# Burden of Alcohol-Associated Liver Disease in Asia: Implications for Health Systems and Public Health Policy

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**Abstract**

Alcohol-related disease is a rapidly escalating public health challenge across Asia, driven by economic growth, urbanization, and changing cultural norms around alcohol use. Despite lower per capita consumption than in Western countries, the region bears a disproportionately high burden of alcohol-attributable harm, reflecting patterns of heavy episodic drinking, widespread unrecorded alcohol use, and limited access to effective prevention and treatment services. Alcohol contributes to a wide range of conditions, including alcohol-associated liver disease, cancers, cardiovascular disease, and injuries, and accounts for a substantial proportion of disability-adjusted life years (DALYs) in the region. This burden places significant pressure on health systems through increased hospital admissions, intensive care use, and long-term management of chronic complications, while also generating major economic losses at both household and societal levels. Strengthening population-level prevention policies and integrating early detection and treatment into health systems are essential to reduce alcohol-related harm across Asia.

**Keywords**

Alcohol-related disease · Asia · Public health burden · DALY · Liver disease · Alcohol-associated liver disease · Healthcare systems · Mortality · Policy · Prevention · Health economics

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**List of Abbreviations**

| | |
|---|---|
| ALD | Alcohol-associated liver disease |
| AUD | Alcohol use disorder |
| DALY | Disability-adjusted life year |
| WHO | World Health Organization |
| YLL | Years of life lost |
| YLD | Years lived with disability |

## Introduction

Alcohol-related disease encompasses a broad spectrum of conditions attributable to alcohol consumption, including acute injuries, chronic diseases, and long-term disabilities (Danpanichkul et al. 2025a, b). These conditions include alcohol-associated liver disease (ALD), various malignancies, cardiovascular disorders, neuropsychiatric conditions, and trauma-related injuries (Danpanichkul et al. 2025b). As a modifiable behavioral risk factor, alcohol is implicated in more than 200 disease and injury conditions globally and has become an increasingly important driver of noncommunicable disease (NCD) burden (Nisreen 2026).

Asia is undergoing a profound epidemiological and socioeconomic transition that has reshaped patterns of alcohol consumption and its associated harms (Danpanichkul et al. 2025a). Historically, many Asian countries maintained relatively low levels of alcohol use, shaped by cultural, religious, and social norms. Over the past two decades, however, rapid economic development, urbanization, and globalization have dramatically altered this landscape. Rising disposable incomes, aggressive marketing by multinational alcohol industries, and expanding beverage availability have collectively driven increased consumption across the region (Bassi et al. 2026). This transformation has positioned Asia among the fastest-growing alcohol markets globally.

The burden of alcohol-related disease in Asia is further amplified by distinctive regional characteristics. Drinking patterns frequently involve heavy episodic or binge drinking rather than regular moderate intake, which confers a higher risk of acute complications such as injuries and cardiovascular events (Piano et al. 2025). Additionally, widespread consumption of unrecorded alcohol, including home-produced and illicitly manufactured beverages, poses significant health risks due to contamination and inconsistent alcohol content. These factors contribute to the so-called alcohol harm paradox, whereby populations with comparatively lower average consumption experience disproportionately higher morbidity and mortality.

A further critical dimension is the interaction between alcohol use and endemic disease. In many Asian countries, chronic viral hepatitis, particularly hepatitis B virus (HBV) infection, remains highly prevalent (Kaewdech et al. 2024; Danpanichkul et al. 2024a). Alcohol acts synergistically with viral hepatitis to accelerate liver disease progression, substantially increasing the risk of cirrhosis and hepatocellular carcinoma (HCC) (Ha and Yao 2024). The rising prevalence of metabolic dysfunction-associated steatotic liver disease (MASLD) introduces

additional complexity, with overlapping metabolic and alcohol-related pathways compounding hepatic injury (Danpanichkul et al. 2024a). Together, these interactions underscore alcohol's role as a cross-cutting risk factor that amplifies harm across multiple disease domains.

The health impact of alcohol in Asia must also be understood within the region's broader epidemiological transition. As countries shift from infectious disease to NCD-driven mortality, alcohol has emerged as a key contributor to premature death and disability among working-age populations (Danpanichkul et al. 2024b). This shift carries substantial societal and economic consequences, including reduced workforce productivity, increased healthcare expenditure, and widening health inequities.

Despite the growing burden, policy responses and healthcare system preparedness vary considerably across the region. Although some countries have enacted regulatory measures, including taxation, advertising restrictions, and drink-driving legislation, enforcement remains inconsistent, and treatment services for alcohol use disorder (AUD) are frequently inadequate (Malawige et al. 2025). These gaps highlight the urgent need for coordinated, evidence-based strategies addressing both population-level risk determinants and individual-level care.

This chapter examines the evolving epidemiology of alcohol-related disease in Asia, its implications for health systems, and the policy and public health responses required to mitigate its consequences. Understanding these dynamics is essential for designing effective, context-sensitive interventions suited to the diverse and rapidly changing environments of the Asian region.

## Epidemiology of Alcohol-Related Disease in Asia

The epidemiological landscape of alcohol consumption and its associated disease burden in Asia has undergone a profound transformation over the past two decades. While traditionally high-consuming regions in Europe and the Americas have seen a stabilization or decline in per capita intake, Asia, particularly South and Southeast Asia, has emerged as the primary driver of global increases in alcohol consumption and alcohol-attributable harm (Danpanichkul et al. 2025a). This shift is inextricably linked to rapid economic development, urbanization, and the aggressive expansion of global alcohol markets into middle-income countries (Sornpaisarn et al. 2020). Asia is now the fastest-growing alcohol market in the world, with a 176% increase in sales recorded between 2000 and 2019 (Alcohol Policy in the WHO South-East Asia Region: A Report 2026).

### Prevalence and Consumption Patterns

Alcohol consumption across Asia is characterized by marked regional heterogeneity, reflecting a complex interplay of religious demographics, socioeconomic factors, and historical drinking traditions.

### Southeast Asia

This subregion represents the epicenter of global consumption growth. In Vietnam, adult per capita consumption (APC) increased by 26.8% between 2010 and 2019. Thailand operates within a more regulated environment yet records an APC nearly double the regional average for the WHO South-East Asia Region (SEAR) (Danpanichkul et al. 2025a; Global status report on alcohol and health 2018). By contrast, Muslim-majority nations such as Indonesia and Malaysia maintain lower aggregate consumption levels owing to religious prohibition, although notable disparities persist among non-Muslim ethnic minority populations (Danpanichkul et al. 2025a; Robert Lourdes et al. 2022).

### East Asia

Dominated by the mature but evolving markets of China and Japan, this region has seen unprecedented rises in intake. China's alcohol consumption has increased by 382% since 2000 (Ji et al. 2026). By 2024, the prevalence of past-year alcohol use among Chinese adults was estimated at 27.6%, with 42.9% of current drinkers engaging in heavy episodic drinking (HED) (Ji et al. 2026). Mongolia represents a severe case, leading the region in several alcohol-attributable metrics, including a high prevalence of alcohol use disorder (AUD) (Cui et al. 2025).

### South Asia

Driven primarily by India, alcohol consumption in this subregion has nearly doubled since 1990 (Danpanichkul et al. 2025a). While a large portion of the population (particularly women) remains lifetime abstainers exceeding 95% in some surveys, the intensity of drinking among those who do consume alcohol is exceptionally high (Kerr et al. 2017).

### Recorded vs. Unrecorded Alcohol

A critical epidemiological feature in Asia is the high prevalence of unrecorded alcohol, which includes homemade, illegally produced, or smuggled spirits (Alcohol Policy in the WHO South-East Asia Region: A Report, 2026). Unrecorded alcohol constitutes approximately 50% of total alcohol consumption in the WHO SEAR (Table 1) (Shield et al. 2025). In countries such as Bangladesh, Indonesia, Nepal, and Timor-Leste, unrecorded alcohol is estimated to exceed 80% of total consumption (Alcohol Policy in the WHO South-East Asia Region: A Report 2026). This poses severe public health risks due to methanol contamination, which frequently leads to mass poisoning outbreaks and fatalities in rural areas of India, Bangladesh, and Cambodia (Manning and Kowalska 2021).

## Alcohol-Attributable Mortality

Alcohol use is associated with more than 200 disease and injury conditions (Global status report on alcohol and health 2018). In Asia, the mortality risk per liter of pure

**Table 1** Alcohol consumption patterns across Asian subregions (Shield et al. 2025)

| Subregion | Adult APC* Total | Adult APC Recorded | Adult APC Unrecorded | Current drinkers (%) | HED Prevalence (%) |
|---|---|---|---|---|---|
| **Global** | 5.5 (4.9, 6.2) | 4.3 (3.8, 4.8) | 1.2 (0.8, 1.6) | 43.8 (42.8, 44.8) | 16.7 (14.5, 18.9) |
| **East Asia** | 5.7 (3.5, 7.9) | 4.8 (3.0, 6.6) | 0.9 (0.0, 2.2) | 61.2 (56.9, 65.4) | 14.8 (4.2, 25.4) |
| **South Asia** | 3.9 (2.1, 5.8) | 2.4 (1.2, 3.6) | 1.5 (0·0, 3.1) | 25.5 (23.4, 27.6) | 9.9 (9.0, 10.8) |
| **Southeast Asia** | 3.9 (3.2, 4.7) | 2.5 (2.0, 3.0) | 1.3 (0.8, 2.0) | 31.9 (31.0, 32.9) | 13.2 (12.8, 13.6) |
| **Central Asia** | 3.7 (3.0, 4.5) | 3.0 (2.4, 3.7) | 0.7 (0.4, 1.0) | 21.4 (20.3, 22.5) | 7.9 (7.6, 8.1) |

*APC* adult per capita consumption (liters), *HED* heavy episodic drinking, 3-year averages

alcohol consumed is higher than in high-income countries due to lower aggregate economic wealth and limited healthcare access (Rehm et al. 2025).

### Liver Disease

ALD is the dominant contributor to alcohol-attributable mortality. In 2021, Asia accounted for 49.51% of global ALD mortality[1,21]. South Asia bears the highest crude burden (99,790 deaths in 2021), while Central Asia has the highest age-standardized death rate (ASDR) at 11.63 per 100,000 (Danpanichkul et al. 2025a).

### Cancers

Alcohol is a confirmed carcinogen. In Asia, it synergizes with endemic infectious diseases like HBV to accelerate primary liver cancer (PLC), which saw alcohol-attributable cases increase by 94.1% between 2000 and 2021 (Danpanichkul et al. 2025b). East Asian populations also face a unique biological risk: the aldehyde dehydrogenase 2 (ALDH2) genetic variant, which impairs acetaldehyde metabolism and significantly elevates the risk of esophageal and head and neck cancers even at low intake levels (Jung et al. 2025).

### Cardiovascular Disease (CVD)

Excessive alcohol consumption increases the risk of stroke. In Southeast Asia, the age-standardized mortality rate for stroke attributable to alcohol has experienced the largest global increase (Qian et al. 2025). Furthermore, mortality from alcohol-related atrial fibrillation and flutter has risen markedly in East Asia (Wang et al. 2025).

### Injuries

Alcohol use is a major contributor to road traffic injuries. In Thailand, alcohol is implicated in approximately 26% of all road traffic fatalities (Road safety 2026). Across the WHO South-East Asia Region (SEAR), the road traffic fatality rate is 18.5 per 100,000 population, nearly twice that observed in high-income countries (Road safety 2026).

## Morbidity and Disability

Asia accounts for nearly half of the global prevalence and mortality of ALD, driven by rapid economic growth and expansion of alcohol markets (Table 2) (Xu et al. 2021; Danpanichkul et al. 2025c; Rehm and Shield 2013). The burden of disease is commonly quantified using disability-adjusted life years (DALYs), which integrate years of life lost (YLLs) due to premature mortality and years lived with disability (YLDs).

**Table 2** Liver disease burden attributable to alcohol in Asia (Xu et al. 2021; Danpanichkul et al. 2025c; Rehm and Shield 2013)

| Parameters | Key findings |
|---|---|
| Global ALD mortality | Asia bears nearly half of the world's ALD death burden (49.5%). |
| Regional ALD prevalence | 4.8% higher than the global average of 3.5%. |
| Regional DALYs | Rising rapidly in South and Southeast Asia subregions (4%) |
| Subregion with highest crude death burden | South Asia: 99,790 ALD-related deaths in 2021 |
| Subregion with Highest ASDR | Central Asia: ASDR of 11.63 per 100,000 |
| PLC prevalence increase (2000–2021) | +94.1%, driven by synergy with endemic hepatitis B |
| Genetic risk factor | ALDH2 variant present in 30–40% of East Asians; elevates cancer risk |

*ASDR* age-standardized death rate, *PLC* primary liver cancer

### Regional DALYs

In 2012, alcohol-related harm accounted for 4.0% of total DALYs in the WHO SEAR. By 2021, Asia contributed 47.85% of the global prevalence of AUD (Danpanichkul et al. 2025a; Zhang et al. 2022). Although global ASMR and YLLs for conditions such as stroke have declined, likely reflecting improvements in acute care, YLD rates have remained largely unchanged (Qian et al. 2025). This pattern suggests that while survival following acute events has improved, a substantial proportion of individuals continue to live with long-term disability.

### Gender Disparity

Males bear a vastly higher burden. In 2021, the DALYs for alcohol-related pancreatitis among Asian males were 9.3 times higher than among females, primarily due to higher volumes of consumption and binge drinking patterns (Li et al. 2025).

## Alcohol-Associated Liver Disease as a Major Driver

ALD encompasses a broad spectrum of hepatic injury, ranging from simple steatosis to alcohol-associated hepatitis (AH), advanced cirrhosis, and HCC.

### Spectrum of Liver Disease

The progression of ALD follows a continuum of histological changes reflecting the liver's maladaptive response to chronic ethanol exposure, shaped by genetic susceptibility, drinking patterns, and comorbid metabolic factors.

### Alcohol-Associated Steatotic Liver Disease

Hepatic steatosis is the earliest and most prevalent histological manifestation of ALD, occurring in up to 90–95% of heavy drinkers (Zhang et al. 2022). It is characterized by the accumulation of lipid droplets, predominantly triglycerides, within the hepatocyte cytoplasm, typically originating in the perivenular (Zone 3) regions of the hepatic lobule. The principal biochemical driver is a profound redox imbalance: ethanol metabolism via the alcohol dehydrogenase (ADH) pathway generates an elevated NADH:$NAD^+$ ratio, suppressing mitochondrial β-oxidation of fatty acids and promoting de novo lipogenesis (Cederbaum 2012). Although hepatic steatosis is largely asymptomatic and reversible with sustained abstinence, its presence heightens hepatic vulnerability to secondary insults, including gut-derived endotoxemia.

### Alcohol-Associated Hepatitis (AH)

AH is a distinct and potentially life-threatening clinical syndrome defined by the acute onset of jaundice, fever, and severe hepatic inflammation. Although AH may arise at any stage of ALD, it is most frequently encountered in patients with preexisting cirrhosis. Histological features include hepatocyte ballooning, Mallory-Denk bodies, and dense neutrophilic infiltration. Disease severity is a critical determinant of short-term outcomes: without intervention, 28–90-day mortality may reach 30–50% (Altamirano et al. 2014). Risk stratification relies on validated prognostic tools, including the Model for End-Stage Liver Disease (MELD) score, which has demonstrated superiority over the Maddrey Discriminant Function (mDF) in predicting short-term mortality (Morales-Arráez et al. 2022).

### Alcohol-Associated Cirrhosis

Chronic alcohol-induced injury triggers a persistent wound-healing response characterized by the activation of quiescent hepatic stellate cells (HSCs) into myofibroblasts (Friedman 2008). These cells deposit an excessive amount of extracellular matrix, leading to the replacement of liver parenchyma with regenerative nodules surrounded by fibrous septa. Cirrhosis is a terminal stage associated with life-threatening complications, including portal hypertension, ascites, variceal bleeding, and hepatic encephalopathy. The 5-year mortality rate for patients with symptomatic alcohol-associated cirrhosis exceeds 50%, a figure significantly higher than that of other chronic liver diseases (Åberg et al. 2024).

### Hepatocellular Carcinoma (HCC)

HCC is a devastating complication that occurs in up to 10% of patients with alcohol-associated cirrhosis (Huang et al. 2023). Alcohol is a recognized class 1 carcinogen; its metabolite, acetaldehyde, forms covalent adducts with DNA, which leads to mutations and chromosomal instability (Lózsa et al. 2026). Furthermore, chronic alcohol consumption induces oxidative stress and activates inflammatory pathways, such as NF-κB, creating a protumorigenic microenvironment (Wang et al. 2015). Despite this high risk, HCC surveillance in patients with ALD is often underutilized

compared to surveillance in patients with other etiologies of liver disease (Ganne-Carrié and Nahon 2025).

## Interaction with Viral Hepatitis, Metabolic Dysfunction, and ALD

The burden of ALD in Asia is frequently amplified by synergistic interactions with other chronic liver conditions, particularly viral hepatitis and metabolic dysfunction.

### Viral Hepatitis-Alcohol Synergy

The copresence of alcohol use and HBV infection leads to a multiplicative increase in the risk of cirrhosis and HCC. Alcohol intake dramatically accelerates disease progression by enhancing HBV replication and suppressing the host's antiviral immune response (Pathania and Osna 2026). A recent meta-analysis established a clear dose-dependent relationship: each daily consumption of 12 g of alcohol (approximately one standard drink) increases the risk of cirrhosis by 6.2% and the risk of HCC by 11.5% (Wu et al. 2025). Similarly, in the context of HCV, no "safe" level of alcohol intake has been established, and even light consumption accelerates fibrosis progression (Monto et al. 2004).

### Metabolic Risk Amplification

The 2023 introduction of the metabolic and alcohol-related liver disease (MetALD) phenotype formally recognizes individuals who fulfill criteria for MASLD while consuming alcohol above established thresholds (≥20 g/day in women, ≥30 g/day in men) (Arab et al. 2025; Kaewdech and Sripongpun 2024; Rinella et al. 2023). The pathological synergy underlying this phenotype is explained by a "multihit" mechanism: insulin resistance augments hepatic free fatty acid flux, while ethanol concurrently promotes de novo lipogenesis. Critically, both insulin resistance and chronic ethanol exposure are potent inducers of cytochrome P450 2E1 (CYP2E1) (Leung and Nieto 2013). This combined induction produces a disproportionate surge in reactive oxygen species (ROS), overwhelming endogenous antioxidant defenses and accelerating the transition to advanced fibrosis and hepatic malignancy (Buzzetti et al. 2016).

## Impact on Health Systems

The substantial burden of ALD in Asia extends far beyond individual morbidity and mortality, exacting a profound and multifaceted toll on the region's health systems. This impact manifests as immense operational strain on healthcare facilities, elevated utilization of critical resources, and staggering economic costs that challenge the fiscal sustainability of national health frameworks. As nations across Asia grapple with the dual pressures of communicable and NCD, the escalating burden attributable to alcohol consumption presents a formidable obstacle to achieving universal health coverage and sustainable development goals. This section reviews the direct

consequences of alcohol-related harm on healthcare service delivery and its cascading economic implications for both national budgets and individual households.

## Hospitalizations and Healthcare Utilization

Hazardous and harmful alcohol consumption is a primary driver of a wide spectrum of acute and chronic medical conditions, leading to a significant surge in demand for healthcare services. This increased utilization spans the entire continuum of care, from emergency departments and intensive care units (ICUs) to long-term inpatient stays and specialized outpatient clinics. Data from across the Asian continent paint a concerning picture of health systems under duress.

ALD, particularly cirrhosis, has emerged as a leading cause of hospitalization and a major contributor to healthcare resource consumption in many Asian countries. In South Korea, a nation with a high per capita alcohol consumption rate, ALD is not only the principal indication for liver transplantation but also a primary driver of recurrent hospital admissions, creating a revolving-door phenomenon that strains hospital capacity. These admissions are frequently complicated by life-threatening events such as variceal hemorrhage, ascites, and hepatic encephalopathy, all of which necessitate complex, resource-intensive medical interventions.

Beyond hepatic diseases, alcohol consumption is a major risk factor for traumatic injuries, which disproportionately burden emergency services and surgical wards. In Thailand, for instance, major public holidays like the Songkran festival are consistently marked by a sharp spike in road traffic accidents. Official reports indicate that over 50% of drivers involved in fatal or severe crashes during these periods have blood alcohol concentrations exceeding the legal limit (Suwannarit et al. 2023). Victims of such incidents often require emergency surgery, critical care, and extensive long-term rehabilitation, placing immense pressure on both personnel and infrastructure.

### ICU Admissions

Patients suffering from severe, acute complications of alcohol use frequently require admission to an ICU. Conditions such as acute-on-chronic liver failure (ACLF), severe alcoholic pancreatitis, and alcoholic ketoacidosis demand high-dependency care, advanced organ support, and continuous monitoring. A nationwide cohort study in Taiwan revealed that patients with alcoholic cirrhosis admitted to the ICU face significantly higher mortality rates and incur greater healthcare costs compared to other critically ill patient populations (Huang et al. 2020). The intensity of care required for these patients diverts critical resources, including specialized staff and equipment, from other essential services.

### Recurrent Admissions

Recurrent hospitalization is a hallmark of ALD, particularly in patients with AUD and alcohol-associated hepatitis. Readmission rates are high, with about 30% of patients rehospitalized within 30 days of discharge, often driven by early alcohol

relapse and hepatic decompensation (Peeraphatdit et al. 2020). This cycle worsens patient outcomes, impairs quality of life, and places substantial strain on hospital resources. Importantly, early alcohol rehabilitation and AUD treatment significantly reduce readmission, relapse, and liver-related complications, highlighting the need to integrate addiction care into routine hepatology practice (Singal et al. 2025).

## Transplant Demand

For patients with end-stage ALD, liver transplantation remains the only definitive, life-extending therapy. In Asia, where organ donor rates are already critically low, the rising demand for liver grafts among patients with ALD further exacerbates the existing organ shortage. Major transplant centers in India and China have reported a steady increase in the proportion of patients on liver transplant waiting lists with alcohol-attributable liver disease (Choudhary et al. 2022). Moreover, liver transplantation represents a substantial resource-intensive intervention for healthcare systems, encompassing comprehensive pretransplant evaluation, a high-risk surgical procedure, and lifelong posttransplant management. This includes chronic immunosuppressive therapy and ongoing clinical monitoring, all of which contribute to significant long-term healthcare costs.

Figure 1 illustrates the pathways through which alcohol-related harm translates into systemic strain. It begins with harmful consumption leading to acute events that overwhelm emergency services and progresses to chronic conditions that demand recurrent, specialized, and ultimately highly advanced and costly interventions. This cascade effect creates a bottleneck, compromising the health system's ability to respond effectively to the broader health needs of the population.

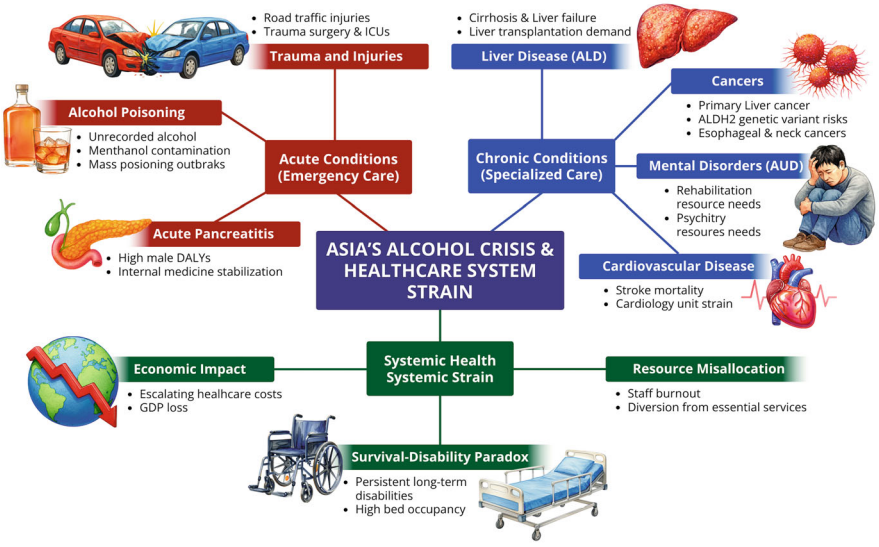



**Fig. 1** Health-system pathways and strain from alcohol-related disease

## Economic and Financial Costs

The impact of alcohol extends beyond the clinical domain, imposing a substantial economic burden at both national and household levels. These costs can be broadly categorized into direct and indirect expenditures, representing a significant drain on economic productivity and a barrier to sustainable societal development.

### Direct Medical Costs

Direct medical costs constitute the most immediately quantifiable component and include all expenditures associated with the diagnosis and management of alcohol-attributable diseases and injuries (Luangsinsiri et al. 2025). These encompass costs related to diagnostic testing, pharmacotherapy, hospitalizations, surgical interventions, and professional healthcare services. An economic analysis from South Korea estimated that direct medical costs for alcohol-related conditions account for a considerable proportion of total national healthcare expenditure, with liver cirrhosis and hepatocellular carcinoma representing major cost drivers (Chung et al. 2006). Similarly, a recent cost-of-illness study in Thailand reported that alcohol consumption imposes a substantial direct healthcare burden, with annual healthcare expenditures exceeding 4.3 billion baht (approximately US$120 million). When broader direct costs including healthcare, law enforcement, and property damage are considered, the total exceeds 6.0 billion baht (approximately US$170 million) annually (Luangsinsiri et al. 2023).

### Indirect Productivity Loss

Indirect productivity losses constitute the largest component of the alcohol-attributable economic burden. In Thailand, recent cost-of-illness analyses indicate that indirect costs account for more than 95% of the total economic burden of alcohol consumption, driven predominantly by productivity losses due to premature mortality (Luangsinsiri et al. 2024). Severe ALD disproportionately affects working-age men, those most likely to be economically active and primary household earners (Danpanichkul et al. 2024c). Consequently, the resulting loss of labor participation extends beyond individual morbidity, with far-reaching effects on household income, workforce productivity, and overall national economic output.

## Vulnerable Populations and Inequities

### Age and Gender Differences

ALD does not affect all populations equally. Emerging data from Asia, consistent with global observations, highlight important age- and sex-based disparities that should inform prevention and care strategies. Although ALD has historically been considered a disease of middle-aged men, recent evidence suggests a more complex epidemiologic pattern. In several Asian settings, an increasing burden is observed

among younger adults (Yoo et al. 2024). While male predominance persists, the burden among women is also rising (Kilian et al. 2023).

Across Asia, burden estimates and meta-analytic data demonstrate substantial heterogeneity in ALD prevalence, incidence, and mortality across subregions, reflecting differences in drinking behaviors, healthcare access, economic transitions, and alcohol policy environments (Danpanichkul et al. 2025a). This heterogeneity is clinically significant, as it indicates that age at onset and disease trajectory are not uniform across the region. In some populations, earlier exposure to hazardous drinking, normalization of alcohol use among younger adults, and delayed diagnosis may shift disease presentation to younger age groups (Danpanichkul et al. 2024c).

Population-based data from Taiwan support this concern, showing that patients with ALD cirrhosis are younger than those with nonalcohol-associated cirrhosis, with a substantially higher proportion aged <60 years (Yang et al. 2020). Although this comparison is limited to cirrhosis cohorts rather than the general population, it reinforces the concept that alcohol-related chronic liver injury may manifest earlier in life and disproportionately affect working-age individuals (Danpanichkul et al. 2024c).

Korean nationwide data further strengthen the age-related signal. A large population-based cohort study demonstrated significant age-stratified shifts in drinking behavior, including persistently high-risk alcohol consumption among younger- and middle-aged adults, accompanied by a rising burden of ALD (Yoo et al. 2024). Importantly, these findings indicate that prevention strategies should not be limited to older individuals with long-standing alcohol use but should also target younger populations in whom harmful drinking patterns may already be established. This has important implications for long-term disease burden, as earlier onset is associated with increased cumulative years lived with disease, a higher risk of progression to cirrhosis, and downstream complications such as hepatocellular carcinoma.

Consistent with global data, sex-based differences in ALD remain pronounced across Asian populations, with men demonstrating substantially higher prevalence than women. Meta-analytic evidence from Asia and China confirms a clear male predominance, reflecting both greater alcohol exposure and long-standing cultural norms that have historically promoted alcohol use among men (Belay et al. 2023). However, this persistent male predominance should not obscure an important emerging trend: the burden of ALD among women is increasing in several settings, particularly in East Asia (Wang et al. 2026).

South Korea provides a notable example of this shift. Nationwide analyses have documented rising rates of high-risk drinking among women, including younger- and middle-aged groups, even as some male age groups show stabilization or decline in high-risk alcohol use (Yoo et al. 2024). Additional cohort data further indicate an increasing proportion of women among patients diagnosed with ALD over time. This trend is particularly concerning because women are more susceptible to alcohol-related liver injury at lower levels of exposure and over shorter durations of consumption compared to men, due to biological factors such as differences in body composition, alcohol metabolism, and hormonal influences (Bizzaro et al. 2023).

Overall, current evidence supports a dual message: while ALD in Asia remains strongly male-predominant, involvement of younger age groups is increasing, and the rising burden among women is becoming more apparent. These patterns underscore the need for targeted public health strategies stratified by age and sex, including school- and workplace-based prevention, culturally tailored risk communication, and earlier screening of high-risk populations.

## Socioeconomic and Cultural Determinants

Beyond age and sex, ALD is strongly shaped by socioeconomic and cultural determinants that influence alcohol exposure, risk behaviors, disease recognition, and access to care (Weichselbaum et al. 2025). In Asia, disparities in ALD burden across countries and subregions likely reflect differences in poverty, urbanization, educational attainment, healthcare infrastructure, and alcohol market regulation (Danpanichkul et al. 2025a). Although liver-specific studies in Asia often lack direct causal analyses of these determinants, the available epidemiologic evidence consistently implicates structural inequities as key drivers of disease burden.

Poverty may increase vulnerability to ALD through multiple pathways, including greater exposure to hazardous drinking environments, limited access to preventive and addiction services, delayed diagnosis, and a higher likelihood of presenting with advanced disease. Regional burden estimates demonstrate substantial heterogeneity in ALD prevalence and mortality across Asia, underscoring the role of macro-level socioeconomic conditions in shaping disease distribution (Danpanichkul et al. 2025a). Within China, meta-analyses and large community-based studies further reveal variation in alcohol use and ALD prevalence by education, income, and place of residence (Tang et al. 2023; Feng et al. 2024). Collectively, these findings support the concept that ALD burden is socially patterned, even when poverty is not directly or uniformly measured.

Informal alcohol markets represent another important, yet undercharacterized, determinant. In many settings, unrecorded or locally produced alcohol is more affordable and accessible, particularly among lower-income populations, potentially increasing both harmful consumption and exposure to unsafe products (Probst et al. 2021). Although most liver-focused studies in Asia do not directly quantify informal alcohol use, broader epidemiologic patterns, including rising burden in rapidly transitioning economies and regions with inconsistent alcohol policy enforcement, are consistent with the impact of unregulated alcohol availability (Danpanichkul et al. 2025a). This gap highlights a critical priority for future research: the need to systematically distinguish between recorded and unrecorded alcohol consumption when assessing ALD risk.

Occupational factors also contribute to ALD risk. Work-related stress, shift work, labor migration, job insecurity, and drinking-centered social or professional norms may promote harmful alcohol use in specific sectors. Community-based studies from China demonstrate variation in drinking patterns and ALD prevalence across occupational groups, providing preliminary support for this association (Wang et al. 2022).

Moreover, the concentration of ALD among working-age adults, as observed in Korean epidemiologic studies, underscores a bidirectional relationship between ALD and socioeconomic disadvantage: adverse occupational and income conditions may increase alcohol-related harm, while ALD itself reduces productivity, increases healthcare expenditures, and exacerbates financial instability (Jang and Kim 2018).

Healthcare system factors may further amplify these disparities. Nationwide data from South Korea demonstrate low uptake of alcohol cessation treatment following ALD diagnosis, highlighting a substantial gap between disease recognition and effective intervention (Kim et al. 2021). When access to specialist care is limited, referral pathways are fragmented, or treatment costs are prohibitive, socially disadvantaged populations are more likely to remain untreated and progress to advanced liver disease (Weichselbaum et al. 2025). Thus, inequities in ALD reflect not only differential exposure to alcohol but also disparities in the capacity of health systems to deliver timely and effective care.

## Prevention, Policy, and Control Strategies

The strategic framework for alcohol control in Asia is guided by the World Health Organization (WHO) Global Alcohol Action Plan 2022–2030 (2026) and the SAFER technical package (2026). The WHO "Best Buys" refer to three highly cost-effective, population-level interventions: increasing excise taxes on alcohol, restricting its physical availability, and enforcing comprehensive bans on advertising, sponsorship, and promotion. "Good Buy" interventions include screening and brief interventions, treatment for AUD, and countermeasures to prevent drink-driving. Although these measures are well supported by evidence, their effectiveness depends largely on health system capacity and the strength of policy enforcement.

In practice, alcohol control strategies operate at two complementary levels. Population-level interventions aim to shift consumption patterns across entire populations through regulatory and fiscal policies that influence alcohol availability, affordability, and marketing. In parallel, health system-level interventions address alcohol-related harm at the individual level through screening, early intervention, and treatment services integrated within healthcare delivery systems (Kilian et al. 2023). The following sections review the evidence base and implementation challenges for both domains in Asian countries.

Despite increasing policy attention, the implementation of alcohol control measures across Asia remains heterogeneous. Comparative analyses from Southeast Asia indicate that, although many countries have adopted key policies such as taxation and drink-driving legislation, substantial gaps persist in enforcement, regulation of alcohol marketing, and provision of treatment services for AUD. These shortcomings reflect limitations in regulatory capacity, fragmented governance structures, and continued commercial influence on alcohol markets, all of which hinder effective policy implementation (Tong et al. 2026; Assanangkornchai et al. 2026) (Fig. 2).

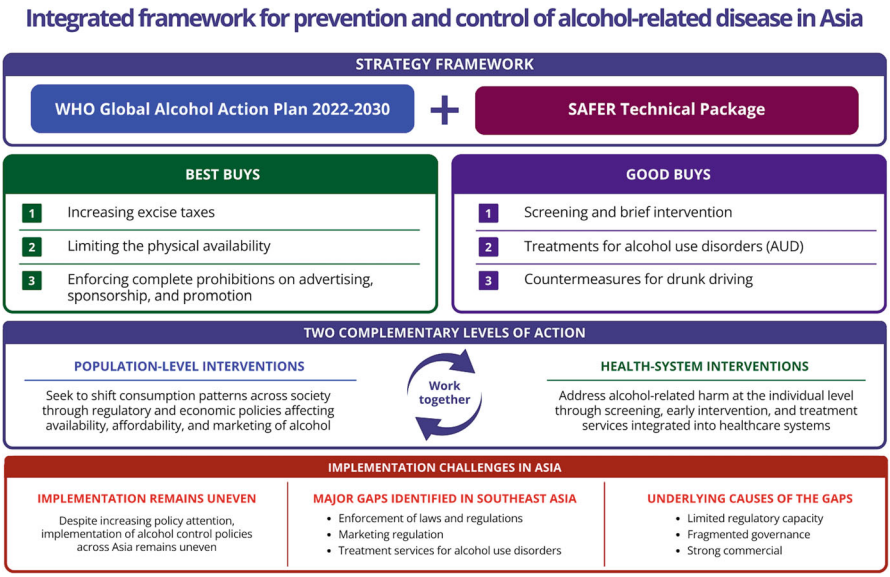



**Fig. 2** Integrated framework for prevention and control of alcohol-related disease in Asia

## Population-Level Interventions

### Taxation and Pricing

**WHO guidance**: Raising alcohol prices through excise taxation or minimum unit pricing (MUP) is among the most effective strategies for reducing alcohol consumption and alcohol-attributable harm. To maintain effectiveness over time, alcohol taxes should be regularly adjusted for inflation to prevent increasing affordability (The SAFER technical package 2026; LeClercq et al. 2021).

**Practices in Asia**: Alcohol taxation policies across Asia are highly heterogeneous. Some countries, such as Thailand and the Philippines, impose relatively high excise taxes, whereas others are in transition. For example, Vietnam is progressively increasing its beer excise tax to 65%, with plans to raise it further to 90% by 2031 (Harm et al. 2026a). Evidence from Thailand demonstrates that excise tax increases and structural reforms between 1996 and 2017 were associated with significant reductions in alcohol consumption, with major policy changes in 2013 and 2017 linked to declines of approximately 9% and 23%, respectively (Zayar et al. 2026).

In contrast, China maintains relatively low excise tax rates on alcohol (Ji et al. 2021). India applies very high state-level excise taxes, in some cases reaching up to 400% on spirits such as whiskey (Schess et al. 2023), while Indonesia imposes import duties of up to 150% on foreign spirits, substantially increasing retail prices (Post 2026). Malaysia has also recently increased alcohol excise taxes by 10% as part of its national budget (Federvini 2026). Despite these measures, several structural challenges persist. Most countries do not systematically index alcohol taxes to inflation, resulting in declining real prices over time in many markets. In addition, no

country in the region has implemented a minimum unit pricing policy. A further major challenge is the high prevalence of unrecorded alcohol consumption, estimated to account for approximately 30% of total consumption in ASEAN countries, which complicates taxation, regulation, and enforcement efforts (Rehm et al. 2014; Srisuk et al. 2022).

### Physical Availability Restrictions

**WHO guidance**: Limiting the physical availability of alcohol includes setting a minimum purchase age (MPA), restricting hours and days of sale, and regulating outlet density through licensing systems. Higher MPAs (typically 18–21 years) are associated with lower levels of alcohol consumption among youth (Alcohol Control Act 2026). Policies that restrict access, such as reduced sales hours, limits on outlet density, and enforcement of licensing regulations, have been shown to reduce alcohol consumption and related harms. Evidence indicates that restricting sales hours or banning alcohol sales on specific days can lead to reductions in both overall consumption and alcohol-related injuries (Siegfried et al. 2014). Similarly, limiting the issuance of new retail licenses and enforcing MPAs are effective population-level interventions.

**Practices in Asia**: Across Asia, most countries have established MPAs ranging from 18 to 21 years (e.g., 18 in China and India, 19 in South Korea, and 20 in Thailand). However, implementation and enforcement vary widely. In many countries, there are no standardized national restrictions on hours of sale, and 24/7 availability, including through online and delivery platforms, is increasingly common. For instance, China does not impose nationwide time restrictions on alcohol sales, and e-commerce platforms play a significant role in distribution (Translate CL 2023).

In contrast, Thailand has implemented more stringent controls, including restricted sales hours (11:00–14:00 and 17:00–24:00), although some restrictions (e.g., the 14:00–17:00 ban) have been temporarily relaxed under a 180-day trial period (Assanangkornchai et al. 2026). India exhibits substantial heterogeneity at the state level: some states impose strict controls, such as bans on public alcohol sales in Himachal Pradesh, while others restrict sales after certain hours (e.g., after 23:00) or on specific occasions such as election days (Schess et al. 2023).

### Marketing and Promotion Restrictions

**WHO guidance**: The World Health Organization recommends comprehensive bans on alcohol advertising, promotion, and sponsorship across all media platforms, including television, radio, Internet, outdoor billboards, and event-based marketing. However, a Cochrane review concluded that the evidence base for advertising bans remains limited and of low quality, largely due to the scarcity of experimental and quasiexperimental studies evaluating their effectiveness (Siegfried et al. 2014).

**Practices in Asia**: Policies regulating alcohol marketing across Asia vary considerably. Thailand has implemented one of the most comprehensive frameworks in the region, prohibiting all broadcast alcohol advertising since 2008. Cambodia has recently strengthened its regulatory framework (2024), introducing restrictions that

prohibit advertising content that glamorizes alcohol consumption or depicts women in sexualized or promotional roles (Harm et al. 2026b). Vietnam's 2019 Alcohol Harm Prevention Law prohibits advertising of alcoholic beverages with an alcohol by volume (ABV) ≥15% (Harm et al. 2026a); however, advertising for beer remains permitted. In China, the 2021 Advertising Law restricts depictions of alcohol consumption and drink-driving and prohibits misleading health-related claims (Translate CL 2023). In contrast, both South Korea and Japan have no comprehensive national bans on alcohol advertising (Kato et al. 2022). India also lacks a nationwide prohibition; while the Broadcast Code restricts direct advertising of alcoholic beverages, indirect promotion is permitted through surrogate advertising and related commercial content (Cable Television Networks Rules 1994). Despite these regulatory measures, alcohol marketing remains widespread across much of Asia, particularly through digital platforms, cinema advertising, and sports sponsorships. Importantly, regulatory loopholes, such as brand extension strategies, event sponsorship, and digital marketing, often enable alcohol companies to maintain substantial promotional exposure even in settings with formal restrictions (Assanangkornchai et al. 2026).

### Drink-Driving Countermeasures

**WHO guidance**: The World Health Organization recommends the implementation of blood alcohol concentration (BAC) limits, with lower thresholds for novice and professional drivers. In addition, random breath testing (RBT) and sobriety checkpoints are highly effective enforcement measures for reducing alcohol-impaired driving and related injuries (Global status report on road safety 2018).

**Practices in Asia**: Most countries in Asia have adopted BAC limits consistent with WHO recommendations and actively enforce drink-driving regulations. Thailand and Vietnam both implement a 0.05% BAC limit; notably, Vietnam introduced a zero-tolerance policy for all drivers in 2019 (Harm et al. 2026a). China and India permit up to 0.05% BAC, although enforcement practices vary. In China, practical enforcement thresholds are often lower (approximately 0.02% for private vehicle drivers) under road safety regulations (Ji et al. 2021). Japan and South Korea apply BAC limits ranging from 0.03% to 0.05% for private drivers. Enforcement intensity also varies across the region. China implemented extensive enforcement activities, including approximately 2300 sobriety checkpoints per day in 2015 (Ji et al. 2021). Thailand relies on frequent sobriety checkpoints conducted daily, although these are not consistently structured as formal random breath-testing programs (Global status report on road safety 2018). The Philippines' Republic Act 10586 ("Anti-Drunk and Drugged Driving Act" of 2013) establishes a 0.05% BAC threshold as legal evidence of driving under the influence for private vehicles (Badua 2021).

## Health-System Interventions

### Alcohol Screening, Brief Intervention, and Referral to Treatment (SBIRT)

**WHO guidance**: The World Health Organization recommends routine integration of alcohol use screening (e.g., AUDIT) and brief interventions into primary care and emergency department settings, along with expansion of treatment services for alcohol dependence, including both psychosocial and pharmacologic approaches. Meta-analyses demonstrate that brief interventions have modest but consistent effectiveness, with even single 5–15 min counseling sessions associated with significant reductions in alcohol consumption (Tanner-Smith and Risser 2016).

**Practices in Asia**: SBIRT remains the least implemented component of the SAFER package across Asia. Most health systems lack standardized alcohol screening protocols embedded within routine clinical care (Tong et al. 2026; Assanangkornchai et al. 2026). Although countries such as Japan and South Korea have highly developed healthcare systems, alcohol-related care is largely reactive, with intervention typically occurring after clinical crises such as hospital admission for withdrawal or advanced disease, rather than through preventive screening in primary care settings (Kim et al. 2021; So et al. 2025). In China and India, the availability of addiction specialists is limited relative to population needs, and there are no established national SBIRT programs (Patel et al. 2016). Some pilot initiatives exist: in Thailand, selected public hospitals have implemented AUDIT-based screening and brief intervention training on a limited scale (Assanangkornchai et al. 2026), while in India, sporadic efforts within medical colleges include training in AUD screening (Alcohol Policy in the WHO South-East Asia Region: A Report 2026). However, these efforts remain fragmented and have not been scaled into national programs. Overall, there is no standardized, region-wide SBIRT framework in Asia. Even in settings where specialized addiction treatment centers exist (e.g., de-addiction units in Indian tertiary hospitals), continuity of care remains limited, with weak outpatient follow-up and poor integration into long-term management systems.

## Applications to Public Health

Based on the epidemiological and policy evidence reviewed in this chapter, it is clear that alcohol control policies identified by the WHO as "Best Buys" and "Good Buys" can yield substantial public health benefits (Global alcohol action plan 2022-2030 2026; The SAFER technical package 2026). Population-level interventions have consistently been associated with reductions in alcohol consumption and alcohol-related harm. Evidence from both policy modeling and real-world evaluations indicates that pricing and availability measures can reduce alcohol-attributable hospital admissions, injuries, and mortality. Collectively, these findings suggest that strengthening implementation of these interventions across Asian countries could generate meaningful health gains.

In the short term, we recommend that governments prioritize fiscal and regulatory measures. Increasing excise taxes (and regularly indexing them to inflation) or implementing minimum unit pricing can rapidly reduce alcohol consumption and related harms, while comprehensive restrictions on alcohol marketing can reduce population exposure, particularly among adolescents and young adults. In parallel, strengthening drink-driving policies can reduce alcohol-related traffic injuries. Within the clinical domain, health systems should proactively integrate alcohol screening and brief interventions (SBIRT) into primary care to identify hazardous and harmful drinking early and provide brief advice, brief intervention, and referral for specialized treatment when indicated.

In the longer term, sustained reductions in alcohol-related harm will require stronger governance and monitoring systems. Governments should reinforce licensing and enforcement mechanisms, expand treatment services for alcohol use disorders within universal health coverage (UHC) frameworks, and strategically consider reinvesting a portion of alcohol tax revenues into prevention and treatment programs. Robust surveillance systems, including systematic monitoring of alcohol consumption, alcohol-attributable harms, and policy implementation, are essential for evaluating effectiveness and guiding policy refinement. An integrated approach aligned with the WHO SAFER framework (The SAFER technical package 2026) and the Global Alcohol Action Plan 2022–2030 (2026) provides a comprehensive strategy for countries in Asia to reduce alcohol-related harm and improve population health outcomes.

## Conclusion

ALD is a rapidly growing public health problem in Asia with major impacts on individuals, health systems, and national economies. Rapid socioeconomic change, shifting drinking patterns, and a high background burden of liver disease have contributed to an increase in alcohol-related harm that exceeds global trends. Although alcohol consumption per capita is generally lower than in Western countries, Asia carries a disproportionately high burden of alcohol-related disease and death. This is driven by high-risk drinking behaviors, widespread unrecorded alcohol use, biological vulnerability in some populations, and limited access to prevention and treatment services. ALD is a major contributor to this burden, often occurring alongside viral hepatitis and metabolic liver disease.

The consequences extend beyond health outcomes. Alcohol-related illness places a significant strain on healthcare systems through increased hospitalizations and long-term care needs. It also creates major economic losses through healthcare spending and reduced productivity. Reducing this burden requires a comprehensive response. Population-level policies such as higher alcohol taxes, restrictions on availability and marketing, and stronger drink-driving laws are among the most effective strategies. At the same time, health systems must improve early detection and treatment of alcohol use disorders by integrating screening and brief interventions into primary care and expanding access to care. In the long term, progress will

depend on sustained political commitment, stronger enforcement of alcohol policies, and better surveillance systems. Strategies should be tailored to regional and cultural differences and aligned with health system capacity. Reducing alcohol-related harm in Asia is both a public health priority and an important investment in future social and economic development.

## Mini-Dictionary of Terms

- **Alcohol-associated liver disease (ALD)**
  A spectrum of liver injury caused by chronic alcohol exposure, ranging from steatosis to cirrhosis and liver cancer.
- **Heavy episodic drinking (HED)**
  Consumption of a large amount of alcohol in a short period, increasing the risk of acute complications and long-term organ damage.
- **Unrecorded alcohol**
  Alcohol not captured in official statistics, including homemade or illicit products, often associated with higher toxicity and safety risks.
- **Disability-adjusted life years (DALYs)**
  A measure of overall disease burden combining premature mortality and years lived with disability.
- **Alcohol harm paradox**
  A situation where populations with lower average alcohol consumption experience disproportionately higher health-related harm.
- **MetALD**
  A condition characterized by coexisting metabolic dysfunction and harmful alcohol intake, leading to accelerated liver disease progression.
- **SBIRT (Screening, Brief Intervention, and Referral to Treatment)**
  A healthcare strategy for early identification and management of individuals at risk, including brief counseling and referral for specialized care.

## Summary Points

- Alcohol-related disease is a major and rapidly increasing contributor to morbidity and mortality in Asia, driven by economic growth, urbanization, and changing drinking behaviors.
- Asia accounts for nearly half of global alcohol-associated liver disease (ALD) mortality, highlighting its disproportionate disease burden.
- Despite lower per capita alcohol consumption compared with Western regions, Asia experiences higher harm per liter consumed due to binge drinking patterns and unrecorded alcohol use.
- Unrecorded alcohol constitutes up to 50–80% of total consumption in some countries, increasing risks of toxicity, poisoning, and preventable deaths.

- Alcohol contributes to more than 200 disease and injury conditions, including liver disease, cancers, cardiovascular disease, and trauma.
- Alcohol-related liver disease is the leading driver of alcohol-attributable mortality, with increasing incidence in younger populations and working-age adults.
- Synergistic interactions between alcohol and HBV, HCV, and MASLD/MetALD significantly accelerate progression to cirrhosis and hepatocellular carcinoma.
- Alcohol imposes a substantial burden on health systems, including high hospitalization rates, ICU utilization, recurrent admissions, and increasing demand for liver transplantation.
- The economic impact is profound, with indirect costs (productivity loss) accounting for up to 80–90% of total societal costs in several Asian countries.
- Implementation of effective alcohol control policies in Asia remains heterogeneous and often limited by weak enforcement, regulatory gaps, and insufficient treatment infrastructure.
- Evidence-based strategies, including taxation, availability restrictions, marketing bans, and health-system interventions (SBIRT)—are essential to reduce alcohol-related harm.

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