Implementing sustainable liver health in Europe: a second EASL–*Lancet* Commission

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See **Comment** page 1736
Second report of the EASL–*Lancet* Commission on liver health in Europe

Executive summary

In December 2021, the European Association for the Study of the Liver (EASL)–*Lancet* Commission on liver disease in Europe launched its first report, which highlighted an alarming increase in liver-related mortality in many European countries. The Commission proposed a roadmap for addressing the documented negative trends. However, quoting one of the accompanying Comment articles, "gaining consensus on what needs to be done is perhaps the easiest step. Implementing change will be much harder, with many vested interests, both professional and commercial, to overcome." This Commission aimed to evaluate and advance the enactment of the previously proposed recommendations.

We evaluated a range of evidence to update and refine the current burden and future projections of liver disease in Europe. This evidence included the 2023 update to the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD), a dedicated modelling framework developed by the Organisation for Economic Co-operation and Development (OECD), and data from both public (eg, UN and WHO) and modelling-based research databases (eg, Polaris Observatory). Cirrhosis and liver cancer cause almost 780 deaths per day in the WHO European Region, accounting for 3% of all deaths. Between 2000 and 2023, rates of liver cancer mortality have increased by more than 50%, and mortality from cirrhosis has remained persistently high. Liver disease burden has a pronounced negative effect on population-level health and life expectancy, and in the absence of liver diseases, the combined economies of the EU27 countries and Norway, Iceland, the UK, and Switzerland (otherwise known as the EU27+4) would be larger by an estimated €55 billion per year, highlighting the unsustainable economic and societal cost of inaction.

Liver disease encapsulates many of the challenges and opportunities that apply to a range of other chronic conditions, which share common risk factors and potential preventative solutions. Eliminating risk factors related to health behaviour (ie, lifestyle) alone would almost halve the burden of liver diseases in the EU27+4 and increase life expectancy. When accounting for the benefits of reducing alcohol consumption and excess weight on other major non-communicable diseases (such as cardiovascular diseases and type 2 diabetes), and cancers, average life expectancy would increase by 10·8 months (range 2·7 to 25·6 months across countries). Using GBD estimates for 2023, we show that three-quarters of the alcohol-attributable disability-adjusted life years lost in the WHO European region relate to non-liver-related causes such as other non-communicable diseases (47%), cancers (13%), and injuries (12%), reinforcing that addressing liver-related risk factors also

Key messages

- Mortality from cirrhosis has remained persistently high in the WHO European region since 2000, with liver cancer mortality increasing by more than 50%, and the cost of liver disease to the combined economies of the EU27+4 (EU member states, plus Norway, Iceland, the UK, and Switzerland) being now estimated at €55 billion per year
- Consumption of alcohol and unhealthy foods are key drivers for liver-related mortality in Europe, and eliminating risk factors related to health behaviour would almost halve the burden of liver diseases in the EU27+4
- Liver disease is closely linked to broader health and longevity harms, which is exemplified by the fact that, in the WHO European region, three-quarters of the alcohol-attributable disability-adjusted life-years lost are due to non-liver-related primary causes, particularly other non-communicable diseases
- Our modelling of viral hepatitis shows that 25% of migrants with chronic hepatitis B and 44% with chronic hepatitis C come from low endemicity countries and would therefore be excluded from testing under current international guidelines
- The European Beating Cancer Plan emphasises the importance of early detection and prevention, yet has overlooked surveillance strategies specific to liver cancer
- The current digital marketing ecosystem and social media algorithms amplify structural determinants of liver health and promote behaviours related to alcohol and unhealthy food consumption in children and adolescents
- The absence of transparency of medicine pricing across Europe exemplifies the extensive health policy and legislative heterogeneity in this region, and joint procurement initiatives and pricing cooperation would strengthen the negotiating capacity of European countries
- Early detection of progressive liver disease requires integrated care pathways, including primary care, endocrinology, psychiatry, and peer-led initiatives, supported by precision diagnostics with an emphasis on non-invasive liver fibrosis assessments, artificial intelligence-driven risk stratification, and updated educational models that account for relevant multimorbidity
- Building upon democratic values of solidarity and equity, the EU and national governments should update and harmonise health-related policies based on the evidence presented in this report and associated recommendations, and develop standardised liver health indicators to drive transparent monitoring of outcomes

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results in broader health and longevity benefits to individuals and society.

By examining the varied landscape of health-related policies and health systems across Europe, we show the complexity of the challenge and the need for common actions to support the implementation of an updated set of evidence-based recommendations.

A fundamental shift is needed, moving away from traditional, fragmented hepatology services towards integrated care models that embed both liver disease prevention and management within broader health-care delivery that focuses on common risk factors. Notable progress includes integrated care pathways in countries such as the UK and Denmark, involving primary care, endocrinology, psychiatry, and cardiology, supported by precision diagnostics, non-invasive fibrosis assessments, and artificial intelligence-driven risk stratification. However, clinical innovation alone is insufficient without robust implementation of public health policies. Policy makers across Europe must act decisively to address liver disease through the implementation of comprehensive and consistent policies, as proposed throughout this report. These initiatives align closely with the WHO Europe best buy policies on non-communicable diseases, including taxation and stricter restrictions on advertising and availability of alcohol and unhealthy foods, and with efforts to enhance transparency of medicine prices throughout Europe.

Recommendations

- Integrate pathways of care for liver disease with other chronic disease pathways, managing multi-morbidity.
- Recognise steatotic liver disease as a preventable non-communicable disease within the core non-communicable disease framework, and invest in equitable prevention and care strategies.
- Develop and implement a European liver health education and training framework.
- Integrate mental health support and anti-stigma approaches into liver disease prevention and care services.
- Strengthen and implement primary and secondary prevention programmes for liver cancer.
- Enforce Europe-wide regulations on digital advertising and marketing of alcohol and unhealthy foods and drinks, particularly algorithm-driven marketing targeting those under 18 years.
- Implement legislation to require mandatory health warnings on alcohol-containing beverages, at the point of purchase and consumption.
- Implement policies and interventions to address the health needs of migrants across Europe, with a strong focus on viral hepatitis elimination.
- Provide publicly accessible guidance frameworks for structuring market entry agreements for medicines that balance equitable access with sustainable pricing.
- Encourage voluntary joint procurement initiatives and pricing cooperation among EU member states to strengthen their negotiating capacity, particularly for high-cost or high-uncertainty drugs.
- Exclude the alcohol industry and their agents from the formulation of public health policy, and from interactions with policy makers, health and public health leaders, and from alcohol harm reduction activities.
- Align taxation of alcohol and unhealthy foods to the economic burden they impose, including costs incurred by health-care systems, law enforcement, the justice system, and social services.

The EU and WHO Europe should lead by developing standardised liver health indicators, monitoring outcomes transparently, and guiding states to implement and adjust policies based on the evidence presented in this report. Building upon experience gained from tobacco control, the EU and national governments must urgently address commercial and other structural determinants of health, including digital marketing targeted at children and adolescents. Exposure to social media algorithms often promotes unhealthy behaviours, which pose severe long-term risks. Comprehensive bans on digital marketing to children, coupled with initiatives to foster health literacy from early childhood, will help protect exposed populations from adopting harmful health behaviour patterns. To achieve measurable progress, clear benchmarks with accountability frameworks should be established at the European level. Such initiatives must explicitly integrate liver disease into broader public health agendas, such as Europe's Beating Cancer Plan and non-communicable disease strategies.

Our modelling highlights that WHO viral hepatitis elimination targets will not be achieved in Europe unless testing is expanded to all migrants. Migration to Europe is complex in terms of the pathways and dynamics, with a large influx of refugees, asylum seekers, and undocumented migrants in recent years due to political conflicts. The WHO European region hosts an estimated 101 million migrants (people living in a different country from where they were born, including refugees and asylum seekers), representing the largest regional share (approximately 36%) of the global international migrant population. Using hepatitis B virus and hepatitis delta virus infection as examples, we show the considerable effect of migration on health and how this varies throughout selected European countries. European governments must integrate liver health into migrant health policies, ensuring universal access to hepatitis screening, vaccination, and continuity of care.

Europe stands at a critical juncture. The prevalence and burden of liver diseases and their close links with broader health and social issues in Europe present both a stark challenge and a historic opportunity. European policy makers, health-care systems, communities with lived experience, patient groups, and other individuals must collaborate urgently and decisively. Substantially

reducing liver disease burden and mortality across the continent is possible by leveraging Europe's potential for coordinated action, strong governance, and evidence-based policy interventions. This effort requires immediate, sustained commitment, reflecting democratic values of solidarity, equity, and the right to health for all. It also requires a compelling narrative that faces down spurious accusations of paternalism, and articulates the benefits to all from such interventions. This effort would, as shown throughout the report, have profound and broad health and societal benefits far beyond hepatology.

Introduction

In the first report from the European Association for the Study of the Liver (EASL)–*Lancet* Commission, we placed liver health on the public policy agenda and underscored the urgency of addressing liver disease, given its high burden and disproportionate effect on young Europeans.[1,2] In contrast to other non-communicable diseases (NCDs), liver-related mortality is increasing.[3] Premature mortality among people of working age is driven by the combined effect of high alcohol consumption and obesity-related behaviours,[4] whereas in older adults, it is often caused by undiagnosed yet treatable chronic viral hepatitis, which may progress to hepatocellular carcinoma. Although some initiatives undertaken during and after the first Commission report have responded to the recommendations it proposed (appendix 1 pp 55–68), substantial barriers to implementation remain, and sustained efforts are needed to translate these recommendations into meaningful change across Europe and beyond.[1,2]

The preventive hepatology approach of the EASL–*Lancet* Commission resonates and aligns with the current Regional Director of the European region of WHO 2025–30, Dr Hans Kluge, who declared that WHO aims to tackle NCDs with a focus on preventing cardiovascular diseases and cancers, and build an NCD-resilient European region.[5] The WHO action plan includes addressing the commercial determinants of NCDs, supporting national innovation policies, and scaling up the engagement of civil society, people with lived experience, and young people, in line with the broader WHO best buys approaches.[6] A key message of the EASL–*Lancet* Commission is that these WHO policies, given overlapping risk factors, implicitly include prevention of chronic liver disease, and that non-viral chronic liver diseases should be explicitly integrated into the NCD strategic agenda and action plans accordingly.

Europe is currently facing the long-term consequences of multiple ongoing challenges that require urgent responses. These include the post-COVID-19 economic downturn and inflation, wars in Ukraine and the Middle East, large-scale migration, environmental changes, and a shifting political focus towards security, driving changes to national and international priorities. The sum of these events influences both policy agendas and funding allocations by diverting resources to manage their consequences. These crises have disproportionately affected marginalised populations, including migrants and those living in low socioeconomic conditions.[7,8] Migrant populations in particular experience elevated burdens of chronic viral hepatitis B, hepatitis C, and hepatitis delta infections, driven by increased exposure to risk factors during migration and in host countries, and complicated by barriers to prevention, diagnosis, and treatment. These systemic inequities hinder progress towards viral hepatitis elimination and broader liver health goals.

The COVID-19 pandemic led to increased unemployment, with resulting hotspots of poverty, domestic violence, and poor mental health, particularly among essential workers and marginalised communities.[9,10] Furthermore, the economic downturn has widened the gap in access to green technologies between high-income and low-income countries, hindering climate justice efforts.[11,12] The compounded effects of these crises have disrupted global supply chains, increased commodity prices, and deepened inequities across multiple domains, including employment, family life, and health.[9,11] These effects are likely to have long-lasting consequences on social equity and global inequality and ultimately affect liver disease burden.

The first EASL–*Lancet* Commission report successfully influenced health systems approaches for people at risk of or living with liver disease and stimulated key policy debates of broad relevance (appendix 1 pp 55–68). However, gaps remain, particularly in policy implementation and enforcement. We therefore aimed to assess the effectiveness of the first EASL–*Lancet* Commission recommendations, and to identify actionable solutions to the challenges. We present an updated analysis of liver disease burden in Europe and its projections for the coming years. Building on these observations, we expand on the opportunities within the highly variable landscape of health-related policies in Europe, with a strong emphasis on structural determinants of health (figure 1). We show how key structural determinants of liver health are interconnected with universal determinants of health and health behaviours (ie, "lifestyle")[4] in Europe, including factors related to digital marketing and migration.

As examples of the intricate relationships between public and commercial interests in European health policy, we explore in depth the obstacles to reducing alcohol-related harms and how the low level of transparency in medicine price negotiations in Europe fuels inequities. We propose refining pathways of liver care based on the approach outlined in the first EASL–*Lancet* Commission report, to account more accurately for liver risk and its resulting multimorbidity, including relevant changes to education and training. Finally, we expand on the relevance of mental health and associated stigma among people with

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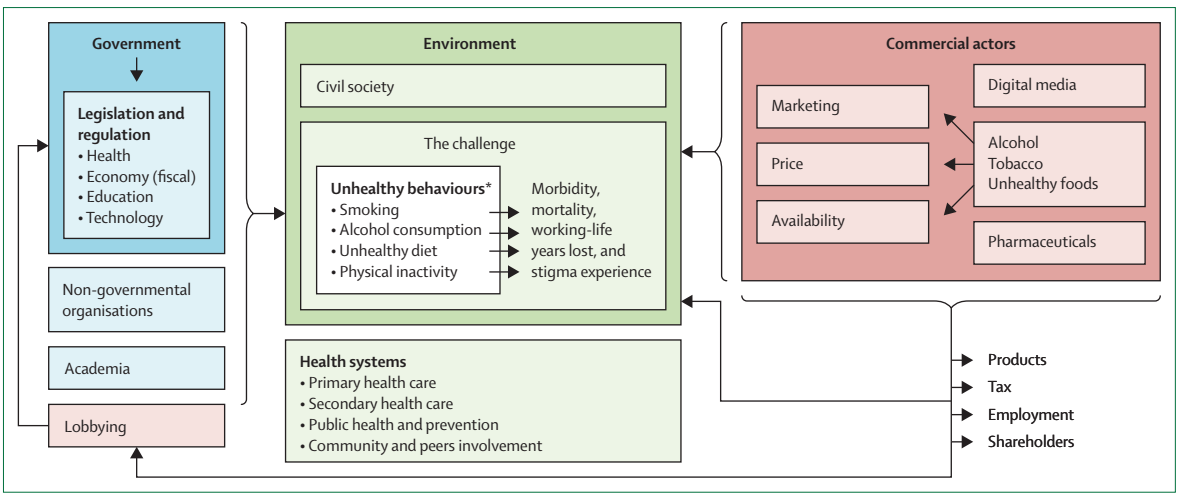

Figure 1: **A schematic ecosystem defining liver health at the individual and societal level**
Individual and accumulated risks* for liver disease (centre) emerge from complex interactions among personal background, structural and commercial determinants of health, and individual behaviours such as alcohol consumption and unhealthy diets. On the left, governance mechanisms—including health-care systems, public health policies, and preventive measures—aim to protect citizens and enhance individual and societal health. These are influenced by lobbying from industry sectors shown on the right, which drive commercial determinants of health by promoting profitable markets, notably alcohol, tobacco, and ultra-processed foods. Industry activities contribute positively to society through economic benefits such as taxes and employment yet simultaneously pose challenges by increasing disease risk through unhealthy products. All these dynamics both affect and are affected by climate change and the natural environment, represented as the outer, central green box, highlighting the broader ecological context of liver disease risk. See main text for additional details. *For data on these risk factors see WHO factsheets.

liver disease, and the opportunities associated with peer involvement and artificial intelligence (AI) in liver disease care pathways, showcasing how liver disease not only reflects key health challenges of the 21st century, but also illuminates their solutions.

The burden of liver disease in Europe: the role of liver cancer

We have used results from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2023 to provide updated data on liver disease and associated risk factors (see appendix 1 pp 8–15 for the methods description).[13,14] In 2023, cirrhosis caused 215 000 deaths (95% uncertainty interval [UI] 204 000–225 000), and liver cancer caused 69 400 deaths (63 700–72 900) in the WHO European region (table 1; estimates for each individual country are given in appendix 2). Combined, these two liver diseases served as the underlying cause of nearly 780 deaths per day, representing approximately 3% of all deaths in the region. Between 2000 and 2023, mortality from cirrhosis remained unchanged, but liver cancer mortality rates increased by 51·4% (45·2–57·4; figure 2; see appendix 1 pp 39–41 for sex-specific trends). The observed difference in temporal trends between cirrhosis and liver cancer might reflect improved survival for cirrhosis, allowing an increasing number of people with liver disease to live on to develop cancer, or changing patterns of aetiology and cause of death ascertainment that are difficult to detect in available empirical data inputs.

Figure 3 shows the changing trends in key risk factors for liver disease for the WHO European region, with declining prevalence of hepatitis B infection and declining mean daily alcohol consumption but rising prevalence of metabolic dysfunction-associated steatotic liver disease (MASLD) and limited progress on reducing hepatitis C virus infection, placing many Europeans at risk of serious liver complications and death (see appendix 1 p 41 for sex-specific trends).

Despite largely unchanged cirrhosis mortality rates due to hepatitis C virus infection between 2000 and 2023, reflecting advances in therapy, there was a marked increase in hepatitis C virus-related liver cancer mortality rates (table 1). Similar trends are seen for hepatitis B virus, with relatively stable cirrhosis mortality rate and increasing liver cancer mortality rate; however, rates are lower than those due to hepatitis C virus.

Alcohol is consumed by 66·4% of people in the European region (95% UI 64·1–68·6), with an age-standardised mean consumption of 25·5 g/day in 2023 (23·4–28·0), and remains the major cause of fatal cirrhosis and liver cancer across the WHO European region (table 1, figure 2, appendix 1 pp 8–15). Although MASLD with cirrhosis currently represents a minority (12–13%) of cirrhosis prevalent cases and deaths in the WHO European region, it is predicted to become a leading future cause unless there is concerted and effective action to mitigate the growth in disease burden associated with obesity and type 2 diabetes.[1,15] Alcohol-related liver disease and MASLD are difficult to separate, and the conditions form a dynamic and continuous spectrum rather than distinct categories.[16] On the one side, alcohol use might directly influence each of the metabolic risk factors for MASLD.[17] On the other side, in a cohort of people with alcohol intake above 24 g/day for women and above

	Prevalence					Mortality				
	N (95% UI)		% (95% UI)			N (95% UI)		Rate per 100 000 (95% UI)		
	2000	2023	2000	2023	% change 2000–23	2000	2023	2000	2023	% change 2000–23
Liver cirrhosis										
Total	2 400 000 (2 190 000–2 620 000)	2 680 000 (2 430 000–2 930 000)	0·2720 (0·2480–0·3000)	0·2830 (0·2560–0·3090)	4·0 (1·9 to 6·7)	194 000 (187 000–203 000)	215 000 (204 000–225 000)	22·00 (21·1–22·9)	22·7 (21·6–23·7)	3·0 (–3·1 to 8·6)
Alcohol-related	871 000 (744 000–1 020 000)	971 000 (831 000–1 140 000)	0·0987 (0·0843–0·1150)	0·1020 (0·0876–0·1200)	3·8 (0·8 to 6·9)	78 700 (68 300–88 600)	85 900 (73 900–96 700)	8·9 (7·7–10·0)	9·1 (7·8–10·2)	1·6 (–8·0 to 4·5)
Hepatitis B virus-related	337 000 (274 000–417 000)	397 000 (321 000–487 000)	0·0382 (0·0311–0·0473)	0·0418 (0·0338–0·0513)	9·7 (5·4 to 13·7)	29 300 (23 600–36 300)	32 600 (26 700–39 900)	3·3 (2·7–4·1)	3·4 (2·8–4·2)	3·5 (–4·4 to 11·7)
Hepatitis C virus-related	510 000 (394 000–623 000)	550 000 (427 000–686 000)	0·0577 (0·0446–0·0705)	0·0580 (0·0450–0·0723)	0·5 (–3·1 to 4·7)	42 600 (34 400–52 400)	44 600 (35 600–54 900)	4·8 (3·9–5·9)	4·7 (3·7–5·8)	–2·5 (–9·3 to 3·5)
MASLD-related	236 000 (157 000–327 000)	344 000 (243 000–459 000)	0·0267 (0·0190–0·0370)	0·0362 (0·0256–0·0483)	35·8 (31·3 to 40·0)	18 400 (13 300–24 800)	26 600 (19 300–34 800)	2·1 (1·5–2·8)	2·8 (2·0–3·7)	34·1 (22·8 to 37·5)
Other	446 000 (356 000–534 000)	420 000 (329 000–528 000)	0·0505 (0·0403–0·0616)	0·0443 (0·0347–0·0557)	–12·3 (–16·4 to –8·3)	25 300 (19 600–32 900)	25 200 (19 300–33 500)	2·9 (2·2–3·7)	2·7 (2·0–3·5)	–7·0 (–13·1 to –1·6)
Liver cancer										
Total	63 700 (55 700–75 000)	123 000 (101 000–152 000)	0·00722 (0·00631–0·00849)	0·01300 (0·01060–0·01690)	80·1 (42·3 to 129·8)	42 600 (40 500–44 400)	69 400 (63 700–72 900)	4·8 (4·4–5·0)	7·3 (6·7–7·7)	51·4 (45·2 to 57·4)
Alcohol-related	23 600 (19 200–29 900)	46 500 (35 400–63 200)	0·00268 (0·00217–0·00339)	0·00490 (0·00373–0·00667)	83·0 (43·7 to 133·3)	15 400 (12 800–18 200)	24 900 (20 500–29 800)	1·7 (1·5–2·1)	2·6 (2·2–3·1)	50·6 (38·8 to 52·4)
Hepatitis B virus-related	11 500 (9160–14 700)	18 700 (14 200–25 000)	0·00130 (0·00104–0·00167)	0·00197 (0·00149–0·00263)	50·9 (22·2 to 85·6)	7250 (5770–9120)	10 200 (7810–13 100)	0·8 (0·7–1·0)	1·1 (0·8–1·4)	31·4 (21·3 to 40·4)
Hepatitis C virus-related	22 300 (17 200–28 800)	44 700 (33 000–59 600)	0·00253 (0·00195–0·00326)	0·00471 (0·00348–0·00628)	86·1 (46·1 to 146·2)	15 700 (12 700–19 000)	26 500 (20 900–32 200)	1·8 (1·4–2·2)	2·8 (2·2–3·4)	57·2 (46·0 to 63·1)
MASLD-related	3720 (2650–5030)	8210 (5560–11 300)	0·00042 (0·00030–0·00057)	0·00087 (0·00059–0·00119)	105·4 (62·1 to 163·1)	2700 (1940–3510)	5220 (3640–6800)	0·3 (0·2–0·4)	0·6 (0·4–0·7)	79·7 (63·4 to 86·4)
Other	2480 (1740–3290)	4540 (3210–6460)	0·00028 (0·00020–0·00037)	0·00048 (0·00034–0·00068)	70·2 (32·2 to 116·1)	1540 (1110–2000)	2510 (1810–3240)	0·2 (0·1–0·2)	0·3 (0·2–0·3)	51·8 (39·0 to 61·3)

See appendix 1 pp 8–15 for methodological details. UI=uncertainty interval. MASLD=metabolic dysfunction-associated steatotic liver disease.

Table 1: **Epidemiology of liver disease in the WHO European region in 2023 compared to 2000**

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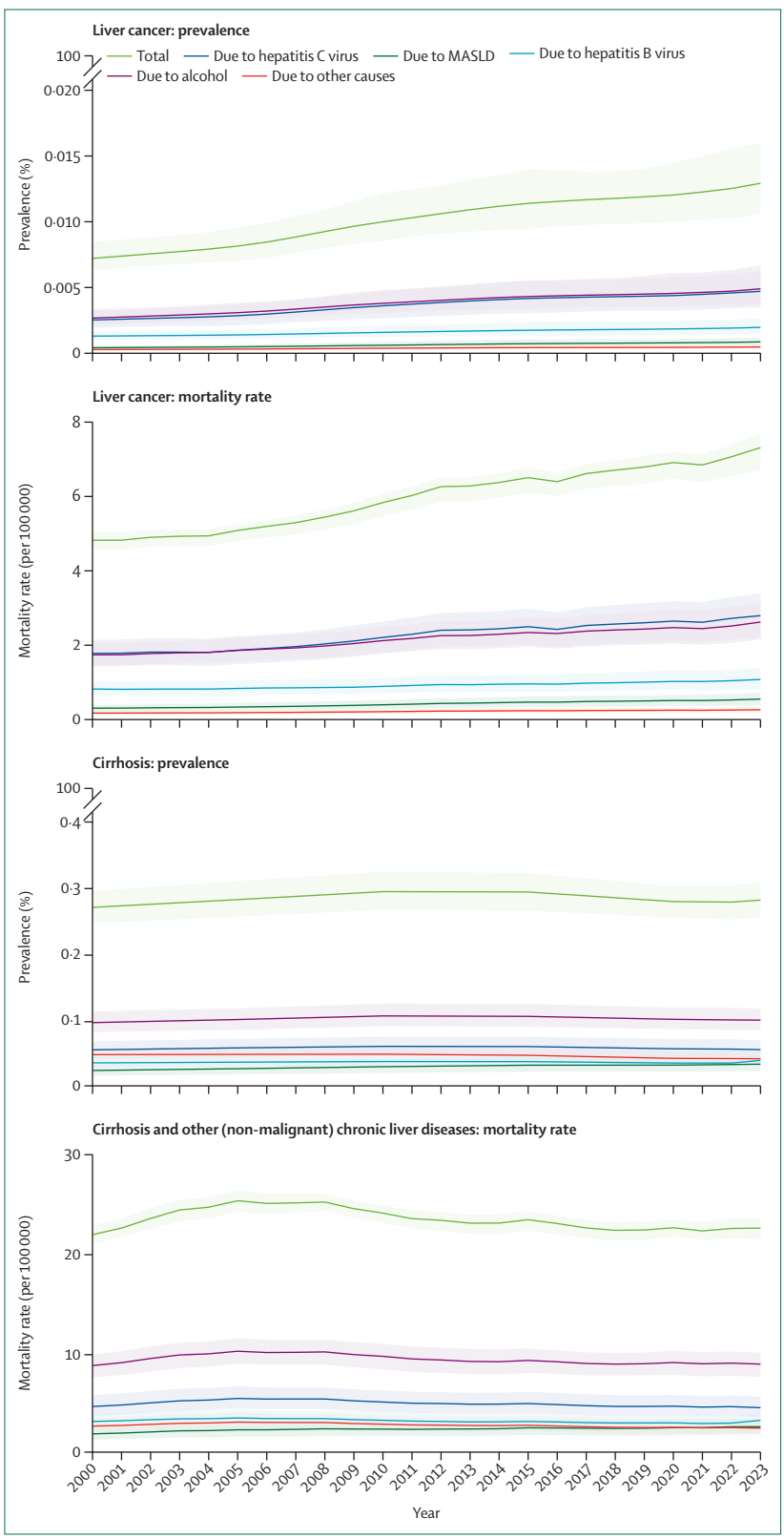
See Online for appendix 1

For **WHO factsheets for data on risk factors in figure 1** see https://www.who.int/europe/news-room/fact-sheets

See Online for appendix 2



36 g/day for men, 98% had at least one cardiometabolic risk factor, and of those with alcohol-related liver disease or metabolic dysfunction and alcohol-related liver disease, around 70% had at least three cardiometabolic risk factors.[18] Among people with MASLD, alcohol intake assessment testing for ethylglucuronide in hair and urine indicated alcohol consumption above low-risk levels in 25% of people with presumed MASLD.[19] Consequently, the true burden of alcohol harm is likely underestimated.[20]

Liver cancer is now the seventh most common cause of cancer death and second most common cause of premature death from cancer globally,[13,14] with hepatocellular carcinoma accounting for over 80% of all primary liver cancers.[21–23] The latest estimates from GBD 2023 show the increasing prevalence of, and mortality from, liver cancer in the WHO European region over the past two decades (figure 2). Key risk factors driving these increases in incidence and mortality include alcohol and viral hepatitis, which together account for 90% of the 123 000 prevalent liver cancer occurrences (95% UI 101 000–152 000), and 89% of the 69 400 deaths from liver cancer (63 700–72 900) in 2023 (table 1). Metabolic dysfunction-associated steatohepatitis (MASH)—the initial step in progression towards advanced liver fibrosis for people with MASLD—represented a minority (6·7–7·5%) of liver cancer cases and deaths in 2023, but it accounted for the largest increase in these outcomes over the past 20 years (table 1). This is consistent with evidence from the European Liver Transplantation Registry, where MASLD is the most rapidly growing indication for liver transplantation.[24]

A heterogenous landscape of European health policies

We found marked variation in the epidemiology of liver disease in the 53 countries in the WHO European region (appendix 2). In the previous report by the EASL–*Lancet* Commission, we showed that the combination of the world's highest levels of alcohol consumption, along with increasing prevalence of obesity and type 2 diabetes, drives the high burden of liver disease in Europe, reflecting a synergistic effect of these factors.[1,25,26] Moreover, alcohol-driven damage starts even within so-called low-risk alcohol consumption, a concept that is subject to extensive debate, leading to a variety of recommendations across countries (table 2).[27–33] Although some countries, including Scotland, Ireland, Lithuania, and Norway, have implemented evidence-based alcohol

Figure 2: **Temporal trend for the WHO European region**
Trends in liver cancer prevalence (A), liver cancer mortality rate (B), cirrhosis prevalence (C), and cirrhosis and other (non-malignant) chronic liver disease mortality rate (D): total and by primary aetiology (data from 2023 update to the Global Burden of Diseases, Injuries, and Risk Factors Study; see appendix 1 pp 8–15 for methodological details). MASLD=metabolic dysfunction-associated steatotic liver disease.

policies to improve population health, broader Europe-wide actions to reduce alcohol harms remain fragmented and inconsistent. National governments often struggle to regulate in the face of forceful lobbying by powerful multinational corporations, resulting in marked heterogeneity in policy responses to harmful commercial influences across Europe.

Even in areas with little controversy and robust scientific evidence, such as early liver disease detection and structured hepatocellular carcinoma surveillance, implementation is currently insufficient in many European countries. Despite having a well defined at-risk population and highly effective prevention and early detection strategies, hepatocellular carcinoma remains largely absent from the current EU cancer policy framework (appendix 1 pp 42–45). The European Beating Cancer Plan emphasises the importance of early detection and prevention, yet has overlooked hepatocellular carcinoma-specific surveillance strategies, using the argument that data from randomised controlled trials are insufficient to support their implementation—neglecting the large body of real-world evidence to support hepatocellular carcinoma surveillance efficacy.[34,35] By contrast, large-scale early detection and screening programmes for cervical and breast cancers have contributed to stable or declining incidence rates.[36–38] As such, the continued rise in liver cancer incidence across Europe (figure 2) stands as clear evidence of a major policy gap, one that must urgently be addressed. EASL has repeatedly called for stronger integration of liver cancer prevention and surveillance into EU strategies (appendix 1 p 91), emphasising that the tools to reduce hepatocellular carcinoma incidence already exist—they simply lack implementation.

The increasing use of GLP-1 receptor agonists in the management of obesity and type 2 diabetes represents a novel public health trend (panel 1). Reports indicate that people using these medications consume fewer calorie-dense, processed foods, leading to declining sales in certain food sectors.[40] In response, it has been suggested that industry might start to develop GLP-1-optimised foods, engineered to bypass appetite suppression mechanisms, reintroducing hyperpalatable, calorie-dense options into the diets of those on these medications.[41] To maximise the benefits of these therapies and their medium-term to long-term benefits (and risks), a balanced approach is needed, namely one that integrates pharmacological advances with sustained public health policies, behavioural interventions, and health-care system adaptations. The future burden of metabolic and liver disease will depend on our ability to navigate this balance and the European policy heterogeneity effectively.

There is insufficient investment in resources needed to support Europe-wide monitoring systems for preventable harms. Without uniform, routine collection of robust data across European countries, evaluating the effect of policy interventions, such as access to chronic viral hepatitis testing and treatment, or alcohol control, becomes difficult. This paucity of data is especially evident in liver disease prevention programmes and in relation to policies such as alcohol taxation, regulation of harmful commodities, and alcohol health warning labelling. Such monitoring systems should also include liver disease medicine prices to detect the effects of variations in price on access to therapies.

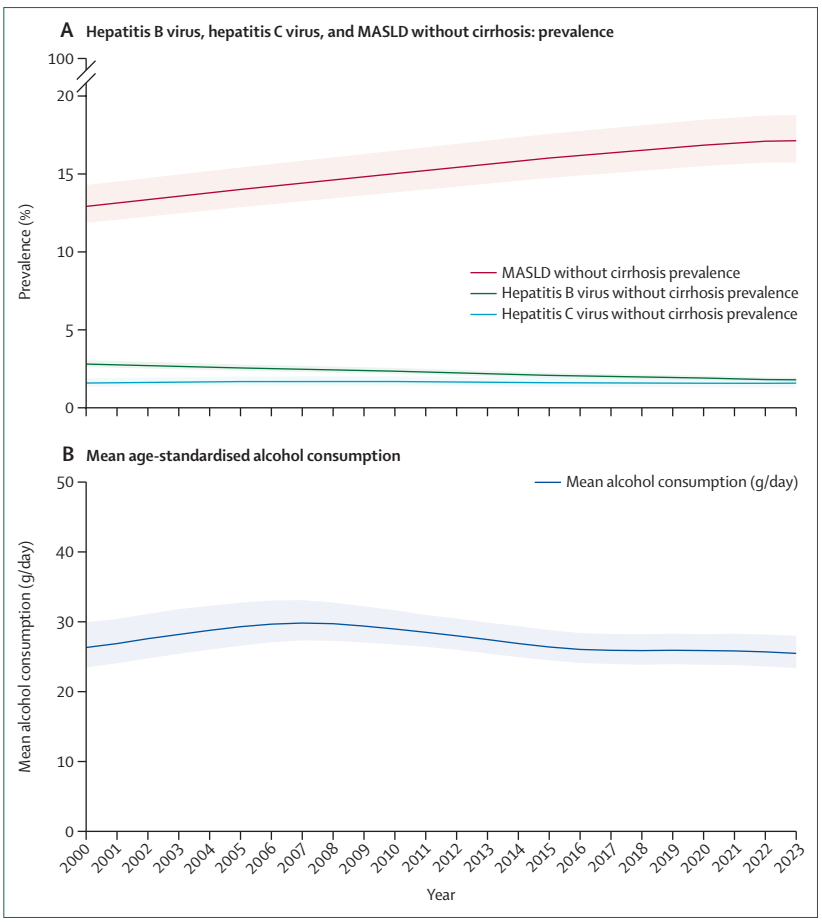


Figure 3: **Temporal trend for WHO European region in key risk factors for liver disease**
(A) Prevalence of MASLD, chronic hepatitis B virus, and hepatitis C virus infection (all without cirrhosis). (B) Mean age-standardised alcohol consumption in g/day (data from 2023 update to the Global Burden of Diseases, Injuries, and Risk Factors Study; see appendix 1 pp 8–15 for methodological details). MASLD=metabolic dysfunction-associated steatotic liver disease.

Consequences of inaction and the opportunity for action

We adapted and expanded the Organisation for Economic Co-operation and Development (OECD) model applied in the first EASL–*Lancet* Commission report to present an update on the epidemiological and economic dynamics related to liver diseases for the period 2025–50, across the EU27 countries, and Iceland, Norway, the UK, and Switzerland (EU27+4 countries; methods description in appendix 1 pp 16–21).[1,42] The model incorporates

	Low-risk drinking threshold and recommendations for men and women aged 18–65 years on national documents between the years 2016–25*				Alcohol consumption total per capita/year (litres of pure alcohol [IQR])†	Calculated pure alcohol per capita consumption (g/day)‡
	Mention of target zero	The low-risk threshold for men	The low-risk threshold for women§	Organisation, year of recommendation (document type)		
Albania	NA	NA	NA	NA	4·5 (2·7–6·6)	9·7
Andorra	NA	NA	NA	NA	9·7 (6·6–12·9)	21·0
Armenia	NA	NA	NA	NA	4·3 (2·5–6·4)	9·3
Austria	None	≤24 g/day	≤16 g/day	Federal Ministry of Health and Women, 2019 (educational material about alcohol risks)	11·5 (8·5–14·6)	24·9
Azerbaijan	NA	NA	NA	NA	2·5 (0·8–4·3)	5·4
Belarus	NA	NA	NA	NA	11·6 (8·8–14·7)	25·1
Belgium	None	≤30 g/day	≤20 g/day	Sciensano, the Belgian Institute for Health, 2020 (web page about alcohol risks)	9·4 (6·7–11·9)	20·3
Bosnia and Herzegovina	NA	NA	NA	NA	5·9 (3·6–8·3)	12·8
Bulgaria	Alcohol avoidance is recommended	≤1 drink per day (ie, 1 beer, 1 glass of wine, 50 mL spirits)¶	≤1 drink per day (ie, 1 beer, 1 glass of wine, 50 mL spirits)¶	Ministry of Health of the Republic of Bulgaria, 2018 (nutritional recommendations)	11·6 (8·5–14·6)	25·1
Croatia	NA	NA	NA	NA	7·6 (4·1–11·0)	16·4
Cyprus	NA	NA	NA	NA	6·4 (3·9–8·7)	13·8
Czechia	There is no safe dose of alcohol	≤40 g/day	≤20 g/day	National Drug and Addiction Monitoring Center, 2024 (web page about alcohol risks)	12·0 (9·1–14·9)	25·9
Denmark	No threshold for a safe level of alcohol consumption has currently been established	If alcohol is consumed, it should be in very low amounts (no specific threshold)	If alcohol is consumed, it should be in very low amounts (no specific threshold)	Nordic Council of Ministers, 2023 (nutritional recommendations)	9·5 (6·6–12·3)	20·5
Estonia	There is no safe level of alcohol	≤20 g/day	≤10 g/day	Health Development Institute, 2022 (web page about alcohol risks)	10·7 (6·6–14·2)	23·1
Finland	No threshold for a safe level of alcohol consumption has currently been established	If alcohol is consumed, it should be in very low amounts (no specific threshold)	If alcohol is consumed, it should be in very low amounts (no specific threshold)	Nordic Council of Ministers, 2023 (nutritional recommendation)	9·1 (6·3–11·8)	19·7
France	All alcohol consumption carries risks	≤20 g/day, not every day (≤10 drinks per week)	≤20 g/day, not every day (≤10 drink per week)	Public Health France, 2024 (web page about alcohol risks)	10·3 (7·2–13·5)	22·3
Germany	As little alcohol as possible, or ideally none at all, should be consumed	≤24 g/day	≤12 g/day	German Centre for Addiction Issues, 2019 (report about alcohol risks)	11·8 (8·5–15·0)	25·5
Greece	None	≤2 drinks/day¶	≤1 drink/day¶	Ministry of Health and Institute of Preventive Medicine, Environmental and Occupational Health, Prolepsis, 2022 (nutritional recommendations)	5·8 (3·5–8·2)	12·5
Hungary	NA	NA	NA	NA	9·9 (6·6–13·3)	21·4
Iceland	No threshold for a safe level of alcohol consumption has currently been established	If alcohol is consumed, it should be in very low amounts (no specific threshold)	If alcohol is consumed, it should be in very low amounts (no specific threshold)	Nordic Council of Ministers, 2023 (nutritional recommendations)	7·9 (5·6–10·4)	17·1
Ireland	The less you drink the lower your risk of developing alcohol-related health issues	≤110 g/week	≤170 g/week	Health Service Executive, 2022 (web page about low-risk alcohol consumption)	10·8 (7·9–13·8)	23·3
Israel	None	≤15 drinks per week (ie, ≤210 g/week)	≤8 drinks per week (ie, ≤112 g/week)	Ministry of Health, 2023 (web page about alcohol risks)	2·8 (1·4–4·4)	6·1
Italy	Zero or as little as possible; it is not possible to identify levels of consumption that do not involve any health risk	≤2 drinks per day (ie, ≤24 g/day)	≤1 drink per day (ie, ≤12 g/day)	Ministry of Health, 2023 (web page about alcohol risks)	7·0 (4·6–9·5)	15·1

(Table 2 continues on next page)

	Low-risk drinking threshold and recommendations for men and women aged 18–65 years on national documents between the years 2016–25*				Alcohol consumption total per capita/year (litres of pure alcohol [IQR])†	Calculated pure alcohol per capita consumption (g/day)‡
	Mention of target zero	The low-risk threshold for men	The low-risk threshold for women§	Organisation, year of recommendation (document type)		
(Continued from previous page)						
Kazakhstan	There is no safe level of alcohol consumption	Consumption of ≥6 drinks per week required habits change¶	Consumption of ≥6 drinks per week required habits change¶	Ministry of Health, 2025 (web page about alcohol risks)	4·5 (2·6–6·5)	9·7
Kyrgyzstan	NA	NA	NA	NA	3·6 (1·9–5·5)	7·8
Latvia	NA	NA	NA	NA	12·9 (9·1–16·8)	27·9
Liechtenstein	NA	NA	NA	NA	NA	NA
Lithuania	NA	NA	NA	NA	12·1 (8·7–15·2)	26·2
Luxembourg	NA	NA	NA	NA	10·8 (8·0–13·8)	23·3
Malta	NA	NA	NA	NA	7·1 (4·1–9·6)	15·3
Moldova	NA	NA	NA	NA	11·1 (7·1–14·8)	24·0
Monaco	NA	NA	NA	NA	NA	NA
Montenegro	NA	NA	NA	NA	10·3 (7·5–13·3)‖	22·3
Netherlands	Do not drink alcohol or no more than one drink daily (ie, ≤10 g/day)	<1 drink per day (ie, ≤10 g/day)	≤1 drink per day (ie, ≤10 g/day)	Nutrition Center of the Netherlands, 2016 (nutritional recommendations)	8·7 (5·9–11·4)	18·8
North Macedonia	NA	NA	NA	NA	4·4 (2·3–6·4)	9·5
Norway	No threshold for a safe level of alcohol consumption has currently been established	If alcohol is consumed, it should be in very low amounts (no specific threshold)	If alcohol is consumed, it should be in very low amounts (no specific threshold)	Nordic Council of Ministers, 2023 (nutritional recommendations)	7·4 (4·9–9·9)	16·0
Poland	NA	NA	NA	NA	11·7 (8·3–15·2)	25·3
Portugal	None	≤3 glasses of beer or ≤2 small glasses of wine or ≤ a third of a glass of spirits per day¶	≤2 glasses of beer or ≤1 small glasses of wine or ≤ a fifth of a glass of spirits per day¶	Ministry of Health, 2020 (nutritional recommendations)	8·9 (6·0–11·6)	19·2
Romania	None	≤2 drinks per day (ie, ≤24 g/day)	≤1 drink per day (ie, ≤12 g/day)	Ministry of Health, 2019 (educational material about alcohol)	16·8 (12·0–21·3)	36·3
Russia	NA	NA	NA	NA	10·5 (7·2–13·9)	22·7
Serbia	NA	NA	NA	NA	7·9 (5·4–10·5)‖	17·1
Scotland	None	≤14 drinks per week (ie, ≤112 g/week)	≤14 drinks per week (ie, ≤112 g/week)	National Health Services, 2024 (web page about low-risk alcohol consumption)	NA	NA
Slovakia	NA	NA	NA	NA	10·7 (7·6–13·9)	23·1
Slovenia	None	≤2 drinks per day (ie, ≤20 g/day)	≤1 drink per day (ie, ≤10 g/day)	Institute of Public Health, 2022 (educational material about alcohol); Ministry of Health, 2021 (report about alcohol risks)	10·4 (7·4–13·3)	22·5
Spain	There is no safe level of alcohol consumption	≤20 g/day	≤10 g/day	Ministry of Health, 2021 (report about alcohol risks)	9·2 (6·4–12·4)	19·9
Sweden	No threshold for a safe level of alcohol consumption has currently been established	If alcohol is consumed, it should be in very low amounts (no specific threshold)	If alcohol is consumed, it should be in very low amounts (no specific threshold)	Nordic Council of Ministers, 2023 (nutritional recommendations)	9·6 (6·4–12·4)	20·8
Switzerland	NA	NA	NA	NA	10·1 (7·1–13·2)	21·8
Tajikistan	NA	NA	NA	NA	0·7 (0·1–1·5)	1·5
Türkiye	NA	NA	NA	NA	1·7 (0·5–3·0)	3·7
Turkmenistan	NA	NA	NA	NA	2·6 (1·2–4·1)	5·6
Ukraine	The less alcohol a person consumes, the better it is for their health	≤2 drinks per day (ie, ≤20 g/day)	≤1 drink per day (ie, ≤10 g/day)	Ministry of Health, 2017 (nutritional recommendations)	9·2 (6·0–12·7)	19·9

(Table 2 continues on next page)

	Low-risk drinking threshold and recommendations for men and women aged 18–65 years on national documents between the years 2016–25*				Alcohol consumption total per capita/year (litres of pure alcohol [IQR])†	Calculated pure alcohol per capita consumption (g/day)‡
	Mention of target zero	The low-risk threshold for men	The low-risk threshold for women§	Organisation, year of recommendation (document type)		
(Continued from previous page)						
UK	None	≤14 drinks per week (ie, ≤112 g/week)	≤14 drinks per week (ie, ≤112 g/week)	Department of Health, 2016 (low-risk alcohol drinking guidelines)	10·7 (7·6–13·8)	23·1
Uzbekistan	NA	NA	NA	NA	2·1 (0·9–3·4)	4·5

For references to cited documents, see appendix 1 pp 81–90. NA=not available. *The search for information sources was mainly based on the drinking guidelines from the International Alliance for Responsible Drinking but not exclusively.[32] Only documents from 2016–25 were included in the table. Non-English sources were translated. Only sources specifying the threshold for low-risk consumption were included. †Data adopted from the WHO Global Health Observatory.[33] Total alcohol per capita is defined as the total (sum of 3-year average recorded and 3-year average unrecorded alcohol per capita, adjusted for 3-year average tourist consumption) amount of alcohol consumed per adult (>15 years) over a calendar year, in litres of pure alcohol. Data are from 2020 for both males and females. ‡Pure alcohol per capita (>15 years) consumption (g/day) was calculated as follows: (alcohol per capita [litres/year]×789)/365. §Not including pregnant and breastfeeding women. ¶No definition of pure alcohol in grams was found. ||Data are from 2019.

Table 2: **Heterogeneity of alcohol low-risk drinking thresholds and alcohol consumption recommendations and drinking patterns across European countries**

Panel 1: GLP-1 receptor agonists: a case study of drug-based prevention regimens

GLP-1 receptor agonists might reduce hepatic steatosis and could have an antifibrotic effect, offering new hope for people at risk of progressive liver disease.[39] Although early results are promising, the overall effect on long-term metabolic dysfunction-associated steatohepatitis-related complications, including cirrhosis, hepatic decompensation, and hepatocellular carcinoma, is still uncertain. Given the slow progression of metabolic dysfunction-associated steatohepatitis, with fibrosis advancing over several years per stage, the real clinical benefit will depend on whether GLP-1 receptor agonists can meaningfully halt or reverse fibrosis at a population level.

Access to GLP-1 receptor agonists through publicly funded health systems is still restricted and often limited to type 2 diabetes rather than obesity and related complications. This restriction has resulted in many people accessing these therapies through private prescriptions, which drives health inequalities and limits the broader population benefits. In Europe, where national health systems regulate medicine pricing and reimbursement, access to GLP-1 receptor agonists for obesity remains inconsistent. Although lower than US costs, a barrier remains for many individuals and highlights the policy disparities that influence obesity and metabolic disease management across different countries.

However, costs are expected to change substantially as generic GLP-1 receptor agonists, including oral preparations, become increasingly available. As with statins and insulin analogues, the entry of generics will likely reduce prices and expand access, potentially shifting these therapies into a broader preventive medicine framework. An associated increased reliance on pharmacotherapy for weight management might lead to a shift away from broader public health interventions, such as taxation of unhealthy foods, advertising restrictions, and community-based obesity prevention strategies. If policy emphasis on obesity moves toward individual pharmacological solutions, there is a substantial risk of diminishing investment in important population-level strategies that address the root causes of obesity.

modules for cirrhosis (compensated and decompensated) and liver cancer, and also takes into account potential causes of liver disease, including health behaviour-related risk factors and communicable diseases. A distinguishing feature of the OECD model is its consideration of the possibility that people who do not develop liver diseases (or any other disease) could still be susceptible to other pathologies and their economic implications. In addition, for this analysis, the model was also linked to the long-term gross domestic product (GDP) model developed by the World Bank,[43] allowing for the evaluation of how population dynamics, primarily in terms of demographic changes and workforce productivity, might impact the economy of countries.

The model[42] projects population-level life expectancy in the EU27+4 countries to be 4·1 months lower (range between 1·4 to 10·8 months across countries) over the next 25 years because of deaths due to liver diseases (figure 4A). To put this in context, according to the UN World Population Prospect, the reduction in life expectancy for European countries due to the COVID-19 pandemic between 2020 and 2021 was 7·4 months.[44,45] A substantial portion of the burden of liver diseases could be avoided if countries were to achieve the WHO NCD global action plan targets for 2030 for alcohol consumption and obesity.[46,47] Achieving these targets would lead to a 9·7% reduction in the liver disease burden on life expectancy across the 31 countries included in the analysis (the remainder of the burden requires reductions in alcohol and obesity beyond the target or is not related to these risk factors). In countries where alcohol consumption and overweight are more prevalent risk factors, and the mortality rate for liver diseases is higher, the achievement of the prevention targets would result in a reduction of the burden on life expectancy of up to 24·6%.

The deleterious effects of liver diseases on population health adversely affect human capital and result in reduced workforce productivity. The analyses suggest that the GDP of affected countries would be depressed by 0·3%, compared to a scenario in which liver diseases do not exist (figure 4B). In absolute numbers, this means

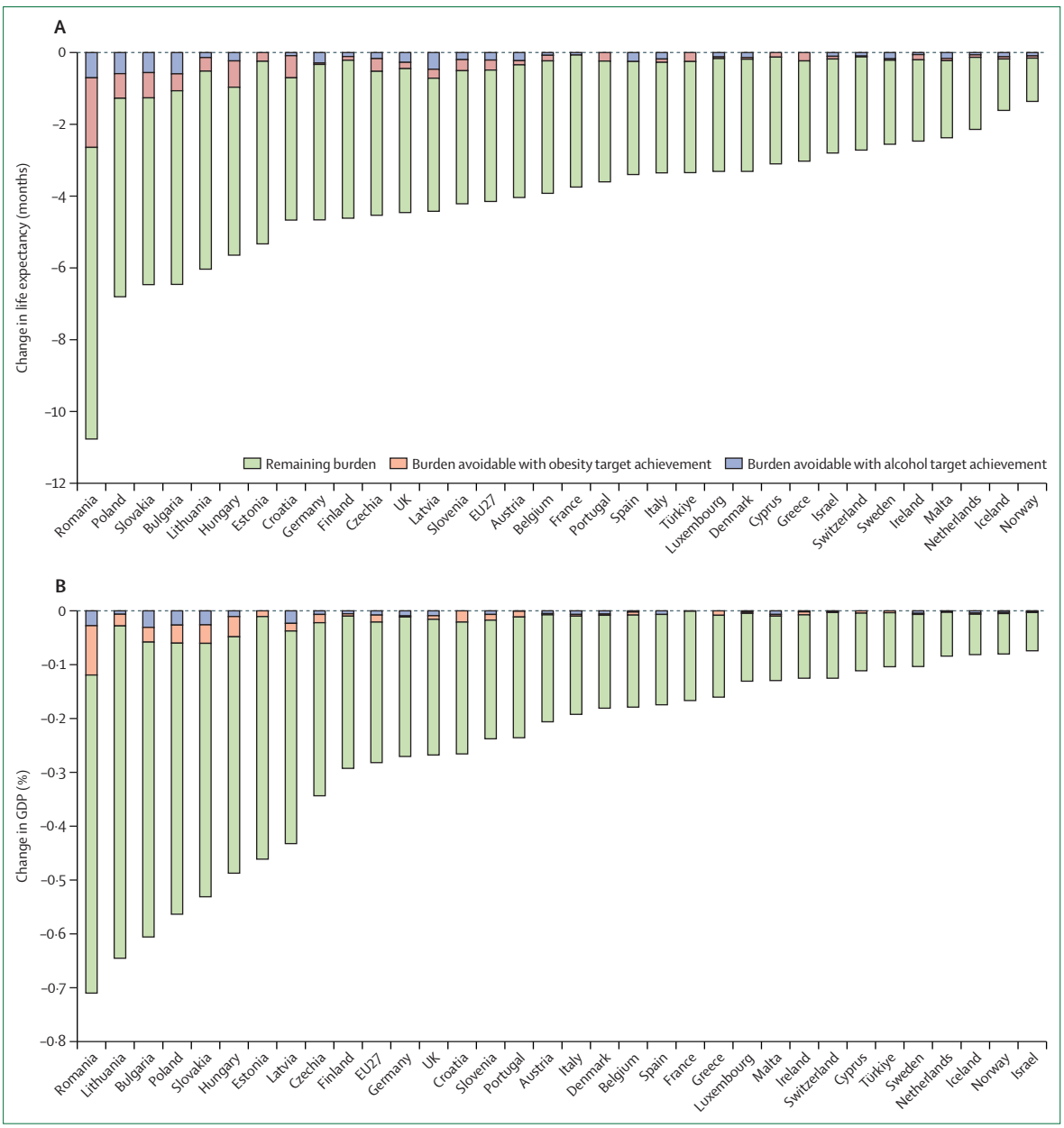


Figure 4: **Burden of liver diseases on life expectancy and GDP and share of avoidable burden by achieving the WHO NCDs global action plan targets**
(A) Reduction in life expectancy (months) due to liver disease and share of this burden avoidable by achieving the WHO NCDs global action plan targets in the EU27+4 (ie, EU and Iceland, Norway, Switzerland, and the UK) over the period 2025–50, calculated by the OECD Strategic Public Health Planning NCD model.[42] (B) Economic impact of liver diseases, in terms of change in percentage of GDP in the EU27+4 calculated by the OECD NCD model. The analysis captures the combined benefits of achieving both obesity and alcohol reduction targets, assuming additive effects (see appendix 1 pp 16–21 for methodological details). GDP=gross domestic product. NCDs=non-communicable diseases. OECD=Organisation for Economic Co-operation and Development.

that in the absence of liver diseases, the economy of the EU27+4 countries would be larger by an amount equivalent to €55 billion per year. Country-specific analysis indicates that the effect of liver diseases on GDP ranges from 0·1% to 0·7%. There are multiple factors that contribute to this cross-country variation: demographics, such as the age of the population and the workforce, risk factors and disease prevalence, and the performance of the health system in managing and treating disease, as reflected in transition and fatality rates.

To reduce the burden of liver disease morbidity and mortality, it is essential that countries allocate resources to its prevention and treatment.[48] A key priority is to improve the standard of care for liver diseases and reduce cross-country variability by lowering the mortality rate among individuals with liver disease. Taking action in

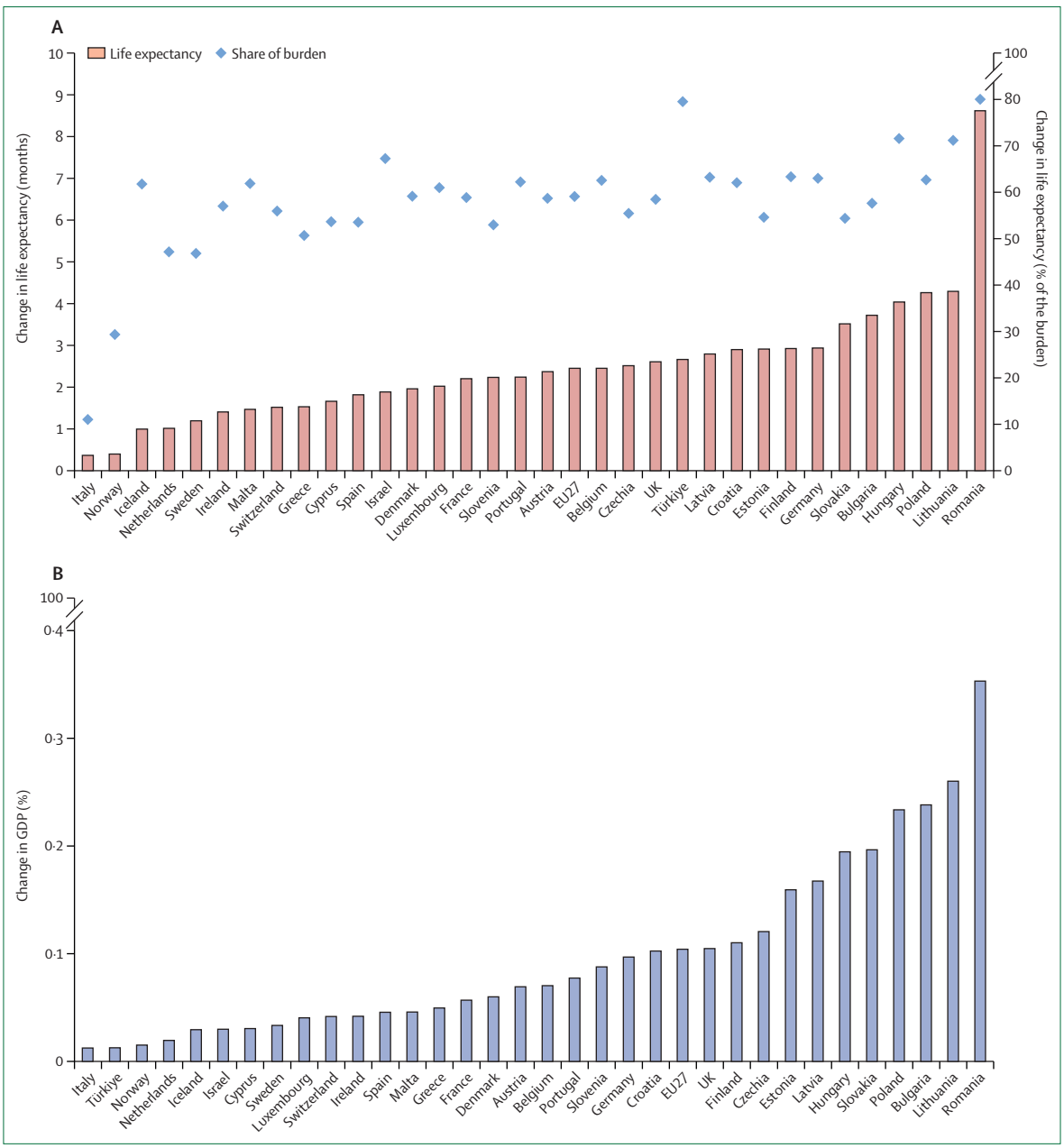


Figure 5: **Health and economic impact of improved standards of care for liver diseases.**
(A) Potential average benefits in terms of life expectancy (months) and as a share of the total burden of liver diseases on life expectancy (as depicted in figure 4) by improving standards of care to achieve the lowest observed fatality rates in the EU27+4 (ie, EU and Iceland, Norway, Switzerland, and the UK) over the period 2025–50, calculated by the OECD Strategic Public Health Planning NCD model.[42] (B) Potential economic impact of improved standards of care to achieve the lowest observed fatality rates in the EU27+4 calculated by the OECD Strategic Public Health Planning NCD model (methodological details in appendix 1 pp 16–21). GDP=gross domestic product. NCD=non-communicable disease. OECD=Organisation for Economic Co-operation and Development.

this area would also help countries in meeting the NCD Global Action Plan target of reducing overall mortality. To assess the potential effect of improved liver disease care, we adapted the OECD model to show the effect on life expectancy and premature mortality under a scenario in which sex-specific and age-specific mortality rates for liver diseases were adjusted to align with the lowest rates observed among the EU27+4 countries. As no single country exhibits the lowest mortality rate for all sex and age categories, every country would benefit to some extent, although the effect would be smaller in countries that already have low mortality rates for multiple sex and age categories. Figure 5 shows that implementing enhanced standards of care for liver diseases would

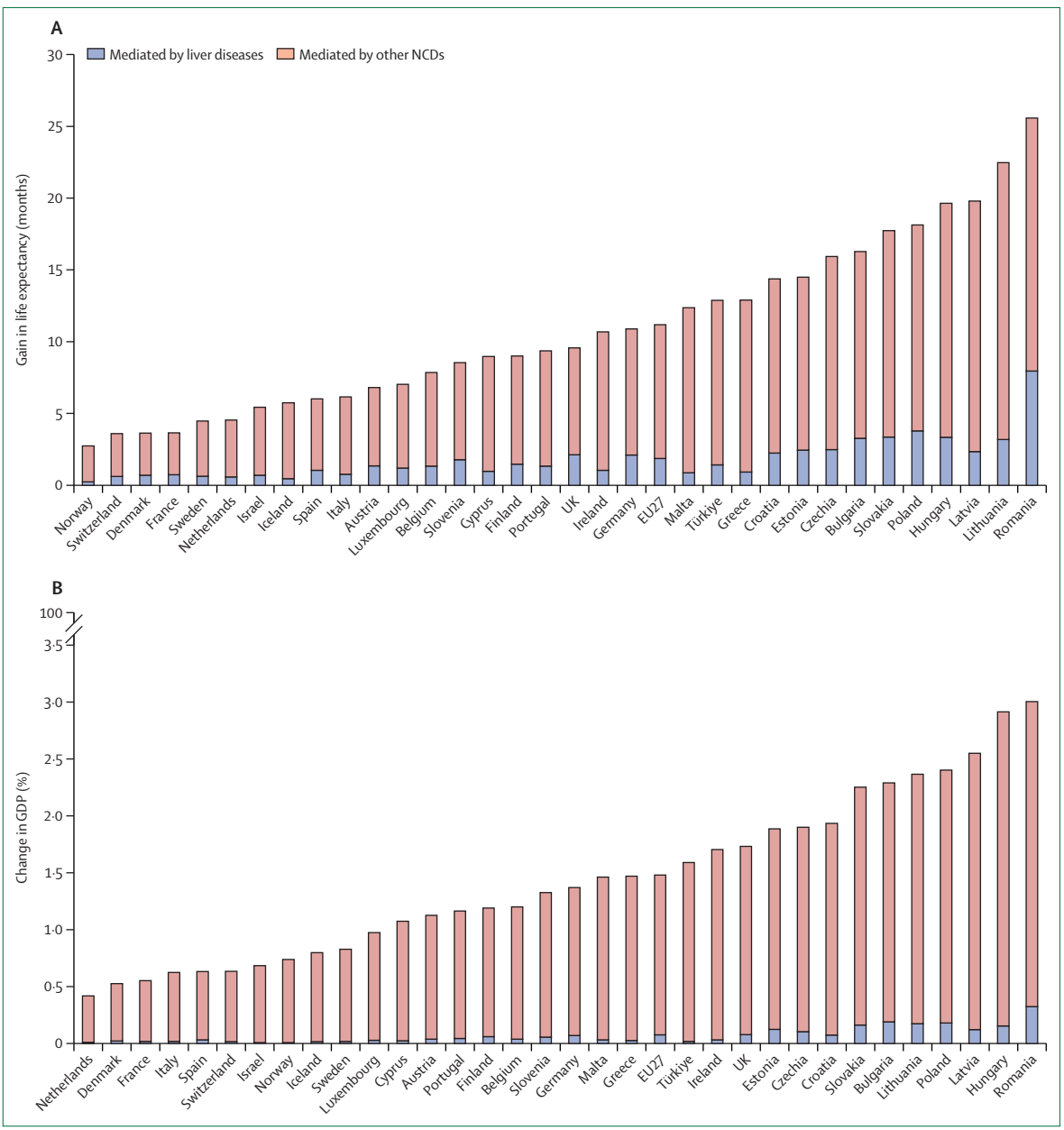


Figure 6: **Health and economic impact of reducing alcohol consumption and overweight**
(A) Potential average benefits in terms of life expectancy (months), mediated by liver diseases and other NCDs, by reducing alcohol consumption (litres per capita) and overweight (proportion of population) to achieve the lowest observed levels for each age and sex group in the EU27+4 (ie, EU and Iceland, Norway, Switzerland, and the UK) over the period 2025–50, calculated by the OECD Strategic Public Health Planning NCD model.[42] (B) Potential economic impact in terms of change in percentage of GDP in the EU27+4 calculated by the OECD Strategic Public Health Planning NCD model (for methodological details see appendix 1 pp 16–21). GDP=gross domestic product. NCDs=non-communicable diseases. OECD=Organisation for Economic Co-operation and Development.

result in an average increase of 2·5 months in life expectancy (range 0·4–8·6 months), which corresponds to a 58% reduction in premature mortality due to liver diseases (range 11–80%). Accordingly, the average increase in GDP across countries would be approximately 0·10% (range 0·01–0·35%).

Investments in improved care will, however, lead to increased health-care expenditure, which might conflict with tightening budgets and competing priorities. Therefore, it is crucial to complement improved liver health care with investment in the prevention of liver disease. Prevention policies are especially attractive because public health policies to reduce liver disease incidence and severity are effective, evidence-based, often inexpensive to implement, and result in reduced health care and other spending. The first EASL–*Lancet*

Commission identified a set of effective, efficient, and cost-effective policy options to address alcohol consumption and overweight.[1] The potential effect of combining these prevention policies in a comprehensive package was assessed by this Commission by adapting the OECD model to a scenario where sex-specific and age-specific levels for these risk factors were aligned with the lowest prevalence rates for alcohol consumption and overweight observed among the EU27+4 countries. Figure 6A illustrates that addressing health behaviour-related risk factors alone could almost halve the burden of liver diseases, increasing life expectancy by an average of 1·8 months (range 0·2–8·0 months). Moreover, when the analysis included the additional benefits of reducing alcohol consumption and overweight on other major NCDs, such as cardiovascular diseases, diabetes, and cancers, the positive effect is substantially increased. Consequently, the average life expectancy could increase by approximately 10·8 months (range 2·7–25·6 months across countries). The increase in GDP that would result from an improvement in human capital would be approximately 0·07%, on average across countries (range 0·01–0·32%), when only the effect on liver diseases is considered, and 1·4% (0·4–2·8%) when the effect on all NCDs is considered (figure 6B). This shows that efforts to address liver diseases are similar to other chronic diseases, as liver diseases encapsulate the challenges and impacts of other chronic conditions—ie, public health measures to reduce liver diseases also have powerful synergistic effects on preventing other chronic diseases and prolonging life.

Panel 2: Misplacing blame and the language of responsibility

Commercial actors often suggest that individuals, rather than businesses, are to blame for the misuse of products and resulting disease by portraying behaviours shaped by physical, economic, social, and political environments as matters of individual rather than corporate responsibility.[63,64] From this perspective, it falls on individuals to make choices that avoid liver disease, and the responsibility of other actors, such as governments or industry, is downplayed. However, a more nuanced perspective considers that appropriate decisions about alcohol use, diet, or physical activity are highly influenced by environments, which might facilitate or hinder such behaviours and constrain the options from which choices are made.[65,66]

The notion of being responsible can be used in ways that shift responsibility to shape those environments away from policy makers and corporations, suggesting instead that individuals should be the primary target of non-communicable disease interventions.[54] A common framing promoted by the alcohol industry is that individuals should drink responsibly; alcohol industry actors thus deflect responsibility by shifting focus from corporate influence to individual behaviour.[67–69]

The drink responsibly slogan implies that responsible behaviour is accessible to all individuals and does not acknowledge the many structural factors that constrain individual behaviour and can be unequally distributed. Such appeals neglect structural pressures that might prompt individuals to turn to alcohol or other behaviours detrimental to liver health in the first place. By trivialising these structural constraints, they might also reinforce feelings of guilt or self-blame.[70] This slogan also paves the way for placing the majority of responsibility for behaviour on individuals, in ways that fail to take account of powerful environmental influences, while diverting attention away from evidence-based policies to shape structural drivers of health that industries work to block or delay.[71]

Structural determinants of liver disease and European health

We explored how health behaviours relevant to liver disease are contingent upon multilayered influences that extend beyond personal knowledge or choices. The behaviour of individuals is shaped by a range of sociocultural factors, including socioeconomic status, food insecurity and security, family and community norms, social pressures, social networks, race and ethnicity, and many aspects of the immediate physical environment (figure 1). Such structural determinants of liver health are unevenly distributed across society and are important drivers of liver disease and health inequalities in Europe and beyond.[49] These social and economic factors have differential effects across different liver diseases. For example, alcohol-related liver disease and MASLD are highly influenced by actions of the alcohol and unhealthy food industries, whereas viral hepatitis (hepatitis C in particular) is less affected by these commercial actors yet still closely linked with social deprivation.

Commercial actors influence NCD-related behaviours directly through pricing, packaging, labelling, advertising, and controlling the availability of alcohol, and indirectly by shaping policy to protect market dominance, even at the expense of public health. Tactics include targeting key groups such as ethnic minorities or children in a low socioeconomic position,[50–53] and shaping social norms around alcohol consumption, as has been documented in the WHO European region.[54] Wealthy corporations leverage economic power and a digital media ecosystem to reinforce these norms.[55,56]

Despite the need to act on commercial factors that influence health, all too often policy makers prefer to rely on relatively ineffective individual-level interventions that seek to influence behaviour, such as information campaigns or motivational slogans.[57,58] Because such interventions rely on individual resources and capacities for behavioural change, they mostly leave structural factors unchanged, and often reinforce or might even worsen existing health inequities, and could aggravate stigma.[59,60] Structural interventions requiring little or no individual agency tend to be less likely to create inequities, are more effective at the population level, and less costly than individual-level approaches.[59,61] Geoffrey Rose highlighted the value of a population approach to prevention, which shifts the question from why did this person get liver disease to why is liver disease common in this population.[62] This approach aims to generate large population-level benefits by reducing risk across the whole population rather than only among high-risk individuals, building on the prevention paradox, in which the majority of burden from a disease comes from people at low risk, who are far more numerous than those at high risk.

Although individuals retain control over many aspects of their lives, social, economic, and commercial determinants create and propagate health inequalities, particularly for disadvantaged groups who face barriers to healthy behaviours (panel 2). These inequities are not negated by the fact that some individuals succeed despite adversity.[72,73] Responsibility for liver health must account for differing susceptibility to environmental and social influences; for example, alcohol advertising in everyday settings can severely challenge those with alcohol use disorder. Neglecting social responsibility leaves exposed people unsupported.[74] Governments, regulators, and non-governmental organisations have key roles in limiting harmful commercial practices and promoting healthy behaviour.[75] Governments are responsible for ensuring that physical, economic, and social environments support individuals to avoid major health risks, such as those arising from alcohol consumption and other unhealthy behaviours (figure 1). Health inequalities, including many of those that are shaped by health behaviours, run counter to what should be seen as part of a societal commitment to equality of opportunity.[49]

Lessons learned from tobacco control

A coherent health policy approach to both alcohol and unhealthy foods is needed to tackle aggressive marketing and other tactics drawn from a well established set of strategies used by alcohol and unhealthy food industries to undermine public health and maximise profits and shareholder value.[76] The physical, social, cultural, and economic environments in which people live are not neutral; they are actively shaped by these industries, aiming to maximise their profits (figure 1).[53,54] Four industry sectors (alcohol, tobacco, ultra-processed food, and fossil fuels) account for approximately a quarter to a third of global deaths.[53,54] These four industries also promote liver disease through various pathways. For example, the alcohol industry spends billions of euros every year on marketing, with a particular focus on young people.[77–79]

The influence of the commercial alcohol and unhealthy food industries extends beyond marketing to consumers and includes attempts to influence policy processes, scientific evidence, and society in general in the pursuit of profit.[53,80] The alcohol industry has substantial resources dedicated to lobbying the EU, with an estimated 95 full-time equivalents lobbyists and annual spending of over €9 million on these efforts.[81] Manufacturers use strategies to increase and consolidate their market power,[82] and the alcohol industry has been shown to use a range of tactics, including "dark nudges" and "sludge"—ie, obfuscatory tactics (deliberately vague or confusing) to influence consumer behaviour in pursuit of their interests.[83] "Dark nudges" aim to influence people in ways that steer them towards particular behaviours, whereas "sludge" employs cognitive biases to reduce the likelihood of healthy behaviour change. For example, material about alcohol harms produced by the alcohol industry might give greater emphasis to minor concerns, such as diuresis, while underplaying cancer risk and accompanying any such messaging with vibrant images of people enjoying themselves. Similarly, warning labels might use very small fonts or images, and hard-to-read colour combinations.[83] Commercial industries have an extensive track record of attempts to influence policy and science, both within countries and internationally, in ways that minimise potential effects on their profits.[53,84,85] They also use communication agencies and public relations organisations and claims of corporate social responsibility to divert attention, promote weak or ineffective interventions, and persistently oppose effective measures.[86,87]

Tobacco industry documents reveal the marketing strategies used to increase the appeal of tobacco products to children, including the use of child-friendly colours, flavours, packaging, and cartoon characters to promote their products.[88] In the latter part of the 20th century, several tobacco companies acquired soft drink brands and used similar integrated marketing strategies to those originally designed to sell cigarettes, surrounding children with consistent product messages for soft drinks at home, in stores, schools, sports stadiums, and theme parks, and many of these approaches have persisted even after the tobacco companies sold the soft drink brands.[89–91] In some countries, such as Norway, legislative action to prevent such marketing is now being taken.[92] Companies have also been shown to manipulate science and to block, amend, and delay policies that threaten their profits, just as was done with tobacco.[93]

Unfortunately, there is mounting evidence that voluntary or multistakeholder partnership approaches, which involve unhealthy commodity industries in formulating public health policies, are less effective when conflicts of interest exist.[94–97] Although often initiated in response to governmental efforts to introduce regulations,[98] voluntary agreements or self-regulations are less effective at safeguarding public health than statutory regulation.[99] Their implementation has resulted in weaker responses and policy substitution, negatively influencing public health and policy.[95,96,100,101] Until governments recognise and act on the entirety of this evidence by implementing effective conflict of interest policies, completely excluding relevant industries from public health policy formulation, and moving from voluntary to regulatory approaches, progress will be limited.[94] These actions need to be supported by a multilevel governance system that privileges public interests over profits and shareholder value. This system requires collaboration between: state actors for regulatory power to change policy for health, equity, and sustainability; civil society groups and social movements to raise collective voices and hold commercial actors and governments accountable; and academia and researchers to provide scientific evidence, and to present it correctly, at the right time, to the right audiences.[102]

The tobacco experience shows the dangers of hands-off policies that rely on public messaging or industry self-regulation instead of restricting harmful commercial practices. Public health campaigns cannot match the marketing power of industry, especially in targeting children. Such approaches also worsen health inequalities, as disadvantaged groups often lack the resources to act on health advice. Policies that change environments are more effective at promoting health and equity than targeting individual-level decisions.[59]

An ongoing failure to reduce alcohol harms in Europe

The WHO European region continues to have the highest levels of alcohol consumption and the highest prevalence of heavy episodic drinking of all WHO regions.[103] The 2023 GBD estimates that approximately 4% of the total 330 million disability-adjusted life-years in the WHO European region were attributable to alcohol.[13,14] GBD attributable-burden estimates are based on dose–response risk curves and population attributable fractions calculated for the full, continuous range of alcohol consumption observed in the population, including the burden due to alcohol consumed at amounts that might not be culturally or clinically recognised as high. The proportion of disability-adjusted life-years attributable to alcohol was highest for cirrhosis (44%) and liver cancer (37%) but also appreciable for a range of other primary causes, including other cancers (5%), injuries (4%), other NCDs (4%), and communicable diseases (2%; figure 7A). Indeed, three-quarters of the alcohol-attributable disability-adjusted life-years in the WHO European region for 2023 relate to non-liver-related primary causes—particularly other NCDs (51%), cancers (15%), and injuries (9%)—which shows the broader health and mortality improvements which would occur if alcohol consumption were reduced (figure 7B).

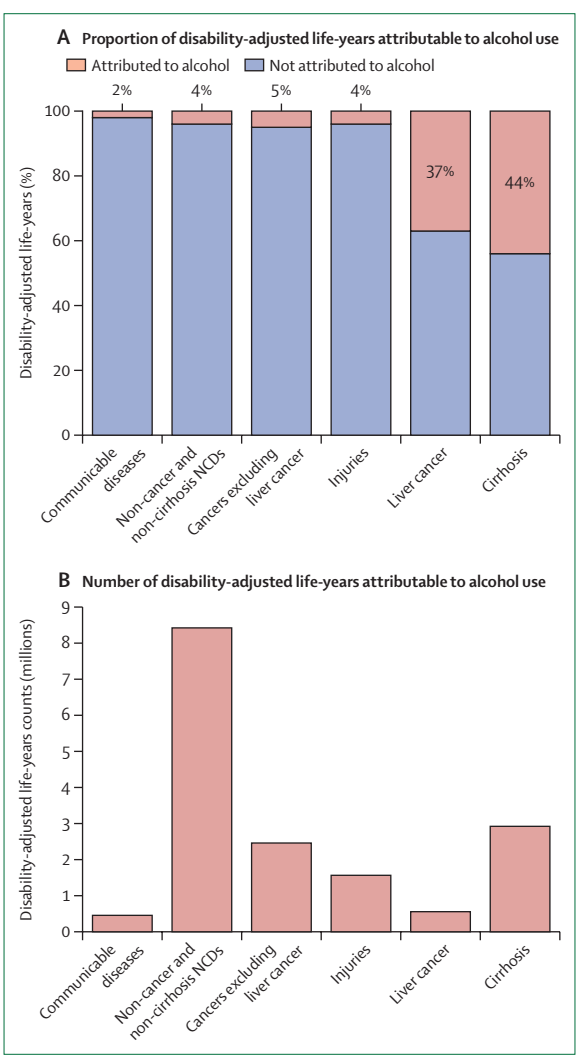


***Figure 7*: Disability-adjusted life-years by primary cause for the WHO European region in 2023**

Disability-adjusted life-years according to the proportion (A) and the number attributable to alcohol use (B; data from 2023 update to the Global Burden of Diseases, Injuries and Risk Factors Study; see appendix 1 pp 8–15 for methodological details). NCDs=non-communicable diseases.

There is an urgent need for fundamental and radical action in response to alcohol-related harms. A key observation, highlighted by the previous Commission report,[1] is the deficit in the implementation of proven, evidence-based alcohol policies.[1,104] Although effective policies to reduce alcohol harms have been identified and endorsed by WHO and other leading agencies,[6] they have not been adequately implemented. This failure of effective policy implementation has been greatly influenced by the large and well funded alcohol industry lobby.[81,105] Discourse around alcohol harms remains dominated by the arguments of the alcohol industry. Their stated perspective is that alcohol is a contributor to European economies, and that it provides employment and opportunity in many sectors, while at the same time, they undermine the arguments of health and other lobbies.[106,107] The industry mis-sells a message that alcohol meets many social needs of individuals, while downplaying the known and proven harms of alcohol. The industry supports alcohol harm reduction initiatives that will have little or no effect on sales and profits and are often futile, and where effective and evidence-based measures are proposed,[108,109] the alcohol industry and its actors lobby intensively against them.

Measurements of alcohol policy implementation

The scale of alcohol policy implementation failure and its harmful consequences can be shown numerically.[110] An Alcohol Performance Index has been developed, which evaluated 169 nations on the basis of the implementation of alcohol-related public health measures under five headings, aligned to WHO SAFER initiatives.[110] This study showed that the higher the Alcohol Performance Index, the lower the rate of harmful consequences of

alcohol, such as alcohol-use disorder, alcohol-related liver disease and associated mortality, alcohol-related hepatocellular carcinoma, cancer mortality, and cardiovascular disease mortality. This work showed the critical importance of national alcohol policy implementation in reducing alcohol harms and underlined the responsibility of governments in reducing alcohol harms, especially as most citizens are unaware of the extent of risks from alcohol.[111] Valuable progress has also been made with other measures of alcohol control policy implementation such as the Bridging the Gap score, which is a scale to measure the implementation of alcohol control policies across Europe, using a scoring system designed to rank countries based on the restrictiveness of alcohol regulations, and is the alcohol policy performance index currently favoured by WHO.[112]

Measurement and comparison of results between countries and various regulations can be key drivers of change. Little has been done in the field of effective alcohol policy legislation and its implementation at the European level. An international ranking showing how effective countries are at reducing alcohol-related harm could encourage the adoption of better policies. This ranking could be done with a refined alcohol policy performance index, with weightings of the various measures to reduce alcohol harms, such as affordability of alcohol, excise taxes, minimum unit price, restrictions on availability, restrictions on advertising, warning labels, drink driving legislation and enforcement, alcohol consumption rates in pregnancy and rates of fetal alcohol spectrum disorders, and childhood and adolescent drunkenness and consumption of alcohol in childhood and adolescence.

The alcohol industry has failed to provide adequate warnings on the labels of alcohol products regarding the known and undeniable risks of alcohol consumption, including cancer, progressive and fatal liver disease, and harm to the fetus during pregnancy. The absence of warnings on labels is a key consumer rights issue.[113] Health warning labels on alcoholic beverages have been shown to be effective, especially regarding cancer risk.[114] The International Agency for Research on Cancer classified alcohol as a group 1 carcinogen (cancer-causing substance) as early as 1988.[115] Despite widespread proven knowledge of the role of alcohol in diverse cancer types,[116–118] alcohol is sold without such warnings (or relevant nutritional information) on the container. Alcoholic beverages containing more than 1·2% alcohol by volume have been exempt from EU labelling obligations that apply to all other foods and drinks. This exemption means that alcohol products are not required to list ingredients, nutritional information, or health warnings. The 2011 (EU) Food Information to Consumers Regulation 1169/2011 is the foundation for modern food labelling in Europe.[119,120] The EU Beating Cancer Plan (2021) promised action on alcohol labelling as part of cancer prevention, pledging to introduce a proposal by the end of 2022 to amend the Food Information to Consumers Regulation, but no tangible outcome has appeared.[121]

The need to protect children from alcohol-related harms can be grouped under three key headings; (1) alcohol consumption during pregnancy and the development of fetal alcohol spectrum disorder;[122] (2) parental alcohol use, a huge contributor to adverse childhood experiences, with lifelong consequences for individuals and society;[123,124] and (3) the marketing and sale of alcohol to children and adolescents, especially in social media, with early onset child and adolescent alcohol consumption.[125] A report from the Health Behaviour in School-Aged Children study indicated that over a third of children aged 15 years had consumed alcohol in the previous month, and one in five had been drunk at least twice.[125] Given the harmful consequences of alcohol consumption in childhood and adolescence, this level of childhood consumption of alcohol is unacceptable and a failure of child protection.[126] Remarkable reductions in childhood and adolescent alcohol, substance, and tobacco use have been achieved in Iceland, through a radical and commendable whole-of-society approach encompassing altering social environments, strengthening protective factors, and reducing risk factors across four key domains: family, peers, school, and leisure time.[127]

Although Iceland provides a powerful example of what is possible when a society prioritises the protection of children from alcohol-related harms,[127] the situation across many European countries remains remarkably lax. Despite alcohol's effect on health at any volume of consumption, and its particularly detrimental effects on the developing brain,[128] several European countries continue to maintain laws that explicitly permit alcohol use among minors under parental supervision. Such accompanied drinking provisions, which range from allowing children aged 14 years to consume beer or wine in restaurants with parents, to permitting children aged 16–17 years to consume alcohol with meals, or enabling alcohol consumption at home at virtually any age, remain in place in countries including Germany, the UK, France, Spain, and Greece. These policies not only normalise early alcohol use but also directly undermine the scientific consensus on the risks associated with child and adolescent alcohol consumption. Given what we now know about alcohol's lifelong effects on physical, cognitive, and mental health, the continued legalisation of underage alcohol consumption in any form is difficult to reconcile with a genuine commitment to child protection and public health.

Stepping up to the challenge

There is a need to move from simply outlining effective recommendations to reduce alcohol harms to ensuring that they are effectively implemented by governments. There are examples of successful implementation of evidence-based alcohol harm reduction policies in Europe with striking success (panel 3). Minimum unit pricing has

Panel 3: A European success story on alcohol control

A standout example of effective alcohol policy implementation has been Lithuania. On joining the EU in 2004, Lithuania had seen a dramatic increase in alcohol consumption and a resulting fall in longevity, because of tax reductions and increased affordability of alcohol. Lithuania has since implemented many of the WHO best buys for alcohol consumption. These include restrictions on television and radio advertising, followed later by a complete ban on all television, radio, and internet advertising, increased alcohol excise tax, reduced hours of off-premise alcohol sales, and increasing the minimum legal age of alcohol purchase from 18 to 20 years.[129] Implementation of these evidence-based alcohol measures has resulted in a substantial reduction in alcohol consumption and notable health benefits, including a substantial increase in life expectancy from 71 to 77 years, in the period from 2007 to 2023, and declines in all-cause mortality beyond secular trends.[130] There was a 29% reduction in the cirrhosis mortality rate.[131] Restrictions on the hours of sale of alcohol, especially on Sundays, resulted in the elimination of excess deaths on Sundays and excess cardiovascular deaths on Mondays.[132] The ban on all alcohol marketing was associated with a 49% reduction in frequency of adolescent intoxication, compared with five other EU jurisdictions.[133] Lithuania is an example of implementing effective alcohol harm reduction policies, with consequent dramatic health benefits.[109]

been adopted in Scotland, Wales, and Ireland. As predicted in previous modelling, minimum unit pricing led to a 13% reduction in alcohol-attributable deaths and a 4% reduction in alcohol-attributable hospitalisations in Scotland, and satisfactory trends in controlling alcohol consumption in all three jurisdictions.[134] Currently, alcohol consumption generates substantial profits for the alcohol industry while leaving the public to bear the costs.[135] The profits of alcohol consumption are capitalised to benefit shareholders, while the health, social, and justice costs, estimated at approximately 2% of GDP in high-income countries, are socialised and borne by the state and taxpayers.[136,137] The alcohol industry makes no direct contribution to offset these harms, effectively creating a societal subsidy of its profits.

Governments should adopt strategies to ensure the alcohol industry bears a fair and proportionate share of the societal economic burden it creates, for example, by aligning excise and ill-health taxes with the direct costs of alcohol harms. As alcohol consumption is price elastic, such measures would both reduce consumption and mitigate harm, creating a virtuous circle with an opportunity to recoup some of the costs of alcohol harms. Additional steps, such as discontinuing agricultural subsidies for ingredients used in alcohol production, could further reduce indirect support for alcohol consumption. Lessons could also be drawn from the proposed reform of the gambling industry in the UK, where members of the all-party parliamentary group for gambling reform have called for betting groups to be taxed in proportion to the damage their operations cause.[138]

Could a vision zero approach apply to alcohol?

In 2023, WHO Europe issued a strong statement asserting that "no level of alcohol consumption is safe for our health".[139] Since then, several high-profile organisations have echoed this message. For example, the International Agency for Research on Cancer "European Code Against Cancer" advises: "If you drink alcohol of any type, limit your intake. Not drinking alcohol is better for cancer prevention".[139] There is a broad agreement that no alcohol consumption is appropriate for specific populations, such as pregnant women or people with advanced liver fibrosis or cirrhosis.[140] However, despite repeated calls for methodological consensus, national alcohol guidelines continue to diverge considerably. There is no internationally recognised target for maximum personal or per capita alcohol consumption, resulting in wide heterogeneity of recommendations across Europe (table 2).

Although consensus on a single numerical target remains elusive, at the individual level, a clear message that any decrease in alcohol consumption reduces harm could offer a unifying approach that both the public and policy makers can rally behind. The 2023 Canadian Guidance on Alcohol and Health, grounded in epidemiological modelling, introduced a continuum of risk to support informed decision-making.[141] According to this framework, the risk of alcohol-related harm is low at up to 27 g of pure alcohol per week (just under 3 European units of 10 g each), moderate at up to 81 g per week (around 8 units), and increases further with each additional drink.[141] The guidance invites people to situate themselves on the continuum of risk. Its main recommendation is for people to consider reducing their alcohol consumption. Although the greatest burden of liver disease and other harms from alcohol is seen in those who consume large volumes of alcohol over a prolonged time, lesser amounts of alcohol also cause harm.[17]

At the national level, some have suggested targets for national annual per capita consumption such as the OECD average or the EU average per capita alcohol consumption. However, these reflect some of the highest levels of alcohol consumption in the world and would be unacceptably high as targets. If there was an international agreement on low-risk, another approach could be to define harmful consumption as exceeding low-risk guidance and calculate per capita consumption among drinkers only, excluding abstainers. Yet even this level is associated with substantial alcohol-related harms and deaths. By contrast, WHO has set a pragmatic and evidence-based target of achieving at least a 10% relative reduction in per capita alcohol consumption within a decade.[46] This target provides governments with a feasible stepping-stone towards reducing population-level harms and a strong anchor for messaging that alcohol consumption should be reduced, which is fully aligned with the no safe level message.

A comparison with road safety helps to frame what this target might mean in practice. Vision Zero, originally established in Sweden and now adopted in Norway and

other countries, aims for zero road deaths by treating road danger as a systemic problem requiring coordinated action across government, industry, and individuals. It recognises that humans are flawed and will make mistakes, but seeks to create a system where those mistakes are not lethal. The concept might not translate completely to alcohol, but the principle is compelling: no one should die because of alcohol consumption. Achieving this target would require coordinated action on the part of governments, through legislation and regulation; producers, through warnings, packaging, and marketing; retailers, through sales practices; health and education systems, through prevention, treatment, and norm setting; and consumers themselves, not as the primary focus of policy, but as one actor within the system. At present, Vision Zero for alcohol might seem like an aspirational goal, but the concept underscores the principle that preventable harms and deaths should never be tolerated.

Healthy diet starvation: an expanded concept of food insecurity

Food insecurity is defined as inconsistent access to sufficient food or low availability of easily accessible and affordable, nutritious food for every household member, in a way that meets their nutritional and culturally relevant preferences for an active, healthy life. Food insecurity is an expanding area of research in hepatology, signalling the understanding that, although starvation is uncommon in regions such as Europe, there is still a phenomenon of healthy diet starvation that fundamentally affects liver health. Any degree of food insecurity can have health consequences through nutritional, psychological, and behavioural pathways.[142] Food insecurity is prevalent in socially deprived communities and negatively affects health.[143,144] A low-cost diet often entails low-quality food consisting mostly of ultra-processed products. Hence, people with food insecurity are at an increased likelihood of buying energy-dense, high-fat, high-sugar, low-nutrient foods, leading to an overall decline in dietary quality.[145,146]

Practice guidelines consistently define saturated fatty acids, and added or free sugars (such as fructose or sucrose in foods and sugar sweetened beverages) as major nutritional risk factors for MASLD.[140,147] Among the leading sources of these nutrients in the diet are ultra-processed foods and drinks, which are branded, commercial formulations extracted or derived from whole foods, that have undergone multiple industrial processes, are combined with additives, and typically contain little or no whole food, designed to compete with no or minimally processed foods and maximise industry profits.[148–153] Ultra-processed foods commonly contain ingredients rarely used in home cooking (some with suspected harmful health effects),[154–157] and tend to be high in energy, salt, sugars, and fat (saturated fat in particular), with low nutritional value and low fibre content.[158] Furthermore, ultra-processed foods are usually easy to cook or ready to eat, and frequently contain hyperpalatable combinations of nutrients and textures that accelerate eating and enhance psychological reward, further promoting excess intake and thus weight gain.[159,160] A link between a diet high in ultra-processed foods and an increased risk of a range of chronic diseases is now well established.[148–153,157] Therefore, several clinical guidelines (eg, for MASLD,[140] cardiovascular disease,[161] and cancer[162]) recommend minimising the consumption of ultra-processed foods. Furthermore, there is a growing discussion around policy responses to protect, incentivise, and support dietary patterns based on fresh and minimally processed foods, particularly for lower-income households.[148–153]

Although many ultra-processed foods are foods high in saturated fats, added sugars, and sodium, and excessive intake is inconsistent with healthy dietary guidance,[160–162] the current definition of ultra-processed foods spans foods with a variety of nutrient profiles and health effects. For example, in a US national sample, beverages represent the largest share of ultra-processed foods intake (39%), followed by processed breads and breakfast foods, frozen or shelf-stable ready-to-eat or heat meals, packaged sweet snacks and desserts, meat and meat-substitute-based products and sauces, cheese spreads, gravies, dairy-based desserts, and packaged savoury snacks.[163] An American Heart Association statement on ultra-processed foods and cardiovascular health notes that although many of these foods are linked with worse cardiometabolic outcomes, not all are harmful, and calls for more nuanced categorisation focusing on cutting back the most harmful ultra-processed foods that are already high in unhealthy fats, added sugars, and salt, while allowing a small number of selected, affordable ultra-processed food of better diet quality to be consumed.[160] Further research is needed to reliably delineate these products.

As highlighted in the first EASL–*Lancet* Commission report,[1] an association between ultra-processed foods consumption and MASLD risk has been documented both in adult[164,165] and adolescent[163] populations. In addition, there are associations between ultra-processed food consumption and a range of other chronic diseases of relevance to liver health, including obesity, metabolic syndrome, type 2 diabetes, cancer, and cardiovascular disease.[148–153] In a randomised trial, two 8-week ad libitum diets following the UK Eatwell Guide were provided; however, one was based on ultra-processed foods and the other on minimally processed food.[166] Both the minimally processed diet and the ultra-processed foods diet generated weight loss as expected, as both were designed as balanced diets; however, the minimally processed food diet generated lower caloric intake and thus greater weight reduction.[166] These findings align with previous studies,[167] and, as both diets were provided ad libitum, a key point is that ultra-processed foods encourage consumption of extra calories due to their caloric density and lower induced satiety. The differential effects of ultra-processed

foods on weight and related health parameters show the urgent need to improve diet quality across Europe.[148–153]

Of relevance to the current geopolitical landscape, the risk factors and drivers of food insecurity include political conflict, climate change, adverse weather events, structural violence, and poverty.[142] People living in deprived areas might experience low availability of affordable, healthy foods (food deserts), aggressive marketing, and disproportionate availability of low-cost unhealthy foods and sugar-sweetened beverages (food swamps), alcohol, and tobacco.[51,52] Fast-food outlet proximity is positively associated with obesity, whereas fresh fruit and vegetable outlet density and proximity are inversely associated with obesity.[168] This health inequity requires action by local governments, city planners, and national policy makers, through zoning regulations simultaneously restricting access to unhealthy food outlets by managing their density in residential areas, schools, and communal spaces, and incentivising healthy food retailers to locate in underserved neighbourhoods. Interventions to bring grocery stores to food deserts can be complemented with restrictions on fast-food restaurants and convenience stores. By simultaneously increasing the availability of healthy food and decreasing the availability of unhealthy foods, policy makers can maximise the potential of the food environment to reduce obesity and promote health equity.[168,169]

Social media and algorithmic amplification of structural disease risk

Understanding the increasingly complex digital factors shaping everyday life is essential for liver disease prevention and control. Internet use, especially on social media platforms, can have multiple effects on health, several of which are directly relevant to liver health.[170,171] There is growing awareness that digital platforms, combined with increasingly sophisticated algorithms, shape users' exposure to alcohol and unhealthy food marketing and misleading health information.[50,172] This exposure is especially relevant for young people, who are the most active users of algorithmically curated platforms and, therefore, the most exposed to harmful commercial influences. As of October, 2025, there were 5·66 billion social media users worldwide,[173] with young people representing the demographic with the highest levels of daily engagement. In Europe, over 96% of young people aged 16–29 years are active internet users,[174] with the majority spending an average of 3–4 h daily on social media platforms including Instagram, Snapchat, TikTok, X, Discord, and YouTube.[175]

Commercial industries exploit this growing access to mobile devices and social media to deliver personalised and targeted advertising of alcohol and unhealthy food to young people.[125,176,177] WHO has identified this marketing practice as a major concern.[178] In parallel, societal digitalisation has transformed how young people discover, select, and access food and drink. Many online food-delivery services (eg, major app-based delivery platforms) function through social-media-linked advertising. These services are highly accessible and have been found to promote energy-dense, processed meals, reinforcing unhealthy dietary patterns already circulating within algorithmic feeds.[179,180]

A lack of transparency regarding the ways in which algorithms shape the online environment increases consumers' vulnerability to data-driven marketing.[181] In the current online environment, poor algorithmic literacy has become a key global problem.[182] Effective countermeasures remain scarce, but should include strengthened regulations to eliminate targeted advertising to minors and digital literacy programmes across schools, families, and communities. Although regulatory frameworks such as the EU Digital Services Act aim to protect children and young people from harmful content and algorithmically targeted advertising, these measures often struggle to counterbalance the influence of big corporations (eg, Big Tech and Big Alcohol)[83,183] on digital environments.[184] Similar concerns have been raised in response to the increasing engagement of the pharmaceutical industry in social media,[185] which might leverage algorithmic amplification and hyperpersonalised marketing and online delivery, often in ways that contradict public health objectives.[176]

The business model underpinning social media platforms has been termed surveillance capitalism,[176] in which data and profit-driven attention-engagement models dominate. These systems collect and analyse user data to prioritise content that maximises visibility and emotional responses, including alcohol and marketing of unhealthy food and drinks, and misleading health claims.[171,186] The entanglement of Big Tech with other industries provides mutual benefit within this algorithmically driven advertising ecosystem. Through this environment, young people are pervasively exposed to marketing of alcohol and unhealthy foods on mobile devices—anywhere and at any time—which might normalise consumption behaviours that can increase the likelihood of developing alcohol-related liver disease and MASLD.[187,188] Public health strategies must account for the ways algorithmic media influence liver health among children and young people, with a focus on alcohol consumption, unhealthy eating habits, and media exposure to high-risk behaviours. In addition, public health initiatives should better communicate the preventable nature of many liver diseases, emphasising early intervention and digital literacy strategies to protect future generations.

How algorithms amplify digital content and services harmful to health

It is crucial to understand how social media algorithms shape young people's screen time and expose them to digital influences that affect their health behaviours. Social media's high-intensity environment, driven by algorithmic curation and content overload, has led many young people to abandon actively seeking news and

information, instead adopting a "news finds me" perspective.[189] Within this framework, the content, advertisements, and food-delivery promotions presented in children's and adolescents' social-media feeds are shaped by algorithms that are designed to prioritise engagement. These algorithmic designs are often associated with prolonged screen time, characterised by cyclic scrolling behaviour,[190,191] referred to as social media intensity.[192] This exposure subjects children and adolescents to repetitive patterns of often misleading and unhelpful information and marketing on their mobile devices,[193] with few possibilities for parental supervision.[194]

In the context of liver health, the promotion of alcohol, sugar-sweetened beverages, and unhealthy foods can occur without users actively seeking it.[195] Young people exposed to alcohol-related content on social media tend to consume more alcohol and drink more frequently than peers who are not exposed.[196] Adolescents, as passive consumers, are particularly susceptible to internalising such content, which increases their risk of developing NCDs.[170] Moreover, their poor recognition and understanding of algorithms and marketing content is especially concerning,[197] as children and adolescents often report positive attitudes towards and high levels of engagement with food marketing.[198] This vulnerability, combined with exposure to algorithmic marketing, is further exacerbated by the increasing accessibility of online food-delivery services. Individuals with higher BMI, greater body fat percentage, or obesity, as well as adolescents and young adults, are more likely to report consuming takeaway or delivery meals or using takeaway food delivery apps.[199–201]

The concept of filter bubbles describes how algorithms, embedded in an attention-economy model,[170,176] create self-reinforcing cycles through engagement-driven and addictive platform designs.[202] TikTok's For You page illustrates this dynamic clearly,[203] using machine learning to refine recommendations based on viewing history, likes, shares, and comments, thereby creating conditions that can produce filter-bubble effects. This positive feedback loop has led to concerns about excessive use of TikTok among young people.[204] One reason for these concerns is that such algorithmically driven environments filter content and generate highly personalised information flows. These curated feeds might shape behaviours and consumption patterns,[193] including exposure to content that might normalise behaviours known to elevate liver-disease risk.[187,188] In addition, these filter bubbles could expose children and young people to health misinformation and advertisements for unhealthy products promoted by influencers,[205–207] representing what might be coined anti-health literacy. Research relevant to liver health shows that influencer marketing often promotes the consumption of unhealthy products.[170]

Social media users, including children and young people, are also exposed to another phenomenon known as echo chambers. In contrast to filter bubbles, echo chambers are largely user-driven, with participants self-selecting into like-minded groups. In such environments, individuals are predominantly exposed to information that aligns with their pre-existing views, while contradictory perspectives are filtered out, amplifying existing attitudes and consumption patterns.[208] It is important to note that filter bubbles and echo chambers feed each other within social networks,[170] amplifying extreme or health-damaging messages and fostering unhealthy online communities,[207] with consequences for the health and wellbeing of children and adolescents.[170,171] These consequences are further exacerbated by misinformation susceptibility and declining trust in evidence-based health information,[182] including that relevant to public and liver health, as shown during the COVID-19 pandemic.[208]

Complexity of generative AI in marketing

Building on the need for a clearer understanding of the digital determinants of liver health, it is important to recognise that the media and marketing environment is changing rapidly. In addition to algorithmic amplification, advances in generative AI increasingly shape how content is created, distributed, and experienced, introducing new challenges for public health. Generative AI tools such as Claude, ChatGPT, Gemini, Midjourney, Character AI, DeepSeek, Grok, etc,[209] have, in a very short period, become deeply embedded in young people's everyday lives.[210] Although AI systems might have the potential to support weight management and behaviour modification,[211] they can also amplify and personalise unhealthy messages. Generative AI is already flooding social media platforms with AI-generated content that lacks accountability, factual accuracy, and authenticity.[212] For example, the field of AI-generated food imagery is evolving rapidly; people frequently prefer AI-generated food images over real ones because of their enhanced visual appeal.[213] However, although little is currently known about the potential public-health effect of this emerging phenomenon, AI-generated images can intensify visual hunger. As generative AI systems continue to optimise food visuals for engagement, they risk reinforcing unhealthy eating behaviours at scale and exacerbating population-level liver-health risks.

In combination with increased screen time, these developments show that marketing aimed at children and young people is no longer limited to traditional formats. Marketing is increasingly intertwined with a broader ecosystem of AI-generated and algorithmically curated content, including virtual reality and dynamic video advertisements,[194] potentially linked with digital food-delivery services that provide immediate access to unhealthy foods and alcohol, especially in urban areas. This complex environment, and the growing ease of access to unhealthy products, make it difficult for young users to navigate and to distinguish commercial persuasion from entertainment, or reality from fiction,

which in turn shapes children's and adolescents' health-related behaviours.[193,214]

Digital policy interventions

There is an urgent need for European countries to tackle the pervasive and harmful effects of social media and screen time to protect children and adolescents. In today's media and marketing landscape, inaction is not an option. Placing sole responsibility on parents to protect children and adolescents from harm related to social media platforms is unrealistic, inappropriate, and ineffective. With mobile devices, children and young people now spend hours immersed in social media, accessing content beyond parental supervision.[194] At the same time, a rights-based approach to children's and young people's health and digital marketing regulation must uphold their rights to participation and protection under the United Nations Convention on the Rights of the Child.[193] The evolving challenge of regulating social media requires balancing restrictive policies with freedom of speech and human rights considerations, particularly for children and young people,[215,216] who have the right to engage in digital media while being safeguarded from health risks, privacy violations, and economic exploitation. Governments and supranational actors must create strong regulatory frameworks that permit children and young people to participate on the internet and social media, without being targeted by harmful marketing.

Initiatives such as the Digital Services Act in the EU, which came into force in November, 2022, aim to address the risks social media platforms pose to children and adolescents. For example, the Digital Services Act prohibits targeted advertisements to minors based on profiling, potentially preventing alcohol companies from directing advertisements toward children and young people. Additionally, the Digital Services Act encourages platforms to adopt secure age-verification systems, which can help limit minors' exposure to alcohol-related content and to products high in fat, salt, and sugar. Yet digital industries continue to collect highly detailed analyses of children and young people's behaviour,[176] including their eating and drinking behaviours. These insights remain inaccessible to external researchers, reinforcing the power imbalance between industry interests and public health efforts,[193] and representing a direct threat to individual rights through the collection and control of personal data.

Constraining industry use of personal data and extending advertising restrictions to alcohol and unhealthy foods will help reduce the normalisation of alcohol consumption and unhealthy eating behaviours among young people. For instance, stricter digital advertising standards should be implemented, including a complete ban on targeted advertisements for alcohol and unhealthy foods directed at minors. Additionally, transparency requirements for data collection and algorithmic decision-making should be enforced. These measures would limit the promotion of unhealthy behaviours and ensure that digital environments prioritise public health over commercial interests. In addition, public health campaigns should also leverage social media platforms to promote healthy eating habits, using peer-led initiatives and influencer partnerships to counter harmful narratives.

Social media stigma, mental health, and eating behaviours

The first EASL–*Lancet* Commission report prioritised addressing the major role of stigma and discrimination of people at risk of liver disease, which results in care avoidance, risk behaviours, and social inequities.[1] Stigma works in opposition to the overarching aim of early detection and prompt care for liver disease.[1] Resistance to efforts to destigmatise liver conditions is often rooted in the erroneous belief that stigma can incentivise individuals to stop engaging in certain behaviours.[217] This view trivialises the reality of behaviour-related conditions and the harm done by stigma. It also ignores the collective responsibility for these illnesses, which is rooted in structural determinants including policies, marketing, culture, and peer group behaviour. Evidence suggests that stigma both makes it more difficult for people to adopt healthy behaviours (eg, avoiding physical activity because of body shaming) and can lead individuals to incur additional risks (eg, avoiding seeking health care because they anticipate negative attitudes from health-care professionals). Stigma also contributes to poor mental and physical health outcomes.[218,219]

The relationship between social media, mental health, stigma, and diet is complex and multifaceted. Social media use has been linked to increased rates of anxiety, poor wellbeing, depression, body dissatisfaction, and low self-esteem among adolescents,[191,192,220–222] all of which can shape eating behaviours relevant to liver health.[223] In addition to promoting unhealthy eating habits with a risk of obesity and MASLD, social media might also reinforce appearance norms and weight-related stigma that affect metabolic health.[224,225] Constant comparison to idealised images on social media can lead to disordered eating patterns, such as binge eating or restrictive dieting,[225] both of which are associated with metabolic dysfunction and liver-related consequences.[226,227] Pressure to conform to unrealistic body standards can lead to body dysmorphia and eating disorders, particularly among adolescents and young adults.[228] These mental health effects could indirectly worsen liver health trajectories through stress-related eating, weight cycling, and dysregulated nutrition.[229,230]

Stigma operates across psychological, social, and digital layers, including the circulation of body shaming and weight-consciousness materials on social media, making single-level interventions inadequate. Effectively addressing stigma requires complex, multilevel strategies

that not only reduce harm but also harness digital spaces as opportunities for positive health interventions, through counter-stigma messaging, evidence-based nutrition guidance, and supportive peer communities.[231] These approaches should be complemented by efforts beyond the online environment, tackling stigma at population, health care, and individual levels, engaging primary care, and involving communities to strengthen outreach, social support, and navigation for people with liver disease within the health-care system.[231] Although these multilevel approaches are often resource-intensive and potentially burdensome for participants, they could be effective due to both additive and interactive effects.[232] Further work is needed to clarify methodological aspects of such interventions in the setting of liver disease.[233]

Liver disease and migrant health in Europe

Changes in global health infrastructure, including the reduction in funding for WHO and other global health initiatives announced in 2025,[234] could substantially exacerbate inequalities in liver disease prevention and care, and negatively affect viral hepatitis elimination efforts, particularly in low-income and middle-income countries. In Europe, funding cuts due to the reduced priority of health versus other societal expenditures (eg, military and energy investments) are likely to slow or even reverse progress in global health. Strict immigration policies and incarceration as responses to migration might reduce health-care access for undocumented migrants, which in turn reinforces existing health disparities,[235,236] and undermines broader efforts to reduce the global burden of liver disease. Strict immigration policies also contribute to growing inequities between migrant and native-born populations,[237] and worsen structural racism, discrimination, and stigma.[1,238]

Migration has a long history in European society, influencing the health and development of both migrant and host communities. The WHO European region hosts an estimated 101 million migrants (defined as people living in a different country to where they were born, including refugees and asylum seekers), which is the largest regional share (approximately 36%) of the global international migrant population.[239] Migration to Europe is complex in terms of migration pathways and is highly dynamic, with a large influx of refugees, asylum seekers, and undocumented migrants in recent years, due to major political conflicts. This influx has resulted in considerable changes to the demographic profile of populations in many countries.[240] There is also considerable variation across countries in the region in terms of the proportion of migrants in the overall national population size (ranging from 1% in Bulgaria and Croatia to 47% in Luxembourg) across EU countries.[241]

Although migrant populations in Europe are typically younger than locally born populations and are generally healthy, migrant populations have an increased burden of infectious diseases compared with the wider general population.[242–244] The reasons for this increased burden are complex and multifactorial.[245] Addressing the health of migrants has been increasingly recognised as a priority across the international health agenda, resulting in numerous policy responses. In 2008, the World Health Assembly adopted a resolution (WHA61·17) aimed at promoting migrant-sensitive health policies, followed by a WHO global action plan (recently extended to 2030) to enhance capacity to tackle the social determinants of health and accelerate progress towards universal health coverage.[246] In Europe, the WHO Regional Committee adopted a regional action plan in 2023 on migrant health that aims to translate and operationalise the global action plan within the region.[247]

The prevalence of viral hepatitis varies worldwide, with the highest prevalence recorded in low-income and middle-income countries in Africa and Asia.[248,249] The migration of populations from countries with high prevalence has had an effect in many European countries.[242] In particular, migrants from intermediate or high endemicity countries (defined as having ≥2% HBsAg prevalence) have a higher prevalence of chronic hepatitis B[250] and liver cancer[251] than the locally born population in their country of residence. In addition, the higher prevalence of hepatitis B among migrants also raises concerns about the burden of hepatitis delta virus, which requires hepatitis B virus co-infection and can lead to a more severe form of chronic viral hepatitis, frequently resulting in rapid disease progression and ultimately high levels of liver cancer and end-stage liver disease-related mortality.[252] At the population level, there is uncertainty surrounding the prevalence of hepatitis delta virus among people living with hepatitis B virus.[252,253] Understanding the burden of viral hepatitis, including the extent of undiagnosed infection, and developing effective pathways of care among migrants is crucial for guiding policy makers regarding interventions that can improve health outcomes.

The first EASL–*Lancet* Commission recognised the need for European nations to adopt unified policies for testing and treatment of viral hepatitis in key population groups at increased risk of infection, such as people who use drugs and newly arrived migrants.[1] In recognition that unsafe injecting practices among people who use drugs contribute majorly to hepatitis C virus transmission globally, the WHO in 2022 set an additional elimination target (ie, ≤2 new infections per 100 person years), thereby leveraging countries to increase efforts in support of this specific population group.[254,255] However, the public health case for coordinated action to target migrant communities disproportionately affected by liver disease has received little attention, and is undermined by insufficient national and regional data on viral hepatitis infection and disease burden according to migration status. The integration of tailored strategies for migrants into national and local viral hepatitis

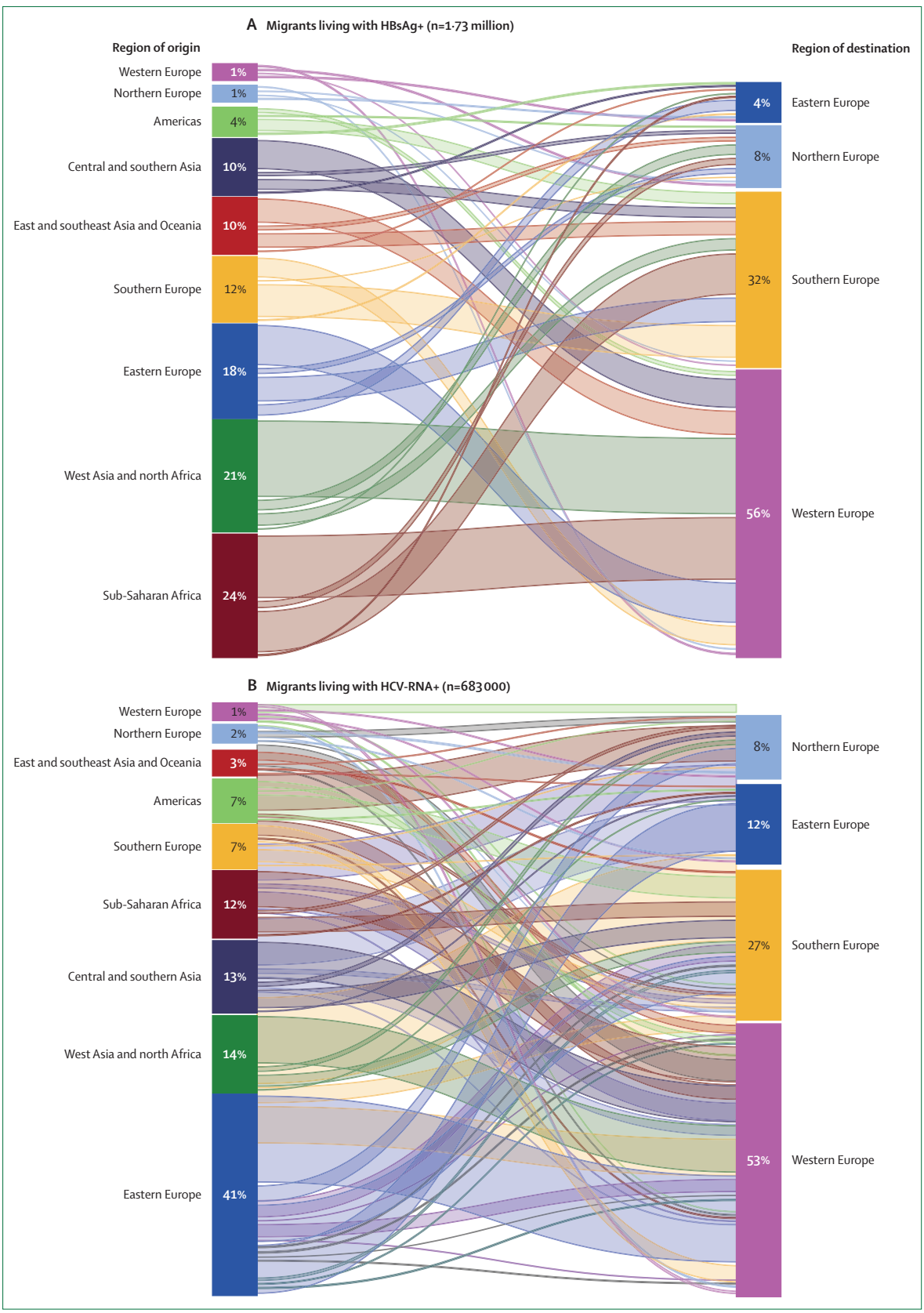


Figure 8: **Origin and destination of migrants living with hepatitis B and C infection in the EU in 2024**
The flow of migrants with chronic hepatitis B virus infection (A) and chronic hepatitis C virus infection (B) to the 27 countries in the EU, according to the region of their country of origin (left) and their country of destination (right). See appendix 1 pp 22–25 and 42–45 for details. HCV-RNA+=hepatitis C virus RNA-positive.

elimination plans is warranted to address the inequity of access and stigma faced by this group. The absence of evidence is a barrier to the development of appropriately targeted strategies for viral hepatitis elimination across Europe. In this Commission report, we addressed this evidence gap through new modelling to estimate the current epidemiological situation of hepatitis B virus and hepatitis C virus among migrant populations in EU countries and the effect of migration on the burden of hepatitis B virus and hepatitis delta virus in selected European countries over time.

Current epidemiological situation of hepatitis B virus and hepatitis C virus among migrant populations in the EU

The number of migrants living with chronic hepatitis B virus and hepatitis C virus infections was recently estimated for the 27 countries within the EU by combining data on (1) the number of international migrant individuals (by country of origin and country of destination) from the UN 2024 estimates[256,257] with (2) chronic hepatitis B virus and hepatitis C virus prevalence estimates from the country-of-origin models maintained by the Polaris Observatory.[258–260] We further analysed the country-level data, generating estimates by region of birth and destination, to assess the broad migration patterns for people living with hepatitis B virus and hepatitis C virus in the EU (see appendix 1 pp 22–25 for methods description).[256,257]

In 2024, an estimated 1·73 million (95% UI 1·04–2·66) migrants were living with chronic hepatitis B virus infection and up to 683 000 (498 000–1 048 000) were living with chronic hepatitis C virus infection in the EU27, corresponding to prevalences of 2·73% (1·6–4·2) for hepatitis B virus and 1·08% (95% UI 0·8–1·7%) for hepatitis C virus in migrant populations; countries with the largest estimated number of migrants living with viral hepatitis (relating to two-thirds of those in the EU) were Germany, France, Italy, and Spain.[260] Figure 8 illustrates the considerable heterogeneity that exists in the flow of migrants to the EU (see appendix 1 pp 42–45 for further details). For migrants living with hepatitis B virus in the EU, 32% originated from other parts of Europe (mainly eastern and southern Europe), 24% from sub-Saharan Africa, and 21% from north Africa and west Asia (figure 8A). For migrants living with hepatitis C virus in the EU, 41% originated from eastern Europe, 14% from north Africa and west Asia, and 13% from central and southern Asia (figure 8B). Most of the migrants with viral hepatitis in the EU had settled in countries in western (55%) and southern (31%) Europe.[260]

Current WHO and European Centre for Disease Prevention and Control guidelines recommend that viral hepatitis testing be targeted at migrants from intermediate or high endemicity countries (ie, ≥2% of seroprevalence for hepatitis B virus and hepatitis C virus antibody).[261,262] According to these thresholds, our modelling for the EU countries highlights that 25% of migrants with chronic hepatitis B virus infection and 44% with chronic hepatitis C virus infection come from low-endemicity countries, and would therefore be excluded from screening under current international guidelines. Consequently, expanding testing to all migrants will be essential to meet the global viral hepatitis elimination targets in European countries.

The effect of migration on the burden of hepatitis B virus and hepatitis delta virus in selected European countries over time

We developed a novel, dynamic, mathematical modelling approach to estimate the contribution of migration to the burden of chronic hepatitis B virus and hepatitis delta virus infection and disease over time in five European countries with different migration trends (Croatia, the Netherlands, Norway, Romania, and the UK), combining data from (1) the 2020 UN International Migrant Stocks and other sources on national population size estimates, (2) the World Bank on population growth estimates by country, (3) country-level datasets on annual incoming migration from different countries, (4) GBD estimates of chronic hepatitis B virus prevalence, and (5) a systematic review of hepatitis delta virus RNA prevalence estimates (by country or region).[252,253,263–265] This model simulated dynamic changes in the whole population over time across the five countries, stratified by local-born or migrant status (by sex, age, and hepatitis B virus endemicity at country of origin), hepatitis B virus infection and liver disease stages, hepatitis delta virus co-infection, and hepatitis B virus or hepatitis delta virus-related mortality due to decompensated cirrhosis and hepatocellular carcinoma (for model details see appendix 1 pp 26–38 and pp 46–48).

The model estimated that the proportion of first-generation people who have migrated into each country was 11–13% of the resident population in 2015, except for Romania, where it was 1·2%. By 2030, our projections suggest that this proportion is expected to increase to 14–18% in Croatia, the Netherlands, Norway, and the UK, and increase to 7–8% in Romania (assuming current migration patterns continue; figure 9). Across the five countries, our modelling projects that chronic hepatitis B virus infections among migrants will likely represent an increasing proportion of the overall hepatitis B virus infection burden over time (figure 9). In the UK, which has an overall low hepatitis B virus prevalence (0·46% in 2015; appendix 1 p 49), our model projects an estimated 9000 to 16 000 annual incoming migrants with chronic hepatitis B virus, resulting in the proportion of overall infections among migrants increasing from 74% in 2015 to 83% by 2030 and the national burden of chronic hepatitis B virus infection increasing from 302 000 in 2015 to 359 000 by 2030 (appendix 1 p 49). This increase in chronic infection burden is further accentuated for hepatitis delta virus, with notable increases in the

proportion of migrants living with chronic hepatitis delta co-infection over this period (figure 9). Conversely, in Romania, with lower numbers of incoming migrants and higher endemic chronic hepatitis B virus prevalence than the other four countries (4·7% in 2015), our modelling projects that ongoing transmission of hepatitis B virus within-country will continue to be the main contributor to the future burden of hepatitis B virus (figure 9), with the number of chronic infections projected to increase by approximately 25% from 923 000 in 2015 to 1·17 million by 2030 (appendix 1 p 49). The heterogeneity across countries is also reflected in our projections of chronic hepatitis B virus prevalence among migrants by 2030, which is estimated to be substantially higher (by five to 25 times) than the local-born population in the Netherlands, Norway, and the UK, but lower among migrants in Romania (figure 10A). In Croatia, the projected chronic

Figure 9: **Changing epidemiology of hepatitis B and delta by migrant status in five European countries between 2015 and 2030**
Estimated proportion of total country population (A), people living with chronic HBV infection (B), people living with chronic HDV co-infection among HBsAg-positive individuals (C), annual incident cases of HBV-associated decompensated cirrhosis and HCC (D), and HBV-associated deaths (E), by migration status in 2015 and 2030 across five European countries. Green: migrants from areas with intermediate or high chronic HBV endemicity. Red: migrants from areas with low chronic HBV endemicity. Blue: local-born individuals. See appendix 1 pp 26–38 for methodological details. HBV=hepatitis B virus. HCC=hepatocellular carcinoma. HDV=hepatitis delta virus.

hepatitis B virus prevalence is similar among migrants and locally born populations—this is due to migrants in Croatia being primarily from low hepatitis B virus endemic countries (figure 9).

Across Croatia, the Netherlands, Norway, and the UK, our modelling projects that, by 2030, an appreciable proportion (10–16%) of all people living with hepatitis B virus in these four countries will be among migrants from low-endemicity regions. This provides further corroboration that achieving the WHO elimination target of diagnosing 90% of individuals with hepatitis B virus will be challenging without broadening current screening guidelines for migrant populations. Furthermore, the annual incidence of hepatitis B virus-related decompensated cirrhosis and hepatocellular carcinoma cases and deaths will increase over time in the absence of action, both overall, and among both locally born and migrants, across all five countries (appendix 1 p 49). The overall annual mortality due to hepatitis B virus-related decompensated cirrhosis and hepatocellular carcinoma is projected to be low (<1 per 100 000) through to 2030 in Croatia, the Netherlands, Norway, and the UK, suggesting that these four countries have attained the WHO elimination target for hepatitis B virus-related deaths (less than four deaths per 100 000; figure 10B).[255] Conversely, overall annual hepatitis B virus mortality is projected to increase to 4·47 per 100 000 (95% credibility interval 3·12–6·41) in Romania by 2030, breaching the mortality target (figure 10B). The annual incidence of and mortality from hepatitis B virus-related decompensated cirrhosis and hepatocellular carcinoma among migrants are markedly higher than locally born populations in the Netherlands, Norway, and the UK, while similar in Croatia, and lower in Romania (figure 10B, appendix 1 p 50). Additionally, our model highlights an increased disease burden attributable to HDV co-infection. Across all five countries, despite the chronic HDV co-infection prevalence remaining relatively stable among people with hepatitis B virus infection between 2015 and 2030 (around 2·0–2·8% across Croatia, the Netherlands, Norway, and the UK, and around 9% in Romania), the proportion of hepatitis B virus-related deaths due to decompensated cirrhosis and hepatocellular carcinoma associated with hepatitis delta virus co-infection is estimated to increase by 1·2–2·0 times between 2015 and 2030 without treatment (appendix 1 p 51).

Viral hepatitis elimination represents an opportunity and obligation for countries to advance the health and wellbeing of migrant populations. Addressing legal, cultural, and structural barriers faced by migrants in accessing and utilising health services has far-reaching benefits beyond liver health.[266] The disease burden for migrants is increasingly shifting to chronic diseases such as obesity, diabetes, hypertension, and cardiovascular diseases.[239,266] Therefore, public health programmes should avoid working in disease silos and adopt a broad,

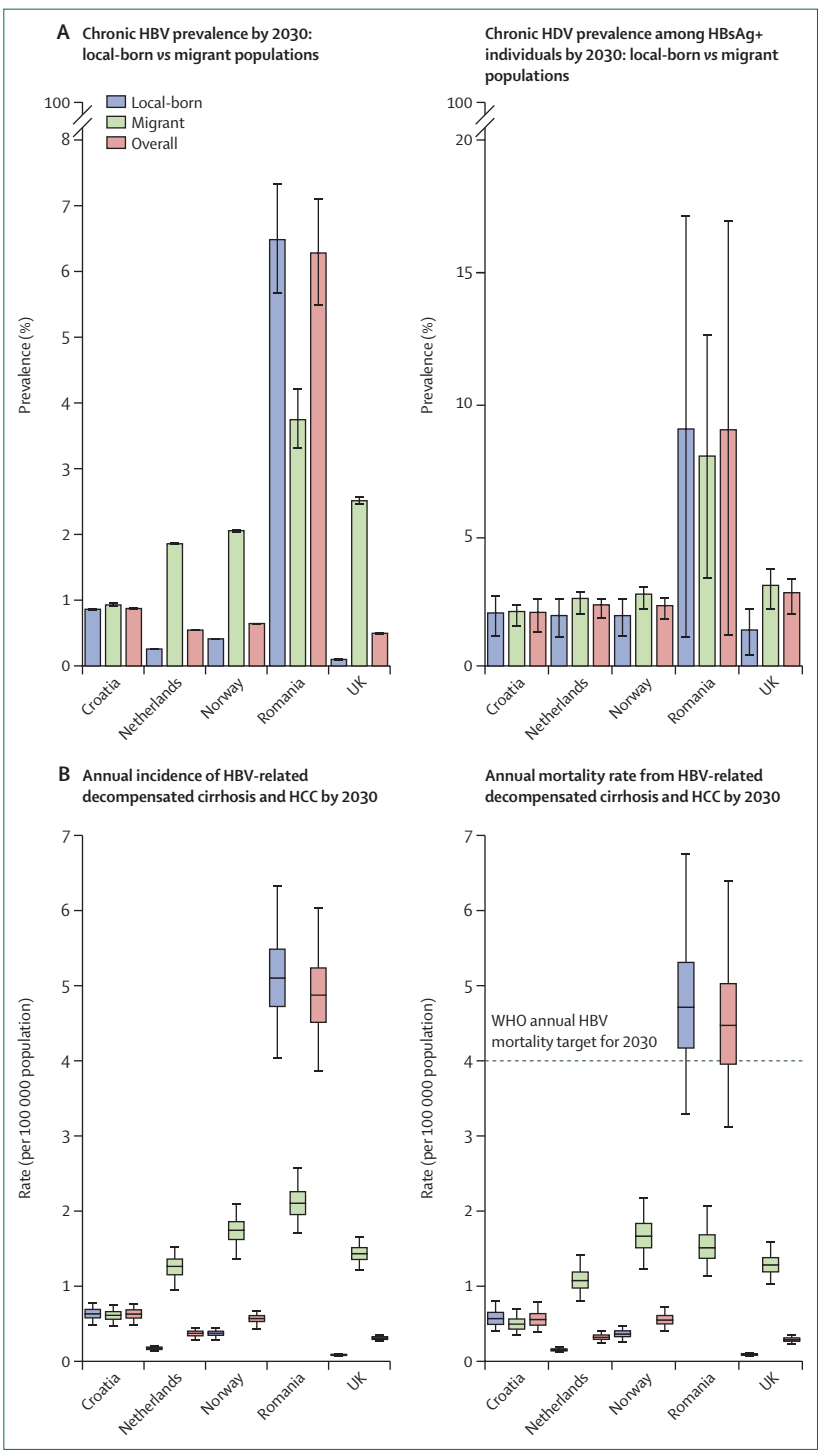


Figure 10: **Variation in hepatitis B and delta prevalence, and HBV-related morbidity and mortality, by migrant status in five European countries in 2030**

Modelled estimates of chronic HBV and HDV prevalence (A), and annual incidence and mortality due to HBV-associated decompensated cirrhosis and HCC per 100 000 persons by 2030 (B), overall and by local-born or migrant status, in Croatia, the Netherlands, Norway, Romania, and the UK. See appendix 1 pp 26–38 for methodological details. HBV=hepatitis B virus. HCC=hepatocellular carcinoma. HDV=hepatitis delta virus.

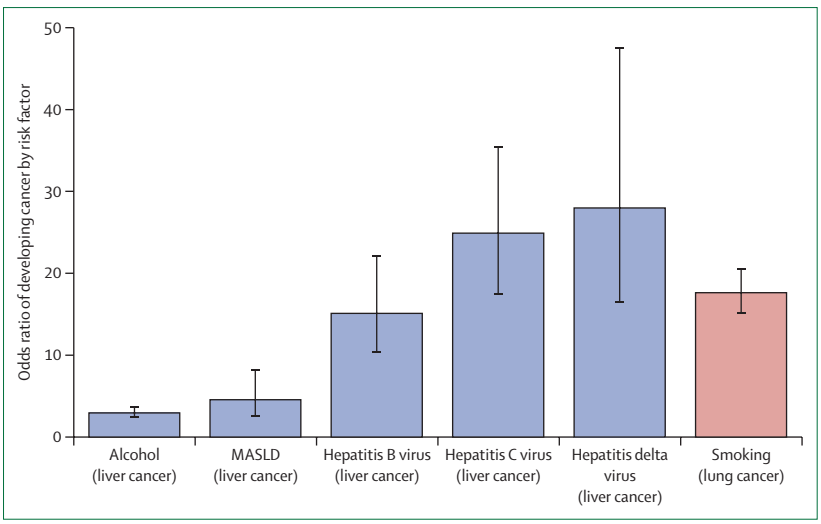


Figure 11: **Risk factors for developing hepatocellular carcinoma compared with lung cancer and smoking**
Hepatocellular carcinoma represents a global health crisis and is almost exclusively linked to underlying chronic liver diseases. These include hepatitis B virus, hepatitis delta virus, and hepatitis C virus infections, alcohol-related liver disease (in the figure represented by risk at >4 drinks per day), and MASLD. In addition, although rare, some autoimmune and genetic liver diseases carry an exceptionally high risk of liver cancer development (not shown). The figure serves to illustrate how the risk (odds ratio and 95% CI) of developing hepatocellular carcinoma from hepatitis virus infections is similar or higher than the risk of developing lung cancer from actively smoking more than one pack of cigarette per day (see appendix 1 pp 98–99 for methodological details). Although the risk of developing hepatocellular carcinoma is lower for alcohol-related liver disease and MASLD than the other mentioned risk factors, they affect a much larger population. MASLD=metabolic dysfunction-associated steatotic liver disease.

inclusive, and equitable approach to migrant health.[267] Countries need to develop and invest in robust data systems that include monitoring of migrant populations, which, combined with increased use of modelling, can inform tailored and population-level strategies to reduce the burden of viral hepatitis-related morbidity and mortality, achieve elimination goals,[245,268] and improve migrant health more broadly. The stated commitment of European countries to universal health coverage will be shown by sufficient integration of migrant needs in health-care systems.

Addressing the burden of hepatocellular carcinoma in Europe

The incidence of liver cancer continues to rise across Europe (figure 2). Liver cancer risk is intertwined with the different concepts of liver risk elaborated in this Commission report. Primary prevention of hepatocellular carcinoma is therefore synergistic with proposed policy priorities aiming to reduce or eliminate risk factors for chronic, progressive liver diseases. The *Lancet* Commission on addressing the global hepatocellular carcinoma burden elaborated these priorities from a global perspective in their report,[35] placing substantial emphasis on the role of viral hepatitis, alcohol, and metabolic factors. In addition, there is increasing attention to specific environmental drivers of hepatocellular carcinoma development,[269,270] including occupational hazards.[271]

Hepatocellular carcinoma and viral hepatitis in Europe

Preventive policies to reduce the incidence of liver cancer by tackling alcohol use and metabolic factors need to be a major emphasis for Europe;[1] however, for hepatocellular carcinoma prevention in Europe to be successful it is important not to underestimate the importance of hepatitis B virus and hepatitis C virus elimination efforts, as pointed out in the first EASL–*Lancet* Commission report and associated strategies.[1,272] Although some progress has been made since the first WHO Global Health Sector Strategy on Viral Hepatitis was published,[273] the global response has so far fallen short of most 2020 health targets.[274] In the WHO European region, hepatitis B virus vaccination uptake remains incomplete, particularly among at-risk adult populations, where catch-up vaccination programmes should be strengthened. Diagnosis and treatment rates for both hepatitis B virus and hepatitis C virus infections are still insufficient and warrant further action. According to 2022 estimates,[275] the diagnosis rates in the WHO European region were 16% for hepatitis B virus infection and 29% for hepatitis C virus infection.

Our modelling highlights the urgent need for strengthening and adaptation of national responses to tackle hepatitis B virus infection across Europe, especially scaling up early diagnosis and treatment in migrant populations. Broader and more inclusive case identification strategies should be implemented to overcome barriers to testing and address inequity in health-care access among migrant and other key population groups affected by viral hepatitis.[276–279] Local strategies should be flexible and co-developed in collaboration with communities affected and based on up-to-date epidemiological information. Most countries, however, remain reluctant to adopt universal hepatitis B virus and hepatitis C virus screening for reasons including reliance on modelling rather than empirical outcome studies; high sensitivity of cost-effectiveness to prevalence and diagnostic and treatment costs; reluctance from payers due to excessive discounting of future benefits against high upfront costs; low yield in low-risk populations; and unaccounted costs of awareness campaigns and primary care training. These objections conflict with consistent evidence that early diagnosis and effective treatment of liver disease—particularly before substantial fibrosis or cirrhosis—can prevent the development of hepatocellular carcinoma, making it one of the most preventable malignancies (figure 11). Some of the clearest examples come from large-scale hepatitis C virus treatment programmes showing that systematic liver disease prevention strategies can directly reduce liver cancer rates (appendix 1 p 52).

As a result, some countries have started to upscale screening strategies. In 2023, the US Centers for Disease Control and Prevention (CDC) upgraded their hepatitis B virus screening recommendation from risk-based to universal screening of all adults 18 years and older, at

least once in their lifetime.[280] This decision was based on a cost-effectiveness analysis showing that, even with the very low US prevalence of undiagnosed hepatitis B virus infection (estimated at 0·24%), screening the general adult population aged 18–69 years (as modelled in the study) compared with current practice would avert an additional 7·4 cases of compensated cirrhosis, 3·3 cases of decompensated cirrhosis, 5·5 cases of hepatocellular carcinoma, 1·9 liver transplants, and 10·3 hepatitis B virus-related deaths, and could be cost-saving if annual antiviral costs remain below US$894.[281] Similar conclusions were reported in an Australian cost-effectiveness study,[282] if testing costs are low and at least 50% of diagnosed individuals receive appropriate management. Although the Australian study did not explicitly quantify hepatocellular carcinoma cases averted, the benefit was implied, as the approach was projected to prevent 315 hepatitis B virus-related deaths in Australia over 2020–30. The US CDC decision was mirrored by similar recommendations in China.[283]

For hepatitis C virus infection, the US Preventive Services Task Force updated its recommendation in 2020 to include screening for all adults aged 18–79 years.[284] This decision was based on evidence that antiviral therapy-induced hepatitis C virus clearance is associated with substantial reductions in all-cause and liver-related mortality, including hepatocellular carcinoma incidence (pooled hazard ratio 0·29 [95% CI 0·23–0·38]).[285,286] The US CDC followed on this by recommending universal hepatitis C screening for all adults 18 years and older and all pregnant women during each pregnancy.[287] The literature supporting this approach is now extensive,[35,288–293] including cost-effectiveness studies from France, the US, South Korea, and China.[294–297]

Surveillance and secondary prevention of hepatocellular carcinoma

Secondary prevention concerns individuals whose liver disease has already progressed to an advanced stage, where early detection of hepatocellular carcinoma remains the only effective way to enable curative treatment and improve survival outcomes. Hepatocellular carcinoma surveillance programmes have been proven to substantially increase the proportion of individuals diagnosed at a stage where curative treatment of the cancer is still possible. Unlike screening programmes for colorectal, gynaecological, and prostate cancers, which require large-scale population testing, hepatocellular carcinoma surveillance can be precisely targeted at individuals already known to be at risk—those with chronic liver disease. However, implementation of hepatocellular carcinoma surveillance remains extremely inconsistent across European countries, leading to unnecessary disparities in outcomes.

Migrants from countries with intermediate or high prevalence of hepatitis B virus are at a higher risk for hepatocellular carcinoma than their hosting country's autochthonous counterparts, due to several factors encompassing different hepatitis B virus genotypes, environmental exposure to carcinogens (such as aflatoxins), higher rate of vertical transmission, and, as a consequence, longer duration of infection.[298] Systematic screening for hepatitis B virus of migrants from these areas would increase early diagnosis and antiviral treatment, thus contributing to slowing liver disease progression and overall burden, including due to hepatocellular carcinoma. Furthermore, screening has been shown to be cost-effective, even when sensitivity analyses have used low estimates for hepatitis B virus prevalence, screening adherence, linkage to care, and treatment compliance.[299] Finally, expanded criteria for antiviral treatment for hepatitis B virus infection might be considered, in line with EASL and WHO clinical practice guidelines.[298,300]

Real-world evidence confirms that structured hepatocellular carcinoma surveillance programmes reduce mortality.[35] Randomised controlled trials to further corroborate these results are therefore considered unethical in most instances.[301] Japan has implemented one of the world's most comprehensive hepatocellular carcinoma surveillance strategies for high-risk individuals, and consistently reports the lowest hepatocellular carcinoma-related mortality rates globally,[302,303] having the highest rate of diagnosis at an early stage when long-term disease-free survival could be achieved after effective therapy. A systematic review and meta-analysis of 59 studies with 145 396 participants showed that hepatocellular carcinoma surveillance greatly improves early detection, access to curative treatment, and overall survival in individuals with cirrhosis.[304] People undergoing surveillance were 1·86 times more likely to be diagnosed at an early stage and had an 83% increased likelihood of receiving curative-intent treatments such as resection or ablation than those not undergoing surveillance.[304] Most importantly, surveillance was associated with a 33% reduction in overall mortality. These findings highlight the need for risk-adapted screening models, improved biomarker validation, and stronger implementation efforts to maximise the effect of early detection of hepatocellular carcinoma in Europe, with a particular emphasis on migrant populations.

People who have undergone curative treatment for hepatocellular carcinoma remain at high risk for recurrence and developing synchronous lesions. Unlike many other cancers, where curative treatment is definitive, the underlying predisposing liver disease in people with hepatocellular carcinoma and cirrhosis persists, maintaining a pro-carcinogenic environment. As a result, recurrence rates are high and structured, post-treatment surveillance protocols that use regular imaging and biomarker assessments to allow early detection of recurrence and facilitate timely intervention are required.[305] There is a rapidly evolving landscape of adjuvant therapeutic strategies with the potential to

reduce hepatocellular carcinoma recurrence after curative treatment.[35] Effectively treating the underlying liver disease, such as chronic hepatitis B virus or hepatitis C virus infection, could also reduce the risk of recurrence.

Implementing new pathways of care for people with chronic liver disease

We have attempted to reimagine pathways of liver care in the perspective of the orientation taken by the Commission.[1] Several concepts underpin the proposed framework: promoting a working definition of liver health, understanding liver risk, managing liver disease in the context of multimorbidity, leveraging AI and digital tools in liver disease detection and care, and patient education and health literacy. A framework where new pathways encompass this approach has the potential to improve overall health in individuals with chronic liver disease, beyond those related to specific liver diseases, to address the balance between a population-centred approach and personalised medicine, to attend to value-based health care and to reduce inequity of the most disadvantaged people with chronic liver disease. The promotion of liver health within care pathways will be an important aspect, as many people will not have developed substantial liver fibrosis at the time of being approached under such a concept.

A definition of liver health has been proposed.[306] Analogous to cardiovascular health, it is based on the absence of liver disease and the presence of favourable health behaviours that promote overall liver health. A Delphi process involving a range of disciplines (eg, public health, cardiovascular disease, primary care, and liver disease specialists) is currently scrutinising these indicators, and it is likely that the definition of liver health will be refined, similar to the way the definition of cardiovascular health has evolved.[307,308] Liver health should integrate with cardiovascular health and metabolic dysfunction definition frameworks to harmonise policy implications. Moreover, socioeconomic and environmental influences should be recognised as providing essential context.

Relevant concepts of liver risk

Most people with advanced liver disease currently present when the disease is already irreversible and likely to be fatal. Therefore, early identification of individuals in the community who are at increased risk of progressive liver disease was a key priority of the first report of the EASL–*Lancet* Commission. Early preventive measures for liver disease hinge on effective risk stratification. Different concepts of liver risk therefore provide a framework for categorising individuals according to their risk of progressive liver disease and advanced fibrosis or cirrhosis, and for determining the nature and intensity of interventions to address those risks.

Standard liver blood tests, such as aspartate aminotransferase and alanine aminotransferase, are often normal in people with advanced liver disease, and are therefore unreliable biomarkers for the detection of progressive liver fibrosis.[1] We previously highlighted the

	Study size	Components	Diagnostic accuracy of fibrosis	Prognostic accuracy of clinical outcomes
LiverRisk Score[310]	14 726 derivation cohort; 8369 validation cohort; 416 200 prognostic cohort (UK Biobank)	Age, sex, fasting glucose, cholesterol, AST, ALT, GGT, and platelet count	AUC 0·88 (>10 kPa); AUC 0·95 (>15 kPa); median transient elastography in derivation cohort 5·9 kPa	HR 471 (95% CI 347–641); liver-related mortality compared with those in the minimal-risk group
CLivD score[311]	25 760 derivation cohort; 8107 validation cohort; Copenhagen population register	Age, sex, GGT, waist–hip ratio, average alcohol consumption, diabetes, and smoking status	NA	AUC 0·841; liver outcomes at 15 years
LiverPRO score[312]	462 development cohort; 8025 validation cohorts; 470 795 in prognostic study (UK Biobank)	AST, GGT, ALP, total cholesterol, sodium, INR, bilirubin, albumin, platelet count, and age	AUC of 0·86 (>F2 fibrosis); median liver stiffness 6·5 kPa; transient elastography in the development cohort: 8–12 kPa 19% and ≥12 kPa 27%	AUC 0·86 for liver-related events
Fibrosis-4[313]	44 481 derivation cohort (n=2 569 717); no validation cohort (Clinical Practice Research Datalink)	AST, ALT, and platelet count	NA	HR of liver related events: high risk 16·46, intermediate risk 2·45, compared with low-risk group
Steatosis-associated fibrosis estimator[314]	679 derivation cohort (NASH Clinical Research Network); 11 953 prognostic cohort (National Health and Nutrition Examination Survey)	Age, BMI, diabetes, platelet count, ALT, AST, and globulins (total serum protein minus albumin)	AUC 0·87; 37% ≥F2 fibrosis (derivation cohort)	High-risk HR 1·53 (95% CI 1·38–1·71), intermediate scores 1·10 (1·00–1·20), compared with low-risk group
CIRRUS model[315]	16 967 derivation cohort (portal hypertension); 183 045 primary care CHIE database (validation cohort)	Albumin, creatinine, MCV, platelet count, total protein, and sodium	AUC 0·9 (cirrhosis, portal hypertension, or both)	AUC 0·84 for liver-related events

The risk scores were developed with routinely available biochemical and anthropometric variables in electronic health records, providing a mechanism for improving the detection of substantial liver disease within a general population. ALT=alanine aminotransferase. ALP=alkaline phosphatase. AST=aspartate aminotransferase. AUC=area under the curve. GGT=gamma glutamyl-transpeptidase. INR=international normalised ratio. MCV=mean corpuscular volume. NA=not applicable.

Table 3: **Examples of risk scores that could be used for stratifying liver disease in the community**

need for consensus approaches to the detection and assessment of the severity of liver fibrosis, similar to the estimation of glomerular filtration rate.[309] We promoted the use of Fibrosis-4 (FIB-4), as a first step towards an emphasis on endpoints of progressive liver fibrosis rather than the traditional focus on routine liver blood test abnormalities,[1] acknowledging still that the FIB-4 test was imperfect. Since then, there have been major developments and data from other projects (table 3).[310–315] We continue to suggest that identifying people in the community who are at increased risk of progressive liver disease should be done with scores specifically designed for assessing liver risk. The selection of which specific test to use depends on availability within each setting, but would benefit from consensus agreements between specialist liver societies to simplify implementation. Furthermore, using such risk assessments at a wider population level could also promote the concept of liver health.

Within the general population, the prevalence of undiagnosed advanced liver fibrosis (≥F3) is relatively low at approximately 0·9–2·0%, which creates a challenge for screening strategies.[316,317] In people with cardiometabolic risk or alcohol use, the prevalence of asymptomatic advanced fibrosis rises to 2·3% or 3·7%, depending on whether it is measured by liver biopsy or by liver stiffness.[318] Two recent meta-analyses have also supported these findings with prevalence rates of 3·3% and 3·5% of advanced fibrosis, assessed by liver stiffness.[319,320] A sequential approach can increase the accuracy of testing for the presence of advanced liver fibrosis. Such an approach requires an initial (index) test characterised by high sensitivity with the aim of identifying all individuals who are likely to have advanced fibrosis. A confirmatory secondary test with high specificity is then better able to distinguish between those with advanced fibrosis and those without.

Although various diagnostic tools have been developed to fulfil these roles and overcome the limitations of FIB-4 (table 3), challenges to practical implementation remain. Specifically, false negative results lead to missed opportunities for early intervention, and a high rate of false positives imposes unnecessary burdens on health-care resources and individuals. There is a paucity of randomised controlled trials providing evidence that supports implementing universal screening programmes for any of the risk scoring systems. In many cases, risk stratification might rely on approaches to identifying the extent of risk factors such as alcohol consumption, obesity, or cardiometabolic health. Although these factors have the benefit of simplicity, this comes at the cost of accuracy.

Most liver disease risk stratification models focus disproportionately on individual-level downstream biomarkers; however, it is also important to consider the role of upstream social determinants of health, such as power, capability, social incentives, and inclusiveness at the population and community level.[321] These include so-called grassroots factors, which have been conceptualised as those "formulated by individuals, households, and communities, and derived from their local systems of observation, practice, and indigenous knowledge".[322] Community-level grassroots indicators—observations or informal signals—alongside those from other forms of population-level data (such as alcohol consumption), can indicate a need for public health interventions that address structural, population-level challenges.[323] These types of indicators emerge from local knowledge, including the experiences of frontline health workers, and might include suggestions from the community on the need for action to support specific population groups, address community-level risks, or target particular geographical areas. Indicators might include frontline observations by pharmacists or primary care clinicians of low awareness of hepatitis B vaccination schedules among specific population groups; community reports of increasing alcohol consumption in particular neighbourhoods; outreach workers identifying low uptake of hepatitis testing or treatment among people who inject drugs; or rising obesity and diabetes rates observed in community health programmes that signal increased risk of metabolic liver disease. In an extended concept, the grassroots approach can also incorporate behavioural, psychological, and socioeconomic indicators, alongside traditional risk factors.

Liver disease could therefore be understood as an emergent property of multilevel systems in which social and structural determinants of health at the community and wider population level shape and interact with individual-level behaviours and risk factors. Acknowledging the multiple ways in which social and environmental factors influence disease (figure 1), and demonstrating the everyday realities of risk as people actually experience them, could lead to more effective interventions, help to reduce stigma, and yield broader health benefits. This approach is particularly important for underserved populations, including migrants and visible minorities, and economically disadvantaged communities.[324]

It is important not to allow grassroots perspectives to perpetuate marginalisation of individuals and communities by framing them as vulnerable within institutional or policy discourses.[325] Instead, a grassroots perspective refers to the vantage point closest to the problem—offering unique, context-specific insights that are not necessarily tied to a community's marginalisation. Understanding risk from this grassroots perspective can provide insights that complement more commonly used population-level perspectives, leading to more effective actions that can be applied at scale. It also has the possibility of addressing wider multimorbidity, as these more holistic risk factors might have broader health benefits. Both downstream and upstream liver risk assessment approaches are essential and complementary,

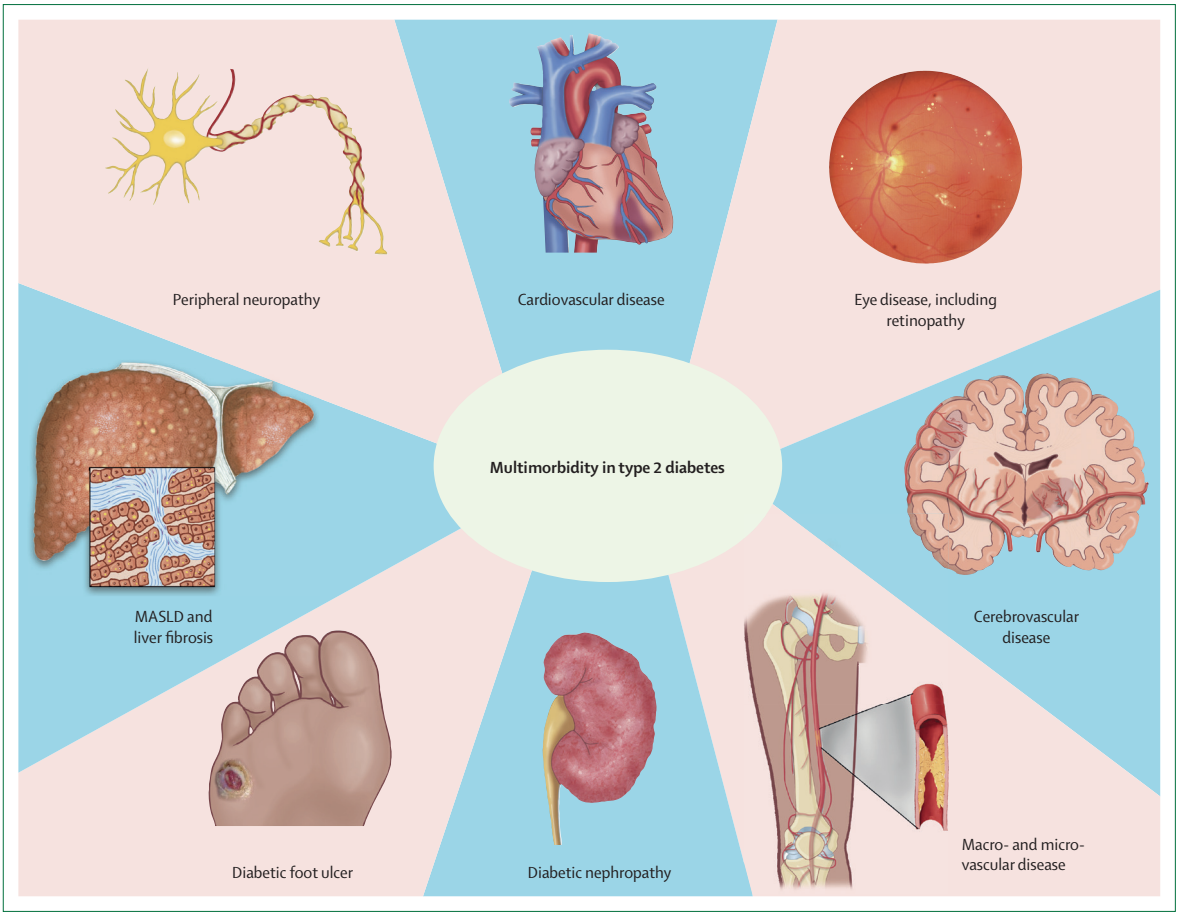


Figure 12: **Multimorbidity perspective for metabolic dysfunction-associated steatotic liver disease**
Metabolic dysfunction-associated steatotic liver disease remains largely unknown to non-liver health specialists and the public. Steatotic liver disease is rarely mentioned in textbooks and guidelines on complications of type 2 diabetes and related non-communicable diseases.[327–329] As illustrated, steatotic liver disease needs to be consistently positioned and presented alongside other comorbidities in relevant clinical and policy-related settings, herein illustrated by the multimorbidity cluster represented by complications to type 2 diabetes. Printed with permission from Kari C Toverud.

but currently most efforts are invested in the first, and efforts should be made to increase our understanding of the relevance of upstream approaches.

A multimorbidity perspective to chronic liver diseases

Chronic liver disease represents a substantial contributor to multimorbidity, defined as the coexistence of two or more chronic conditions, with evidence indicating that it independently accounts for approximately 50% of relevant multimorbidity cases.[326] The strong association of chronic liver disease with highly prevalent conditions, including psychiatric comorbidities, type 2 diabetes, cardiovascular disease, chronic kidney disease, and some cancers, particularly liver cancer, colorectal cancer, and lung cancer, has a number of implications, most importantly providing the rationale for diagnosing and managing liver disease as part of multimorbidity clusters, such as that represented by type 2 diabetes, as illustrated in figure 12,[327–329] an approach which was also promoted in the first EASL–*Lancet* Commission report.[1]

There are several advantages to a multimorbidity approach to chronic liver disease. First, by addressing common risk factors (eg, alcohol consumption, obesity, and insulin resistance), there are synergistic benefits through commensurate improvements in other illnesses. Secondly, a more holistic, multidisciplinary approach could lead to earlier recognition and treatment of complications within each condition, implementing evidence-based treatments consistently and in a coordinated manner, and reducing morbidity and mortality. Ultimately, the concept of multimorbidity clusters could change treatment approaches. People with similar presentations of steatotic liver disease, but who present in different multimorbidity contexts, have different trajectories towards cardiovascular or liver outcomes. The management of these multimorbidity-context driven phenotypes will therefore implicitly be different, with the need for tailored therapeutic strategies to attend to the underlying biological profiles and different clinical trajectories.[330]

Implementing health-care pathways accounting for multimorbidity

The alignment of chronic liver disease as part of multimorbidity represents a shift away from traditional silos of care. We present several concepts brought together in figure 13. The proposed orientation has three distinct aspects. The first is that there are multiple entry points into liver care pathways, not just those centred on primary care detection and referral. Pathways should also be accessible from services that attend to the risk factors associated with chronic liver disease, including alcohol and poor mental health, such as addiction and outreach services. The second aspect is managing chronic liver disease with a multidisciplinary team who look after multimorbidity in a coordinated and holistic manner, preferably in a community setting. The use of telemedicine or digital tools might facilitate maintaining this model even in rural or remote areas. These technologies can improve access to speciality care, reduce barriers, and potentially decrease hospital readmissions for chronic liver disease.[331,332] The third and final concept is balancing these actions with the responsibility of attending to the liver health of the overall population.

There are multiple entry points into the pathway depicted in figure 13. These include traditional primary care referral routes and referrals through mental health and addiction services, where many people with undiagnosed chronic liver disease are seen. There is a bi-directional relationship of these services with the onward stratification of liver diseases, so specific expertise in obesity management, alcohol use disorder, and psychiatric screening and care can be requested. As people with liver disease also present opportunistically to facilities such as community pharmacies or sexual health services, these contacts could be exploited for diagnosing and managing liver disease. The precise tools used for liver disease stratification are expected to evolve. Current international guidelines use FIB-4 as the first screening test, followed by second-step fibrosis tests, such as transient elastography or serum-based fibrosis biomarkers.[333,334] The anticipation is that this approach will change over time with more precise risk calculators, including AI-based assessments, along with a shift towards more emphasis on prognostic scores (table 3). The individual risk scores will have differences in prognostic accuracy and both positive and negative predictive values, but implementation is also dependent on whether variables need specific liver blood tests or anthropometric measures, which might not be routinely collected in certain community settings. Additionally, accessibility and awareness, cost and reimbursement aspects, EU (and FDA) regulations, as well as ease of use, warrant consideration.

An important objective of the proposed pathway is that only a small proportion of people with advanced

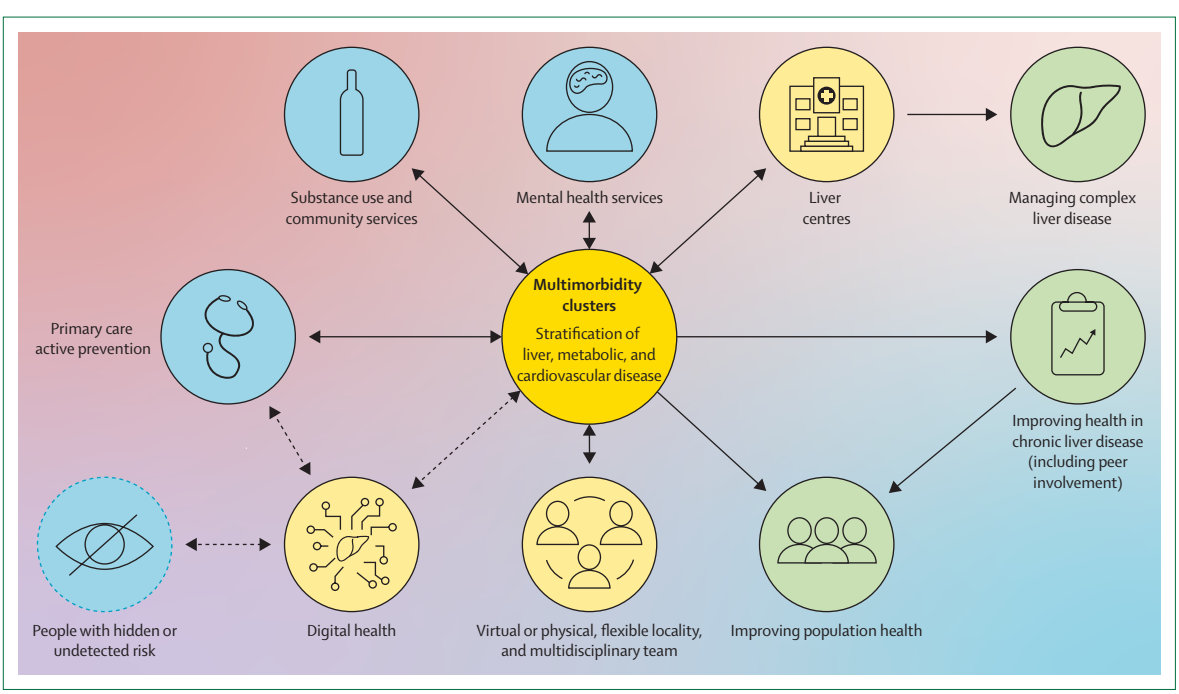


Figure 13: **A schematic framework positioning a multimorbidity perspective to chronic liver diseases**
There are multiple entry points into care clusters that are integrated across disciplines (eg, diabetes care, mental health, renal, and cardiology), health-care professionals (primary or secondary care physicians, nurse specialists, dieticians, psychologists, etc), and peer involvement. Location is flexible depending on country setting. Risk assessment tools stratify people at both an individual level and population level, with expectation that they will transition to automated digital and artificial intelligence-based tools in the future (represented by dotted lines). The composition of multimorbidity clusters will start with known associations but evolve with new data.

and progressive liver disease would be referred to specialist liver centres. The remaining individuals could be managed in a community setting and within other services. Clustering of chronic liver disease with metabolic, cardiovascular, renal, and psychiatric disorders is a logical starting point, but more nuanced clustering might evolve in light of emerging research. A population cohort study showed that chronic liver disease was associated with multiple conditions.[335] Another population study identified three distinct clusters: "cardiac", "metabolic–geriatric", and "substance abuse–mental", and noted that cancer could also be considered as a fourth cluster.[336] Ideally, individual specialities would contribute protocols and expertise to the management of people with specific conditions (eg, hypertension, type 2 diabetes, dyslipidaemia, and renal function optimisation [figure 13]), but those people would receive care in a holistic and consistent manner. The clinical care would be delivered within a community setting by a multidisciplinary team that also includes nurse specialists, dieticians, peers, and psychologists, and access to specialist tests (eg, transient elastography and serum fibrosis biomarkers). Depending on existing infrastructure, these clusters could be co-located in physical structures such as community diagnostic hubs, existing primary care facilities, or on a virtual platform.

This proposed framework allows liver disease to be viewed through the lens of population and liver health. Elements of health inequity, which arise from referral bias (eg, the most at risk and marginalised people not accessing diagnostic and treatment pathways), require tailored, community-led interventions to facilitate their engagement with services and help them navigate the health-care system; population health data analytical tools to understand where liver disease resides within defined geographical areas, to target services appropriately; and bespoke community-based outreach services, akin to those for viral hepatitis, which can be used to identify people with chronic liver disease in a timely manner.[337–339] There are examples of models, driven by population health analytics, already happening. For example, in Nottingham, UK, the integrated care system uses a local population health database of approximately 0·7 million to identify people with risk factors for chronic liver disease, with areas of high social deprivation targeted first. A community liver disease clinic (with a community hepatologist, nurses, and mobile equipment for transient elastography) is transported across the region, seeing people who have been invited through a population health data approach that does not require referral by busy primary care doctors (appendix 1 p 92). The bidirectional flow of individuals between health-care settings in community and specialist hospitals also provides a more dynamic model of care than the traditional unidirectional referral process.

Psychiatric disorders and psychosocial distress in people with liver disease

People living with severe psychiatric disorders experience a substantial reduction in life expectancy. They lose between 7 and 20 years, with an estimated median of 10 years of potential life lost, and 14·3% of deaths worldwide are attributable to mental ill health,[340–342] often co-existing with other comorbidities, including chronic liver disease.[343–345] Unhealthy behaviours such as alcohol consumption or emotional eating might be used as coping behaviours in individuals with long-term psychological distress or psychiatric comorbidities.[346–348] Conversely, people with liver disease might accumulate multiple risk factors for depression and should be targeted for early psychiatric screening and care following a liver disease diagnosis.[349]

The prevalence of psychiatric disorders or psychosocial stress in people with liver disease is high compared with the general population.[350,351] Prevalence varies depending on the specific liver disease and in different groups with risk factors for mental illness—eg, in people who use drugs or alcohol, in migrants, or in people with obesity. Depression and anxiety (including self-reported symptoms) are highly prevalent and are also the most investigated. Reviews have shown that people with alcohol-related liver disease reported being affected by depression (37%) and anxiety disorder (45%).[350] A 2023 meta-analysis reported a pooled point prevalence of 25% for depression and 29% for anxiety in people with alcohol-related liver disease after liver transplantation.[352] Similar estimates have been made for hepatocellular carcinoma.[353] In addition, people with chronic liver disease often experience symptoms such as fatigue and sleep disorders, which further negatively affect their psychological wellbeing.[352,354–356] Mental illnesses, depression in particular, are therefore increasingly recognised as both consequences of and contributors to chronic liver diseases and associated stigma, creating a bidirectional inter-relationship with implications for clinical management.

Despite the high prevalence and clinical importance of psychiatric comorbidities in liver disease, mental health and hepatology services remain largely separate. Multidisciplinary models of care, particularly in alcohol-related liver disease, combining hepatologists, psychiatrists, and addiction counsellors, improve outcomes, including therapy uptake and reduced liver decompensation, but are still uncommon in routine practice.[357,358] Even when behavioural health screening is implemented in hepatology clinics, broad adoption is minimal despite demonstrated benefits.[359] Similar gaps exist in chronic liver disease and MASLD, where mental health affects disease behaviours and quality of life, but is rarely addressed in standard care.[360]

Considering the substantial overlap between psychiatric disorders and liver disease, psychiatric care and services providing psychological or social support offer

opportunities to prevent liver disease by both aiding behavioural changes and serving as entry points for liver disease detection and referral to specialist services. In turn, hepatology services need to screen for both psychiatric and substance use disorders and refer to psychiatric services when appropriate to improve liver-related outcomes and survival.[361]

International liver speciality associations and liver patient organisations must intensify efforts to promote liver health through a comprehensive approach at any level of the prevention and care cascade (appendix 1 p 79). This requires raising awareness among health-care staff and peers about stigma, mental health, and social deprivation and how they can affect preventive initiatives and the pathways of care.[362,363] Interventions such as the outpatient behavioural health programmes based on the screening, brief intervention, and referral to treatment concept have been shown to be acceptable to people with chronic liver disease and able to improve health-related quality of life.[359] Care models based on individual preferences are also promising approaches in people with chronic liver disease and mental health concerns, although more research is needed in this field to assess their outcomes,[364] and an integrated perspective might be particularly challenging for people with comorbid conditions due to drug interactions.[365]

The role of primary care in liver disease pathways

The first EASL–*Lancet* Commission report outlined the concept of primary care hepatology.[1,366] Although chronic hepatitis B virus and hepatitis C virus infections are frequently diagnosed in primary care settings in many countries, there has been considerably less focus on early diagnosis and management of MASLD or alcohol-related liver disease. Therefore, efforts should be made to improve the diagnosis of these diseases in primary care settings throughout European countries, in line with the case-finding approach suggested by the EASL multidisciplinary clinical practice guidelines on MASLD.[140] The WHO NCD action plan has identified four risk factors that have relevance to chronic liver disease (physical inactivity, unhealthy eating, alcohol consumption, and tobacco use),[46] and the presence of these factors should trigger evaluation for liver disease in primary care.

There are several important barriers in primary care that need to be recognised and addressed. The increasing complexity of modern medicine and demands of multiple specialities (including hepatology) place increasing pressure on a system that is overstretched and under-resourced.[367] This combines with a perception of increasing testing and investigation of many individuals who are found not to have clinically significant liver disease and thus no discernible change in management is needed.[368] There is often a paucity of resources to support new diagnostic tools and pathways of care[369] and the solutions are multifaceted;[366] one solution, supported by this Commission and described earlier, is placing chronic liver disease in the context of multimorbidity. As outlined in the first EASL–*Lancet* Commission report,[1] this approach is supported by primary care as it attends to holistic care of the person, remains within the ethos of how chronic conditions are managed, and provides clarity regarding how specialist input can be accessed in a coordinated manner. A primary care approach requires some adaption of training even if automation and digital care guidance can help overcome liver health awareness and education barriers. Digital tools and AI are expected to increasingly automatically pool laboratory and other clinical data to provide risk estimates for individuals and, in turn, link these to action in a care pathway orchestrated by primary care physicians.[312]

Peer-driven interventions

The involvement of peers (ie, individuals living with liver disease or their close contacts such as family members) in specific services to improve treatment of people with substance use disorders is increasingly applied,[370] building on an established history of peer-led structures such as mutual support groups.[371] A review of studies assessing the effect of peer support on public health outcomes for people with substance use disorders found a moderate level of evidence for their benefits, with increased trust in treatment structures, increased satisfaction and treatment retention, and reduced relapse rates.[370] Although the literature has predominantly assessed the integration of peer workers into non-hospital settings (eg, outpatient care, community centres, and prisons),[372] peer support specialists in emergency rooms and inpatient treatment have also been reported.[373,374] However, peer-support services in inpatient or emergency settings for alcohol-use disorder have not been widely established,[374] presenting a potentially important gap, especially from a liver health perspective. Researchers have also pointed out difficulties in evaluating peer-led interventions due to a high variability in the scope of practice, funding, and training and certification for peer workers.[373]

Apart from improving clinical outcomes, peer workers can serve as a bridge between people with liver disease and health-care providers, reduce liver disease stigma, and have reported increased empowerment in their own recovery journeys.[375] Importantly, increased integration of peers into both research on and implementation of interventions represents a shift towards empowering people with liver disease in their own care and reducing power imbalances in the health-care system, a step towards fulfilling the call of "nothing about us without us".[376] To this end, peer workers should be integrated not only into the interventions to be tested, but also into the design, organisation, and assessment of research.[377]

Peers also serve as crucial ambassadors for raising health literacy and awareness. They can share their experiences with prevention tools and care, offer guidance on recognising liver disease-related symptoms, and provide self-management tips, for example through

peer-led education programmes. They can bridge the gap between medical expertise and real-world experience, making health messages more relatable and actionable.[378,379] Peer-led initiatives can foster trust and engagement, particularly in communities where health-care institutions might be viewed with scepticism; they can also provide practical insights on managing risk factors, navigating the health-care system, accessing available resources, and encourage early screening and health behaviour changes through personal stories that resonate more deeply than traditional awareness campaigns, helping individuals cope with the challenges of diagnosis and treatment.[380,381] Peer-led social contact interventions are also a powerful evidence-based intervention to reduce stigma in health-care settings.[382] By increasing empathy and positive attitudes in health-care staff, they could facilitate engagement and retention in liver care. Peer-led initiatives can strengthen liver disease prevention and care by building trust, guiding people to services, motivating healthy choices, and offering social and emotional support, but more research is needed for full assessment of their effect.

By integrating peer networks into grassroots structures, education strategies, and health systems, prevention and care of liver diseases initiatives could become more inclusive and better able to respond to population needs, including those of people living in conditions of social deprivation. Peer involvement at all levels of the health-care system also has the potential to drive substantial social transformations and policy changes. A notable example is the Montreal health model for cancer care, which is expanding the role of peers in communication, awareness, and support within health-care teams.[383] The concept of patient-partnership also extends to related domains, such as research and teaching.

AI and digital health literacy

The expansion of digital health-care technology is currently transforming how individuals are diagnosed with disease, obtain knowledge about their condition, communicate with health-care professionals, receive certain forms of treatment (such as health behaviour interventions), and is likely to change the monitoring of chronic diseases. Although many societal sectors have rapidly embraced AI, health care has remained comparatively cautious, with slower integration and adoption resulting from regulatory, cultural, practical, technological, and financial barriers and attempts to balance the potential for societal benefit against potential harms.

In hepatology, AI has shown strengths in diagnostic imaging, markedly advancing the analysis of radiological data from CT, MRI, and ultrasound scans.[384,385] Image-based analysis by deep learning models can, for instance, facilitate earlier diagnosis of cancers when applied to radiological images.[386] For example, in the case of perihilar cholangiocarcinoma among people with primary sclerosing cholangitis, convolutional neural network models can effectively detect cancer in the presence or absence of concomitant masses.[385] By improving early detection of these conspicuous cancers, these models have the potential to improve clinical outcomes through earlier consideration of liver transplantation.

In pathology, AI-driven image recognition and interpretation algorithms have also enhanced tumour diagnostics and histological evaluations, providing increased precision, consistency, and reliability in digital pathology.[387,388] Deep learning models can improve differentiation of histologically similar cancers, such as combined hepatocellular carcinoma and cholangio-carcinoma, when applied to pathology images, thus providing an avenue for targeted chemotherapeutic interventions.[389] The performance of AI methodology can be further enhanced with the inclusion of multimodal data, which can allow AI tools to outperform traditional modelling systems. In the case of hepatocellular carcinoma, the combination of clinical data with pathology imaging for model derivation exceeded the RETREAT score in the prediction of recurrence after transplantation.[390] The benefits of AI could further be appreciated through the application of AI tools to pathology specimens for the prediction of pharmacologic response to treatment for hepatocellular carcinoma, thus enhancing the concept of precision oncological therapy.[391]

Beyond imaging, the development of AI-driven diagnostic and prognostic algorithms that use data obtained routinely in clinical practice, such as the LiverPro model for prediction of clinically significant fibrosis (table 3),[312] exemplifies how machine learning is likely to enhance clinical decision-making and risk stratification in liver disease, and could open new opportunities for early identification of liver disease with routine data already available. The relationship with health behaviour factors and liver disease risk could potentially facilitate digital interventions, including bespoke digital coaching.

Generative language models (generative AI) are already being used by healthy individuals and people with liver disease to assess their own health risks or disease-related information.[392] Integrating such tools with digital literacy could strengthen access to health information and decision making, and AI tools could engage people at risk of and affected by liver disease by providing personalised health tips and advice.[393] The applications of these tools extend further into evaluation of complications of liver disease (eg, hepatic encephalopathy)[394,395] and differentiation of fibrosis stage (eg, histopathologic analyses of MASH).[396]

Despite the potential for AI technology to advance hepatological diagnosis and care, major valid concerns about accuracy, biases, and ethical issues remain.[392] Caution is advised with regard to the involvement of both the pharmaceutical and technology industries in

developing these tools, due to concerns about objectivity, privacy, data ownership and security, and conflicts of interest.[185] Systems are increasingly shaped by a form of algorithmic logic vulnerable to skewed incentives if the underlying logic is driven by market forces rather than medical necessity. Furthermore, although potentially beneficial in health-care education and research, AI-based tools require stringent regulation and should complement, not replace, professional medical advice.

Risks and barriers of AI and digital hepatology in Europe

As digital tools become more common in clinical practice, there is a concern that those affected by digital poverty—who are often also at elevated risk of liver disease—will be further marginalised and disadvantaged. For clinicians, a poor understanding of AI model development and design can lead to misinterpretation of findings and results that might not be clear to the end-user. Biases in the data used for AI training could reduce the applicability of results to certain population subgroups, similar to the historical exclusion of women in research.[397] Further work is needed to not only standardise the process of model development and post-deployment monitoring to increase transparency regarding the appropriate use of these models, but also to rigorously test these models through randomised controlled trials to assess their actual effect on clinical outcomes in relevant populations.

The health-care industry is heavily regulated, and these regulations have not yet fully adapted to accommodate rapidly evolving digital and AI-driven innovations, particularly self-learning AI systems. The rigorous regulatory environment in Europe, originally designed for traditional medical technologies, will need to be adapted for validating and implementing AI-based solutions, especially those using dynamic learning algorithms. Navigating these challenges will require thoughtful revisions to regulatory frameworks, respecting legal directives such as the General Data Protection Regulation, to safely leverage AI's potential without compromising safety or personal data. In the EU, AI software can be classified as a medical device and therefore requires a conformity assessment, which provides a CE mark to be used in clinical practice. Two of the most relevant regulatory frameworks are the In Vitro Diagnostic Device Regulation (IVDR) and the Medical Device Regulation (MDR). IVDR applies to AI tools used in laboratory diagnostics, such as AI systems predicting drug response from pathology tissue slides. MDR applies to most other AI tools, such as clinical decision support systems or chatbots.[398]

The EU AI Act,[399] along with related regulations for data handling, has provided further guidance on the development and use of AI systems, for example by introducing a detailed risk classification scheme. However, for medical applications, IVDR and MDR are the primary regulatory frameworks, and it remains unclear in practice which exact requirements the EU AI Act will add.[400] The AI Act is expected to mainly complement, rather than replace, existing obligations—adding new demands particularly around data governance, algorithmic transparency, and human oversight.[401] Dual compliance with both sector-specific regulations and the AI Act is anticipated, but transitional periods and evolving guidance leave open questions regarding the precise implementation of AI in health care. Although the full process of obtaining a CE mark for an AI product typically takes 2–3 years, hundreds of AI tools have successfully achieved certification.

Beyond regulatory requirements, implementing AI in hepatology and beyond faces practical challenges. Health-care information systems often do not offer interoperability, making seamless integration of AI tools difficult. Many promising algorithms remain siloed in research environments, unable to interface with hospital electronic health records. Perhaps most concerning is the misalignment between technical innovation and clinical priorities, as many AI tools address problems that either already have adequate solutions or lack genuine clinical significance, resulting in applications that, despite technical excellence, fail to address pressing clinical needs.

Health literacy disparity and the digital divide

Technological advancements have the potential to improve health literacy, but without addressing accompanying socioeconomic disparities, they risk exacerbating existing inequalities. The digital divide—unequal access to and use of digital technologies driven by socioeconomic, geographical, and generational factors—remains a public health issue. Similarly, health literacy disparity, reflecting differences in individuals' ability to access, comprehend, and apply health information, poses a challenge. As electronic information sources continue to proliferate, these gaps could widen further. Digital platforms and tools might help improve health literacy in chronic liver disease management. However, high-quality health information delivered via digital platforms often excludes individuals with low digital literacy, unintentionally deepening inequities in health care access and understanding.[402]

Most health literacy tools are not designed to target specific age groups; however, they should be adapted to meet the needs of adolescents.[403] Furthermore, addressing socioeconomic and regional inequities is key, as unequal access to literacy education leaves some young European populations better able to acquire knowledge and information,[404] whereas others are more susceptible to health misinformation. Digital educational campaigns should therefore prioritise delivering accessible, evidence-based content tailored to adolescents, refuting misleading claims around alcohol and unhealthy foods.[171] Building digital literacy and resilience against AI-driven biases by teaching children and students how algorithms amplify certain content and how to recognise the limitations of AI

is also crucial in a rapidly evolving ecosystem largely governed by transnational corporations.[53] In addition, public awareness should extend to user-driven dynamics such as echo chambers, whereby people tend to interact mainly with others who share similar views (homophily). Together with cognitive biases (eg, confirmation bias or availability heuristic), such mechanisms can reinforce selective exposure and amplify polarisation in health discourse.[405] Strengthening health literacy, therefore, requires not only understanding algorithmic amplification but also recognising how individual behaviours and biases sustain these echo chambers. Increasing awareness of these mechanisms, as emphasised in psychological research, is a necessary step to complement structural and algorithmic interventions.[406,407]

Social media has democratised health information dissemination,[170] and empowered consumers,[408] enabling users to access a wider range of health information, challenge corporate narratives, and engage in peer-driven discussions. As such, social media interventions have shown promise in promoting health literacy and behaviour change. Meta-analyses have shown positive effects on health-related outcomes, with effect sizes ranging from small to moderate.[409–412] A meta-analysis of studies done between 2010 and 2013 suggested that social media platforms such as Facebook and Twitter (now X) were successfully used in health interventions, but isolating their specific effects remained challenging due to various factors, including the complexity of multi-component designs.[410] Although interactive social media interventions have shown promise in improving physical activity and wellbeing, further research is needed to explore potential adverse effects and issues related to health equity,[413] and to address heterogeneity in outcomes and potential biases in study designs.[409,410]

Importantly, health literacy cannot be achieved in isolation, but requires fostering health-literate environments that empower individuals to navigate, interpret, and, crucially, act on health information effectively and equally. Promoting media and organisational literacy today is an essential component of health literacy efforts and involves evaluating information credibility and understanding systemic influences such as marketing strategies, corporate agendas, and the role of institutions in shaping public health narratives. Strengthening organisational literacy helps individuals to recognise how policies, industry lobbying, and institutional decision-making influence the health information they receive, equipping them to advocate for structural change.

Anti-health literacy: propagation of unhealthy behaviour in social media

The case of the influence of social media on alcohol consumption in youth is emblematic.[170] Social media platforms have a key role in the marketing and promotion of alcohol.[195] Alcohol-related posts often represent drinking in a positive light, frequently showcasing alcohol in social contexts (97·0% [425/438]) and depicting individuals holding drinks (67·2% [277/412]).[414] Research suggests that teenagers who spend 30 min or more on social media daily might face an increased risk of alcohol consumption and binge drinking.[415] A systematic review found that young people exposed to alcohol-related content on social media tend to consume more alcohol and drink more frequently than their peers who are not exposed.[196] Adolescents, as passive consumers, are particularly susceptible to internalising such content, increasing their risk of developing NCDs.[170]

Beyond alcohol, social media use is strongly associated with unhealthy eating habits and obesity, particularly among children and young people. Platforms are densely populated with advertisements and posts promoting high-calorie, high-fat foods, which can lead to an increase in the consumption of unhealthy foods.[214] The constant exposure to such content normalises unhealthy eating behaviours,[225,416] undermining public health efforts to promote balanced diets and healthy behaviours. Social media also distorts body image, leading to restrictive or disordered eating.[417] At the same time, higher use of social media platforms among younger generations is linked to increased consumption of unhealthy products such as sweets, sugary drinks, and fast food.[418]

A second mechanism, seen especially in young people from socially deprived areas who face greater exposure to risk environments, is the spread of unhealthy behaviours such as alcohol use, poor nutrition, and smoking, which is sometimes referred to as contamination of behaviours. The spread of obesity within social networks predates the widespread existence of digital social media platforms,[419] but social media platforms can generate novel social interactions and personal relationships. Social network analyses indicate that friendships—clustered social networks—better propagate behaviours than random networks, and influence obesity, body image perceptions, and behavioural expectations.[420] An individual's unhealthy food consumption has consistently been linked to that of their friends, with this association being particularly strong among boys.[421] Longitudinal studies suggest that over time, individuals' eating habits increasingly resemble those of their friends,[421] offline and online, with homophilic selection and social influence contributing to shared health behaviours within adolescent peer groups.[422,423]

Educational needs and liver health literacy

Variability in postgraduate training and competence certification in Europe is an important issue, since it contributes to barriers in mobility and internationalisation of the European health-care workforce. These barriers occur in a setting where there was a shortage of 1·2 million doctors, nurses, and midwives in the EU in 2022; in addition, over a third of doctors, and a quarter of nurses, are currently older than 55 years, and an uneven geographical distribution of doctors results in

medical deserts.[424] Hence, strategies aimed at optimising factors that can be modified, such as postgraduate training heterogeneity and working conditions, are one of the current focuses and commitments of the EU.[425]

Although undergraduate education has benefited from harmonisation through the Bologna Process,[426] postgraduate education and training in Europe is not harmonised. Each European country regulates its own postgraduate medical education through national medical boards, ministries of health, and accreditation bodies. To foster quality standards and overcome the large variability in postgraduate training in Europe, the Union of European Medical Specialists (UEMS) was established in 1958.[427] UEMS seeks to harmonise postgraduate medical education and training by defining European training requirements for medical specialities, which include specific clinical knowledge, technical and communication skills, and ethics. European training requirements serve as guidance for national training programmes, ensuring a minimum standard of competence for specialists in all European countries, but adherence remains voluntary and is susceptible to national and regional variability.

The speciality structure of UEMS is built upon the so-called Annex V of the European Commission, which defines qualifications for health staff specialities within the EU.[428] Since the outline of Annex V requires support from a minimum number of member states (at least 11), specialities and sub-specialities might exist in single countries without being listed or formally represented by UEMS, leading to a heterogeneous situation representing a barrier to health staff mobility in Europe. This situation is also true for hepatology, which is variably represented within gastroenterology, internal medicine, and even infectious diseases, and only about 20% of the countries have a medical speciality or sub-speciality title in hepatology (appendix 1 p 53). UEMS generally discourages sectioning beyond Annex V definitions and emphasises competencies rather than subspecialties to account for specific topics. One mechanism within the UEMS system, which has been implemented for palliative care, is the establishment of multidisciplinary joint committees to account for topics relevant to many specialities (eg, hepatology at the crossroads of internal medicine, gastroenterology, infectious diseases, and endocrinology).

The challenges arising from heterogeneous training and the absence of specific hepatology certification in most European countries, along with the increasing burden of liver diseases in Europe, the complexity of the multidisciplinary and multimorbidity management of people with liver disease, and the rapid progresses in several fields of hepatology underline the need to create a sustainable, next generation competence to encompass liver disease care.[1,429] Harmonised training to establish this competence will help enhance the quality of care, facilitate workforce distribution by improving European mobility, and reduce the uneven distribution of diverse specialists caring for people with liver disease across Europe (appendix 1 p 80).

Hepatology competence and a liver curriculum amongst increasing multimorbidity

As the complexity of health care grows, paired with an ageing population and increasing multimorbidity and migration, requiring an integrated and holistic care model across Europe, disciplines such as hepatology must evolve to secure adequate skills and relevant competencies. The potential for hepatology to evolve into a fully recognised and separate speciality, and to eventually be considered for inclusion in the EU Annex V, as has previously occurred with other disciplines such as nephrology and cardiology, merits consideration. However, training frameworks that balance broad competencies with the flexibility of add-on targeted specialisations have emerged as possible alternatives to classical speciality development. In this context, the UK Shape of Training Review, which proposes generalist clinical training followed by specific speciality certification, provides a useful model.[430]

In our view, hepatology competence and certification of competence should integrate similar principles, with an initial broad-based specialist medical training, and introduce well defined modules and clinical experience with progressive acquisition of competence and credentials in hepatology. A certification like this could help to fill the gap in key elements of care for liver disease, responding to varying needs of populations in different European geographical areas, by providing a competent work force not necessarily as fully trained hepatologists but with consistent capacity (eg, preventative hepatology and care for decompensated advanced chronic liver disease in general internal medicine wards in non-tertiary hospitals). However, to fulfil the needs in specific complex areas of hepatology, further specialised modules are required in areas such as interventional hepatology, liver oncology, and transplant hepatology. Some European countries have adopted competency-based medical education, with emphasis on entrustable professional activities that ensure that specialists in training meet skill-based competencies.[431] EASL is working on the development of modules to compose a European hepatology curriculum, with standardised competencies compliant with the UEMS European training requirements.

Rethinking the role of nurses in hepatology

Across Europe, nurses traditionally manage inpatients with liver diseases, including decompensated advanced chronic liver disease, transplant care, and viral hepatitis; however, their roles remain markedly heterogeneous.[432] The current landscape of liver disease, as outlined in this Commission report, requires nurses to take on a much broader role in caring for people with liver diseases in both hospital and outpatient care. Areas that might

benefit from an expanded role of nurses include, but are not limited to (1) primary care: counselling and optimising health behaviour in people with MASLD, identifying people with above low-risk alcohol consumption for liver assessment and starting pathways for treatment of alcohol-use disorder, identifying people with high risk of viral hepatitis, and applying preventive measures in people with metabolic risk factors for liver disease, particularly obesity and type 2 diabetes; (2) in-hospital care: counselling and management of people with MASLD in the setting of type 2 diabetes and obesity, identifying people with alcohol consumption above low-risk levels and triaging for further care, and care of people with advanced chronic liver disease for disease monitoring and prevention of complications after liver transplantation and in hepatocellular cancer screening. Additionally, nurses play an important role in supporting and counselling caregivers of people with liver disease.

Currently, education for nurses in liver diseases is very scarce at the undergraduate and postgraduate levels. According to an informal survey done by this Commission in 23 nursing schools in 11 European countries, only 45% of the schools have specific modules addressing liver health and disease. At the postgraduate level, very few scientific societies include programmes for nursing education in liver diseases in their regular meetings, and specific nursing programmes in hepatology and liver transplant nurse coordination exist only in a few European countries where regulations allow certified hepatology specialist nurses (ie, advanced nurse practitioners) to adjust medications, such as diuretics, lactulose, or non-selective beta-blockers.[432] Beyond introducing liver disease modules in undergraduate nursing education, there is a need to develop relevant postgraduate nurse training that addresses both primary care and hospital needs and aligns with relevant concepts of multimorbidity (eg, screening for liver fibrosis by nurses involved in type 2 diabetes care). A European Certification for Advanced Hepatology Nursing linked to clinical experience, continuing education, and competency assessment should be established, ensuring a recognised qualification across European countries.

Knowledge and understanding among people with liver disease

Health literacy encompasses an individual's ability to access, understand, and apply health information to make informed decisions about their wellbeing.[433] It also involves essential skills such as interpreting medical advice and navigating the health-care system.[433] Empowerment is a broader concept that extends beyond knowledge to include confidence, self-efficacy, and the ability to take control of one's health. It also involves engaging in shared decision-making with medical professionals and challenging stigma and discrimination.[434] Although health literacy can be a tool for empowerment, it does not automatically lead to it. Critical health literacy, which involves questioning societal conditions and power relations, is essential for true empowerment (appendix 1 p 93).[435] Increasing health literacy, liver disease awareness, and empowerment might have different effects in people at risk of or living with liver disease than in the general population.[436] There is evidence that people at risk of liver disease, such as some migrant populations,[437] people who use drugs, or people living in socially deprived areas,[438] tend to have lower health literacy levels than more affluent communities. People who use drugs, especially those who were younger and with lower levels of formal education, were less likely than their older or more highly educated counterparts to have been assessed for hepatitis C virus treatment, with stigma, fear of side effects, and minimal knowledge about treatment options identified as barriers.[439]

Gaps in knowledge in people with liver disease have been shown—eg, poor understanding and substantial misconceptions about viral hepatitis.[440,441] People with advanced chronic liver disease have also been found to have low levels of health literacy.[442] Overall, there is a poor understanding of cirrhosis and its complications in the general population.[442] Notably, it can be argued that the term cirrhosis is unnecessarily complex and alienating and should be replaced with a more comprehensible term, such as liver failure, similar to what was done for lung, heart, and kidney disease. The term cirrhosis is historical yet still dominant in the medical literature to describe the late consequences of chronic liver disease. The general population strongly associates the term cirrhosis with alcohol consumption, and as such, the word carries a burden of stigma that can act as a barrier to care. Therefore, there are many reasons and potential benefits to shift to the use of a more neutral and modern term.

We call for a broad discussion on the future use of the term cirrhosis and advocate for a shift towards the use of advanced chronic liver disease. The latter term was initially proposed by a pathology consensus process to better reflect the dynamic behaviour of liver disease and liver fibrosis, even in its late stages,[443] and is already used in some areas of hepatology.[444] Indeed, whereas cirrhosis was previously thought to be irreversible, it is now accepted that it can regress if the factors related to ongoing liver damage are removed. Therefore, the term advanced chronic liver disease has the advantage of being descriptive, more easily comprehensible, and neutral (thus non-stigmatising). The new term also allows additional dimensions to be embedded that can vary in the natural history of the disease, such as liver function, clinical stage (compensated, decompensated, etc), results of non-invasive tests with prognostic significance, and progressive or regressive patterns of the disease.

Individual responsibility and empowerment

The role of social and economic forces in shaping individuals' health behaviours and the potential of so-called agentic interventions to widen health inequities also call into question health literacy interventions. Information and understanding are foundational to making healthy choices, yet they are not sufficient to overcome powerful behavioural factors (panel 2). Structural factors are often much more powerful influences on behaviour than knowledge. For instance, a study that included 2938 adults found that people with MASLD,[445] despite having nutrition literacy and perceptions comparable to those without MASLD and despite receiving behavioural interventions, nevertheless maintained poor diets. Furthermore, critics have highlighted that although over 50 tools have been developed in the past decade to measure individuals' health literacy, there has been insufficient focus on the communication abilities of health-care professionals or the systemic contexts in which health discussions and actions occur.[446] A glaring gap remains in the education and preparation of health-care professionals to address health literacy effectively.[447] Studies on health literacy and outcomes should consider both sides: the literacy skills of individuals and the communication skills of professionals, and the policy constraints and institutional facilitators shaping these interactions, as well as wider structural factors.

Health literacy (appendix 1 p 93) should therefore be understood as a dual phenomenon, encompassing both individual and systemic dimensions.[448] Emphasising personal accountability alone risks overlooking the complex interplay of structural, cultural, and institutional factors that influence health outcomes. Organisational health literacy offers a lens for addressing these systemic challenges. The concept of organisational health literacy emphasises the necessity for health-care organisations to implement strategies that make health information and services more accessible and understandable.[449] This approach provides a more balanced distribution of responsibility, versus the current emphasis on individual responsibility to access information and services.

However, a more radical approach is also needed: building on a capability framework, poor health outcomes are often a result of limited freedom rather than from insufficient knowledge.[450] When individuals are constrained by structural forces that restrict their options—whether that involves reducing alcohol consumption, access to nutritious foods, or support to quit smoking—their inability to make healthier choices cannot be attributed merely to an absence of information. From this perspective, health literacy enables capabilities or substantive freedoms; it helps empower individuals to resist the powerful push and pull of profit-driven industries and external influences that shape their behaviours. The government's role in building health literacy, therefore, must go beyond merely issuing guidelines or education campaigns; it should actively foster both a knowledge environment in which citizens are protected from exploitative marketing and physical, social, and economic environments that do not constrain healthy behaviours. Health literacy, understood in this broader sense, has the potential to become a pathway to emancipation, granting individuals and communities the power to shape their own futures.

Liver health awareness should move beyond fragmented, interest-driven efforts toward a coherent, structured, and inclusive model. Publicly funded networks, rooted in scientific rigour and supported by both institutional and peer-led efforts, could help enhance public understanding of liver health (appendix 1 p 94). By ensuring targeted messaging, reducing misinformation, and fostering a sense of community, such network initiatives could contribute to improved health outcomes across Europe and beyond. Evaluating the effectiveness of network models in selected regions will be important, as will funding mechanisms, to secure independence from the pharmaceutical industry.

European medicine price policy heterogeneity reduces transparency

The introduction of highly effective and safe direct-acting antivirals (DAAs) in 2013 marked a pronounced breakthrough in hepatitis C virus management. However, the high initial price—despite being supported by cost-effectiveness analyses—sparked debate on the affordability of innovative, essential medicines and inequities in access. Among previous EASL–*Lancet* Commission recommendations, we suggested improving medicine price transparency, aligning with our mission to promote harmonised health-related policies across Europe and ensure fair and universal access to effective treatment.[1,451]

Confidentiality in agreements between governments and the pharmaceutical industry, although often criticised, remains standard practice. Intellectual property rights grant manufacturers temporary monopolies to maximise profits and recoup development costs, but decision makers might limit these to prevent access barriers. Therefore, negotiations weigh cost-effectiveness and affordability to safeguard equity and health-care financial sustainability. Lack of price transparency can disadvantage some countries, leading to overpayments, inequities, and concerns about sustainability. In low-income and middle-income countries, structural limitations often drive inequities more than price, which can be mitigated by voluntary or compulsory licensing.

DAAs illustrate substantial cross-country disparities in ex-factory prices and affordability, often forcing treatment prioritisation based on national health-care budgets (table 4).[452] These disparities persist despite robust methods to assess scientific evidence, to quantify health and societal values, and to gauge the quality of data used for health technology assessments. In some cases, countries issued compulsory licenses, as with

	Mechanism	Advantages	Challenges
USA[453]	Internal reference pricing with a premium—ie, initial price aligned with the price of existing telaprevir-based regimens, increased by 17% due to unprecedented efficacy and safety profile, and lack of competitors	The steep price triggered a congressional investigation, revealing the full details of the pharmaceutical industry pricing strategy	Fragmented system due to a myriad of payers (federal, such as Medicare, and private), leading to price variability across insurance providers and states and inequitable access; strict prior authorisation criteria (fibrosis staging, sobriety requirements, despite minimal supporting evidence, and specific prescriber qualifications)
Italy[454,455,456]	Outcomes-based agreement	High expected number of treatments documented in a national registry, allowing the progressive application of price rebates if treatment targets were met; the registry allowed monitoring of treatment outcomes, ensuring adherence to agreements; single payer; only designated specialised centres could prescribe DAAs, ensuring structured follow-up and adherence monitoring, facilitating the implementation of outcome-based agreements	Treatment access initially prioritised to individuals with greatest need; complexity of data management and administrative work
France[457]	Outcomes-based agreement	DAAs were assigned a grade 2 (ie, significant), due to the improvement of medical service provided as the efficacy and safety profile were well evident; single dominant payer (with decisions binding for all smaller payers)	In anticipation of a substantial budgetary impact, given the initial high price and the large population requiring treatment (~400 000), access was prioritised for individuals with advanced liver fibrosis (METAVIR F3–F4), and all cases required approval by a multidisciplinary team (although restrictions were later revised to allow broader access)
Germany*	Free pricing agreement for the first 6 months, during this period of time a clinical benefit assessment comparing the new to existing treatments is performed; once an added value is confirmed, the pharmaceutical company negotiates an official reimbursement price with the association of health insurances	The process takes into consideration the clinical added value, the strength of evidence, and the cost control in comparison to the standard of care	>100 independent health insurance companies negotiate additional individual discount contracts with the pharmaceutical industry, which are kept confidential
UK*	Favourable cost-effectiveness but significant budget effect, limiting the medicine access to specific population subgroups	Fast-track approach for high-priority individuals (eg, advanced liver disease)	Access influenced by affordability concerns and procurement policies
Poland*	External reference pricing (taking in consideration the cost-effectiveness analysis with a specified incremental cost-effectiveness ratio limit, ie, 3 times the GDP per capita)	Strong political support; no access restrictions based on individual profile (although sobriety was recommended, this criterion was not strictly enforced)	Only centres staffed with at least two infectious disease specialists could prescribe treatment; lack of patient registry (although the prospective collection of data allowed monitoring of treatment uptake)
Romania*	Volume-based agreement	Price slightly rebated compared with the industry proposal (although not adapted to the local purchase power); prospective collection of treatment data, with reimbursement contingent to success; single payer	Due to the high price, initial access restrictions were imposed based on fibrosis stage (F3–F4); restrictions were lifted after 2018, and were never applied to special cases (ie, post-transplant recurrence, chronic kidney disease, interferon-intolerance or contraindications, and extrahepatic manifestations); lack of national registry (although referral centres had large number of well documented persons on waiting lists); treatment exclusion of people who use drugs and uninsured individuals; prescriber restrictions (gastroenterology and infectious disease specialists)
Spain*	Risk-sharing, volume-based agreement with maximum expenditure caps	Secured access to innovative treatments for many individuals within a short timeframe; reduced budget effect via aggressive negotiations and risk-sharing approach	Implementing all sustainability criteria simultaneously; maintaining transparency and trust with both pharmaceutical companies and regional health authorities; facing media scrutiny
Australia*	Subscription model, with an annual expenditure cap (not made public, but potentially around AUS$250 million), and an unlimited number of people treated each year, for a duration of 5 years	Negotiations were held between the Australian government and the pharmaceutical industry only, but they were preceded by a meeting involving clinicians and representatives of the academic world and the community (eg, people who use drugs and patient organisations); no access restrictions based on liver disease stage, drug and alcohol use, and prescriber type; primary care physicians had to liaise with a specialist until they gained experience, but could nonetheless prescribe from the start	Although very favourable price initially paid per treatment, later the number of people dwindled, increasing the price per treatment (despite remaining competitive)
Egypt[458–461]	Voluntary license agreement between the brand manufacturer and local generics' manufacturers	Strong political commitment (national hepatitis C virus elimination plan in place since 2005); support from WHO, Global Fund, and two World Bank loans; the agreement set a precedent for other LMICs by balancing affordability with quality assurance	Huge logistic challenge due to the highest hepatitis C virus prevalence on the world

DAA=directing-acting antiviral. GDP=gross domestic product. LMIC=low-income and middle-income countries. *Data regarding Germany, UK, Poland, Romania, Spain, and Australia were collected via interviews with selected, anonymous experts.

Table 4: **Examples of the heterogeneity of hepatitis C virus DAAs market entry pricing agreements**

antiretrovirals in Thailand and for sorafenib in India.[462,463] These exceptional measures carry diplomatic and trade risks, leading to potential backlashes from governments and the pharmaceutical industry, and might reduce innovation incentives. In public health emergencies, the threat of compulsory licensing might serve as leverage, as Germany did during the COVID-19 remdesivir shortage.[464] Addressing these challenges is both a practical necessity and an ethical imperative.

Disclosing net prices can reduce negotiation flexibility, discourage discounts, or distort competition. Many governments, while advocating for greater transparency, prefer confidentiality to secure favourable deals. Countries might fear that transparency weakens bargaining power and could even cause price inflation if companies set higher initial prices to hedge against future risks. This highlights the tensions between transparency and the flexibility needed for affordability and market sustainability.

The advantages and disadvantages of disclosing details of market entry price negotiations of novel medicines warrant balanced consideration, consistent with WHO and OECD positions.[465,466] When DAAs became available, countries adopted highly diverse agreements with pharmaceutical companies (table 4), which is an evolving policy concern. Despite WHO and OECD calls for greater transparency in medicine prices, and the EU Transparency Directive[467] requiring timely and transparent decisions, most details remain under non-disclosure agreements.

Optimising medicine price agreements

Medicine prices exert substantial pressure on health-care systems. Medicine spending constitutes approximately 9–20% of total health-care expenditures,[468,469] and a large proportion of this spending is allocated to costs in hospitals.[470,471] Health-care spending has been on the rise due to population ageing, increased demand for improved health-care services as income levels rise, and other factors and challenges, including technological advances.[472,473]

As shown in table 4, the strategies adopted by different countries to negotiate medicine prices with the pharmaceutical industry at the time of DAAs' market entry revealed a highly heterogeneous landscape, which offers valuable learning experiences for improving future negotiations. For a price agreement to be considered successful, there needs to be a balancing act between three core objectives: (1) optimisation of health outcomes, demonstrated by measurable improvements in morbidity and mortality; (2) achieving cost-effectiveness (micro-economic efficiency), while ensuring budget affordability and maintaining long-term health-care financial sustainability (macroeconomic efficiency); and (3) equity, guaranteeing universal access to care, including for marginalised populations, with measurable reductions in health-care disparities. This framework offers a systematic approach to negotiating and evaluating the effectiveness of future medicine price agreements, although it should be acknowledged that fulfilling all three criteria is very arduous.

Countries might also adopt special legislative actions to curb budget inflation. As shown in table 4, a US Senate Committee exposed the mechanisms leading to the initial market price of sofosbuvir.[453] Although this report did not result in immediate price reductions, it succeeded in sparking a much-needed public debate on how price agreements should be conducted to prioritise the interests of the community. Price controls can also occur through budget legislation, such as the US Inflation Reduction Act[474] and a similar Swiss measure.[475] The Inflation Reduction Act caps medicine price hikes to inflation and requires rebates if prices rise faster. European countries have adopted cost containment tools such as budget caps, clawbacks, rebates, and fixed pharmaceutical spending targets to maintain financial sustainability, in addition to price controls through direct price setting (eg, through external reference price), indirect price setting (eg, through rate of return on capital used), or price according to the perceived value of a product (eg, through cost-effectiveness pricing or comparative clinical benefit assessment).[476] Still, it remains unclear whether full price transparency would reduce cross-country disparities and lead to lower prices.

Stakeholders involved in the negotiations: role and approaches

Payers hold ultimate responsibility for negotiating medicine prices, given their unique position at the intersection between health-care providers, pharmaceutical companies, and budgetary oversight. Table 5 summarises the goals, tools, and limitations of all stakeholders involved in price negotiations for new medicines.[69]

Manufacturers are keen to showcase the efficacy and safety of their new products, but the introduction of new medicines to the market involves uncertainties that should be factored into price agreements. Several price entry agreements address these uncertainties (table 4). For example, in outcomes-based risk-sharing models, full reimbursement depends on treatment response. If outcomes are not met, payers might request rebates or full or partial refunds. Advanced modelling techniques and the integration of real-world evidence from longitudinal studies can complement projections and provide a stronger empirical basis for decision making. Although such approaches might not eliminate all uncertainties, they can enhance the comparability and robustness of future scenario analyses.

At the regulatory level, the approval of new treatments in the EU is overseen by a single entity, the European Medicines Agency. However, prices and reimbursements are handled nationally, resulting in diverse approaches across member states. Adapting the reimbursed price of a new medicine to local purchasing power could mitigate the cost effect, although in low-income and

	Key objectives	Tools at disposal	Limitations to be factored in	Proposed additional instruments
Pharmaceutical industry	Recoup research and development costs; profit maximisation; maximise access; improve uptake and use	Demonstrate the health and societal benefits of novel medicines through RCT and real-world data	Uncertainties and risks regarding clinical outcomes (depending on the time horizon)	Shorten the time in clinical development and accelerate time to access; strong RCT designs; head-to-head studies
Regulatory authorities	Determine the starting indications	Data filed by the pharmaceutical industry at the time of the new medicine application; consultations with expert health-care providers, scientific societies, HTA agencies, and patient organisations	Development trial data typically assesses efficacy and safety only in the short-term and mostly in selected populations (which has little to do with daily clinical reality)	Require updated efficacy and safety data from real-world, national and multinational registries
Payers, both public and private ones (ie, health insurance companies)	To influence and negotiate net prices using a combination of tools such as HTA, external reference pricing, and managed entry agreements	HTA agencies, evaluating the clinical effectiveness and cost-effectiveness of treatments, and their budget affordability; managed entry agreements and other instruments	Annual budgetary restrictions (spending caps or affordability thresholds); austerity measures; in case of unaffordable budget effect, negotiations might be lengthy and impose access restrictions; quantifying the long-term benefits of public health interventions is challenging[69] and the financial commitment might suffer from hyperbolic discounting bias	Prefer strong RCT designs, head-to-head studies, clinical endpoints, and sufficiently long follow-up periods; joint procurement leading to stronger bargaining power; tenders, when multiple medicines of comparable efficacy and safety profile become available, to promote competition
Health care providers	Provide feedback to negotiating stakeholders through the assessment of real-world effectiveness (if and when available) and safety of new treatments; monitor the post-marketing progress of interventions whenever the cost of treatment is linked to measurable clinical outcomes; establish national and supranational management guidelines; education (peers, health associates, people with liver disease, and general public)	Real-world evidence (eg, observational or cohort studies) and use of registries	Cost and imposition on clinicians' time; complex administrative burden linked to collection and analysis of multiple variables over time; minimal perceived usefulness over time	Financial and non-financial incentives; financial support from scientific societies, other associations, foundations, and the payor community
People with liver disease	Provide experiential evidence, to help understand what the implications are of living with a disease; political pressure to broaden access to highly effective medicines, to facilitate the enrolment of individuals into clinical trials, or to act on what is an unaffordable out-of-pocket burden (where coverage by the health system is incomplete)	Patient organisations	Insufficient public awareness; scarce financial resources; stigma or outright discrimination	Increased involvement of patient organisations and other non-governmental organisations in different parts of decision making

HTA=health technology assessment. RCT=randomised controlled trial.

Table 5: **Comparison among the objectives, tools, limitations, and additional instruments to be proposed among stakeholders involved at different stages of the market entry of new medicines**

middle-income countries with a high disease prevalence, the overall affordability of innovative medicines—priced based on the price agreed in high-income countries—is, in most cases, completely out of reach. The Medicines Patent Pool enables voluntary licenses that allow these countries (including those in the upper-middle income lending group) to access otherwise unaffordable medicines,[477] leading to substantial savings due to competition among generic manufacturers.[478] Access can be further facilitated by a combination of additional factors, as shown by Egypt's national hepatitis C virus elimination programme (table 4). Here, success was achieved by the combination of bilateral agreements between originator companies and local generic manufacturers, a strong political commitment, and logistical and financial support from WHO, the Global Fund, and two World Bank loans. This case could serve as a model for other agreements designed to guarantee access to novel medicines in low-income and middle-income countries and any country with limited purchasing power, balancing affordability with quality assurance.

Joint procurement might positively contribute to access to new medicines and equity via increased bargaining power,[479] although it has not been implemented widely so far, with some exceptions regarding the procurement of vaccines.[480–482] Technically, joint procurement requires a joint needs assessment for the countries that participate in the procurement partnership, as local disease burden and clinical priorities could differ substantially among members; agreement on the principles underpinning value assessment and health technology assessment in order to conduct joint assessments or distribute the burden of assessments among members of the partnership; and pooling of resources, if procurement is to take place jointly. Supranational collaborations, such as the Beneluxa initiative, have exceptionally been able to run joint assessments for highly innovative but expensive medicines. Due to variations in health systems and alternative therapy funding, individual rather than joint negotiations are generally preferred.[479]

Apart from the discussed exceptions, the elevated entry price of hepatitis C virus DAAs resulted in unaffordable

budgets across most countries. The price of one course of treatment for chronic hepatitis C in 2014 was very close to the price of a treatment of previously existing telaprevir-based combinations, adjusted for cure rate[483] (plus a premium reflecting innovation, its high efficacy, and safety[453]). Notably, this reference price dated back to the 1990s, based on interferon alfa-2b, which was approved for a different indication (hairy cell leukaemia).[483] Therefore, the initial price of treating one person with hepatitis C in the 1990s had no relation to the expected health benefit of a hepatitis C cure, and yet it influenced all subsequent price negotiations, including those of DAAs, with an effect on national budgets.

Health-care providers and patient organisations are not directly involved in price negotiations. However, providers play a crucial role in implementing outcome-based agreements (table 5). In particular, national patient registries have proven key in this respect to leverage favourable outcomes-based agreements and volume-based rebates.[456] In Italy, in 2014, the large number of people with hepatitis C virus infection awaiting effective therapy and documented in a nationwide database allowed the purchase of large amounts of DAAs at discounted prices, and, based on the number of treatments prescribed, subsequent batches benefited from additional discounts. Therefore, establishing national patient registries should be a priority to anticipate price negotiations for innovative medicines. However, they are costly and labour-intensive.

Action on liver disease should learn from patient activism in other contexts, especially in relation to HIV infection, which has shaped policy through petitions, lawsuits, media campaigns, and even acts of civil disobedience. Financial incentives and other sources of funding could be considered to promote the implementation of patient registries. Price negotiations are highly technical, yet allowing input from people with liver disease would bring major benefits, at least at the political level. In Australia, during the initial approval process of sofosbuvir, the Ministry of Health summoned clinicians, academics, pharmaceutical company executives, as well as substance use and hepatitis organisation representatives, to a key stakeholder meeting. The participation of community representatives in the meeting was pivotal in advocating for a broadly accessible hepatitis C virus treatment programme.

Beyond hepatitis C: MASLD and primary biliary cholangitis

The issue of market entry price affordability of novel and innovative medicines in high-income countries remains unresolved. Some examples relevant to hepatology include the market entry prices of resmetirom,[484] the GLP-1 receptor agonists (panel 1), and second-line therapies for primary biliary cholangitis (panel 4).[485–489]

Resmetirom was approved for the treatment of MASH with moderate to advanced fibrosis (F2–F3) in adults based on the results of a phase 3 trial.[490] Fibrosis improvement in MASLD is a surrogate marker of clinical endpoints. The market entry price in the USA was very high, with cost-effectiveness studies having provided conflicting results, depending on model assumptions.[484,491,492] However, the price was based on the medicine's value as a first-in-class therapy; resmetirom was the first medicine directly targeting liver steatosis, without previous comparisons, and based on an innovative mechanism of action, mediated by agonism on the thyroid hormone receptor β in the liver.[493] However, the orphan-drug dynamics in the case of resmetirom appear debatable, because MASH is not a rare disease, and its approval is based on surrogate markers, and therefore contingent upon further post-authorisation verification and report of clinical benefits in confirmatory trials.[494,495]

The GLP-1 receptor agonists represent a relevant, additional case; their marketing transcends strictly

Panel 4: Pricing of second-line therapies in primary biliary cholangitis

The first medicine to be conditionally approved for individuals with primary biliary cholangitis (PBC) who were not responding to or tolerating standard ursodeoxycholic acid treatment was obeticholic acid in 2016 (US Food and Drug Administration and the European Medicines Agency). The market entry price was very high, but the manufacturer justified it based on the necessity to recoup incurred development costs (including for testing obeticholic acid in other conditions), the forward planned costs of its continuous development, the rarity of the disease, and the broad therapeutic potential of the innovative mechanism of action.[485] Thus, the initial price setting of obeticholic acid appears to have followed typical orphan-drug dynamics, with little or no competition and risk amortisation strategies. However, at its annual price of approximately US$70 000, obeticholic acid was later shown not to be cost-effective.[486]

According to the same orphan-drug dynamics, subsequent entrants would adopt or exceed the existing price rather than competing downward, which is exactly what happened with peroxisome proliferator-activated receptor agonists seladelpar and elafibranor, which received conditional, regulatory approval for the same indication in 2024.[487] In other words, the former market price of obeticholic acid likely acted as an anchor.

Today hepatologists find themselves in an ethically uncomfortable position: they are legally permitted to prescribe expensive, conditionally approved medicines with preliminary outcomes data, while being discouraged or even prevented (due to labelling and reimbursement restrictions or liability concerns) from using cheaper generic peroxisome proliferator-activated receptor agonists with even stronger long-term evidence of clinical benefit.[487] A contrasting perspective argues that regulatory approval reflects a rigorous evaluation of efficacy and safety that off-label therapies have not undergone, and that prioritising unlicensed treatments on cost grounds risks undermining patient safety and reducing incentives for new medicines development. From this perspective, the ethical priority should remain with therapies that have undergone formal regulatory scrutiny.[488]

Precedents of repurposing of medicines that are either generic or about to become off-patent exist—for example, anastrozole use for preventing breast cancer in individuals at high risk, based on the results of an investigator-initiated clinical trial.[489] However, although a generic medicine preventing a common cancer is extremely cost-effective at the population scale, the absence of patent protection becomes a hurdle rather than an asset when repurposing a generic medicine for a rare disease such as primary biliary cholangitis, especially if used only for a subgroup of affected individuals.

medical need, reflecting a complex phenomenon encompassing clinical innovation, social demand, and behavioural trends.[496] From a pricing-policy perspective, GLP-1 receptor agonists share similarities with DAAs for hepatitis C, combining high commercial value, high initial price levels (accompanied by poor transparency regarding development costs), and market dominance due to minimal competition (few manufacturers and incremental formulations). In addition, GLP-1 receptor agonists are experiencing a rapid demand expansion into multiple indications (beyond type 2 diabetes and obesity, including cardiovascular risk) and the requirement of long-term, potentially lifelong, and non-curative treatment duration, increases budgetary effect. In the case of hepatitis C virus DAAs, the large global demand, their clinically meaningful innovation, and the early supply constraints (leading to access restrictions), allowed manufacturers to negotiate high prices until generic competition emerged. Some of the tools used for DAAs might be applicable to GLP-1 receptor agonists—eg, volume caps. In addition, conditional reimbursement could be considered, strictly tied to metabolic endpoints, with expansion of indications only after confirmatory evidence.

Transparency in medicine price negotiations: the way forward

Achieving full transparency in medicine price negotiations remains a distant goal.[497] A major barrier lies in the extensive use of non-disclosure agreements between pharmaceutical companies and payers, which typically contain strict confidentiality clauses.[498] Although companies argue that disclosing price details could compromise competitiveness and business models, this practice might result in substantial disparities in medicine prices across countries (eg, beyond what would be expected based only on their respective purchasing power). On the other hand, the recent European Integrated Price Information Database (EURIPID) survey highlights that governments themselves also enforce opacity: 68% of surveyed countries enforced confidentiality through non-disclosure agreements and 27% embedded these clauses into national law.[498] Therefore, the EURIPID data shifts part of the transparency debate from industry-driven secrecy to government-enforced confidentiality. Such legal fragmentation across Europe prevents the sharing of key price data from EU Member States, thus exacerbating disparities in market access and price efficiency.

Strategic confidentiality in negotiations has enabled governments to secure additional public health benefits that might not be feasible under fully transparent agreements. Benefits might include service provisions, such as laboratory support, patient programmes, or screening services, which can enhance health system efficiency and equity. In addition, it is reasonable to assume that full (net) price agreement transparency could even lead to inflated list prices, to protect industry from unforeseen risks. Thus, although transparency might still be considered a desirable policy goal, at the same time we should acknowledge that confidentiality could enhance negotiation outcomes, allowing governments to secure strategic benefits.

Several models have the potential to improve transparency. Supranational collaborations, in terms of joint clinical assessments and scientific consultations (established by the EU Regulation on Health Technology Assessment regulation), facilitate the assessment of comparative clinical effectiveness and safety of new health technologies (medicines, diagnostics, and medical devices), reducing the duplication of effort in national assessments by providing a single EU-level assessment report. In principle, this approach might reduce price disparities across Europe via aligned assessments and seems particularly relevant for high-cost therapies (eg, novel cancer therapies, including hepatocellular carcinoma) and orphan medicines, where individual countries might have insufficient bargaining power.

However, each EU Member State would retain authority to make final reimbursement decisions based on its own appraisal of the evidence package presented, combined with economic evaluations (ie, cost-effectiveness or cost-utility analyses, budget impact, and additional evidence requirements), meaning that price and reimbursement decisions would still be country-specific and subject to local rules and priorities. Nonetheless, cross-border partnerships (eg, the Beneluxa initiative),[479] initiatives such as the Pan-American Health Organisation revolving fund,[482] or other collaborations (eg, the Valletta Declaration),[499] might allow for shared aggregated price ranges, and confidential elements (eg, service add-ons or volume discounts) would remain protected to maintain flexibility in negotiations, thus preserving governments' ability to negotiate effectively. However, different collaborations could have varying willingness to pay, although they would still strive to converge on the lowest price in an environment of increased transparency. Indeed, different countries implement multiple measures to ensure budget affordability, including at the therapy area level (eg, hepatitis C virus medicines), as well as at a macro level to ensure financial sustainability. A gradual transition to disclosure of net prices under controlled conditions to prevent market disruptions would be the next step, but final net prices would rarely be available due to continuous adjustments imposed by budget restrictions, austerity measures, and real-world performance.

Another powerful approach could be represented by tenders, issued by governments and payers to secure low prices through competitive bidding. Traditionally, an originator medicine that loses its exclusivity through patent or data exclusivity expiry is subject to generic competition. A tender that includes the originator and all its generics can result in substantial price reductions, benefiting health insurers and providers. Product class

tenders among on-patent originators treating the same condition can also take place if the EU Health Technology Assessment regulation has deemed that they offer very similar benefits and are, therefore, interchangeable.

Tenders might be an option that can be applied to many liver diseases, including chronic hepatitis B virus infection and MASLD, where several new medicines are approaching the market, assuming they are comparable in effectiveness and safety, and any new entry could further feed competition through successive bidding rounds. Although market consolidation through the award of a tender to a single supplier could expose countries to supply risks, and aggressive price reductions might disincentivise some manufacturers, forcing them out of the market, tenders can still be a powerful tool in joint (particularly hospital-based) procurements and might facilitate price benchmarks within the Health Technology Assessment regulation framework. The latter works especially when countries use external references to set medicine prices, because if a tender secures a lower price in one country, this could directly influence the price in other countries (unless market-specific factors like market size, supply costs, and local regulations represent an obstacle).

Nonetheless, the case of primary biliary cholangitis (panel 4) illustrates the need for pricing models that explicitly link market authorisation under uncertainty with dynamic, evidence-responsive pricing structures. From a distributive-justice perspective, paying a substantial price premium for greater uncertainty is hard to reconcile with evidence-based, equitable, and cost-conscious care. Beyond the pricing issue, the situation suggests a true governance gap in how orphan indications are assessed post-approval. The robustness of the economic justification of resmetirom pricing is undermined by the substantial assumption-sensitivity of cost-effectiveness analyses. Conditional approvals based on surrogate markers rather than hard clinical outcomes should automatically include mandatory Health Technology Assessment re-evaluation once post-marketing data mature. Joint clinical assessments under Health Technology Assessment regulation could support adaptive re-pricing as new evidence emerges, especially from dedicated registries. These commitments, in turn, ought to be linked to adaptive pricing clauses, consistent with a call for an outcome-based pricing reform.

From evidence to impact: implementing recommendations of the EASL–*Lancet* Commission

Since the first EASL–*Lancet* Commission report, progress has been observed on several of its recommendations (appendix 1 pp 55–68). Early detection of progressive liver disease and multidisciplinary care were key orientations, and notable shifts have subsequently occurred in clinical practice towards liver fibrosis testing and early identification of at-risk individuals and populations. Strengthening primary care hepatology was integral to this approach.[366] The successful advocacy for renaming non-alcoholic fatty liver disease to MASLD reflected a first step towards reducing stigma and promoting person-first terminology, and collaborations between WHO and EASL, based on recommendations of the EASL–*Lancet* Commission report, have highlighted the importance of integrating liver disease into global health priorities. Other trends relevant to the future of hepatology have been less elaborated in the EASL–*Lancet* Commission recommendations—eg, developments pertaining to rare liver diseases (appendix 1 pp 95–97).

Liver disease represents more than a medical problem and is intricately linked to broader social and economic inequities, disproportionately affecting marginalised populations with limited health-care access. As outlined earlier, migrant populations are particularly affected by viral hepatitis and might experience barriers in access to diagnosis, vaccination, and care, compounded by the complexities of migration pathways and health systems fragmentation across Europe. Addressing viral hepatitis within migrant communities is essential for achieving elimination goals and requires inclusive, culturally sensitive and non-stigmatising policies that ensure universal access to prevention and treatment services—policies which hold relevance also beyond liver diseases. Monitoring progress through the collection of robust data would underpin the successful implementation of these policies.

Furthermore, the persistent influence of industry lobbying on health policy, particularly from alcohol and unhealthy food and drink producers, hinders the implementation of appropriate regulations. The absence of European coordination to drive policy alignment and harmonisation has led to disparities in prevention efforts, access to care, and public health priorities, creating a situation where marginalised communities, often the most affected by liver disease, continue to face systemic barriers to care due to economic and geographical inequities. Medical professional organisations have also struggled to communicate compelling, evidence-based arguments to policy makers, resulting in a failure of evidence-based policy implementation in most European countries.

Building on experience in handling the barriers to implementation of the comprehensive framework of recommendations from the first EASL–*Lancet* Commission report (appendix 1 pp 55–68),[1] we have worked to provide a more focused set of recommendations (table 6). Rather than repeating and expanding the recommendations proposed in the first report, we have selected key priority actions deriving from the work presented in the current report.

We are making our case at a difficult time: global competition for health-care staff, low economic growth,

	Responsible entities	How	Success story	Short-term and long-term goals
Integrate pathways of care for liver disease with other chronic disease pathways, managing multimorbidity	Hepatology; multiple entry points for prevention and detection; disciplines involved in multi-morbidity, including: psychiatry, obesity, cardiovascular, endocrine, renal, addiction services, nutrition services, primary care; patient groups (advocacy and peer–peer support); health boards and commissioners of health	Expand and sustain multifaceted entry points for pathways of liver care; understand liver risk at both individual and population levels and promote emerging prediction strategies based on grassroot indicators of health; manage individuals in the community within integrated multidisciplinary teams eventually using telemedicine approaches for those in distant areas, including internal medicine, psychiatry, endocrine, cardiovascular, renal diseases specialists, allied health-care workers, nurses, dieticians, psychologists, and peer–peer support; leverage digital health to provide tools for risk assessments, providing education to and monitoring of people with liver disease; find the balance between implementing innovative technology without worsening aspects of health inequity, bias and sensitivity to information governance concerns; promote liver health at the population level, particularly in underserved groups, with specific attention to favourable health behaviours relevant to liver disease such as low alcohol consumption, healthy diet, and lack of sedentary activity	SCAN–ECHO[500] programme which aimed to bridge the gap between primary care physicians in rural areas and liver disease specialists showed that people whose primary care physician participated in SCAN–ECHO had higher survival rates compared to those whose providers did not engage in the programme; the LiverRisk score[501] has shown superior accuracy compared to traditional scores such as FIB-4 in predicting liver fibrosis and related mortality and to be cost-effective; the Integrated Diagnostics for Early Detection of Liver Disease (ID-LIVER) project in the UK[502] used AI algorithms to identify and refer people at high risk for chronic liver disease through electronic health records, which improved early detection and management of chronic liver disease, showing the efficacy of combining AI with integrated care pathways	1–4 years: novel community models of care that integrate chronic liver disease within multimorbidity; digital or AI-driven health tools for the detection, education, and management of liver disease at a population level; 5–10 years: data starting to show improvement in mortality and morbidity from chronic liver disease
Recognise steatotic liver disease as a preventable NCD within the core NCD framework, and invest in equitable prevention and care strategies	Experts (medical, research, and public health) in liver health and NCDs, national governments, policy makers, and global health stakeholders	Embed liver disease in national and European NCD strategies, aligning with efforts on diabetes, cardiovascular disease, and cancer; establish inclusive task forces, involving civil society and multidisciplinary experts, to develop a country-tailored checklist that prioritise core and optional funding across the spectrum of liver diseases, from hepatitis to alcohol-related liver disease and MASLD, based on the national burden and health system capacity; invest in prevention and early detection, focusing on shared risk factors for NCD, integrating actions prioritising equity and addressing the social determinants of liver disease; advance sustainability, by ensuring that financial, societal, and environmental resources are responsibly managed, benefiting both current and future generations; measure impact, with liver-related indicators of national monitoring systems	In 2021, India became the first country to incorporate MASLD into its National Programme for Prevention and Control of Cancer;[503] this integration acknowledges the shared risk factors between MASLD and other major NCDs, facilitating a holistic approach to prevention and management; the WHO Framework Convention on Tobacco Control, which has led to increased funding for tobacco cessation programmes through taxation; the UK's Alcohol Duty System, which imposes taxes on alcoholic beverages to fund public health initiatives; Mexico's General Law on Adequate and Sustainable Nutrition (April 18, 2024), turns the constitutional right to nutritious food into concrete action, establishing a legal framework to promote and protect the right to healthy, sustainable nutrition as a fundamental human right	1–4 years: include liver disease in national NCD strategies; establish inclusive task forces to prioritise funding; increase investment in the prevention of shared risk factors for liver disease and other NCDs (alcohol consumption, poor nutrition, physical inactivity, and tobacco use); strengthen screening and early detection strategies; 5–10 years: expand these initiatives into a broader plan (including environmental and structural interventions to support healthy behaviours); scale up prevention services in socially deprived areas; launch educational campaigns to reduce structural stigma; improve access to affordable, healthy food
Develop and implement a European liver health education and training framework	EU, UEMS, EASL, national ministries of health and education, and academic institutions	Develop a unified European core curriculum in hepatology aligned with the UEMS–ETRs, incorporating both generalist and specialist competencies; design modular, role-adaptable training pathways (foundational content for general practitioners, advanced content for specialist hepatologists, and dedicated tracks for nursing and allied health professionals); integrate interprofessional education components that emphasise collaborative care, communication, and coordination within multidisciplinary teams; create role-specific training tracks, such as modules for general practitioners on advanced chronic liver disease and MASLD management; advanced tracks for hospital-based and transplant hepatology and specific education for hepatology nursing; embed liver health within broader chronic disease and multimorbidity training contexts to avoid siloed specialty training; develop and implement digital learning tools, e-learning modules, and simulation-based formats to overcome capacity and geographical barriers	Early pilots in some countries as a sign of harmonisation in progress	1–4 years: update medical and nursing core curricula; engage UEMS, European medical associations and nurses boards and begin discussing integration into existing educational frameworks; 5–10 years: national adaptation and accreditation in at least 50% of European countries; establish specific certifications for physicians and nurses; and develop monitoring and evaluation mechanisms

(Table 6 continues on next page)

	Responsible entities	How	Success story	Short-term and long-term goals
(Continued from previous page)				
Integrate mental health support and anti-stigma approaches into liver disease prevention and care services	National ministries of health and education, national and international health authorities, EASL, health-care staff at any level, communities and patient associations, addiction and psychiatry specialty associations	Include mental health and stigma reduction goals in liver disease care strategies at institutional and national levels; provide targeted training to medical staff on mental health and stigma reduction towards people at risk of or living with a liver disease; include education on communication skills to foster non-judgmental interactions; embed psychologists, social workers, or mental-health nurses into liver clinics or care pathways; implement routine screening for depression, anxiety, and psychosocial stress using validated tools; use peer navigators or patient advocates to reduce self-stigma and support engagement in care of people with liver disease	In the UK, the Hepatitis C Trust developed a peer support model embedded in liver services which improved treatment uptake among marginalised populations and addressed stigma;[504] France has developed professional peer support worker programmes within mental-health services and evidence shows they improve users' overall functioning; a recent Australian initiative[505] involved a co-design workshop with health-care professionals to develop strategies for reducing weight stigma in clinical settings	1–4 years: incorporate training on mental health screening and stigma reduction, possibly with peer involvement, into medical and nursing education; develop professional peer worker programmes for liver disease prevention and care; introduce routine screening for mental health disorders in hepatology services; 5–10 years: develop sustainable liver care models that include screening and support for mental health disorders; address misconceptions about people at risk of or with liver disease through public education and evidence-based anti-stigma interventions
Strengthen and implement primary and secondary prevention programmes for liver cancer*	National and international health authorities, EU, professional medical associations, health-care staff at any level, communities and patient associations, and other professional bodies involved in viral hepatitis management	Promote HBV vaccination, and screening and early treatment of HBV and HCV according to local epidemiology, and in concordance with the viral hepatitis elimination goals; ensure and expand access to effective antiviral therapies; address alcohol consumption, obesity, type 2 diabetes, and smoking as early intervention targets; include hepatocellular carcinoma surveillance in Europe's Beating Cancer Plan; aligning with European Code Against Cancer recommendations; implement and harmonise surveillance protocols for people with HBV without cirrhosis, including those coinfected with HDV, and for people with advanced chronic liver disease across member states; fund multicentre prospective studies; develop scoring algorithms incorporating clinical and genetic predictors and imaging and AI; train AI on national datasets and implement tools in electronic health records; support biomarker discovery and clinical validation of scores and biomarkers in EU cohorts; support validation and reimbursement of abbreviated magnetic resonance imaging, contrast-enhanced ultrasound, and AI-enhanced imaging protocols	Universal HBV vaccination and HBV-related hepatocellular carcinoma screening, and HBV registry and surveillance in Taiwan; hepatocellular carcinoma surveillance in Japan; validation in the general population of a predictive model of liver cancer incidence in the UK Biobank	1–4 years: pilot integration in tertiary centres; technology evaluation; economic analysis; 5–10 years: population-wide prevention programs, risk-based screening protocols, and scaled deployment; broad clinical uptake; inclusion in European and national guidelines
Enforce Europe-wide regulations on digital advertising and marketing of alcohol and unhealthy foods and drinks, particularly algorithm-driven marketing targeting those under 18 years	EU; European Commission Directorate-General for Health & Food Safety; European Commission Directorate-General for Communications Networks, Content and Technology; national ministries of health, communications, and trade and industry; WHO Europe; digital platform operators (eg, Meta, TikTok, Google, etc); independent health advocacy organisations and NGOs; and alcohol and food regulatory agencies (eg, European Food Safety Agency)	Integrate policy into existing frameworks; leverage the EU DSA to mandate transparency around advertising algorithms and targeting criteria, and use this legal foundation to restrict harmful marketing content and impose punitive sanctions on platforms and advertisers that fail to comply with regulatory standards; fiscal measures and health-directed incentives: introduce a levy on digital advertisements for alcohol and UPFs, with revenues earmarked for liver disease prevention; funds should also support public health campaigns, research, and digital literacy initiatives targeting youth and other exposed groups; European observatory on digital marketing; create an independent observatory to monitor and evaluate digital marketing practices related to alcohol and UPFs; to include real-time public dashboards and country scorecards to benchmark exposure, regulatory compliance, and marketing intensity; age-gating and exposure controls: mandate the implementation of verified age-assurance technologies across digital platforms to reduce youth exposure to harmful marketing content; regulatory standards should ensure interoperability and privacy compliance across jurisdictions; platform accountability through co-regulation: require digital platforms to conduct regular, independent audits of their advertising content and algorithmic promotion systems, these audits should be externally verified, publicly accessible, and include specific metrics on the marketing of alcohol and UPFs; public education and counter-marketing strategies: develop and disseminate evidence-based public health campaigns that counter harmful marketing narratives and raise awareness of liver health risks; engage trusted influencers and community figures to amplify health messages, especially on social media	Countries such as Norway and Lithuania have restricted alcohol advertising, including digital marketing; Norway enforces media-neutral ban covering all platforms with fines for violations to protect minors;[506] Ireland's Public Health (Alcohol) Act 2018 limits alcohol visibility in physical spaces;[507] and these principles can also apply to digital media and UPF marketing	1–4 years: define DSA requirements, pilot age-gating, and launch cross-sector working groups; 5–10 years: integrate alcohol and unhealthy foods marketing into public health law, promote alcohol-free digital environments, and visibly reduce youth exposure

(Table 6 continues on next page)

	Responsible entities	How	Success story	Short-term and long-term goals
(Continued from previous page)				
Implement legislation to require mandatory health warnings on alcohol-containing beverages, at the point of purchase and consumption	EU, national parliaments, NGOs, patient advocacy organisations, and media	The prescribed content and format of labels should be clearly stated in regulations; health warnings must clearly state that alcohol causes cancer, can lead to fatal liver disease, and poses risks to the fetus during pregnancy; the health warnings should be placed prominently on the container, and clearly separated from the rest of the label; their visibility should be ensured through size, use of colour, and contrasting background; the text describing the health warnings can be combined with symbols and pictograms for better visibility and understanding of the message	On-bottle alcohol health warning labels will be introduced in Ireland in September, 2028, including warnings for cancers, fatal liver disease, and avoidance of alcohol consumption in pregnancy	Throughout Europe as soon as possible
Implement policies and interventions to address the health needs of migrants across Europe, with a strong focus on viral hepatitis elimination	National governments, European public health authorities, WHO and WHO Europe, European Centre for Disease Prevention and Control, health-care providers and community organisations, and political leaders and advocates	Policies and interventions must be tailored to address the distinct factors affecting migrant health and services developed with the migrant community; community outreach programmes in conjunction with culturally tailored information and language-specific awareness campaigns; effective strategies to scale up vaccination, screening, and treatment for viral hepatitis ensuring equity of access for all migrants as part of population-wide approach; development and strengthening of surveillance and monitoring systems for migrant health, including viral hepatitis elimination; promotion of health equity, human rights, and universal access to health care across all settings	HBV COMSAVA[508] is a success story from Catalonia focused on addressing viral hepatitis among African migrants; this programme is an example of a community-based, integrated approach aimed at improving prevention and the early detection and treatment of hepatitis B in this population; the programme includes HBV screening in the community, linkage to care, HBV therapy, and the offer of HBV vaccination for contacts; as a result, the COMSAVA initiative increased awareness about hepatitis B and its modes of transmission, diagnoses of HBV, and vaccination in the community	1–4 years: adoption of migrant-inclusive health-care policies at national and European levels to reduce barriers to health care for migrants; increase awareness and education by developing culturally appropriate, multilingual educational materials, and use community-based outreach programmes in partnership with migrant communities; increased access to viral hepatitis screening for migrants driven by local demographic and epidemiological data; HBV vaccination offered to all migrant populations, by implementing vaccination campaigns; implementation of policy changes with monitoring showing increased awareness levels, screening rates, and vaccination uptake among migrant populations; 5–10 years: achieve viral hepatitis elimination in migrant communities by establishing long-term, sustainable programmes that are integrated into local health-care systems; effective, financed care pathways in to account for migrant needs
Provide publicly accessible guidance frameworks for structuring market entry agreements for medicines that balance equitable access with sustainable pricing	National and international health authorities; European Commission; EU member states; health technology assessment agencies; European Medicines Agency	Implement tiered disclosure models; strengthen health technology assessment regulation joint clinical assessments; create shared regional reference platforms where list prices are available and can be easily compared; include criteria for when confidentiality is justified and how it can coexist with transparency obligations; investments in interoperable real-world data infrastructure to support outcomes-based pricing, monitor treatment effectiveness and safety, and enable a periodic reassessment of medicines value	Managed entry agreements developed under the Beneluxa Initiative,[479] which successfully assessed innovative but expensive medicines; Italy's confidential agreement on hepatitis C medicines, which balanced access and sustainability	1–4 years: stronger regional co-operation alongside the Beneluxa standards in EU member states groupings with similar purchasing power; 5–10 years: EU-level pricing policies and value assessment, diffusion of harmonised but adaptable agreement models across members
Encourage voluntary joint procurement initiatives and pricing cooperation among EU member states to strengthen their negotiating capacity, particularly for high-cost or high-uncertainty medicines	National and international health authorities; European Commission; EU member states; health technology assessment agencies; European Medicines Agency	Create a database of successful negotiations to inform future deals; to expand the EU Joint Procurement Agreement beyond crisis situations to facilitating collective bargaining to cover—eg, high-cost orphan medicines, advanced therapies, or oncology therapies	EU Joint Procurement of COVID-19 vaccines, securing timely and equitable access; Beneluxa Initiative; Nordic Pharmaceuticals Forum; Valletta Declaration	1–4 years: promote pilot initiatives for joint assessment initiatives; 5–10 years: greater use of mechanisms for joint assessment and negotiation; pilots for joint procurement aiming to enhance learning and future wider implementation

(Table 6 continues on next page)

	Responsible entities	How	Success story	Short-term and long-term goals
(Continued from previous page)				
Exclude the alcohol industry and their agents from the formulation of public health policy, and from interactions with policy makers, health and public health leaders, and from alcohol harm reduction activities	EU, WHO Europe, policy makers and politicians and ministers, public health and medical professional societies, civil society, and patient associations	Exclusion of alcohol industry actors and their representatives from all interactions with relevant policy makers; civil society and harm reduction organisations must maintain full independence and reject any funding or partnerships with the alcohol industry	Lithuania and other Baltic states have achieved success in reducing alcohol consumption, and consequent reductions in hospitalisations, deaths, and childhood alcohol consumption	1–4 years: these measures should be implemented as soon as possible; they should be monitored over the long term (5–10 years), taking account of industry and other adaptations designed to minimise impact, and adapted and strengthened over time in response to any attempts by commercial actors to undermine their effectiveness
Align taxation of alcohol and unhealthy foods to the economic burden they impose, including costs incurred by health-care systems, law enforcement, the justice system, and social services	National governments, EU, EASL, national medical societies, WHO Europe, OECD, European Health Alliance on Alcohol, and NGOs	Estimate the costs of associated harms to EU member states; select and implement the most effective option to recoup the estimated costs (eg, with excise duty) and recoup increased cost to revenue of state; legislate and enforce recoup costs; evaluate benefits of increased costs on reducing consumption and harms; re-assess the costs and adjust taxes over time; expand over time to other unhealthy commodities, drawing lessons from alcohol	There is no evidence that revenues from alcohol taxation are higher than costs of associated harm in European countries (alcohol harms cost approximately 2% of GDP in the EU27 countries)[403]	1–4 years: establish state and EU-level agencies for alcohol harm reduction; introduce and expand minimum unit pricing and excise tax reforms; begin recouping costs to shift burden from taxpayers to the alcohol industry; 5–10 years: expand fiscal harm-recouping model to other unhealthy commodities (eg, sugary drinks and unhealthy foods); institutionalise virtuous fiscal-health cycle: reduced consumption, reduced harms, and lower income tax burden

Building on the comprehensive framework of recommendations from the first EASL–*Lancet* Commission,[1] recommendations of the current report have been selected to maximise impact, with a particular emphasis on key deficits to European health policy. AI=artificial intelligence. DSA=Digital Services Act. EASL=European Association for the Study of the Liver. ETRs=European Training Requirements. FIB-4=fibrosis-4 index. GDP=gross domestic product. HBV=hepatitis B virus. HCV=hepatitis C virus. HDV=hepatitis delta virus. MASLD=metabolic-dysfunction associated steatotic liver disease. NCD=non-communicable disease. NGO=non-governmental organisation. OECD=Organisation for Economic Co-operation and Development. UEMS=European Union of Medical Specialists. UPF=ultra-processed foods. *For further recommendations on liver cancer, see separate Lancet Commission report.[35]

Table 6: **Priority recommendations from the EASL–*Lancet* Commission for further implementation**

pressure on government budgets for defence, trade tariffs, and rising populism. Current challenges require a global public health approach in response to the multifaceted threats of climate change, political denial of health risks, and other systemic barriers.[509] Within that reality, one must carefully justify extra resources and, at times, unpopular choices. The politically most difficult of our recommendations are those calling for action on alcohol and unhealthy foods, given cost-of-living crises and strong political lobbying and advocacy by corporate actors.

This report and its recommendations are supported by strong scientific evidence and newly generated data, providing a sound basis for their expected impact, but it will also be necessary to convene fora to test what resonates with the public and governments, and frame arguments that speak to both head and heart.

A European call for sustainability and change

A sustainability perspective on liver health should advocate for practices that enhance health promotion, and equitable and efficient resource use, striving to create a balanced system that safeguards both human wellbeing and the environment (appendix 1 p 54). In this context, sustainable health can be defined as the capacity of health systems to deliver effective, equitable care that meets present population needs without compromising the ability of future generations to achieve optimal health, while remaining within ecological and economic boundaries.[510] Viewed through a sustainability lens, our recommendations underscore that improving liver health outcomes requires more than just clinical or policy-level interventions; it also demands a clear commitment to intergenerational equity and balanced allocation of resources.[1] As shown by our modelling, public health measures to reduce liver disease risk factors and behaviours are fundamental to a sustainable health-care system and economy. Early detection and standardised testing for liver disease reduce the long-term strain on health-care systems, allowing for reinvestment of saved resources in underserved communities and preventing the perpetuation of health inequities. The explicit integration of non-viral liver diseases into NCD frameworks, coupled with collaborative, multimorbidity-based, person-centred care, cultivates a more resilient, equitable health-care environment that can adapt to shifting social and demographic challenges.

Making the sustainability perspective more explicit also means calling attention to how proposed measures against stigma and discrimination, transparent prices of medicines, and strong policy action on alcohol and unhealthy food marketing preserve health as a shared societal resource, safeguarding the wellbeing of current and future populations. In this way, policy makers and health-care providers are not only addressing immediate health needs but are also ensuring that scarce resources—financial, societal, and environmental—are responsibly managed and fairly distributed across communities and generations.

As such, a sustainability approach provides a valuable framework for exploring policy recommendations across various domains that can, directly or indirectly, improve liver health.[511,512] For instance, recouping the costs to society of alcohol-related harm through alcohol taxes and other fiscal measures could lower alcohol consumption, thus reducing liver and other chronic diseases, street crime, domestic violence, road traffic injuries, and sickness absence, and reverse the substantial reductions in GDP imposed by these harms. Such systems approaches align closely with the principles of sustainability, particularly those outlined in the UN Sustainable Development Goals (SDGs).[513] The SDGs were explicitly designed as an interconnected system: they recognise that action in one area will affect outcomes in others, and that development should balance social, economic, and environmental sustainability.[514] On the most evident level, liver health aligns with SDG 3.3 on NCDs, yet it also intersects with several other targets, such as SDG 2.2 on malnutrition, and more indirectly with SDG 10.3 on reducing inequalities, SDG 11.7 on green public spaces, and SDG 11.6 on air quality.

The SDG concept is intrinsically linked to the management of our planet's resources and the equitable distribution of those resources across generations and communities. A sustainability perspective on liver health underscores the importance of addressing the overuse, misuse, and unequal distribution of resources, which have implications for health outcomes (appendix 1 p 54). Excessive consumption of natural resources or medical interventions depletes resources, reduces their availability for future generations, causes environmental degradation that negatively affects public health, and results in inefficiencies and harmful consequences that exacerbate health issues.[515] Additionally, uneven resource distribution—whether in health care, nutritious food, or safe living conditions—creates disparities in health, including the prevalence of liver disease.[516–518] Emerging research also indicates that the environmental and social factors driving climate change might greatly contribute to the development of various liver diseases, albeit through indirect causal pathways.[519]

Conclusion

This EASL–*Lancet* Commission report is published against the backdrop of an escalating and unsustainable burden of liver disease in Europe. Evidence-based policy implementation by national governments and the EU to reduce this burden has been inadequate. Our recommendations (table 6) present substantial opportunities to advance policy in key areas, including alcohol regulation, childhood protection from marketing, and harmonisation of the European health-related policy landscape. Importantly, these same measures would

also deliver major co-benefits by reducing the burden of other NCDs, including cardiovascular disease and cancer. Responsible entities named in table 6, in particular, medical societies such as EASL, WHO, relevant EU bodies, and European states, should urgently initiate work to develop and update action plans based on the framework represented by the revised set of recommendations in this report and the associated scientific evidence that has been showcased by our report.

The evidence presented in this Commission report is intended to stimulate and support advances in policy-making and implementation to achieve the NCD global action plan targets for 2030.[46] At least three of the targets that countries have committed to achieve are pertinent to liver diseases: (1) a one-third relative reduction in the overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases (with 2015 as the baseline); (2) a 20% relative reduction in alcohol consumption (ie, harmful use), against a 2010 baseline; and (3) a halt to the rise in diabetes and obesity, against a 2010 baseline. Although several European countries have made progress towards reaching these targets, intense and reinvigorated efforts are necessary, especially given that the original objective was to meet these targets by 2025.

Growing public awareness of risk factors for ill-health creates a major opportunity to push for the implementation of more robust regulatory frameworks. Shifting global health priorities and economic crises, including the COVID-19 pandemic and economic downturns, combined with conflict-driven societal costs, have underscored the need for resilient health systems that prioritise cost-effective prevention strategies, in parallel to those for treating manifest disease.[10] These shifts might create momentum for implementing harmonised, European-wide, and evidence-based policies and health care. Given increasing financial and political pressures on health-care systems, investing in prevention and early intervention aligns with current financial and political priorities. Such investments in prevention are even more pertinent and urgent in the current context of geopolitical reconfiguration, shifting policy priorities, and health budget reductions, and should inspire and inform similar investments at the global level.

Contributors

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Declaration of interests

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