

LIVER CANCER IN VIETNAM AND ASIA FROM 2013 TO 2023: EPIDEMIOLOGICAL TRENDS AND CONTRIBUTING RISK FACTORS – A SCOPING REVIEW

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ABSTRACT

Objectives: This scoping review explored liver cancer incidence, mortality trends, and risk factors in Vietnam and Asia from 2013 to 2023, using the PCC framework (Population, Concept, Context).

Methods: Following PRISMA-ScR guidelines, a literature search was conducted using PubMed, Web of Science, and Vietnamese sources. Eligible studies were selected and synthesized thematically to provide a comprehensive view.

Results: Thirty-three studies were included. Vietnam and several Asian countries reported some of the highest liver cancer rates globally, with age-standardized incidence rates reaching 20.2 per 100,000 in Vietnam, 25.7 in China, and 31.0 in Mongolia, according to GLOBOCAN 2022 data. Major risk factors include HBV/HCV infections, aflatoxin exposure, alcohol, metabolic disorders, environmental pollution, and poor healthcare access.

Conclusions: The burden of liver cancer remains high in Vietnam and Asia. Comprehensive public health interventions addressing both infectious and lifestyle-related factors, along with improvements in healthcare infrastructure, are urgently needed to address the growing health challenges.

Keywords: Liver cancer, Vietnam, Asia, incidence, mortality, risk factors, HBV, aflatoxins.

1. INTRODUCTION

Liver cancer is a leading cause of cancer-related deaths worldwide, with over 70% of cases occurring in Asia [1]. Hepatocellular carcinoma (HCC), the most common subtype, is strongly linked to chronic hepatitis B and C infections [2]. In Southeast and East Asia, factors such as aflatoxin exposure, alcohol abuse, and NAFLD also contribute to the burden [3]. Vietnam has among the highest rates globally, with over 24,500 new cases and 25,272 deaths in 2022 [4]. Poor hepatitis screening and limited access to early diagnosis exacerbate the situation.

This scoping review aims to provide a systematic summary of liver cancer incidence and mortality in Vietnam and Asia during the past decade, and to examine major contributing risk factors, including viral, metabolic, dietary, genetic, socioeconomic,

and environmental determinants. It also highlights public health challenges and policy gaps that must be addressed to mitigate the rising burden.

2. METHODS

This review adhered to the scoping review methodology outlined in the PRISMA-ScR framework. A comprehensive literature search was conducted using PubMed, Web of Science, Scopus, and major Vietnamese databases. The search strategy utilized key terms including: “liver cancer,” “hepatocellular carcinoma,” “Vietnam,” “Asia,” “risk factors,” “incidence,” “mortality,” and “public health.” Boolean operators (AND, OR) were applied to combine search terms appropriately.

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Searches were limited to publications between 2013 and 2023 in English and Vietnamese. Inclusion criteria focused on studies reporting liver cancer trends, risk factor analyses, or public health strategies relevant to Vietnam or Asian populations. Conference abstracts, editorials, and non-peer-reviewed sources were excluded.

The screening process involved duplicate removal, abstract screening, full-text review, and extraction using a predesigned template. While formal quality assessment is not mandatory in scoping reviews, we conducted a preliminary appraisal of included studies during the full-text screening process. This assessment was based on general indicators, including study design clarity, relevance to the research question, population coverage, and data transparency. This approach aligns with the scoping review objective of mapping key concepts and knowledge gaps rather than evaluating the effectiveness or methodological rigor of individual studies.

Thirty-three eligible studies were ultimately included. A PRISMA flow diagram illustrates the selection process (Figure 1).

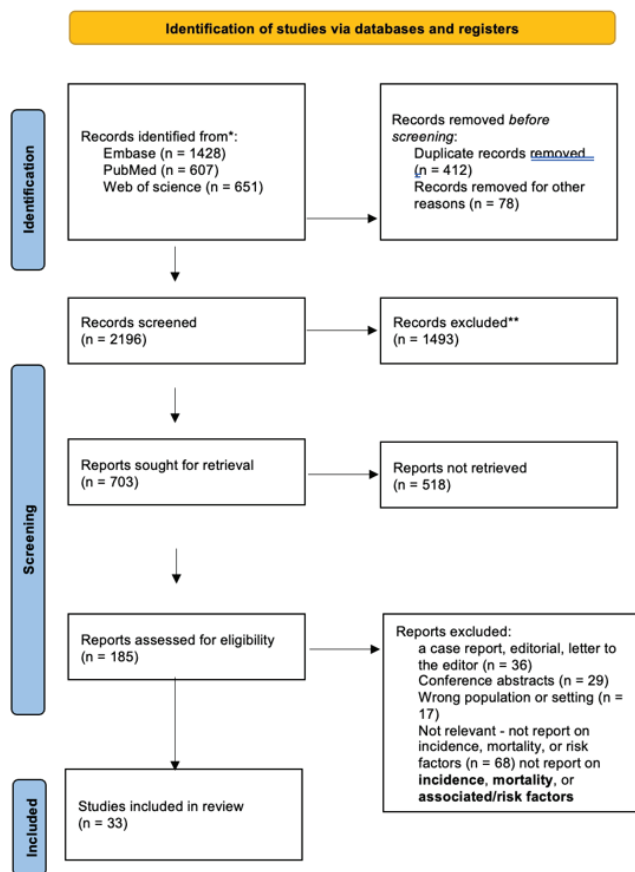


Figure 1. PRISMA Flow Diagram

3. RESULTS

A total of 33 studies were included in this scoping review based on predefined eligibility criteria. These studies investigated various aspects of liver cancer, including incidence, mortality, risk factors, and public health responses across Vietnam and other Asian countries. Of these, 21 representative studies are summarized in Table 1 below, highlighting key findings and geographic diversity. The complete list of all 33 studies is available upon request or in the supplementary material.

Table 1. Representative Studies on Liver Cancer in Vietnam and Asia (n = 21)

First Author	Year	Country/Region	Main Findings
Nguyen M.	2023	Vietnam	Liver cancer ranked 1st in incidence and mortality in 2022
Le QN	2019	Vietnam	HBV prevalence among HCC patients is 81.3%
Le TV	2020	Vietnam	High aflatoxin exposure detected in rural children
Ma X	2023	Hong Kong	Declining liver cancer trend from 1991 to 2020 due to HBV control
Yu MW	2017	Taiwan	Family history and TP53 mutation are associated with HCC
Loomba R	2013	Asia	Obesity and diabetes increase liver cancer risk
Nguyen DS	2022	Vietnam	Rural populations face disparities in liver cancer outcomes
Suh S	2018	Korea	Cirrhosis and HBV infection increase the risk of HCC
Azit NA	2021	Malaysia	T2DM patients have higher HCC risk

First Author	Year	Country/Region	Main Findings
Virani S	2017	Thailand	Alcohol significantly contributes to the HCC burden
Bray F	2021	Global	Liver cancer is the 6th most common and 3rd deadliest cancer worldwide
IARC	2022	Global	Asia accounts for over 70% of liver cancer incidence and mortality
WHO	2017	Global	Global Hepatitis Report emphasizes viral hepatitis as a primary cause of Hepatocellular carcinoma (HCC)
Nguyen TP	2020	Vietnam	NAFLD/NASH cases are rising in Vietnamese cities
Wang X	2019	China	High regional variation in HBV prevalence across Chinese provinces
Tanaka J	2016	Japan	Success of national HBV screening and vaccination programs
Jung KS	2015	Korea	Surveillance and early detection reduced liver cancer mortality
Kim BH	2020	South Korea	Hospital-based study on changing HCC etiologies
Chen CJ	2010	Taiwan	Landmark study on HBV vaccination impact on HCC reduction
Zhou Y	2019	China	Association between aflatoxin and liver cancer confirmed in rural areas
Fan J	2020	China	Integrated liver cancer control improved outcomes in Shanghai

Note: These studies were selected for their geographic diversity and relevance to the topic. A complete list of all 33 included studies is available upon request.

3.1. Incidence and Mortality of Liver Cancer in Asia and Vietnam

According to GLOBOCAN 2022 data, liver cancer incidence rates vary significantly across Asia. Mongolia recorded the highest age-standardized incidence rate (ASR) at 31.0 per 100,000 population, followed by China (25.7), Vietnam (20.2), Thailand (17.5), South Korea (15.9), and Japan (14.1). Vietnam's incidence rate remains among the highest in Southeast Asia and shows signs of a stable or increasing trend over the past decade. In contrast, countries such as Japan and China have experienced gradual declines, primarily attributed to successful hepatitis B virus (HBV) vaccination programs and enhanced public health interventions. These differences reflect disparities in the prevalence of chronic hepatitis B and C infections, healthcare access, and the effectiveness of national cancer control strategies. Vietnam and Mongolia continue to face substantial challenges due to limited access to HBV vaccination and early detection of the disease. At the same time, countries such as Japan and South Korea have achieved gradual declines through well-established hepatitis prevention programs. These trends closely correspond with the regional distribution of chronic HBV and HCV diseases.

Mortality patterns largely reflect incidence trends due to the aggressive nature of liver cancer and limited access to early detection and curative treatment in many countries. In Vietnam, the liver cancer mortality ASR in 2022 was 25.0 per 100,000 - higher than its incidence rate, indicating a substantial case-fatality rate. Although this appears epidemiologically implausible, it may be explained by underreporting of incident cases due to late or missed diagnoses, especially in rural or underserved areas. Meanwhile, mortality data based on death registration systems may be relatively more complete. This discrepancy underscores the need to strengthen cancer surveillance and early detection infrastructure in Vietnam. Similarly, high mortality rates were observed in Mongolia (28.6) and China (23.7). Conversely, Japan has demonstrated significant improvements, with mortality declining to 8.5 per 100,000, thanks to early diagnosis strategies and strong healthcare infrastructure.

Table 1 summarizes the trends in incidence and mortality across selected Asian countries. The data indicate persistent challenges in Vietnam and Mongolia, alongside progress in countries that have implemented robust hepatitis control and cancer screening programs.

Table 2. Trends in Liver Cancer Incidence and Mortality in Asia and Vietnam

Country	Incidence ASR (per 100,000)	Incidence Trend (2013–2022)	Mortality ASR (per 100,000)	Mortality Trend (2013–2022)
Vietnam	20.2	Stable/Increasing	25.0	High and persistent
China	25.7	Decreasing slowly	23.7	Decreasing
Japan	14.1	Decreasing	8.5	Decreasing
Thailand	17.5	Increasing (cholangiocarcinoma)	15.3	Slight decrease
South Korea	15.9	Stable	13.6	Decreasing
Mongolia	31.0	Highest globally	28.6	High and stable

*ASR: Age-Standardized Rate; Data compiled from GLOBOCAN 2022 and national cancer registries

3.2. Contributing Risk Factors

Multiple factors contribute to the high burden of liver cancer in Vietnam and across Asia. Viral hepatitis remains the most significant, with HBV and HCV accounting for up to 75% of cases in the region [5]. In Vietnam, the prevalence of HBsAg among HCC patients has been recorded at 81.3%. Cirrhosis, frequently resulting from chronic hepatitis or alcohol abuse, significantly increases liver cancer risk.

Environmental exposures, such as aflatoxins produced by *Aspergillus* species and commonly found in poorly stored maize and peanuts, are prevalent in rural Vietnam, further elevating the risk of HCC, especially when combined with HBV disease [6]. Meanwhile, lifestyle-related factors

such as excessive alcohol consumption, smoking, obesity, and type 2 diabetes are becoming increasingly important. Vietnam's high alcohol consumption rates, rising urban obesity levels, and the growing incidence of metabolic syndrome contribute to the expanding role of non-viral risk factors [7].

Additionally, familial predisposition and genetic mutations (e.g., TERT, TP53) have been linked to an increased risk of HCC, although studies in Vietnam remain limited. Socioeconomic and environmental factors-including poor access to healthcare, low health literacy, pesticide exposure, and industrial pollution-disproportionately affect rural populations, compounding the risk of late diagnosis and inadequate treatment [8,9].

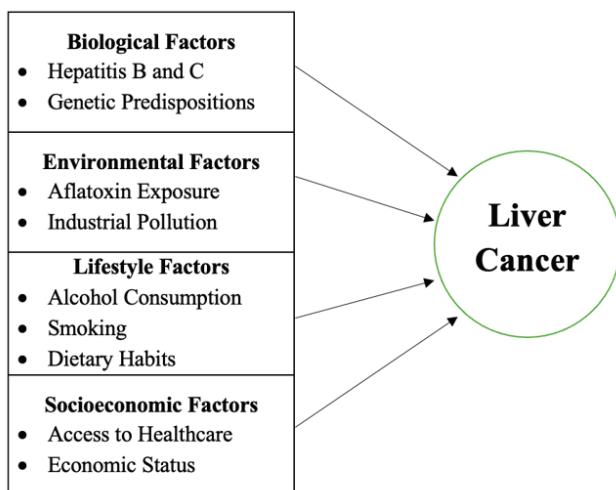
Table 3. Summary of Risk Factors for Liver Cancer in Vietnam and Asia

Risk Factor Category	Examples	Evidence from Vietnam/Asia
Viral Infections	HBV, HCV, cirrhosis	HBV: ~81.3% of HCC cases in Vietnam [5]
Dietary Toxins	Aflatoxin (from moldy maize, peanuts)	Standard in rural areas, high in children's diet [6]
Metabolic Disorders	Obesity, diabetes, NAFLD/NASH	Rising in urban populations [7]
Behavioral Factors	Alcohol consumption, smoking	High in men; linked to cirrhosis and HCC
Genetic Susceptibility	Family history, TP53, TERT mutations	Limited data in Vietnam; present in East Asia [8]
Environmental/Social	Pesticides, industrial waste, and limited healthcare	Rural disparities in access and exposure [9]

Table 4. Comparative Prevalence of Major Risk Factors (HBV, aflatoxin, obesity, diabetes, alcohol consumption) in Selected Asian Countries

Country	HBV Prevalence (%)	Aflatoxin Exposure	Obesity (%)	Diabetes (%)	Alcohol Use (liters/capita/year)
Vietnam	10–20	High	~15	~6.0	8.3
China	7–10	High	~6–8	~11.2	7.2
Thailand	5–7	Moderate	~10	~9.9	6.9
Japan	<1	Low	~4	~7.6	7.5
South Korea	~4	Low	~5	~8.6	10.2

* Data approximated from WHO, IARC, and country-specific reports

**Figure 2. Framework of Risk Factors in Vietnam and Asia**

4. DISCUSSION

Liver cancer remains one of the leading causes of cancer-related deaths in Asia. As reported in GLOBOCAN 2022, the region accounts for over 70% of global liver cancer cases and deaths [3]. In Vietnam, both incidence and mortality rates are among the highest globally, with minimal decline over the past decade [4]. By contrast, countries such as Japan and South Korea have achieved notable reductions in incidence and mortality due to their longstanding HBV vaccination programs and effective surveillance systems [10].

For instance, a study by Ma et al. (2023) in Hong Kong documented a steady decline in liver cancer incidence from 1991 to 2020, primarily attributed to improvements in hepatitis control and healthcare access [10]. These findings underscore the importance of integrated prevention and control policies.

In Vietnam, the persistent burden is closely

associated with high HBV prevalence, limited access to antiviral therapy, and poor public awareness [5]. Moreover, emerging contributors such as diabetes, obesity, and aflatoxin exposure compound the burden, especially in underserved areas [6,7]. Despite national efforts to vaccinate against hepatitis B, adult coverage remains low, particularly in rural populations. Access to screening services is limited in remote areas, and community-based early detection programs are still underdeveloped. These gaps contribute to delayed diagnoses and persistently high mortality rates.

Environmental risks, notably aflatoxin exposure due to improper food storage, remain prevalent in agricultural communities. In rural and highland regions, inadequate food storage increases the risk of aflatoxin contamination. In urban centers, alcohol use, obesity, and diabetes are key contributors. Rural populations also face challenges in accessing HBV vaccination and routine screening services, contributing to delayed diagnoses. These emerging non-infectious risk factors, including dietary toxins and metabolic conditions, are becoming increasingly important in specific regions and now contribute significantly to the overall risk, alongside traditional viral causes.

Successful strategies from other Asian countries offer applicable models. Japan and Taiwan have reduced liver cancer through HBV screening and early diagnosis. Vietnam should strengthen primary care and integrate liver disease management into local health services.

Addressing liver cancer requires intersectoral collaboration. Improvements in food safety, health education, and access to diagnostic tools are crucial. Furthermore, a unified national cancer registry would enable better tracking of incidence and outcomes, supporting more targeted public health interventions.

5. CONCLUSION

Liver cancer remains a significant health challenge in Vietnam and Asia. Its burden is driven by a combination of viral, environmental, metabolic, and socioeconomic factors. To reduce the incidence and mortality of hepatitis, Vietnam should expand hepatitis screening and treatment, strengthen early detection systems, regulate food safety, and invest in community-based health services. Future efforts must prioritize comprehensive strategies and long-term policy commitments to address both traditional and emerging risk factors.

Priority should be given to vulnerable groups, including rural populations with limited healthcare access, children who have not received complete HBV vaccination, and individuals with chronic liver disease or a family history of liver cancer. Targeted interventions for these high-risk groups are crucial in reducing the disease burden and improving outcomes.

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