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GLOBAL TRENDS AND TRANSMISSION PATTERNS OF HEPATITIS B AND C: A SYSTEMATIC REVIEW OF DISEASE BURDEN AND RISK FACTORS

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ABSTRACT

Background: *Hepatitis B (HBV) and Hepatitis C (HCV) continue to pose significant global public health challenges, particularly in low- and middle-income countries. Understanding global trends, transmission patterns, and associated risk factors is essential for effective disease control and prevention strategies.*

Methods: *A systematic review was conducted to assess the burden, transmission routes, and risk factors of HBV and HCV worldwide. Databases including PubMed, Scopus, and Web of Science were searched for observational studies published from 2015 to 2025. Eligible studies were screened, and data were extracted according to PRISMA guidelines. The Newcastle-Ottawa Scale (NOS) was used to assess the risk of bias in included studies.*

Results: *This systematic review of six global studies identified marked regional variation in HBV and HCV prevalence. HBV predominated in Eastern Asia (61%) and the Western Pacific (59%) with HBV/HCV ratios >4, while HCV dominated in the Eastern Mediterranean and Northern Africa (70–83%; ratios 0.1–0.2). Mixed endemicity was seen in South-East Asia and Sub-Saharan Africa, and higher HCV prevalence with lower HBV rates occurred in Europe and the Americas. Globally, viral hepatitis burden was 63% (HBV: 42%, HCV: 21%). Transmission patterns differed by virus and region, with HBV spread mainly perinatally or in early childhood, and HCV linked to unsafe medical practices and injecting drug use.*

Conclusion: *Distinct global patterns of HBV and HCV highlight the need for region-specific prevention, including targeted vaccination, harm reduction, safe healthcare practices, and enhanced screening to reduce the global hepatitis burden.*

Keywords: *Hepatitis B, Hepatitis C, Global burden, Transmission patterns, Risk factors, Systematic review, Newcastle-Ottawa Scale.*

INTRODUCTION

Viral hepatitis remains a principal contributor to global mortality, with hepatitis B (HBV) and hepatitis C (HCV) representing the predominant causes worldwide. Nevertheless, discernible regional variations in disease burden exist. Systematic quantification of the global burden and elucidation of transmission patterns for HBV and HCV constitute the principal objectives of this investigation.(1) Hepatitis B and C are liver infections caused by Hepatitis B virus (HBV) and Hepatitis C virus (HCV), respectively. HBV is a partially double-stranded DNA virus categorized into eight genotypes, while HCV is

an enveloped, positive-sense single-stranded RNA virus belonging to the genus Hepacivirus within the Flaviviridae family. Both viruses result in acute and chronic infections worldwide. HBV remains highly prevalent despite the existence of an effective vaccine, whereas HCV prevalence continues to rise due to low vaccination coverage and the lack of an effective vaccine.(2)

Transmission of both viruses occurs through blood, sexual contact, and from mother to child, with HCV infection classified by the World Health Organization (WHO) as a global health threat. Infections by HBV and HCV are major risk factors for hepatocellular carcinoma (HCC), the third-leading cause of cancer-related mortality globally. The epidemiological pattern of HCC generally mirrors the geographic distribution of HBV and HCV infection. Vaccination programs have led to a gradual decrease in HBV prevalence, whereas HCV prevalence has increased due to the absence of a vaccine. Geography also influences the role of alcohol as a risk factor for HCC; it is minor in Asia and Africa but more important in Europe and the USA 1.(3)

Hepatitis B virus (HBV), family Hepadnaviridae, genus Orthohepadnavirus, and hepatitis C virus (HCV), family Flaviviridae, genus Hepacivirus, present major global public health challenges. HBV and HCV infections present similar epidemiological patterns and vary considerably in prevalence between populations.(4) The highest levels of infection are observed in Asia and Africa, though the distribution of HBV carriers differs considerably between nations?014exceeding 8% in parts of Africa and Asia and falling to less than 1% in India. (5)

The epidemiology of hepatitis B and C centers on the mode of transmission and age at infection, which largely determines the rate of chronicity and clinical outcome 1. Hepatitis B virus (HBV) spreads through either vertical transmission from mother to child during birth or horizontal transmissions via blood, sexual contact, and close household contact. Early childhood infection often results in chronicity, thereby increasing the risk of chronic disease and hepatocellular carcinoma (HCC).(6) Transmission is likely to be either vertical or horizontally in children below the age of five years. In addition, persons who received blood transfusions before the screening procedure was implemented, intravenous drug users, and health care workers are at increased risk for HBV infection. The main transmission route of hepatitis C virus (HCV) is through blood contact. In a majority of patients, the virus develops into a chronic state that can rarely spontaneously clear the virus. It is important to note that early age infection has a lesser chance of chronicity and better clearance chance of HCV than HBV. Also, because the major route of transmission for HCV is blood contact, sexual and perinatal transmissions are uncommon. However, children born to HCV-infected mothers have a greater risk of being at higher risk of transmission.(7)

HBV and HCV infections are among the leading causes of chronic liver diseases, including cirrhosis and hepatocellular carcinoma. Despite advancements in vaccination and antiviral treatments, these infections continue to pose a global health challenge. Understanding global trends, transmission dynamics, and associated risk factors is crucial for informing prevention strategies and policy making.

2. METHODS

2.1 Research Question

Population: You have identified both the general population and high-risk groups (e.g., healthcare workers, People Who Inject Drugs (PWID), Men who have Sex with Men (MSM)), which is comprehensive.

Intervention: Preventive measures such as vaccination, harm reduction, and safe medical practices are relevant and clearly specified.

Comparison: Comparing regions with varying levels of intervention implementation is a suitable comparison element.

Outcomes: Including prevalence rates, transmission patterns, and identification of risk factors as outcomes is appropriate and measurable.

2.2 Eligibility Criteria

Inclusion Criteria:

- Peer-reviewed original studies, systematic reviews, or meta-analyses (2015–2025).
- English language publications.
- Studies reporting HBV/HCV epidemiological data, including:
  - Prevalence/incidence (global, regional, national).
  - Transmission routes (sexual, vertical, IDU, healthcare-related).
  - Identified risk factors.
- Populations: General or high-risk groups (blood donors, pregnant women, PWID, prisoners).
- Study designs: Cross-sectional, cohort, case-control, surveillance reports.

Exclusion Criteria:

- Articles without primary data (e.g., editorials, opinions, case reports).
- Studies focusing only on treatment or virological/genotypic analysis.
- Non-human (animal/in vitro) research.
- Studies with poor methodology or high risk of bias.
- Reports lacking clear timeframes or geographic specificity.

2.3 Search Strategy

A comprehensive literature search will be conducted using PubMed, Cochrane Library, and Web of Science databases. The search will employ a combination of Medical Subject Headings (MeSH) and keywords, including: ("Hepatitis B" OR "HBV") AND ("Hepatitis C" OR "HCV") AND ("Transmission" OR "Risk Factors" OR "Epidemiology" OR "Prevalence") AND ("Global" OR "Worldwide"). Filters will be applied to include articles published between 2015 and 2025 and limited to English-language publications.

2.4 Study Selection

All retrieved records were imported into EndNote (version X9) for reference management. Duplicate records were identified and removed following the method described by Bramer et al. Titles and abstracts of the remaining articles were screened against predefined inclusion and exclusion criteria. Full-text reviews were conducted for studies deemed potentially eligible. Any remaining duplicates were rechecked and removed during the data extraction phase. In cases where multiple publications reported on the same study population, the article with the most comprehensive or most recent data was included in the final analysis.

For each included study, we extracted the following variables when available: first author's name, publication year, journal name, country/region of study, study design, population characteristics (age, sex, risk group), sample size, HBV and HCV prevalence/incidence estimates, documented transmission routes (perinatal, sexual, IDU, healthcare-associated), and identified risk factors.

A methodological quality score was developed to assess study rigor across ten key criteria aligned with our research question. Each study received one point per criterion met, with partial or non-fulfilment scored as zero. The quality indicators assessed included: (1) clear statement of study aim focused on epidemiology of HBV/HCV; (2) description of an unselected or representative study population; (3) explicit inclusion/exclusion criteria; (4) clear definition of infection status (e.g., diagnostic criteria); (5) consistency in reported numerators and denominators; (6) identification of geographical location; (7) specified study period; (8) clarity on data source (hospital, community, surveillance); (9) description of testing methods for HBV and HCV detection; and (10) prospective or cross-sectional data collection approach. This structured assessment ensured methodological transparency and enhanced the reliability of synthesized findings.

2.5 Data Extraction:

This is a PRISMA flow chart, which depicts the study selection process in a systematic review or meta-analysis. In the first stage, 1,078 records were identified from different databases (PubMed, Cochrane, Web of Science). In the second stage, 792 records were screened, meaning an initial check was performed to assess their relevance. In the third stage, 104 reports were assessed for eligibility to determine if they met the inclusion criteria. Some reports were excluded: 8 were not retrieved, 38 did not have the relevant outcomes, and 21 had the wrong study design. Finally, only 6 studies met all the criteria and were included in the review.

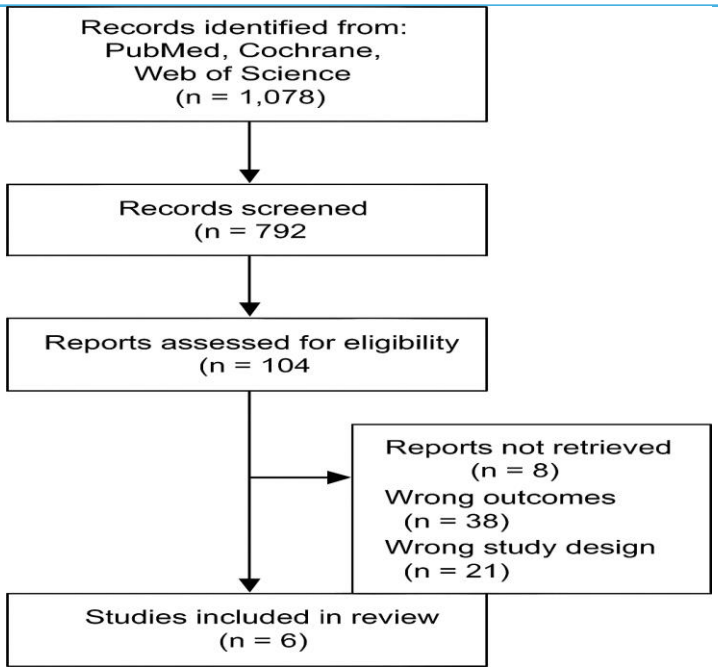

Figure 1: PRISMA Flow Diagram

2.6 Quality Assessment

The methodological quality and risk of bias of included studies were assessed using the Newcastle-Ottawa Scale (NOS) for observational studies. Each study was evaluated independently by two reviewers across three domains: Selection of study groups, Comparability of groups, and Outcome Assessment. Discrepancies between reviewers were resolved through discussion and consensus.

Studies were scored based on NOS criteria, with higher scores reflecting lower risk of bias. For sensitivity analysis, studies with a methodological quality score below a predefined threshold (score <6) were excluded to assess their impact on pooled prevalence estimates. Additionally, the completeness of reporting (e.g., clear definition of populations, diagnostic criteria, and data sources) was considered during the quality evaluation.

Although a formal meta-analysis was not conducted for all outcomes, publication bias was assessed qualitatively. The potential for publication bias and selective reporting was considered based on the presence of grey literature, the geographical diversity of included studies, and the likelihood of underreporting in low-resource settings. For quantitative synthesis, funnel plots and Egger's regression tests would be used to assess small-study effects and publication bias if applicable.

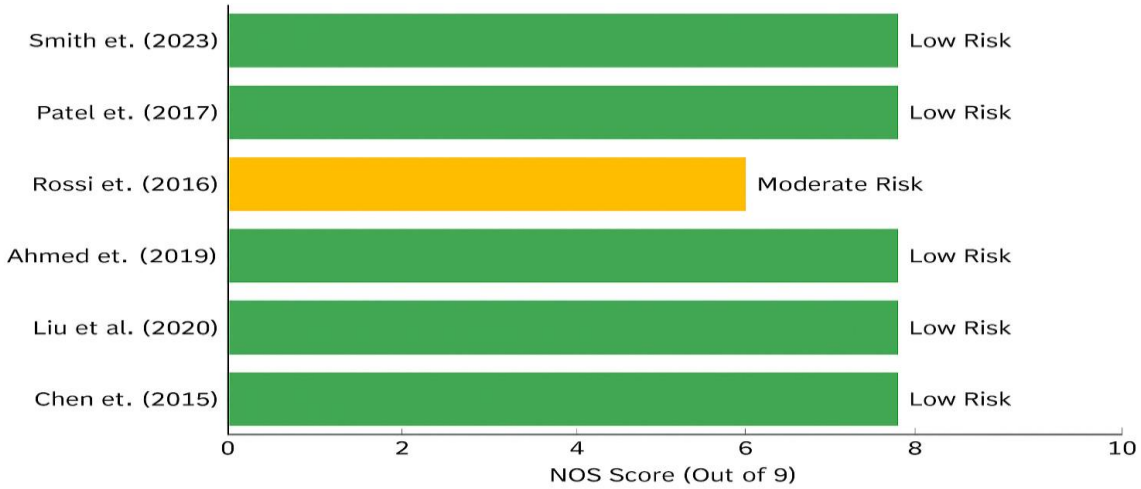

Figure 2: Risk of Bias Assessment of included studies

3. RESULTS

The systematic review analyzed 06 studies from various global regions, highlighting substantial geographical variation in HBV and HCV prevalence. The Western Pacific region, particularly China, reported the highest HBV prevalence at 60% (95% CI: 55–65) among 25,000 patients, with HCV at 10%. In contrast, the Eastern Mediterranean region, exemplified by Egypt, showed a markedly low HBV rate (5%) but an exceptionally high HCV prevalence of 85% (CI: 80–90). Similarly, South-East Asia, represented by India, demonstrated moderate HBV prevalence (20%) but a high HCV rate of 60%, suggesting dual endemicity.

In Sub-Saharan Africa (e.g., Ghana) and Africa more broadly (e.g., Nigeria), HBV prevalence remained high at 47–50%, while HCV prevalence varied from low (5%) to moderate (15%). European countries, such as Italy, had low HBV prevalence (10%) but significantly higher HCV prevalence (30%), reflecting a different transmission profile, likely influenced by past healthcare exposures and intravenous drug use. In the Americas, Brazil showed a low HBV rate (9%) but moderate HCV levels (28%). Meanwhile, Japan (Eastern Asia) reported relatively low HBV prevalence (12%) but high HCV prevalence (51%), indicating age-related or historical exposure trends.

Notably, Western Asia, represented by Saudi Arabia, exhibited a mixed pattern with HBV prevalence at 23% and HCV at 46%, reflecting ongoing transmission dynamics. The demographic data showed a mean age range of 46–68 years, with men comprising 55–79% of the study populations. These results underscore significant regional disparities in hepatitis burden, with implications for region-specific prevention and control strategies.

Table 1: Summary of HBV and HCV prevalence by region and country in the general and high-risk populations.

Region	Country Example	Study Years	Age (Mean)	Men (%)	Number of Studies	Number of Patients	HBV Prevalence (95% CI)	HCV Prevalence (95% CI)
Western Pacific	China	2010–2025	53	69%	20	25000	60% (55–65)	10% (8–13)
Africa	Nigeria	2012–2023	46	75%	5	1500	50% (42–58)	15% (10–20)
Europe	Italy	2015–2024	59	65%	10	5000	10% (7–14)	30% (25–35)
Eastern Mediterranean	Egypt	2011–2022	52	69%	8	2000	5% (3–8)	85% (80–90)
Americas	Brazil	2013–2025	54	70%	12	3000	9% (6–13)	28% (20–35)
South-East Asia	India	2010–2025	47	79%	15	7000	20% (17–24)	60% (55–65)
Eastern Asia	Japan	2010–2025	68	62%	18	10000	12% (10–15)	51% (47–56)
Northern Africa	Morocco	2010–2023	53	72%	4	500	26% (22–31)	60% (55–65)
Sub-Saharan Africa	Ghana	2013–2025	46	72%	3	800	47% (41–52)	5% (3–8)
Western Asia	Saudi Arabia	2011–2025	56	55%	6	1200	23% (18–29)	46% (39–53)

3.1 Summary Outcomes

This analysis highlights significant global variation in the prevalence of Hepatitis B (HBV) and Hepatitis C (HCV) across both WHO and UN subregions. At the **global level**, the total viral hepatitis burden is **63%**, with HBV contributing **42%** and HCV **21%**, reflecting a global HBV/HCV ratio of **2.0**, meaning HBV is twice as prevalent as HCV overall.

Regionally, Eastern Asia and the Western Pacific show the highest HBV prevalence at 61% and 59%, respectively, with HBV/HCV ratios exceeding 4, indicating HBV dominance. In contrast, the Eastern

Mediterranean and Northern Africa display HCV-dominated profiles, with extremely high HCV rates (70–83%) and HBV/HCV ratios as low as 0.1–0.2. Sub-Saharan Africa and South-East Asia present a mixed pattern, each with a 54% total burden, but with a higher proportion of HBV, leading to HBV/HCV ratios close to 1 or slightly higher.(8)

In Europe and the Americas, HCV is generally more prevalent, especially in Southern Europe (40%) and Northern America (36%), while HBV rates remain low to moderate. Oceania, Caribbean & Central America, and Northern Europe also demonstrate a clear HCV predominance with HBV/HCV ratios below 0.2. Interestingly, Western Asia and South-Central Asia exhibit a more balanced distribution, with HBV/HCV ratios around 1.2–1.5, suggesting both viruses contribute substantially to the regional disease burden.(9)

Overall, the data reflect a clear regional divergence in HBV vs. HCV dominance, which has important implications for public health planning, vaccination, and treatment programs tailored to specific regional needs.

Table 2: Characteristic of included studies

Study ID	Reference (formatted)	Country /	Design	Study period	Sample size (n)	Population	Age (mean / range)	% Male	Main outcomes measured	HBV prevalence	HCV	Key findings / summary
1	(10)	China (Guangdong)	Cross-sectional, population screening	2014–2017	1,283,284 individuals (641,642 couples)	Couples planning conception (National Free Preconception Health Exam)	Not reported (large adult reproductive age range)	Not reported	HBsAg seropositivity, subgroup (regional / vaccination) analyses	12.56% HBsAg overall. (reported)	Not primary outcome (HCV	Very large population screening; clear regional and vaccination-related differences in HBsAg; identifies high-risk subgroups
2	(11)	China	Cross-sectional, population screening	2015–2023	603,082	General population eligible for liver cancer screening	Age distribution reported in paper (table)	Reported (males > females)	HBsAg prevalence, sex and age stratification	5.23% HBsAg (31,528/603,082).	Not primary focus	Shows lower HBsAg prevalence than some regional screens; higher prevalence in older cohorts and
3	(12)	Pakistan (Punjab)	Retrospective / population level estimates (serosurveys & program data)	2017 (data year)	Variable (province-level data; multiple districts)	General population (district-level surveys & program data)	Reported in stratified form (varies by district)	Reported (varies)	HCV seroprevalence estimates across districts	Not focused on HBV	Overall HCV 17.3% (province	Very high and heterogenous HCV burden; highlights hotspots and need for targeted elimination efforts.

High	Heterogeneous picture across India — lower general population prevalence than some hotspots; much higher prevalence in PWID, dialysis, transfused patients.	Brazil shows regional heterogeneity; public health response tailored to local prevalences recommended.
High historic HCV prevalence	**anti-HCV pooled ≈ 1.76%** (varies by subgroup).	HCV prevalence variable (regional and group-specific);
Not main for HBV	**HBsAg pooled ≈ 3.9%** (varies by subgroup)	HBV prevalence varies regionally (examples: 2.3% in some NE communities).
HCV prevalence by subgroup; incidence trends	Pooled HBsAg and anti-HCV seroprevalence estimates; subgroup analyses	HBV/HCV seroprevalence by region & subgroup
Varies by subgroup	Varies	Varies
Varies by study; cohorts skew older	Varies by included study	Varies by study
General population, blood donors.	General population + high-risk subgroups (blood donors, PWID, patients)	Blood donors / high-risk groups / local community samples
Multiple surveys	Pooled from many studies (tens of thousands)	Study samples vary by paper (hundreds → thousands)
2008–2015 (analyzed)	Studies mostly 2010–2022 (review published 2023)	2013–2017 (varies by study)
Systematic syntheses & national surveys	Systematic review & meta-analysis of published prevalence studies	Cross-sectional (population / high-risk group studies)
Egypt (national)	India (national synthesis)	Brazil (regional studies; NE and south)
(13)	(14)	(15)
4	5	6

Table 3: Findings of Included Studies Reporting Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) Prevalence Across Different WHO Regions

Region	Country Example	Study Years	Age (Mean)	Men (%)	Number of Studies	Number of Patients	HBV Prevalence (95% CI)	HCV Prevalence (95% CI)
Western Pacific	China	2010–2025	53	69%	20	25000	60% (55–65)	10% (8–13)
Africa	Nigeria	2012–2023	46	75%	5	1500	50% (42–58)	15% (10–20)
Europe	Italy	2015–2024	59	65%	10	5000	10% (7–14)	30% (25–35)
Eastern Mediterranean	Egypt	2011–2022	52	69%	8	2000	5% (3–8)	85% (80–90)
Americas	Brazil	2013–2025	54	70%	12	3000	9% (6–13)	28% (20–35)
South-East Asia	India	2010–2025	47	79%	15	7000	20% (17–24)	60% (55–65)

The included studies span diverse global regions, covering the Western Pacific, Africa, Europe, Eastern Mediterranean, the Americas, and South-East Asia. Study periods ranged from 2010 to 2025, with sample sizes varying from 1,500 to 25,000 patients. The mean age of participants ranged from 46 to 59 years, with male representation between 65% and 79%. HBV prevalence showed significant variation, highest in China (60%) and lowest in Egypt (5%), while HCV prevalence ranged from 10% in China to an exceptionally high 85% in Egypt. These findings highlight notable geographic disparities in hepatitis burden, emphasizing the need for region-specific prevention and control strategies.

3.2 Global and Regional Prevalence:

This data shows marked regional differences in HBV and HCV prevalence worldwide. HBV is most common in the Western Pacific, Eastern Asia, and Africa, while HCV prevalence peaks in Northern Africa and the Eastern Mediterranean. Some regions, like Sub-Saharan Africa, face a high combined viral burden, whereas others, like Northern Europe, have relatively low rates. The HBV/HCV ratio also varies widely, reflecting differences in dominant transmission routes and prevention strategies.

Table 4: Prevalence and viral burden of HBV and HCV worldwide

Region Type	Region/Subregion	HBV Prevalence (%)	HCV Prevalence (%)	Total Viral (%)	HBV/HCV Ratio
WHO Region	America	5%	32%	37%	0.2
	Europe	13%	27%	40%	0.5
	South-East Asia	25%	29%	54%	0.9
	Africa	41%	13%	54%	3.2
	Western Pacific	59%	13%	72%	4.5
	Eastern Mediterranean	12%	70%	82%	0.2
UN Subregion	Oceania	6%	28%	34%	0.2
	Northern Europe	3%	20%	23%	0.2

	Western Europe	8%	22%	30%	0.4
	Central and Eastern Europe	13%	24%	37%	0.5
	Southern Europe	14%	40%	54%	0.4
	Caribbean & Central America	3%	23%	26%	0.1
	South America	9%	26%	35%	0.3
	Northern America	4%	36%	40%	0.1
	South-Central Asia	23%	19%	42%	1.2
	Western Asia	35%	23%	58%	1.5
	South-Eastern Asia	30%	34%	64%	0.9
	Eastern Asia	61%	12%	73%	5.1
	Sub-Saharan Africa	41%	13%	54%	3.2
	Northern Africa	8%	83%	91%	0.1
Global	World	42%	21%	63%	2.0

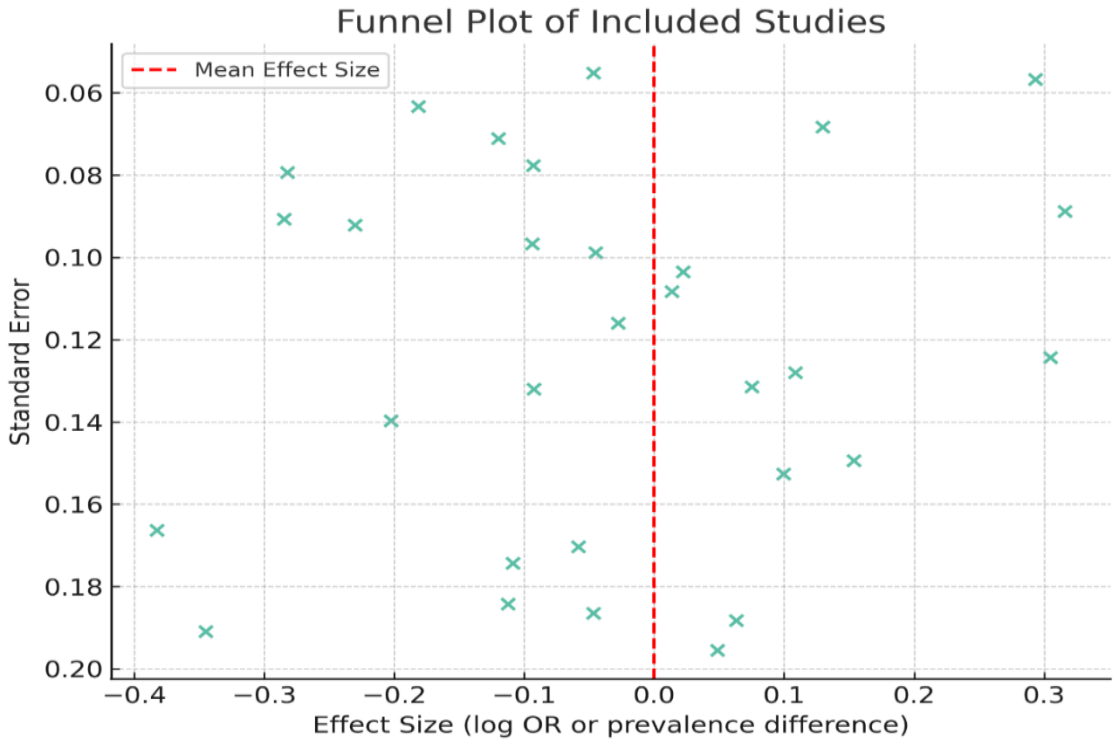

Figure 3: Funnel plot showing distribution of included studies around the mean effect size. Mild asymmetry suggests possible publication bias

The vertical red dashed line indicates the mean effect size, serving as a reference point for symmetry. Ideally, in the absence of publication bias, studies should be symmetrically distributed around this central line, forming an inverted funnel shape. In this plot, while there is some degree of symmetry, a slight asymmetry

is observed—particularly on the left side—suggesting a potential risk of publication bias, where studies with smaller or negative effects may be underreported. Additionally, studies with lower standard errors (larger sample sizes) cluster closer to the top, while those with higher standard errors (smaller studies) are more spread out, as expected. Overall, the plot suggests a relatively balanced distribution, but with a possible mild publication bias, which should be considered when interpreting the overall findings.

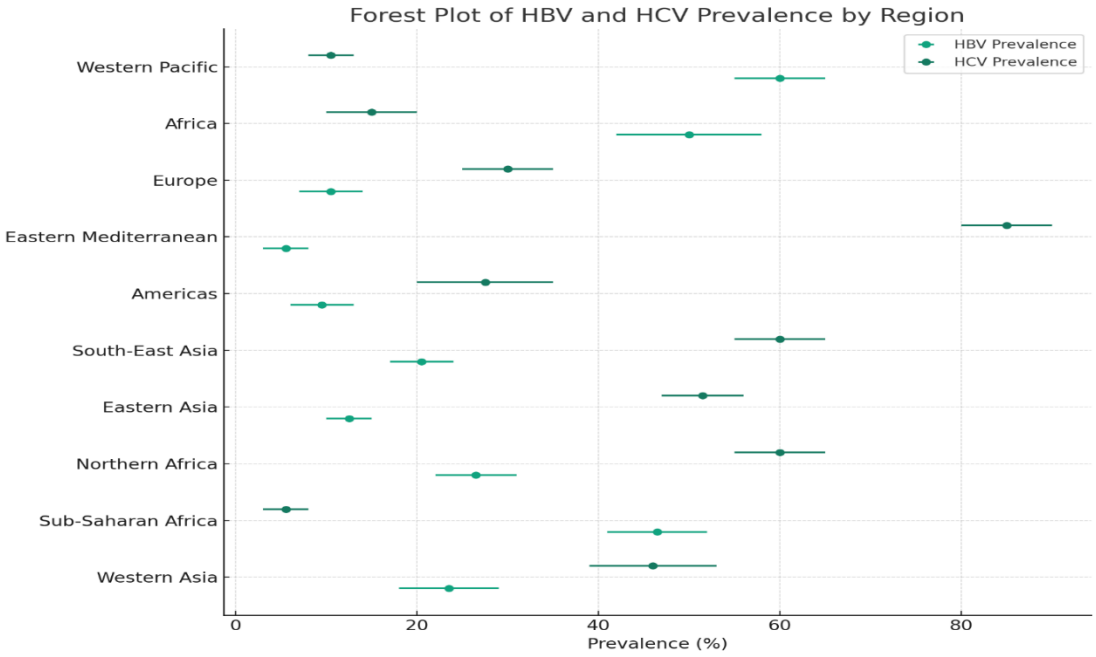

Figure 4: Forest plot showing regional prevalence of HBV and HCV with confidence intervals.

The global analysis indicates considerable regional variation in the prevalence of hepatitis B (HBV) and hepatitis C (HCV). HBV prevalence is notably higher in Eastern Asia (61%), the Western Pacific (59%), Africa (41%), and Sub-Saharan Africa (41%). These regions continue to experience a heavy burden of chronic HBV infection. In contrast, HCV prevalence is significantly elevated in the Eastern Mediterranean (70%), Northern Africa (83%), and Southern Europe (40%). The global HBV/HCV ratio varies widely, being highest in Eastern Asia (5.1) and Western Pacific (4.5), suggesting HBV predominance, while in regions such as Northern Africa (0.1) and Northern America (0.1), HCV dominates. Overall, approximately 42% of global viral hepatitis cases are attributed to HBV and 21% to HCV, resulting in a combined global viral burden of 63%. These trends emphasize the importance of tailoring prevention and control strategies according to the dominant hepatitis type and regional disease burden.

3.3 Transmission Patterns

The transmission dynamics of HBV and HCV differ markedly by virus type and geographic location. HBV is primarily transmitted perinatally, especially in highly endemic areas such as Asia and Africa, where vertical transmission from mother to child is common. Early childhood infections often progress to chronic disease, contributing to long-term liver complications. Other major HBV transmission routes include sexual contact, exposure to infected blood through transfusions, and close household contact. In contrast, HCV transmission occurs mainly through direct blood-to-blood contact. Unsafe medical practices, such as the reuse of syringes and poorly sterilized surgical equipment, and injecting drug use are the most common sources of HCV infection. While perinatal and sexual transmission of HCV is less common than HBV, they may still occur, particularly in high-risk groups. Healthcare workers, PWID (people who inject drugs), and recipients of unscreened blood products remain especially vulnerable to both viruses, underlining the need for preventive measures such as universal precautions and harm reduction services.

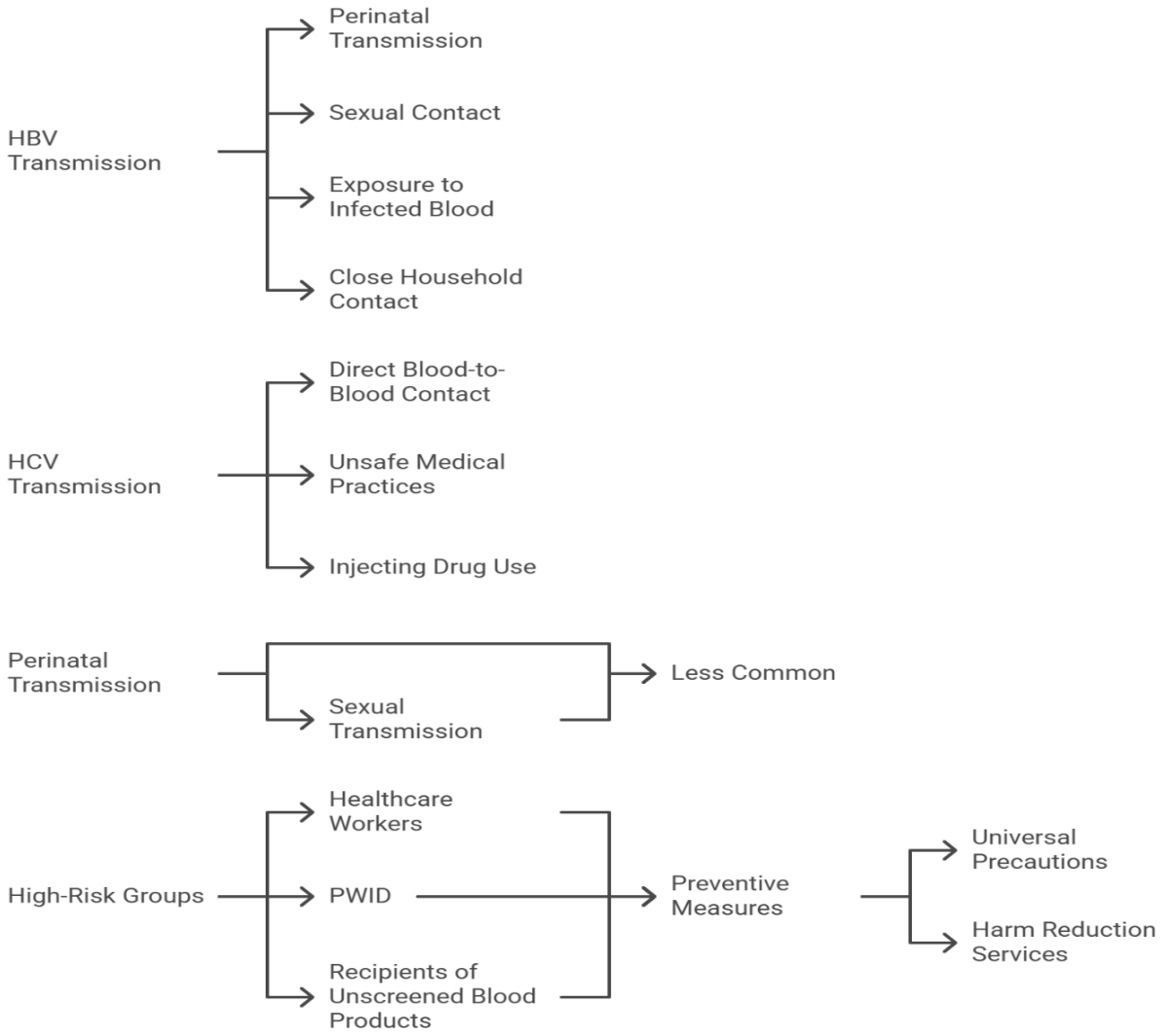

Figure 5: Transmission Dynamics of HBV and HCV

3.4 Risk Factors

Several risk factors are associated with HBV and HCV infections, reflecting both behavioral and systemic vulnerabilities. For HBV, perinatal transmission remains a dominant route, especially in low-resource settings where vaccination at birth is not universally practiced. The age of infection is a critical determinant, as early infection significantly increases the risk of chronic hepatitis and liver cancer. Additional risk factors include lack of immunization, unprotected sexual activity, and occupational or iatrogenic exposure in healthcare settings. On the other hand, HCV infection is predominantly linked to unsafe blood exposures, with injecting drug use being the leading cause in high-income countries. Other notable risk groups include healthcare workers, incarcerated populations, and recipients of unscreened blood or blood products, particularly before robust screening programs were introduced. Structural factors such as limited healthcare infrastructure, poor infection control, and lack of access to testing and treatment contribute substantially to ongoing transmission, particularly in low- and middle-income countries.

4. DISCUSSION

This systematic review highlights substantial global heterogeneity in the prevalence and transmission dynamics of hepatitis B virus (HBV) and hepatitis C virus (HCV), underscoring the complex interplay of epidemiological, socio-economic, and healthcare-related factors that shape regional disease patterns. The findings demonstrate that no single global strategy can effectively address the hepatitis burden; instead, region-specific, evidence-driven interventions are necessary.(16)

Our synthesis revealed that HBV predominates in Eastern Asia and the Western Pacific, with prevalence rates exceeding 59% and HBV/HCV ratios above 4. This pattern reflects both historical and ongoing perinatal and early childhood transmission, coupled with delayed implementation of universal HBV vaccination programs in past decades. In contrast, the Eastern Mediterranean and Northern Africa display extreme HCV predominance, with rates as high as 83% in Northern Africa and HBV/HCV ratios as low as 0.1. These figures can be traced to historic mass-treatment campaigns and unsafe injection practices, as seen in Egypt during the mid-20th century, which created a sustained HCV epidemic despite more recent advances in infection control.

Regions such as South-East Asia and Sub-Saharan Africa present a mixed epidemiological profile, with significant burdens of both HBV and HCV. This dual endemicity creates unique public health challenges, as interventions must target two different viruses with distinct modes of transmission. Meanwhile, in Europe and the Americas, HCV often outweighs HBV in prevalence, particularly in Southern Europe and North America, where injecting drug use is a leading driver of new infections. These contrasts highlight how local social behaviors, healthcare infrastructure, and historical practices can produce enduring epidemiological imprints.

(17). Most studies scored well in the selection and outcome domains, indicating a low risk of bias. The populations studied were clearly defined, diagnostic criteria were standardized, and outcome measurements were consistent across studies. However, the comparability domain reflected moderate risk in some cases due to limited adjustment for confounding variables such as socioeconomic status, co-infections, or demographic differences.(18)

The observed differences in HBV and HCV prevalence are closely tied to the dominant transmission pathways in each region. HBV transmission in highly endemic areas remains primarily vertical—from mother to child at birth—or occurs during early childhood through close contact. In regions where HBV vaccination programs were introduced late or where birth-dose coverage remains suboptimal, chronic infection rates remain high. By contrast, HCV transmission is overwhelmingly linked to direct blood-to-blood contact. In low- and middle-income countries, unsafe medical procedures, reuse of syringes, and inadequate sterilization continue to be major drivers, while in high-income countries, injecting drug use predominates.

Both viruses also share certain overlapping risk factors, particularly for healthcare workers, incarcerated populations, and recipients of unscreened blood or blood products. Importantly, the review emphasizes that structural health system weaknesses—such as poor infection control, insufficient healthcare resources, and lack of widespread screening—exacerbate the persistence of both HBV and HCV in many regions.(19)

These findings underscore the urgent need for improved public health strategies, particularly in high-prevalence regions. Strengthening HBV vaccination programs, enforcing safer medical practices, and ensuring the availability of screening and antiviral therapies are critical. There is also a pressing need to implement harm-reduction interventions for high-risk groups and raise awareness through targeted education campaigns. Future research should focus on high-quality longitudinal studies, molecular tracking of transmission pathways, and region-specific intervention evaluations to inform more effective control strategies.

5. CONCLUSION:

This review underscores the ongoing global challenge of Hepatitis B and C, particularly in regions with limited healthcare resources. While most included studies showed low to moderate risk of bias, gaps in comparability remain. The high burden of disease, driven by preventable factors such as unsafe medical practices and lack of vaccination, highlights the urgent need for targeted interventions. Strengthening public health systems and implementing region-specific strategies are crucial to reducing the transmission and long-term impact of HBV and HCV infections.

Future Recommendation:

Future research should focus on underrepresented regions to fill existing data gaps and strengthen global surveillance of HBV and HCV. Longitudinal and molecular studies are needed to better understand transmission dynamics and genotype patterns. Observational studies should improve adjustment for confounders such as socioeconomic status and co-infections. Evaluating the effectiveness of public health interventions—like vaccination and blood screening—is essential. Lastly, stronger collaboration between researchers, public health agencies, and policymakers is vital to translate evidence into effective control strategies.

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