

Global Epidemiology of Alcohol-Related Liver Disease, Liver Cancer, and Alcohol Use Disorder, 2000–2021

Pojusakorn Danpanichkul^{1#}, Luis Antonio Díaz^{2–5#}, Kanokphong Suparan⁶, Primrose Tothananurongroj⁷, Supapitch Sirimangklanurak⁷, Thanida Auttapracha⁷, Hanna L. Blaney⁸, Banthoon Sukphutanan^{7,9}, Yanfang Pang^{6,10–12}, Siwanart Kongarin⁷, Francisco Idalsoaga⁴, Eduardo Fuentes-López¹³, Lorenzo Leggio¹⁴, Mazen Nouredin¹⁵, Trenton M. White^{16,17}, Alexandre Louvet¹⁸, Philippe Mathurin¹⁸, Rohit Loomba², Patrick S. Kamath¹⁹, Jürgen Rehm^{20–24}, Jeffrey V. Lazarus^{5,16,17,25}, Karn Wijarnpreecha^{26–28*}, Juan Pablo Arab^{3–5,29*}

¹Department of Internal Medicine, Texas Tech University Health Sciences Center, Lubbock, Texas, USA

²MASLD Research Center, Division of Gastroenterology and Hepatology, University of California San Diego, San Diego, California, USA

³Departamento de Gastroenterología, Escuela de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile

⁴Observatorio Multicéntrico de Enfermedades Gastrointestinales (OMEGA), Santiago, Chile

⁵The Global NASH Council, Washington, DC, USA

⁶Department of Microbiology, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

⁷Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

⁸Division of Gastroenterology and Hepatology, University of Maryland, Baltimore, Maryland, USA

⁹Lerdsin Hospital, Bangkok, Thailand

¹⁰Affiliated Hospital of Youjiang Medical University for Nationalities, Baise, Guangxi, China

¹¹National Immunological Laboratory of Traditional Chinese Medicines, Baise, Guangxi, China

¹²Center for Medical Laboratory Science, Affiliated Hospital of Youjiang Medical University for Nationalities, Baise, Guangxi, China

¹³Departamento de Ciencias de la Salud, Facultad de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile

¹⁴Clinical Psychoneuroendocrinology and Neuropsychopharmacology Section, Translational Addiction Medicine Branch, National Institute on Drug Abuse Intramural Research Program and National Institute on Alcohol Abuse and Alcoholism, Division of Intramural Clinical and Biological Research, National Institutes of Health, Baltimore, Maryland, USA

¹⁵Houston Research Institute and Houston Methodist Hospital, Houston, Texas, USA

¹⁶Barcelona Institute for Global Health (ISGlobal), Hospital Clínic, University of Barcelona, Barcelona, Spain

¹⁷CUNY Graduate School of Public Health and Health Policy (CUNY SPH), New York, New York, USA

¹⁸Université Lille, CHU de Lille, Service des maladies de l'appareil digestif, Hôpital Huriez, INFINITE-U1286, Lille, France

¹⁹Division of Gastroenterology and Hepatology, Mayo Clinic College of Medicine and Science, Rochester, Minnesota, USA

²⁰Institute for Mental Health Policy Research, Centre for Addiction and Mental Health, Toronto, Ontario, Canada

²¹Campbell Family Mental Health Research Institute, Centre for Addiction and Mental Health, Toronto, Ontario, Canada

²²Dalla Lana School of Public Health, University of Toronto, Toronto, Ontario, Canada ²³Department of Psychiatry, University of Toronto, Toronto, Ontario, Canada

²⁴Centre for Interdisciplinary Addiction Research, University of Hamburg, Hamburg, Germany

²⁵Faculty of Medicine and Health Sciences, University of Barcelona, Barcelona, Spain

²⁶Division of Gastroenterology and Hepatology, Department of Medicine, University of Arizona College of Medicine, Phoenix, Arizona, USA

²⁷Department of Internal Medicine, Banner University Medical Center, Phoenix, Arizona, USA

²⁸BIO5 Institute, University of Arizona College of Medicine-Phoenix, Phoenix, Arizona, USA

²⁹Division of Gastroenterology, Hepatology, and Nutrition, Department of Internal Medicine, Virginia Commonwealth University School of Medicine, Richmond, Virginia, USA

#Authors in bold share first authorship

***Corresponding Authors:**

Juan Pablo Arab, MD

Stravitz-Sanyal Institute of Liver Disease and Metabolic Health

Division of Gastroenterology, Hepatology, and Nutrition, Department of Internal Medicine

Virginia Commonwealth University School of Medicine

Mail: 1200 E. Broad St, 14th floor, PO Box 980341, Richmond, VA 23298, USA.

Email: juanpablo.arab@vcuhealth.org

Karn Wijarnpreecha, MD, MPH

Division of Gastroenterology and Hepatology, Department of Medicine, University of Arizona College of Medicine, Phoenix, Arizona, USA

Department of Internal Medicine, Banner University Medical Center, Phoenix, Arizona, USA

BIO5 Institute, University of Arizona College of Medicine-Phoenix, Phoenix, Arizona, USA

Email: dr.karn.wi@gmail.com

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Abbreviations: ALD: alcohol-related liver disease; APC: annual percent change; ASDR: age-standardized death rate; ASIR: age-standardized incidence rate; ASPR: age-standardized prevalence rate; ASR: age-standardized rates; AUD: alcohol use disorder; CI: confidence interval; COVID-19: Coronavirus Disease 2019; GBD: Global Burden of Disease; GHDx: Global Health Data Exchange; HCC: hepatocellular carcinoma; ICD-10: International Classification of Diseases, 10th Revision ; SDI: sociodemographic index; UI: uncertainty interval; USA: United States of America

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Author contributions:

Conceptualization – Pojsakorn Danpanichkul, Juan Pablo Arab, Luis Antonio Díaz, Karn Wijarnpreecha

Data curation – Pojsakorn Danpanichkul, Banthoon Sukphutanan, Thanida Auttapracha, Supapitch Sirimangklanurak

Formal analysis – Pojsakorn Danpanichkul, Banthoon Sukphutanan, Kanokphong Suparan, Siwanart Kongarin, Yanfang Pang

Funding acquisition - No funding required.

Investigation – Pojsakorn Danpanichkul, Siwanart Kongarin, Primrose Tothananarungroj, Supapitch Sirimangklanurak

Methodology – Pojsakorn Danpanichkul, Luis Antonio Díaz, Jeffrey V. Lazarus

Project Administration – Pojsakorn Danpanichkul, Karn Wijarnpreecha, Juan Pablo Arab, Luis Antonio Díaz

Supervision – Karn Wijarnpreecha, Juan Pablo Arab, Luis Antonio Diaz, Mazen Nouredin, Jeffrey V. Lazarus

Validation – Pojsakorn Danpanichkul, Siwanart Kongarin, Banthoon Sukphutanan, Thanida Auttapracha, Supapitch Sirimangklanurak, Primrose Tothananarungroj

Visualization – Pojsakorn Danpanichkul, Siwanart Kongarin, Luis Antonio Díaz

Writing, original draft – Pojsakorn Danpanichkul, Kanokphong Suparan, Yanfang Pang, Luis Antonio Díaz, Karn Wijarnpreecha, Hanna L. Blaney

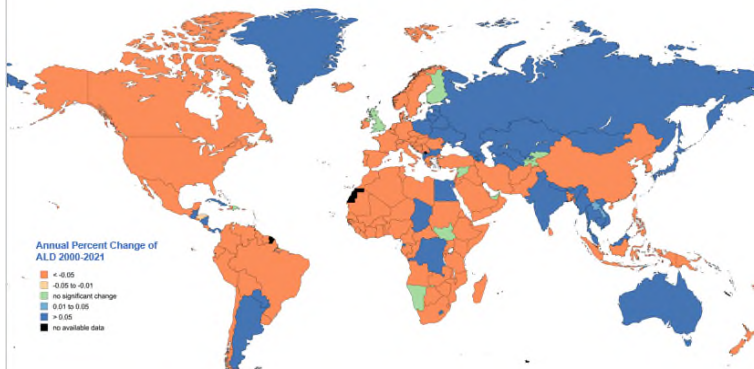
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All authors have read and approved the final version of the manuscript for submission.

ORCIDi:

- Pojsakorn Danpanichkul 0000-0002-9121-165X
- Luis Antonio Díaz 0000-0002-8540-4930
- Kanokphong Suparan 0000-0002-6853-7387
- Supapitch Sirimangkklanurak 0009-0003-5341-1073
- Primrose Tothananarungroj 0009-0006-1551-7602
- Thanida Auttapracha 0000-0001-7726-5814
- Hanna L. Blaney 0000-0003-4919-9519
- Siwanart Kongarin 0009-0005-5966-0809
- Banthoon Sukphutanan 0009-0002-1288-7393
- Yanfang Pang 0009-0005-3872-9475
- Francisco Idalsoaga 0000-0001-5607-0698
- Eduardo Fuentes-López 0000-0002-0141-0226
- Lorenzo Leggio 0000-0001-7284-8754
- Mazen Nouredin 0000-0003-2127-2040
- Trenton M. White 0000-0002-0633-4445
- Alexandre Louvet 0000-0002-5293-007X
- Philippe Mathurin 0000-0003-3447-2025
- Rohit Loomba 0000-0002-4845-9991
- Patrick S. Kamath 0000-0002-7888-1165
- Jürgen Rehm 0000-0001-5665-0385
- Jeffrey V. Lazarus 0000-0001-9618-2299
- Karn Wijarnpreecha 0000-0002-0871-9963
- Juan Pablo Arab 0000-0002-8561-396X

Global epidemiology of alcohol-related liver disease, alcohol-attributable liver cancer, and alcohol use disorder 2000–2021



111.12 million cases of AUD (+15% since 2000)

1.27 million cases of ALD (+39% since 2000)

132,030 cases of alcohol-attributable liver cancer (+94% since 2000)

- **49 countries** showed an increasing prevalence rate of ALD in the past two decades
- During the COVID-19 pandemic, **females have a higher increase in ALD prevalence, incidence, and death** compared to males

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ABSTRACT

Background/ Aims: Alcohol represents a leading burden of disease worldwide, including alcohol use disorder (AUD) and alcohol-related liver disease (ALD). We aim to assess the global burden of AUD, ALD, and alcohol-attributable primary liver cancer between 2000–2021.

Methods: We registered the global and regional trends of AUD, ALD, and alcohol-related liver cancer using data from the Global Burden of Disease 2021 Study, the largest and most up-to-date global epidemiology database. We estimated the annual percent change (APC) and its 95% confidence interval (CI) to assess changes in age-standardized rates over time.

Results: In 2021, there were 111.12 million cases of AUD, 3.02 million cases of ALD, and 132,030 cases of alcohol-attributable primary liver cancer. Between 2000 and 2021, there was a 14.66% increase in AUD, a 38.68% increase in ALD, and a 94.12% increase in alcohol-attributable primary liver cancer prevalence. While the age-standardized prevalence rate for liver cancer from alcohol increased (APC: 0.59%, 95% confidence interval [CI] 0.52 to 0.67%) over these years, it decreased for ALD (APC: -0.71%, 95% CI -0.75 to -0.67%) and AUD (APC: -0.90%, 95% CI -0.94 to -0.86%). There was significant variation by region, socioeconomic development level, and sex. During the last years (2019–2021), the prevalence, incidence, and death of ALD increased to a greater extent in females.

Conclusions: Given the high burden of AUD, ALD, and alcohol-attributable primary liver cancer, urgent measures are needed to prevent them at both global and national levels.

Keywords: alcoholic cirrhosis; liver disease; cirrhosis; alcohol-associated liver disease; ALD; AUD; epidemiology; global health; addiction; public health

INTRODUCTION

In 2021, alcohol consumption ranked as the ninth leading cause of the global disease burden.¹ Alcohol use has been causally linked to numerous disease and injury categories, with over 200 of the International Classification of Diseases, 10th Revision (ICD-10) three-digit categories being attributable to alcohol.²⁻⁴ In particular, alcohol use disorder (AUD) constitutes a chronic brain disease characterized, among many other features, by compulsive heavy alcohol use and loss of control over alcohol intake, leading to significant psychological, social, and physical harm.⁵ AUD is a highly prevalent mental health disorder, affecting around 3.7% of the global adult population in 2019.⁶ Furthermore, alcohol-related liver disease (ALD) is a striking health consequence, with higher mortality in individuals with cirrhosis.⁷ The economic costs due to alcohol use were estimated at 2.6% of global gross domestic product, most of them attributable to losses in productivity (61.2%).⁸ In the United States of America (USA), the annual direct and indirect costs of ALD are projected to increase from \$31 billion in 2022 to \$66 billion in 2040, representing a 118% increase in this period.⁹

Individuals with ALD have two diseases to treat (AUD and chronic liver disease),^{10,11} and ideal treatments should be multidisciplinary to manage and treat both comorbid conditions.¹² Unfortunately, timely access to AUD treatments for individuals with ALD is scarce, even in developed countries, due to several barriers at the patient, clinician, and organizational levels.¹³ For example, a retrospective study conducted in the USA, including 35,682 veterans with ALD, demonstrated that 12% received behavioral therapy after AUD diagnosis, and 1% received behavioral therapy with pharmacotherapeutic agents.¹⁴ Also, difficulties in hepatocellular carcinoma (HCC) surveillance have been identified in ALD. In the USA and Europe, fewer than 30% of HCC cases are diagnosed by surveillance in patients with cirrhosis, and screening among individuals with ALD is less commonly performed than in those with hepatitis C virus-related cirrhosis.¹⁵ Thus, gaps in both healthcare access and treatment likely contribute to the burden of disease due to alcohol.

While numerous studies have examined the local and regional epidemiology of ALD and AUD, there are significant gaps in understanding their global epidemiology.^{16,17} The Coronavirus Disease 2019 (COVID-19) pandemic has further deepened this understanding through its significant effects on disease burden, high mortality rates, long-term health impacts, and disruptions to healthcare systems, which have undoubtedly influenced the burdens of ALD, AUD, and liver cancer.¹⁸ To bridge these gaps, we leveraged the Global Burden of Disease (GBD) Study 2021 data, one of the most comprehensive and up-to-date global datasets for ALD, AUD, liver cancer, and their risk factors available.^{18–20} Our study aimed to investigate the temporal trends of ALD, AUD, and alcohol-attributable primary liver cancer across 204 countries and territories, stratifying the data by sex, geographic location, and sociodemographic index (SDI) from 2000 to 2021.

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METHODS

Data source

The study accessed data on AUD, ALD, and alcohol-attributable liver cancer incidence, prevalence, and deaths from 2000 to 2021, from the GBD 2021.^{18–20} The data stratified by sex, region, and country were accessed through the Global Health Data Exchange (GHDx) query tool (<http://ghdx.healthdata.org/gbd-results-tool>), a resource maintained by the Institute for Health Metrics and Evaluation (University of Washington, USA).^{18–20}

Estimation methods

The estimation methods for the GBD 2021 and the methodology for estimating the burden of diseases were described in previous GBD study publications.^{18–20} For AUD, the analysis utilized ICD-10 codes E24.4, F10-F10.9, G31.2, G62.1, G72.1, P04.3, Q86.0, R78.0, and X45-X45.9, X65-X65.9, Y15-Y15.9. For ALD and alcohol-attributable primary liver cancer, estimates of etiologies for chronic liver disease (ICD10: B18-B18.9, I85-I85.9, I98.2, K70-K70.3, K71.7, K73-K75, K75.2, K75.4-K76.2, K76.4-K76.9, and K77.8) and liver cancer (C22-C22.8, D13.4) were derived from a systematic GBD literature search, incorporating population-based studies. Data for five etiologies—chronic hepatitis B virus infection, chronic hepatitis C virus infection, ALD, metabolic dysfunction associated steatohepatitis, and other causes—were analyzed using DisMod-MR 2.1, a Bayesian meta-regression model, stratified by age, sex, location, and year. The proportions for each etiology were scaled to sum to 100%, and the ALD and alcohol-attributable primary liver cancer were extracted. In summary, data were obtained from various reliable sources, including population-based cancer registries, vital registration systems, and verbal autopsy studies (**Supplementary Material 1**). Several statistical methods were employed to enhance the consistency and reliability of the data, including misclassification correction, garbage code redistribution, and noise reduction algorithms. These techniques minimize biases to improve the accuracy of estimates. The study employed a Cause-of-death Ensemble model, a Bayesian geospatial regression analysis,^{18–20} that calculates mortality by age, sex, geographical location, and year.

Countries were grouped by development level using the SDI (i.e., low, low-middle, middle, high-middle, high), a composite measure of lag-distributed income per capita, average years of education, and fertility rates among females younger than 25 years (**Supplementary Table 1**).¹ The burden of diseases was stratified into 21 regions based on the GBD region classification, which are Central Asia, Central Europe, Eastern Europe, Australasia, High-income Asia-Pacific, High-income North America, Southern Latin America, Western Europe, Andean Latin America, Central Latin America, Tropical Latin America, Caribbean, North Africa and Middle East, South Asia, East Asia, Southeast Asia, Oceania, Central Sub-Saharan Africa, Eastern Sub-Saharan Africa, Southern Sub-Saharan Africa, and Western Sub-Saharan Africa.²¹

Statistical Analysis

The study reports an estimate for the frequency of prevalence, incidence, and deaths accompanied by 95% uncertainty intervals (UIs). These intervals are determined by identifying the 2.5th and 97.5th ranked values across all 1,000 draws from the posterior distribution. This approach provides a range of values that reflects the uncertainty inherent in statistical modeling. The change in any variable between 2000 and 2021 was calculated as follows: $(\text{value in 2021} - \text{value in 2000}) / \text{value in 2000}$. Age-standardized rates (ASRs), including age-standardized prevalence rate (ASPR), age-standardized incidence rate (ASIR), and age-standardized death rate (ASDR) per 100,000, were calculated using the GBD population estimate method.²² Age-standardized rates (ASRs) provide several advantages, including adjusting for age distribution differences to allow fair comparisons across regions, countries, or time periods. Unlike crude numbers, ASRs per 100,000 standardize data by population size, facilitating comparisons between countries with varying populations or prevalence rates. This ensures that observed differences represent actual disease burden rather than demographic variations. To assess changes in ASRs over time, the study calculated the annual percent change (APC) and its 95% confidence interval (CI). When both the annualized rate of change and the lower boundary of its 95% CI were positive, it was classified as an increasing trend. Conversely, if the annualized rate of change and the upper boundary of its 95% CI were negative, it was classified as a decreasing trend. This

analysis used the Joinpoint regression program, version 4.9.1.0, developed by the Statistical Research and Applications Branch of the National Cancer Institute in Bethesda.

RESULTS

The global burden of alcohol use disorder, alcohol-related liver disease, and alcohol-attributable primary liver cancer

In 2021, there were 111.12 million cases of AUD (+14.66% from 2000), 3.02 million cases of ALD (+38.68% from 2000), and 132,030 cases of alcohol-attributable primary liver cancer (+94.12% from 2000) (**Tables 1–3 and Figure 1A–C**). In terms of incidence, there were 55.78 million new cases of AUD (+15.24% from 2000), 462,690 cases of ALD (+38.29% from 2000), and 99,540 cases of alcohol-attributable liver cancer (+82.89% from 2000) (**Tables 1–3**). There were 158,470 deaths from AUD (-3.23% from 2000), 354,250 deaths from ALD (+32.60% from 2000), and 92,230 deaths from alcohol-attributable primary liver cancer (+76.75% from 2000) (**Tables 1–3 and Figure 1D–F**). The ASPRs of AUD, ALD, and primary liver cancer from alcohol were 1,335.43 (95% UI 1,153.65 to 1,539.75), 34.81 (95% UI 28.88 to 40.26), and 1.51 (95% UI 1.23 to 1.82), respectively (**Tables 1–3 and Figure 1A–C**). The ASIRs of these conditions were 673.98 (95% UI 563.13 to 776.68), 5.34 (95% UI 4.40 to 6.25), and 1.14 (95% UI 0.93 to 1.38), respectively (**Tables 1–3**). The ASDRs were 1.84 (95% UI 1.50 to 2.01), 4.08 (95% UI 3.45 to 4.81), and 1.06 (95% UI 0.86 to 1.29) for AUD, ALD, and alcohol-attributable primary liver cancer, respectively (**Tables 1–3 and Figure 1D–F**). An examination of trends from 2000 to 2021 indicated an annual rise in the ASPR for alcohol-attributable primary liver cancer (APC: 0.59%, 95% CI 0.52 to 0.67%), whereas decrease in AUD (APC: -0.90%, 95% CI -0.94 to -0.86%) and ALD (APC: -0.71%, 95% CI -0.75 to -0.67%) (**Tables 1–3**). Similarly, the trend of ASIR increased from alcohol-attributable primary liver cancer (APC: 0.26%, 95% CI 0.22 to 0.30%), yet decreased in AUD (APC: -0.78%, 95% CI -0.81 to -0.75%) and ALD (APC: -0.84%, 95% CI -0.87 to -0.82%) (**Tables 1–3**). ASDRs remained stable in alcohol-attributable primary liver cancer but declined in AUD (APC: -2.19%, 95% CI -2.44 to -1.93%) and ALD (APC: -1.11%, 95% CI -1.19 to -1.04%) (**Tables 1–3**).

Regarding sex, changes from 2000 to 2021 from ALD and AUD were less pronounced in females than males (**Supplementary Figure 1A–C**). When analyzed during the pandemic timeframe (2019 to 2021) versus the pre-pandemic timeframe (2000 to 2019), prevalence, incidence, and mortality (except for AUD) underwent nearly equal or higher degrees of changes in the pre-pandemic compared to the pandemic timeframe (**Supplementary Figure 1A–F**). From 2019 to 2021, AUD prevalence and incidence increased in males, whereas it decreased in females (**Supplementary Figure 1D–E**). AUD death decreased at a higher degree in females than males (**Supplementary Figure 1F**). However, ALD metrics increased more in females: prevalence by 4.90%, incidence by 4.96%, and mortality by 1.07%. In males, prevalence increased by 3.87%, incidence by 3.73%, and mortality by 0.88% (**Supplementary Figure 1D–F**).

Alcohol use disorder

The highest burden of AUD was observed in Eastern Europe, where the ASPR, ASIR, and ASDR were 3,292.73 (95% UI 2,901.33 to 3,724.07), 1,634.85 (95% UI 1,373.51 to 1,906.75), and 10.66 (95% UI 9.82 to 11.56), respectively (**Table 1**). While a decline in ASPR was observed across most regions, ASPR was increased in Australasia (APC: 0.72%, 95% CI 0.59 to 0.84%), Oceania (APC: 0.13%, 95% CI 0.11 to 0.15%), and Western Sub-Saharan Africa (APC: 0.08%, 95% CI 0.05 to 0.11%) (**Table 1**). Considering ASIR, most regions exhibited a decrease, but increased in Australasia (APC: 0.76%, 95% CI 0.65 to 0.86%), Oceania (APC: 0.12%, 95% CI 0.10 to 0.14%), and Western Sub-Saharan Africa (APC: 0.10%, 95% CI 0.07 to 0.12%) (**Table 1**). On the other hand, ASDR increased only in High-income North America (APC: 1.83%, 95% CI 1.16 to 2.50%) (**Table 1**).

When evaluated against the SDI, high SDI countries exhibited the highest burden of AUD with ASPR, ASIR, and ASDR of 1,847.63 (95% UI 1,603.23 to 2,115.44), 915.37 (95% UI 772.84 to 1,052.98), and 2.58 (95% UI 2.50 to 2.66), respectively (**Table 1** and **Figure 2A–B**). ASDR decreased in all SDI strata except remained stable in high SDI countries (**Table 1**).

The national difference in ASPRs of AUD among different nations in 2021 is illustrated in **Figure 3A and Supplementary Table 2**. Briefly, the ASPR of AUD was highest in Mongolia with an ASPR of 4,716.94 (95% UI 3,986.35 to 5,453.81), followed by Guatemala at 4,049.97 (95% UI 3,444.01 to 4,623.66), El Salvador at 3,917.28 (95% UI 3,312.16 to 4,461.73), and Kazakhstan at 3,895.96 (95% UI 3,302.65 to 4,889.17). Around 40 countries/ territories showed an uptrend of ASPR from AUD. New Zealand (APC: 3.46%, 95% CI 3.21 to 3.70%), Mongolia (APC: 1.49%, 95% CI 1.30 to 1.67%), Taiwan (APC: 1.24%, 95% CI 0.95 to 1.52%), and Uruguay (APC: 0.64%, 95% CI 0.56 to 0.72%) exhibited the highest increases of ASPR from 2000 to 2021 (**Supplementary Table 2**).

Alcohol-related liver disease

In 2021, the highest ASPR of ALD was observed in Eastern Europe, with an ASPR of 125.22 (95% UI 102.77 to 148.78). In contrast, ASIR and ASDR were highest in Central Asia, with 18.56 (95% UI 14.78 to 22.14) and 11.63 (95% UI 9.26 to 14.28), respectively (**Table 2**). The ASPR, ASIR, and ASDR of ALD demonstrated a downward trend in most GBD regions from 2000 to 2021 (**Table 2**). However, Central Asia (APC: 0.88%, 95% CI 0.79 to 0.97%), Eastern Europe (APC: 0.68%, 95% CI 0.53 to 0.82%), Central Sub-Saharan Africa (APC: 0.16%, 95% CI 0.14 to 0.18%), and South Asia (APC: 0.10%, 95% CI 0.08 to 0.13%) exhibited an uptrend in ASPR. ASIR increased in Eastern Europe (APC: 0.47%, 95% CI 0.35 to 0.59%) and Central Asia (APC: 0.44%, 95% CI 0.32 to 0.56%) (**Table 2**). ASDR increased in Eastern Europe (APC: 0.99%, 95% CI 0.58 to 1.41%) and High-income North America (APC: 0.74%, 95% CI 0.38 to 1.10%) (**Table 2**).

Regarding SDI, high SDI countries exhibited the highest ASPR with a value of 39.37 (95% UI 32.74 to 45.26), whereas low SDI countries exhibited the highest ASIR and ASDR with a value of 7.79 (95% UI 6.10 to 9.66) and 5.94 (95% UI 4.43 to 7.78), respectively (**Figure 2C-D**). In this timeframe, ASPR, ASIR, and ASDR decreased in all SDI strata (**Table 2 and Figure 2C-D**).

The geographical variation in ASPRs of ALD among different countries/ territories in 2021 is illustrated in **Figure 3B and Supplementary Table 3**. In short, the ASPR of ALD was highest in the Republic of Moldova with an ASPR of 182.41 (95% UI 145.28 to 220.48), followed by Ukraine at 146.50 (95% UI 118.14 to 178.47), Mongolia at 145.63 (95% UI 115.28 to 174.84), and Turkmenistan at 130.18 (95% UI 100.91 to 157.40). 49 countries/ territories exhibited an uptrend, with the highest ascending trends observed in Kazakhstan (APC: 1.74%, 95% CI 1.50 to 1.98%), Armenia (APC: 1.60%, 95% CI 1.42 to 1.77%), Turkmenistan (APC: 1.35%, 95% CI 1.29 to 1.41%), and Ukraine (APC: 1.21%, 95% CI 0.90 to 1.53%) (**Figure 3C and Supplementary Table 3**).

Alcohol-attributable primary liver cancer

In 2021, the highest burden of alcohol-attributable primary liver cancer in terms of ASRs was observed in Australasia, with an ASPR, ASIR, and ASDR of 3.77 (95% UI 3.03 to 4.61), 2.32 (95% UI 1.87 to 2.86), and 1.92 (95% UI 1.53 to 2.37), respectively (**Table 3**). From 2000 to 2021, Australasia (APC: 3.52%, 95% CI 3.24 to 3.80%), Southern Latin America (APC: 3.46%, 95% CI 3.32 to 3.60%), and High-income North America (APC: 2.72%, 95% CI 2.58 to 2.86%) experienced the most notable changes in ASPR (**Table 3**). ASIR increased in two-thirds of regions, with the highest upward progression observed in Southern Latin America (APC: 3.26%, 95% CI 3.03 to 3.50%), Australasia (APC: 2.79%, 95% CI 2.54 to 3.04%), and High-income North America (APC: 2.46%, 95% CI 2.32 to 2.60%). Similarly, ASDR exhibited the most pronounced increases in Southern Latin America (APC: 3.09%, 95% CI 2.74 to 3.45%), Australasia (APC: 2.47%, 95% CI 1.79 to 3.15%), and High-income North America (APC: 2.30%, 95% CI 1.87 to 2.73%) (**Table 3**).

In terms of SDI, ASPR of alcohol-attributable primary liver cancer increased in high (APC: 1.10%, 95% CI 1.05 to 1.16%), middle (APC: 0.96%, 95% CI 0.89 to 1.04%), and low-middle SDI countries (APC: 0.93%, 95% CI 0.89 to 0.97%) (**Table 3 and Figure 2E**). From the designated time frame, ASIR increased in low-middle (APC: 0.90%, 95% CI 0.85 to 0.94%), middle (APC: 0.61%, 95% CI 0.53 to 0.69%), and high SDI strata (APC: 0.56%, 95% CI 0.51 to 0.62%) (**Table 3**). Similarly, ASDR increased

in low-middle (APC: 0.89%, 95% CI 0.70 to 1.09%), middle (APC: 0.35%, 95% CI 0.18 to 0.52%), and high SDI countries (APC: 0.27%, 95% CI 0.06 to 0.48%) (**Table 3 and Figure 2F**).

Classified by country, the ASPR of alcohol-attributable primary liver cancer was highest in Mongolia with an ASPR of 17.07 (95% UI 11.56 to 25.43), followed by Republic of Korea at 6.12 (95% UI 4.02 to 9.14), Gambia at 6.07 (95% UI 3.38 to 10.00), and Austria at 5.12 (95% UI 4.23 to 6.06) (**Supplementary Figure 2**). From 2000 to 2021, Poland (APC: 7.11%, 95% CI 6.33 to 7.89%), United Kingdom (APC: 4.91%, 95% CI 4.66 to 5.16%), Sweden (APC: 4.87%, 95% CI 4.49 to 5.25%), and Guatemala (APC: 4.09%, 95% CI 3.70 to 4.48%) exhibited the highest rising trends. 111 countries/territories showed increasing trends of ASPR for liver cancer from alcohol (**Supplementary Table 4**).

DISCUSSION

Trends in alcohol use and its related health consequences have been evolving over the last few years, likely promoted by sociodemographic changes, cultural aspects, and the COVID-19 pandemic, among other factors.^{16,23} In this study, we analyzed the trends in the global burden of some of the most frequent and striking consequences in health from alcohol misuse, AUD, ALD, and alcohol-attributable primary liver cancer, using the GBD 2021.¹ In 2021, there were 158,470, 354,250, and 92,230 deaths from AUD, ALD, and alcohol-attributable primary liver cancer, respectively. From 2000 to 2021, around one-fourth of countries and territories exhibited an uptrend in the prevalence rate of ALD. The study also revealed a noteworthy rise in ALD and alcohol-attributable primary liver cancer burden both from the past two decades and during the COVID-19 pandemic. During the COVID-19 pandemic, females exhibited a higher increase in prevalence, incidence, and mortality from ALD compared to males, in contrast to prior to the pandemic.

Our findings are in line with trends observed from the GBD 2019 study,^{21,24} which highlighted the rising prevalence rates of ALD and alcohol-attributable primary liver cancer even while the prevalence rate of AUD declined. Our findings suggest that factors beyond alcohol consumption contribute to the rising prevalence of ALD and primary liver cancer.^{25,26} Improved screening and diagnostic techniques allow for earlier and more accurate detection, while changes in disease registry systems may enhance the ability to capture current epidemiological trends, potentially leading to higher reported prevalence rates.^{27,28} Furthermore, while overall AUD prevalence may be declining, higher-risk drinking behaviors, such as binge-drinking, among specific populations could be on the rise.^{29,30} Even though the global burden of AUD declined, it is still markedly high, with over 111 million people living with AUD in 2021. The global decline masked an important regional variation in which Australasia, Oceania, and Western Sub-Saharan Africa exhibited an uptrend from age-adjusted incidence rates of AUD. Mortality from AUD decreased or remained stable in nearly all regions except increased in High-income North America. Of note, although AUD was more frequent in countries with high SDI, countries with lower SDI exhibited higher ASDRs from ALD, which could be explained by poorer healthcare access and availability of

treatments and technologies, among other social and cultural variables.^{31,32} ALD and AUD co-exist, with ALD being one the most common alcohol-associated organ damage hence, policies to decrease alcohol use together with prevention and early detection of AUD are crucial for effectively reducing alcohol-related harm and ALD.^{14,33–35}

Our study found that during the COVID-19 pandemic, the change in incidence and mortality from AUD, ALD, and liver cancer from alcohol exhibited a lower increase compared to pre-pandemic trends, even though several studies reported an increasing rate of ALD and alcohol consumption at the greater extent during COVID-19 pandemic.^{36,37} This observation may be explained by changes in access to alcohol, which was subjected to multiple factors, including the restriction of alcohol sales.^{38,39} For example, in South Africa, alcohol was restricted in some regions during the COVID-19 pandemic.³⁸ However, data from a cross-sectional study including over 3,000 individuals indicated that around a fifth of alcohol drinkers increased or started alcohol consumption during the pandemic.³⁸ A lag time between increased alcohol consumption and liver injury from alcohol, along with other factors, might be expected. Other relevant factors, such as the interaction between alcohol use and metabolic dysfunction (e.g., obesity, type 2 diabetes mellitus, arterial, and dyslipidemia), including MetALD, could also contribute to this rising trend of chronic liver disease and HCC.^{40–42} Interestingly, our study found that from 2019 to 2021, females experienced a greater increase in ALD prevalence compared to males. This trend may be attributed to the rise in alcohol consumption among females during the COVID-19 pandemic.⁴³ In addition, self-underreporting of alcohol consumption is a well-recognized bias that impedes accurate tracking of epidemiological trends in AUD. This may partly explain the observed decline in AUD in our findings, especially during the pandemic, when limited healthcare access, heightened stigma in remote surveys, and disruptions in data collection likely played a role.⁴⁴ Moreover, whether AUD declines in female populations in areas where alcohol use among females is due to stigma remains an unproven hypothesis. Long-term data is needed to quantify the global effect of the COVID-19 pandemic on the alcohol-related disease burden, particularly liver disease, which accounts for nearly 90 percent of alcohol-related harm.

We acknowledge several limitations, which are common challenges encountered in GBD studies and relate to the availability and quality of primary data, mainly influenced by the efficacy of vital registration systems in each country.^{1,22} Furthermore, the estimation methodology used by the GBD often leads to an underestimation of mortality, particularly in low-income countries, attributed to the absence of high-quality data and underreported risk factors attributable to the stigma around alcohol and its related health consequences. Additionally, GBD estimated AUD using ICD-10 codes rather than the Diagnostic and Statistical Manual of Mental Disorders, 5th edition. This can lead to an underestimation of the true burden of AUD, ALD, and alcohol-attributable liver cancer in these regions.^{1,45} The report on alcohol use also tends to be underestimated.⁴⁶ Also, we performed our analysis based on geographical and SDI strata, which comprise many factors of social determinants of health; however, it is not fully comprehensive. In addition, the GBD analysis framework is currently limited to attributing a single cause to a specific outcome, preventing the inclusion of co-variation with other relevant risk factors. Thus, future modeling studies should be conducted, incorporating other comorbidities and determinants of health, such as race, ethnicity, age, socio-economic status, cultural factors, and other relevant risk factors for liver disease, such as viral hepatitis and metabolic dysfunction.^{41,47-50}

In conclusion, our study reported a high burden of AUD, ALD, and liver cancer attributable to alcohol, including an increased prevalence rate of liver cancer from alcohol from 2000 to 2021. Prevalence, incidence, and mortality of ALD increased from 2019 to 2021, with a steeper trend in females compared to males. Given that 49 countries exhibited an uptrend in ALD prevalence rates and 111 countries were found to have an uptrend in liver cancer prevalence rates from alcohol consumption between 2000 and 2021, it is essential to implement comprehensive strategies globally. These strategies should focus on reducing alcohol intake, preventing AUD, and effectively treating its health consequences, including ALD and HCC, in all countries and territories worldwide.

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Figure 1. Prevalence and age-standardized prevalence rates from 2000 to 2021 of patients with alcohol use disorder (A), alcohol-related liver disease (B), and alcohol-attributable primary liver cancer (C). Death and age-standardized death rates from 2000 to 2021 of patients with alcohol use disorder (D), alcohol-related liver disease (E), and alcohol-attributable primary liver cancer (F).

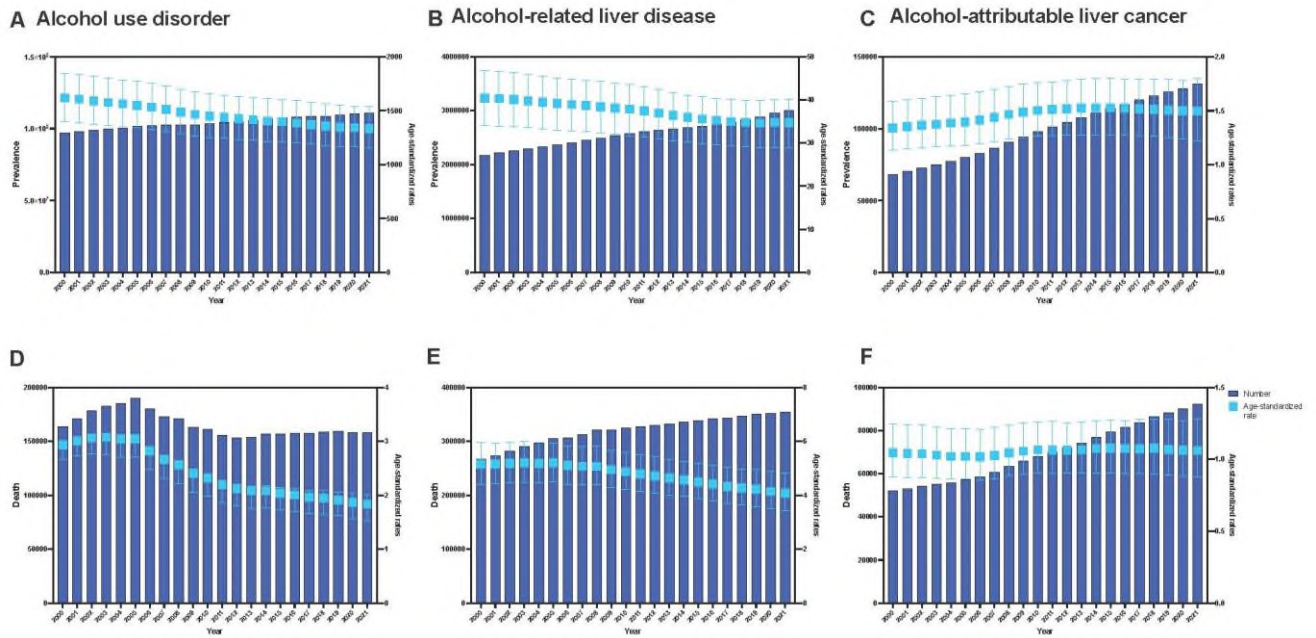
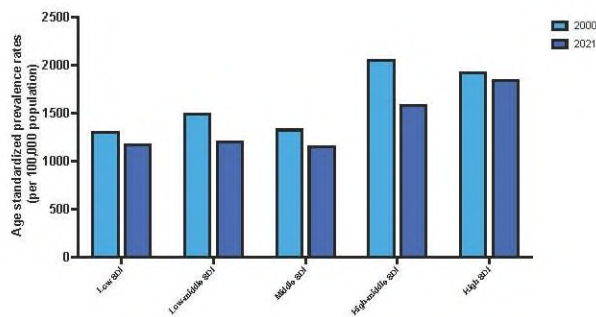
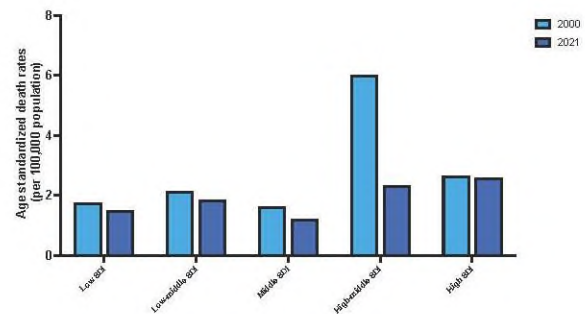


Figure 2. Age-standardized prevalence (A) and death (B) rates of patients with alcohol use disorder in 2000 and 2021, by sociodemographic index. Age-standardized prevalence (C) and death (D) rates of patients with alcohol-related liver disease in 2000 and 2021, by sociodemographic index. Age-standardized prevalence (E) and death (F) rates of patients with alcohol-attributable primary liver cancer in 2000 and 2021, by sociodemographic index.

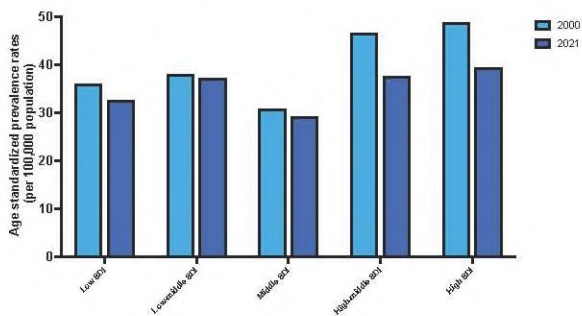
A Alcohol use disorder



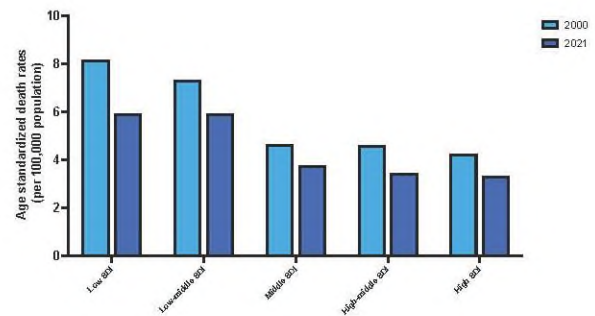
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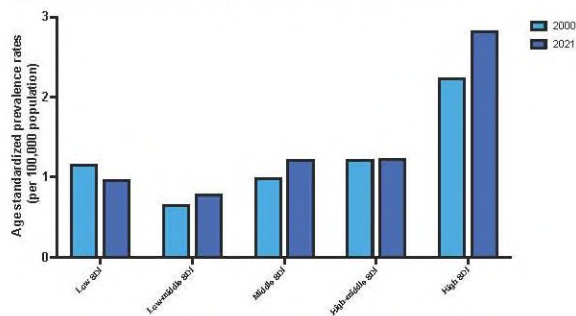
C Alcohol-related liver disease



D



E Alcohol-attributable liver cancer



F

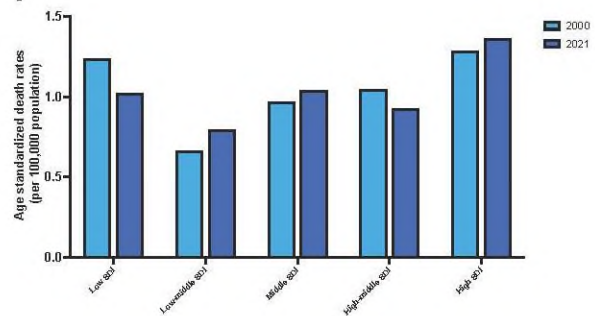
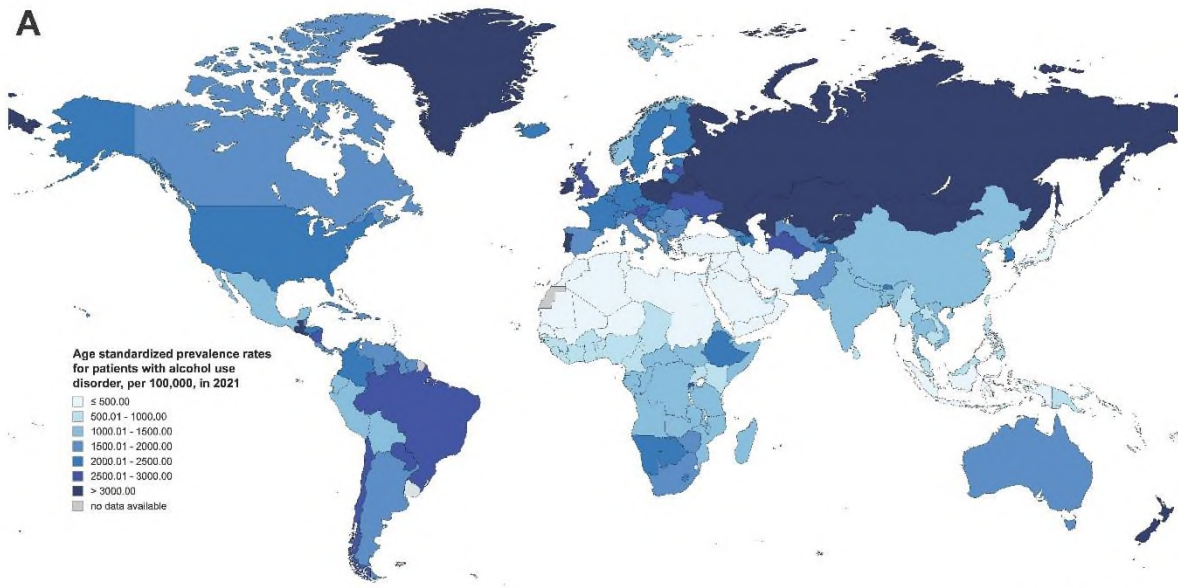
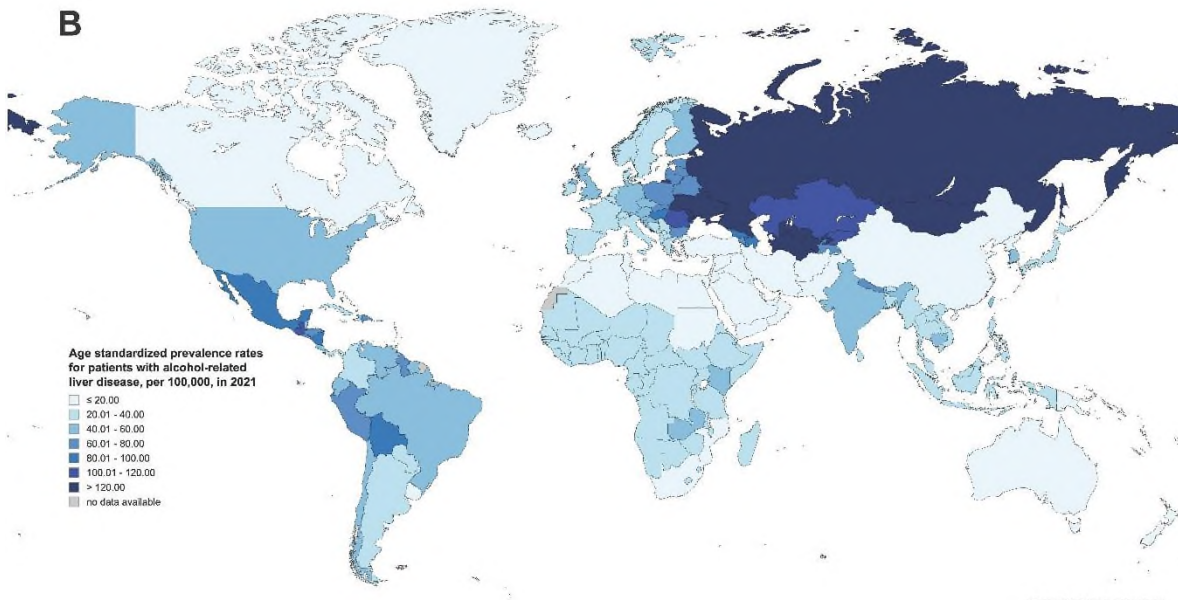


Figure 3. Age-standardized prevalence rates of patients with alcohol use disorder (A) and alcohol-related liver disease (B) in 2021, by country. (C) Annual percent change in age-standardized prevalence rates of alcohol-related liver disease from 2000 to 2021, by country.

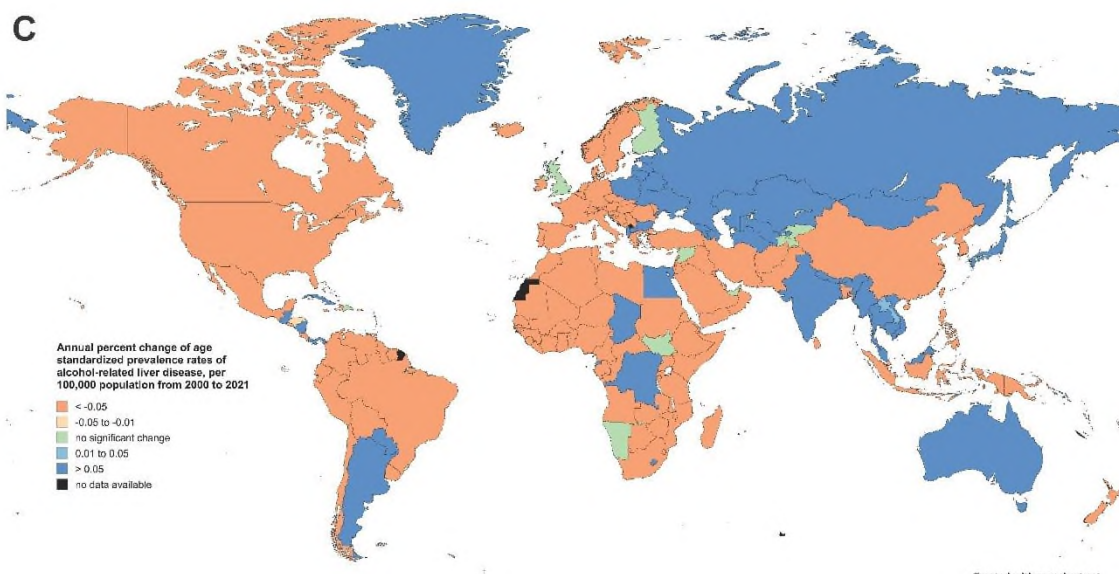
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A

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B

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C

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Table 1 Prevalence, incidence, death, and age-standardized rates from 2000 to 2021 in patients with alcohol use disorder

	2021 Prevalence (95% UI)	2021 ASPR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>	2021 Incidence (95% UI)	2021 ASIR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>	2021 Death (95% UI)	2021 ASDR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>
Overall	111.12 million (96.36 million to 127.90 million)	1335.43 (1153.65 to 1539.75)	-0.9 (-0.94 to -0.86)	<0.001	55.78 million (46.56 million to 64.31 million)	673.98 (563.13 to 776.68)	-0.78 (- 0.81 to - 0.75)	<0.001	158470 (129570 to 173260)	1.84 (1.5 to 2.01)	-2.19 (-2.44 to -1.93)	<0.001
Sex												
Female	24.92 million (21.17 million to 29.29 million)	599.5 (508.32 to 704.46)	-1.07 (-1.14 to -1)	<0.001	12.27 million (10.16 million to 14.40 million)	297.51 (244.34 to 349.58)	-1.04 (- 1.08 to - 1)	<0.001	23260 (22140 to 24620)	0.53 (0.5 to 0.56)	-2.99 (-3.59 to -2.4)	<0.001
Male	86.20 million (75.34 million to 98.86 million)	2077.27 (1809.94 to 2388.21)	-0.85 (-0.89 to -0.8)	<0.001	43.50 million (36.42 million to 50.25 million)	1050.39 (880.68 to 1209.52)	-0.7 (- 0.73 to - 0.68)	<0.001	135210 (106440 to 149670)	3.2 (2.52 to 3.55)	-2 (-2.24 to - 1.76)	<0.001
Region												
Central Asia	2.54 million (2.22 million to 2.94 million)	2581.06 (2252.39 to 2969.55)	-1.61 (-1.73 to -1.49)	<0.001	12.64 million (10.86 million to 14.50 million)	1274.93 (1102.99 to 1463.29)	-1.41 (- 1.53 to - 1.28)	<0.001	2720 (2370 to 3100)	2.78 (2.42 to 3.16)	-4.24 (-4.97 to -3.51)	<0.001
Central Europe	3.52 million (3.15 million to 3.93 million)	2393.52 (2115.8 to 2716.1)	-0.55 (-0.63 to -0.46)	<0.001	17.24 million (14.88 million to 1952590)	1227.02 (1054.53 to 1395)	-0.53 (- 0.65 to - 0.41)	<0.001	8180 (7540 to 8780)	4.71 (4.35 to 5.05)	0.21 (-0.42 to 0.84)	0.519
Eastern Europe	8.60 million (7.64 million to 9.76 million)	3292.73 (2901.33 to 3724.07)	-1.31 (-1.42 to -1.2)	<0.001	4074750 (3384440 to 4793310)	1634.85 (1373.51 to 1906.75)	-0.74 (- 0.98 to - 0.5)	<0.001	30750 (28240 to 33340)	10.66 (9.82 to 11.56)	-3.83 (-5.19 to -2.46)	<0.001
Australasia	702640 (600260 to 818890)	2450.41 (1756.51 to 2450.41)	0.72 (0.59 to 0.84)	<0.001	352600 (303510 to 409380)	1072.84 (906.15 to 1254.21)	0.76 (0.65 to 0.86)	<0.001	490 (460 to 510)	1.12 (1.06 to 1.18)	-0.48 (-1.6 to 0.64)	0.399
High-income Asia Pacific	2.29 million (1.96 million to 2.60 million)	1054.43 (890.89 to 1241.51)	-0.09 (-0.31 to 0.14)	0.443	982130 (813990 to 11.43 million)	484.09 (395.56 to 572.37)	-0.15 (- 0.29 to - 0.01)	0.038	1580 (1340 to 1790)	0.51 (0.44 to 0.58)	-1.98 (-2.29 to -1.66)	<0.001
High-income North America	8.55 million (7.39 million to 9.82 million)	2155.75 (1849.51 to 2484.03)	-0.04 (-0.11 to 0.04)	0.332	39.91 million (33.42 million to 46.59 million)	1038.85 (865.87 to 1222.59)	0.06 (- 0.04 to 0.16)	0.213	18670 (18090 to 19230)	3.72 (3.62 to 3.84)	1.83 (1.16 to 2.5)	<0.001
Southern Latin America	1.56 million (1.29 million to 1.84 million)	2113.45 (1736.46 to 2517.42)	-0.83 (-0.88 to -0.78)	<0.001	792,320 (651,340 to 953,320)	1086.56 (885.56 to 1316.53)	-0.59 (- 0.68 to - 0.5)	<0.001	770 (730 to 820)	0.93 (0.89 to 0.99)	-4.87 (-5.39 to -4.35)	<0.001
Western Europe	9.96 million (8.74 million to 11.24 million)	2113.94 (1832.43 to 2466.96)	-0.22 (-0.28 to -0.16)	<0.001	4907350 (43.19 million to 55.08 million)	1083.17 (923.39 to 1247.99)	-0.2 (- 0.31 to - 0.09)	<0.001	14400 (13760 to 15080)	2.02 (1.95 to 2.11)	-1.6 (-1.86 to -1.34)	<0.001
Andean Latin America	771300 (650140 to 904830)	1135.86 (966.24 to 1322.89)	-0.96 (-1.53 to -0.38)	0.001	412110 (339350 to 484590)	604.03 (502.02 to 708.93)	-0.85 (- 1.43 to - 0.27)	0.004	770 (590 to 1040)	1.21 (0.93 to 1.64)	-4.74 (-5.37 to -4.11)	<0.001
Central Latin America	5.10 million (4.40 million to 5.81 million)	1907.85 (1643.23 to 2172.87)	-0.37 (-0.48 to -0.27)	<0.001	2.69 million (2.30 million to 3.06 million)	1004.5 (858.51 to 1143.59)	-0.37 (- 0.54 to - 0.21)	<0.001	6430 (5620 to 7320)	2.44 (2.13 to 2.78)	-3.47 (-3.91 to -3.03)	<0.001
Tropical Latin America	6.52 million (5.65 million to 7.47 million)	2539 (2208.26 to 2904.37)	-0.93 (-1.16 to -0.71)	<0.001	3.26 million (2.72 million to 3.81 million)	1277.13 (1065.61 to 1490.94)	-0.97 (- 1.17 to - 0.78)	<0.001	8550 (8200 to 8890)	3.23 (3.09 to 3.36)	-0.97 (-1.4 to -0.54)	<0.001
Caribbean	853730 (734980 to 979280)	1682.64 (1439.64 to 1935.14)	0.09 (-0.16 to 0.34)	0.459	1.28 million (1.01 million to 1.56 million)	885.07 (741.85 to 1017.77)	0.12 (- 0.14 to 0.38)	0.376	1480 (1240 to 1720)	2.78 (2.33 to 3.24)	0.02 (-0.63 to 0.68)	0.946
North Africa and Middle East	2.44 million (1.94 million to 2.98 million)	381.9 (311.1 to 465.2)	-0.29 (-0.33 to -0.25)	<0.001		199.24 (157.49 to 240.04)	-0.24 (- 0.29 to - 0.19)	<0.001	700 (430 to 820)	0.12 (0.08 to 0.14)	-2.14 (-2.38 to -1.9)	<0.001

South Asia	22.91 million (19.79 million to 26.68 million)	1244.56 (1077.21 to 1441.41)	-1.37 (-1.45 to -1.3)	<0.001	12.09 million (10.01 million to 14.19 million)	644.52 (536.38 to 756.74)	-1.34 (- 1.45 to - 1.22)	<0.001	23650 (12040 to 30210)	1.37 (0.7 to 1.74)	-0.31 (-0.46 to -0.16)	<0.001
East Asia	19.82 million (16.99 million to 23.21 million)	1155.35 (971.48 to 1350.39)	-0.08 (-0.15 to -0.01)	0.022	9.68 million (7.82 million to 11.50 million)	580.77 (468.22 to 688.35)	-0.02 (- 0.08 to 0.05)	0.643	19310 (9970 to 25420)	0.98 (0.51 to 1.29)	0.03 (-0.22 to 0.28)	0.82
Southeast Asia	5.61 million (4.79 million to 6.52 million)	747.43 (637.59 to 866.79) 855.34	-0.42 (-0.45 to -0.39)	<0.001	2.88 million (2.37 million to 3.37 million)	382.69 (315.23 to 447.8) 451.04	-0.37 (- 0.4 to - 0.34)	<0.001	9840 (6720 to 13640)	1.3 (0.89 to 1.79)	-1.38 (-1.45 to -1.31)	<0.001
Oceania	107220 (86970 to 128610)	(706.05 to 1016.9) 1075.46	0.13 (0.11 to 0.15)	<0.001	46800 to 70060)	(368.95 to 542.32) 595510	0.12 (0.1 to 0.14)	<0.001	100 (50 to 150)	0.92 (0.49 to 1.42)	-0.57 (-0.7 to -0.43)	<0.001
Central Sub-Saharan Africa	1.10 million (896280 to 1.32 million)	(895.54 to 1258.1)	-0.02 (-0.08 to 0.04)	0.494	(481290 to 723020)	(462.74 to 674.22)	0.01 to 0.09)	0.151	1370 (910 to 1820)	1.68 (1.12 to 2.21)	-0.46 (-0.56 to -0.36)	<0.001
Eastern Sub-Saharan Africa	4.80 million (4.05 million to 5.68 million)	1509.56 (1297.8 to 1731.17) 1956.26	-0.07 (-0.18 to 0.04)	0.236	2.53 million to 3.01 million)	760.99 (634.43 to 884.31)	-0.02 (- 0.09 to 0.05)	0.59	4220 (3240 to 5650)	2.22 (1.76 to 2.88)	-0.94 (-1 to - 0.88)	<0.001
Southern Sub-Saharan Africa	1.56 million (1.32 million to 1.83 million)	(1686.57 to 2285.51)	-0.65 (-0.78 to -0.52)	<0.001	806280 (655030 to 963410) 960750	989.87 (810.26 to 1166.9)	-0.57 (- 0.7 to - 0.43)	<0.001	830 (590 to 960)	1.22 (0.87 to 1.42)	-1.47 (-1.85 to -1.09)	<0.001
Western Sub-Saharan Africa	1.82 million (1.51 million to 2.16 million)	511.9 (434.14 to 593.59)	0.08 (0.05 to 0.11)	<0.001	(776030 to 1.14 million)	261.28 (216.36 to 302.72)	0.1 (0.07 to 0.12)	<0.001	3650 (2380 to 4750)	1.35 (0.87 to 1.76)	-0.62 (-0.74 to -0.5)	<0.001
Sociodemographic Index												
Low SDI	10.04 million (8.44 million to 11.81 million)	1181.48 (1011.32 to 1369.74)	-0.48 (-0.49 to -0.47)	<0.001	5.31 million (4.37 million to 6.25 million)	601.52 (500.85 to 695.22)	-0.46 (- 0.48 to - 0.44)	<0.001	9400 (6340 to 11780)	1.49 (1.03 to 1.86)	-0.76 (-0.86 to -0.65)	<0.001
Low-middle SDI	22.24 million (19.13 million to 25.77 million)	1208.59 (1048.55 to 1386.76)	-1.04 (-1.08 to -1)	<0.001	11.61 million (9.68 million to 13.53 million)	618.1 (515.84 to 719.74)	-1.02 (- 1.06 to - 0.98)	<0.001	31330 (20600 to 37410)	1.85 (1.22 to 2.2)	-0.67 (-0.84 to -0.51)	<0.001
Middle SDI	31.35 million (27.02 million to 36.25 million)	1159.2 (992.08 to 1343.29)	-0.68 (-0.71 to -0.64)	<0.001	15.96 million (13.07 million to 18.83 million)	593.72 (488.6 to 695.56)	-0.65 (- 0.68 to - 0.63)	<0.001	34360 (22640 to 40340)	1.22 (0.8 to 1.43)	-1.29 (-1.45 to -1.12)	<0.001
High-middle SDI	24.68 million (21.63 million to 28.16 million)	1588.01 (1373.31 to 1829.9)	-1.24 (-1.33 to -1.15)	<0.001	12.01 million (9.98 million to 13.94 million)	795.45 (667.73 to 918.44)	-0.87 (- 0.94 to - 0.8)	<0.001	41750 (38500 to 45200)	2.35 (2.16 to 2.54)	-4.44 (-5.13 to -3.76)	<0.001
High SDI	22.71 million (20.09 million to 25.56 million)	1847.63 (1603.23 to 2115.44)	-0.18 (-0.24 to -0.13)	<0.001	10.84 million (9.29 million to 12.27 million)	915.37 (772.84 to 1052.98)	-0.13 (- 0.17 to - 0.1)	<0.001	41410 (40060 to 42800)	2.58 (2.5 to 2.66)	-0.09 (-0.56 to 0.38)	0.703

Abbreviation: APC: annual percent change; ASIR: age-standardized incidence rate; ASDR: age-standardized death rate; ASPR: age-standardized prevalence rate; CI: confidence interval; SDI: sociodemographic index; UI: uncertainty interval

Table 2 Prevalence, incidence, death, and age-standardized rates from 2000 to 2021 in patients with alcohol-related liver disease

	2021 Prevalence (95% UI)	2021 ASPR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>	2021 Incidence (95% UI)	2021 ASIR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>	2021 Death (95% UI)	2021 ASDR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>
Overall	3.02 million (2.50 million to 3.48 million)	34.81 (28.88 to 40.26)	-0.71 (-0.75 to -0.67)	<0.001	462690 (380020 to 543250)	5.34 (4.4 to 6.25)	-0.84 (- 0.87 to - 0.82)	<0.001	354250 (299200 to 418950)	4.08 (3.45 to 4.81)	-1.11 (- 1.19 to - 1.04)	<0.001
Sex												
Female	841260 (670230 to 1 million)	18.73 (15.01 to 22.27)	-1.05 (-1.14 to -0.96)	<0.001	109810 (87040 to 131680)	2.42 (1.91 to 2.9)	-1.04 (- 1.13 to - 0.95)	<0.001	77790 (61930 to 95500)	1.7 (1.36 to 2.09)	-1.38 (- 1.47 to - 1.28)	<0.001
Male	2.17 million (1.83 million to 24.99 million)	51.53 (43.47 to 59.11)	-0.58 (-0.6 to - 0.55)	<0.001	352880 (293190 to 411540)	8.46 (7.06 to 9.85)	-0.80 (- 0.83 to - 0.77)	<0.001	276460 (235400 to 326210)	6.66 (5.7 to 7.82)	-1.04 (- 1.13 to - 0.96)	<0.001
Region												
Central Asia	97210 (77030 to 118290)	105.74 (84.11 to 127.61)	0.88 (0.79 to 0.97)	<0.001	16720 (13210 to 20150)	18.56 (14.78 to 22.14)	0.44 (0.32 to 0.56)	<0.001	10180 (8070 to 12610)	11.63 (9.26 to 14.28)	-0.54 (- 1.22 to 0.14)	0.118
Central Europe	130840 (110270 to 150730)	72.06 (60.9 to 82.59)	-0.71 (-0.75 to -0.67)	<0.001	18440 (15560 to 21390)	10.15 (8.66 to 11.68)	0.94 to - 0.84)	<0.001	15270 (12780 to 17670)	7.82 (6.53 to 9.06)	-1.02 (- 1.48 to - 0.56)	<0.001
Eastern Europe	369190 (306040 to 435430)	125.22 (102.77 to 148.78)	0.68 (0.53 to 0.82)	<0.001	37810 (31270 to 44170)	13.14 (10.95 to 15.48)	0.47 (0.35 to 0.59)	<0.001	32870 (28800 to 37330)	10.65 (9.31 to 12.09)	0.99 (0.58 to 1.41)	<0.001
Australasia	4780 (3610 to 6010)	10.42 (7.86 to 12.99)	-0.05 (-0.11 to 0.01)	0.133	670 (520 to 830)	1.47 (1.14 to 1.81)	0.16 to - 0.05)	0.323	460 (360 to 580)	0.97 (0.74 to 1.22)	-0.3 (-1 to 0.41)	0.407
High-income Asia Pacific	136800 (114860 to 158080)	40.29 (34.06 to 46.31)	-0.84 (-1 to - 0.69)	<0.001	16260 (13800 to 18770)	4.57 (3.85 to 5.3)	-1.5 (-1.57 to -1.42)	<0.001	10960 (9470 to 12550)	2.71 (2.36 to 3.1)	-2.01 (-2.4 to -1.62)	<0.001
High-income North America	235560 (193200 to 282730)	41.32 (34.04 to 49.33)	-0.46 (-0.61 to -0.3)	<0.001	29530 (23990 to 35360)	5.24 (4.25 to 6.26)	0.38 to - 0.06)	0.149	22650 (19810 to 25610)	3.84 (3.35 to 4.34)	0.74 (0.38 to 1.1)	<0.001
Southern Latin America	28120 (20840 to 35130)	33.65 (25.14 to 42.09)	-0.12 (-0.17 to -0.07)	<0.001	5110 (3840 to 6360)	6.13 (4.62 to 7.66)	-0.35 (- 0.33)	<0.001	3190 (2460 to 3980)	3.77 (2.9 to 4.67)	-1.3 (-1.62 to -0.98)	<0.001
Western Europe	283400 (234890 to 328100)	40.1 (33.58 to 46.45)	-1.63 (-1.67 to -1.59)	<0.001	38610 (32350 to 44030)	5.29 (4.47 to 6.07)	-1.6 (-1.64 to -1.55)	<0.001	25950 (22530 to 29550)	3.25 (2.81 to 3.71)	-2.4 (-2.85 to -1.95)	<0.001
Andean Latin America	40600 (32290 to 48040)	66.3 (52.52 to 78.67)	-0.48 (-0.5 to - 0.45)	<0.001	7900 (6410 to 9220)	13.06 (10.58 to 15.24)	-0.74 (- 0.77 to - 0.71)	<0.001	5800 (4350 to 7560)	9.72 (7.27 to 12.71)	-1.17 (- 1.73 to - 0.6)	<0.001
Central Latin America	189550 (159260 to 221940)	72.3 (60.91 to 84.69)	-0.71 (-0.79 to -0.63)	<0.001	32230 (27340 to 37320)	12.4 (10.51 to 14.36)	-0.66 (- 0.76 to - 0.55)	<0.001	22040 (18290 to 25740)	8.53 (7.08 to 9.96)	-1.35 (- 1.53 to - 1.16)	<0.001
Tropical Latin America	110900 (94750 to 128830)	41.98 (35.92 to 48.78)	-1.68 (-1.77 to -1.59)	<0.001	19380 (16420 to 22630)	7.36 (6.27 to 8.58)	1.13 to - 1.02)	<0.001	11950 (10880 to 13120)	4.54 (4.14 to 4.98)	-1.71 (-2 to -1.42)	<0.001
Caribbean	25420 (20370 to 30560)	47.83 (38.48 to 57.45)	-0.16 (-0.2 to - 0.12)	<0.001	4660 (3760 to 5540)	8.7 (7.05 to 10.32)	-0.26 (- 0.37 to - 0.16)	<0.001	3810 (2870 to 4890)	7.09 (5.35 to 9.1)	-0.4 (-0.63 to -0.17)	0.001
North Africa and Middle East	21330 (14370 to 29650)	4.25 (2.88 to 5.84)	-0.47 (-0.49 to -0.45)	<0.001	5240 (3420 to 7360)	1.16 (0.76 to 1.63)	-0.92 (- 0.94 to - 0.89)	<0.001	3780 (2480 to 5420)	0.87 (0.56 to 1.24)	-1.88 (- 2.02 to - 1.74)	<0.001
South Asia	731440 (611660 to 853120)	42.81 (35.98 to 50)	0.1 (0.08 to 0.13)	<0.001	119130 (97670 to 140560)	7.49 (6.19 to 8.78)	-0.79 (- 0.82 to - 0.76)	<0.001	99790 (71750 to 126470)	6.4 (4.58 to 8.14)	1.16 to - 0.77)	<0.001
East Asia	218170 (170790 to 269250)	9.94 (7.96 to 12.11)	-0.69 (-0.76 to -0.62)	<0.001	26130 (20070 to 32660)	1.19 (0.93 to 1.47)	-1 (-1.16 to -0.85)	<0.001	15270 (11600 to 20350)	0.69 (0.53 to 0.92)	2.28 to - 1.64)	<0.001
Southeast Asia	214280 (165730 to 268700)	29.57 (22.93 to 36.7)	-0.61 (-0.68 to -0.55)	<0.001	43210 (33240 to 54700)	6.22 (4.91 to 7.73)	-0.7 (-0.75 to -0.65)	<0.001	39170 (30720 to 49650)	5.74 (4.57 to 7.18)	1.22 to - 1.04)	<0.001
Oceania	1270 (860 to 1700)	12.51 (8.63 to 17.01)	-0.29 (-0.3 to - 0.27)	<0.001	220 (150 to 310)	2.38 (1.66 to 3.19)	0.28 to - 0.26)	<0.001	150 (100 to 230)	1.68 (1.12 to 2.43)	0.92 to - 0.55)	<0.001
Central Sub- Saharan Africa	23070 (15990 to 30980)	32.45 (22.45 to 43.3)	0.16 (0.14 to 0.18)	<0.001	5610 (3850 to 7530)	8.62 (5.95 to 11.41)	-0.55 (-0.6 to -0.5)	<0.001	5270 (3170 to 7880)	8.12 (5.04 to 12.01)	0.98 to - 0.81)	<0.001
Eastern Sub- Saharan Africa	67410 (51660 to 85310)	33.55 (25.32 to 42.15)	-0.73 (-0.83 to -0.62)	<0.001	16610 (12460 to 21030)	9.07 (6.81 to 11.45)	-1.02 (- 1.08 to - 0.97)	<0.001	12190 (8840 to 16100)	6.83 (5.04 to 8.81)	-1.56 (- 1.62 to - 1.5)	<0.001
Southern Sub- Saharan Africa	75090 (58350 to 93150)	17.05 (13.44 to 20.89)	-1.78 (-1.92 to -1.64)	<0.001	2280 (1760 to 2830)	3.64 (2.81 to 4.49)	-1.67 (- 1.82 to - 1.53)	<0.001	2200 (1740 to 2810)	3.57 (2.85 to 4.43)	-1.59 (- 1.95 to - 1.23)	<0.001
Western Sub- Saharan Africa	214280 (165730 to 268700)	31.09 (24.31 to 38.35)	-0.77 (-0.81 to -0.74)	<0.001	16940 (12820 to 21330)	7.87 (6.1 to 9.82)	-1.12 (- 1.15 to - 1.09)	<0.001	11270 (7850 to 15060)	5.44 (3.9 to 7.23)	-1.69 (- 1.75 to - 1.63)	<0.001
Sociodemographic Index												
Low SDI	204870 (163690 to 247790)	32.68 (25.66 to 39.5)	-0.45 (-0.49 to -0.4)	<0.001	43410 (33580 to 53810)	7.79 (6.1 to 9.66)	-0.99 (- 1.02 to - 0.95)	<0.001	32310 (24340 to 42400)	5.94 (4.43 to 7.78)	-1.5 (-1.69 to -1.31)	<0.001

Low-middle SDI	614500 (507620 to 717410)	37.22 (30.77 to 43.37)	-0.1 (-0.12 to - 0.08)	<0.001	111510 (90630 to 132280) 137380 (112880 to 161390)	7.2 (5.89 to 8.55)	-0.65 (- 0.69 to - 0.61)	<0.001	90030 (66550 to 112990)	5.93 (4.38 to 7.5)	-1.02 (- 1.18 to - 0.86)	<0.001
Middle SDI	823020 (682750 to 959110) 692370	29.21 (24.35 to 33.91)	-0.25 (-0.29 to -0.21)	<0.001	(70840 to 98220) 85200 (71430 to 98880)	4.94 (4.09 to 5.8)	-0.57 (- 0.59 to - 0.54)	<0.001	103870 (89660 to 119900) 66100	3.76 (3.25 to 4.34)	-1.01 (- 1.11 to - 0.91)	<0.001
High-middle SDI	(575750 to 800000) 677590	37.55 (31.32 to 43.45)	-1.03 (-1.11 to -0.94)	<0.001		4.58 (3.85 to 5.31)	1.34 to - 1.23)	<0.001	(58180 to 75450) 61500	3.46 (3.05 to 3.94)	-1.4 (-1.64 to -1.17)	<0.001
High SDI	(562080 to 778640)	39.37 (32.74 to 45.26)	-1.03 (-1.09 to -0.97)	<0.001		4.9 (4.11 to 5.7)	1.12 to - 0.99)	<0.001	(53800 to 69540)	3.33 (2.92 to 3.75)	-1.2 (-1.44 to -0.96)	<0.001

Abbreviation: APC: annual percent change; ASIR: age-standardized incidence rate; ASDR: age-standardized death rate; ASPR: age-standardized prevalence rate; CI: confidence interval; SDI: sociodemographic index; UI: uncertainty interval

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Table 3 Prevalence, incidence, deaths, age-standardized rates, and changes from 2000 to 2021 in patients with alcohol-attributable primary liver cancer

	2021 Prevalence (95% UI)	2021 ASPR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>	2021 Incidence (95% UI)	2021 ASIR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>	2021 Death (95% UI)	2021 ASDR per 100,000 (95% UI)	2000 to 2021 APC (95% CI)	<i>p</i>
Overall	132030 (107260 to 159050)	1.51 (1.23 to 1.82)	0.59 (0.52 to 0.67)	<0.001	99540 (80960 to 120400)	1.14 (0.93 to 1.38)	0.26 (0.22 to 0.3)	<0.001	92230 (75050 to 112160)	1.06 (0.86 to 1.29)	0.08 (-0.06 to 0.21)	0.253
Female	26400 (21110 to 32300)	0.57 (0.46 to 0.7)	0.44 (0.35 to 0.53)	<0.001	21610 (17130 to 26520)	0.47 (0.37 to 0.57)	0.22 (0.12 to 0.32)	<0.001	20960 (16640 to 25770)	0.45 (0.36 to 0.56)	0.06 (-0.25 to 0.36)	0.706
Male	105630 (87080 to 126660)	2.56 (2.1 to 3.06)	0.63 (0.56 to 0.69)	<0.001	77930 (64120 to 94160)	1.91 (1.57 to 2.29)	0.24 (0.21 to 0.27)	<0.001	71270 (58190 to 86610)	1.77 (1.45 to 2.13)	0.06 (-0.03 to 0.15)	0.222
Region												
Central Asia	1530 (1070 to 2130)	1.75 (1.22 to 2.35)	-0.39 (-0.59 to -0.19)	<0.001	1420 (990 to 1940)	1.69 (1.17 to 2.28)	-0.39 (-0.49 to -0.28)	<0.001	1480 (1030 to 2020)	1.79 (1.23 to 2.41)	-0.36 (-0.59 to -0.12)	0.003
Central Europe	2810 (2290 to 3320)	1.3 (1.06 to 1.54)	0.94 (0.88 to 1)	<0.001	2690 (2180 to 3160)	1.21 (0.99 to 1.42)	0.78 (0.73 to 0.83)	<0.001	2840 (2300 to 3340)	1.26 (1.03 to 1.49)	0.73 (0.12 to 1.35)	0.019
Eastern Europe	3170 (2720 to 3630)	0.92 (0.79 to 1.05)	0.99 (0.74 to 1.24)	<0.001	2970 (2560 to 3380)	0.85 (0.73 to 0.97)	0.86 (0.63 to 1.1)	<0.001	3100 (2690 to 3540)	0.88 (0.76 to 1)	0.77 (-0.11 to 1.65)	0.088
Australasia	1840 (1480 to 2250)	3.77 (3.03 to 4.61)	3.52 (3.24 to 3.8)	<0.001	1180 (940 to 1460)	2.32 (1.87 to 2.86)	2.79 (2.54 to 3.04)	<0.001	1010 (800 to 1260)	1.92 (1.53 to 2.37)	2.47 (1.79 to 3.15)	<0.001
High-income Asia Pacific	13960 (10850 to 17640)	3.31 (2.57 to 4.27)	-1.06 (-1.22 to -0.91)	<0.001	7350 (5720 to 9220)	1.68 (1.29 to 2.14)	-2.02 (-2.2 to -1.83)	<0.001	5530 (4360 to 6970)	1.21 (0.94 to 1.54)	-2.58 (-2.77 to -2.39)	<0.001
High-income North America	17500 (15260 to 19800)	2.82 (2.47 to 3.19)	2.72 (2.58 to 2.86)	<0.001	11470 (10000 to 13010)	1.78 (1.56 to 2.01)	2.46 (2.32 to 2.6)	<0.001	9030 (7840 to 10210)	1.37 (1.2 to 1.55)	2.3 (1.87 to 2.73)	<0.001
Southern Latin America	490 (370 to 640)	0.57 (0.42 to 0.74)	3.46 (3.32 to 3.6)	<0.001	460 (330 to 590)	0.68 (0.39 to 0.98)	3.26 (3.03 to 3.5)	<0.001	470 (340 to 620)	0.54 (0.39 to 0.7)	3.09 (2.74 to 3.45)	<0.001
Western Europe	26260 (21410 to 31250)	3.1 (2.54 to 3.7)	1.39 (1.24 to 1.55)	<0.001	17010 (13720 to 20240)	1.91 (1.57 to 2.29)	0.66 (0.56 to 0.75)	<0.001	14940 (12000 to 17970)	1.62 (1.31 to 1.93)	0.31 (0.07 to 0.55)	0.01
Andean Latin America	430 (300 to 610)	0.74 (0.52 to 1.05)	1.71 (1.46 to 1.96)	<0.001	420 (300 to 600)	0.73 (0.51 to 1.03)	1.67 (1.4 to 1.93)	<0.001	460 (320 to 650)	0.79 (0.54 to 1.12)	1.71 (1.09 to 2.34)	<0.001
Central Latin America	1950 (1560 to 2400)	0.77 (0.62 to 0.94)	1.76 (1.63 to 1.89)	<0.001	1850 (1480 to 2260)	0.74 (0.59 to 0.91)	1.69 (1.57 to 1.82)	<0.001	1960 (1570 to 2410)	0.79 (0.63 to 0.98)	1.56 (1.4 to 1.72)	<0.001
Tropical Latin America	1540 (1320 to 1770)	0.59 (0.51 to 0.67)	1.01 (0.72 to 1.3)	<0.001	1440 (1240 to 1650)	0.55 (0.48 to 0.64)	0.97 (0.82 to 1.13)	<0.001	1510 (1310 to 1730)	0.59 (0.51 to 0.67)	0.93 (0.19 to 1.68)	0.014
Caribbean	330 (240 to 420)	0.61 (0.46 to 0.78)	0.38 (0.29 to 0.48)	<0.001	2210 (1460 to 3230)	0.49 (0.33 to 0.7)	0.25 (0.15 to 0.36)	<0.001	2280 (1510 to 3300)	0.6 (0.44 to 0.76)	0.27 (-0.15 to 0.7)	0.209
North Africa and Middle East	2420 (1630 to 3540)	0.51 (0.34 to 0.74)	1.18 (1.12 to 1.24)	<0.001	10410 (8550 to 12600)	0.69 (0.57 to 0.83)	1.08 (1.03 to 1.13)	<0.001	10840 (8940 to 13210)	0.51 (0.34 to 0.73)	0.93 (0.63 to 1.23)	<0.001
South Asia	11220 (9230 to 13690)	0.72 (0.59 to 0.87)	1.5 (1.44 to 1.56)	<0.001	20950 (15630 to 27790)	0.93 (0.7 to 1.23)	1.54 (1.45 to 1.63)	<0.001	18770 (14020 to 24880)	0.73 (0.6 to 0.88)	1.6 (1.33 to 1.88)	<0.001
East Asia	26880 (19990 to 35680)	1.19 (0.89 to 1.58)	0.97 (0.8 to 1.14)	<0.001	11140 (8040 to 15660)	1.63 (1.19 to 2.29)	0.35 (0.17 to 0.53)	<0.001	11160 (8080 to 15720)	0.84 (0.64 to 1.11)	0.99 to 0.53)	0.547
Southeast Asia	12870 (9200 to 18440)	1.82 (1.31 to 2.55)	0.39 (0.35 to 0.44)	<0.001	30 (20 to 60)	0.41 (0.22 to 0.85)	0.2 (0.15 to 0.25)	<0.001	30 (20 to 70)	1.67 (1.22 to 2.35)	0.17 (0.03 to 0.31)	0.017
Oceania	40 (20 to 70)	0.43 (0.23 to 0.88)	-0.76 (-0.83 to -0.68)	<0.001	420 (170 to 920)	0.71 (0.29 to 1.7)	-0.83 (-0.9 to -0.74)	<0.001	430 (170 to 970)	0.43 (0.23 to 0.89)	1.06 to -0.71)	<0.001
Central Sub-Saharan Africa	470 (190 to 1010)	0.74 (0.29 to 1.69)	-0.74 (-0.83 to -0.66)	<0.001	1840 (1240 to 2650)	1.06 (0.72 to 1.58)	-1.19 (-1.27 to -1.12)	<0.001	1910 (1280 to 2760)	0.76 (0.3 to 1.87)	0.96 to -0.7)	<0.001
Eastern Sub-Saharan Africa	1990 (1340 to 2890)	1.08 (0.73 to 1.55)	-1.09 (-1.17 to -1.01)	<0.001	910 (720 to 1150)	1.53 (1.21 to 1.91)	-1.44 (-1.61 to -1.27)	<0.001	950 (750 to 1190)	1.14 (0.76 to 1.69)	1.27 to -1.11)	<0.001
Southern Sub-Saharan Africa	990 (780 to 1250)	1.58 (1.25 to 1.99)	-1.44 (-1.67 to -1.21)	<0.001	3070 (2210 to 4140)	1.54 (1.13 to 2.05)	-1.32 (-1.45 to -1.18)	<0.001	3200 (2330 to 4300)	1.63 (1.29 to 2.03)	1.59 to -1.18)	<0.001
Western Sub-Saharan Africa	3340 (2380 to 4510)	1.56 (1.14 to 2.1)	-1.31 (-1.45 to -1.18)	<0.001	4910 (3530 to 6700)	0.95 (0.69 to 1.29)	-0.94 (-1.03 to -0.86)	<0.001	5120 (3700 to 7020)	1.66 (1.22 to 2.19)	-0.93 (-1.09 to -0.76)	<0.001
Sociodemographic Index												
Low SDI	5310 (3800 to 7260)	0.97 (0.7 to 1.33)	-0.88 (-0.97 to -0.8)	<0.001	11130 (8890 to 14390)	0.75 (0.6 to 0.97)	1.03 to 0.86)	<0.001	11580 (9280 to 14970)	1.02 (0.74 to 1.4)	1.09 to 0.76)	<0.001
Low-middle SDI	12040 (9610 to 15440)	0.79 (0.63 to 1.02)	0.93 (0.89 to 0.97)	<0.001			0.9 (0.85 to 0.94)	<0.001		0.8 (0.64 to 1.02)	0.89 (0.7 to 1.09)	<0.001

Middle SDI	34290 (26800 to 43890)	1.22 (0.96 to 1.55)	0.96 (0.89 to 1.04)	<0.001	29130 (22880 to 36860)	1.05 (0.84 to 1.32)	0.61 (0.53 to 0.69)	<0.001	28330 (22390 to 35630)	1.04 (0.83 to 1.29)	0.35 (0.18 to 0.52)	<0.001
High-middle SDI	24460 (19550 to 29820)	1.23 (0.99 to 1.5)	0 (-0.08 to 0.09)	0.963	19600 (15810 to 23680)	0.98 (0.79 to 1.18)	-0.37 (-0.47 to 0.26)	<0.001	18540 (15110 to 22320)	0.92 (0.76 to 1.11)	-0.58 (-0.83 to 0.32)	<0.001
High SDI	55840 (46490 to 65540)	2.82 (2.37 to 3.32)	1.1 (1.05 to 1.16)	<0.001	34690 (28970 to 40960)	1.7 (1.42 to 1.99)	0.56 (0.51 to 0.62)	<0.001	28570 (23770 to 33860)	1.36 (1.13 to 1.61)	0.27 (0.06 to 0.48)	0.011

Abbreviation: APC: annual percent change; ASIR: age-standardized incidence rate; ASDR: age-standardized death rate; ASPR: age-standardized prevalence rate; CI: confidence interval; SDI: sociodemographic index; UI: uncertainty interval

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Supplementary Material 1: Overview of the Global Burden of Disease Methodology

1. Overview

The Global Burden of Disease (GBD) study in 2021 presents data on deaths and causes of death across 204 countries and territories, using a uniform methodology. For analysis purposes, the methodology designated below was adopted from the Global Burden of Disease Study 2021.

The Global Burden of Disease study 2021 employs a variety of data sources, including surveys, census records, vital statistics, and health-related databases, to calculate mortality rates. This data is available via the Global Health Data Exchange (GHDx) citation tool, found at <http://ghdx.healthdata.org/>. Here, users can explore and retrieve GHDx records, and export metadata and citations as CSV files. Additionally, the GBD offers interactive visualizations of its findings online at <https://vizhub.healthdata.org/gbd-compare/>, which includes a comprehensive range of health metrics. The essential summary results of GBD 2021, particularly those related to mortality, are available for download in a tabular format through the GBD's data download tool at <http://ghdx.healthdata.org/gbd-results-tool>. To access these files, users are required to submit their email address, after which they will be provided with a link to download the data once it is ready.

2. Causes of Death Database

Data sources for causes of death were derived from vital registration systems, verbal autopsies, and other surveillance systems spanning from 2000-2021. The cause of death (CoD) data in the Global Burden of Disease study is harmonized using the International Classification of Diseases (ICD) versions 9 and 10 coding system. This data is then consolidated into a single database, which is used to produce estimates of mortality specific to cause, differentiated by sex, year, age, and geographical region. The CoD database incorporates multiple types of data sources, including vital registration (VR), verbal autopsy (VA), sibling histories, and surveys/censuses. For countries with comprehensive VR systems, additional data sources are generally not necessary. However, given that less than half of the world's population has deaths documented in VR systems, alternative data sources are critical to ensure a complete estimation of mortality. Consequently, in countries where VR systems are not fully developed, vital statistics regarding causes of death are often augmented with these alternative types of data. The data inputs utilized to create the estimates can be accessed at <http://ghdx.healthdata.org/gbd-2021/data-input-sources>.

The main source for Cause of Death (CoD) data in the Global Burden of Disease study is the WHO Mortality Database. This database gathers information provided by individual countries, sourced from their respective official mortality records. These CoD records are typically assigned to the most specific categories possible. However, in some instances, they are categorized into broader cause groups according to various International Classification of Diseases (ICD) tabulation lists, such as the ICD-9 Basic Tabulation List, ICD-10 Mortality Tabulation, Russia Tabulation, and India Medical Certification of Cause of Death. In countries lacking comprehensive Vital Registration (VR) systems, Verbal Autopsy (VA) studies are employed. These studies involve trained interviewers collecting data from the deceased's relatives through standardized questionnaires to ascertain the cause of death. Additionally, sample registration systems, as seen in countries like Indonesia and India, are also increasingly being used. VA data are notably diverse, reflecting the variety in instruments used, the range of causes listed (from single causes to complete ICD cause lists), methods for assigning CoD, recall periods, and age groups targeted. Cultural nuances can also influence how certain questions are interpreted. When aligning these causes with the GBD's cause list, the validity of CoD must be considered. VAs are generally less precise for causes that require medical verification, such as diabetes, compared to more straightforward causes like road injuries or homicides.

3. Steps in Data Input

Step 1: Standardise input data

The Cause of Death (CoD) database in the Global Burden of Disease study was compiled using a range of formats such as mortality databases, literature reviews, and various reports. These data sources were required to fulfill specific criteria, including having an adequate number of death cases within the population and a comprehensive list of causes. The process of refining this data is intricate and varies with the type of data source. For instance, data derived from Vital Registration (VR) microdata generally needs less modification to fit into a standardized format, including details like location, age, sex, year, and ICD-coded cause of death. After the data is processed and standardized, it receives unique identifiers for linking to the Global Health Data Exchange (GHDx) and for proper citation purposes. The next step involves categorizing the data into combined sex and age groups, which is essential for the process of sex-age disaggregation. Additionally, the documentation from these sources undergoes a thorough review process. This review is crucial to confirm whether the data accurately represents the entire population of a location or if it reflects just a subset within that region. Diagnostics were also reviewed at the final stage to avoid sending cleaning errors downstream. All death totals were compared with the sum of cause-specific deaths to ensure that all observed deaths were accounted for and the sample size was complete.

The Cause of Death (CoD) information from tabulated Vital Registration (VR) data was organized into aggregated groups for analysis. Some of these groups could be directly correlated to specific causes in the Global Burden of Disease (GBD) study, while others were less informative and couldn't be mapped directly to GBD causes. These aggregated causes were then further divided and mapped to more detailed causes or targets, based on their categorization within the International Classification of Diseases (ICD) groupings. To address data gaps, the study utilized the proportions of deaths from nearby countries within the same super-region. This approach was based on the observation that countries within a super-region often exhibit similar CoD trends. In cases where there was a lack of detailed ICD information for any cause or demographic group, global proportions were employed. This method ensured a more comprehensive and representative analysis of the CoD data, particularly in regions where specific details were missing or incomplete.

Step 2: Map to GBD cause list

In the Global Burden of Disease (GBD) study 2021, a total of 439 mapping tools were employed to align the cause list from the collected data with the cause list used in the GBD. Prominent among these mapping tools were those designed for the International Classification of Diseases, Ninth Revision (ICD9) and Tenth Revision (ICD10) Vital Registration (VR) data. These widely accepted mappings played a crucial role in standardizing the data. This alignment through mapping was essential for enabling comparisons across different data sources and demographic groups, ensuring consistency and accuracy in the analysis and interpretation of the data.

Step 3: Split age-sex groups

Certain data sources, such as VA studies, provided death information for various age groups with different intervals. To ensure consistency, these age intervals were mapped to the standardized age groups used in the GBD. In cases where the input source reported deaths due to impossible causes for a specific sex and age group, the data were redistributed proportionally to all causes to maintain accuracy and coherence in the estimates.

Step 4: Redistribute

To enhance the consistency of Cause of Death (CoD) data, it is essential to redistribute uninformative codes, commonly referred to as garbage codes. These garbage codes, such as "heart failure" or "ill-defined cancer site," should not be considered as the underlying cause of death. To achieve this, a redistribution process is conducted, where deaths assigned to garbage codes or redistribution targets are reanalyzed. Regression analyses are performed separately for each target group and sex, considering country, year, age, and sex as the key factors for the redistribution packages.

Step 5: Correct post-redistribution problems

During this phase, the data underwent a thorough review to verify the appropriateness of the cause list based on the original data source and CoD assignment. Two main corrections were implemented: 1) Causes that resulted from overly precise targeting in the redistribution process were grouped together under their parent causes to ensure a more reasonable and accurate cause list. 2) A "bridge map" was conducted for specific sources to ensure that they did not include causes that could not be reliably determined using the methods applied. This step aimed to enhance the reliability and consistency of the data.

Step 6: Drop VR country-years or mark them as non-representative

Lozano and colleagues describe the negative impact of low-completeness VR data on CoD modelling for GBD 2010⁴. For GBD 2021, VR location-years with completeness less than 50% were dropped, and completeness between 50-69% was marked as non-representative. Moreover, any country-year with multiple mortalities registered to major garbage codes greater than 50% of the registered mortality was dropped.

Step 7: Aggregate causes

In this stage, the cause list was structured hierarchically into four levels. At the top level (Level 1), deaths were classified into three broad groups: "communicable, maternal, neonatal, nutritional diseases", "non-communicable diseases", and "injuries". Within the Level 1 group of non-communicable diseases, there was a Level 2 cause called "diabetes and kidney diseases", which aggregated the Level 3 causes "Diabetes mellitus" and "chronic kidney disease". For example, "Diabetes mellitus" further aggregated the Level 4 causes "Diabetes mellitus type 1" and "Diabetes mellitus type 2", while "chronic kidney disease" aggregated several Level 4 causes, including "chronic kidney disease due to diabetes type 1", "chronic kidney disease due to diabetes type 2", "Hypertensive chronic kidney disease", "glomerulonephritis chronic kidney disease", and "other chronic kidney disease". In this hierarchical structure, the mortality estimate for a parent cause includes the sum of deaths due to both the parent cause itself and any Level 4 sub-causes under that specific category³.

Step 8: Application of noise reduction algorithm

Bayesian noise reduction algorithm was used to deal with zero counts in VR and VA for a specific age group in a specific year. Here, we assume a normal prior and a normal data likelihood. Estimating normal prior for the given list of countries was done by running a Poisson regression to estimate the number of deaths due to a specific cause and sex with dummy variables for year and age.

Step 9: Identify outliers in the cause of death

As death rates for CoD tend to have a stable age pattern that does not change rapidly over time in a large population, it is fair to assume a relatively stable pattern in death rate for all causes. Rare exceptions to this include epidemic diseases and specific types of injuries. These outliers have been corrected using the noise reduction process as mentioned in step 8³. Identifying outliers occurs before the models' finalisation for each cause. This is based on the judgement of the modeller and senior faculty, and these outlier decisions are reversible and may be revisited³.

4. Causes of Death Modelling Methods

To estimate cause of mortality, GBD utilizes the Cause of Death Ensemble model (CODEm), which combines results from different statistical models weighted based on the out-of-sample predictive validity. The CODEm approach involves four essential components. Firstly, all relevant data sources are collected and utilized in the modeling process, even if they vary in quality, as they provide valuable information about the epidemiological process. Secondly, multiple plausible models are employed to establish well-documented associations in the estimates. By using a diverse set of individual models to create a predictive ensemble model, CODEm has demonstrated superior performance compared to using a single model, not only in cause of death estimation but also in other prediction applications. Third, the out-of-sample predictive validity is assessed for all individual models, which are then ranked for use in the ensemble modelling stage. Fourth, differently weighted combinations of individual models are examined to select the ensemble model with the highest out-of-sample predictive validity.

Various plausible statistical models were developed for each cause of death, considering that multiple factors may co-vary with each cause. In the CODEm framework, four groups of statistical models are used: 1) linear mixed effects regression (LMER) models of the natural log of cause-specific death rates, 2) LMER models of the logit of cause fraction, 3) spatiotemporal Gaussian process regression (ST-GPR) models of the natural logarithm of cause-specific death rates, and 4) ST-GPR models of the logit of cause fraction. These component models are weighted based on their predictive validity rank, and ensemble estimates are determined using these weights.

After the weighting scheme is decided, 1000 draws are created for the final ensemble, with the number of draws contributed by each model proportional to its weight. Mortality estimates were scaled with other causes of death to 100% of all-cause death estimates within each age, sex, year and location. The estimate for each mortality cause is the mean of 1000 draws from the set best performing models⁷. 95% uncertainty intervals (UIs) were calculated for all estimates to reflect the 2.5th and 95th percentile values of the 1000 draws. Disability-adjusted life years (DALYs) were estimated by the summation of years of life lost and years lost due to disability, which serves to quantify the extent of health loss related to specific diseases. Years of life lost were obtained by multiplying the estimated number of deaths by age with a standard life expectancy. In contrast, the multiplication of prevalence computed years lost due to disability by a disability weight, ranging from 0 to 1, where 0 is a state of full health, and 1 is death⁸. Age-standardized rates per 100,000 population were also derived using the direct method to the GBD 2021 population estimate with five-year age groups³. All estimates were reported with the corresponding 95% UIs.

5. Sociodemographic Index

The Sociodemographic Index (SDI) was utilized to assess the development level of 204 countries and territories, with indicators scaled from 0 (lowest) to 1 (highest). These countries were then grouped into quintiles based on their SDI values, categorizing them as high, high-medium, middle, middle-low, and low levels of development. This stratification allowed for the comparison of age-standardized death rates related to diseases across countries with varying levels of development. The quality of data in the GBD database relied on the data provided by each country included in the study. Prevalence estimates for disease burden in the GBD were presented with a 95% uncertainty interval (UI), indicating the true value of a parameter with 95% probability. The UIs take into account the variance in parameter estimation and uncertainties related to data collection, model selection, and other aspects of the estimation process.

6. GBD World Population Age Standard

The GBD world population age standard was used to derive the age-standardized populations in the GBD data. For all nationwide locations with a population greater than 5 million in 2021, we utilised the non-weighted mean of 2021 age-specific proportional distributions from the GBD 2021 population estimates to generate an updated standard population age structure.

Supplementary Table 1: Sociodemographic index in 2021 from GBD 2021
[https://doi.org/10.1016/S0140-6736\(24\)00757-8](https://doi.org/10.1016/S0140-6736(24)00757-8)

Location	2021
Global	0.66582097
Central Europe, eastern Europe, and central Asia	0.76946635
Central Asia	0.67516398
Armenia	0.70183319
Azerbaijan	0.69485127
Georgia	0.7324736
Kazakhstan	0.7251445
Kyrgyzstan	0.60397933
Mongolia	0.61782156
Tajikistan	0.54151119
Turkmenistan	0.68216078
Uzbekistan	0.66282189
Central Europe	0.79624445
Albania	0.70684979
Bosnia and Herzegovina	0.72307789
Bulgaria	0.76815094
Croatia	0.79834103
Czechia	0.82845043
Hungary	0.79075477
Montenegro	0.79580058
North Macedonia	0.7506297
Poland	0.81204281
Romania	0.76845386
Serbia	0.79241629
Slovakia	0.81061053
Slovenia	0.84243073
Eastern Europe	0.80285101
Belarus	0.78448471
Estonia	0.84491779
Latvia	0.83066352
Lithuania	0.85648405
Moldova	0.73221488
Russia	0.808536
Ukraine	0.76077391
High income	0.85188481
Australasia	0.84551406
Australia	0.84425281
New Zealand	0.8494425
High-income Asia Pacific	0.876767
Brunei	0.81023437
Japan	0.87124181
Aichi	0.88304884
Akita	0.83224902
Aomori	0.82834421
Chiba	0.86129264
Ehime	0.84350171
Fukui	0.85814258
Fukuoka	0.85834771
Fukushima	0.84094147
Gifu	0.85334719
Gunma	0.86111136
Hiroshima	0.8699086
Hokkaido	0.84374398
Hyogo	0.86817016

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Ibaraki	0.85880457
Ishikawa	0.85937894
Iwate	0.83497989
Kagawa	0.85781836
Kagoshima	0.83204731
Kanagawa	0.88265439
Kochi	0.83490616
Kumamoto	0.83453659
Kyoto	0.87601835
Mie	0.86056119
Miyagi	0.85888657
Miyazaki	0.82658986
Nagano	0.85857784
Nagasaki	0.82921388
Nara	0.8516522
Niigata	0.8451521
Oita	0.84928244
Okayama	0.86256022
Okinawa	0.82180305
Osaka	0.87640925
Saga	0.8349259
Saitama	0.85637105
Shiga	0.87432337
Shimane	0.83867226
Shizuoka	0.86545045
Tochigi	0.8611865
Tokushima	0.85748626
Tokyo	0.92881011
Tottori	0.83595696
Toyama	0.86518113
Wakayama	0.84703748
Yamagata	0.83793315
Yamaguchi	0.85625589
Yamanashi	0.85778285
South Korea	0.88667527
Singapore	0.85609777
High-income North America	0.86346547
Canada	0.87317088
Greenland	0.82821034
USA	0.86244835
Alabama	0.82560514
Alaska	0.8575246
Arizona	0.84673287
Arkansas	0.81770902
California	0.87021505
Colorado	0.87665477
Connecticut	0.90310756
Delaware	0.86836623
Washington, DC	0.90596476
Florida	0.86197928
Georgia	0.84656427
Hawaii	0.86954692
Idaho	0.83651792
Illinois	0.8791878
Indiana	0.84285983
Iowa	0.86405652

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Kansas	0.8593838
Kentucky	0.82132538
Louisiana	0.82534646
Maine	0.8657542
Maryland	0.8892257
Massachusetts	0.90662136
Michigan	0.86397113
Minnesota	0.88701394
Mississippi	0.81047168
Missouri	0.84816914
Montana	0.85910771
Nebraska	0.86512865
Nevada	0.84768276
New Hampshire	0.89826368
New Jersey	0.89192244
New Mexico	0.83171658
New York	0.88517687
North Carolina	0.84444531
North Dakota	0.87303178
Ohio	0.85051343
Oklahoma	0.82866324
Oregon	0.87017789
Pennsylvania	0.87241675
Rhode Island	0.88389348
South Carolina	0.83771865
South Dakota	0.85572087
Tennessee	0.83303324
Texas	0.83478328
Utah	0.85461679
Vermont	0.8899999
Virginia	0.8801199
Washington	0.87758484
West Virginia	0.81771351
Wisconsin	0.8717261
Wyoming	0.86214872
Southern Latin America	0.73598472
Argentina	0.72312297
Chile	0.77151472
Uruguay	0.71928344
Western Europe	0.84872632
Andorra	0.8694411
Austria	0.853837
Belgium	0.85365402
Cyprus	0.83563055
Denmark	0.8984242
Finland	0.85983137
France	0.83836488
Germany	0.90295709
Greece	0.79185441
Iceland	0.87636168
Ireland	0.87375385
Israel	0.80901165
Italy	0.80577353
Abruzzo	0.81684436
Basilicata	0.78401643
Calabria	0.77571305

Accepted article

Campania	0.76694337
Emilia-Romagna	0.82972471
Friuli-Venezia Giulia	0.82030206
Lazio	0.82733885
Liguria	0.82213339
Lombardia	0.82942992
Marche	0.80347318
Molise	0.7883506
Piemonte	0.80703906
Provincia autonoma d Bolzano	0.83971134
Provincia autonoma d Trento	0.82938492
Puglia	0.76398208
Sardegna	0.77279343
Sicilia	0.76308681
Toscana	0.81165411
Umbria	0.79910132
Valle d'Aosta	0.81230429
Veneto	0.80853444
Luxembourg	0.88442896
Malta	0.80158503
Monaco	0.90826283
Netherlands	0.88846426
Norway	0.91613281
Agder	0.90748954
Innlandet	0.89975406
Mere og Romsdal	0.90742629
Nordland	0.89694228
Oslo	0.94569179
Rogaland	0.91508373
Troms og Finnmark	0.9051632
Trendelag	0.91597759
Vestfold og Telemark	0.90730742
Vestland	0.91759629
Viken	0.91469281
Portugal	0.74415185
San Marino	0.88800547
Spain	0.7892837
Sweden	0.8868803
Stockholm	0.91682271
Sweden except Stockholm	0.87515115
Switzerland	0.93305911
UK	0.85900018
England	0.86143731
East Midlands	0.83585605
Derby	0.84601068
Derbyshire	0.8242381
Leicester	0.8290671
Leicestershire	0.85188895
Lincolnshire	0.82136376
Northamptonshire	0.83963536
Nottingham	0.85887136
Nottinghamshire	0.82300786
Rutland	0.85273375
East of England	0.85640792
Bedford	0.85809966
Cambridgeshire	0.88802758

Accepted article

Central Bedfordshire	0.85225452
Essex	0.84549145
Hertfordshire	0.88751072
Luton	0.83971713
Norfolk	0.83730988
Peterborough	0.83787447
Southend-on-Sea	0.82580139
Suffolk	0.84115103
Thurrock	0.81959772
Greater London	0.90486476
Barking and Dagenham	0.80732495
Barnet	0.88597606
Bexley	0.84454783
Brent	0.86016434
Bromley	0.86954533
Camden	0.93847483
Croydon	0.85206634
Ealing	0.88272888
Enfield	0.846461
Greenwich	0.84608019
Hackney	0.89294628
Hammersmith and Fulham	0.93515317
Haringey	0.87208455
Harrow	0.86001527
Havering	0.83464387
Hillingdon	0.89313813
Hounslow	0.89699458
Islington	0.92474007
Kensington and Chelsea	0.9484787
Kingston upon Thames	0.90869828
Lambeth	0.91638082
Lewisham	0.85730894
Merton	0.88773396
Newham	0.84168813
Redbridge	0.85026508
Richmond upon Thames	0.93213255
Southwark	0.91950983
Sutton	0.85842158
Tower Hamlets	0.90448814
Waltham Forest	0.8405096
Wandsworth	0.92424149
Westminster	0.93719883
North East England	0.82727303
County Durham	0.81227652
Darlington	0.83720409
Gateshead	0.83024418
Hartlepool	0.79887777
Middlesbrough	0.801471
Newcastle upon Tyne	0.87252066
North Tyneside	0.8384006
Northumberland	0.82331701
Redcar and Cleveland	0.79836982
South Tyneside	0.80107303
Stockton-on-Tees	0.83098489
Sunderland	0.81916413
North West England	0.84444382

Accepted article

Darwen	Blackburn with	0.81150374
	Blackpool	0.78992589
	Bolton	0.81417076
	Bury	0.83008916
	Cheshire East	0.88475483
	Cheshire West and Chester	0.87117793
	Cumbria	0.8434669
	Hallam	0.83618135
	Knowsley	0.81367171
	Lancashire	0.84112554
	Liverpool	0.84843784
	Manchester	0.88142914
	Oldham	0.79840629
	Rochdale	0.80206832
	Salford	0.83869917
	Sefton	0.8258419
	St Helens	0.8122146
	Stockport	0.86171971
	Tameside	0.80054689
	Trafford	0.89675378
	Warrington	0.87875621
	Wigan	0.80685214
	Wirral	0.81931629
	South East England	0.8760666
	Bracknell Forest	0.89100286
Hove	Brighton and	0.8982572
	Buckinghamshire	0.88878524
	East Sussex	0.83959479
	Hampshire	0.87285
	Isle of Wight	0.82639983
	Kent	0.84534539
	Medway	0.82066784
	Milton Keynes	0.88717834
	Oxfordshire	0.89847693
	Portsmouth	0.86587693
	Reading	0.90587359
	Slough	0.87855725
	Southampton	0.86134908
	Surrey	0.9048594
	West Berkshire	0.89775701
	West Sussex	0.86479215
	Windsor and Maidenhead	0.91581805
	Wokingham	0.91165875
	South West England	0.86146702
	Bath and North East Somer	0.89543536
	Bournemouth	0.87046477
	Bristol, City of	0.89704187
	Cornwall	0.83876856
	Devon	0.8553761
	Dorset	0.85161514
	Gloucestershire	0.8718063
	North Somerset	0.85901767
	Plymouth	0.84330754
	Poole	0.8634943
	Somerset	0.84340431
	South Gloucestershire	0.88498476

Accepted article

Swindon	0.86754591
Torbay	0.81303848
Wiltshire	0.85946824
West Midlands	0.83586514
Birmingham	0.8380669
Coventry	0.84861807
Dudley	0.80416452
Herefordshire, County of	0.84631047
Sandwell	0.7857223
Shropshire	0.84321876
Solihull	0.87207823
Staffordshire	0.82832024
Stoke-on-Trent	0.79824252
Telford and Wrekin	0.82734156
Walsall	0.79252944
Warwickshire	0.86667286
Wolverhampton	0.81238984
Worcestershire	0.8436113
Yorkshire and the Humber	0.83745888
Barnsley	0.78926182
Bradford	0.8159859
Calderdale	0.83786393
Doncaster	0.79561402
East Riding of Yorkshire	0.83573194
Kingston upon Hull, City of	0.79993173
Kirklees	0.82420785
Leeds	0.86876125
North East Lincolnshire	0.80483785
North Lincolnshire	0.82590487
North Yorkshire	0.85619466
Rotherham	0.80422881
Sheffield	0.85489097
Wakefield	0.80681149
York	0.88873893
Northern Ireland	0.83853194
Scotland	0.85206142
Wales	0.83427854
Latin America and Caribbean	0.64854128
Andean Latin America	0.65160246
Bolivia	0.5990108
Ecuador	0.66101705
Peru	0.66205404
Caribbean	0.64200305
Antigua and Barbuda	0.74986689
The Bahamas	0.80502067
Barbados	0.74674876
Belize	0.610229
Bermuda	0.82136542
Cuba	0.66872986
Dominica	0.74696718
Dominican Republic	0.6193882
Grenada	0.66899303
Guyana	0.65081234
Haiti	0.44827828
Jamaica	0.68326306
Puerto Rico	0.82525285

Accepted article

Saint Kitts and Nevis	0.75498705
Saint Lucia	0.67250974
Saint Vincent and the Grenadines	0.63719596
Suriname	0.63386574
Trinidad and Tobago	0.76876325
Virgin Islands	0.82183085
Central Latin America	0.6406851
Colombia	0.65544291
Costa Rica	0.70034048
El Salvador	0.56377519
Guatemala	0.53997242
Honduras	0.51303725
Mexico	0.6845753
Aguascalientes	0.68115928
Baja California	0.70408197
Baja California Sur	0.70969428
Campeche	0.66536343
Chiapas	0.56994091
Chihuahua	0.67338657
Coahuila	0.67756288
Colima	0.69911677
Durango	0.63832484
Guanajuato	0.64637431
Guerrero	0.58485047
Hidalgo	0.63347845
Jalisco	0.67599837
México	0.68158781
Mexico City	0.75984841
Michoacán de Ocampo	0.61308202
Morelos	0.67007405
Nayarit	0.65817891
Nuevo León	0.71014182
Oaxaca	0.5890419
Puebla	0.62203183
Querétaro	0.68255812
Quintana Roo	0.68106867
San Luis Potosí	0.64665151
Sinaloa	0.67716497
Sonora	0.7106796
Tabasco	0.64872802
Tamaulipas	0.68208611
Tlaxcala	0.64782243
Veracruz de Ignacio de la Llave	0.62813896
Yucatán	0.65305081
Zacatecas	0.63477366
Nicaragua	0.52395847
Panama	0.70886483
Venezuela	0.59651306
Tropical Latin America	0.65244239
Brazil	0.65304389
Acre	0.56585153
Alagoas	0.53565998
Amapá	0.63217964
Amazonas	0.60948447
Bahia	0.57739425
Ceará	0.5688657

Accepted article

Distrito Federal	0.77601684
Espírito Santo	0.67019259
Goiás	0.64093387
Maranhão	0.49892987
Mato Grosso	0.65118576
Mato Grosso do Sul	0.64753332
Minas Gerais	0.65229325
Pará	0.5821344
Paraná	0.56386815
Paraná	0.67485653
Pernambuco	0.58676422
Piauí	0.52524312
Rio de Janeiro	0.71609384
Rio Grande do Norte	0.58985482
Rio Grande do Sul	0.69333753
Rorônia	0.62485487
Roraima	0.62100557
Santa Catarina	0.7013407
São Paulo	0.7137276
Sergipe	0.59584018
Tocantins	0.60858788
Paraguay	0.6357181
North Africa and Middle East	0.65822472
North Africa and Middle East	0.65822472
Afghanistan	0.3372
Algeria	0.65950092
Bahrain	0.7530432
Egypt	0.60678709
Iran	0.6972074
Alborz	0.74830202
Ardebil	0.65863977
Bushehr	0.70841871
Chahar Mahaal and Bakhtiari	0.6779886
East Azarbaijan	0.66819323
Fars	0.71483077
Gilan	0.71231945
Golestan	0.65807753
Hamadan	0.66873482
Hormozgan	0.67033137
Ilam	0.70619493
Isfahan	0.70971684
Kerman	0.66843927
Kermanshah	0.67446847
Khorasan-e-Razavi	0.66982684
Khuzestan	0.66958791
Kohgiluyeh and Boyer-Ahmad	0.6937062
Kurdistan	0.64226169
Lorestan	0.66911829
Markazi	0.68284382
Mazandaran	0.7299299
North Khorasan	0.6516102
Qazvin	0.6876536
Qom	0.69407591
Semnan	0.72392638
Sistan and Baluchistan	0.55130598
South Khorasan	0.65312538

Accepted article

Tehran	0.77603245
West Azerbaijan	0.62711246
Yazd	0.71334428
Zarjan	0.66172913
Iraq	0.66262623
Jordan	0.72530723
Kuwait	0.84665105
Lebanon	0.74474635
Libya	0.7257714
Morocco	0.5626983
Oman	0.7733916
Palestine	0.63101167
Qatar	0.84686058
Saudi Arabia	0.81514349
Sudan	0.54194974
Syria	0.62300407
Tunisia	0.68243222
Türkiye	0.71269287
United Arab Emirates	0.84931773
Yemen	0.45037638
South Asia	0.55786466
South Asia	0.55786466
Bangladesh	0.49242088
Bhutan	0.47306238
India	0.57540165
Nepal	0.43317483
Pakistan	0.50402869
Azad Jammu & Kashmir	0.54211877
Balochistan	0.4179715
Gilgit-Balistan	0.39754999
Islamabad Capital Territory	0.69619537
Khyber Pakhtunkhwa	0.45058115
Punjab	0.52020049
Sindh	0.51257496
Southeast Asia, east Asia, and Oceania	0.6988499
East Asia	0.7257049
China	0.72162976
North Korea	0.56985483
Taiwan (province of China)	0.87474705
Oceania	0.46744513
American Samoa	0.72372753
Cook Islands	0.77910995
Fiji	0.67505163
Guam	0.8039822
Kiribati	0.52718658
Marshall Islands	0.57409113
Federated States of Micronesia	0.58753497
Nauru	0.62517783
Niue	0.72622205
Northern Mariana Islands	0.77153521
Palau	0.75404693
Papua New Guinea	0.41779744
Samoa	0.59339277
Solomon Islands	0.42836032
Tokelau	0.68642562
Tonga	0.62634994

Accepted article

Tuvalu	0.57662053
Vanuatu	0.47310071
Southeast Asia	0.6497773
Cambodia	0.47382149
Indonesia	0.65686834
Aceh	0.66955184
Bali	0.64956588
Bangka-Bellung Islands	0.64425984
Banten	0.64071299
Bengkulu	0.61387065
Gorontalo	0.56999021
Jakarta	0.79840944
Jambi	0.63956368
West Java	0.64387683
Central Java	0.61338882
East Java	0.64551738
West Kalimantan	0.58612167
South Kalimantan	0.62320608
Central Kalimantan	0.63899383
East Kalimantan	0.75929387
North Kalimantan	0.75298676
Riau Islands	0.74775431
Lampung	0.60887136
Maluku	0.58032188
North Maluku	0.56291087
West Nusa Tenggara	0.58703482
East Nusa Tenggara	0.54945119
Papua	0.64580288
West Papua	0.67512564
Riau	0.72278452
West Sulawesi	0.57565685
South Sulawesi	0.62113541
Central Sulawesi	0.61625384
Southeast Sulawesi	0.61532587
North Sulawesi	0.65046831
West Sumatra	0.66576366
South Sumatra	0.64553676
North Sumatra	0.66702565
Yogyakarta	0.67542992
Laos	0.48913609
Malaysia	0.74252383
Maldives	0.65088663
Mauritius	0.71826045
Myanmar	0.53390084
Philippines	0.65121933
Abra	0.64654691
Agusan Del Norte	0.60936062
Agusan Del Sur	0.54241367
Aklan	0.64007481
Albay	0.6398634
Antique	0.57433252
Apayao	0.61105972
Aurora	0.61450607
Basian	0.54682572
Bataan	0.65690151
Batanes	0.68230486

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Batangas	0.68441127
Benguet	0.71350365
Biliran	0.64405335
Bohol	0.60378059
Bukidnon	0.55051685
Bulacan	0.70752202
Cagayan	0.63506809
Camari nes Norte	0.59428649
Camari nes Sur	0.63255484
Camiguin	0.6324379
Capiz	0.56808796
Catanduanes	0.60947869
Cavite	0.72678437
Cebu	0.65607636
Cotabato (North Cotabato)	0.55377082
Davao de Oro	0.53441776
Davao Del Norte	0.63810495
Davao Del Sur	0.66000147
Davao Occidental	0.5814625
Davao Oriental	0.54667344
Dinagat Islands	0.62078136
Eastern Samar	0.49567523
Guimaras	0.60924067
Iligao	0.59712822
Ilocos Norte	0.68692159
Ilocos Sur	0.67227776
Iloilo	0.67291782
Isabela	0.63731965
Kalinga	0.57819828
La Union	0.66096366
Laguna	0.70092466
Lanao Del Norte	0.58250552
Lanao Del Sur	0.53070277
Leyte	0.61094256
Maguindanao	0.51129551
Marinduque	0.55186124
Masbate	0.45410809
Misamis Occidental	0.5857211
Misamis Oriental	0.66020852
Mountain Province	0.52052229
National Capital Region	0.75174222
Negros Occidental	0.60317817
Negros Oriental	0.57608402
Northern Samar	0.52220911
Nueva Ecija	0.6501666
Nueva Vizcaya	0.61619295
Occidental Mindoro	0.46883504
Oriental Mindoro	0.60323574
Palawan	0.53000513
Pampanga	0.69599928
Pangasinan	0.66575335
Quezon	0.62856238
Quirino	0.57149884
Rizal	0.7094079
Romblon	0.53239065
Samar (Western Samar)	0.5255082

Accepted article

Sarangani	0.58386943
Siquijor	0.6007397
Sorsogon	0.60025457
South Cotabato	0.63208137
Southern Leyte	0.60021125
Sultan Kudarat	0.52067608
Sulu	0.48353585
Surigao Del Norte	0.6274452
Surigao Del Sur	0.58874071
Tarlac	0.65064553
Tawi-Tawi	0.53581204
Zambales	0.6508406
Zamboanga Del Norte	0.53718454
Zamboanga Del Sur	0.63090878
Zamboanga Sibugay	0.54986602
Seychelles	0.73015077
Sri Lanka	0.70153494
Thailand	0.68254793
Timor-Leste	0.44486782
Viet Nam	0.62793372
Sub-Saharan Africa	0.4585873
Central sub-Saharan Africa	0.47225565
Angola	0.45372195
Central African Republic	0.30916789
Congo (Brazzaville)	0.58307524
DR Congo	0.38317985
Equatorial Guinea	0.65785746
Gabon	0.63469139
Eastern sub-Saharan Africa	0.40972098
Burundi	0.28937436
Comoros	0.47597889
Djibouti	0.48795837
Eritrea	0.40386394
Ethiopia	0.3588233
Addis Ababa	0.6947296
Afar	0.28877341
Amhara	0.32045319
Benishangul-Gumuz	0.32022848
Dire Dawa	0.54066885
Gambella	0.45822008
Harari	0.53816876
Oromia	0.33581502
Somali	0.26825381
Southern Nations, Nationalities	0.35552153
Tigray	0.38218351
Kenya	0.52376808
Baringo	0.51488321
Bomet	0.52936785
Bungoma	0.49872518
Busia	0.47766502
Elgeyo Marakwet	0.52629704
Embu	0.5475554
Garissa	0.32106827
Homa Bay	0.49387181
Isiolo	0.43396683
Kajiado	0.50696971

Accepted article

Kakamega	0.509529
Kericho	0.52357336
Kiambu	0.59311015
Kilifi	0.48600916
Kirinyaga	0.54301445
Kisii	0.54460484
Kisumu	0.54440932
Kitui	0.47474946
Kwale	0.47513821
Lakipia	0.57571177
Lamu	0.50378649
Machakos	0.54803579
Makueni	0.51256894
Mandera	0.23826383
Marsabit	0.40018158
Meru	0.50821615
Migori	0.47280301
Mombasa	0.59638778
Murang'a	0.55086949
Nairobi	0.68372244
Nakuru	0.5700454
Nandi	0.51627871
Narok	0.45910307
Nyamira	0.58926708
Nyandarua	0.57610986
Nyeri	0.57878748
Samburu	0.3783124
Siaya	0.4765244
Taita Taveta	0.54098098
Tana River	0.38284535
Tharaka Nithi	0.52986011
Trans Nzoia	0.54850455
Turkana	0.37343424
Uasin Gishu	0.56734559
Vihiga	0.52308879
Wajir	0.25205011
West Pokot	0.4441209
Madagascar	0.40024694
Malawi	0.38455383

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Supplementary Table 2: Prevalence, age-standardized prevalence rates, temporal progression of alcohol use disorder from 2000 to 2021, classified by country/ territory

Country	2000 Prevalence (95% UI)	2000 ASPR (95% UI)	2021 Prevalence (95% UI)	2021 ASPR (95% UI)	2000 to 2021 APC (95% CI)	p
Afghanistan	52180 (41810 to 66590)	449.49 (366.66 to 551.76)	104470 (83760 to 130230)	434.94 (357.96 to 520.06)	-0.16 (-0.19 to -0.12)	<0.001
Albania	49440 (40400 to 59520)	1606.02 (1319.77 to 1927.45)	45210 (38010 to 54410)	1436.67 (1190.05 to 1743.22)	-0.5 (-0.6 to -0.4)	<0.001
Algeria	119030 (93770 to 150040)	412.51 (332.12 to 507.21)	170230 (138220 to 206280)	379.68 (311.48 to 457.06)	-0.39 (-0.46 to -0.31)	<0.001
American Samoa	440 (360 to 540)	849.42 (702.78 to 1027.84)	410 (350 to 490)	835.22 (709.35 to 988.57)	-0.08 (-0.12 to -0.03)	0.001
Andorra	1580 (1280 to 1940)	2029.68 (1648.96 to 2474.32)	1820 (1530 to 2150)	1887.57 (1552.75 to 2281.66)	-0.32 (-0.43 to -0.22)	<0.001
Angola	115410 (93210 to 141440)	1129.81 (926.66 to 1346.11)	249380 (205130 to 304540)	1101.47 (926.23 to 1310.31)	-0.12 (-0.14 to -0.1)	<0.001
Antigua and Barbuda	1750 (1480 to 2030)	2269.68 (1939.46 to 2623.95)	2510 (2150 to 2910)	2385.79 (2043.69 to 2784.12)	0.44 (0.22 to 0.67)	<0.001
Argentina	852340 (736410 to 986550)	2348.05 (2032.01 to 2715.81)	961420 (780080 to 1158310)	1960.85 (1589.81 to 2377.32)	-0.87 (-0.98 to -0.75)	<0.001
Armenia	90070 (75780 to 106170)	2655.27 (2240.85 to 3137.67)	74130 (62280 to 86270)	2140.02 (1783.44 to 2519.57)	-1.03 (-1.19 to -0.87)	<0.001
Australia	370980 (316860 to 432330)	1819.32 (1536.15 to 2138.28)	515170 (437240 to 600850)	1832.79 (1535.83 to 2176.71)	0.01 (-0.07 to 0.09)	0.803
Austria	258660 (227400 to 291520)	2912.26 (2514.68 to 3357.88)	274450 (232470 to 321160)	2659.67 (2226.94 to 3165.52)	-0.44 (-0.54 to -0.34)	<0.001
Azerbaijan	230660 (187270 to 276870)	2888.96 (2388.13 to 3401.6)	277910 (234620 to 329000)	2351.49 (1998.77 to 2768.34)	-1 (-1.23 to -0.77)	<0.001
Bahamas	6900 (5710 to 8220)	2194.93 (1851.89 to 2603.34)	9320 (7680 to 10820)	2130.98 (1765.34 to 2482.32)	0.03 (-0.17 to 0.24)	0.759
Bahrain	3450 (2700 to 4350)	491.6 (396.25 to 610.86)	8260 (6320 to 10320)	440.36 (351.35 to 538.79)	-0.52 (-0.54 to -0.5)	<0.001
Bangladesh	1357610 (1078460 to 1685910)	1275.98 (1030.61 to 1555.09)	1919250 (1525500 to 2398750)	1146.1 (919.16 to 1420.28)	-0.55 (-0.65 to -0.45)	<0.001
Barbados	4630 (3890 to 5460)	1626.69 (1351.93 to 1922.81)	5370 (4520 to 6330)	1528.1 (1270.36 to 1822.18)	-0.08 (-0.31 to 0.16)	0.524
Belarus	446310 (383870 to 498900)	3786.51 (3249.34 to 4228.84)	419020 (354480 to 476060)	3468.55 (2944.12 to 3973.99)	-0.44 (-0.5 to -0.38)	<0.001
Belgium	292690 (245830 to 336810)	2652.46 (2188.13 to 3115.2)	310670 (262440 to 366410)	2463.88 (2042.65 to 2971.05)	-0.35 (-0.44 to -0.26)	<0.001
Belize	3460 (2800 to 4120)	1772.57 (1463.64 to 2077.74)	7610 (6320 to 8880)	1803.62 (1512.99 to 2077.58)	0.29 (0.03 to 0.55)	0.027
Benin	23630 (19110 to 29240)	509.66 (419.14 to 616.75)	49940 (40230 to 61130)	514.88 (421.11 to 620.25)	0.05 (0 to 0.1)	0.054
Bermuda	1120 (920 to 1330)	1487.8 (1231.56 to 1783.74)	1090 (910 to 1270)	1404.47 (1135.82 to 1686.19)	-0.05 (-0.28 to 0.19)	0.695
Bhutan	12320 (9900 to 15110)	2314.03 (1886.84 to 2771.17)	21980 (15020 to 29180)	2281.84 (1890.63 to 2715.74)	-0.05 (-0.39 to 0.29)	0.772
Bolivia (Plurinational State of)	105640 (88820 to 127520)	1577.26 (1306.01 to 1880.01)	159500 (133200 to 188380)	1385.81 (1163.42 to 1613.59)	-0.39 (-0.68 to -0.11)	0.01
Bosnia and Herzegovina	109840 (94390 to 126670)	2395.93 (2048.28 to 2777.77)	73960 (62360 to 86920)	1746.31 (1437.45 to 2081.44)	-1.43 (-1.63 to -1.22)	<0.001
Botswana	32230 (25520 to 40160)	2428.15 (1953.21 to 2948.86)	54390 (42880 to 65300)	2243.15 (1791.13 to 2669.38)	-0.45 (-0.54 to -0.36)	<0.001
Brazil	5492390 (4686010 to 6349740)	3163.05 (2717.75 to 3634.78)	6310960 (5465120 to 7237820)	2526.15 (2198.31 to 2893.02)	-0.98 (-1.2 to -0.76)	<0.001
Brunei Darussalam	2980 (2310 to 3780)	894.08 (715.73 to 1107.22)	4380 (3450 to 5400)	834.94 (669.9 to 1018.99)	-0.31 (-0.35 to -0.28)	<0.001
Bulgaria	198870 (170750 to 225300)	2065.82 (1776.06 to 2350.87)	141650 (116970 to 164710)	1703.87 (1404.17 to 2000.09)	-0.82 (-1.04 to -0.6)	<0.001
Burkina Faso	44120 (35710 to 53840)	527.45 (432.18 to 634.47)	88910 (72320 to 107150)	554.18 (459.88 to 649.36)	0.23 (0.21 to 0.25)	<0.001
Burundi	60250 (48900 to 72860)	1401.01 (1165.44 to 1645.36)	133060 (105620 to 162210)	1381.11 (1135.68 to 1634.65)	-0.07 (-0.19 to 0.06)	0.322
Côte d'Ivoire	70440 (57130 to 87780)	557.11 (461.54 to 660.1)	119270 (96760 to 144710)	550.67 (463.12 to 650.39)	-0.05 (-0.08 to -0.03)	<0.001
Cabo Verde	1720 (1410 to 2120)	482.52 (394.21 to 581.38)	2890 (2370 to 3470)	496.19 (413.95 to 586.3)	0.13 (0.1 to 0.16)	<0.001
Cambodia	84890 (68370 to 104680)	844.13 (697.59 to 1010)	138900 (112640 to 168660)	810.81 (662.87 to 975.35)	-0.18 (-0.2 to -0.17)	<0.001
Cameroon	57920 (47040 to 71760)	533.9 (440.44 to 642.23)	130250 (105000 to 159210)	539.72 (443.85 to 641.34)	0.05 (0.04 to 0.07)	<0.001
Canada	555150 (474220 to 653080)	1744.19 (1464.12 to 2100.27)	712290 (596890 to 830660)	1775.84 (1459.97 to 2123.8)	0.09 (0.08 to 0.1)	<0.001
Central African Republic	30460 (24700 to 37170)	1185.68 (985.52 to 1425.2)	47960 (38570 to 57420)	1155.17 (948.59 to 1355.63)	-0.13 (-0.18 to -0.08)	<0.001
Chad	28210 (22830 to 34770)	509.86 (417.81 to 611.49)	58850 (47540 to 72790)	526.18 (431.65 to 630.48)	0.15 (0.12 to 0.19)	<0.001
Chile	497650 (418550 to 576030)	3107.8 (2612.91 to 3594.55)	537970 (444210 to 634940)	2576.7 (2111.72 to 3071.83)	-0.89 (-1.05 to -0.72)	<0.001
China	17063380 (14248570 to 20043810)	1198.37 (1013.06 to 1396.51)	19429780 (16642110 to 22774670)	1173.55 (987.33 to 1371.62)	-0.09 (-0.16 to -0.02)	0.009
Colombia	885250 (708600 to 1107130)	2308.88 (1878.78 to 2856.01)	1198660 (1002380 to 1436670)	2210.27 (1849.99 to 2652.72)	-0.23 (-0.33 to -0.14)	<0.001
Comoros	5180 (4160 to 6430)	1207.98 (993.98 to 1454.42)	8240 (6750 to 9930)	1195.65 (1003.62 to 1407.86)	-0.08 (-0.22 to 0.05)	0.224
Congo	28520 (22540 to 34580)	1182.23 (960.08 to 1416.69)	53810 (44010 to 64440)	1154.79 (949.64 to 1353.52)	-0.13 (-0.16 to -0.1)	<0.001
Cook Islands	200 (170 to 230)	1085.98 (904.74 to 1271)	200 (170 to 240)	1065.29 (892 to 1240.31)	-0.1 (-0.16 to -0.05)	<0.001

Costa Rica	72490 (59410 to 86800)	1916.34 (1596.71 to 2253.83)	105620 (86970 to 124880)	1990.74 (1636.55 to 2349.49)	0.1 (-0.01 to 0.21)	0.084
Croatia	135760 (117680 to 156000)	2382.11 (2064.32 to 2728.5)	124660 (107490 to 143740)	2162.75 (1843.48 to 2527.66)	-0.43 (-0.51 to -0.36)	<0.001
Cuba	215320 (178850 to 256130)	1651.7 (1380.37 to 1970.14)	232970 (201850 to 265890)	1669.6 (1432.45 to 1927.18)	0.28 (0 to 0.56)	0.049
Cyprus	17430 (13850 to 21690)	1764.66 (1405.42 to 2212.38)	24280 (19410 to 30210)	1604.61 (1276.56 to 2029.94)	-0.46 (-0.55 to -0.36)	<0.001
Czechia	289250 (250540 to 333790)	2336.56 (2009.16 to 2688.41)	311100 (267600 to 352920)	2332.27 (2000.37 to 2660.01)	0.02 (-0.03 to 0.06)	0.511
Democratic People's Republic of Korea	171210 (139450 to 203760)	701.71 (572.95 to 834.84)	223140 (184410 to 264470)	729.48 (604.62 to 877.11)	0.24 (0.18 to 0.3)	<0.001
Democratic Republic of the Congo	367400 (296250 to 449310)	1036.82 (849.68 to 1242.02)	714680 (580180 to 859580)	1052.97 (856.68 to 1243.42)	0.05 (-0.03 to 0.12)	0.223
Denmark	189220 (161320 to 218310)	3040.62 (2562.71 to 3569.37)	197780 (167990 to 236600)	2877.38 (2403.91 to 3395.82)	-0.26 (-0.32 to -0.2)	<0.001
Djibouti	7000 (5600 to 8570)	1406.6 (1159.39 to 1675.67)	16230 (13250 to 20070)	1404.62 (1175.82 to 1691.69)	-0.06 (-0.12 to 0)	0.04
Dominica	1470 (1220 to 1750)	2213.39 (1849.52 to 2634.69)	1660 (1360 to 1940)	2219.98 (1814.79 to 2609.62)	0.19 (-0.01 to 0.39)	0.057
Dominican Republic	120140 (96750 to 144260)	1528.01 (1245.85 to 1813.72)	171800 (141410 to 202520)	1500.96 (1240.9 to 1761.01)	0.11 (-0.28 to 0.51)	0.575
Ecuador	178340 (146970 to 210420)	1629.05 (1365.69 to 1884.3)	225170 (186570 to 262760)	1230.39 (1030.07 to 1432.32)	-0.9 (-1.87 to 0.08)	0.073
Egypt	232440 (182440 to 292960)	371.43 (294.8 to 464.62)	354850 (277990 to 441820)	356.16 (283.36 to 440.64)	-0.2 (-0.24 to -0.16)	<0.001
El Salvador	208750 (166680 to 247010)	4257.97 (3419.5 to 4996.11)	251180 (212230 to 285990)	3917.28 (3312.16 to 4461.73)	-0.44 (-0.48 to -0.39)	<0.001
Equatorial Guinea	4670 (3770 to 5720)	1071.17 (883.53 to 1294.89)	13010 (10280 to 16210)	1083.39 (885.52 to 1283.78)	0.06 (0.04 to 0.07)	<0.001
Eritrea	40020 (31950 to 49690)	1405.07 (1152 to 1670.52)	77740 (62900 to 96390)	1429.23 (1184.6 to 1703.9)	0.03 (-0.02 to 0.07)	0.226
Estonia	45810 (40570 to 51070)	2774.37 (2449.95 to 3107.92)	37560 (31200 to 42450)	2351.03 (1949.24 to 2672.1)	-0.77 (-0.82 to -0.73)	<0.001
Eswatini	15670 (12780 to 19330)	2166.2 (1779.83 to 2615.58)	21580 (17250 to 26240)	2137.61 (1754.62 to 2566.66)	-0.12 (-0.22 to -0.03)	0.008
Ethiopia	1027340 (883000 to 1202910)	2388.82 (2063.78 to 2725.97)	1900830 (1617310 to 2235140)	2337.23 (2030.41 to 2691.35)	-0.06 (-0.12 to 0.01)	0.1
Fiji	5230 (4120 to 6620)	661.67 (532.03 to 829.02)	5700 (4530 to 7050)	614.44 (488.49 to 757.72)	-0.37 (-0.43 to -0.31)	<0.001
Finland	144980 (133650 to 158940)	2565.46 (2332.51 to 2869.99)	139550 (118960 to 160010)	2382.22 (1996.22 to 2792.86)	-0.34 (-0.42 to -0.26)	<0.001
France	1582870 (1339070 to 1852860)	2413.36 (2008.08 to 2882.05)	1552490 (1325340 to 1796100)	2202.99 (1846.3 to 2609.17)	-0.4 (-0.53 to -0.27)	<0.001
Gabon	11760 (9560 to 14260)	1237.77 (1023.95 to 1458.46)	18370 (15120 to 22040)	1172.55 (969.67 to 1388.96)	-0.25 (-0.29 to -0.22)	<0.001
Gambia	5020 (4040 to 6210)	508.09 (420.3 to 613.8)	9410 (7670 to 11660)	518.67 (423.26 to 624)	0.09 (0.04 to 0.14)	<0.001
Georgia	115310 (95720 to 135030)	2241.46 (1846.03 to 2633.98)	79860 (67260 to 93690)	1979.03 (1660.46 to 2352.69)	-0.64 (-0.88 to -0.41)	<0.001
Germany	2092710 (1936620 to 2260350)	2333.87 (2143.63 to 2547.5)	2022910 (1776130 to 2332500)	2105.99 (1805.17 to 2541.72)	-0.49 (-0.64 to -0.33)	<0.001
Ghana	77520 (62300 to 96320)	517.35 (421.18 to 630.8)	152540 (123850 to 184250)	529.2 (439.57 to 624.1)	0.1 (0.08 to 0.11)	<0.001
Greece	211650 (169420 to 267970)	1735.14 (1369.66 to 2225.12)	155320 (127530 to 189050)	1546.06 (1222.31 to 1945.55)	-0.54 (-0.59 to -0.48)	<0.001
Greenland	2620 (2210 to 3120)	4297.29 (3602.14 to 5076.98)	2240 (1850 to 2620)	3639.12 (3030.48 to 4326.35)	-0.8 (-0.83 to -0.76)	<0.001
Grenada	1740 (1420 to 2060)	1781.67 (1475.05 to 2086.41)	2140 (1810 to 2550)	1871.47 (1577.19 to 2218.3)	0.49 (0.22 to 0.75)	<0.001
Guam	1370 (1090 to 1660)	848.01 (684.72 to 1018.46)	1470 (1240 to 1710)	874.25 (729.46 to 1037.37)	0.06 (-0.05 to 0.17)	0.307
Guatemala	384710 (331330 to 446520)	4767.69 (4177.73 to 5478.69)	604430 (514000 to 691950)	4049.97 (3444.01 to 4623.66)	-0.84 (-0.96 to -0.72)	<0.001
Guinea	29270 (23750 to 35750)	498.99 (412.27 to 599.61)	50650 (41010 to 62080)	521.08 (431.34 to 617.67)	0.2 (0.18 to 0.22)	<0.001
Guinea-Bissau	4780 (3860 to 5910)	556.83 (462.98 to 665.59)	8480 (6800 to 10420)	558.43 (463.94 to 657.72)	0.02 (-0.01 to 0.04)	0.165
Guyana	13640 (11130 to 16560)	1972.87 (1613.81 to 2344.75)	15130 (12560 to 17500)	1966.57 (1640.51 to 2266.88)	0.19 (-0.03 to 0.42)	0.092
Haiti	127330 (103760 to 150610)	1973.19 (1632.45 to 2302.37)	223900 (181480 to 269530)	1895.85 (1559.09 to 2240.49)	0.01 (-0.21 to 0.23)	0.937
Honduras	112610 (92120 to 135150)	2435.52 (2024.89 to 2866.67)	221870 (180520 to 265600)	2454.86 (2035.31 to 2870.12)	-0.05 (-0.24 to 0.15)	0.626
Hungary	382230 (333090 to 433110)	3065.3 (2667.84 to 3483.67)	279870 (242970 to 321900)	2203.08 (1916.32 to 2564.83)	-1.51 (-1.76 to -1.27)	<0.001
Iceland	2048.34 (1681.87 to 2529)	2048.34 (1681.87 to 2529)	7770 (6400 to 9160)	2051.21 (1671.51 to 2464.51)	0.03 (-0.01 to 0.07)	0.168
India	6070 (5000 to 7410)	1704.22 (1432.29 to 2010.52)	77061810 (14812950 to 19652280)	1185.74 (1033.33 to 1361.09)	-1.72 (-1.84 to -1.59)	<0.001
Indonesia	1008890 (846640 to 1197600)	481.06 (408.59 to 564.83)	1457700 (1231450 to 1705410)	480.65 (411.64 to 561.64)	-0.03 (-0.09 to 0.04)	0.433
Iran (Islamic Republic of)	223620 (186070 to 263820)	362.24 (308.56 to 422.51)	314620 (264080 to 368340)	327.61 (278.19 to 383.4)	-0.48 (-0.51 to -0.45)	<0.001
Iraq	85160 (66110 to 110360)	388.13 (306.79 to 493.51)	146300 (114800 to 184500)	362.99 (290.59 to 452.26)	-0.33 (-0.38 to -0.28)	<0.001
Ireland	139660 (114490 to 167940)	3344.97 (2737.89 to 4030.78)	159460 (131830 to 189810)	3086.72 (2515.29 to 3762.56)	-0.36 (-0.39 to -0.33)	<0.001
Israel	55400 (44400 to 67510)	872.92 (701.99 to 1059.59)	71170 (57370 to 86730)	764.89 (614.9 to 940.77)	-0.56 (-0.73 to -0.39)	<0.001

Italy	1073970 (916610 to 1262020)	1711.56 (1444.73 to 2024.85)	955940 (824860 to 1103440)	1574.84 (1340.32 to 1864.53)	-0.36 (-0.43 to -0.3)	<0.001
Jamaica	31480 (25060 to 39710)	1243.63 (997.72 to 1533.14)	34910 (27770 to 42710)	1110.59 (887.84 to 1358.36)	-0.45 (-0.71 to -0.18)	0.001
Japan	795040 (685460 to 916360)	534.39 (457.77 to 628.26)	677300 (589730 to 765170)	480.89 (412 to 564.81)	-0.44 (-0.74 to -0.14)	0.004
Jordan	16660 (12890 to 21590)	390.49 (310.47 to 491.8)	45550 (35960 to 58050)	363.2 (290.96 to 455.86)	-0.35 (-0.43 to -0.27)	<0.001
Kazakhstan	774980 (659970 to 927100)	5134.52 (4381.85 to 6072.66)	777270 (659190 to 981280)	3895.96 (3302.65 to 4889.17)	-1.31 (-1.43 to -1.19)	<0.001
Kenya	142140 (119640 to 167710)	649.87 (562.61 to 746.67)	262920 (225010 to 307870)	645 (557.15 to 739.54)	-0.05 (-0.08 to -0.01)	0.007
Kiribati	530 (420 to 650)	713.78 (582.96 to 856.16)	780 (630 to 950)	690.14 (569.68 to 833.89)	-0.15 (-0.17 to -0.13)	<0.001
Kuwait	9410 (7090 to 12370)	429.44 (343.81 to 538.81)	21680 (16870 to 27420)	370.09 (296.4 to 452.45)	-0.7 (-0.74 to -0.66)	<0.001
Kyrgyzstan	184020 (153090 to 211820)	4327.04 (3587.01 to 4954.75)	214500 (184010 to 250690)	3310.22 (2835.45 to 3857.61)	-1.29 (-1.46 to -1.13)	<0.001
Lao People's Democratic Republic	42880 (34820 to 51770)	1036.65 (858.47 to 1225.58)	67280 (54300 to 83190)	924.94 (751.08 to 1125.58)	-0.55 (-0.57 to -0.53)	<0.001
Latvia	86390 (76170 to 96080)	3059.18 (2688.63 to 3423.44)	63540 (53450 to 73530)	2732.67 (2316.27 to 3208.19)	-0.52 (-0.69 to -0.35)	<0.001
Lebanon	13550 (10820 to 16780)	397.24 (319.24 to 489.63)	23700 (19180 to 28940)	381.01 (309.81 to 463.48)	-0.2 (-0.26 to -0.14)	<0.001
Lesotho	28460 (23000 to 34760)	2047.07 (1676.1 to 2479.79)	37480 (30840 to 45580)	2262.28 (1870.53 to 2704.47)	0.47 (0.35 to 0.59)	<0.001
Liberia	10730 (8680 to 13200)	514.33 (426.82 to 616.68)	22390 (18080 to 27290)	515.9 (423.98 to 618.07)	-0.01 (-0.09 to 0.08)	0.894
Libya	19930 (15570 to 25040)	420.18 (338.02 to 514.08)	30620 (24350 to 37470)	388.09 (313.19 to 468.34)	-0.38 (-0.4 to -0.36)	<0.001
Lithuania	138340 (120030 to 153140)	3410.5 (2946.04 to 3774.35)	85360 (73480 to 96480)	2496.18 (2159.58 to 2826.51)	-1.5 (-1.66 to -1.34)	<0.001
Luxembourg	12850 (10850 to 15060)	2614.16 (2191.87 to 3132.53)	18460 (15470 to 21830)	2478.26 (2060.82 to 2990.54)	-0.23 (-0.29 to -0.16)	<0.001
Madagascar	145760 (116700 to 179550)	1285.29 (1075.6 to 1518.42)	277200 (225910 to 336220)	1256.26 (1047.67 to 1470.37)	-0.18 (-0.24 to -0.12)	<0.001
Malawi	106620 (86320 to 129690)	1376.98 (1137.66 to 1636.39)	191710 (157440 to 236060)	1331.25 (1122.65 to 1603.11)	-0.24 (-0.3 to -0.17)	<0.001
Malaysia	133470 (106130 to 164370)	588.34 (473.21 to 714.41)	183630 (149040 to 219590)	526.34 (431.7 to 624.28)	-0.54 (-0.57 to -0.51)	<0.001
Maldives	1560 (1220 to 1960)	676.09 (539.77 to 837.18)	4740 (3620 to 6160)	703.27 (554.56 to 883.92)	0.2 (0.15 to 0.24)	<0.001
Mali	37390 (30310 to 46070)	479.96 (396.73 to 589.29)	78910 (64090 to 97370)	483.87 (398.36 to 581.18)	0.03 (0.02 to 0.05)	<0.001
Malta	7110 (5680 to 8720)	1684.47 (1323 to 2100.8)	7320 (5990 to 8800)	1608 (1293.22 to 2012.59)	-0.2 (-0.25 to -0.14)	<0.001
Marshall Islands	410 (320 to 500)	976.38 (799.14 to 1186.53)	560 (450 to 680)	1007.39 (827.82 to 1211.33)	0.13 (0.04 to 0.21)	0.005
Mauritania	9030 (7310 to 11140)	460.51 (378.67 to 553.82)	14970 (12180 to 18520)	442.02 (365.6 to 534.37)	-0.2 (-0.23 to -0.17)	<0.001
Mauritius	19530 (15920 to 23480)	1478.04 (1221.32 to 1757.02)	22060 (18990 to 25930)	1461.8 (1269.84 to 1732.37)	-0.03 (-0.06 to 0)	0.07
Mexico	1449150 (1231780 to 1688730)	1581.95 (1354.51 to 1815.7)	2003780 (1718430 to 2299300)	1457.1 (1252.15 to 1673.89)	-0.45 (-0.69 to -0.22)	<0.001
Micronesia (Federated States of)	850 (700 to 1040)	964.27 (796.76 to 1153.68)	980 (800 to 1150)	983.87 (809.24 to 1153.89)	0.09 (0.06 to 0.13)	<0.001
Monaco	580 (470 to 710)	1745.04 (1363.89 to 2180)	580 (490 to 700)	1625.61 (1300.06 to 2010.18)	-0.32 (-0.39 to -0.25)	<0.001
Mongolia	72430 (58270 to 89000)	3443.61 (2834.43 to 4151.92)	160760 (135110 to 187510)	4716.94 (3986.35 to 5453.81)	1.49 (1.3 to 1.67)	<0.001
Montenegro	12690 (10440 to 15050)	1811.63 (1490.01 to 2146.38)	12190 (10000 to 14220)	1658.06 (1360.33 to 1959.14)	-0.4 (-0.42 to -0.38)	<0.001
Morocco	110770 (87990 to 138930)	396.78 (318.36 to 486.69)	144780 (116920 to 177680)	374.45 (302.97 to 459.21)	-0.28 (-0.35 to -0.2)	<0.001
Mozambique	159840 (128660 to 196930)	1289.43 (1069.28 to 1557.06)	303470 (248490 to 371210)	1426.96 (1198.56 to 1702.4)	0.43 (0.31 to 0.55)	<0.001
Myanmar	364980 (296790 to 453160)	839.37 (694.35 to 1023.25)	440310 (358870 to 527910)	766.06 (626.89 to 914.16)	-0.45 (-0.51 to -0.4)	<0.001
Namibia	31790 (26040 to 38210)	2283.8 (1906.75 to 2708.95)	48400 (38430 to 58910)	2208.17 (1785.15 to 2658.05)	-0.18 (-0.48 to 0.12)	0.229
Nauru	100 (80 to 120)	1052.93 (877.05 to 1260.67)	100 (80 to 120)	1042.62 (852.63 to 1228.28)	-0.03 (-0.11 to 0.05)	0.447
Nepal	239080 (190610 to 284630)	1260.36 (1021.97 to 1490.83)	353820 (288410 to 422430)	1184.75 (978.72 to 1405.33)	-0.32 (-0.35 to -0.29)	<0.001
Netherlands	293120 (255480 to 338690)	1618.67 (1394.51 to 1884.68)	317290 (268700 to 373480)	1660.54 (1364.94 to 2011.93)	0.13 (-0.08 to 0.34)	0.232
New Zealand	67110 (55570 to 80480)	1650.72 (1356.26 to 1987.79)	187470 (155090 to 222770)	3322.45 (2704.3 to 4014.42)	3.46 (3.21 to 3.7)	<0.001
Nicaragua	100860 (82960 to 120620)	2670.31 (2243.11 to 3130.02)	187020 (155720 to 221150)	2871.69 (2409.44 to 3337.76)	0.26 (0 to 0.51)	0.047
Niger	37070 (30000 to 46000)	482.6 (397.46 to 575.77)	75890 (61440 to 93730)	480.94 (396.66 to 567.91)	-0.02 (-0.05 to 0.01)	0.253
Nigeria	445110 (377610 to 522970)	493.99 (428.18 to 565.36)	823090 (704550 to 965330)	502.36 (436.15 to 571.81)	0.09 (0.05 to 0.13)	<0.001
Niue	20 (10 to 20)	908.63 (749.23 to 1091.6)	20 (10 to 20)	867.48 (706.53 to 1058.39)	-0.23 (-0.26 to -0.2)	<0.001
North Macedonia	42120 (35050 to 49210)	1858.18 (1550.47 to 2165.01)	43140 (35210 to 51200)	1591.3 (1291.9 to 1893.85)	-0.73 (-0.79 to -0.67)	<0.001
Northern Mariana Islands	1010 (820 to 1220)	1223.18 (1020.31 to 1430.45)	680 (550 to 810)	1276.21 (1042.37 to 1513.03)	0.24 (0.06 to 0.42)	0.01

Norway	87460 (75710 to 100180)	1758.88 (1506.72 to 2042.81)	89590 (77070 to 102860)	1468.95 (1259.93 to 1708.9)	-0.87 (-1.11 to -0.62)	<0.001
Oman	9240 (7210 to 11820)	440.42 (354.73 to 557.68)	22630 (17140 to 29690)	407.32 (324.22 to 504.9)	-0.38 (-0.43 to -0.34)	<0.001
Pakistan	1810240 (1541850 to 2122740)	1737.93 (1494.71 to 2008.84)	3552800 (3041740 to 4148730)	1742.9 (1516.22 to 2020.73)	-0.02 (-0.05 to 0.02)	0.358
Palau	180 (140 to 230)	806.65 (650.55 to 978.19)	170 (140 to 210)	812.04 (650.88 to 992.07)	0 (-0.12 to 0.12)	0.963
Palestine	9030 (7010 to 11630)	384.8 (307.15 to 482.25)	17040 (13390 to 21730)	358.02 (286.65 to 449.18)	-0.35 (-0.42 to -0.29)	<0.001
Panama	47710 (38520 to 58410)	1684.26 (1363.18 to 2029.44)	75790 (60830 to 90650)	1722.65 (1382.07 to 2064.99)	-0.03 (-0.23 to 0.16)	0.753
Papua New Guinea	37810 (30540 to 45660)	836.52 (695.39 to 989.7)	79890 (64070 to 97270)	863.25 (701.73 to 1037.14)	0.15 (0.13 to 0.17)	<0.001
Paraguay	111970 (91200 to 136020)	2562.96 (2127.02 to 3061.42)	210070 (174360 to 253060)	2909.57 (2410.3 to 3455.61)	0.59 (0.54 to 0.64)	<0.001
Peru	296770 (243740 to 354730)	1283.85 (1060.65 to 1517.27)	386640 (317670 to 466700)	1017.46 (838.55 to 1217.76)	-0.99 (-1.27 to -0.71)	<0.001
Philippines	656410 (550800 to 762490)	963.51 (821.95 to 1110.43)	958810 (818830 to 1114200)	859.3 (739.15 to 993.1)	-0.56 (-0.6 to -0.52)	<0.001
Poland	1368720 (1180400 to 1581420)	3060.52 (2639.84 to 3516.83)	1506240 (1319250 to 1726840)	3076.52 (2686.13 to 3501.49)	0.04 (-0.02 to 0.1)	0.189
Portugal	362460 (301930 to 430750)	3043.28 (2507.4 to 3635.7)	350100 (287650 to 409470)	3005.24 (2420.88 to 3653.14)	-0.06 (-0.13 to 0)	0.058
Puerto Rico	92130 (78080 to 107790)	2227.03 (1871.33 to 2626.23)	67740 (57210 to 77920)	1700.02 (1415.85 to 2000.82)	-1.08 (-1.19 to -0.98)	<0.001
Qatar	3200 (2430 to 4140)	461.11 (367.51 to 577.82)	18190 (13600 to 23830)	434.2 (343.59 to 538.46)	-0.28 (-0.36 to -0.2)	<0.001
Republic of Korea	1395370 (1231660 to 1572280)	2630.39 (2328.91 to 2977.01)	1563890 (1302940 to 1825030)	2331.39 (1890.93 to 2760.39)	-0.53 (-0.9 to -0.15)	0.007
Republic of Moldova	107870 (93240 to 124340)	2296.04 (1986.09 to 2654.34)	111820 (96620 to 129080)	2356.91 (2027.4 to 2736.88)	0.12 (0.01 to 0.24)	0.033
Romania	768040 (656750 to 883950)	2925.44 (2515.6 to 3370.95)	467060 (399000 to 539230)	1971.76 (1682.25 to 2318.76)	-1.87 (-1.96 to -1.78)	<0.001
Russian Federation	8402730 (7328340 to 9630150)	4762.84 (4139.04 to 5498.93)	6342590 (5596200 to 7275410)	3481.54 (3056.47 to 3977.79)	-1.5 (-1.79 to -1.21)	<0.001
Rwanda	156340 (126970 to 196160)	2886.46 (2349 to 3515.84)	313070 (257850 to 381070)	2858.21 (2385.63 to 3384.94)	-0.06 (-0.44 to 0.32)	0.746
Saint Kitts and Nevis	1570 (1330 to 1860)	3481.89 (2977.89 to 4074.23)	2280 (1890 to 2660)	3165.4 (2600.82 to 3693.63)	-0.34 (-0.66 to -0.01)	0.041
Saint Lucia	3070 (2530 to 3660)	2138.29 (1767.09 to 2526.28)	4460 (3760 to 5170)	2102.1 (1759.69 to 2459.37)	0.14 (-0.09 to 0.37)	0.22
Saint Vincent and the Grenadines	2240 (1870 to 2650)	2213.49 (1850.84 to 2602.32)	2800 (2300 to 3210)	2200.28 (1811.65 to 2547.23)	0.2 (-0.06 to 0.45)	0.125
Samoa	1280 (1050 to 1550)	864.25 (720.3 to 1035.99)	1600 (1310 to 1910)	870.88 (719.07 to 1033.43)	0.01 (-0.07 to 0.09)	0.781
San Marino	520 (410 to 650)	1709.56 (1349.25 to 2167.75)	520 (430 to 630)	1584.2 (1255.86 to 1975.75)	-0.35 (-0.4 to -0.29)	<0.001
Sao Tome and Principe	550 (440 to 670)	528.18 (431.42 to 631.02)	1020 (840 to 1220)	542.98 (456.39 to 642.63)	0.13 (0.1 to 0.16)	<0.001
Saudi Arabia	84640 (65290 to 107610)	433.11 (344.04 to 535.65)	195220 (150370 to 247580)	411.4 (328.51 to 509.98)	-0.24 (-0.25 to -0.22)	<0.001
Senegal	35500 (28890 to 43620)	479.15 (395.16 to 577.37)	60770 (48810 to 74630)	482.29 (397.55 to 574.87)	0.03 (0 to 0.06)	0.09
Serbia	251940 (210940 to 294230)	2208.6 (1853.92 to 2573.33)	230560 (196330 to 264740)	1997.36 (1700.28 to 2334.73)	-0.42 (-0.67 to -0.17)	0.001
Seychelles	720 (580 to 870)	843.39 (687.55 to 1011.4)	940 (780 to 1150)	799.41 (654.26 to 971.02)	-0.26 (-0.35 to -0.17)	<0.001
Sierra Leone	16620 (13300 to 20240)	498.02 (406.4 to 601.48)	35870 (29480 to 43650)	513.1 (425.66 to 601.08)	0.15 (0.12 to 0.17)	<0.001
Singapore	33130 (26190 to 42450)	682.47 (548.06 to 853.03)	45770 (37100 to 56620)	656.08 (524.32 to 810.62)	-0.2 (-0.38 to -0.02)	0.034
Slovakia	136720 (115730 to 156140)	2222.91 (1881.29 to 2563.87)	155170 (131440 to 182050)	2285.16 (1912.86 to 2693.08)	0.17 (0.14 to 0.19)	<0.001
Slovenia	65150 (54670 to 74750)	2603.9 (2201.11 to 2992.56)	74480 (64330 to 84360)	2579.07 (2247.78 to 2921.91)	0.01 (-0.22 to 0.25)	0.909
Solomon Islands	3560 (2910 to 4280)	1047.34 (866.69 to 1255.27)	6520 (5450 to 7710)	1089.39 (922.5 to 1278.12)	0.18 (0.14 to 0.23)	<0.001
Somalia	84360 (66780 to 104340)	1235.63 (1019.81 to 1454.38)	180960 (147100 to 221940)	1250.05 (1033.6 to 1495.05)	0.05 (0 to 0.1)	0.046
South Africa	937610 (793220 to 1096700)	2280.13 (1941.58 to 2643.54)	1184990 (1006360 to 1372360)	1976.23 (1694.62 to 2281.45)	-0.73 (-0.96 to -0.5)	<0.001
South Sudan	68180 (54500 to 84270)	1335.07 (1114.73 to 1583.11)	81960 (67060 to 98930)	1206.54 (1000.73 to 1447.85)	-0.56 (-0.66 to -0.46)	<0.001
Spain	794000 (646000 to 961500)	1700.94 (1370.36 to 2083.12)	733270 (610700 to 881060)	1530.99 (1229.76 to 1904.61)	-0.48 (-0.64 to -0.32)	<0.001
Sri Lanka	235070 (192630 to 280160)	1235 (1014.24 to 1464.21)	221920 (185540 to 261000)	921.53 (768.39 to 1083.6)	-1.42 (-1.57 to -1.28)	<0.001
Sudan	88750 (71380 to 111440)	421.89 (341.99 to 515.94)	145790 (115440 to 182190)	377.61 (303.82 to 456.63)	-0.53 (-0.55 to -0.52)	<0.001
Suriname	7560 (6260 to 9080)	1727.38 (1445.94 to 2052.88)	10470 (8830 to 12200)	1693.49 (1419.83 to 1985.6)	0.11 (-0.13 to 0.35)	0.371
Sweden	258830 (224360 to 297570)	2674.32 (2311.56 to 3112.25)	234990 (202940 to 272670)	2060.43 (1755.64 to 2404.54)	-1.19 (-1.27 to -1.12)	<0.001
Switzerland	218480 (184020 to 252060)	2662.17 (2200.12 to 3140.74)	236380 (198950 to 277180)	2327.35 (1911.61 to 2805.87)	-0.63 (-0.69 to -0.58)	<0.001
Syrian Arab Republic	55890 (43990 to 70950)	410.03 (335.23 to 510)	51460 (41620 to 61730)	375.35 (301.47 to 452.76)	-0.43 (-0.49 to -0.38)	<0.001
Türkiye	301670 (237930 to 375990)	450.01 (364.36 to 561.07)	382700 (307900 to 475900)	417.15 (335.9 to 519.77)	-0.37 (-0.44 to -0.29)	<0.001

Taiwan (Province of China)	117690 (94790 to 142300)	463.39 (374.27 to 562.52)	167580 (142640 to 193790)	595.06 (502.71 to 698.98)	1.24 (0.95 to 1.52)	<0.001
Tajikistan	146790 (123320 to 171630)	3003.4 (2503.03 to 3452.29)	202880 (169230 to 238420)	2204.2 (1864.89 to 2550.39)	-1.48 (-1.57 to -1.39)	<0.001
Thailand	919540 (740010 to 1110650)	1315.6 (1062.47 to 1584.01)	830420 (689090 to 988990)	1073.64 (887.93 to 1297.23)	-0.97 (-1.1 to -0.84)	<0.001
Timor-Leste	5810 (4710 to 7240)	808.68 (662.77 to 979.41)	8870 (7160 to 10850)	755.55 (626.7 to 907.73)	-0.33 (-0.38 to -0.28)	<0.001
Togo	18020 (14580 to 22110)	503.75 (416.28 to 595.99)	34470 (27960 to 41560)	510.07 (418.51 to 603.17)	0.06 (0.05 to 0.07)	<0.001
Tokelau	10 (10 to 10)	793.38 (659.8 to 966.61)	10 (10 to 10)	834.82 (689.23 to 1001.63)	0.25 (0.15 to 0.35)	<0.001
Tonga	650 (530 to 780)	776.71 (648.85 to 933.66)	710 (590 to 840)	773.08 (642.03 to 914.87)	-0.03 (-0.05 to -0.01)	0.011
Trinidad and Tobago	20510 (16940 to 24390)	1530.16 (1264.76 to 1806.96)	26040 (21680 to 30460)	1624.35 (1356.29 to 1920.63)	0.49 (0.27 to 0.72)	<0.001
Tunisia	39190 (31000 to 48840)	401.46 (320.81 to 495.82)	47990 (38800 to 58850)	376.68 (303.95 to 465.22)	-0.3 (-0.36 to -0.24)	<0.001
Turkmenistan	126140 (107730 to 149060)	3473.94 (2970.49 to 4100.4)	151430 (126290 to 175560)	2901.4 (2435.78 to 3349.56)	-0.86 (-0.91 to -0.81)	<0.001
Tuvalu	80 (60 to 100)	876.87 (726.79 to 1057.86)	110 (90 to 140)	961.19 (785.14 to 1154.58)	0.39 (0.25 to 0.54)	<0.001
Uganda	137080 (110680 to 168230)	883.9 (732.55 to 1046.64)	263190 (211550 to 322540)	876.09 (726.33 to 1035.61)	-0.07 (-0.12 to -0.01)	0.022
Ukraine	2048220 (1785920 to 2354450)	3517.6 (3041.05 to 4071.07)	1543270 (1342560 to 1774480)	2829.46 (2458.78 to 3259.5)	-1.09 (-1.31 to -0.88)	<0.001
United Arab Emirates	22530 (17230 to 28670)	563.63 (456.65 to 677.65)	76160 (59220 to 97580)	538.64 (434.7 to 655.38)	-0.22 (-0.26 to -0.18)	<0.001
United Kingdom	1700170 (1466010 to 1961290)	2707.52 (2323.91 to 3164.63)	2087110 (1815460 to 2401180)	2904.94 (2490.05 to 3374.95)	0.43 (0.21 to 0.66)	<0.001
United Republic of Tanzania	316430 (258400 to 390340)	1289.04 (1074.23 to 1555.08)	577650 (474770 to 711670)	1297.19 (1087.08 to 1540.01)	-0.01 (-0.06 to 0.04)	0.637
United States of America	6570580 (5648840 to 7564400)	2223 (1898.99 to 2573.23)	7831180 (6794640 to 8973210)	2198.86 (1888.66 to 2549.63)	-0.05 (-0.13 to 0.02)	0.166
United States Virgin Islands	2980 (2500 to 3470)	2531.56 (2126.31 to 2971.7)	2630 (2130 to 3060)	2471.17 (2007.02 to 2884.85)	0.05 (-0.16 to 0.25)	0.64
Uruguay	46320 (39330 to 54010)	1357.19 (1140.31 to 1593.35)	57280 (48150 to 67620)	1540.55 (1270.6 to 1840.06)	0.64 (0.56 to 0.72)	<0.001
Uzbekistan	720070 (589330 to 861910)	3278.13 (2704.5 to 3902.48)	604550 (483820 to 727350)	1731.98 (1402.97 to 2060.55)	-3.03 (-3.24 to -2.81)	<0.001
Vanuatu	1380 (1100 to 1690)	894.73 (730.87 to 1073.17)	2500 (2030 to 2970)	908.03 (750.35 to 1063.3)	0.06 (0.04 to 0.09)	<0.001
Venezuela (Bolivarian Republic of)	397020 (320460 to 478590)	1806.46 (1480.5 to 2138.6)	450410 (374190 to 539590)	1607.06 (1317.27 to 1945.27)	-0.67 (-0.9 to -0.44)	<0.001
Viet Nam	804270 (647250 to 978410)	1046.87 (854.34 to 1260.97)	1270810 (1033630 to 1531940)	1146.99 (934.42 to 1385.43)	0.41 (0.36 to 0.45)	<0.001
Yemen	56090 (44420 to 69660)	416.79 (338.96 to 505.65)	110970 (88210 to 139430)	386.99 (315.23 to 473.19)	-0.36 (-0.41 to -0.31)	<0.001
Zambia	93420 (75560 to 115540)	1418.48 (1177.99 to 1685.11)	210720 (173670 to 256710)	1446.32 (1217.73 to 1713.46)	0.06 (0.01 to 0.12)	0.034
Zimbabwe	162270 (128060 to 201190)	1799.28 (1435.51 to 2197.96)	211920 (171110 to 259810)	1646.17 (1350.8 to 1976.19)	-0.4 (-0.72 to -0.08)	0.014

Abbreviation: APC: annual percent change; ASPR: age-standardized prevalence rate; CI: confidence interval; UI: uncertainty interval

Supplementary Table 3: Prevalence, age-standardized prevalence rates, temporal progression of alcohol-related liver disease from 2000 to 2021, classified by country/territory

Country	2000 Prevalence (95% UI)	2000 ASPR (95% UI)	2021 Prevalence (95% UI)	2021 ASPR (95% UI)	2000 to 2021 APC (95% CI)	p
Afghanistan	310 (190 to 460)	3.94 (2.43 to 5.73)	440 (280 to 640)	3.43 (2.19 to 4.91)	-0.67 (-0.78 to -0.55)	<0.001
Albania	670 (530 to 820)	23.43 (18.68 to 28.29)	1000 (780 to 1220)	24.95 (19.67 to 30.05)	0.3 (0.17 to 0.43)	<0.001
Algeria	630 (400 to 900)	3.32 (2.1 to 4.75)	1150 (740 to 1630)	2.95 (1.89 to 4.19)	-0.61 (-0.68 to -0.53)	<0.001
American Samoa	10 (0 to 10)	14.47 (9.81 to 19.64)	10 (10 to 10)	14.44 (10.17 to 19.47)	-0.05 (-0.15 to 0.06)	0.387
Andorra	40 (30 to 40)	42.7 (34.71 to 50.4)	50 (40 to 60)	36.29 (29.02 to 43.17)	-0.79 (-0.89 to -0.7)	<0.001
Angola	2570 (1780 to 3440)	39.28 (27.28 to 51.59)	5770 (3970 to 7710)	38.05 (26.48 to 50.2)	-0.14 (-0.16 to -0.12)	<0.001
Antigua and Barbuda	30 (20 to 30)	39.76 (31.71 to 47.55)	40 (30 to 50)	38.51 (31.13 to 45.81)	-0.19 (-0.23 to -0.14)	<0.001
Argentina	10530 (7910 to 13140)	28.18 (21.08 to 34.99)	16060 (11880 to 20140)	29.92 (22.13 to 37.53)	0.28 (0.27 to 0.3)	<0.001
Armenia	1710 (1360 to 2090)	49.63 (39.53 to 60.11)	2800 (2210 to 3370)	68.09 (54.4 to 81.38)	1.6 (1.42 to 1.77)	<0.001
Australia	2560 (1910 to 3260)	10.85 (8.09 to 13.71)	4160 (3080 to 5320)	10.9 (8.04 to 13.76)	0.11 (0.04 to 0.18)	0.004
Austria	9060 (7360 to 10780)	81.72 (66.59 to 97.12)	6820 (5440 to 8110)	47.19 (37.92 to 55.92)	-2.58 (-2.79 to -2.36)	<0.001
Azerbaijan	5070 (3950 to 6220)	80.43 (62.61 to 97.81)	9160 (7130 to 11050)	84.91 (66.32 to 101.54)	0.28 (0.2 to 0.36)	<0.001
Bahamas	130 (100 to 150)	49.48 (39.93 to 58.99)	180 (140 to 220)	40.49 (32.32 to 48.25)	-0.97 (-1.04 to -0.89)	<0.001
Bahrain	20 (10 to 30)	5.52 (3.54 to 7.91)	50 (30 to 70)	4.21 (2.69 to 5.89)	-1.32 (-1.4 to -1.25)	<0.001
Bangladesh	29710 (21400 to 38620)	39.35 (28.33 to 51.77)	42480 (30780 to 55290)	28.11 (20.31 to 36.4)	-1.6 (-1.66 to -1.54)	<0.001
Barbados	100 (80 to 120)	34.96 (28.23 to 41.72)	150 (120 to 180)	32.07 (25.94 to 38.39)	-0.43 (-0.51 to -0.36)	<0.001
Belarus	7660 (5990 to 9040)	59.7 (46.39 to 70.57)	10370 (8210 to 12410)	74.68 (58.58 to 89.02)	1.08 (0.95 to 1.22)	<0.001
Belgium	6470 (5300 to 7650)	45.03 (37.18 to 53.11)	6310 (5030 to 7510)	34.95 (28.18 to 41.76)	-1.17 (-1.38 to -0.96)	<0.001
Belize	70 (50 to 80)	49.26 (39.19 to 59.26)	180 (140 to 220)	51.93 (41.17 to 62.61)	0.25 (0.22 to 0.29)	<0.001
Benin	940 (670 to 1240)	31.4 (22.12 to 41.63)	1740 (1250 to 2290)	27 (18.82 to 36.03)	-0.72 (-0.8 to -0.63)	<0.001
Bermuda	30 (20 to 30)	36.64 (29.76 to 43.44)	30 (20 to 40)	26.76 (21.73 to 31.74)	-1.51 (-1.59 to -1.42)	<0.001
Bhutan	160 (110 to 210)	37.54 (26.87 to 49.65)	280 (200 to 370)	39.75 (28.53 to 52.03)	0.25 (0.2 to 0.3)	<0.001
Bolivia (Plurinational State of)	4310 (3370 to 5180)	84.32 (65.58 to 101.88)	8010 (6320 to 9630)	81.55 (63.84 to 98.13)	-0.16 (-0.18 to -0.15)	<0.001
Bosnia and Herzegovina	2130 (1670 to 2600)	40.95 (32.15 to 49.72)	1900 (1500 to 2300)	34.54 (27.47 to 41.49)	-0.85 (-0.95 to -0.76)	<0.001
Botswana	260 (180 to 350)	27.46 (19.06 to 36.56)	460 (320 to 610)	24.47 (17.47 to 32.03)	-0.56 (-0.65 to -0.47)	<0.001
Brazil	87810 (75010 to 101410)	60.46 (51.82 to 69.65)	108920 (92970 to 126730)	42.25 (36.11 to 49.13)	-1.71 (-1.8 to -1.62)	<0.001
Brunei Darussalam	40 (30 to 50)	18.49 (12.91 to 24.52)	70 (50 to 100)	15.75 (11.1 to 20.96)	-0.79 (-0.96 to -0.62)	<0.001
Bulgaria	7430 (6100 to 8810)	63.83 (51.69 to 75.24)	8450 (6920 to 9970)	76.53 (62.99 to 89.83)	0.86 (0.81 to 0.92)	<0.001
Burkina Faso	2000 (1420 to 2630)	34.73 (24.45 to 45.48)	3020 (2160 to 3940)	27.82 (19.69 to 36.83)	-1.06 (-1.13 to -0.99)	<0.001
Burundi	1110 (780 to 1510)	38.65 (25.96 to 52.37)	1770 (1210 to 2390)	29.37 (20.31 to 39.2)	-1.29 (-1.42 to -1.15)	<0.001
Côte d'Ivoire	2710 (1910 to 3590)	35.81 (25.16 to 47.09)	4790 (3370 to 6290)	32.25 (22.74 to 42.32)	-0.48 (-0.56 to -0.41)	<0.001
Cabo Verde	70 (50 to 90)	25.64 (17.9 to 33.71)	140 (100 to 190)	28.39 (19.99 to 37.54)	0.47 (0.45 to 0.5)	<0.001
Cambodia	2720 (1890 to 3640)	36.64 (25.73 to 49.17)	6130 (4320 to 8180)	42.14 (30.01 to 55.81)	0.69 (0.65 to 0.74)	<0.001
Cameroon	2220 (1570 to 2940)	30.61 (21.41 to 40.31)	4140 (2870 to 5440)	25.42 (17.77 to 33.33)	-0.88 (-1.04 to -0.72)	<0.001
Canada	5030 (3480 to 6690)	12.73 (8.69 to 16.93)	7810 (5380 to 10450)	12.23 (8.43 to 16.17)	-0.2 (-0.24 to -0.16)	<0.001
Central African Republic	590 (410 to 800)	34.32 (23.16 to 46.05)	930 (630 to 1280)	31.33 (20.98 to 41.76)	-0.44 (-0.5 to -0.38)	<0.001
Chad	1100 (770 to 1470)	29.24 (20.13 to 39.11)	2230 (1550 to 2930)	30.92 (21.66 to 40.89)	0.28 (0.25 to 0.31)	<0.001
Chile	7630 (5650 to 9620)	54.39 (39.81 to 69.05)	11140 (8250 to 13910)	44.46 (33.34 to 55.33)	-0.93 (-0.99 to -0.87)	<0.001
China	123220 (98820 to 151650)	9.96 (8.05 to 12.28)	193020 (151660 to 239640)	9.06 (7.23 to 11.16)	-0.5 (-0.56 to -0.44)	<0.001
Colombia	7890 (6240 to 9540)	27.25 (21.35 to 33.06)	12200 (9530 to 14950)	22.17 (17.32 to 27.14)	-1.03 (-1.08 to -0.97)	<0.001

Comoros	80 (50 to 100)	25.95 (17.16 to 35.15)	130 (90 to 180)	24.27 (16.47 to 32.96)	-0.3 (-0.4 to 0.2)	<0.001
Congo	580 (400 to 780)	35.9 (24.76 to 47.62)	1230 (870 to 1640)	35.46 (25.01 to 46.25)	-0.05 (-0.07 to -0.04)	<0.001
Cook Islands	0 (0 to 0)	13.51 (9.25 to 18.47)	0 (0 to 0)	14.13 (10.05 to 19.05)	0.2 (0.07 to 0.33)	0.003
Costa Rica	1700 (1340 to 2040)	59.16 (46.62 to 71.47)	3150 (2380 to 3890)	56.99 (43.38 to 70.22)	-0.2 (-0.27 to 0.12)	<0.001
Croatia	6020 (4820 to 7220)	90.66 (72.93 to 107.46)	4350 (3460 to 5180)	59.89 (48.85 to 70.87)	-1.95 (-2.04 to -1.86)	<0.001
Cuba	4350 (3520 to 5210)	34.01 (27.53 to 40.81)	7080 (5580 to 8540)	39.94 (32.27 to 47.92)	0.77 (0.75 to 0.79)	<0.001
Cyprus	310 (240 to 370)	28.98 (22.99 to 34.5)	460 (370 to 540)	23.36 (18.91 to 27.68)	-1.02 (-1.05 to -1)	<0.001
Czechia	8560 (7030 to 10120)	61.35 (50.11 to 72.38)	9580 (7820 to 11310)	56.81 (46.01 to 67.09)	-0.36 (-0.42 to -0.29)	<0.001
Democratic People's Republic of Korea	4100 (2670 to 5890)	17.24 (11.35 to 24.26)	5790 (3780 to 8220)	16.77 (11.02 to 23.46)	-0.12 (-0.16 to -0.08)	<0.001
Democratic Republic of the Congo	6930 (4830 to 9340)	28.7 (19.73 to 38.33)	14500 (10120 to 19640)	30.43 (20.91 to 40.95)	0.29 (0.26 to 0.32)	<0.001
Denmark	4260 (3490 to 5010)	58.82 (47.74 to 69.3)	3560 (2840 to 4260)	39.44 (31.71 to 47.23)	-1.92 (-2.08 to -1.76)	<0.001
Djibouti	90 (60 to 120)	30.31 (20.06 to 40.88)	230 (160 to 320)	29.22 (19.92 to 40.11)	-0.16 (-0.21 to -0.11)	<0.001
Dominica	20 (20 to 30)	35 (28.05 to 42.26)	20 (20 to 30)	29.77 (23.91 to 35.47)	-0.78 (-0.82 to -0.73)	<0.001
Dominican Republic	4080 (3310 to 4820)	67.8 (54.65 to 80.36)	7050 (5610 to 8420)	67.74 (54.17 to 80.89)	0 (-0.12 to 0.12)	0.966
Ecuador	5160 (4120 to 6160)	60.59 (48.02 to 72.23)	9480 (7450 to 11400)	56.34 (44.07 to 67.8)	-0.35 (-0.41 to -0.3)	<0.001
Egypt	3470 (2190 to 4990)	9.66 (6.29 to 13.84)	6780 (4130 to 10020)	10.19 (6.34 to 14.81)	0.33 (0.19 to 0.46)	<0.001
El Salvador	2760 (2160 to 3370)	67.73 (52.31 to 82.18)	4000 (3080 to 4900)	66.03 (50.66 to 81.13)	-0.13 (-0.21 to -0.04)	0.004
Equatorial Guinea	70 (50 to 100)	25.59 (17.45 to 34.07)	180 (130 to 240)	26.09 (18.28 to 34.66)	0.08 (0.05 to 0.11)	<0.001
Eritrea	630 (430 to 860)	37.2 (24.68 to 50.24)	1240 (860 to 1680)	34.45 (23.38 to 45.4)	-0.37 (-0.41 to -0.34)	<0.001
Estonia	1250 (1020 to 1500)	67.58 (53.95 to 80.33)	1450 (1160 to 1720)	76.58 (60.63 to 91.01)	0.61 (0.48 to 0.73)	<0.001
Eswatini	130 (90 to 180)	26.59 (18.63 to 35.8)	180 (130 to 240)	25.19 (17.67 to 33.21)	-0.24 (-0.35 to -0.14)	<0.001
Ethiopia	13380 (10570 to 16570)	47.12 (36.37 to 58.8)	18130 (14520 to 22130)	36.3 (28.8 to 44.65)	-1.24 (-1.28 to -1.19)	<0.001
Fiji	60 (40 to 80)	10 (6.83 to 13.64)	90 (60 to 120)	9.66 (6.65 to 13.38)	-0.16 (-0.21 to -0.11)	<0.001
Finland	3720 (2990 to 4420)	51.19 (41.17 to 60.65)	4420 (3480 to 5340)	52.76 (41.95 to 63.44)	0.18 (-0.11 to 0.48)	0.229
France	44420 (36360 to 52490)	55.52 (45.26 to 65.77)	38810 (31440 to 45770)	37.47 (30.45 to 44.2)	-1.83 (-1.96 to -1.71)	<0.001
Gabon	290 (200 to 380)	38.75 (27.17 to 51.16)	470 (330 to 620)	37.29 (26.46 to 49.23)	-0.18 (-0.22 to -0.15)	<0.001
Gambia	190 (130 to 250)	29.9 (20.74 to 39.93)	340 (240 to 460)	28.53 (19.87 to 37.8)	-0.24 (-0.29 to -0.19)	<0.001
Georgia	4400 (3500 to 5330)	74.68 (59.46 to 89.89)	4230 (3400 to 5060)	83.55 (67.11 to 99.84)	0.58 (0.48 to 0.68)	<0.001
Germany	89800 (73950 to 105930)	74.12 (60.6 to 87.46)	69630 (55940 to 82550)	48.53 (39.01 to 57.43)	-2.01 (-2.06 to -1.96)	<0.001
Ghana	3520 (2470 to 4670)	33.41 (23.43 to 43.96)	6390 (4510 to 8540)	31.07 (21.74 to 40.78)	-0.35 (-0.4 to -0.3)	<0.001
Greece	4620 (3750 to 5520)	28.61 (23.3 to 33.94)	4690 (3800 to 5540)	27.83 (22.31 to 32.89)	-0.17 (-0.3 to 0.03)	0.015
Greenland	10 (10 to 10)	16.37 (11.34 to 22.22)	10 (10 to 20)	16.98 (11.82 to 22.51)	0.16 (0.11 to 0.2)	<0.001
Grenada	40 (30 to 50)	48.24 (38.66 to 57.81)	50 (40 to 60)	43.65 (35.41 to 51.51)	-0.48 (-0.55 to -0.42)	<0.001
Guam	30 (20 to 40)	24.02 (17.04 to 32.1)	50 (30 to 60)	22.94 (16.26 to 30.85)	-0.23 (-0.27 to -0.19)	<0.001
Guatemala	6460 (4910 to 8090)	103.39 (79.52 to 129.38)	13640 (10600 to 16600)	108.74 (84.8 to 132.44)	0.24 (0.23 to 0.26)	<0.001
Guinea	1300 (890 to 1740)	28.16 (19.17 to 37.99)	1770 (1240 to 2360)	26.41 (18.11 to 35.54)	-0.29 (-0.43 to -0.16)	<0.001
Guinea-Bissau	200 (140 to 270)	35.84 (24.43 to 48.35)	340 (230 to 450)	34.44 (23.97 to 46.21)	-0.17 (-0.23 to -0.12)	<0.001
Guyana	450 (360 to 550)	84.4 (68.01 to 100.3)	570 (450 to 690)	78.52 (62.65 to 94.44)	-0.33 (-0.44 to -0.21)	<0.001
Haiti	2730 (2110 to 3370)	56.03 (42.96 to 69.02)	4690 (3670 to 5740)	52.62 (41.07 to 64.24)	-0.3 (-0.31 to -0.29)	<0.001
Honduras	2350 (1790 to 2900)	70.02 (53.32 to 86.63)	4950 (3730 to 6150)	69.63 (51.83 to 86.25)	-0.03 (-0.03 to -0.02)	<0.001
Hungary	26290 (22490 to 29800)	194.77 (165.14 to 221.16)	13120 (11010 to 15090)	84.41 (70.38 to 96.5)	-3.95 (-4.07 to -3.83)	<0.001
Iceland	50 (40 to 60)	16.4 (13.08 to 19.7)	60 (50 to 80)	13.49 (10.76 to 16.26)	-0.94 (-0.96 to -0.91)	<0.001

India	352720 (293100 to 410550)	44.82 (37.71 to 52.49)	651940 (548590 to 757820)	47.77 (40.27 to 56.17)	0.31 (0.27 to 0.34)	<0.001
Indonesia	61730 (49340 to 75880)	40.82 (32.28 to 50.16)	77770 (61630 to 96010)	28.88 (22.98 to 35.62)	-1.62 (-1.72 to -1.53)	<0.001
Iran (Islamic Republic of)	2390 (1840 to 3010)	5.8 (4.43 to 7.42)	3980 (3070 to 5060)	4.68 (3.63 to 5.87)	-1.06 (-1.16 to -0.95)	<0.001
Iraq	400 (260 to 560)	3.12 (1.97 to 4.51)	810 (510 to 1150)	2.84 (1.8 to 4.02)	-0.46 (-0.56 to -0.36)	<0.001
Ireland	1080 (870 to 1290)	24.7 (19.73 to 29.47)	1580 (1260 to 1890)	23.12 (18.37 to 27.59)	-0.3 (-0.5 to -0.09)	0.006
Israel	1500 (1170 to 1800)	23.43 (18.53 to 28.32)	1980 (1560 to 2380)	17.76 (14.1 to 21.3)	-1.33 (-1.42 to -1.24)	<0.001
Italy	46310 (37730 to 55910)	50.68 (41.59 to 60.81)	37080 (30130 to 44420)	32.29 (26.6 to 38.42)	-2.17 (-2.28 to -2.06)	<0.001
Jamaica	450 (360 to 540)	20.76 (16.74 to 25.02)	560 (440 to 670)	18.14 (14.4 to 21.74)	-0.67 (-0.74 to -0.6)	<0.001
Japan	77070 (63000 to 92670)	36.6 (30.42 to 43.54)	91990 (77430 to 107820)	37.49 (31.79 to 43.64)	0.17 (0.02 to 0.32)	0.027
Jordan	80 (50 to 110)	3.27 (2.07 to 4.63)	240 (160 to 340)	2.78 (1.77 to 3.89)	-0.82 (-0.88 to -0.76)	<0.001
Kazakhstan	10460 (8280 to 12640)	73.66 (59.01 to 89.07)	20880 (16540 to 25340)	105.82 (84 to 127.48)	1.74 (1.5 to 1.98)	<0.001
Kenya	5940 (4710 to 7380)	46.47 (36.27 to 57.92)	11020 (8820 to 13540)	40.81 (31.99 to 50.36)	-0.61 (-0.76 to -0.46)	<0.001
Kiribati	10 (10 to 20)	22.71 (14.98 to 31.63)	20 (10 to 30)	20.11 (13.33 to 27.7)	-0.56 (-0.63 to -0.5)	<0.001
Kuwait	40 (20 to 50)	3.08 (1.98 to 4.37)	100 (60 to 140)	2.4 (1.58 to 3.43)	-1.22 (-1.27 to -1.16)	<0.001
Kyrgyzstan	3900 (3040 to 4850)	108.63 (84.53 to 133.84)	6330 (4870 to 7740)	108.61 (84.65 to 132.42)	0.04 (-0.11 to 0.19)	0.629
Lao People's Democratic Republic	790 (560 to 1060)	25.66 (17.76 to 34.09)	1470 (1040 to 1960)	25.89 (18.4 to 34.23)	0.05 (0.03 to 0.06)	<0.001
Latvia	1880 (1500 to 2250)	59.02 (46.91 to 70.62)	1780 (1430 to 2120)	63.81 (50.48 to 75.91)	0.4 (0.26 to 0.54)	<0.001
Lebanon	100 (70 to 150)	3.24 (2.08 to 4.68)	180 (120 to 260)	3.07 (1.93 to 4.41)	-0.28 (-0.35 to -0.21)	<0.001
Lesotho	260 (180 to 350)	22.4 (15.18 to 29.65)	300 (210 to 410)	23.59 (16.59 to 31.27)	0.31 (0.19 to 0.44)	<0.001
Liberia	540 (370 to 720)	38.8 (26.57 to 52.03)	1030 (740 to 1370)	37.67 (26.24 to 49.86)	-0.13 (-0.15 to -0.12)	<0.001
Libya	100 (70 to 150)	3.76 (2.39 to 5.28)	200 (130 to 290)	3.3 (2.11 to 4.66)	-0.61 (-0.81 to -0.4)	<0.001
Lithuania	3000 (2340 to 3670)	68.59 (53.09 to 84.17)	3120 (2490 to 3760)	79.26 (63.32 to 95.03)	0.8 (0.26 to 1.34)	0.004
Luxembourg	370 (300 to 430)	63.61 (51.96 to 74.9)	350 (290 to 420)	37.48 (30.66 to 44.47)	-2.51 (-2.57 to -2.45)	<0.001
Madagascar	2250 (1560 to 3040)	32.51 (22.09 to 43.73)	4050 (2810 to 5450)	28.67 (20.07 to 38.11)	-0.6 (-0.73 to -0.46)	<0.001
Malawi	2100 (1430 to 2790)	42.22 (28.36 to 56.61)	3200 (2260 to 4310)	35.56 (24.62 to 47.15)	-0.81 (-0.97 to -0.64)	<0.001
Malaysia	3180 (2310 to 4120)	20.94 (14.9 to 27.2)	6750 (4710 to 8890)	21.98 (15.15 to 28.83)	0.23 (0.21 to 0.24)	<0.001
Maldives	20 (20 to 30)	14.6 (10.25 to 19.23)	60 (40 to 80)	13.08 (9.47 to 17.12)	-0.52 (-0.57 to -0.47)	<0.001
Mali	1540 (1050 to 2090)	28.81 (19.5 to 38.98)	2330 (1610 to 3140)	21.64 (14.89 to 29.03)	-1.37 (-1.46 to -1.27)	<0.001
Malta	130 (110 to 160)	25.45 (19.97 to 30.63)	140 (120 to 170)	20.51 (16.64 to 24.65)	-1.03 (-1.07 to -0.98)	<0.001
Marshall Islands	10 (0 to 10)	22.45 (15.4 to 30.68)	10 (10 to 10)	21.02 (14.41 to 28.57)	-0.3 (-0.32 to -0.28)	<0.001
Mauritania	390 (270 to 530)	28.52 (19.36 to 38.85)	580 (410 to 780)	23.39 (16.08 to 31.72)	-0.95 (-1 to -0.89)	<0.001
Mauritius	490 (340 to 660)	42.57 (29.84 to 55.85)	420 (290 to 550)	23.4 (16.52 to 30.33)	-2.82 (-2.96 to -2.68)	<0.001
Mexico	84960 (70420 to 100370)	120.13 (101.2 to 142.14)	131240 (110480 to 154830)	97.16 (81.65 to 115.06)	-1.03 (-1.14 to -0.92)	<0.001
Micronesia (Federated States of)	10 (10 to 20)	21.95 (14.48 to 30.24)	20 (10 to 30)	21.71 (15.03 to 30.07)	-0.04 (-0.08 to -0.01)	0.01
Monaco	20 (20 to 30)	38.77 (30.43 to 47.04)	20 (20 to 30)	34.05 (27.17 to 41.22)	-0.62 (-0.66 to -0.58)	<0.001
Mongolia	1680 (1300 to 2070)	123.37 (94.99 to 150.03)	3950 (3150 to 4790)	145.63 (115.28 to 174.84)	0.82 (0.73 to 0.92)	<0.001
Montenegro	170 (140 to 210)	23.1 (18.41 to 27.8)	200 (160 to 230)	22.49 (18.1 to 26.69)	-0.14 (-0.24 to -0.04)	0.006
Morocco	650 (420 to 910)	3.23 (2.06 to 4.66)	1130 (720 to 1630)	3.11 (2 to 4.43)	-0.23 (-0.38 to -0.08)	0.002
Mozambique	1460 (1040 to 1930)	18.27 (12.81 to 24.26)	2400 (1680 to 3230)	17.5 (12.19 to 23.64)	-0.21 (-0.25 to -0.17)	<0.001
Myanmar	8820 (6030 to 11950)	24.92 (16.92 to 34.01)	14980 (10420 to 20000)	26.6 (18.52 to 35.09)	0.32 (0.28 to 0.37)	<0.001
Namibia	250 (180 to 340)	25.34 (17.67 to 33.7)	410 (290 to 540)	24.75 (17.36 to 32.31)	-0.09 (-0.19 to 0.02)	0.122
Nauru	0 (0 to 0)	19.65 (13.27 to 27.12)	0 (0 to 0)	18.91 (12.65 to 25.99)	-0.18 (-0.23 to -0.12)	<0.001

Nepal	9610 (7500 to 11560)	62.47 (49.21 to 75.2)	16660 (12840 to 20660)	63.76 (48.95 to 78.91)	0.09 (0.04 to 0.14)	<0.001
Netherlands	5810 (4680 to 6820)	27.12 (21.78 to 32.05)	5900 (4690 to 7010)	20.78 (16.66 to 24.68)	-1.29 (-1.35 to -1.24)	<0.001
New Zealand	450 (360 to 550)	9.58 (7.75 to 11.77)	620 (500 to 750)	8.03 (6.55 to 9.77)	-0.83 (-0.87 to -0.79)	<0.001
Nicaragua	1820 (1440 to 2190)	69.91 (54.15 to 84.01)	4480 (3480 to 5410)	83.63 (64.06 to 101.14)	0.88 (0.85 to 0.91)	<0.001
Niger	1250 (870 to 1690)	26.65 (18.12 to 36.08)	2400 (1660 to 3210)	23.65 (16.48 to 32.12)	-0.57 (-0.61 to -0.53)	<0.001
Nigeria	25980 (20770 to 32020)	42.48 (33.27 to 52.25)	39190 (31730 to 47510)	35.25 (28.1 to 42.92)	-0.88 (-0.92 to -0.84)	<0.001
Niue	0 (0 to 0)	22.26 (15.54 to 30.4)	0 (0 to 0)	20.28 (14.31 to 27.4)	-0.46 (-0.49 to -0.42)	<0.001
North Macedonia	780 (620 to 930)	32.48 (26.26 to 38.81)	1090 (880 to 1310)	33.44 (27.29 to 39.47)	0.12 (0.1 to 0.15)	<0.001
Northern Mariana Islands	20 (10 to 20)	35.31 (24.49 to 47.98)	20 (10 to 30)	32.31 (22.79 to 43.46)	-0.4 (-0.56 to -0.25)	<0.001
Norway	1850 (1540 to 2200)	31.4 (25.99 to 36.97)	1870 (1540 to 2200)	22.91 (19.08 to 26.8)	-1.45 (-1.8 to -1.1)	<0.001
Oman	50 (30 to 70)	4.74 (2.95 to 6.88)	120 (80 to 180)	4.49 (2.83 to 6.33)	-0.27 (-0.29 to -0.25)	<0.001
Pakistan	12700 (10060 to 15810)	15.29 (12.04 to 19.2)	20070 (15700 to 25010)	12.11 (9.61 to 14.87)	-1.12 (-1.21 to -1.03)	<0.001
Palau	0 (0 to 10)	25.79 (17.71 to 34.72)	10 (0 to 10)	24.29 (16.45 to 32.52)	-0.28 (-0.41 to -0.14)	<0.001
Palestine	50 (30 to 70)	3.64 (2.33 to 5.35)	100 (60 to 140)	3.46 (2.25 to 4.91)	-0.25 (-0.26 to -0.23)	<0.001
Panama	740 (590 to 900)	33.29 (26.2 to 40.4)	1520 (1170 to 1870)	34.44 (26.54 to 42.32)	0.16 (0.14 to 0.18)	<0.001
Papua New Guinea	350 (230 to 470)	10.48 (7 to 14.21)	740 (510 to 1010)	10.09 (6.95 to 13.87)	-0.18 (-0.21 to -0.16)	<0.001
Paraguay	990 (800 to 1180)	29.17 (23.31 to 34.62)	1980 (1590 to 2360)	31.19 (25.04 to 37.07)	0.32 (0.28 to 0.36)	<0.001
Peru	13780 (11460 to 16070)	76.19 (62.51 to 88.73)	23110 (18530 to 27250)	66.83 (53.19 to 78.9)	-0.62 (-0.66 to -0.59)	<0.001
Philippines	12390 (9720 to 15290)	24.5 (19.36 to 29.97)	20790 (16580 to 25250)	22.03 (17.61 to 26.87)	-0.52 (-0.55 to -0.49)	<0.001
Poland	31920 (26050 to 38190)	66.83 (54.59 to 80.06)	43700 (36900 to 50140)	75.72 (64.15 to 87.04)	0.59 (0.56 to 0.62)	<0.001
Portugal	9370 (7630 to 11060)	65.82 (53.36 to 78.29)	6490 (5160 to 7790)	36.55 (29.27 to 43.49)	-2.79 (-2.85 to -2.73)	<0.001
Puerto Rico	3440 (2780 to 4120)	77 (62.47 to 92.65)	2810 (2190 to 3430)	50.21 (39.55 to 60.51)	-2.07 (-2.28 to -1.85)	<0.001
Qatar	20 (10 to 30)	8 (5.05 to 11.53)	90 (60 to 130)	5.77 (3.71 to 8.28)	-1.55 (-1.62 to -1.48)	<0.001
Republic of Korea	44600 (37290 to 52590)	90.67 (75.9 to 106.46)	44290 (35390 to 52640)	50.54 (40.6 to 60.01)	-2.78 (-2.85 to -2.7)	<0.001
Republic of Moldova	12530 (9830 to 15100)	253.09 (199.93 to 304.75)	10280 (8060 to 12500)	182.41 (145.28 to 220.48)	-1.32 (-1.55 to -1.08)	<0.001
Romania	33180 (26940 to 39670)	112.78 (91.26 to 134.18)	32290 (25760 to 38690)	103.55 (83.71 to 122.87)	-0.41 (-0.46 to -0.36)	<0.001
Russian Federation	204880 (169180 to 242410)	107.87 (88.83 to 127.3)	251530 (208940 to 297180)	122.73 (101.21 to 146.26)	0.67 (0.39 to 0.96)	<0.001
Rwanda	1540 (1080 to 2050)	44.81 (31.03 to 59.06)	2690 (1880 to 3600)	35.78 (24.58 to 46.96)	-1.06 (-1.12 to -1)	<0.001
Saint Kitts and Nevis	20 (20 to 30)	54.58 (43.52 to 65.75)	40 (30 to 40)	46.92 (36.83 to 56.42)	-0.76 (-0.88 to -0.65)	<0.001
Saint Lucia	60 (50 to 70)	48.87 (39.96 to 57.9)	100 (80 to 120)	42.69 (34.75 to 50.8)	-0.67 (-0.71 to -0.62)	<0.001
Saint Vincent and the Grenadines	30 (30 to 40)	36.27 (28.89 to 43.66)	50 (40 to 60)	38.14 (31.31 to 45.37)	0.25 (0.21 to 0.29)	<0.001
Samoa	20 (20 to 30)	20.5 (13.83 to 27.98)	30 (20 to 40)	20.17 (13.83 to 27.16)	-0.08 (-0.12 to -0.04)	<0.001
San Marino	20 (10 to 20)	44.24 (35.57 to 52.9)	20 (20 to 30)	40.08 (32.31 to 47.57)	-0.48 (-0.51 to -0.44)	<0.001
Sao Tome and Principe	40 (30 to 50)	47.99 (34.25 to 63.04)	60 (40 to 80)	45.18 (31.12 to 60.53)	-0.28 (-0.31 to -0.25)	<0.001
Saudi Arabia	500 (320 to 710)	5.24 (3.29 to 7.54)	1090 (700 to 1560)	4.62 (2.95 to 6.62)	-0.58 (-0.64 to -0.53)	<0.001
Senegal	1280 (890 to 1740)	25.87 (17.5 to 35.22)	2140 (1490 to 2890)	23.56 (16.15 to 31.71)	-0.45 (-0.52 to -0.38)	<0.001
Serbia	4820 (3780 to 5860)	36.83 (29.13 to 44.3)	4660 (3680 to 5590)	33.3 (26.79 to 39.54)	-0.49 (-0.51 to -0.47)	<0.001
Seychelles	30 (20 to 40)	42.29 (30.53 to 54.91)	50 (40 to 70)	39.27 (27.83 to 51.73)	-0.36 (-0.42 to -0.3)	<0.001
Sierra Leone	740 (520 to 970)	30.5 (21.29 to 40.49)	1160 (810 to 1530)	24.75 (17.43 to 32.81)	-1 (-1.07 to -0.93)	<0.001
Singapore	260 (180 to 350)	6.71 (4.73 to 9.1)	450 (310 to 610)	5.2 (3.67 to 7.01)	-1.32 (-2.19 to -0.44)	0.003
Slovakia	5690 (4620 to 6670)	87.78 (70.82 to 103.32)	6570 (5330 to 7870)	79.22 (63.77 to 95.04)	-0.48 (-0.6 to -0.35)	<0.001
Slovenia	2720 (2200 to 3250)	98.9 (79.85 to 118.11)	2040 (1620 to 2450)	57.26 (46.13 to 67.79)	-2.57 (-2.69 to -2.46)	<0.001

Solomon Islands	70 (50 to 100)	28.28 (18.86 to 39.04)	150 (100 to 210)	30.84 (20.83 to 42.06)	0.41 (0.31 to 0.51)	<0.001
Somalia	1550 (1030 to 2150)	38 (25.24 to 52.38)	2720 (1870 to 3720)	33.62 (23.27 to 45.71)	-0.6 (-0.64 to -0.55)	<0.001
South Africa	7770 (6190 to 9530)	23.89 (19.19 to 29.24)	7890 (6280 to 9660)	15.02 (12.05 to 18.36)	-2.18 (-2.3 to -2.06)	<0.001
South Sudan	940 (660 to 1270)	30.82 (20.49 to 42.25)	1420 (960 to 1920)	30.84 (20.48 to 42.15)	0 (-0.03 to 0.02)	0.768
Spain	32650 (28130 to 37380)	56.74 (48.84 to 64.91)	26840 (22300 to 31070)	34.47 (28.73 to 39.7)	-2.33 (-2.48 to -2.19)	<0.001
Sri Lanka	6780 (4720 to 9240)	39.83 (28.14 to 53.1)	7170 (5070 to 9390)	26.38 (18.81 to 34.5)	-1.95 (-2.03 to -1.87)	<0.001
Sudan	610 (390 to 870)	4.7 (3 to 6.8)	870 (570 to 1240)	3.79 (2.44 to 5.44)	-1.05 (-1.12 to -0.97)	<0.001
Suriname	190 (160 to 230)	53.89 (42.96 to 64.34)	310 (240 to 370)	47.37 (37.29 to 56.93)	-0.62 (-0.64 to -0.6)	<0.001
Sweden	5030 (4240 to 5930)	38.83 (32.82 to 45.47)	5590 (4660 to 6600)	33.29 (27.66 to 39.01)	-0.73 (-0.77 to -0.69)	<0.001
Switzerland	4200 (3390 to 5000)	40.89 (32.82 to 48.72)	3820 (3040 to 4550)	26.35 (21.18 to 31.36)	-2.07 (-2.25 to -1.89)	<0.001
Syrian Arab Republic	310 (200 to 450)	3.76 (2.45 to 5.35)	520 (340 to 750)	3.77 (2.46 to 5.35)	-0.01 (-0.07 to 0.05)	0.649
Türkiye	1250 (820 to 1790)	2.38 (1.56 to 3.4)	2000 (1270 to 2960)	2.08 (1.34 to 3.05)	-0.65 (-0.75 to -0.54)	<0.001
Taiwan (Province of China)	18670 (13540 to 24710)	77.95 (57.07 to 103.32)	19360 (13380 to 25480)	51.01 (35.72 to 67.38)	-2.01 (-2.08 to -1.95)	<0.001
Tajikistan	2350 (1810 to 2920)	67.14 (51.96 to 82.71)	4720 (3630 to 5810)	66.36 (51.09 to 81.5)	-0.03 (-0.16 to 0.09)	0.589
Thailand	20320 (14570 to 26440)	33.43 (24.14 to 43.52)	36160 (25560 to 46740)	35.52 (25.04 to 46.47)	0.31 (0.26 to 0.35)	<0.001
Timor-Leste	110 (80 to 150)	21.63 (14.73 to 29.51)	210 (150 to 290)	22.75 (15.87 to 30.54)	0.25 (0.23 to 0.28)	<0.001
Togo	640 (440 to 850)	29.12 (20.33 to 38.77)	1290 (900 to 1710)	25.98 (18.15 to 34.63)	-0.54 (-0.6 to -0.48)	<0.001
Tokelau	0 (0 to 0)	16.25 (11.23 to 22.47)	0 (0 to 0)	16.76 (11.54 to 22.95)	0.15 (0.1 to 0.2)	<0.001
Tonga	20 (10 to 20)	24.31 (16.7 to 33.39)	20 (10 to 30)	22.95 (15.71 to 31.51)	-0.27 (-0.3 to 0.25)	<0.001
Trinidad and Tobago	400 (320 to 480)	33.39 (27.11 to 39.95)	560 (440 to 670)	29.76 (23.73 to 35.86)	-0.56 (-0.58 to -0.53)	<0.001
Tunisia	310 (200 to 450)	4.22 (2.67 to 6.01)	550 (350 to 790)	4.06 (2.56 to 5.75)	-0.21 (-0.25 to -0.17)	<0.001
Turkmenistan	2790 (2120 to 3420)	99.26 (78.14 to 120.75)	6310 (4830 to 7690)	130.18 (100.91 to 157.4)	1.35 (1.29 to 1.41)	<0.001
Tuvalu	0 (0 to 0)	19.74 (13.41 to 26.93)	0 (0 to 0)	20.28 (13.9 to 27.46)	0.14 (0.12 to 0.16)	<0.001
Uganda	3140 (2200 to 4190)	34.92 (24.02 to 46.42)	5870 (4150 to 7850)	32.72 (22.97 to 43.33)	-0.31 (-0.42 to -0.21)	<0.001
Ukraine	74280 (59680 to 89820)	115.72 (92.8 to 141.03)	90650 (73750 to 109440)	146.5 (118.14 to 178.47)	1.21 (0.9 to 1.53)	<0.001
United Arab Emirates	50 (30 to 80)	4.28 (2.66 to 6.34)	320 (190 to 470)	4.33 (2.72 to 6.2)	0.02 (-0.06 to 0.09)	0.681
United Kingdom	44910 (37760 to 52360)	57.83 (48.42 to 67.36)	56660 (47310 to 66450)	58.01 (48.15 to 68.24)	-0.02 (-0.12 to 0.08)	0.65
United Republic of Tanzania	5160 (3590 to 6910)	32.47 (22.45 to 42.95)	8590 (6030 to 11650)	28.7 (19.72 to 38.54)	-0.58 (-0.78 to -0.37)	<0.001
United States of America	167600 (140240 to 196740)	48.9 (40.91 to 57.54)	227730 (186700 to 273740)	44.79 (36.94 to 53.33)	-0.45 (-0.61 to -0.29)	<0.001
United States Virgin Islands	70 (50 to 80)	52.4 (41.95 to 62.71)	80 (70 to 100)	53.76 (43.02 to 64.44)	0.12 (0.04 to 0.21)	0.003
Uruguay	950 (700 to 1200)	23.8 (17.62 to 29.8)	920 (680 to 1160)	19 (14.07 to 23.89)	-1.08 (-1.14 to -1.03)	<0.001
Uzbekistan	18670 (14570 to 22980)	116.06 (89.45 to 141.74)	38830 (30260 to 47360)	125.52 (99.39 to 151.72)	0.39 (0.35 to 0.43)	<0.001
Vanuatu	20 (20 to 30)	21.71 (14.5 to 29.82)	40 (30 to 60)	19.72 (13.16 to 27.21)	-0.45 (-0.51 to -0.39)	<0.001
Venezuela (Bolivarian Republic of)	7390 (5840 to 8950)	46.03 (36.31 to 54.95)	14380 (11130 to 17460)	45.57 (35.39 to 55.14)	-0.09 (-0.18 to 0)	0.047
Viet Nam	17140 (12140 to 22890)	30.38 (21.3 to 40.14)	42020 (29700 to 55410)	38.43 (27.76 to 50.2)	1.12 (1.05 to 1.19)	<0.001
Yemen	340 (210 to 500)	4.53 (2.8 to 6.53)	590 (380 to 840)	3.53 (2.23 to 5.12)	-1.22 (-1.37 to -1.07)	<0.001
Zambia	1960 (1360 to 2640)	49.81 (34.41 to 66.73)	3890 (2740 to 5150)	44.85 (30.88 to 59.59)	-0.47 (-0.58 to -0.36)	<0.001
Zimbabwe	1720 (1220 to 2260)	30.18 (21.01 to 39.77)	2150 (1500 to 2900)	25.34 (17.77 to 33.39)	-0.82 (-0.92 to -0.73)	<0.001

Abbreviation: APC: annual percent change; ASPR: age-standardized prevalence rate; CI: confidence interval; UI: uncertainty interval

Supplementary Table 4: Prevalence, age-standardized prevalence rates, temporal progression of primary liver cancer from alcohol from 2000 to 2021, classified by country/ territory

Country	2000 Prevalence (95% UI)	2000 ASPR (95% UI)	2021 Prevalence (95% UI)	2021 ASPR (95% UI)	2000 to 2021 APC (95% CI)	p
Afghanistan	30 (20 to 50)	0.4 (0.22 to 0.68)	40 (30 to 70)	0.44 (0.25 to 0.7)	0.41 (0.38 to 0.44)	<0.001
Albania	80 (50 to 120)	2.85 (1.87 to 4.16)	120 (70 to 190)	2.71 (1.65 to 4.14)	-0.25 (-0.35 to -0.15)	<0.001
Algeria	20 (10 to 30)	0.12 (0.08 to 0.18)	60 (40 to 100)	0.17 (0.1 to 0.27)	1.73 (1.64 to 1.81)	<0.001
American Samoa	0 (0 to 0)	0.55 (0.36 to 0.81)	0 (0 to 0)	0.67 (0.42 to 1.03)	0.95 (0.68 to 1.22)	<0.001
Andorra	0 (0 to 10)	4.69 (3.1 to 6.7)	10 (0 to 10)	4.45 (2.78 to 6.56)	-0.29 (-0.46 to -0.12)	0.001
Angola	100 (10 to 300)	1.74 (0.23 to 5.15)	200 (40 to 520)	1.45 (0.3 to 3.91)	-0.86 (-0.91 to -0.82)	<0.001
Antigua and Barbuda	0 (0 to 0)	0.75 (0.56 to 0.97)	0 (0 to 0)	0.93 (0.71 to 1.17)	1.17 (0.78 to 1.56)	<0.001
Argentina	80 (60 to 100)	0.21 (0.16 to 0.27)	190 (140 to 250)	0.34 (0.25 to 0.45)	2.38 (2.08 to 2.68)	<0.001
Armenia	60 (40 to 80)	1.74 (1.19 to 2.41)	70 (50 to 100)	1.57 (1.09 to 2.16)	-0.45 (-0.87 to -0.03)	0.036
Australia	410 (320 to 510)	1.72 (1.34 to 2.13)	1550 (1200 to 1930)	3.76 (2.95 to 4.69)	3.78 (3.44 to 4.11)	<0.001
Austria	400 (340 to 480)	3.28 (2.79 to 3.86)	860 (700 to 1020)	5.12 (4.23 to 6.06)	2.18 (2.06 to 2.3)	<0.001
Azerbaijan	100 (60 to 150)	1.57 (0.92 to 2.5)	250 (130 to 440)	2.29 (1.22 to 3.88)	1.83 (1.76 to 1.89)	<0.001
Bahamas	0 (0 to 0)	1.04 (0.77 to 1.35)	0 (0 to 10)	1 (0.74 to 1.33)	-0.25 (-0.39 to -0.1)	0.001
Bahrain	0 (0 to 0)	0.68 (0.44 to 1.04)	0 (0 to 10)	0.5 (0.3 to 0.76)	-1.55 (-1.75 to -1.35)	<0.001
Bangladesh	270 (180 to 420)	0.43 (0.28 to 0.65)	620 (380 to 940)	0.43 (0.26 to 0.65)	-0.01 (-0.04 to 0.03)	0.725
Barbados	0 (0 to 0)	0.67 (0.5 to 0.86)	0 (0 to 10)	0.89 (0.63 to 1.21)	1.33 (1.26 to 1.39)	<0.001
Belarus	130 (100 to 170)	0.95 (0.72 to 1.22)	180 (130 to 240)	1.12 (0.79 to 1.51)	0.79 (0.64 to 0.93)	<0.001
Belgium	230 (180 to 290)	1.41 (1.11 to 1.76)	430 (330 to 540)	2.03 (1.56 to 2.55)	1.71 (1.39 to 2.03)	<0.001
Belize	0 (0 to 0)	0.81 (0.6 to 1.06)	0 (0 to 0)	0.7 (0.5 to 0.92)	-0.83 (-1.07 to -0.58)	<0.001
Benin	100 (50 to 150)	3.48 (1.82 to 5.75)	120 (80 to 180)	2.07 (1.3 to 3.12)	-2.44 (-2.6 to -2.29)	<0.001
Bermuda	0 (0 to 0)	0.8 (0.62 to 0.98)	0 (0 to 0)	0.7 (0.52 to 0.9)	-0.59 (-0.75 to -0.42)	<0.001
Bhutan	0 (0 to 10)	0.89 (0.5 to 1.46)	10 (0 to 10)	0.9 (0.53 to 1.38)	0.06 (0.02 to 0.1)	0.002
Bolivia (Plurinational State of)	40 (20 to 50)	0.75 (0.48 to 1.16)	80 (50 to 130)	0.91 (0.55 to 1.44)	0.92 (0.87 to 0.98)	<0.001
Bosnia and Herzegovina	110 (80 to 160)	2.01 (1.41 to 2.8)	140 (100 to 200)	2.24 (1.54 to 3.12)	0.54 (0.42 to 0.68)	<0.001
Botswana	10 (0 to 40)	1.65 (0.58 to 4.46)	20 (10 to 40)	1.13 (0.51 to 2.49)	-1.84 (-1.98 to -1.7)	<0.001
Brazil	620 (550 to 710)	0.47 (0.42 to 0.54)	1470 (1270 to 1680)	0.58 (0.49 to 0.66)	0.94 (0.78 to 1.1)	<0.001
Brunei Darussalam	0 (0 to 0)	1.1 (0.65 to 1.69)	0 (0 to 10)	0.89 (0.57 to 1.37)	-1.07 (-1.16 to -0.97)	<0.001
Bulgaria	290 (210 to 360)	2.13 (1.61 to 2.73)	220 (150 to 300)	1.63 (1.16 to 2.26)	-1.15 (-1.45 to -0.85)	<0.001
Burkina Faso	300 (120 to 570)	5.34 (2.16 to 10.18)	400 (170 to 690)	3.9 (1.69 to 6.66)	-1.5 (-1.59 to -1.4)	<0.001
Burundi	30 (10 to 50)	0.98 (0.56 to 1.85)	30 (20 to 60)	0.53 (0.28 to 1.15)	-2.91 (-3.21 to -2.61)	<0.001
Côte d'Ivoire	90 (60 to 130)	1.34 (0.91 to 1.97)	100 (60 to 170)	0.83 (0.46 to 1.36)	-2.27 (-2.43 to -2.11)	<0.001
Cabo Verde	10 (0 to 10)	1.83 (1.2 to 2.78)	10 (10 to 20)	2.39 (1.46 to 3.61)	1.28 (1.21 to 1.36)	<0.001
Cambodia	80 (40 to 180)	1.28 (0.61 to 2.75)	220 (100 to 450)	1.64 (0.77 to 3.32)	1.2 (1.02 to 1.38)	<0.001
Cameroon	220 (130 to 380)	3.34 (1.95 to 5.86)	350 (180 to 650)	2.45 (1.26 to 4.47)	-1.52 (-1.89 to -1.16)	<0.001
Canada	810 (670 to 960)	2.01 (1.67 to 2.39)	2590 (2120 to 3080)	3.83 (3.17 to 4.55)	3.11 (2.94 to 3.28)	<0.001
Central African Republic	30 (10 to 60)	1.82 (0.8 to 3.5)	30 (10 to 50)	0.99 (0.39 to 2.07)	-2.89 (-2.96 to -2.81)	<0.001
Chad	110 (50 to 210)	3.16 (1.38 to 5.71)	150 (80 to 260)	2.33 (1.28 to 4.3)	-1.52 (-1.7 to -1.34)	<0.001
Chile	60 (50 to 80)	0.47 (0.34 to 0.6)	270 (190 to 350)	1.03 (0.75 to 1.34)	3.88 (3.55 to 4.2)	<0.001
China	11620 (9280 to 14420)	0.97 (0.78 to 1.2)	26240 (19420 to 34990)	1.21 (0.9 to 1.59)	1.03 (0.85 to 1.21)	<0.001
Colombia	120 (90 to 150)	0.44 (0.33 to 0.58)	350 (240 to 460)	0.63 (0.44 to 0.83)	1.67 (1.57 to 1.76)	<0.001

Comoros	0 (0 to 0)	0.82 (0.47 to 1.33)	0 (0 to 10)	0.68 (0.37 to 1.13)	-0.91 (-1.1 to -0.72)	<0.001
Congo	20 (10 to 40)	1.51 (0.75 to 2.59)	40 (20 to 70)	1.15 (0.56 to 2.26)	-1.3 (-1.45 to -1.14)	<0.001
Cook Islands	0 (0 to 0)	1.35 (0.91 to 1.99)	0 (0 to 0)	2.91 (1.9 to 4.58)	3.72 (3.49 to 3.94)	<0.001
Costa Rica	30 (20 to 40)	1.17 (0.86 to 1.51)	100 (70 to 130)	1.74 (1.28 to 2.3)	1.89 (1.76 to 2.02)	<0.001
Croatia	100 (80 to 130)	1.42 (1.12 to 1.79)	150 (120 to 200)	1.74 (1.32 to 2.25)	0.93 (0.45 to 1.41)	<0.001
Cuba	70 (50 to 90)	0.54 (0.4 to 0.7)	100 (70 to 130)	0.52 (0.38 to 0.67)	-0.23 (-0.35 to -0.1)	<0.001
Cyprus	10 (10 to 20)	1.28 (0.94 to 1.7)	30 (20 to 50)	1.48 (1.01 to 2.19)	0.7 (0.57 to 0.83)	<0.001
Czechia	270 (220 to 330)	1.78 (1.44 to 2.14)	290 (220 to 370)	1.35 (1.03 to 1.76)	-1.31 (-1.43 to -1.2)	<0.001
Democratic People's Republic of Korea	170 (80 to 290)	0.72 (0.36 to 1.23)	200 (120 to 330)	0.59 (0.34 to 0.95)	-0.97 (-1.04 to -0.89)	<0.001
Democratic Republic of the Congo	110 (50 to 260)	0.49 (0.21 to 1.19)	180 (70 to 430)	0.43 (0.17 to 1.02)	-0.63 (-0.72 to -0.55)	<0.001
Denmark	130 (100 to 160)	1.6 (1.23 to 1.99)	220 (160 to 290)	1.9 (1.43 to 2.43)	0.82 (0.74 to 0.9)	<0.001
Djibouti	0 (0 to 0)	0.86 (0.48 to 1.43)	10 (0 to 10)	0.77 (0.45 to 1.3)	-0.5 (-0.56 to -0.43)	<0.001
Dominica	0 (0 to 0)	0.95 (0.69 to 1.28)	0 (0 to 0)	1.15 (0.76 to 1.64)	0.89 (0.73 to 1.04)	<0.001
Dominican Republic	20 (20 to 30)	0.44 (0.31 to 0.6)	60 (40 to 90)	0.61 (0.42 to 0.88)	1.6 (1.27 to 1.94)	<0.001
Ecuador	40 (30 to 50)	0.46 (0.33 to 0.62)	110 (70 to 150)	0.65 (0.45 to 0.91)	1.75 (1.25 to 2.26)	<0.001
Egypt	420 (260 to 650)	1.13 (0.69 to 1.75)	1160 (700 to 1920)	1.66 (1 to 2.68)	1.88 (1.81 to 1.95)	<0.001
El Salvador	10 (10 to 20)	0.32 (0.23 to 0.43)	30 (20 to 30)	0.42 (0.29 to 0.57)	1.23 (1.1 to 1.37)	<0.001
Equatorial Guinea	0 (0 to 0)	0.41 (0.19 to 0.9)	10 (0 to 10)	0.91 (0.51 to 1.69)	3.88 (3.74 to 4.03)	<0.001
Eritrea	10 (10 to 20)	0.8 (0.46 to 1.42)	20 (10 to 40)	0.59 (0.33 to 1.11)	-1.44 (-1.49 to -1.39)	<0.001
Estonia	30 (20 to 40)	1.33 (0.99 to 1.71)	40 (30 to 50)	1.68 (1.28 to 2.16)	1.16 (1.07 to 1.26)	<0.001
Eswatini	20 (10 to 40)	4.85 (2.39 to 8.3)	30 (10 to 70)	4.19 (1.42 to 9.73)	-0.73 (-0.91 to -0.54)	<0.001
Ethiopia	140 (100 to 220)	0.51 (0.36 to 0.84)	190 (130 to 320)	0.42 (0.28 to 0.69)	-1.05 (-1.19 to -0.91)	<0.001
Fiji	0 (0 to 0)	0.42 (0.28 to 0.63)	0 (0 to 10)	0.57 (0.33 to 0.91)	1.58 (1.43 to 1.73)	<0.001
Finland	170 (130 to 220)	2.1 (1.58 to 2.69)	460 (330 to 590)	3.69 (2.7 to 4.75)	2.75 (2.49 to 3.01)	<0.001
France	2560 (1920 to 3240)	2.85 (2.12 to 3.57)	4380 (3120 to 5820)	3.51 (2.53 to 4.67)	0.97 (0.93 to 1.02)	<0.001
Gabon	10 (10 to 30)	2.02 (0.93 to 3.78)	20 (10 to 40)	1.84 (0.99 to 3.19)	-0.47 (-0.54 to -0.4)	<0.001
Gambia	30 (20 to 50)	5.83 (3.85 to 8.36)	70 (40 to 110)	6.07 (3.38 to 10)	0.18 (0.09 to 0.27)	<0.001
Georgia	60 (50 to 90)	1 (0.71 to 1.37)	70 (50 to 100)	1.25 (0.89 to 1.66)	0.98 (0.25 to 1.71)	0.009
Germany	3900 (3210 to 4570)	2.77 (2.32 to 3.25)	7230 (5580 to 8910)	4.01 (3.16 to 4.91)	1.74 (1.6 to 1.88)	<0.001
Ghana	230 (150 to 320)	2.32 (1.6 to 3.31)	270 (160 to 420)	1.44 (0.86 to 2.34)	-2.26 (-2.36 to -2.17)	<0.001
Greece	190 (140 to 240)	1.05 (0.78 to 1.34)	330 (240 to 440)	1.56 (1.14 to 2.08)	1.86 (1.76 to 1.97)	<0.001
Greenland	0 (0 to 0)	2.22 (1.6 to 2.92)	0 (0 to 0)	2.51 (1.79 to 3.44)	0.58 (0.47 to 0.69)	<0.001
Grenada	0 (0 to 0)	0.86 (0.66 to 1.12)	0 (0 to 0)	1.38 (1.03 to 1.79)	2.25 (1.99 to 2.5)	<0.001
Guam	0 (0 to 0)	0.49 (0.33 to 0.69)	0 (0 to 0)	0.87 (0.57 to 1.29)	2.77 (2.65 to 2.88)	<0.001
Guatemala	30 (20 to 40)	0.52 (0.37 to 0.67)	130 (90 to 180)	1.16 (0.83 to 1.57)	4.09 (3.7 to 4.48)	<0.001
Guinea	160 (110 to 230)	3.5 (2.36 to 5.22)	180 (100 to 290)	2.9 (1.74 to 4.78)	-0.88 (-0.96 to -0.79)	<0.001
Guinea-Bissau	30 (10 to 40)	5.31 (2.09 to 8.82)	30 (20 to 40)	3.36 (1.89 to 5.2)	-2.15 (-2.18 to -2.12)	<0.001
Guyana	0 (0 to 0)	0.85 (0.63 to 1.09)	0 (0 to 10)	0.7 (0.46 to 0.99)	-0.91 (-1.07 to -0.74)	<0.001
Haiti	20 (10 to 30)	0.39 (0.19 to 0.78)	30 (10 to 60)	0.37 (0.18 to 0.74)	-0.21 (-0.28 to -0.14)	<0.001
Honduras	10 (10 to 30)	0.51 (0.29 to 0.9)	50 (30 to 80)	0.76 (0.48 to 1.2)	1.94 (1.88 to 1.99)	<0.001
Hungary	130 (110 to 170)	0.86 (0.68 to 1.09)	150 (110 to 190)	0.78 (0.58 to 1.04)	-0.49 (-0.61 to -0.37)	<0.001
Iceland	0 (0 to 0)	1.07 (0.8 to 1.4)	10 (10 to 20)	2.31 (1.72 to 3)	3.76 (3.53 to 3.99)	<0.001

India	3640 (2970 to 4460)	0.53 (0.43 to 0.66)	9580 (7840 to 11720)	0.76 (0.63 to 0.93)	1.74 (1.62 to 1.87)	<0.001
Indonesia	880 (580 to 1330)	0.61 (0.41 to 0.92)	1870 (1170 to 3100)	0.69 (0.43 to 1.16)	0.64 (0.59 to 0.68)	<0.001
Iran (Islamic Republic of)	60 (50 to 90)	0.17 (0.13 to 0.25)	170 (140 to 210)	0.23 (0.18 to 0.28)	1.13 (0.48 to 1.79)	0.001
Iraq	30 (20 to 50)	0.31 (0.19 to 0.48)	110 (60 to 170)	0.46 (0.26 to 0.7)	1.89 (1.74 to 2.04)	<0.001
Ireland	50 (40 to 70)	1.16 (0.9 to 1.45)	140 (100 to 180)	1.78 (1.37 to 2.26)	2.04 (1.89 to 2.19)	<0.001
Israel	40 (30 to 60)	0.64 (0.47 to 0.85)	90 (70 to 130)	0.79 (0.57 to 1.05)	1.02 (0.91 to 1.13)	<0.001
Italy	2860 (2540 to 3230)	2.92 (2.61 to 3.31)	2710 (2360 to 3200)	2.23 (1.91 to 2.61)	-1.35 (-1.74 to -0.96)	<0.001
Jamaica	10 (10 to 10)	0.4 (0.29 to 0.54)	10 (10 to 20)	0.48 (0.31 to 0.68)	0.79 (0.71 to 0.87)	<0.001
Japan	9000 (7910 to 10440)	3.97 (3.49 to 4.59)	8060 (6750 to 9800)	2.36 (1.99 to 2.82)	-2.51 (-2.62 to -2.39)	<0.001
Jordan	0 (0 to 10)	0.18 (0.11 to 0.28)	10 (10 to 20)	0.14 (0.08 to 0.23)	-1.19 (-1.25 to -1.14)	<0.001
Kazakhstan	440 (320 to 580)	3.28 (2.37 to 4.27)	260 (170 to 350)	1.34 (0.92 to 1.83)	-4.23 (-4.9 to -3.56)	<0.001
Kenya	90 (60 to 170)	0.74 (0.49 to 1.36)	240 (180 to 330)	0.92 (0.69 to 1.28)	1.08 (1 to 1.17)	<0.001
Kiribati	0 (0 to 0)	0.69 (0.45 to 1.01)	0 (0 to 0)	0.54 (0.34 to 0.87)	-1.15 (-1.32 to -0.98)	<0.001
Kuwait	0 (0 to 0)	0.24 (0.16 to 0.36)	0 (0 to 0)	0.12 (0.08 to 0.18)	-3.42 (-3.6 to -3.25)	<0.001
Kyrgyzstan	30 (20 to 40)	0.79 (0.53 to 1.09)	40 (30 to 60)	0.87 (0.59 to 1.21)	0.35 (-0.33 to 1.03)	0.316
Lao People's Democratic Republic	50 (30 to 80)	1.94 (1.15 to 3)	90 (50 to 140)	1.81 (1.08 to 2.67)	-0.33 (-0.37 to -0.29)	<0.001
Latvia	40 (30 to 50)	1.01 (0.75 to 1.29)	50 (40 to 70)	1.49 (1.14 to 1.9)	1.91 (1.57 to 2.24)	<0.001
Lebanon	10 (0 to 10)	0.22 (0.13 to 0.33)	10 (10 to 20)	0.22 (0.13 to 0.34)	0.18 (0.11 to 0.26)	<0.001
Lesotho	30 (10 to 60)	2.55 (1.21 to 5.45)	40 (10 to 100)	3.04 (1.03 to 7.7)	0.79 (0.42 to 1.16)	<0.001
Liberia	50 (30 to 80)	3.82 (1.95 to 6.33)	80 (50 to 130)	3.34 (2 to 5.19)	-0.64 (-0.79 to -0.49)	<0.001
Libya	10 (10 to 20)	0.48 (0.3 to 0.74)	30 (20 to 50)	0.62 (0.39 to 1)	1.17 (1.12 to 1.22)	<0.001
Lithuania	50 (40 to 60)	0.98 (0.75 to 1.24)	90 (70 to 120)	1.77 (1.35 to 2.24)	2.92 (2.64 to 3.19)	<0.001
Luxembourg	10 (10 to 10)	1.7 (1.35 to 2.09)	20 (20 to 30)	2.21 (1.67 to 2.78)	1.29 (1.11 to 1.47)	<0.001
Madagascar	40 (20 to 70)	0.58 (0.32 to 1.03)	60 (30 to 110)	0.47 (0.25 to 0.86)	-0.96 (-1.06 to -0.85)	<0.001
Malawi	60 (40 to 90)	1.31 (0.84 to 1.89)	80 (60 to 120)	1.02 (0.65 to 1.51)	-1.22 (-1.31 to -1.13)	<0.001
Malaysia	110 (70 to 160)	0.83 (0.54 to 1.22)	250 (160 to 400)	0.85 (0.53 to 1.31)	0.11 (0.03 to 0.19)	0.009
Maldives	0 (0 to 0)	1.3 (0.86 to 1.9)	0 (0 to 0)	1.02 (0.62 to 1.46)	-1.14 (-1.26 to -1.02)	<0.001
Mali	200 (130 to 290)	4.04 (2.69 to 5.85)	390 (250 to 590)	4.06 (2.62 to 6.21)	0.01 (-0.13 to 0.15)	0.874
Malta	0 (0 to 10)	0.79 (0.56 to 1.04)	10 (10 to 20)	1.36 (0.99 to 1.8)	2.6 (2.51 to 2.69)	<0.001
Marshall Islands	0 (0 to 0)	0.42 (0.21 to 0.77)	0 (0 to 0)	0.47 (0.25 to 0.91)	0.6 (0.39 to 0.81)	<0.001
Mauritania	50 (10 to 110)	4.21 (1.1 to 8.55)	60 (30 to 100)	2.73 (1.27 to 4.6)	-2.07 (-2.16 to -1.98)	<0.001
Mauritius	0 (0 to 0)	0.3 (0.21 to 0.4)	0 (0 to 0)	0.17 (0.12 to 0.23)	-2.78 (-3.11 to -2.44)	<0.001
Mexico	350 (300 to 400)	0.56 (0.49 to 0.65)	1010 (820 to 1210)	0.78 (0.63 to 0.93)	1.51 (1.42 to 1.61)	<0.001
Micronesia (Federated States of)	0 (0 to 0)	0.7 (0.41 to 1.2)	0 (0 to 0)	0.61 (0.34 to 1.16)	-0.67 (-0.79 to -0.55)	<0.001
Monaco	0 (0 to 0)	2.67 (1.72 to 4.09)	0 (0 to 10)	3.82 (2.39 to 5.81)	1.69 (1.62 to 1.76)	<0.001
Mongolia	150 (90 to 230)	11.98 (6.99 to 19.13)	430 (280 to 650)	17.07 (11.56 to 25.43)	1.73 (1.56 to 1.9)	<0.001
Montenegro	20 (10 to 20)	2.14 (1.48 to 2.95)	30 (20 to 40)	2.52 (1.65 to 3.55)	0.79 (0.7 to 0.88)	<0.001
Morocco	10 (0 to 10)	0.04 (0.03 to 0.07)	20 (10 to 30)	0.05 (0.03 to 0.09)	1.04 (0.96 to 1.12)	<0.001
Mozambique	310 (200 to 460)	4.3 (2.81 to 6.44)	490 (230 to 1080)	4.23 (2.02 to 9.38)	-0.09 (-0.16 to -0.02)	0.015
Myanmar	140 (70 to 300)	0.45 (0.23 to 0.98)	290 (140 to 640)	0.55 (0.27 to 1.21)	0.97 (0.89 to 1.04)	<0.001
Namibia	10 (0 to 10)	0.67 (0.44 to 0.99)	10 (10 to 20)	0.71 (0.45 to 1.03)	0.27 (0.15 to 0.39)	<0.001
Nauru	0 (0 to 0)	0.87 (0.52 to 1.38)	0 (0 to 0)	0.82 (0.46 to 1.38)	-0.23 (-0.47 to 0.01)	0.061

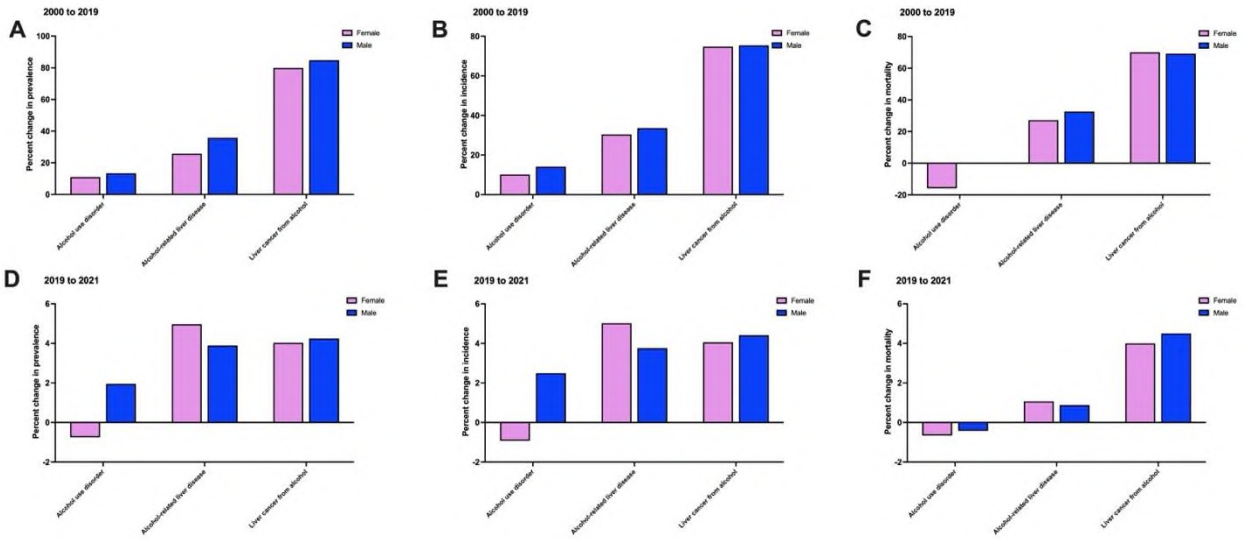
Nepal	50 (30 to 80)	0.4 (0.25 to 0.65)	200 (120 to 310)	0.81 (0.47 to 1.25)	3.39 (3.24 to 3.55)	<0.001
Netherlands	150 (120 to 180)	0.67 (0.54 to 0.81)	370 (290 to 470)	1.1 (0.87 to 1.38)	2.35 (2.22 to 2.49)	<0.001
New Zealand	110 (90 to 120)	2.27 (2 to 2.58)	300 (250 to 340)	3.82 (3.21 to 4.44)	2.45 (2.21 to 2.69)	<0.001
Nicaragua	10 (10 to 20)	0.51 (0.35 to 0.72)	40 (30 to 60)	0.81 (0.53 to 1.18)	2.33 (2.06 to 2.59)	<0.001
Niger	100 (50 to 190)	2.43 (1.21 to 4.59)	120 (70 to 220)	1.39 (0.84 to 2.49)	-2.64 (-2.7 to -2.58)	<0.001
Nigeria	550 (260 to 1000)	0.97 (0.48 to 1.78)	790 (510 to 1150)	0.82 (0.55 to 1.17)	-0.87 (-0.98 to -0.77)	<0.001
Niue	0 (0 to 0)	0.72 (0.44 to 1.13)	0 (0 to 0)	0.79 (0.45 to 1.4)	0.35 (0.21 to 0.49)	<0.001
North Macedonia	70 (60 to 100)	3.12 (2.35 to 4.07)	100 (70 to 140)	3.04 (2.08 to 4.15)	-0.12 (-0.2 to -0.03)	0.012
Northern Mariana Islands	0 (0 to 0)	0.62 (0.41 to 0.92)	0 (0 to 0)	0.94 (0.59 to 1.49)	2 (1.7 to 2.29)	<0.001
Norway	60 (50 to 70)	0.9 (0.8 to 1.03)	190 (170 to 210)	2.04 (1.81 to 2.31)	3.94 (3.75 to 4.13)	<0.001
Oman	0 (0 to 10)	0.4 (0.25 to 0.63)	10 (10 to 10)	0.39 (0.25 to 0.59)	-0.1 (-0.18 to -0.02)	0.019
Pakistan	430 (320 to 600)	0.58 (0.42 to 0.81)	810 (580 to 1130)	0.58 (0.41 to 0.79)	0.03 (-0.02 to 0.08)	0.196
Palau	0 (0 to 0)	1.32 (0.81 to 2.08)	0 (0 to 0)	1.21 (0.74 to 1.85)	-0.43 (-0.59 to -0.28)	<0.001
Palestine	10 (10 to 10)	0.68 (0.43 to 1.05)	20 (10 to 20)	0.58 (0.36 to 0.92)	-0.72 (-0.79 to -0.64)	<0.001
Panama	10 (10 to 10)	0.53 (0.39 to 0.66)	40 (30 to 60)	0.99 (0.69 to 1.34)	3.09 (2.9 to 3.29)	<0.001
Papua New Guinea	10 (0 to 30)	0.39 (0.17 to 1.02)	20 (10 to 50)	0.31 (0.12 to 0.87)	-1.11 (-1.16 to -1.06)	<0.001
Paraguay	20 (10 to 30)	0.63 (0.46 to 0.84)	70 (40 to 90)	1.09 (0.71 to 1.57)	2.64 (2.51 to 2.76)	<0.001
Peru	80 (60 to 110)	0.48 (0.33 to 0.65)	240 (160 to 350)	0.73 (0.48 to 1.06)	1.97 (1.72 to 2.22)	<0.001
Philippines	750 (560 to 960)	1.62 (1.21 to 2.04)	1430 (1080 to 1820)	1.6 (1.21 to 2.03)	-0.08 (-0.13 to -0.03)	0.001
Poland	90 (80 to 100)	0.19 (0.17 to 0.21)	540 (470 to 610)	0.78 (0.68 to 0.88)	7.11 (6.33 to 7.89)	<0.001
Portugal	230 (180 to 280)	1.4 (1.09 to 1.72)	510 (390 to 630)	2.39 (1.82 to 2.99)	2.61 (2.55 to 2.68)	<0.001
Puerto Rico	40 (30 to 50)	0.9 (0.66 to 1.15)	70 (50 to 90)	1.12 (0.79 to 1.5)	1.06 (0.82 to 1.3)	<0.001
Qatar	0 (0 to 0)	1.64 (1.03 to 2.55)	10 (10 to 20)	1.69 (0.98 to 2.72)	0.04 (-0.23 to 0.31)	0.755
Republic of Korea	2230 (1570 to 3090)	4.9 (3.42 to 6.63)	5810 (3810 to 8750)	6.12 (4.02 to 9.14)	1.09 (0.94 to 1.23)	<0.001
Republic of Moldova	80 (60 to 100)	1.58 (1.2 to 1.96)	70 (50 to 80)	1.14 (0.9 to 1.42)	-1.53 (-1.79 to -1.26)	<0.001
Romania	200 (150 to 250)	0.64 (0.49 to 0.79)	490 (370 to 610)	1.39 (1.05 to 1.76)	3.89 (3.56 to 4.23)	<0.001
Russian Federation	1360 (1240 to 1490)	0.68 (0.61 to 0.75)	2360 (2070 to 2700)	1 (0.88 to 1.13)	1.91 (1.61 to 2.21)	<0.001
Rwanda	50 (30 to 80)	1.64 (1.04 to 2.46)	70 (40 to 110)	0.96 (0.54 to 1.49)	-2.6 (-3.02 to -2.19)	<0.001
Saint Kitts and Nevis	0 (0 to 0)	0.84 (0.62 to 1.09)	0 (0 to 0)	1.06 (0.73 to 1.39)	1.11 (0.67 to 1.55)	<0.001
Saint Lucia	0 (0 to 0)	0.72 (0.56 to 0.88)	0 (0 to 0)	0.61 (0.44 to 0.81)	-0.73 (-0.99 to -0.48)	<0.001
Saint Vincent and the Grenadines	0 (0 to 0)	0.92 (0.7 to 1.18)	0 (0 to 0)	1.04 (0.77 to 1.34)	0.61 (0.42 to 0.79)	<0.001
Samoa	0 (0 to 0)	0.73 (0.45 to 1.13)	0 (0 to 0)	0.63 (0.38 to 0.99)	-0.69 (-0.81 to -0.57)	<0.001
San Marino	0 (0 to 0)	1.09 (0.79 to 1.45)	0 (0 to 0)	1.36 (0.78 to 2.08)	1.06 (0.98 to 1.15)	<0.001
Sao Tome and Principe	0 (0 to 0)	0.6 (0.39 to 0.88)	0 (0 to 0)	0.47 (0.26 to 0.83)	-1.19 (-1.41 to -0.96)	<0.001
Saudi Arabia	30 (20 to 50)	0.39 (0.24 to 0.61)	60 (40 to 100)	0.33 (0.2 to 0.54)	-0.71 (-0.81 to -0.62)	<0.001
Senegal	80 (40 to 120)	1.67 (0.96 to 2.45)	110 (70 to 160)	1.32 (0.84 to 1.95)	-1.12 (-1.15 to -1.1)	<0.001
Serbia	240 (170 to 330)	1.75 (1.22 to 2.37)	280 (190 to 400)	1.69 (1.13 to 2.38)	-0.18 (-0.3 to -0.06)	0.003
Seychelles	0 (0 to 0)	1.03 (0.71 to 1.46)	0 (0 to 0)	1.09 (0.73 to 1.52)	0.28 (0.08 to 0.49)	0.007
Sierra Leone	80 (30 to 140)	3.35 (1.35 to 6.07)	70 (40 to 110)	1.65 (1 to 2.58)	-3.33 (-3.61 to -3.05)	<0.001
Singapore	30 (20 to 50)	0.96 (0.63 to 1.46)	80 (50 to 130)	0.96 (0.62 to 1.45)	0.03 (-0.07 to 0.13)	0.575
Slovakia	140 (110 to 190)	2.15 (1.59 to 2.83)	170 (120 to 240)	1.82 (1.22 to 2.55)	-0.78 (-0.88 to -0.68)	<0.001
Slovenia	50 (40 to 60)	1.64 (1.23 to 2.06)	90 (70 to 120)	2.12 (1.54 to 2.79)	1.24 (1.19 to 1.3)	<0.001

Solomon Islands	0 (0 to 0)	0.72 (0.31 to 1.47)	0 (0 to 0)	0.57 (0.33 to 1.01)	-1.09 (-1.33 to -0.85)	<0.001
Somalia	60 (20 to 110)	1.57 (0.59 to 3.06)	80 (30 to 170)	1.2 (0.49 to 2.47)	-1.31 (-1.46 to -1.15)	<0.001
South Africa	590 (480 to 690)	1.94 (1.62 to 2.27)	740 (580 to 900)	1.48 (1.18 to 1.82)	-1.35 (-1.62 to -1.08)	<0.001
South Sudan	30 (10 to 50)	0.98 (0.52 to 1.69)	50 (30 to 80)	1.08 (0.61 to 1.75)	0.42 (0.31 to 0.52)	<0.001
Spain	1740 (1310 to 2210)	2.75 (2.06 to 3.49)	2400 (1690 to 3220)	2.83 (2.02 to 3.81)	0.16 (0.06 to 0.26)	0.001
Sri Lanka	70 (50 to 100)	0.47 (0.33 to 0.65)	110 (60 to 170)	0.38 (0.21 to 0.58)	-1.16 (-1.33 to -1)	<0.001
Sudan	50 (20 to 90)	0.39 (0.19 to 0.74)	80 (50 to 130)	0.41 (0.23 to 0.66)	0.25 (0.16 to 0.34)	<0.001
Suriname	0 (0 to 0)	0.73 (0.53 to 0.98)	10 (0 to 10)	0.84 (0.53 to 1.28)	0.68 (0.59 to 0.77)	<0.001
Sweden	80 (70 to 90)	0.52 (0.45 to 0.6)	260 (220 to 310)	1.37 (1.13 to 1.65)	4.87 (4.49 to 5.25)	<0.001
Switzerland	350 (270 to 430)	3.12 (2.38 to 3.89)	490 (360 to 630)	2.87 (2.13 to 3.66)	-0.42 (-0.59 to -0.25)	<0.001
Syrian Arab Republic	40 (30 to 60)	0.58 (0.37 to 0.88)	60 (40 to 100)	0.44 (0.27 to 0.71)	-1.31 (-1.48 to -1.14)	<0.001
Türkiye	160 (110 to 250)	0.33 (0.22 to 0.5)	430 (280 to 650)	0.44 (0.29 to 0.67)	1.38 (1.26 to 1.5)	<0.001
Taiwan (Province of China)	300 (210 to 420)	1.32 (0.91 to 1.88)	440 (290 to 650)	1.04 (0.7 to 1.52)	-1.1 (-1.29 to -0.91)	<0.001
Tajikistan	30 (20 to 50)	0.96 (0.53 to 1.62)	60 (30 to 90)	0.89 (0.48 to 1.42)	-0.31 (-0.38 to -0.24)	<0.001
Thailand	2610 (1860 to 3620)	4.79 (3.42 to 6.61)	4240 (2770 to 6180)	3.9 (2.61 to 5.63)	-0.98 (-1.1 to -0.86)	<0.001
Timor-Leste	0 (0 to 0)	0.5 (0.28 to 0.85)	0 (0 to 10)	0.54 (0.3 to 1.04)	0.42 (0.38 to 0.46)	<0.001
Togo	30 (20 to 50)	1.6 (0.95 to 2.69)	50 (30 to 100)	1.24 (0.7 to 2.19)	-1.26 (-1.35 to -1.16)	<0.001
Tokelau	0 (0 to 0)	0.4 (0.21 to 0.74)	0 (0 to 0)	0.65 (0.36 to 1.13)	2.34 (2.06 to 2.63)	<0.001
Tonga	0 (0 to 0)	3.51 (2.3 to 5.23)	0 (0 to 0)	2.65 (1.55 to 4.32)	-1.34 (-1.41 to -1.26)	<0.001
Trinidad and Tobago	10 (10 to 10)	0.61 (0.46 to 0.79)	10 (10 to 20)	0.69 (0.45 to 0.96)	0.53 (0.44 to 0.61)	<0.001
Tunisia	20 (10 to 20)	0.22 (0.14 to 0.33)	40 (20 to 60)	0.29 (0.16 to 0.46)	1.34 (1.17 to 1.51)	<0.001
Turkmenistan	30 (20 to 40)	1.09 (0.76 to 1.49)	60 (40 to 90)	1.38 (0.91 to 1.99)	1.14 (1.08 to 1.21)	<0.001
Tuvalu	0 (0 to 0)	0.52 (0.3 to 0.84)	0 (0 to 0)	0.59 (0.34 to 0.99)	0.63 (0.34 to 0.93)	<0.001
Uganda	210 (150 to 300)	2.5 (1.74 to 3.51)	320 (200 to 470)	1.91 (1.22 to 2.78)	-1.3 (-1.33 to -1.26)	<0.001
Ukraine	600 (510 to 710)	0.82 (0.69 to 0.96)	370 (260 to 530)	0.5 (0.34 to 0.7)	-2.38 (-2.66 to -2.1)	<0.001
United Arab Emirates	10 (10 to 10)	1.27 (0.73 to 2.05)	60 (30 to 90)	1.24 (0.74 to 1.94)	-0.11 (-0.16 to -0.05)	<0.001
United Kingdom	1390 (1250 to 1550)	1.52 (1.37 to 1.68)	5060 (4540 to 5750)	4.16 (3.71 to 4.67)	4.91 (4.66 to 5.16)	<0.001
United Republic of Tanzania	190 (130 to 300)	1.28 (0.82 to 2.02)	270 (160 to 430)	0.98 (0.59 to 1.55)	-1.31 (-1.45 to -1.17)	<0.001
United States of America	5480 (4960 to 6010)	1.57 (1.41 to 1.73)	14910 (13040 to 16940)	2.7 (2.37 to 3.06)	2.64 (2.54 to 2.74)	<0.001
United States Virgin Islands	0 (0 to 0)	0.64 (0.44 to 0.87)	0 (0 to 0)	0.96 (0.58 to 1.52)	1.91 (1.56 to 2.26)	<0.001
Uruguay	10 (10 to 20)	0.35 (0.25 to 0.46)	40 (30 to 60)	0.79 (0.55 to 1.08)	4.02 (3.87 to 4.16)	<0.001
Uzbekistan	130 (80 to 190)	0.87 (0.56 to 1.32)	300 (190 to 460)	1.02 (0.65 to 1.54)	0.78 (0.56 to 1.01)	<0.001
Vanuatu	0 (0 to 0)	0.44 (0.24 to 0.83)	0 (0 to 0)	0.5 (0.26 to 0.84)	0.57 (0.35 to 0.79)	<0.001
Venezuela (Bolivarian Republic of)	80 (60 to 100)	0.55 (0.42 to 0.69)	220 (150 to 310)	0.71 (0.48 to 1)	1.23 (0.98 to 1.49)	<0.001
Viet Nam	1430 (910 to 2120)	2.7 (1.7 to 4.11)	4330 (2560 to 6960)	3.96 (2.41 to 6.25)	1.85 (1.8 to 1.9)	<0.001
Yemen	10 (10 to 30)	0.18 (0.07 to 0.38)	20 (10 to 40)	0.15 (0.07 to 0.27)	-0.9 (-0.98 to -0.83)	<0.001
Zambia	100 (60 to 170)	2.79 (1.54 to 4.69)	80 (30 to 200)	0.98 (0.41 to 2.47)	-4.97 (-5.4 to -4.54)	<0.001
Zimbabwe	170 (110 to 240)	3.09 (2.1 to 4.47)	160 (90 to 250)	2.1 (1.23 to 3.32)	-1.85 (-2.03 to -1.67)	<0.001

Abbreviation: APC: annual percent change; ASPR: age-standardized prevalence rate; CI: confidence interval; UI: uncertainty interval

Supplementary Figure 1

- (A) Percent change in prevalence of alcohol use disorder, alcohol-related liver disease, and alcohol-attributable primary liver cancer from 2000 to 2019 in females versus males
- (B) Percent change in incidence of alcohol use disorder, alcohol-related liver disease, and alcohol-attributable primary liver cancer from 2000 to 2019 in females versus males
- (C) Percent change in death from alcohol use disorder, alcohol-related liver disease, and alcohol-attributable primary liver cancer from 2000 to 2019 in females versus males
- (D) Percent change in prevalence of alcohol use disorder, alcohol-related liver disease, and alcohol-attributable primary liver cancer from 2019 to 2021 in females versus males
- (E) Percent change in incidence of alcohol use disorder, alcohol-related liver disease, and alcohol-attributable primary liver cancer from 2019 to 2021 in females versus males
- (F) Percent change in death from alcohol use disorder, alcohol-related liver disease, and alcohol-attributable primary liver cancer from 2019 to 2021 in females versus males



Accepted

Supplementary Figure 2

Age-standardized prevalence rates attributable to liver cancer from alcohol in 2021 by country

