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Review Article

Barriers across the hepatitis B and C care cascade in India: a narrative review of recent evidence

Har Ashish Jindal[1]*, Ankur Sabarwal[2]

[1]Department of Community Medicine and SPH, Satellite centre Sangrur, PGIMER, Chandigarh, India
[2]Eden Hospital, Chandigarh, India

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***Correspondence:**
Dr. Har Ashish Jindal,
E-mail: drhj.pgi@gmail.com

ABSTRACT

Chronic hepatitis B virus (HBV) and hepatitis C virus (HCV) infections are leading causes of cirrhosis and hepatocellular carcinoma in India. Despite an effective HBV vaccine and curative HCV therapy, progress toward the World Health Organization (WHO) 2030 elimination targets has lagged, largely owing to persistent gaps across the care cascade. This narrative review synthesises recent evidence (2020-2026) from Indian peer-reviewed literature, national programme documents, and international agency reports to characterise barriers affecting screening and diagnosis, linkage to care, treatment initiation, retention, surveillance, and prevention. Barriers operate at multiple, interacting levels. At the community level, limited awareness, stigma, low perceived risk, and the asymptomatic course of infection suppress testing demand. At the health-system level, inadequate diagnostic infrastructure, workforce shortages, fragmented service delivery, and heterogeneous programme implementation delay diagnosis and treatment. Although antiviral therapy is provided free under the National Viral Hepatitis Control Programme (NVHCP), out-of-pocket costs for travel, investigations, and follow-up reduce sustained engagement. Weak patient-tracking and fragmented reporting systems contribute to losses along the continuum, while suboptimal timely hepatitis B birth-dose coverage and low vaccination uptake among high-risk groups perpetuate transmission. Recent Indian experience nevertheless identifies effective models, including integrated "one-stop" district services, decentralised hub-and-spoke delivery, and community-led same-day test-and-treat programmes for marginalised populations. Scaling these approaches, alongside strengthened active linkage, standardised national cascade reporting, and improved operational delivery of the hepatitis B birth dose, will be essential to accelerate hepatitis elimination in India.

Keywords: Hepatitis B, Hepatitis C, Care cascade, Barriers, Screening, India, NVHCP

INTRODUCTION

Chronic infection with HBV or HCV is a major cause of chronic liver disease, cirrhosis, and hepatocellular carcinoma worldwide. The WHO has set 2030 elimination targets for viral hepatitis, including a 90% reduction in new chronic infections and a 65% reduction in mortality.[1,2] Progress in low- and middle-income countries (LMICs), including India, remains insufficient.

India is estimated to have 29.8 million people living with chronic HBV infection and 5.5 million people living with chronic HCV infection, accounting for a substantial share of the global viral hepatitis burden.[3-6] In 2018, the Government of India launched the NVHCP to provide free testing and treatment and to drive elimination.[7] Nonetheless, substantial gaps persist across the care cascade-testing, linkage to confirmatory diagnosis and treatment, long-term retention, surveillance, and prevention.

Since the scale-up of NVHCP implementation, particularly from 2020 onward, several programmatic and implementation studies have evaluated performance at state and district levels, highlighting both progress and persistent bottlenecks.[8-11] This review synthesises recent evidence to identify the principal barriers across the HBV and HCV care cascade in India and to highlight promising strategies for improvement.

RATIONALE FOR A NARRATIVE APPROACH

A narrative review was selected because the relevant evidence is methodologically heterogeneous-spanning implementation studies, economic evaluations, programme reports, and policy documents-and is therefore not amenable to the quantitative pooling of a systematic review or meta-analysis. To reduce selection bias, we nevertheless adopted a structured, reproducible search strategy, as recommended for high-quality narrative reviews.

Data sources and search strategy

We searched PubMed and Scopus for records published between January 2020 and May 2026, using combinations of the terms: "hepatitis B," "hepatitis C," "viral hepatitis," "India," "care cascade," "continuum of care," "screening," "diagnosis," "linkage to care," "treatment," "retention," "follow-up," "vaccination," and "National Viral Hepatitis Control Programme" / "NVHCP." Searches were limited to English-language publications. We supplemented database searches by hand-screening reference lists of relevant articles and by reviewing operational guidelines, surveillance reports, and policy documents from the Ministry of Health and Family Welfare (MoHFW), the NVHCP, and the WHO. Foundational documents predating 2020 were included where necessary for context.

Eligibility and study selection

We included original research, implementation studies, and programme evaluations conducted in India; reviews and commentaries offering relevant insight into cascade barriers and facilitators; and policy, operational, and surveillance documents. Eligible records addressed at least one cascade stage-screening/testing, linkage to confirmatory diagnosis, treatment initiation, retention, surveillance/data systems, or prevention (notably HBV vaccination). Studies addressing only clinical management without reference to cascade outcomes or system-level barriers were excluded unless they provided essential context. Evidence was synthesised thematically by cascade stage.

BARRIERS TO HEPATITIS B AND C TESTING

Barriers at health-system, provider, and community levels contribute to low testing uptake in India.

Limited integration of routine screening

Testing is not comprehensively integrated into routine services. Missed opportunities occur in antenatal, primary, and general outpatient care, where systematic HBV/HCV screening is often not offered. At a tertiary centre in Puducherry, nearly one-quarter of outpatients offered hepatitis B surface antigen (HBsAg) testing declined, with disproportionately higher refusal among men-suggesting low perceived risk, stigma, and inadequate awareness.[12]

Diagnostic infrastructure gaps and geographic inequities

Situational analyses of the NVHCP document limited availability of screening and confirmatory tests, including HCV RNA testing, at peripheral facilities.[7] Decentralized care with generic direct-acting antivirals in the management of chronic hepatitis C in a public health care setting.[13,14]

Provider-level barriers

Provider factors include limited awareness and training among primary-care providers on who to screen and how to act on results, and inconsistent implementation of NVHCP training across states.[15-17] Consequently, opportunities to test at-risk individuals-or those with abnormal liver function tests-are frequently missed.

Community-level barriers

Limited awareness, misconceptions about transmission, and stigma reduce testing demand.[15] Because chronic HBV and HCV are often asymptomatic for years, perceived need for testing is low among otherwise healthy adults, contributing to late presentation.

TESTING-STRATEGY INNOVATIONS

Self-testing and point-of-care approaches

HCV self-testing piloted in urban slums encountered challenges with blood-sample collection, instruction interpretation, and absence of integrated counselling, limiting current feasibility and usability. Economic evaluations from Tamil Nadu (HCV) and Punjab (HBV) indicate that rapid point-of-care testing can be cost-effective under specific conditions, though budget impact and scalability depend on local capacity.[18,19]

Reaching high-risk and marginalised populations

Migrants, prisoners, and people who inject drugs (PWID) face structural barriers including criminalisation, stigma, and poor service access.[20] In Manipur, a community-led, same-day HCV test-and-treat model for PWID achieved high uptake and rapid linkage when delivered in

accessible, non-stigmatising settings, illustrating the potential of peer-led models.[21,22]

LINKAGE TO CONFIRMATORY TESTING AND TREATMENT

Cascade losses after initial screening

Substantial attrition occurs between screening and confirmatory diagnosis or treatment. In one apex NVHCP treatment centre, only 27.7% of HBV-positive and 8.9% of HCV-positive blood donors-already identified as reactive-attended clinics for confirmatory testing and care, exposing the weakness of passive referral and the need for active linkage. [23]

Service-delivery models and outcomes

The integrated district-hospital models-co-locating screening, viral-load testing, and treatment-achieved higher confirmatory-testing uptake, faster turnaround, and better treatment initiation and retention than referral-based models.[24] Fragmented pathways introduce travel costs, long waits, reporting delays, and counselling/follow-up shortfalls. Punjab's systematically developed hub-and-spoke model offers a replicable template.[13]

Financial barriers despite free treatment

Although antiviral therapy is free under the NVHCP, patients incur out-of-pocket costs for travel, uncovered investigations, and monitoring visits,[25]contributing to documented cascade losses even after diagnosis and linkage.[26]

RETENTION IN CARE AND LONG-TERM FOLLOW-UP

Chronic HBV management

HBV typically requires long-term monitoring and, in some cases, prolonged therapy. Low perceived need for care among asymptomatic individuals and socioeconomic constraints undermine follow-up.

HCV adherence and discontinuation

Punjab's programmatic experience identified early discontinuation of direct-acting antiviral (DAA) therapy linked to supply-chain disruptions and adherence challenges, underscoring the need for reliable supply, counselling, and simplified, decentralised delivery.

Models of successful retention

Micro-elimination initiatives demonstrate that high retention and cure are achievable: Punjab's expanded hub-and-spoke model reported cure rates exceeding 90% among PWID and other marginalised groups.[27] Real-world NVHCP data suggest an overall sustained virologic response (SVR) of 92%, although outcomes are poorer in decompensated cirrhosis owing to higher mortality.[28]

Mobility and system constraints

Internal labour migration disrupts continuity, as patients may relocate mid-treatment. Weak patient-tracking, limited record interoperability, inadequate active follow-up, insufficient counselling time, and overburdened clinics compound attrition.

DATA REPORTING AND SURVEILLANCE CHALLENGES

Incomplete, heterogeneous reporting

Despite an established NVHCP reporting system, gaps persist in completeness, timeliness, and quality.[29] Under-reporting from the large private sector is a major limitation, and standardised cascade metrics are lacking across states. Implementation reports highlight incomplete screening capture, absent indicators for reflex testing (automatic viral-load testing after a positive screen), and the limited linkage/retention reporting within routine health management information systems (HMIS).

Fragmented digital infrastructure

Poor interoperability between laboratories, treatment centres, and national databases, together with parallel reporting systems across vertical programmes (immunisation, HIV, hepatitis), creates duplication and gaps.[30]While individual studies such as HEAD-Start (>37,000 screened) report detailed cascade outcomes, consolidated national cascade metrics (screened → confirmed → treated → retained) are not routinely published, impeding progress assessment.[24]

HEPATITIS B BIRTH DOSE AND HIGH-RISK VACCINATION

Timely birth dose

India includes a hepatitis B birth dose in the Universal Immunization Programme (UIP), yet timely coverage (within 24 hours) remains suboptimal (77.6%) despite high institutional-delivery rates (NFHS-6).[31] Operational barriers include home births and delayed postnatal contact; labour-room workflow and staffing gaps; supply- and cold-chain challenges in high-fertility, hard-to-reach areas; limited caregiver awareness; and provider under-emphasis on the 24-hour window. Targeted operational improvements at labour-room and provider levels are needed.[32]

High-risk groups

Coverage among high-risk adults-healthcare workers, PWID, and household contacts of HBV/HCV-infected

persons-is inconsistent India.[33] Stigma, low risk perception, and poor integration with HIV, harm-reduction, and occupational-health services impede uptake. Community-led integration of HBV vaccination with HCV treatment has increased uptake among marginalised groups but remains localised.

DISCUSSION

Barriers to HBV and HCV elimination in India are multifactorial and span every cascade stage. At the community level, inadequate awareness, low perceived risk, stigma, and asymptomatic infection suppress demand until advanced disease develops.[9]

At health-system level, deficiencies in infrastructure, diagnostics, workforce and service integration delay care; fragmented models incur substantial losses and financial and logistical barriers persist despite free therapy. At programme and policy level, incomplete surveillance and integration with other national programs, private-sector under-reporting, inconsistent cascade metrics, and fragmented digital systems constrain monitoring. Challenges in reaching high-risk populations, including people who inject drugs, together with persistent gaps in organised screening, a substantial pool of undiagnosed infections, and the need for coordinated public health action, continue to hinder progress towards viral hepatitis elimination in India (Table 1).[21,34-36]

Table 1: Key barriers across the hepatitis B and C care cascade in India.

Care cascade stage	Key barriers	Impact on HBV/HCV elimination
Awareness and risk perception	Low public awareness, misconceptions about transmission, stigma, asymptomatic nature of infection	Delayed health-seeking behaviour and low demand for testing
Screening and diagnosis	Limited routine screening, inadequate integration into primary care, insufficient diagnostic infrastructure, restricted access to confirmatory testing (HCV RNA/HBV DNA)	Under-diagnosis and delayed identification of infected individuals
High-risk population access	Stigma, criminalisation of PWID, poor access among migrants, prisoners, and marginalised groups	Low testing coverage and continued transmission in vulnerable populations
Linkage to care	Passive referral systems, fragmented services, long travel distances, multiple visits required	Loss of patients between screening and treatment initiation
Treatment initiation	Delays in confirmatory testing, workforce shortages, inconsistent implementation of NVHCP services	Reduced treatment uptake and prolonged infectiousness
Retention in care	Migration, inadequate patient tracking, poor counselling, follow-up costs, supply-chain disruptions	Treatment discontinuation and loss to follow-up
Surveillance and data systems	Incomplete reporting, private-sector under-reporting, fragmented databases, lack of standardised cascade indicators	Difficulty monitoring programme performance and elimination progress
Prevention (HBV vaccination)	Suboptimal timely birth-dose coverage, operational barriers at delivery facilities, low vaccination uptake among high-risk groups	Ongoing HBV transmission and missed prevention opportunities
Policy and programme implementation	Variable state-level implementation, limited inter-programme integration, insufficient operational research	Uneven progress toward elimination targets

Table 2: Strategies to strengthen the HBV/HCV care cascade in India.

Cascade stage	Potential solutions
Screening	Routine provider-initiated screening, point-of-care testing, targeted screening of high-risk groups
Linkage to care	Active recall systems, patient navigation, integrated "one-stop" services
Treatment	Decentralised hub-and-spoke models, simplified treatment pathways
Retention	Digital patient tracking, community-based follow-up, adherence counselling
Surveillance	Standardised national cascade indicators, integrated electronic reporting systems
Prevention	Improved birth-dose delivery, targeted vaccination of high-risk populations, integration with harm-reduction services
Community engagement	Peer-led models, awareness campaigns, stigma reduction interventions

Promising models. Integrated "one-stop" district services improve linkage and retention; decentralised hub-and-spoke delivery with capacity-building and political commitment achieves high coverage as well as the cure (Punjab); community-led, same-day test-and-treat reaches marginalised groups (Manipur); and state-specific economic evaluations guide rational scale-up.[21] These models, however, are not yet institutionalised nationally.

Limitations

As a narrative review, this synthesis is subject to selection bias despite a structured search, and was restricted to English-language records indexed in two databases, potentially omitting regional-language or grey literature. The heterogeneity of included sources precluded quantitative synthesis, and several recent programme outcomes derive from single-state experiences (notably Punjab and Manipur) that may not generalise nationally. Findings should therefore be interpreted as a thematic mapping of barriers and facilitators rather than a definitive quantitative assessment.

CONCLUSION

Barriers across testing, linkage, treatment, retention, reporting, and vaccination impede HBV and HCV elimination in India. Evidence from 2020-2026 clarifies these bottlenecks and identifies scalable models.

Priority actions are: Strengthen active linkage-implement active recall, patient navigation, and structured pathways from blood banks, antenatal clinics, and outpatient departments to NVHCP centres. Scale integrated "one-stop" services-co-locate screening, confirmatory testing, and treatment. Expand decentralised hub-and-spoke delivery-replicate Punjab's model with peripheral capacity-building and robust supply chains. Embed diagnostics and digital linkage in NVHCP guidelines-incorporate reflex testing, simplified algorithms, and electronic tracking.

Institutionalise national cascade reporting-standardised, WHO-aligned metrics across public and private sectors. Improve birth-dose delivery-address labour-room workflows, cold chain, and provider training, prioritising high-fertility and hard-to-reach areas. Integrate hepatitis services into harm-reduction and community programmes-for PWID, migrants, prisoners, and other marginalised groups. Strengthening primary-care platforms, integrating services, leveraging digital health, and prioritising high-risk populations will be critical to closing cascade gaps and accelerating elimination in India. Implementing targeted interventions and ensuring equitable access across regions will be essential to overcome existing barriers and achieve comprehensive hepatitis elimination goals.

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