Elimination of Hepatitis B Virus (HBV) requires recognition of catastrophic costs for patients and their families

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Background

The high profile 'End TB Strategy' includes tackling 'catastrophic costs',[1] which are defined as out-of-pocket expenses that together exceed 20% of annual household income. In this 'Comment', we consider this concept for people living with Hepatitis B (PLWHB) (**Figure 1; Table S1**).

Morbidity and mortality from hepatitis B virus (HBV) infection arise as a result of chronic liver disease, including hepatocellular carcinoma (HCC). A 2024 WHO viral hepatitis report states that '*the global response is off-track*', and advocates for universal healthcare access for PLWHB,[2] while transformative new guidelines recommend simplified and relaxed criteria for treatment.[3] For those who are treatment eligible, a nucleos(t)ide analogue (NA), typically tenofovir disoproxil fumarate (TDF), is prescribed long term. To date, costing evaluation for HBV infection largely represents the perspective of the healthcare payer/provider, and economic analyses report that for every US $1 invested by healthcare systems, there will be a US $2-3 long-term return.[2] However, no formal assessment of the potential for HBV infection to impose catastrophic costs on individuals or their families has been developed.

In contrast to TB, there is no cure for HBV infection, meaning that the financial impact is not time constrained, and even modest healthcare costs accumulate over time. In order to make HBV treatment scale-up practical, accessible and sustainable, there is a pressing need to include evaluation of patient-level costs (**Figure 1**).

Care cascade costs for HBV

In many countries, testing for HBV may be through point of care testing (POCT), with kits costing US $0.2-0.95 per unit. However, additional procurement costs (which can be influenced by stock-outs and supply chain issues) may be passed on to the user. In the case of a positive test, onward referral is required for clinical review and confirmatory testing. Itemised costs are summarised in **Table S2**.

Baseline assessment and ongoing HBV monitoring requires measurement of HBV DNA viral load (VL) and liver enzymes. Through a Global Access Program, the public sector in eligible countries can access the Xpert HBV VL assay (Cepheid) for US $15/test. However, VL costs vary considerably; even within supported hepatitis elimination programmes, the documented price varies from $9 - $62/test,[2] according to pricing inclusivity, shipping and trade terms, and the supplier-distributor relationship. Hardware may already be established for other programs (e.g. for TB / HIV), but costs of equipment maintenance, laboratory infrastructure, transport or personnel are nevertheless passed on to patients. Costs of repeated, long-term monitoring can exceed the costs of

treatment,[4] and those who access testing through private facilities typically pay more. If available, liver fibrosis assessment (elastography) and liver imaging (ultrasound) may be recommended, or alternative laboratory-based scores can be used as a surrogate marker for liver fibrosis, but all these approaches add further to costs.

TDF is a low-cost generic drug, and features on the global WHO essential medicines list, although <50% of countries in Africa include TDF in their equivalent national list. The agreed global benchmark price for generic TDF is US $2.40/month.[2] TDF is widely free of charge as part of combination therapy for HIV, but is not universally available as monotherapy. High in-country prices are driven by a range of issues including fragmented demand, small order sizes, and lack of centralized procurement. Even low price generic medication is unaffordable in some settings, and there are huge disparities between countries (with reported monthly costs between $32 and $1850).[2]

People at risk of catastrophic costs

In many populations where HBV is highly prevalent, household incomes are low, so the relative economic impact of HBV is high.[5] In Africa, only 33% of countries provide viral hepatitis services free of charge,[2] leading to a lack of financial protection; in Cameroon 'unbearable costs' have been associated with HBV, causing individuals to opt out of follow-up.[6] Catastrophic costs for PLWHB have been reported for those receiving either out-patient or in-patient care,[7] even with health care insurance,[8,9] and may also be experienced by people in high income countries with state-funded healthcare (where travel to clinic and missing time from work is unaffordable for those on low incomes). HBV has a disproportionate clinical impact on individuals who are disadvantaged, marginalised and under-served ('key populations'),[10] who face more barriers to care, and competing social / health priorities. The risk of catastrophic costs may be higher for individuals with complications, comorbidities, coinfection, and/or requirements for tailored treatment. For people with chronic kidney disease, tenofovir alafenamide (TAF) or entecavir (ETV) have better risk profiles than TDF, but may not be affordable.

Health consequences of HBV typically impact adults in early and middle life, resulting in a high economic burden for individuals and families. The economic cost of HCC may be catastrophic given the substantial impact of illness and deaths in adults of working and child-rearing age. If HBV is diagnosed during pregnancy, additional healthcare costs coincide with the arrival of a new baby. New WHO guidelines suggest a more permissive approach to treating from age 12 years,[3] so there is now a need to consider the financial impact on young people and their families. The financial impact on households is amplified when more than one member of a family is living with HBV, and/or when family members take on caring responsibilities.

PLWHB commonly experience stigma and discrimination[11] which can have financial impact, limiting access to opportunities for training, travel or employment – potentially with life-long impact. Fatigue and mental health concerns may exacerbate economic implications (e.g. by limiting capacity for paid employment or domestic work).[10] Long-term financial impacts can be exacerbated if individuals sell assets, spend savings or take loans to cover their healthcare costs.

Recommendations

There is a clear need for assessment of the catastrophic costs of HBV infection, representing diverse countries, settings and populations, building on evidence and approaches for TB and HIV infection (**Table S3)**. Presenting such evidence should underpin interventions and policies for financial protection and costed national plans for HBV.[2,12] There are many opportunities for linking to other programs providing laboratory infrastructure and healthcare interventions, including decentralisation of care, which could provide cost savings both for individuals and clinical services.

Improved patient and community representation can promote peer support and advocacy, improve awareness, reduce stigma, and support access to affordable services. Advocacy is important to build awareness, to promote policy change aiming to develop affordable and accessible services (reducing direct costs), and to support financial and legal protection (tackling indirect costs). Political action is essential to ensure countries access medications and diagnostic tests at globally benchmarked prices, mobilising international funding and building on innovative approaches such as funding from social corporate responsibility programs and micro-levies.[1]

Legislative protection should already prevent discrimination, but is not universal, and may not be upheld or enforced, leading to detrimental economic consequences.[13] There is a need for more inclusive insurance schemes, and enforcement of legislation related to social protection and a move towards universal health coverage.[2] Social Health Insurance packages combine government, employer and means-tested personal contributions to mitigate against catastrophic costs; for PLWHB, these must cater for long-term needs.[1]

Conclusion

To date, recognition and robust assessment of the potentially catastrophic costs associated with HBV infection have been overlooked. Progress towards HBV elimination targets cannot be achieved if individuals and families are exposed to this risk, which amplify existing health and social inequities.

Contributors' statement

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Writing original draft - JJ, LD, PCM
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Supervision - PCM
Writing review and editing - all authors contributed

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Conflict of interest

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Figure 1: Summary of direct and indirect costs experienced by people living with HBV and their families. Note that out-of-pocket costs to PLWHB vary significantly by setting, and may change over time. Some existing literature suggests direct costs account for 60-70%, vs indirect costs 30-40% as indicated on the figure,[14,15] but updated data are needed, and this breakdown will vary according to population and healthcare provision. Figure created in Biorender with a licence to publish.

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