extracted from the VCH serology unit registry for all tests conducted among patients whose reason for testing was recorded as ANC-1. Data extracted included patient date of birth, test date and test result; information about the referring ANC-1 clinic was not collected. Duplicate records (based on name, date of birth and test date) were removed from the analysis.

Data analysis

Outcome measures included the ANC-1 HBV testing rate (calculated as the total number of ANC-1 HBV tests divided by the total number of ANC-1 consultations, by year, expressed as a percentage) and the ANC-1 HBV test positivity rate (defined as the total number of ANC-1 HBV

Table 1. Number of annual ANC-1 consultations and ANC-1 HBV tests and corresponding testing and positivity rates, Vanuatu, 2018–2020

	2018	2019	2020	Total	<i>P</i> (trend)
No. of ANC-1 consultations	3289	3354	3377	10 020	NA
No. (%) of ANC-1 consultations by service provider					
Vila Central Hospital	2709 (82.4)	2671 (79.6)	2563 (75.9)	7943 (79.3)	NA
Vanuatu Family Health Association	341 (10.4)	453 (13.5)	494 (14.6)	1288 (12.9)	NA
Other	239 (7.3)	230 (6.9)	320 (9.5)	789 (7.9)	NA
No. (%) of HBV tests at ANC-1	2897 (88.1)	3036 (90.5)	3009 (89.1)	8942 (89.2)	0.12
No. (%) of positive HBV tests at ANC-1	205 (7.1)	208 (6.9)	208 (6.9)	621 (6.9)	0.98

ANC-1: first antenatal care visit; HBV: hepatitis B virus; NA: not applicable.

positive test results during a defined time period, divided by the total number of ANC-1 HBV tests with a known result, by year, expressed as a percentage). Poisson regression with robust standard errors was used to assess changes in ANC-1 HBV test coverage and test positivity by year, including the number of ANC-1 consultations and the number of ANC-1 HBV tests conducted, respectively, as offsets. Measures were calculated by year, over the total study period and by health facility type (government-run or government-affiliated). Data were cleaned and managed in Microsoft Excel, and statistical analyses were conducted using Stata (version SE 18, StataCorp, College Station, Texas, United States of America).

RESULTS

A total of 10 020 ANC-1 visits were recorded at participating clinics between 1 January 2018 and 31 December 2020 (Table 1). The annual number of ANC-1 consultations remained stable, ranging from 3289 in 2018 to 3377 in 2020, with an average of 3340 per year. Among all ANC-1 visits, the majority ($n = 7943$, 79.3%) were conducted at the VCH ANC clinic. The largest volume of community-based ANC-1 services was provided by VFHA, accounting for 12.9% ($n = 1288$) of all ANC-1 consultations, and the smaller community-based health facilities provided the remainder of ANC-1 consultations ($n = 789$, 7.9%).

A total of 8942 ANC-1 HBV tests were performed between 2018 and 2020, with an average of 2980 tests each year. The median age of women receiving an HBV test as part of ANC-1 was 27.3 years (standard deviation 5.9, range 12–50 years; data not shown).

ANC-1 HBV test coverage was high and stable over time, at 88.1% (2897/3289) in 2018, 90.5% (3036/3354) in 2019, and 89.1% (3009/3377) in 2020. In Poisson regression models accounting for the number of ANC-1 consultations, there was no evidence that HBV test coverage differed by year ($P \geq 0.05$).

Among the total 8942 ANC-1 HBV tests performed during the reporting period, 621 were positive (6.9%). Test positivity decreased slightly from 7.1% (205/3289) in 2018 to 6.9% in both 2019 (208/3036) and 2020 (208/3009); however, the decrease was not statistically significant ($P \geq 0.05$).

DISCUSSION

The study found that just less than 90% of pregnant women on Efate Island attending an ANC clinic had an HBV test at their ANC-1 consultation between 2018 and 2020. While below the 95% WHO target, this is high coverage, particularly when considering the challenges associated with accessing health-care services in Vanuatu. A large proportion of pregnant women accessed ANC-1 services at VCH, with less than one third accessing ANC-1 services from community-based health centres, which likely contributed to the high testing rate due to co-location and convenience of the laboratory testing facilities at VCH.

In April 2022, the Vanuatu MOH implemented a partial decentralization policy, whereby ANC services were expanded from hospital-based to community-based health clinics, while laboratory services remained

centralized.⁸ Data were not available to calculate the ANC-1 HBV testing rates and test positivity rates for 2021 and 2022; however, unpublished data from VCH suggest that ANC-1 HBV test numbers decreased considerably in 2021, from 3009 tests in 2020 to 971 in 2021 (a reduction of 67.7%). The observed reduction in testing may reflect financial and logistical barriers, such as the cost and complexity of travelling to laboratory services for testing, in addition to difficulties accessing community-based ANC, highlighting the importance of expanding ANC-1 HBV testing through effective implementation of decentralization strategies in primary- and community-care settings.^{9,10} Disruptions related to the COVID-19 pandemic are also likely to have contributed: Vanuatu experienced community transmission for the first time in March 2022.^{11,12} Ongoing monitoring of ANC-1 HBV testing coverage is, therefore, recommended to support programmatic oversight and enable timely identification and response to declines in testing uptake.

The high ANC-1 testing rate reported in this study is unlikely to be reflective of ANC-1 HBV testing rates in rural and remote areas of Vanuatu. The country's population is widely distributed, living across 65 inhabited islands and served by two referral hospitals, four provincial hospitals and 34 health centres,¹³ and with a Universal Health Coverage Index of 52 in 2023.¹⁴ In highly geographically isolated settings such as Vanuatu, decentralized ANC-1 HBV testing is crucial. Nurse- and midwife-administered HBV ANC testing was piloted in Vanuatu as part of a field trial in selected sites to prevent MTCT of hepatitis B in 2024,⁵ with early results suggesting feasibility and acceptability,¹⁵ however, further deliberation is needed to ensure sustainable resourcing and feasibility in remote areas. Expanded monitoring of ANC-1 and ANC-1 HBV test coverage is recommended to ensure that differences related to location and service type can be identified and addressed. Additionally, differences in access to and use of ANC-1 and ANC-1 HBV testing by other factors such as age, education and gravidity should be considered and monitored, where possible, to ensure equitable access for all pregnant women.

HBV positivity among ANC-1 women was 6.9%, consistent with intermediate endemicity according to classifications used by WHO and others.¹⁶ Although below the high-prevalence threshold ($\geq 8\%$), this level indicates a substantial risk of MTCT and underscores the importance of routine antenatal screening to

facilitate access to follow-up care for subsequent clinical management, such as peripartum antiviral prophylaxis where feasible, and timely hepatitis B vaccine within 24 hours of birth. Of concern is the fact that hepatitis B birth dose coverage was estimated at only 59% in Vanuatu in 2020,¹⁷ leaving a considerable proportion of infants unprotected and at risk of perinatal infection. Providing peripartum antiviral prophylaxis where feasible, in addition to increasing birth-dose vaccination and follow-up among exposed infants, is therefore critical to reduce vertical transmission in this population.

There are some limitations to this study that should be considered. First, this is a cross-sectional descriptive study, where data linkage across sites and years was not possible. There may be some bias in the data. Due to the absence of unique patient identifiers, it is possible that there was misclassification or duplication in laboratory records, and we are unable to account for demographic or behavioural confounders. As noted, the data included are only from health facilities on Efate Island, and findings are thus not representative across Vanuatu. Second, the data do not include private health facilities; however, anecdotal evidence suggests the number of women accessing private ANC-1 is low. Third, while the Abbott Determine HBsAg 2 test is considered to have acceptable sensitivity and specificity, there may be variations in test performance or testing procedures, or contextual factors that impacted prevalence estimates.

Conclusion

ANC-1 HBV testing coverage on Efate Island was high but below the WHO target, and positivity remains at intermediate endemic levels, indicating ongoing MTCT risk. Strengthened decentralized testing, birth-dose vaccination and follow-up for exposed infants are essential to reduce perinatal HBV transmission in Vanuatu. Ongoing monitoring of ANC-1 and ANC-1 HBV test coverage, disaggregated by province and service type, is also essential to monitor coverage of essential interventions during the decentralization process.

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Conflicts of interest

The authors have no conflicts of interest to declare.

Ethics statement

As this study used routinely collected and de-identified data, it did not require ethics approval. However, the Vanuatu MOH Human Research Ethics Committee provided ethical approval for this study.

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