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The global, regional, and national burden of thyroid cancer in 204 countries from 1990 to 2021: a systemic analysis of the Global Burden of Disease Study 2021

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Abstract

Background: Thyroid cancer contributes significantly to cancer-related disability, morbidity, and health-care costs. Conducting a thorough evaluation of both non-fatal and fatal health trends associated with thyroid cancer by age, sex, and geography over time is essential for guiding policy making across 21 Global Burden of Disease (GBD) regions and 204 countries and territories.

Methods: This study utilised the established GBD 2021 methodology and a suite of advanced analytic tools to comprehensively assess thyroid cancer incidence, prevalence, death, and disability-adjusted life-years (DALYs). The Bayesian meta-regression modelling tool DisMod-MR 2.1 was leveraged to generate age-, sex-, and location-specific incidence rates of thyroid cancer spanning from 1990 to 2021.

Results: The global burden of thyroid cancer has shown mixed trends between 1990 and 2021. In 2021, there were an estimated 250,000 (95% UI 223,000–275,000) new cases, 44,800 (40,000–48,500) deaths, and 1.25 million (1.09–1.38) DALYs attributed to thyroid cancer. While the age-standardised incidence rate (ASIR) has significantly increased by 41.3% (28.8–54.5) since 1990, the age-standardised death rate (ASDR) has a possible declined, decreasing by 7.0% (–0.1 to 15.8). The age-standardised DALY rate for thyroid cancer also decreased globally by 4.2% (–5.5 to 14.1) between 1990 and 2021. Despite this overall decline in mortality, significant regional disparities exist. In 2021, the highest ASIRs were observed in high-income North America (5.3 per 100,000 [5.1–5.5]), Australasia (4.6 per 100,000 [3.7–5.5]), and high-income Asia Pacific (4.4 per 100,000 [3.9–5.2]). The majority of countries (189) experienced ASDRs below 1 per 100,000 people, while 15 countries had ASDRs between 1.0 and 1.6 per 100,000. Furthermore, there are notable sex-specific differences in DALY trends. High body-mass index is a significant risk factor for thyroid cancer, emphasising the importance of addressing obesity and related health issues.

Conclusion: The rising incidence and prevalence rates of thyroid cancer, alongside a slight decline in mortality and DALYs, provide a complex global landscape of thyroid cancer trends, coupled with significant heterogeneity across regions, nations, and Socio-demographic Index (SDI) levels, and offers invaluable insights into the risk factors, health-care interventions, and outcomes associated with thyroid cancer.

Keywords: Thyroid cancer, GBD, Global burden of disease, Papillary, Follicular, Medullary

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1 Introduction

Thyroid cancer is one of the most morbid endocrine malignancies,1 accounting for 2.1% of burden from all cancer worldwide, with 77% of cases occurring in females.2 It has ranked ninth in incidence among all cancers.3 Distribution of thyroid cancer has varied geographically: the highest burdens of thyroid cancer were found in North America, Australia, New Zealand, east Asia, and southern Europe.4 More than 90% of new incident cases of thyroid cancer are found in high- or very high-income countries,5 with rates as much five times higher in high and very high HDI countries as compared to low and middle HDI.6,7 Some previously published epidemiological evidence has shown that the incidence and prevalence of thyroid cancer have been increasing in both high-income and low- and middle-income countries (LMICs).6,8-10 However, the mortality rate due to thyroid cancer was inconsistent worldwide: it remained low, was stable, or declined in various places.9-12 Furthermore, the significant variations in death rates among different areas highlight the inequity in health-care accessibility and diagnostic resources, presenting a substantial obstacle to achieving universal health coverage objectives. A global study from 1990 to 2017 noted that incidence cases, death counts, and DALYs counts of thyroid cancer increased by 169%, 87%, and 75%, respectively.1 Global thyroid cancer incidence and mortality are expected to increase by approximately 30% and 67%, respectively, by 2040, with the greatest change in mortality and incidence of thyroid cancer expected to be observed in Africa (100% and 84%, respectively).5 Another study reported that between 1990 and 2019, there was a consistent increase in thyroid cancer incidence across all income groups, while a slight decrease in mortality rates was observed in most income brackets, excluding the lower-middle-income category. Projections suggest that the age-standardised incidence rate (ASIR) is likely to rise, while the age-standardised mortality rate (ASMR) is anticipated to decline worldwide from 2020 to 2030, with variations across income groups.13 This rapid increase in incidence predicts thyroid cancer will be the fourth-leading prevalent malignancy following breast, prostate, and lung cancer in 2030.11 The projected increase in thyroid cancer cases is not just a statistic but a prediction that requires prompt action from policy makers, health-care providers, and researchers. Even though the incidence of thyroid cancer has had a steep upward trend for the past two decades, there were no new risk factors or increased exposure to known contributors to thyroid cancer.14 Reasons for early and massive detection of thyroid cancer15,16 include advancements in diagnostic criteria and modalities, health-care systems, patient literacy, medical education and specialty, finance, medical registration, and increased use of radiation.17-19 This contradictory situation, in which progress in technology for diagnosing medical conditions results in a sudden increase in the number of cases without discovering any new factors that contribute to the risk, necessitates a thorough evaluation of our screening procedures and the possibility of excessive diagnosis they may involve. Thyroid cancer consists a spectrum of different histological types which differ in terms of prognosis, risk factors, incidence, mode of dissemination, and cellular origin, such as papillary, follicular, medullary, and anaplastic. While the majority of thyroid cancers are sporadic, epidemiological research indicates that the condition is more prevalent among females, those with a family history of the disease, individuals exposed to radiation, and those with low iodine levels.20 Comprehending the variety of histological types of thyroid cancer is essential for customising treatment methods and enhancing patient results, highlighting the significance of histological specificity in both research and clinical practice. While the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2021 provided valuable insights into the incidence, prevalence, and mortality of various diseases and injuries, including thyroid cancer, there remains a significant gap in the literature regarding the comprehensive assessment of thyroid cancer burden from 1990 to 2021. Therefore, there is a need for a more in-depth examination of the burden of thyroid cancer, including its trends over time and variations by region, nation, age, and Socio-demographic Index (SDI).

2 Methods

2.1 Overview

The Global Burden of Disease (GBD) study employs a standardised methodology to estimate key health metrics such as incidence, prevalence, and YLDs across various dimensions, including cause, age, sex, year, and geographical location.21 The most recent iteration, the GBD 2021 study, stands out for its extensive and updated epidemiological insights. It offers a thorough analysis of incidence, prevalence, mortality rates, YLDs, YLLs, and DALYs for 23 distinct age groups, encompassing males, females, and the combined population in 204 countries and territories, which are organised into 21 regions and seven super-regions. The GBD 2021 results are accessible through the Global Health Data Exchange (GHDx). The GHDx serves as the world's most comprehensive catalog of health-related data, encompassing surveys, censuses, vital statistics, and more.21

2.2 Data sources

The results of the Global Burden of Disease (GBD) 2021 study21 were generated using a comprehensive and multi-dimensional approach, drawing from a vast array of data sources across the globe. Specifically, the burden of thyroid cancer was estimated using a total of 7,346 data sources, which included three sources for prevalence, 3,658 for incidence, and 4,107 for mortality.21 This extensive data collection is crucial for accurately assessing the impact of thyroid cancer on global health, as it allows researchers to account for variations in disease presentation and outcomes across different regions and populations. The data sources comprise several distinct types of sources.21

2.3 Mortality estimation

The GBD 2021 study provides a comprehensive assessment of thyroid cancer mortality worldwide, employing a multi-dimensional approach that integrates diverse data sources. By standardising and pooling all available data on causes of death (CoD), researchers can generate cause-specific mortality estimates stratified by age, sex, year, and geography.21 The CoD database utilised in the GBD study comprises seven distinct types of data sources: vital registration (VR), verbal autopsy (VA), cancer registries (CR), police records, sibling history, surveillance systems, and survey/census data. In countries with well-established VR systems, mortality data can be directly obtained from official records, negating the need for additional data sources. However, less than half of the global population is covered by comprehensive VR systems. Consequently, in regions where VR data are incomplete, researchers supplement vital statistics with other data types to ensure accurate estimates of mortality due to thyroid cancer. To estimate thyroid cancer mortality, the GBD study relies heavily on cancer registry data. The mortality estimates derived from these registries are transformed from incidence data using mortality-to-incidence ratios (MIRs). The process begins by matching processed incidence and mortality data from cancer registries according to key variables such as cancer type, age, sex, year, and geographical location. This matching generates crude MIRs that serve as foundational inputs for further modelling. The next step involves a three-step modelling approach utilising the spatiotemporal Gaussian process regression (ST-GPR) method. This sophisticated model incorporates the Healthcare Access and Quality (HAQ) Index as a covariate, allowing researchers to adjust for variations in health-care accessibility and quality across different regions. The logit-transformed MIRs serve as the outcome variable in this linear mixed-effects model. By leveraging this advanced statistical technique, researchers can refine the crude MIRs to produce more accurate estimates of thyroid cancer mortality. Finally, the GBD estimation process culminates in the application of the Cause of Death Ensemble model (CODEm). This model synthesises crude mortality estimates derived from the previous steps, along with additional inputs from vital registration and verbal autopsy data. A careful selection of covariates is made based on their established relationships with thyroid cancer mortality. The final mortality estimates generated by CODEm are then divided by the MIRs obtained from ST-GPR, resulting in age-, sex-, and location-specific estimates for incident cases of thyroid cancer.21

2.4 Estimation of incidence and prevalence

The final mortality estimates for thyroid cancer derived from the GBD study undergo a critical transformation to yield thyroid cancer incidence estimates. This transformation process utilises mortality-to-incidence ratios (MIRs) that are specifically tailored for thyroid cancer.21 Once the GBD study has produced its final thyroid cancer mortality estimates—after adjustments using CoDCorrect, a model designed to refine cause-of-death data—these figures are not directly interpreted as incidence rates. Instead, they are converted into incidence estimates through a systematic approach that involves the MIRs. At this stage, the thyroid cancer mortality estimates, which are expressed in terms of 1000 draws, are divided by the corresponding modelled MIRs, also represented at the 1000-draw level. This division is essential because it allows researchers to translate mortality data into incidence data by applying the relationship defined by the MIRs. Essentially, MIRs provide a ratio that indicates how many new cases of thyroid cancer arise for each death attributed to the disease. The outcome of this division is a set of 1000 draws of thyroid cancer incidence estimates. This statistical approach generates a comprehensive picture of thyroid cancer incidence, providing not just a singular estimate but a range of possible values that reflect uncertainty in the data. From these 1000 draws, researchers can derive an estimated mean incidence rate along with a 95% uncertainty interval.21

After converting the final thyroid cancer mortality estimates into incidence figures, we proceeded to integrate these incidence estimates with annual relative survival rates spanning from one to ten years post-diagnosis. Research has indicated that the value of (1 – MIR) can act as a reliable proxy for five-year relative survival rates; however, this relationship can fluctuate depending on the specific type of cancer. To account for these variations, we developed cancer-specific predictive models aimed at estimating five-year survival rates based on MIRs, utilising comprehensive data sourced from the SEER (Surveillance, Epidemiology, and End Results) program. To gather the necessary data for our modelling, we employed SEER*Stat to extract mortality, incidence, and relative survival statistics from nine SEER registries covering the period from 1980 to 2014. These data were stratified by cancer type, sex, five-year intervals, and age groups—excluding those aged 80 and older. In particular, we focused on modelling the five-year relative survival for thyroid cancer using MIRs derived from SEER's mortality and incidence statistics. To enhance the robustness of our analysis and minimise variability stemming from small sample sizes, we included only those MIRs based on a minimum of 25 incident cases of thyroid cancer. With these models in place, we generated estimated five-year survival rates tailored to specific age, sex, year, and geographical location. To ensure that our predicted survival values remained realistic, we applied Winsorisation, constraining the predicted five-year survival rates within a range of 0% to 100%. Following this, we sought to extend our yearly survival estimates up to ten years. For this purpose, we retrieved age- and sex-specific annual relative survival data from SEER for individuals diagnosed between 2001 and 2010. We calculated a proportional scalar by dividing the predicted GBD five-year survival estimate by the corresponding SEER five-year survival statistic. This scalar was instrumental in scaling the SEER one- to ten-year survival curve to align with our thyroid cancer survival predictions under a proportional hazards framework. Finally, we combined absolute survival estimates with incidence data to derive prevalence figures for each year following diagnosis, from year one through year ten. This prevalence was then categorised into four distinct sequelae. For survivors who lived beyond ten years, we classified them as "cured" and divided this population into two phases: (1) the diagnosis and primary therapy phase and (2) the controlled phase. Conversely, for those who did not survive beyond the ten-year mark, we allocated yearly prevalence into the four sequelae by applying fixed durations for each phase: (1) diagnosis and primary therapy phase, (3) metastatic phase, and (4) terminal phase.21

2.5 Disability estimation

The mortality estimates generated from the CODEm framework were integrated with reference life tables to derive estimates for years of life lost (YLLs). This process involved calculating the years lost due to premature mortality associated with thyroid cancer. By employing life tables that reflect the average lifespan of a population, we could accurately assess the impact of thyroid cancer on life expectancy. The integration of these mortality estimates with life tables provided a clearer picture of the burden of disease and allowed for more precise public health planning and resource allocation. To further elucidate the long-term impact of thyroid cancer, we divided the ten-year prevalence into four sequelae, each with a fixed duration based on expected person-time spent in each phase of the disease. These sequelae included the diagnosis and primary therapy phase lasting approximately 4.0 months, a metastatic phase lasting about 9.7 months, and a terminal phase lasting around 1.0 month. The remaining duration was assigned to a controlled phase, where individuals are managed for their condition but may not be actively undergoing treatment. This structured approach enabled us to quantify the time patients spend in different health states, providing valuable insights into the overall burden of disease and its implications for patient care. To account for the co-occurrence of non-fatal health conditions within the population, YLDs underwent a comorbidity correction. This correction is essential for understanding how multiple health issues can compound the overall burden experienced by individuals. We simulated a population of 20,000 individuals across various age groups, sexes, locations, and years to model this co-occurrence. Each individual's likelihood of experiencing a particular sequela was determined by its prevalence, allowing us to create a realistic representation of the population's health status. Subsequently, each simulated individual was assigned a cumulative disability weight based on a multiplicative function of all disability weights associated with their health conditions, enabling us to adjust the sequela-specific disability weights accordingly. The final step in our analysis involved calculating the YLD rate for each sequela by multiplying the adjusted disability weights by the age-sex-location-year-specific population figures. The sum of YLLs and YLDs produced DALYs, where one DALY represents one year of healthy life lost due to disease or disability. To facilitate comparisons across different demographics, we expressed age-specific rates of incidence, mortality, and DALYs of thyroid cancer per 100,000 person-years using Global Burden of Disease (GBD) 2021 population estimates. Age-standardised rates were then calculated as weighted averages of these age-specific rates, with weights reflecting the proportion of individuals in corresponding age groups according to the GBD world population age standard.22

2.6 Risk factor analysis

The GBD study conducts an extensive analysis of risk factors related to thyroid cancer health outcomes. To quantify the relationship between these risk factors and health outcomes, GBD compiles data from diverse sources, including randomised controlled trials, cohort studies, case-control studies, and meta-analyses. This thorough data collection enables the estimation of relative risks (RRs), which summarise the likelihood of a specific health outcome arising from exposure to a particular risk factor. Additionally, GBD generates summary exposure values (SEVs), reflecting the age-specific risk-weighted prevalence of exposure on a scale from 0 to 100—where 0 indicates no exposure and 100 indicates complete exposure. Moreover, GBD calculates the population attributable fraction (PAF), which quantifies the proportion of a health outcome that can be attributed to a specific risk factor, as well as the associated risk-attributable burden measured in DALYs. A novel approach called Burden of Proof Risk Function (BPRF) analysis has been introduced to complement RR estimates, offering a more conservative interpretation of risk–outcome associations and strengthening the analysis's robustness. To assess the burden of specific risk factors, the GBD study employs a comparative risk assessment (CRA) framework comprising seven key methodological components. The process begins by determining the effect size through the calculation of the relative risk (RR) linked to exposure to the risk factor. Next, exposure data are gathered and analysed using Bayesian statistical models such as ST-GPR and DisMod-MR, which help account for biases and variations in exposure levels. The third step involves establishing theoretical minimum risk exposure levels (TMRELs) based on epidemiological evidence. Following this, population attributable fractions (PAFs) are computed to evaluate the potential health benefits of reducing exposure to TMRELs. SEVs are then calculated for each risk factor to represent age-specific risk-weighted prevalence of exposure. Mediation factors are also considered to adjust for potential overestimations of PAFs and to assess the combined effects of multiple risk factors on health outcomes. Finally, estimates of attributable burden are calculated by multiplying PAFs with DALYs or deaths associated with the thyroid cancer outcomes, taking into account various demographic factors such as age, sex, location, and year.23

3 Results

3.1 Thyroid cancer burden at the global level

Table 1: Global, regional, and national incidence, age-standardised incidence rate and percentage change of Thyroid cancer 1990-2021

Location	Incidence cases in1990(95%UI)	ASIR 1990(95%UI)	Incidence cases in 2021(95%UI)	ASIR in 2021(95%UI)	Percentage change of incidence cases 1990-2021(95%UI)	Percentage change of ASIR ,1990-2021(95%UI)
Global	900000 (850000 to 1000000)	2.1 (2 to 2.2)	250000 (220000 to 270000)	2.9 (2.6 to 3.2)	177.6 (153.5 to 203.8)	41.3 (28.8 to 54.5)
Central Europe, Eastern Europe, and Central Asia	12037 (11635 to 12490)	2.6 (2.5 to 2.7)	16124 (15012 to 17325)	2.8 (2.6 to 3)	34 (23.8 to 44.1)	8 (-0.1 to 16.1)
Central Asia	914 (841 to 996)	1.7 (1.6 to 1.9)	1631 (1432 to 1845)	1.7 (1.5 to 2)	78.4 (52.4 to 106.9)	0.8 (-13.8 to 16.9)
Armenia	50 (37 to 64)	1.6 (1.2 to 2.1)	145 (109 to 190)	3.6 (2.7 to 4.7)	191.5 (90.8 to 341.8)	118.8 (41.9 to 227.9)
Azerbaijan	60 (44 to 84)	1.1 (0.8 to 1.4)	151 (105 to 212)	1.3 (0.9 to 1.8)	150.2 (51.2 to 304)	20.9 (-23.6 to 92.6)
Georgia	117 (92 to 146)	1.9 (1.5 to 2.4)	208 (169 to 258)	4.1 (3.3 to 5.1)	78 (25.1 to 147.6)	115.4 (49.1 to 203.7)
Kazakhstan	509 (447 to 576)	3.6 (3.1 to 4)	590 (480 to 705)	3 (2.4 to 3.5)	15.8 (-9.4 to 48.3)	-16.8 (-34.8 to 6.7)
Kyrgyzstan	80 (62 to 105)	2.3 (1.8 to 3)	148 (105 to 200)	2.5 (1.8 to 3.3)	84.5 (15.4 to 182.6)	6.4 (-31.6 to 59.4)
Mongolia	17 (12 to 25)	1.4 (1 to 2)	57 (42 to 78)	1.9 (1.4 to 2.6)	230.8 (113 to 413.4)	36.9 (-11.3 to 109.3)
Tajikistan	1 (0 to 1)	0 (0 to 0)	1 (1 to 2)	0 (0 to 0)	89.2 (18.8 to 201.2)	-21.6 (-50.5 to 23.2)
Turkmenistan	40	1.7	86	1.8	113.5	3.8

	(36 to 45)	(1.5 to 1.9)	(66 to 116)	(1.4 to 2.4)	(53 to 193.6)	(-24.9 to 41.1)
Uzbekistan	40 (29 to 52)	0.3 (0.2 to 0.4)	245 (179 to 334)	0.8 (0.6 to 1)	519.8 (298 to 852.2)	160.4 (68.4 to 296.2)
Central Europe	4655 (4429 to 4884)	3.2 (3 to 3.4)	4876 (4407 to 5323)	2.7 (2.4 to 2.9)	4.8 (-5.4 to 15.3)	-15.3 (-23.7 to -6.8)
Albania	39 (28 to 53)	1.6 (1.2 to 2.1)	77 (53 to 111)	2 (1.4 to 2.9)	94.5 (17.5 to 205.6)	25.9 (-24.2 to 98.6)
Bosnia and Herzegovina	81 (58 to 97)	1.8 (1.3 to 2.1)	104 (76 to 140)	1.9 (1.4 to 2.6)	28.5 (-10.6 to 94.2)	8.5 (-24.9 to 64.4)
Bulgaria	246 (208 to 292)	2.1 (1.8 to 2.5)	251 (195 to 318)	2.2 (1.7 to 2.8)	1.9 (-24.2 to 41.3)	2.7 (-23.7 to 40.8)
Croatia	282 (243 to 327)	4.6 (4 to 5.3)	249 (202 to 302)	3.5 (2.8 to 4.3)	-11.7 (-31.4 to 13.3)	-24.2 (-41.3 to -3.3)
Czechia	559 (472 to 663)	4.4 (3.7 to 5.2)	640 (487 to 828)	3.8 (2.9 to 5)	14.4 (-15 to 52.7)	-12.9 (-35.9 to 18.9)
Hungary	504 (436 to 574)	3.8 (3.2 to 4.3)	449 (365 to 535)	2.9 (2.4 to 3.5)	-10.9 (-29.3 to 12.8)	-22.5 (-38.6 to -2.5)
North Macedonia	40 (30 to 47)	2 (1.5 to 2.4)	70 (53 to 89)	2.2 (1.7 to 2.8)	74.1 (27.3 to 132.7)	8.7 (-20.5 to 46.8)
Montenegro	21 (16 to 27)	3.2 (2.5 to 4.1)	34 (26 to 43)	3.8 (3 to 4.8)	64.1 (23.2 to 113)	20.8 (-8.2 to 56.8)
Poland	1859 (1739 to 1975)	4.4 (4.1 to 4.6)	1632 (1450 to 1830)	2.8 (2.5 to 3.1)	-12.2 (-23.5 to -0.9)	-35.1 (-43.4 to -26.9)
Romania	532 (458 to 621)	2 (1.7 to 2.3)	675 (525 to 871)	2.2 (1.7 to 2.9)	26.9 (-5.3 to 67.5)	13.3 (-16.1 to 51)
Serbia	183 (138 to 246)	1.6 (1.2 to 2.2)	308 (220 to 425)	2.2 (1.6 to 3)	68.4 (11.7 to 142.8)	33.8 (-11.2 to 93.9)
Slovakia	162 (128 to 200)	2.8 (2.2 to 3.5)	235 (179 to 318)	2.8 (2.2 to 3.9)	45.1 (2.3 to 106.3)	1.5 (-28.7 to 45)
Slovenia	74 (63 to 87)	3.1 (2.6 to 3.6)	84 (61 to 113)	2.3 (1.7 to 3.1)	13.9 (-18.3 to 56.3)	-25.7 (-46.6 to 2.7)

Eastern Europe	6468 (6164 to 6831)	2.4 (2.3 to 2.6)	9617 (8698 to 10650)	3.2 (2.9 to 3.5)	48.7 (32.9 to 65.2)	32 (17.7 to 46.9)
Belarus	300 (250 to 363)	2.5 (2 to 3)	546 (427 to 698)	3.8 (3 to 4.9)	81.7 (35.9 to 140.4)	53 (13.2 to 101.3)
Estonia	58 (45 to 74)	3.1 (2.4 to 4)	80 (61 to 103)	3.8 (2.9 to 4.9)	37.3 (-6.1 to 92.2)	22.2 (-15.5 to 71.3)
Latvia	83 (64 to 106)	2.6 (2 to 3.3)	125 (94 to 161)	4 (3 to 5.2)	50.7 (5.4 to 124.1)	54.4 (7.1 to 132.5)
Lithuania	131 (104 to 163)	3.1 (2.5 to 3.9)	166 (132 to 205)	3.7 (2.9 to 4.6)	27 (-7 to 73.7)	19.4 (-14.3 to 65.8)
Republic of Moldova	80 (72 to 89)	1.8 (1.6 to 2)	126 (106 to 151)	2.3 (2 to 2.8)	57.9 (30 to 92.2)	31.8 (8.5 to 59.3)
Russian Federation	4393 (4249 to 4543)	2.5 (2.4 to 2.6)	6782 (6175 to 7461)	3.3 (3 to 3.6)	54.4 (38.3 to 69.8)	30.6 (17.1 to 43.5)
Ukraine	1422 (1182 to 1752)	2.2 (1.8 to 2.7)	1792 (1235 to 2540)	2.8 (1.9 to 4)	26 (-18.1 to 89.4)	29.3 (-14.9 to 93.2)
High-income	39873 (38435 to 41138)	3.6 (3.5 to 3.8)	72567 (67961 to 75871)	4.4 (4.1 to 4.6)	82 (73.6 to 90.1)	20 (15.2 to 25.2)
High-income Asia Pacific	6950 (6496 to 7654)	3.4 (3.2 to 3.8)	14278 (12630 to 16477)	4.4 (3.9 to 5.2)	105.4 (84.5 to 131.1)	28.6 (16.3 to 45.8)
Brunei Darussalam	5 (3 to 7)	3.2 (2.4 to 4.5)	17 (13 to 23)	3.9 (2.9 to 5)	263.4 (176.3 to 434.6)	18.8 (-7.7 to 69.4)
Japan	5941 (5619 to 6250)	3.6 (3.4 to 3.8)	10067 (9099 to 10910)	4.3 (3.9 to 4.6)	69.4 (54.4 to 84.2)	18 (9 to 27.6)
Republic of Korea	921 (660 to 1593)	2.5 (1.8 to 4.4)	3923 (2980 to 5824)	4.8 (3.6 to 7.1)	326.1 (194.4 to 541.4)	93.8 (33.1 to 189.3)
Singapore	83 (72 to 96)	3 (2.6 to 3.5)	271 (225 to 335)	3.2 (2.7 to 4)	225 (158.6 to 316)	6.1 (-16 to 34.7)
Australasia	586 (522 to 660)	2.6 (2.3 to 2.9)	1949 (1570 to 2343)	4.6 (3.7 to 5.5)	232.7 (162.8 to 313)	75.2 (38.2 to 117.5)
Australia	481	2.6	1725	4.8	258.7	88.5

	(419 to 550)	(2.2 to 2.9)	(1384 to 2106)	(3.9 to 6)	(182.7 to 356.6)	(46.6 to 140.2)
New Zealand	105 (89 to 125)	2.8 (2.4 to 3.3)	224 (185 to 263)	3.2 (2.6 to 3.7)	113.2 (61.6 to 171.2)	13.4 (-14 to 44.9)
Western Europe	19206 (18292 to 20159)	3.9 (3.7 to 4.1)	26005 (23788 to 28201)	3.8 (3.5 to 4.2)	35.4 (23 to 47.7)	-1 (-10.1 to 8.4)
Andorra	2 (1 to 2)	2.9 (2 to 4.1)	4 (3 to 6)	3.1 (2 to 4.3)	141.7 (39.5 to 320.3)	5.6 (-38.4 to 81.5)
Austria	534 (477 to 597)	5.3 (4.7 to 5.9)	690 (570 to 826)	4.8 (4 to 5.8)	29.1 (2.8 to 61.8)	-8.2 (-26.9 to 15.4)
Belgium	434 (374 to 509)	3.3 (2.8 to 3.8)	590 (479 to 717)	3.4 (2.8 to 4.2)	35.9 (5.8 to 74.7)	4.8 (-18.1 to 36.5)
Cyprus	22 (17 to 28)	2.9 (2.2 to 3.7)	52 (39 to 73)	2.8 (2.1 to 3.9)	132.9 (60 to 236.8)	-3.9 (-34.5 to 43.8)
Denmark	119 (103 to 137)	1.7 (1.5 to 2)	150 (127 to 180)	1.6 (1.3 to 1.9)	26.3 (2.1 to 60)	-8.9 (-27 to 16.7)
Finland	216 (189 to 250)	3.3 (2.9 to 3.9)	270 (221 to 329)	3 (2.4 to 3.7)	25.2 (-1 to 58.2)	-9.7 (-29 to 15.7)
France	3779 (3360 to 4227)	5.4 (4.8 to 6.1)	6261 (5175 to 7463)	6.7 (5.5 to 8)	65.7 (35.3 to 102.4)	22.5 (-0.8 to 50.5)
Germany	4225 (3716 to 4851)	3.9 (3.4 to 4.5)	4969 (4104 to 5936)	3.7 (3 to 4.4)	17.6 (-6.5 to 44)	-5.1 (-24.9 to 16.8)
Greece	325 (296 to 355)	2.4 (2.2 to 2.6)	452 (399 to 509)	2.7 (2.4 to 3)	39 (19 to 61)	12.8 (-3.8 to 30.1)
Iceland	21 (18 to 24)	8 (6.9 to 9.2)	31 (25 to 38)	6.5 (5.3 to 8.1)	44.3 (13.5 to 84.2)	-18.5 (-36.4 to 4.7)
Ireland	104 (91 to 118)	2.7 (2.4 to 3.1)	188 (157 to 226)	2.8 (2.3 to 3.3)	80.2 (45.1 to 122.7)	1.3 (-18.6 to 26)
Israel	149 (128 to 176)	3.2 (2.7 to 3.8)	355 (293 to 431)	3.3 (2.7 to 4)	138.6 (82.1 to 208.1)	3 (-21.7 to 33.2)
Italy	4878 (4511 to 5318)	6.4 (5.9 to 7)	5312 (4772 to 5870)	5.3 (4.8 to 5.8)	8.9 (-3.8 to 22.7)	-17.7 (-27.8 to -7)

Luxembourg	21 (19 to 23)	4.2 (3.8 to 4.6)	33 (28 to 38)	3.4 (3 to 4)	55.2 (30.2 to 82.7)	-18.6 (-31.9 to -4)
Malta	13 (11 to 15)	3 (2.6 to 3.6)	23 (18 to 28)	3.2 (2.6 to 4)	78.2 (35.5 to 129.4)	7.7 (-17.4 to 39.1)
Monaco	2 (1 to 2)	3 (2.3 to 3.9)	3 (2 to 4)	4.3 (3.1 to 5.9)	78.3 (26.1 to 156.3)	42.9 (-0.6 to 107.1)
San Marino	2 (1 to 2)	5.2 (4.2 to 6.4)	2 (1 to 3)	4.2 (2.4 to 6.2)	41.3 (-16.5 to 117.4)	-18.4 (-52.6 to 25.6)
Netherlands	322 (287 to 363)	1.8 (1.6 to 2)	586 (490 to 688)	2.2 (1.8 to 2.6)	82 (51.9 to 119.1)	23.6 (2.6 to 49.2)
Norway	138 (127 to 148)	2.4 (2.2 to 2.6)	229 (201 to 255)	2.7 (2.4 to 3)	66.4 (47.2 to 90.4)	13.5 (0.5 to 30.7)
Portugal	419 (359 to 482)	3.3 (2.8 to 3.8)	645 (513 to 800)	3.6 (2.8 to 4.4)	53.9 (18.2 to 98.3)	8.9 (-16.2 to 39.8)
Spain	1265 (1136 to 1400)	2.7 (2.4 to 3)	1939 (1620 to 2302)	2.5 (2.1 to 3)	53.2 (24.3 to 90.9)	-4.2 (-22.3 to 19.4)
Sweden	272 (234 to 318)	2.1 (1.9 to 2.5)	329 (269 to 397)	1.9 (1.6 to 2.4)	20.9 (-4.6 to 53.2)	-9.5 (-28.7 to 14.1)
Switzerland	230 (204 to 257)	2.5 (2.2 to 2.8)	278 (231 to 328)	1.9 (1.6 to 2.2)	20.9 (-1.5 to 47.2)	-25.2 (-39.5 to -8.4)
United Kingdom	1700 (1647 to 1749)	2.2 (2.2 to 2.3)	2593 (2464 to 2695)	2.6 (2.4 to 2.7)	52.5 (46.2 to 59.1)	14.3 (9.7 to 19)
Southern Latin America	1000 (896 to 1119)	2.1 (1.9 to 2.4)	2047 (1787 to 2334)	2.5 (2.2 to 2.9)	104.7 (79.5 to 138.6)	19.2 (4.5 to 39.1)
Argentina	659 (582 to 752)	2 (1.8 to 2.3)	1170 (964 to 1414)	2.2 (1.8 to 2.7)	77.6 (43 to 124.7)	9.5 (-11.9 to 38.3)
Chile	259 (215 to 305)	2.3 (1.9 to 2.8)	726 (620 to 869)	3.1 (2.6 to 3.7)	180.6 (121.4 to 261.2)	31.4 (3.7 to 69.2)
Uruguay	82 (67 to 99)	2.3 (1.9 to 2.8)	150 (125 to 183)	3.4 (2.8 to 4.1)	82.9 (42.4 to 139.3)	45.2 (12.6 to 91.9)
	12130	3.8	28289	5.3	133.2	39.1

High-income North America	(11695 to 12450)	(3.7 to 3.9)	(26783 to 29536)	(5.1 to 5.5)	(123.5 to 144.1)	(33.3 to 45.6)
Canada	933 (804 to 1076)	3 (2.6 to 3.5)	1891 (1549 to 2289)	3.4 (2.8 to 4.2)	102.7 (60.9 to 155.4)	14 (-10.6 to 45.2)
Greenland	1 (1 to 1)	1.8 (1.3 to 2.4)	1 (1 to 2)	1.8 (1.3 to 2.5)	60.3 (8.4 to 150.3)	2.8 (-29.7 to 51)
United States of America	11196 (10784 to 11509)	3.9 (3.8 to 4)	26396 (25052 to 27472)	5.5 (5.3 to 5.7)	135.8 (125.9 to 145.5)	41.7 (35.7 to 47.6)
Latin America and Caribbean	3949 (3822 to 4087)	1.5 (1.5 to 1.6)	15913 (14526 to 17502)	2.5 (2.3 to 2.7)	303 (267.1 to 340.7)	64.1 (49.5 to 79.4)
Caribbean	443 (411 to 479)	1.6 (1.5 to 1.7)	1245 (1086 to 1427)	2.4 (2.1 to 2.7)	181.1 (140.7 to 224.3)	50.8 (29.1 to 73.8)
Antigua and Barbuda	1 (1 to 1)	1.8 (1.7 to 2)	3 (3 to 4)	3.1 (2.8 to 3.4)	254.6 (210.2 to 306.3)	68.3 (47.8 to 91.6)
Bahamas	4 (3 to 4)	2 (1.8 to 2.2)	14 (11 to 17)	3.1 (2.4 to 3.9)	257.1 (172.8 to 363.8)	55.4 (19.8 to 99.7)
Barbados	5 (4 to 5)	1.9 (1.7 to 2)	12 (10 to 15)	2.8 (2.2 to 3.5)	149.1 (91 to 217.6)	47.4 (13.5 to 88.6)
Belize	1 (1 to 1)	0.7 (0.6 to 0.7)	5 (4 to 6)	1.4 (1.2 to 1.6)	613.4 (504.7 to 737.9)	111.8 (80.1 to 149.7)
Cuba	189 (173 to 208)	1.8 (1.6 to 2)	559 (466 to 662)	3.3 (2.7 to 3.9)	195.8 (141.2 to 260.2)	83.7 (49.7 to 125.1)
Dominica	1 (1 to 1)	1.3 (1.1 to 1.6)	1 (1 to 2)	1.7 (1.3 to 2.1)	75.6 (34 to 127.4)	26.3 (-3.2 to 61.6)
Dominican Republic	47 (38 to 56)	1 (0.8 to 1.2)	173 (128 to 231)	1.6 (1.2 to 2.1)	267.5 (164.5 to 409.6)	58.1 (14.6 to 119.1)
Grenada	2 (1 to 2)	2.2 (1.9 to 2.6)	3 (3 to 4)	2.9 (2.4 to 3.4)	124.7 (78.3 to 181.1)	30.5 (4 to 63.2)
Guyana	5 (4 to 6)	1.1 (0.9 to 1.2)	13 (10 to 17)	1.8 (1.3 to 2.4)	161.4 (83.7 to 259.6)	67.3 (19 to 127.5)
Haiti	51	1.3	131	1.4	156.1	7.9

	(33 to 72)	(0.9 to 1.9)	(88 to 189)	(1 to 2)	(71.7 to 267.9)	(-26 to 52.8)
Jamaica	24	1.4	80	2.6	230.9	91.1
	(22 to 27)	(1.2 to 1.5)	(59 to 108)	(1.9 to 3.5)	(132.3 to 355.2)	(34.5 to 162.8)
Saint Lucia	2	2.3	7	3.1	233.7	32.8
	(2 to 2)	(2.2 to 2.5)	(6 to 9)	(2.5 to 3.8)	(162.1 to 324.6)	(5 to 69.4)
Saint Vincent and the Grenadines	2	2.5	5	3.9	188	58.3
	(2 to 2)	(2.2 to 2.7)	(5 to 6)	(3.4 to 4.6)	(142.2 to 246.9)	(33.2 to 90.4)
Suriname	4	1.2	10	1.5	167.7	21
	(3 to 4)	(1 to 1.5)	(7 to 12)	(1.1 to 1.9)	(96.8 to 256.6)	(-9.8 to 58.1)
Trinidad and Tobago	15	1.7	45	2.5	192.1	50.4
	(14 to 16)	(1.5 to 1.8)	(34 to 59)	(1.9 to 3.3)	(115.6 to 276.9)	(11.5 to 94.9)
Bermuda	2	2.8	5	4.6	153.8	60.2
	(2 to 2)	(2.6 to 3.2)	(4 to 6)	(3.7 to 5.7)	(98.5 to 222.5)	(23.8 to 104.9)
Puerto Rico	73	2	134	2.8	84.2	38.8
	(65 to 81)	(1.8 to 2.3)	(107 to 163)	(2.2 to 3.5)	(44 to 136)	(7.6 to 80.4)
Saint Kitts and Nevis	0	1.4	1	1.7	166.6	24.6
	(0 to 1)	(1.2 to 1.5)	(1 to 2)	(1.4 to 2.1)	(114.5 to 233)	(1 to 55.6)
United States Virgin Islands	1	1.1	1	1.1	22.5	2.1
	(1 to 1)	(0.8 to 1.3)	(1 to 2)	(0.8 to 1.5)	(-12.9 to 74.7)	(-27.3 to 47.4)
Andean Latin America	422	1.8	2424	3.9	474.1	119.7
	(354 to 495)	(1.5 to 2.1)	(1907 to 3044)	(3.1 to 4.8)	(343.9 to 654.5)	(70.6 to 188.7)
Bolivia (Plurinational State of)	95	2.6	380	3.8	301.6	48.6
	(60 to 129)	(1.6 to 3.5)	(251 to 542)	(2.5 to 5.4)	(177.7 to 507.7)	(3.2 to 121.6)
Ecuador	88	1.4	714	4.2	712.3	201.8
	(80 to 96)	(1.3 to 1.5)	(550 to 900)	(3.2 to 5.3)	(515.5 to 959.9)	(128.9 to 290.7)
Peru	240	1.7	1330	3.8	454.9	118.9
	(194 to 294)	(1.4 to 2.1)	(928 to 1840)	(2.6 to 5.2)	(278.3 to 707.1)	(49.9 to 217.9)
Central Latin America	1712	1.7	7753	3	352.8	72.9
	(1651 to 1775)	(1.7 to 1.8)	(6907 to 8701)	(2.6 to 3.3)	(298.9 to 406.6)	(52.8 to 93.5)

Colombia	516 (470 to 565)	2.4 (2.2 to 2.6)	2087 (1687 to 2599)	3.8 (3.1 to 4.7)	304.5 (219.2 to 406.9)	59 (25.5 to 98.4)
Costa Rica	55 (49 to 62)	2.6 (2.3 to 2.9)	189 (159 to 220)	3.5 (2.9 to 4)	243.7 (179.4 to 313.7)	33.7 (9.1 to 60)
El Salvador	57 (45 to 64)	1.7 (1.3 to 1.9)	201 (156 to 253)	3.3 (2.5 to 4.1)	253.4 (176.1 to 355.7)	91.6 (48.5 to 148)
Guatemala	59 (55 to 63)	1.4 (1.3 to 1.5)	265 (223 to 311)	2.1 (1.8 to 2.5)	348.3 (274.5 to 429.5)	52.7 (28.1 to 81)
Honduras	13 (10 to 16)	0.5 (0.4 to 0.7)	70 (49 to 96)	1 (0.7 to 1.3)	431.9 (272.3 to 662.6)	86.4 (29.1 to 163.8)
Mexico	809 (784 to 834)	1.6 (1.6 to 1.7)	3988 (3478 to 4536)	3 (2.6 to 3.4)	392.8 (329.1 to 461.1)	84.6 (61 to 110.1)
Nicaragua	20 (17 to 25)	1 (0.9 to 1.3)	102 (76 to 130)	1.8 (1.4 to 2.3)	404.8 (287 to 551.1)	78.1 (37.4 to 131.7)
Panama	38 (33 to 44)	2 (1.8 to 2.3)	127 (101 to 159)	2.9 (2.3 to 3.6)	232.6 (152 to 336.1)	42 (7.7 to 83.5)
Venezuela (Bolivarian Republic of)	145 (133 to 156)	1.3 (1.2 to 1.3)	724 (542 to 942)	2.4 (1.8 to 3.1)	400.7 (267.1 to 561.4)	89.9 (39.8 to 149.8)
Tropical Latin America	1372 (1299 to 1443)	1.3 (1.2 to 1.3)	4491 (4198 to 4758)	1.7 (1.6 to 1.8)	227.4 (204.6 to 249.2)	34.5 (25.7 to 43.3)
Brazil	1329 (1256 to 1402)	1.3 (1.2 to 1.3)	4324 (4025 to 4580)	1.7 (1.6 to 1.8)	225.4 (203.2 to 248.1)	33.8 (25 to 42.4)
Paraguay	43 (36 to 54)	1.7 (1.4 to 2.1)	167 (123 to 219)	2.6 (1.9 to 3.4)	288.9 (172.8 to 448.8)	58.3 (11.8 to 121.5)
North Africa and Middle East	3792 (3151 to 5143)	1.7 (1.4 to 2.3)	21222 (17602 to 24975)	3.7 (3.1 to 4.3)	459.7 (321.5 to 608.4)	115.6 (62.5 to 172.9)
North Africa and Middle East	3792 (3151 to 5143)	1.7 (1.4 to 2.3)	21222 (17602 to 24975)	3.7 (3.1 to 4.3)	459.7 (321.5 to 608.4)	115.6 (62.5 to 172.9)
Algeria	294 (224 to 378)	1.7 (1.3 to 2.2)	1597 (1105 to 2117)	3.6 (2.6 to 4.8)	443.9 (288.2 to 674)	109.3 (50.9 to 195.1)

Bahrain	11 (9 to 15)	4 (3.2 to 5.3)	80 (59 to 109)	5.7 (4.1 to 7.5)	633.5 (400.2 to 972.7)	42.5 (-1.4 to 110.2)
Egypt	447 (369 to 604)	1.2 (1 to 1.7)	2055 (1530 to 2710)	2.5 (1.9 to 3.2)	360.1 (241.9 to 523.4)	101.4 (49.2 to 172.5)
Iran (Islamic Republic of)	359 (236 to 463)	1 (0.6 to 1.3)	3291 (1398 to 4116)	3.5 (1.5 to 4.4)	815.5 (430.8 to 1132.6)	247.8 (107.3 to 366.1)
Iraq	258 (186 to 387)	2.3 (1.6 to 3.6)	1545 (1111 to 2119)	4.6 (3.3 to 6.2)	498 (272.1 to 848.4)	97.6 (22.1 to 212)
Jordan	63 (48 to 83)	3 (2.3 to 4)	451 (327 to 631)	4.3 (3.1 to 5.9)	615.9 (382.3 to 989)	42.9 (-4.9 to 115.9)
Kuwait	54 (47 to 62)	4.2 (3.7 to 4.8)	275 (219 to 327)	5.4 (4.3 to 6.4)	409.5 (301.5 to 552)	27 (2.4 to 59.6)
Lebanon	73 (53 to 98)	2.9 (2.1 to 3.9)	261 (198 to 348)	4.3 (3.3 to 5.8)	255.7 (135.5 to 452.6)	47.8 (-1.9 to 127.8)
Libya	87 (64 to 116)	3.2 (2.3 to 4.4)	446 (307 to 630)	5.9 (4.2 to 8.2)	412.8 (218.6 to 761.9)	84.8 (17.1 to 213.2)
Morocco	212 (162 to 277)	1.1 (0.9 to 1.5)	834 (564 to 1204)	2.2 (1.5 to 3.1)	294 (155.3 to 497.1)	88.8 (25.7 to 181.1)
Palestine	32 (22 to 44)	3.1 (2 to 4.2)	139 (90 to 175)	4 (2.5 to 5.1)	331.9 (197.1 to 535.6)	31.9 (-8.1 to 93.5)
Oman	15 (10 to 20)	1.3 (0.9 to 1.7)	103 (69 to 138)	2.7 (1.8 to 3.5)	608 (357.7 to 970.1)	107.8 (38.2 to 205.9)
Qatar	10 (7 to 13)	4.1 (3.1 to 5.2)	135 (95 to 186)	6 (4.3 to 7.9)	1259.3 (804.6 to 1879.7)	45.4 (1.8 to 103.5)
Saudi Arabia	208 (136 to 335)	2.1 (1.4 to 3.5)	2943 (2098 to 3917)	7.1 (5.4 to 9.3)	1316.7 (772.6 to 2273.7)	239.9 (112.7 to 448.7)
Syrian Arab Republic	77 (41 to 186)	1 (0.6 to 2.5)	445 (275 to 702)	3 (1.8 to 4.8)	480.1 (196.1 to 1065.7)	186 (50 to 466.9)
Tunisia	127 (95 to 163)	2 (1.5 to 2.6)	522 (351 to 708)	3.8 (2.6 to 5.2)	310 (163.4 to 491.2)	90.7 (23.5 to 173.1)
Turkey	1162	2.7	4240	4.4	264.8	61.1

	(854 to 1594)	(2 to 3.7)	(3189 to 5746)	(3.3 to 6)	(150.2 to 417.5)	(10.3 to 125.6)
United Arab Emirates	38	4.5	372	5.2	873.4	16.2
	(25 to 55)	(2.9 to 6.3)	(283 to 509)	(4.1 to 6.7)	(591.7 to 1415.8)	(-16.6 to 80)
Yemen	47	0.7	334	1.6	603.7	124.5
	(25 to 107)	(0.4 to 1.6)	(226 to 483)	(1.1 to 2.4)	(243.5 to 1292.1)	(9 to 339.8)
Sudan	117	0.9	626	2.1	434.5	119
	(46 to 305)	(0.4 to 2.4)	(360 to 998)	(1.2 to 3.2)	(155.7 to 1135.8)	(6.8 to 389.2)
South Asia	7853	1	37336	2.1	375.4	110.9
	(6476 to 10285)	(0.8 to 1.3)	(30263 to 44931)	(1.7 to 2.6)	(264.7 to 495.9)	(62.4 to 162)
South Asia	7853	1	37336	2.1	375.4	110.9
	(6476 to 10285)	(0.8 to 1.3)	(30263 to 44931)	(1.7 to 2.6)	(264.7 to 495.9)	(62.4 to 162)
Afghanistan	98	1.4	509	3.1	418.2	127.7
	(33 to 276)	(0.5 to 3.8)	(227 to 855)	(1.4 to 5.2)	(188 to 870.7)	(23.6 to 323.9)
Bangladesh	684	1	2983	1.9	336.4	85.3
	(490 to 973)	(0.8 to 1.4)	(1875 to 5393)	(1.2 to 3.3)	(178.4 to 642)	(21.5 to 206.5)
Bhutan	4	1	14	1.9	262.4	81.1
	(2 to 5)	(0.7 to 1.5)	(9 to 23)	(1.2 to 3.1)	(111 to 559.6)	(9.4 to 212.2)
India	5856	0.9	28334	2.1	383.9	119.6
	(4761 to 7739)	(0.8 to 1.2)	(22851 to 34107)	(1.7 to 2.5)	(258.2 to 507.5)	(64.3 to 172.1)
Nepal	120	0.9	529	1.9	340.8	102.3
	(81 to 178)	(0.6 to 1.4)	(351 to 823)	(1.3 to 2.9)	(205.8 to 603.9)	(44.1 to 206.8)
Pakistan	1190	1.6	5476	3	360.1	81.7
	(948 to 1556)	(1.3 to 2.1)	(3849 to 7662)	(2.1 to 4)	(220.8 to 560.3)	(30.5 to 153.2)
Southeast Asia, East Asia, and Oceania	19689	1.5	77575	2.8	294	90.7
	(16262 to 22389)	(1.2 to 1.7)	(64192 to 91823)	(2.3 to 3.3)	(233.5 to 385.2)	(62.8 to 133.1)
East Asia	13203	1.3	50885	2.5	285.4	94.5
	(10809 to 15461)	(1.1 to 1.5)	(41562 to 63162)	(2.1 to 3.1)	(201.6 to 412)	(52.5 to 157.3)
China	12157	1.2	48105	2.5	295.7	98
	(9714 to 14406)	(1 to 1.5)	(38695 to 60068)	(2 to 3.1)	(204.5 to 437.9)	(52.7 to 166.9)
	302	1.6	776	2.4	157	47

Democratic People's Republic of Korea	(211 to 414)	(1.1 to 2.2)	(532 to 1105)	(1.6 to 3.4)	(73.9 to 283.2)	(-0.5 to 116.5)
Taiwan (Province of China)	744 (675 to 828)	3.8 (3.5 to 4.2)	2004 (1727 to 2264)	5.9 (5 to 6.7)	169.4 (125.3 to 219.6)	52.7 (28.4 to 79.3)
Southeast Asia	6441 (5206 to 7277)	2 (1.7 to 2.3)	26559 (20899 to 31184)	3.6 (2.9 to 4.2)	312.4 (248.9 to 377)	78.8 (52.7 to 106)
Cambodia	105 (67 to 139)	1.9 (1.2 to 2.5)	544 (341 to 772)	3.8 (2.4 to 5.3)	418.4 (255.2 to 641.4)	98.3 (39.2 to 179.1)
Indonesia	2004 (1395 to 2417)	1.6 (1.1 to 1.9)	7343 (4749 to 9783)	2.6 (1.7 to 3.4)	266.5 (172.2 to 386.6)	60 (20.4 to 108.8)
Lao People's Democratic Republic	44 (25 to 63)	1.8 (1.1 to 2.6)	154 (99 to 213)	2.7 (1.7 to 3.7)	252.1 (135.9 to 431.4)	47.6 (1 to 119.8)
Malaysia	288 (231 to 345)	2.4 (2 to 2.9)	1280 (1061 to 1548)	4 (3.3 to 4.8)	344.2 (242.4 to 489.3)	66.4 (31 to 119.3)
Maldives	1 (1 to 2)	1.2 (0.7 to 1.7)	6 (5 to 8)	1.3 (1 to 1.7)	352.7 (181.8 to 872.5)	7.8 (-30.8 to 116.7)
Myanmar	497 (314 to 660)	1.8 (1.2 to 2.4)	1400 (941 to 1860)	2.6 (1.8 to 3.4)	181.8 (86.4 to 339)	44.2 (-3.6 to 119.3)
Philippines	1123 (839 to 1384)	2.8 (2.1 to 3.5)	4113 (3321 to 5120)	4.2 (3.4 to 5.2)	266.2 (181.5 to 363.9)	48.6 (13.1 to 87.6)
Sri Lanka	289 (227 to 344)	2.2 (1.7 to 2.7)	835 (508 to 1203)	3.2 (2 to 4.6)	189.4 (75.6 to 317.2)	43.3 (-13 to 106)
Thailand	1036 (829 to 1409)	2.3 (1.9 to 3.2)	3801 (2727 to 5757)	3.9 (2.8 to 5.9)	267 (161.2 to 407.2)	68.8 (20.3 to 128.6)
Timor-Leste	5 (3 to 7)	1.3 (0.8 to 1.8)	20 (13 to 28)	2.1 (1.3 to 3)	290.3 (162.2 to 500.2)	56.7 (8.6 to 136.4)
Viet Nam	1025 (756 to 1389)	2.2 (1.6 to 3)	6996 (4791 to 9263)	6.3 (4.4 to 8.3)	582.6 (369.5 to 895.8)	192.2 (93.3 to 330.8)

Oceania	45 (30 to 60)	1.2 (0.8 to 1.6)	131 (80 to 185)	1.4 (0.9 to 1.9)	193.9 (133.9 to 262.5)	14.3 (-7.9 to 40.7)
Fiji	16 (10 to 21)	3.3 (2.1 to 4.4)	34 (20 to 48)	3.9 (2.4 to 5.5)	111.3 (45.4 to 222.5)	16.4 (-18.7 to 74)
Kiribati	0 (0 to 0)	0 (0 to 0.1)	0 (0 to 0)	0.1 (0 to 0.1)	137.8 (68 to 233.5)	19.9 (-12.8 to 63.3)
Marshall Islands	0 (0 to 0)	0.9 (0.8 to 1.2)	1 (0 to 1)	1.5 (1 to 2.1)	249.3 (136.2 to 404.1)	57.1 (4.2 to 123.8)
Micronesia (Federated States of)	1 (0 to 1)	1.1 (0.8 to 1.5)	1 (1 to 2)	1.7 (1.1 to 2.3)	127 (53.3 to 231.2)	46.7 (0.4 to 111.5)
Papua New Guinea	18 (10 to 28)	0.8 (0.4 to 1.2)	67 (36 to 119)	1 (0.5 to 1.7)	271.7 (152.3 to 460.3)	25.2 (-15.8 to 83.6)
Samoa	2 (2 to 3)	2.1 (1.6 to 3.1)	6 (4 to 8)	3.3 (2.3 to 4.7)	151.7 (68.5 to 291)	54.1 (4.1 to 138.1)
Solomon Islands	1 (1 to 2)	0.8 (0.4 to 1.1)	6 (3 to 9)	1.3 (0.8 to 1.9)	351 (216.9 to 581.7)	67 (21.5 to 142.6)
Tonga	1 (0 to 1)	1 (0.7 to 1.3)	1 (1 to 2)	1.5 (0.9 to 2.2)	112.5 (45 to 214.3)	54 (6.3 to 125.6)
Vanuatu	1 (0 to 1)	0.8 (0.6 to 1.1)	3 (2 to 4)	1.2 (0.8 to 1.6)	313 (179.4 to 517.5)	50.6 (4.6 to 120.4)
American Samoa	1 (0 to 1)	2.4 (1.8 to 3.1)	2 (1 to 2)	3.6 (2.5 to 4.7)	191.6 (96.1 to 321.9)	50.9 (2.6 to 113.4)
Cook Islands	0 (0 to 0)	1.7 (1.3 to 2.2)	0 (0 to 1)	2.2 (1.6 to 3.2)	96.7 (36.5 to 206.1)	25.2 (-14.5 to 98.3)
Guam	1 (1 to 1)	0.9 (0.7 to 1.5)	4 (3 to 4)	1.8 (1.4 to 2.2)	325.5 (114.6 to 504.4)	103.5 (5.8 to 181.1)
Nauru	0 (0 to 0)	1.4 (0.9 to 1.9)	0 (0 to 0)	2.3 (1.3 to 3.3)	106.9 (39.8 to 211.2)	64.9 (14.1 to 140)
Niue	0 (0 to 0)	1.3 (0.9 to 1.7)	0 (0 to 0)	2.3 (1.5 to 3)	67.4 (13.6 to 143.5)	83.7 (24.4 to 171.1)

Northern Mariana Islands	0 (0 to 0)	1.1 (0.8 to 1.5)	1 (1 to 1)	1.6 (1.3 to 2)	215.5 (85.4 to 400)	54.8 (0 to 125.8)
Palau	0 (0 to 0)	1.6 (1.2 to 2.2)	0 (0 to 1)	2.1 (1.5 to 2.7)	162.3 (81.2 to 277.6)	25.5 (-13.3 to 77.5)
Tokelau	0 (0 to 0)	1.2 (0.8 to 1.6)	0 (0 to 0)	2.2 (1.4 to 2.9)	105 (44.5 to 203.7)	85.3 (30.5 to 177.1)
Tuvalu	0 (0 to 0)	1.1 (0.8 to 1.5)	0 (0 to 0)	1.6 (1 to 2.1)	127.9 (60.6 to 229.1)	46.6 (3.6 to 107.7)
Sub-Saharan Africa	2693 (2191 to 3229)	0.9 (0.8 to 1.1)	8801 (6735 to 12362)	1.2 (1 to 1.7)	226.8 (154.3 to 343.5)	32.3 (5.3 to 72.1)
Central Sub-Saharan Africa	154 (112 to 226)	0.6 (0.4 to 0.8)	496 (319 to 771)	0.7 (0.4 to 1.1)	222.6 (134 to 337.7)	21.7 (-11.4 to 61.7)
Angola	25 (17 to 37)	0.5 (0.4 to 0.8)	118 (71 to 192)	0.7 (0.4 to 1.2)	365.3 (201.9 to 582.2)	42.8 (-3.4 to 102.3)
Central African Republic	9 (6 to 12)	0.6 (0.5 to 0.9)	17 (11 to 26)	0.6 (0.4 to 0.9)	93.5 (31.7 to 177.7)	-6.6 (-35.8 to 30.2)
Congo	10 (7 to 14)	0.8 (0.6 to 1.1)	36 (22 to 58)	1 (0.6 to 1.5)	274.2 (148.7 to 447.3)	26.6 (-14.4 to 79)
Democratic Republic of the Congo	103 (71 to 159)	0.5 (0.4 to 0.9)	302 (182 to 499)	0.6 (0.4 to 1.1)	192.1 (93 to 318.1)	16.8 (-22.6 to 65.5)
Equatorial Guinea	1 (1 to 2)	0.6 (0.4 to 0.8)	8 (4 to 14)	1.1 (0.6 to 1.8)	549 (257.2 to 978.5)	89.5 (9.6 to 202.3)
Gabon	5 (4 to 8)	0.9 (0.6 to 1.2)	14 (9 to 22)	1.1 (0.7 to 1.7)	167.7 (74.3 to 302.7)	28.2 (-14.5 to 88.2)
Eastern Sub-Saharan Africa	1908 (1517 to 2388)	1.8 (1.5 to 2.2)	6384 (4630 to 9479)	2.4 (1.8 to 3.5)	234.5 (143.3 to 396.3)	33.3 (-0.3 to 88.1)
Burundi	50 (34 to 73)	1.6 (1.1 to 2.2)	115 (74 to 185)	1.5 (1 to 2.3)	131 (38.1 to 365.1)	-6.3 (-42 to 80.6)
Comoros	4 (2 to 6)	1.4 (0.9 to 2.1)	12 (8 to 20)	1.9 (1.2 to 3.2)	222 (114 to 410.1)	42 (-3.3 to 112.8)

Djibouti	3 (2 to 4)	1.1 (0.8 to 1.7)	17 (10 to 30)	1.8 (1.1 to 3)	574.3 (315.5 to 1011.9)	55.6 (2.9 to 140.5)
Eritrea	23 (19 to 31)	1.4 (1.1 to 1.7)	81 (52 to 131)	1.9 (1.3 to 2.9)	247.9 (121.7 to 446)	42.7 (-2.9 to 117.4)
Ethiopia	971 (711 to 1321)	3.5 (2.6 to 4.7)	2701 (1775 to 4540)	3.9 (2.6 to 6.4)	178.3 (81.7 to 423.2)	11.7 (-24.1 to 97.5)
Kenya	51 (34 to 79)	0.4 (0.3 to 0.6)	253 (179 to 397)	0.7 (0.5 to 1.1)	400 (259.2 to 629.5)	81.1 (27 to 159.4)
Madagascar	87 (68 to 115)	1.2 (1 to 1.6)	296 (199 to 411)	1.6 (1.1 to 2.2)	240.3 (125.6 to 397.8)	29.5 (-9.2 to 85.4)
Malawi	66 (48 to 90)	1.2 (0.9 to 1.5)	231 (141 to 382)	1.9 (1.2 to 2.9)	247.7 (113.3 to 430.7)	65.4 (11.1 to 141.6)
Mauritius	15 (14 to 16)	1.8 (1.6 to 1.9)	28 (25 to 31)	1.6 (1.4 to 1.8)	89.3 (66.3 to 112.2)	-9.8 (-20 to 0.4)
Mozambique	92 (61 to 151)	1.1 (0.8 to 1.8)	329 (198 to 608)	1.9 (1.2 to 3.3)	258.8 (139.3 to 428.9)	64.3 (12.2 to 136.6)
Rwanda	76 (57 to 103)	1.8 (1.4 to 2.5)	187 (125 to 290)	2 (1.4 to 3)	146.4 (51.8 to 393.7)	9.6 (-29.8 to 105)
Seychelles	1 (0 to 1)	0.9 (0.7 to 1.1)	1 (1 to 2)	1.1 (0.9 to 1.4)	175.5 (110.4 to 255.7)	26.9 (-3.1 to 62.8)
Somalia	46 (29 to 64)	1.2 (0.8 to 1.7)	145 (91 to 214)	1.4 (0.9 to 2.1)	216 (116.9 to 377.7)	20.2 (-15.5 to 74.5)
United Republic of Tanzania	215 (157 to 310)	1.4 (1.1 to 2)	749 (497 to 1150)	2 (1.4 to 2.9)	248.4 (139.1 to 396.6)	37.1 (-3.3 to 86.6)
Uganda	125 (90 to 172)	1.4 (1.1 to 2)	804 (536 to 1128)	3.3 (2.3 to 4.5)	542.5 (305.1 to 932)	130.7 (50.2 to 262.1)
Zambia	63 (49 to 80)	1.4 (1.1 to 1.8)	353 (168 to 721)	2.9 (1.5 to 5.5)	463.2 (165.5 to 1057.7)	104.8 (3.7 to 288.5)
South Sudan	37 (25 to 54)	1.1 (0.8 to 1.5)	106 (69 to 165)	1.8 (1.2 to 2.7)	188.1 (84.9 to 366.2)	65.3 (10 to 157.1)
	377	1.1	1117	1.6	196.3	47.8

Southern Sub-Saharan Africa	(318 to 448)	(0.9 to 1.3)	(935 to 1316)	(1.3 to 1.9)	(146.2 to 256.4)	(20.8 to 78.1)
Botswana	6 (4 to 10)	0.9 (0.6 to 1.4)	20 (12 to 32)	1.1 (0.7 to 1.7)	217.5 (108.5 to 410)	16.7 (-20.9 to 84.3)
Lesotho	6 (4 to 10)	0.7 (0.5 to 1.1)	16 (11 to 25)	1.3 (0.9 to 2)	152.9 (39.5 to 301.2)	88.2 (4.1 to 194.7)
Namibia	6 (4 to 8)	0.7 (0.6 to 0.9)	24 (16 to 36)	1.3 (0.9 to 1.9)	317.4 (174.5 to 525)	89.1 (24.9 to 179.6)
South Africa	254 (214 to 304)	1 (0.8 to 1.2)	716 (615 to 880)	1.4 (1.1 to 1.6)	181.8 (139.6 to 229.7)	40.6 (19.4 to 64.4)
Eswatini	4 (3 to 6)	1.1 (0.8 to 1.6)	12 (7 to 19)	1.7 (1 to 2.5)	196.7 (78.4 to 369.6)	51.8 (-4.6 to 138.6)
Zimbabwe	100 (74 to 128)	1.9 (1.5 to 2.4)	328 (206 to 457)	3.3 (2.2 to 4.4)	227.6 (97.7 to 383)	72.3 (10 to 148.5)
Western Sub-Saharan Africa	254 (186 to 312)	0.2 (0.2 to 0.3)	804 (598 to 1069)	0.3 (0.2 to 0.3)	216 (144.6 to 302.3)	20.6 (-5.4 to 50.5)
Benin	7 (4 to 10)	0.3 (0.2 to 0.4)	20 (13 to 32)	0.3 (0.2 to 0.4)	186.2 (92.6 to 327.2)	-8.6 (-37.8 to 36.4)
Burkina Faso	18 (9 to 26)	0.3 (0.2 to 0.5)	39 (23 to 54)	0.3 (0.2 to 0.4)	115.1 (45.5 to 231.5)	-16.4 (-41.4 to 30.5)
Cameroon	24 (13 to 32)	0.4 (0.2 to 0.5)	74 (47 to 110)	0.4 (0.2 to 0.5)	215.5 (109.7 to 393.4)	-7.9 (-38.2 to 47.1)
Cabo Verde	0 (0 to 0)	0.1 (0.1 to 0.2)	3 (1 to 6)	0.6 (0.1 to 1.1)	1280.1 (131.8 to 3057.5)	444 (-0.6 to 1096)
Chad	8 (4 to 12)	0.2 (0.1 to 0.4)	22 (15 to 31)	0.2 (0.2 to 0.3)	169.5 (78 to 318.1)	-1.6 (-33.2 to 54.4)
CÃ´te d'Ivoire	41 (29 to 55)	0.6 (0.5 to 0.8)	163 (110 to 239)	0.9 (0.6 to 1.2)	301.6 (159.7 to 522.7)	38.7 (-5.6 to 100.2)
Gambia	2 (1 to 2)	0.3 (0.2 to 0.4)	8 (5 to 11)	0.5 (0.3 to 0.7)	354 (197.1 to 593.7)	60.3 (9.3 to 137.2)
Ghana	6	0.1	25	0.1	281.7	44

	(4 to 9)	(0 to 0.1)	(16 to 36)	(0.1 to 0.1)	(162.1 to 455.8)	(-0.1 to 102.8)
Guinea	19 (15 to 25)	0.5 (0.4 to 0.6)	51 (35 to 75)	0.6 (0.4 to 0.9)	167 (77.5 to 320.3)	27.8 (-12.7 to 92.8)
Guinea-Bissau	2 (1 to 3)	0.4 (0.2 to 0.5)	4 (3 to 6)	0.4 (0.2 to 0.5)	110.3 (33.1 to 247)	-7.4 (-38.8 to 51)
Liberia	4 (2 to 6)	0.3 (0.1 to 0.4)	13 (8 to 18)	0.3 (0.2 to 0.5)	196.7 (92.9 to 386.6)	15.1 (-22.4 to 89.3)
Mali	56 (44 to 70)	1.1 (0.9 to 1.3)	161 (107 to 244)	1.2 (0.8 to 1.7)	187.7 (93.6 to 318.9)	10.8 (-22.8 to 54.6)
Mauritania	4 (2 to 5)	0.3 (0.2 to 0.4)	10 (7 to 15)	0.4 (0.2 to 0.5)	161.7 (69.2 to 370.3)	8.5 (-28.8 to 96.7)
Niger	10 (5 to 14)	0.2 (0.1 to 0.3)	26 (16 to 39)	0.2 (0.1 to 0.3)	163.1 (74 to 315.1)	-16.4 (-43.7 to 32.7)
Nigeria	28 (18 to 50)	0 (0 to 0.1)	119 (73 to 207)	0.1 (0.1 to 0.1)	322.3 (167.8 to 582.7)	70.8 (13.8 to 168.4)
Sao Tome and Principe	0 (0 to 0)	0.1 (0.1 to 0.2)	0 (0 to 1)	0.2 (0.1 to 0.3)	201.8 (63.4 to 402.8)	68.4 (7.2 to 148.8)
Senegal	13 (6 to 20)	0.3 (0.2 to 0.4)	32 (21 to 51)	0.3 (0.2 to 0.5)	147.9 (64.5 to 304.3)	-1.1 (-33.5 to 65.6)
Sierra Leone	6 (3 to 9)	0.2 (0.1 to 0.4)	16 (9 to 24)	0.3 (0.2 to 0.4)	147 (64.3 to 277.8)	7.6 (-25.1 to 63.5)
Togo	6 (3 to 9)	0.3 (0.2 to 0.5)	19 (11 to 30)	0.3 (0.2 to 0.5)	202.8 (101.1 to 357.2)	-1.7 (-34 to 51.6)

Table 2: Global, regional, and national DALYs counts, age-standardised DALYs rate and percentage change of Thyroid cancer 1990-2021

Location	DALYs counts in 1990(95%UI)	ASDALYsR in 1990(95%UI)	DALYs counts in 2021(95%UI)	ASDALYsR in 2021(95%UI)	Percentage change of DALYs counts ,1990-2021(95%UI)	Percentage change of ASDALYsR,1990-2021(95%UI)
Global	647000 (600000 to 720000)	15.2 (14.2 to 16.8)	1250000 (110000 to 1380000)	14.6 (12.8 to 16.1)	92.7 (72.2 to 112.5)	-4.2 (-14.1 to 5.5)
Central Europe, Eastern Europe, and Central Asia	80861 (77545 to 84384)	17.1 (16.4 to 17.9)	75792 (70447 to 81360)	12.3 (11.4 to 13.2)	-6.3 (-12.7 to -0.1)	-28.1 (-32.9 to -23.5)
Central Asia	8145 (7568 to 8817)	15.9 (14.7 to 17.2)	10273 (9056 to 11543)	11.7 (10.3 to 13)	26.1 (9.6 to 45.4)	-26.5 (-35.8 to -15.7)
Armenia	397 (300 to 510)	13.7 (10.4 to 17.5)	892 (676 to 1144)	21.2 (16 to 27.3)	124.7 (50.5 to 235)	54.7 (3.7 to 130)
Azerbaijan	611 (462 to 826)	11 (8.3 to 14.7)	1056 (768 to 1421)	9.4 (6.9 to 12.4)	72.9 (10.7 to 167.5)	-14.7 (-44.7 to 29.9)
Georgia	910 (749 to 1100)	14.6 (12 to 17.7)	1404 (1152 to 1700)	25.8 (21.3 to 31.5)	54.2 (14.7 to 110.9)	76.8 (29.8 to 138.7)
Kazakhstan	4486 (4001 to 5042)	32.3 (28.7 to 36.5)	3222 (2644 to 3826)	16.9 (13.9 to 20.1)	-28.2 (-42.9 to -8.5)	-47.6 (-58.4 to -33.5)
Kyrgyzstan	706 (553 to 885)	21.5 (16.9 to 26.8)	866 (655 to 1131)	15.7 (12 to 20.4)	22.8 (-16.6 to 77.7)	-26.7 (-49.1 to 4.3)
Mongolia	233 (173 to 328)	19.1 (14.2 to 26.6)	436 (334 to 576)	15.9 (12.1 to 20.9)	87.4 (26 to 173.1)	-17 (-43.4 to 19.7)
Tajikistan	6	0.2	9	0.1	51.3	-34.1

	(4 to 8)	(0.1 to 0.3)	(6 to 12)	(0.1 to 0.2)	(-2 to 122.2)	(-58.1 to -2.3)
Turkmenistan	433 (391 to 479)	19.1 (17.3 to 21.1)	638 (488 to 832)	13.9 (10.7 to 17.9)	47.4 (8.5 to 97)	-27.3 (-45.9 to -2.8)
Uzbekistan	364 (275 to 478)	2.8 (2.1 to 3.7)	1750 (1291 to 2371)	5.8 (4.3 to 7.8)	380.7 (212.4 to 638.8)	108.9 (37.3 to 218.7)
Central Europe	34786 (33224 to 36474)	23.5 (22.4 to 24.6)	23434 (21250 to 25475)	11.6 (10.5 to 12.7)	-32.6 (-38.4 to -26.5)	-50.6 (-55 to -46)
Albania	386 (279 to 489)	16.8 (12.1 to 21)	444 (319 to 631)	10.9 (7.7 to 15.4)	15.1 (-28.4 to 78)	-35.3 (-59.1 to 1.2)
Bosnia and Herzegovina	656 (470 to 776)	15.1 (10.8 to 17.7)	571 (428 to 739)	9.7 (7.3 to 12.7)	-13 (-39.2 to 33.3)	-35.5 (-54.9 to -1.3)
Bulgaria	2325 (1968 to 2734)	19.6 (16.6 to 23.1)	1633 (1292 to 2071)	13.2 (10.4 to 16.7)	-29.8 (-47.6 to -4)	-32.7 (-49.6 to -8)
Croatia	1410 (1256 to 1602)	23.2 (20.6 to 26.2)	878 (738 to 1041)	10.9 (9.1 to 13)	-37.8 (-49 to -23.8)	-53.1 (-61.7 to -42.7)
Czechia	2935 (2495 to 3470)	22 (18.7 to 26)	2021 (1579 to 2538)	10.5 (8.1 to 13.3)	-31.2 (-48 to -10.6)	-52.1 (-64.5 to -36.4)
Hungary	3700 (3246 to 4176)	26.5 (23.3 to 29.8)	2039 (1662 to 2491)	11.8 (9.7 to 14.2)	-44.9 (-56.1 to -30.8)	-55.4 (-64.3 to -44.7)
North Macedonia	345 (261 to 402)	17.7 (13.5 to 20.6)	397 (310 to 504)	12.2 (9.6 to 15.4)	15.1 (-13.8 to 54.7)	-31.2 (-48.3 to -7.5)
Montenegro	106 (85 to 135)	16.5 (13.3 to 21)	156 (123 to 195)	16.7 (13.3 to 20.9)	47.4 (15.4 to 86)	1 (-21 to 28.2)
Poland	14357 (13755 to 14939)	33.1 (31.7 to 34.5)	7939 (7126 to 8700)	12 (10.8 to 13.2)	-44.7 (-50.2 to -39.1)	-63.8 (-67.4 to -60.1)
Romania	4717 (4142 to 5397)	17.1 (15 to 19.5)	3696 (2905 to 4596)	11.1 (8.6 to 13.8)	-21.7 (-38.5 to -0.5)	-35.4 (-49.8 to -17.8)
Serbia	1639 (1255 to 2155)	14.9 (11.5 to 19.7)	1825 (1328 to 2426)	11.9 (8.6 to 15.8)	11.3 (-23.7 to 55.7)	-20.4 (-45.4 to 11.8)
Slovakia	1205 (975 to 1457)	20.5 (16.6 to 24.9)	1168 (912 to 1529)	13.1 (10.2 to 17.2)	-3.1 (-28.4 to 32.5)	-35.9 (-52.7 to -12.5)

Slovenia	447 (378 to 521)	18.5 (15.6 to 21.5)	326 (239 to 428)	8.1 (5.9 to 10.6)	-27 (-46.7 to -1)	-56.3 (-68.4 to -40.3)
Eastern Europe	37930 (35923 to 40329)	13.9 (13.1 to 14.7)	42086 (38218 to 46388)	12.9 (11.7 to 14.1)	11 (-0.5 to 22.2)	-7.1 (-16.7 to 1.9)
Belarus	1631 (1361 to 1958)	13.2 (11 to 15.7)	2160 (1693 to 2771)	14.2 (11.1 to 18.2)	32.4 (-0.3 to 73.5)	7.8 (-18.2 to 41.4)
Estonia	311 (244 to 396)	16 (12.6 to 20.3)	331 (253 to 421)	13.6 (10.3 to 17.3)	6.4 (-27 to 44.6)	-14.8 (-41.7 to 15.9)
Latvia	469 (371 to 593)	14 (11 to 17.7)	614 (471 to 781)	17.3 (13.2 to 22.3)	30.7 (-5.6 to 83.2)	24.2 (-11 to 76.6)
Lithuania	569 (477 to 691)	13.2 (11 to 16.1)	720 (587 to 877)	14.3 (11.6 to 17.3)	26.4 (-4.6 to 63.9)	8.4 (-18.1 to 41.5)
Republic of Moldova	584 (523 to 648)	13 (11.6 to 14.4)	661 (557 to 783)	11.5 (9.8 to 13.7)	13.1 (-5.9 to 34.1)	-11 (-25.7 to 5.1)
Russian Federation	25897 (24804 to 27029)	14.6 (13.9 to 15.2)	28639 (26154 to 31382)	12.8 (11.7 to 14)	10.6 (0.5 to 20.7)	-12.3 (-20.2 to -4.4)
Ukraine	8468 (7069 to 10308)	12.3 (10.3 to 14.8)	8961 (6370 to 12155)	12.8 (9 to 17.2)	5.8 (-29.4 to 52.5)	4.3 (-30.4 to 48.6)
High-income	174915 (165070 to 184456)	15.2 (14.4 to 16.1)	222890 (200353 to 239966)	11.5 (10.5 to 12.5)	27.4 (20.3 to 33.6)	-24.7 (-28.3 to -21.1)
High-income Asia Pacific	30856 (28505 to 35131)	15.4 (14.1 to 17.5)	50783 (43704 to 57571)	11.8 (10.5 to 13.7)	64.6 (45.9 to 80.2)	-23.1 (-29.9 to -15.6)
Brunei Darussalam	32 (24 to 43)	27.9 (20.8 to 36.5)	82 (64 to 104)	22.3 (17.4 to 28.2)	154.1 (98.9 to 254.1)	-20.2 (-38 to 10.1)
Japan	24889 (23406 to 26351)	14.8 (13.9 to 15.7)	38321 (32740 to 42214)	11.5 (10.2 to 12.5)	54 (37.8 to 64.5)	-22.7 (-26.9 to -18.8)
Republic of Korea	5529 (4125 to 9409)	17.3 (12.9 to 30.6)	11532 (9175 to 16858)	13 (10.3 to 18.9)	108.6 (36.4 to 191.7)	-24.9 (-51.4 to 4.1)
Singapore	406 (347 to 467)	17.1 (14.6 to 19.8)	848 (708 to 1036)	10 (8.4 to 12.3)	108.8 (67.5 to 164.5)	-41.4 (-53 to -25.8)
Australasia	2544	11	5041	10.6	98.2	-3.9

	(2273 to 2868)	(9.9 to 12.5)	(4104 to 6033)	(8.7 to 12.8)	(61.3 to 141.5)	(-22.3 to 17.5)
Australia	2037	10.6	4318	10.8	112	1.9
	(1785 to 2327)	(9.3 to 12.1)	(3467 to 5259)	(8.7 to 13.3)	(69.4 to 161.2)	(-19 to 26.2)
New Zealand	507	13.2	723	9.5	42.6	-27.9
	(435 to 596)	(11.3 to 15.5)	(590 to 844)	(7.8 to 11.1)	(10.2 to 82.2)	(-44.3 to -7.8)
Western Europe	94707	17.6	84465	10.5	-10.8	-40.6
	(89027 to 100543)	(16.6 to 18.8)	(75823 to 92550)	(9.4 to 11.5)	(-17.6 to -3.5)	(-45.3 to -35.4)
Andorra	9	14.7	14	9.6	63.7	-34.5
	(6 to 12)	(10.4 to 20.2)	(10 to 20)	(6.5 to 13.9)	(-4.1 to 173.5)	(-61.6 to 8.4)
Austria	2606	23.6	2260	14	-13.3	-41
	(2347 to 2869)	(21.2 to 26.2)	(1875 to 2671)	(11.5 to 16.6)	(-29.4 to 6.3)	(-52.2 to -27.2)
Belgium	2722	18.9	2412	12	-11.4	-36.6
	(2345 to 3161)	(16.3 to 21.9)	(1983 to 2910)	(9.8 to 14.5)	(-30.8 to 13.7)	(-50.7 to -18.2)
Cyprus	169	22.3	206	10.5	21.7	-53.1
	(133 to 212)	(17.6 to 27.4)	(157 to 276)	(8 to 13.9)	(-12.7 to 70)	(-66.6 to -33.1)
Denmark	799	10.9	738	6.8	-7.7	-37.6
	(696 to 907)	(9.5 to 12.3)	(617 to 876)	(5.6 to 8)	(-23.6 to 13.1)	(-48.7 to -23.1)
Finland	1243	18.3	1042	9.7	-16.1	-47.2
	(1099 to 1408)	(16.1 to 20.8)	(859 to 1255)	(8 to 11.8)	(-32.3 to 3.8)	(-57 to -34)
France	14236	18.9	12915	11.4	-9.3	-39.8
	(12841 to 15725)	(17 to 20.9)	(10513 to 15390)	(9.2 to 13.7)	(-25.1 to 8.8)	(-50 to -27.6)
Germany	24312	20.3	18569	11.2	-23.6	-45
	(21483 to 27655)	(18 to 23.1)	(15500 to 22065)	(9.3 to 13.4)	(-38.2 to -7.6)	(-55.5 to -33.3)
Greece	1855	12.7	2060	10.1	11	-20
	(1715 to 2017)	(11.7 to 13.8)	(1814 to 2306)	(9 to 11.4)	(-1.6 to 24.5)	(-29.7 to -10.3)
Iceland	103	37.6	103	19.5	-0.8	-48.1
	(91 to 117)	(33.1 to 42.5)	(86 to 124)	(16.2 to 23.7)	(-20.4 to 23.2)	(-58.6 to -35.2)
Ireland	695	17.4	644	8.7	-7.3	-49.9
	(616 to 779)	(15.4 to 19.5)	(533 to 773)	(7.2 to 10.4)	(-23.9 to 12.2)	(-58.7 to -39.5)
Israel	1067	22.3	1538	13.2	44.2	-40.9
	(924 to 1254)	(19.3 to 26.3)	(1274 to 1856)	(10.9 to 15.9)	(13.2 to 83.8)	(-53.8 to -25.1)

Italy	18163 (16824 to 19562)	22 (20.4 to 23.8)	14513 (12904 to 16260)	11.8 (10.6 to 13.3)	-20.1 (-26.4 to -11.5)	-46.3 (-50.6 to -40.4)
Luxembourg	141 (129 to 154)	27.1 (24.7 to 29.6)	129 (113 to 146)	12.7 (11.1 to 14.5)	-8.9 (-21.6 to 6.6)	-53.2 (-59.7 to -45.1)
Malta	84 (72 to 98)	19.7 (17 to 22.9)	94 (77 to 113)	11.2 (9.1 to 13.6)	11.6 (-13.7 to 42.7)	-43.4 (-56.5 to -27.2)
Monaco	9 (7 to 11)	14.4 (11 to 18.4)	11 (8 to 14)	13.7 (10.1 to 17.8)	27.5 (-8.3 to 74.9)	-4.6 (-31.5 to 35.2)
San Marino	8 (7 to 10)	25.4 (20.4 to 31.1)	9 (5 to 13)	13.9 (8.4 to 20.1)	4.7 (-34.2 to 57)	-45.2 (-66.5 to -16)
Netherlands	2330 (2092 to 2598)	12.1 (10.9 to 13.5)	2943 (2455 to 3413)	9.3 (7.7 to 10.9)	26.3 (7.4 to 49.4)	-23.3 (-35.1 to -9)
Norway	829 (773 to 885)	13.2 (12.3 to 14.1)	897 (791 to 999)	9.5 (8.5 to 10.6)	8.1 (-1.8 to 21.1)	-28 (-34.7 to -19.4)
Portugal	2431 (2140 to 2815)	18.4 (16.2 to 21.1)	2128 (1721 to 2631)	10.1 (8 to 12.5)	-12.4 (-30.9 to 10.3)	-45.1 (-56.8 to -30.7)
Spain	7640 (6940 to 8375)	15 (13.6 to 16.5)	7707 (6510 to 9240)	8.8 (7.5 to 10.5)	0.9 (-16.4 to 23.1)	-41.5 (-51.2 to -28.6)
Sweden	1853 (1599 to 2139)	13.2 (11.4 to 15.2)	1724 (1405 to 2081)	8.7 (7.2 to 10.4)	-7 (-25.7 to 14.9)	-34.3 (-47.6 to -18.8)
Switzerland	1403 (1262 to 1558)	14.6 (13.2 to 16.2)	1207 (1010 to 1424)	7.2 (6.1 to 8.5)	-14 (-28.2 to 3.4)	-50.7 (-59 to -40.7)
United Kingdom	9922 (9516 to 10281)	12.1 (11.6 to 12.6)	10527 (9828 to 11130)	9.2 (8.7 to 9.7)	6.1 (1.6 to 10.2)	-24.2 (-27.1 to -21.4)
Southern Latin America	9492 (8618 to 10470)	20.3 (18.4 to 22.3)	11960 (10465 to 13594)	14.3 (12.5 to 16.2)	26 (9.7 to 46.2)	-29.6 (-38.7 to -18.5)
Argentina	6509 (5852 to 7259)	20 (18 to 22.3)	7616 (6431 to 8935)	14.1 (11.9 to 16.6)	17 (-4.4 to 44.1)	-29.5 (-42.4 to -13.1)
Chile	2262 (1916 to 2622)	21.3 (18.1 to 24.6)	3431 (2962 to 4039)	13.9 (12 to 16.3)	51.7 (24.1 to 91.6)	-34.9 (-46.8 to -17.5)
Uruguay	721	19.4	912	18.5	26.5	-4.6

	(601 to 864)	(16 to 23.3)	(764 to 1096)	(15.5 to 22.3)	(1.1 to 60.3)	(-24.2 to 22.2)
High-income North America	37316 (34968 to 39721)	11.2 (10.5 to 12)	70642 (65004 to 76457)	12 (11 to 13)	89.3 (81.8 to 97)	6.5 (2.2 to 10.9)
Canada	3676 (3191 to 4193)	11.6 (10 to 13.2)	6156 (5054 to 7395)	9.6 (7.8 to 11.6)	67.4 (37 to 107.1)	-17.6 (-32.6 to 2.3)
Greenland	7 (5 to 9)	16.5 (12.7 to 20.9)	8 (5 to 11)	11 (7.6 to 14.8)	18.3 (-15.5 to 67.8)	-32.9 (-51.2 to -5.3)
United States of America	33632 (31573 to 35774)	11.2 (10.5 to 11.9)	64477 (59384 to 69967)	12.3 (11.3 to 13.4)	91.7 (85.3 to 98.6)	9.4 (5.7 to 13.7)
Latin America and Caribbean	42705 (41055 to 44440)	17.3 (16.6 to 18)	110247 (100928 to 121293)	17.5 (16.1 to 19.3)	158.2 (137 to 181.5)	1.2 (-6.9 to 10.2)
Caribbean	4117 (3769 to 4556)	14.9 (13.7 to 16.5)	8690 (7533 to 10099)	16.3 (14.1 to 19)	111.1 (82.7 to 143.4)	9.6 (-5.3 to 26.3)
Antigua and Barbuda	8 (8 to 9)	15.6 (14.2 to 16.9)	21 (20 to 22)	19.3 (18 to 20.5)	156.1 (131.7 to 185.2)	24.1 (12.5 to 38.2)
Bahamas	34 (31 to 37)	19 (17.2 to 20.8)	92 (73 to 115)	21.2 (17.1 to 26.5)	171 (107.3 to 247.9)	11.9 (-13.9 to 43.3)
Barbados	43 (40 to 47)	15.9 (14.8 to 17.1)	81 (63 to 100)	16.7 (13.2 to 20.9)	86.5 (45.2 to 132.2)	5.1 (-18.4 to 30.8)
Belize	7 (7 to 8)	7 (6.6 to 7.6)	37 (33 to 42)	10.8 (9.5 to 12.2)	405.4 (338.8 to 480)	54.7 (34.4 to 77.9)
Cuba	1340 (1234 to 1449)	12.9 (11.8 to 13.9)	3156 (2663 to 3717)	17.2 (14.4 to 20.2)	135.5 (96.3 to 180.9)	33.3 (10.7 to 59.4)
Dominica	9 (7 to 11)	15 (12.6 to 18.1)	13 (10 to 16)	15.5 (12.3 to 19.3)	45.1 (12.2 to 87.1)	3.4 (-19.4 to 31.8)
Dominican Republic	538 (439 to 634)	12.3 (9.9 to 14.5)	1401 (1058 to 1823)	13.4 (10.1 to 17.5)	160.3 (95.8 to 253.8)	9.3 (-18.6 to 49.8)
Grenada	16 (14 to 18)	23.7 (20.6 to 26.7)	25 (22 to 30)	21.9 (18.7 to 25.7)	55.3 (26.1 to 91.4)	-7.3 (-24.8 to 13.9)
Guyana	69 (60 to 78)	15.6 (13.7 to 17.5)	133 (99 to 175)	18.8 (14.1 to 24.6)	92.3 (38.8 to 158.6)	20.8 (-12.1 to 61.1)

Haiti	886 (589 to 1233)	23.1 (16 to 31.9)	1711 (1179 to 2385)	19.8 (13.9 to 27.2)	93.1 (30.7 to 180.1)	-14.2 (-40.7 to 21.6)
Jamaica	219 (197 to 242)	12.3 (11 to 13.5)	523 (391 to 689)	17 (12.7 to 22.3)	139.2 (73.7 to 219.9)	38.6 (0.5 to 84.6)
Saint Lucia	22 (20 to 23)	23.9 (22.3 to 25.7)	49 (40 to 59)	20.7 (17.1 to 24.9)	125.5 (83.7 to 175)	-13.6 (-29.6 to 5.2)
Saint Vincent and the Grenadines	19 (18 to 21)	25.8 (23.7 to 27.8)	42 (36 to 48)	29.8 (26.1 to 34.3)	118.8 (87.8 to 157.9)	15.6 (-0.8 to 36.5)
Suriname	41 (33 to 49)	14.8 (11.9 to 17.2)	84 (63 to 108)	13.1 (9.7 to 16.8)	103.5 (51.6 to 167.7)	-11.5 (-33.8 to 15.5)
Trinidad and Tobago	157 (149 to 167)	17.7 (16.7 to 18.7)	320 (242 to 416)	17.2 (13 to 22.3)	103.9 (53.5 to 162.9)	-2.8 (-26.4 to 25.1)
Bermuda	14 (12 to 15)	21.4 (19.4 to 23.6)	21 (17 to 26)	17.4 (14.2 to 21.8)	53.5 (26 to 92.9)	-18.8 (-34 to 1.8)
Puerto Rico	539 (494 to 587)	15 (13.7 to 16.3)	668 (545 to 811)	11.8 (9.6 to 14.5)	23.9 (-1.1 to 52.7)	-21 (-37.1 to -2)
Saint Kitts and Nevis	6 (6 to 7)	17.2 (15.6 to 18.7)	10 (8 to 13)	14.3 (11.8 to 17.2)	68.8 (36.9 to 102.9)	-16.5 (-31.6 to -0.7)
United States Virgin Islands	9 (7 to 11)	9.6 (7.7 to 11.9)	9 (7 to 12)	6.6 (4.9 to 8.7)	3.1 (-24.6 to 45.5)	-31.1 (-49.1 to -4.7)
Andean Latin America	5274 (4419 to 6186)	23 (19.3 to 27)	16690 (13208 to 20767)	27.5 (21.7 to 34.3)	216.5 (151 to 303.7)	19.6 (-5 to 53)
Bolivia (Plurinational State of)	1427 (937 to 1921)	39.4 (25.3 to 53.6)	3696 (2427 to 5129)	38.4 (25.3 to 53.3)	159.1 (79.8 to 278.8)	-2.5 (-32.3 to 42.5)
Ecuador	1019 (940 to 1108)	17 (15.6 to 18.6)	5195 (4038 to 6572)	31.1 (24.2 to 39.4)	409.7 (293.4 to 554.6)	83.1 (41.8 to 133.9)
Peru	2828 (2290 to 3467)	21.3 (17 to 25.9)	7799 (5517 to 10575)	22.8 (16 to 30.9)	175.8 (94.6 to 300.6)	7.2 (-24.7 to 54.7)
Central Latin America	18293 (17666 to 18921)	19.5 (18.9 to 20.2)	52187 (47013 to 58083)	20.4 (18.4 to 22.7)	185.3 (154 to 216.9)	4.4 (-6.8 to 15.9)

Colombia	5305 (4898 to 5759)	26.5 (24.4 to 28.7)	12032 (9856 to 14969)	21.9 (17.9 to 27.2)	126.8 (81.5 to 182.7)	-17.4 (-33.8 to 2.8)
Costa Rica	375 (342 to 410)	19.3 (17.6 to 21.1)	996 (852 to 1160)	18.1 (15.5 to 21.1)	165.7 (126.1 to 211.3)	-6.2 (-20.6 to 9.7)
El Salvador	682 (531 to 758)	21.2 (16.3 to 23.6)	1290 (1004 to 1605)	21.1 (16.3 to 26.2)	89.1 (48.3 to 141)	-0.7 (-22.5 to 27)
Guatemala	847 (809 to 889)	20.6 (19.6 to 21.7)	2262 (1942 to 2614)	19.2 (16.5 to 22.1)	167 (126.8 to 211.7)	-7.1 (-21 to 8.4)
Honduras	177 (140 to 217)	7.3 (5.6 to 8.9)	693 (491 to 945)	10.2 (7.2 to 13.9)	291.9 (175.3 to 438.3)	39.7 (-2.7 to 91.8)
Mexico	8879 (8596 to 9172)	18.7 (18.1 to 19.3)	28243 (25014 to 31949)	21.7 (19.2 to 24.5)	218.1 (180.4 to 259.6)	15.6 (2.1 to 30.5)
Nicaragua	219 (187 to 265)	12 (10.1 to 14.4)	706 (533 to 886)	13.6 (10.2 to 17)	222.4 (151.2 to 310.5)	13.3 (-12.7 to 44.1)
Panama	298 (264 to 335)	17.1 (15.1 to 19.1)	754 (591 to 939)	17.1 (13.4 to 21.3)	153.1 (90.7 to 228.1)	0 (-24.4 to 29.2)
Venezuela (Bolivarian Republic of)	1511 (1422 to 1613)	14.1 (13.1 to 15)	5210 (3929 to 6793)	17.2 (13 to 22.4)	244.8 (156.4 to 357.1)	22.5 (-8.2 to 61.2)
Tropical Latin America	15021 (14259 to 15823)	14.8 (14 to 15.6)	32680 (30547 to 34741)	12.7 (11.8 to 13.5)	117.6 (103.2 to 132.1)	-14.2 (-19.5 to -8.5)
Brazil	14582 (13822 to 15388)	14.7 (13.9 to 15.5)	31442 (29327 to 33410)	12.5 (11.6 to 13.3)	115.6 (101.7 to 130.1)	-15 (-20.1 to -9.5)
Paraguay	439 (375 to 539)	17.9 (15.2 to 21.8)	1239 (917 to 1607)	20.4 (15 to 26.3)	182 (101.3 to 290.8)	13.9 (-19.2 to 57.9)
North Africa and Middle East	21944 (18189 to 30746)	11 (9.1 to 15.5)	65316 (55454 to 76496)	12.7 (10.9 to 14.8)	197.6 (121.2 to 272.4)	15.4 (-14.4 to 44.3)
North Africa and Middle East	21944 (18189 to 30746)	11 (9.1 to 15.5)	65316 (55454 to 76496)	12.7 (10.9 to 14.8)	197.6 (121.2 to 272.4)	15.4 (-14.4 to 44.3)
Algeria	1497 (1187 to 1898)	9.9 (7.9 to 13.2)	4579 (3315 to 5894)	11.6 (8.6 to 14.8)	206 (125.7 to 313.3)	17.1 (-13.2 to 57.4)

Bahrain	49 (40 to 63)	23.8 (19.4 to 29.7)	192 (139 to 257)	18.7 (13.4 to 24.4)	289.8 (165.6 to 465.3)	-21.5 (-44.9 to 15.1)
Egypt	3140 (2666 to 4264)	9.8 (8.2 to 13.8)	8330 (6475 to 10542)	11.7 (9.2 to 14.6)	165.3 (102.3 to 246.3)	19.3 (-9.9 to 53.6)
Iran (Islamic Republic of)	1384 (1003 to 1668)	4.4 (3.1 to 5.4)	7843 (3433 to 9780)	9.3 (4.1 to 11.5)	466.9 (205.6 to 638.7)	108.5 (17.3 to 172.4)
Iraq	1415 (1039 to 2153)	14.2 (10.3 to 22)	4748 (3483 to 6435)	16.4 (12 to 21.6)	235.5 (115.4 to 413)	15.9 (-26.4 to 77.8)
Jordan	277 (217 to 364)	15.6 (12.4 to 20.6)	1171 (850 to 1612)	13.1 (9.8 to 17.8)	322.8 (189.6 to 527.3)	-16.1 (-41.8 to 22.7)
Kuwait	138 (122 to 158)	14.6 (13 to 16.5)	498 (400 to 621)	12.8 (10.4 to 15.7)	260.5 (187.5 to 347.3)	-12.2 (-29.3 to 8.1)
Lebanon	327 (246 to 430)	13.9 (10.5 to 18.2)	696 (551 to 915)	11.6 (9.2 to 15.3)	112.9 (47.6 to 209.8)	-17 (-42.1 to 19.9)
Libya	369 (275 to 495)	15.5 (11.4 to 21.6)	1214 (866 to 1658)	18.8 (13.8 to 25.1)	229.2 (115.8 to 441.6)	21.6 (-17.4 to 99.2)
Morocco	1387 (1106 to 1730)	8.2 (6.6 to 10)	3472 (2536 to 4660)	9.5 (7 to 12.6)	150.3 (73.4 to 249.7)	16.2 (-18.1 to 58.2)
Palestine	179 (119 to 243)	18.7 (12.1 to 25.4)	453 (285 to 561)	15.8 (9.8 to 19.6)	152.6 (75.1 to 252.9)	-15.6 (-40.5 to 17)
Oman	67 (48 to 90)	7.4 (5.4 to 9.8)	240 (160 to 315)	8.4 (5.8 to 10.7)	257.7 (132.9 to 421.1)	14.6 (-24.2 to 69.2)
Qatar	35 (26 to 45)	23.1 (17.7 to 28.3)	256 (173 to 362)	18.1 (13 to 24.3)	628 (400.6 to 938.9)	-21.7 (-44.5 to 7.1)
Saudi Arabia	1168 (807 to 1809)	14.3 (10.1 to 23.6)	6726 (4969 to 8948)	21.6 (16.6 to 27.4)	475.7 (261.7 to 815.2)	50.4 (-3.6 to 129.5)
Syrian Arab Republic	406 (226 to 945)	6.2 (3.5 to 14.3)	1392 (928 to 2093)	9.9 (6.7 to 14.9)	242.9 (79.6 to 545)	58.4 (-15.4 to 198.1)
Tunisia	559 (428 to 722)	9.7 (7.4 to 12.6)	1429 (997 to 1964)	10.7 (7.5 to 14.5)	155.5 (67.5 to 265.3)	10.4 (-27 to 58.5)
Turkey	7070	18.2	13414	14.1	89.7	-22.1

	(5523 to 9242)	(14.4 to 23.5)	(10490 to 17275)	(11.1 to 18.3)	(38.1 to 155.8)	(-43.2 to 3.3)
United Arab Emirates	192 (132 to 267)	31.4 (21.3 to 43.6)	1117 (844 to 1470)	25.4 (20 to 32.3)	483.1 (321.9 to 734.8)	-19.1 (-41.3 to 21.9)
Yemen	375 (205 to 839)	6.3 (3.4 to 14.5)	1730 (1181 to 2456)	9.8 (6.6 to 14.2)	361.6 (129.9 to 789)	55.7 (-22.1 to 197.9)
Sudan	883 (385 to 2238)	7.7 (3.5 to 19.2)	2659 (1707 to 4050)	10.3 (6.8 to 15.3)	200.9 (46.2 to 537.2)	33.4 (-34.6 to 179.2)
South Asia	105303 (88400 to 135793)	14.2 (12 to 18.2)	302257 (249828 to 356789)	18.2 (15.1 to 21.4)	187 (123.9 to 254.2)	28.2 (0.9 to 56)
South Asia	105303 (88400 to 135793)	14.2 (12 to 18.2)	302257 (249828 to 356789)	18.2 (15.1 to 21.4)	187 (123.9 to 254.2)	28.2 (0.9 to 56)
Afghanistan	1015 (366 to 2818)	13.7 (5 to 38.2)	3097 (1459 to 5106)	22.4 (10.7 to 36.2)	205.2 (64.6 to 446.7)	63.4 (-12.9 to 190)
Bangladesh	9753 (7403 to 13331)	15.1 (11.7 to 20.4)	22092 (13982 to 37366)	14.5 (9.3 to 24)	126.5 (49.8 to 262.5)	-3.5 (-35.6 to 49.8)
Bhutan	54 (35 to 75)	15.5 (10.3 to 22.2)	111 (73 to 173)	16.3 (10.9 to 24.8)	105.5 (29.7 to 237.1)	4.9 (-31.4 to 72.1)
India	77650 (64371 to 102706)	13 (10.9 to 17.1)	225288 (186617 to 264478)	17.2 (14.2 to 20)	190.1 (119.4 to 254.6)	31.8 (0.9 to 60.9)
Nepal	1744 (1215 to 2470)	14.2 (10.1 to 20.2)	4465 (3038 to 6631)	16.9 (11.7 to 24.6)	156 (78.1 to 284.1)	19.4 (-14.3 to 73.7)
Pakistan	16101 (12902 to 20531)	22.9 (18.8 to 29)	50302 (36509 to 67210)	30.2 (22.6 to 39.6)	212.4 (129.9 to 325.9)	32.2 (-0.4 to 77.9)
Southeast Asia, East Asia, and Oceania	179757 (152385 to 203248)	14.3 (12.3 to 16.2)	379330 (312166 to 440313)	13.5 (11.2 to 15.6)	111 (80.4 to 151.4)	-5.7 (-19.9 to 12.1)
East Asia	116582 (98062 to 136721)	12.2 (10.4 to 14.2)	213609 (173066 to 262362)	10.3 (8.3 to 12.5)	83.2 (45.9 to 136.3)	-16.3 (-32.8 to 7.5)
China	110736 (92143 to 130509)	12.1 (10.1 to 14.1)	203325 (163131 to 251789)	10.1 (8.1 to 12.4)	83.6 (44.3 to 140.3)	-16.4 (-33.6 to 8.8)
	2450	13.9	4350	13.1	77.5	-5.3

Democratic People's Republic of Korea	(1722 to 3326)	(9.9 to 18.7)	(3110 to 6010)	(9.5 to 18.1)	(27.1 to 161.3)	(-31.6 to 35.8)
Taiwan (Province of China)	3396 (3118 to 3701)	19.3 (17.8 to 20.8)	5934 (5142 to 6741)	15.6 (13.5 to 17.8)	74.7 (50 to 101.2)	-19.3 (-30.5 to -7.4)
Southeast Asia	62695 (51465 to 70375)	21.4 (17.9 to 24.3)	164547 (130333 to 189174)	23.6 (18.8 to 27)	162.5 (127 to 200.3)	10.3 (-5 to 25.9)
Cambodia	1431 (945 to 1874)	27.2 (18.3 to 35.4)	4459 (2844 to 6152)	33.1 (21.3 to 45.4)	211.6 (118.7 to 327.9)	21.7 (-13.9 to 63.2)
Indonesia	21968 (15720 to 26123)	19 (13.9 to 22.4)	55407 (36366 to 72736)	21 (14 to 27.3)	152.2 (93 to 228)	10.2 (-14.9 to 41.6)
Lao People's Democratic Republic	665 (399 to 961)	28.2 (17.1 to 40.2)	1378 (889 to 1922)	26.4 (17.3 to 36.3)	107.3 (42.3 to 211.7)	-6.2 (-34.9 to 39.1)
Malaysia	2437 (2029 to 2867)	22.9 (19.1 to 28)	6609 (5601 to 8034)	22 (18.6 to 27.1)	171.3 (117 to 241.8)	-3.7 (-22.3 to 21.8)
Maldives	15 (9 to 20)	14.5 (9 to 19.2)	29 (22 to 37)	7.6 (5.7 to 9.7)	91.6 (26.2 to 276.5)	-47.5 (-64.2 to -2.4)
Myanmar	6520 (4318 to 8598)	24.5 (16.8 to 32.1)	11496 (7886 to 15296)	22.2 (15.4 to 29.5)	76.3 (19.2 to 167.2)	-9.4 (-38.1 to 33.1)
Philippines	9966 (7534 to 12203)	28.2 (21.4 to 35)	30428 (24389 to 36937)	33.7 (27.3 to 40.7)	205.3 (141.5 to 275.8)	19.7 (-6.3 to 49)
Sri Lanka	2479 (1922 to 2922)	21 (16.1 to 24.7)	4044 (2524 to 5800)	15 (9.4 to 21.4)	63.1 (0.7 to 133.9)	-28.5 (-55.2 to 2.7)
Mauritius	119 (111 to 127)	15.3 (14.4 to 16.4)	166 (150 to 181)	9 (8.2 to 9.8)	39.7 (24.5 to 54)	-41.2 (-47.4 to -35.6)
Seychelles	5 (4 to 6)	8.3 (6.8 to 10.1)	9 (7 to 10)	7.1 (5.8 to 8.5)	79.9 (44.1 to 129.3)	-14.7 (-31.5 to 7.5)
Thailand	7828 (6437 to 10637)	19.8 (16.1 to 27.1)	17720 (13111 to 26321)	17.1 (12.7 to 25.4)	126.4 (66.5 to 203.4)	-13.5 (-35.5 to 14.5)
Timor-Leste	65	18.6	186	20.3	188	9.1

	(40 to 92)	(11.9 to 26.1)	(120 to 266)	(13 to 29.2)	(98.9 to 335)	(-25.2 to 62.6)
Viet Nam	9109	20.5	32388	31.1	255.6	51.7
	(6839 to 12595)	(15.2 to 29.5)	(23961 to 42160)	(23.4 to 40.2)	(148 to 401.8)	(3.5 to 115.3)
Oceania	480	13.9	1174	13.5	144.3	-2.6
	(325 to 641)	(9.8 to 18.5)	(725 to 1642)	(8.6 to 18.6)	(98.5 to 200.2)	(-20.8 to 19.4)
Fiji	155	36.4	275	34.1	77.6	-6.3
	(100 to 202)	(23.7 to 47.2)	(174 to 384)	(21.9 to 46.7)	(25.7 to 157)	(-33 to 33.3)
Kiribati	0	0.7	1	0.7	91	0.3
	(0 to 1)	(0.5 to 1.3)	(0 to 1)	(0.5 to 1.3)	(40.1 to 160.1)	(-24.3 to 35.4)
Marshall Islands	2	12.6	6	15.4	162.7	22.6
	(2 to 3)	(10.2 to 15.9)	(4 to 9)	(10.3 to 21.2)	(78.2 to 263.9)	(-15.9 to 69.3)
Micronesia (Federated States of)	8	15.3	13	16.2	58.4	5.8
	(6 to 11)	(11.4 to 20.1)	(9 to 18)	(10.6 to 22.2)	(8.8 to 131.3)	(-26.8 to 53.7)
Papua New Guinea	214	9.8	652	10.6	205.2	7.8
	(125 to 323)	(6 to 14.7)	(353 to 1085)	(5.9 to 17.6)	(108.6 to 337.1)	(-25.7 to 57.7)
Samoa	21	21.2	34	21.5	65.9	1.7
	(15 to 30)	(15.5 to 33)	(25 to 49)	(15.7 to 32.1)	(17.3 to 139.6)	(-26.2 to 44.2)
Solomon Islands	17	10.6	56	13.7	224	28.6
	(9 to 26)	(6 to 16)	(35 to 83)	(8.6 to 20.3)	(134 to 379.5)	(-5.2 to 84.8)
Tonga	6	9.7	10	11.6	66.2	19.8
	(4 to 8)	(7.2 to 13.3)	(6 to 14)	(7.3 to 16.3)	(17.2 to 135.7)	(-15.4 to 67)
Vanuatu	8	10.5	26	13.3	243.4	27.3
	(5 to 11)	(7.3 to 14.5)	(17 to 35)	(9 to 17.5)	(140.9 to 395.5)	(-10.1 to 80.9)
American Samoa	5	22.6	12	25.5	137.6	13.1
	(4 to 7)	(16.9 to 29.1)	(8 to 16)	(17 to 32.9)	(65.6 to 224.5)	(-20.5 to 55.3)
Cook Islands	2	16.5	3	11.8	27.3	-28.3
	(2 to 3)	(12.3 to 20.6)	(2 to 4)	(9 to 17)	(-10.6 to 95)	(-50.4 to 10.8)
Guam	5	6.9	19	9.6	260.3	38.4
	(4 to 9)	(5.6 to 11.5)	(15 to 23)	(7.3 to 11.3)	(91 to 401.3)	(-23.8 to 90.9)
Nauru	1	16.8	1	21.1	53.7	25.9

	(1 to 1)	(11.7 to 22.4)	(1 to 2)	(12.9 to 30.3)	(6.5 to 120.6)	(-12.9 to 83.9)
Niue	0	12.9	0	16.1	16.3	24.9
	(0 to 0)	(9.6 to 16.7)	(0 to 0)	(10.9 to 20.7)	(-20.9 to 67.7)	(-15.5 to 79.3)
Northern Mariana Islands	2	8.2	6	10.3	218.2	25.3
	(1 to 3)	(6.2 to 11.5)	(4 to 6)	(8 to 12)	(90.7 to 375.4)	(-17.8 to 75)
Palau	2	16	3	15.6	109.9	-2.5
	(1 to 2)	(11.9 to 21.7)	(2 to 5)	(11.1 to 19.9)	(46.4 to 197.2)	(-31.7 to 37.9)
Tokelau	0	13.4	0	15.2	25.2	12.7
	(0 to 0)	(9.5 to 18.8)	(0 to 0)	(10 to 20)	(-9.8 to 76.4)	(-19.1 to 59.2)
Tuvalu	1	14.4	2	14.5	54.1	0.2
	(1 to 1)	(11.1 to 19.2)	(1 to 2)	(9.7 to 19.2)	(9.8 to 112.2)	(-28.2 to 37.6)
Sub-Saharan Africa	41255	14.7	90652	13.9	119.7	-5
	(33998 to 49069)	(12.2 to 17.3)	(69140 to 123226)	(10.8 to 18.5)	(71.2 to 193)	(-23.7 to 20.9)
Central Sub-Saharan Africa	2545	9.4	5956	8.9	134	-5.6
	(1889 to 3610)	(6.9 to 13.7)	(3863 to 9188)	(5.8 to 13.9)	(69.8 to 218.7)	(-31 to 26.8)
Angola	439	8.9	1363	9.2	210.5	2.8
	(313 to 613)	(6.2 to 12.8)	(835 to 2151)	(5.6 to 14.5)	(103.2 to 358.7)	(-30.3 to 47.7)
Central African Republic	160	11.6	274	9.9	71.1	-14.8
	(119 to 228)	(8.8 to 16.3)	(181 to 412)	(6.6 to 14.7)	(17.3 to 141.3)	(-41.1 to 18.4)
Congo	155	12.7	377	11.4	142.9	-9.9
	(117 to 219)	(9.4 to 17.5)	(237 to 570)	(7.4 to 16.9)	(66.6 to 247.5)	(-37.3 to 26.1)
Democratic Republic of the Congo	1689	9	3735	8.5	121.2	-6.2
	(1187 to 2524)	(6.3 to 13.8)	(2320 to 6051)	(5.1 to 13.9)	(50.4 to 214.6)	(-36.4 to 31)
Equatorial Guinea	23	10.2	70	10.5	202.4	2.8
	(16 to 33)	(7.2 to 14.8)	(39 to 113)	(6 to 16.6)	(77 to 389.9)	(-38 to 61)
Gabon	79	12.9	137	11.5	73.3	-10.9
	(59 to 107)	(9.7 to 17.5)	(94 to 199)	(8 to 16.5)	(17.6 to 148.5)	(-38.2 to 26.2)
Eastern Sub-Saharan Africa	31046	30.1	66491	27.8	114.2	-7.6
	(25044 to 38047)	(24.5 to 36.7)	(48520 to 94804)	(20.6 to 38.4)	(58.1 to 204.6)	(-30.6 to 26)
Burundi	809	26	1441	19.9	78.1	-23.6

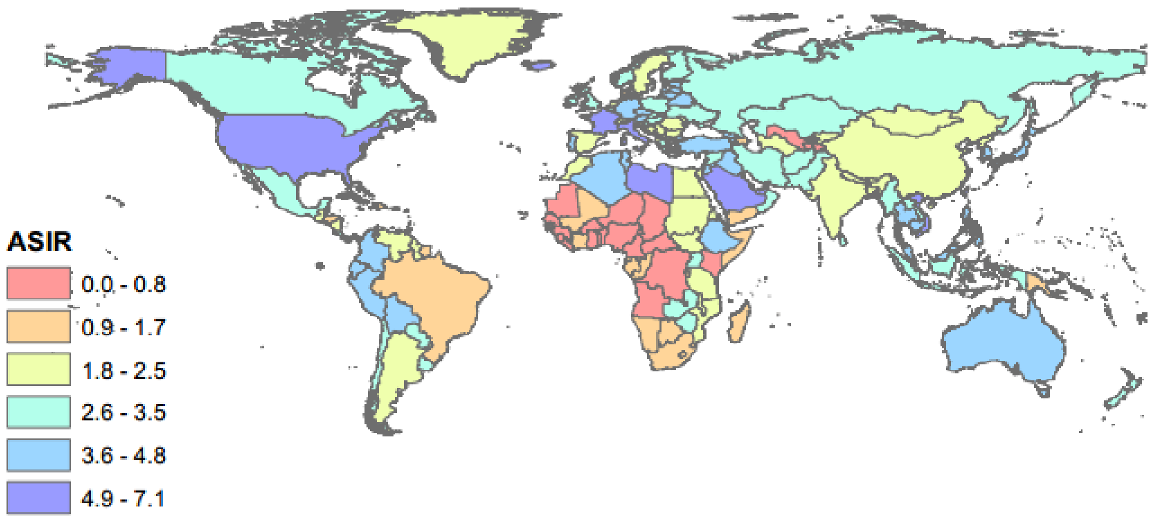
	(579 to 1135)	(18.6 to 35.9)	(922 to 2229)	(13 to 29.5)	(10 to 233.2)	(-51.7 to 43)
Comoros	54 (34 to 82)	20.2 (13.7 to 29.5)	129 (85 to 205)	21.9 (14.6 to 34.3)	139.7 (64.8 to 256.8)	8.5 (-25 to 58.5)
Djibouti	35 (23 to 52)	16.8 (11.5 to 24.6)	174 (105 to 292)	20.2 (12.9 to 32.1)	400.7 (226.6 to 677.1)	20.7 (-17.5 to 82.6)
Eritrea	385 (311 to 493)	22.9 (19 to 28.9)	993 (661 to 1519)	25.7 (17.9 to 37)	157.8 (68.7 to 294.7)	12 (-22.3 to 65.5)
Ethiopia	17175 (12843 to 23141)	62.9 (47.6 to 83.4)	27067 (18222 to 42992)	44.2 (29.8 to 67.4)	57.6 (3.9 to 184.4)	-29.7 (-52.4 to 20.2)
Kenya	597 (404 to 889)	5.2 (3.6 to 7.8)	2343 (1703 to 3531)	7.7 (5.7 to 11.3)	292.3 (181.3 to 445.4)	46.7 (3.6 to 103.5)
Madagascar	1258 (1006 to 1595)	18.2 (14.6 to 22.9)	3181 (2163 to 4358)	18.5 (12.7 to 25.3)	152.8 (75.5 to 251.5)	1.9 (-27.7 to 40.7)
Malawi	961 (716 to 1263)	17.4 (13.2 to 22.1)	2326 (1484 to 3629)	21.4 (14.2 to 31)	142.1 (60.8 to 245.9)	23 (-15.4 to 71.1)
Mozambique	1439 (973 to 2248)	18.4 (12.8 to 27.8)	4051 (2551 to 7149)	24.8 (16.1 to 41.7)	181.5 (94.5 to 304.6)	35.2 (-5.2 to 89.2)
Rwanda	1252 (952 to 1658)	31 (23.7 to 41.2)	1900 (1295 to 2834)	22.5 (15.8 to 32.3)	51.7 (-2.7 to 174.6)	-27.2 (-51.2 to 24.1)
Somalia	765 (507 to 1073)	20.7 (13.9 to 28.9)	2148 (1384 to 3069)	22.5 (14.8 to 31.6)	180.9 (94.1 to 316.8)	8.5 (-22.6 to 58.1)
United Republic of Tanzania	2964 (2183 to 4094)	20.6 (15.4 to 28)	7527 (5071 to 10971)	21.7 (15.2 to 30.7)	153.9 (77.8 to 257.6)	5.4 (-23.9 to 44.5)
Uganda	1851 (1344 to 2515)	21.9 (16.1 to 29.5)	8250 (5658 to 11489)	37.6 (26.7 to 50.8)	345.7 (189 to 602.4)	71.7 (13.9 to 167.8)
Zambia	921 (741 to 1147)	21.8 (17.6 to 26.9)	3696 (1725 to 7111)	34.1 (17.3 to 61)	301.2 (85.2 to 678.8)	56.4 (-21.7 to 180.7)
South Sudan	558 (388 to 796)	17.1 (12.2 to 24)	1208 (819 to 1791)	22.4 (15.4 to 32.3)	116.6 (44.1 to 235.4)	30.8 (-10.5 to 97.2)
Southern Sub-Saharan Africa	4035 (3399 to 4776)	12.4 (10.3 to 14.8)	10253 (8481 to 11926)	15.7 (12.8 to 18.1)	154.1 (108.5 to 207.5)	26.3 (2.7 to 52.5)

Botswana	84 (55 to 131)	12.6 (8.4 to 19.4)	196 (124 to 310)	11.5 (7.6 to 17.6)	133.1 (55.2 to 265.8)	-8.7 (-37.1 to 43.1)
Lesotho	95 (66 to 147)	10.3 (7.2 to 16.2)	215 (146 to 320)	17.7 (12.2 to 26.1)	126.9 (30.5 to 253.4)	72.4 (-0.8 to 166.1)
Namibia	78 (61 to 100)	9.8 (7.6 to 12.8)	216 (147 to 304)	12.9 (9.1 to 17.7)	176.9 (85 to 301)	32.5 (-9.1 to 89.9)
South Africa	2554 (2150 to 3097)	10.3 (8.5 to 12.7)	5941 (5046 to 6947)	11.9 (9.9 to 13.6)	132.6 (100.7 to 169.9)	15.7 (-2.3 to 36)
Eswatini	55 (41 to 76)	15.4 (11.6 to 21.4)	133 (82 to 196)	19.6 (12.5 to 28.9)	141.6 (52.6 to 278.2)	27 (-17.7 to 96.9)
Zimbabwe	1169 (892 to 1464)	23.9 (18.7 to 29.8)	3552 (2372 to 4763)	38.9 (27.4 to 50.7)	203.9 (89 to 328.2)	62.9 (4.1 to 127.6)
Western Sub-Saharan Africa	3629 (2762 to 4379)	3.2 (2.4 to 3.8)	7951 (6109 to 10289)	2.8 (2.2 to 3.5)	119.1 (72.5 to 179.2)	-11.6 (-30.3 to 11.9)
Benin	108 (63 to 151)	4.2 (2.4 to 5.9)	219 (144 to 320)	2.9 (2 to 4.1)	102.6 (41.1 to 200.6)	-32.4 (-52.4 to 2.9)
Burkina Faso	261 (137 to 362)	4.9 (2.5 to 6.9)	430 (272 to 597)	3.3 (2.2 to 4.5)	65 (13.7 to 155.9)	-33.1 (-52.8 to 7.3)
Cameroon	321 (178 to 425)	5.6 (3.1 to 7.3)	715 (473 to 1035)	3.9 (2.6 to 5.5)	122.3 (51.6 to 247.5)	-31.3 (-52.7 to 13.1)
Cabo Verde	2 (2 to 3)	1 (0.8 to 1.4)	20 (4 to 41)	3.8 (0.8 to 7.5)	748.4 (53.7 to 1876.1)	270.3 (-25.5 to 729)
Chad	128 (73 to 180)	3.8 (2.1 to 5.3)	288 (203 to 397)	3.1 (2.2 to 4.1)	125 (51.5 to 252.5)	-17.4 (-43.3 to 32.4)
CÃ´te d'Ivoire	522 (381 to 672)	8.6 (6.5 to 10.8)	1391 (962 to 1981)	8.3 (5.9 to 11.5)	166.5 (80.5 to 294.9)	-2.9 (-32 to 38)
Gambia	21 (15 to 27)	4.2 (3.1 to 5.5)	69 (48 to 94)	5.1 (3.6 to 6.9)	233.4 (125.6 to 374.3)	21.8 (-16.1 to 71.4)
Ghana	113 (56 to 170)	1.2 (0.6 to 1.7)	302 (184 to 459)	1.3 (0.8 to 1.9)	167.7 (75.3 to 305.1)	9.8 (-23.2 to 58.7)
Guinea	309	7.9	625	8.1	102.6	2.8

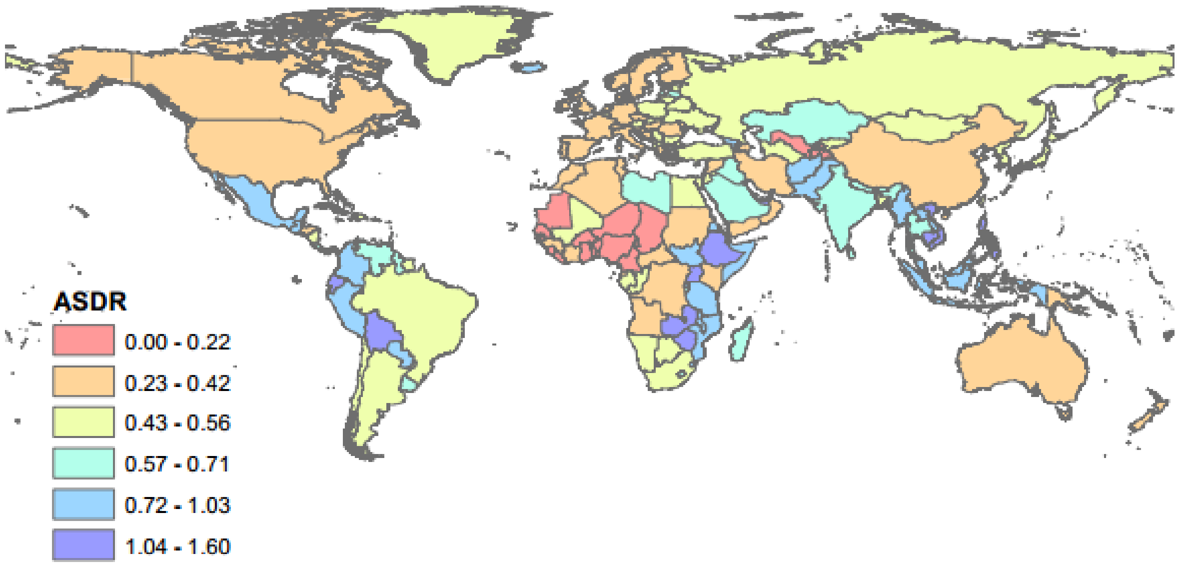
	(242 to 393)	(6.3 to 10)	(438 to 893)	(5.8 to 11.2)	(35.9 to 203.1)	(-29.5 to 49.9)
Guinea-Bissau	35 (19 to 49)	6.4 (3.4 to 8.9)	52 (38 to 73)	4.5 (3.2 to 6)	50 (-2.4 to 140.1)	-29.8 (-52.5 to 14)
Liberia	66 (35 to 89)	4.6 (2.3 to 6.3)	113 (73 to 160)	3.4 (2.3 to 4.7)	71.4 (13.1 to 178.2)	-26.1 (-50 to 22.9)
Mali	799 (641 to 969)	15.7 (12.7 to 18.9)	1657 (1138 to 2416)	13.2 (9.3 to 18.9)	107.3 (44.7 to 194.1)	-15.6 (-39 to 17.5)
Mauritania	57 (32 to 76)	4.9 (2.6 to 6.5)	84 (58 to 120)	3.1 (2.1 to 4.5)	46 (-3.6 to 148.4)	-36.6 (-57.9 to 9.8)
Niger	160 (89 to 218)	4 (2.1 to 5.4)	324 (203 to 472)	2.6 (1.7 to 3.7)	103.1 (35.8 to 212.5)	-35.1 (-54.8 to 5.2)
Nigeria	372 (242 to 670)	0.7 (0.4 to 1.2)	1006 (646 to 1797)	0.8 (0.5 to 1.4)	170.5 (85.6 to 312.3)	18.1 (-16.2 to 75)
Sao Tome and Principe	2 (1 to 4)	2 (0.8 to 3.3)	4 (1 to 7)	2 (1 to 3.3)	62.4 (-18.7 to 184.8)	3.4 (-33.8 to 59)
Senegal	180 (96 to 265)	4.3 (2.2 to 6.2)	315 (210 to 475)	3.1 (2.1 to 4.6)	75.2 (17 to 183.4)	-27.8 (-50.9 to 21.5)
Sierra Leone	93 (47 to 132)	3.7 (1.8 to 5.3)	161 (98 to 237)	2.9 (1.9 to 4.2)	72.6 (19.8 to 157.8)	-21.1 (-44.4 to 22.4)
Togo	80 (45 to 116)	4.5 (2.3 to 6.3)	177 (113 to 271)	3.3 (2.2 to 5)	121 (47 to 234.6)	-25.7 (-49.3 to 16.3)

Figures

a. Age-standardised incidence rate (per 100,000)



b. Age-standardised death rate (per 100,000)



c. Age-standardised DALYs rate (Per 100,000)

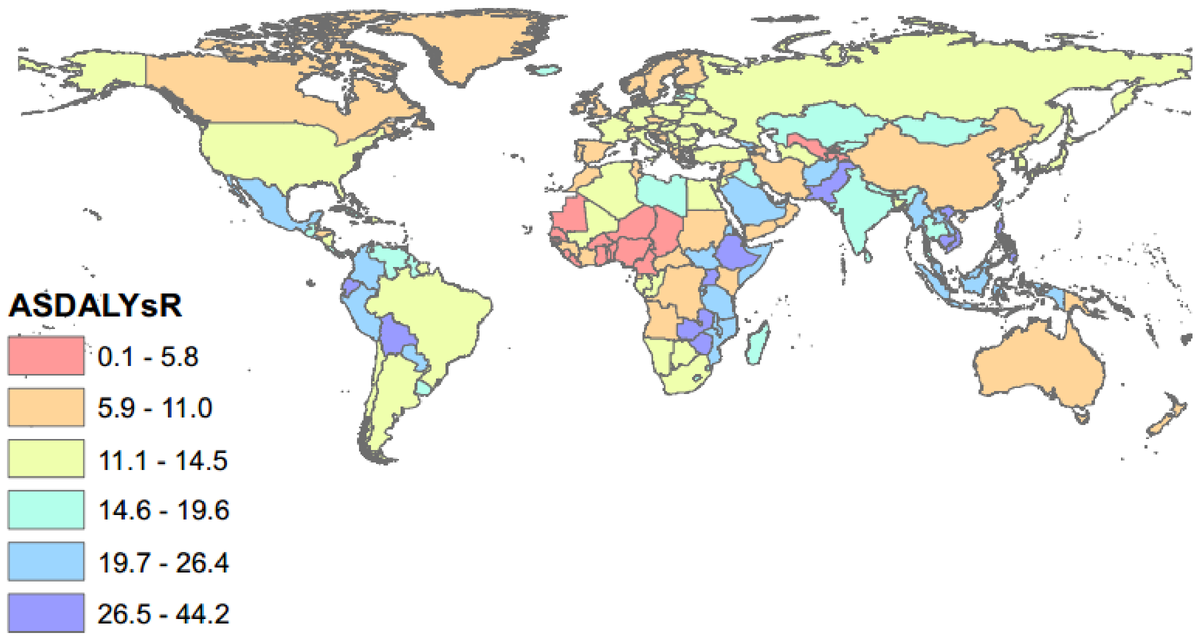
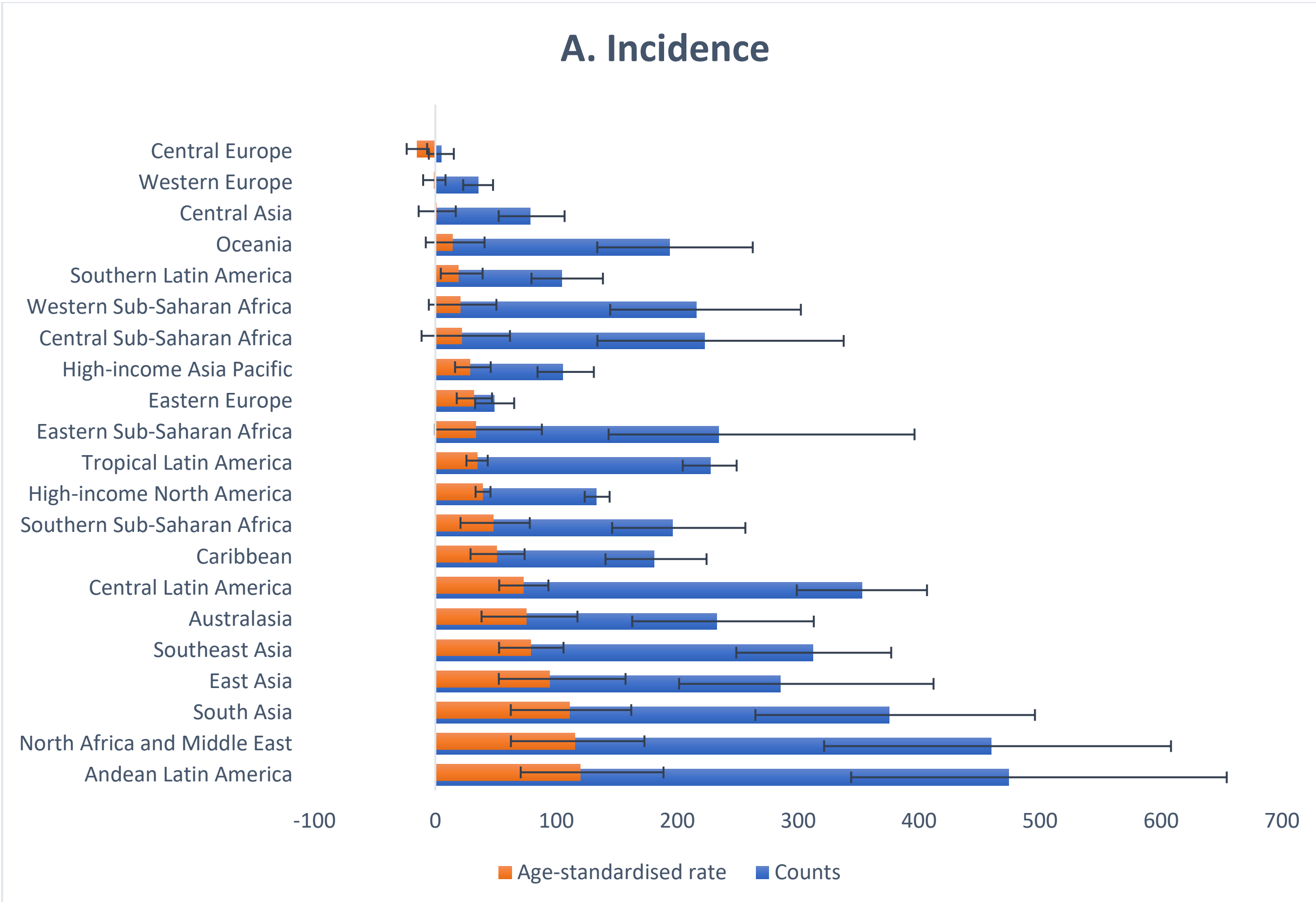
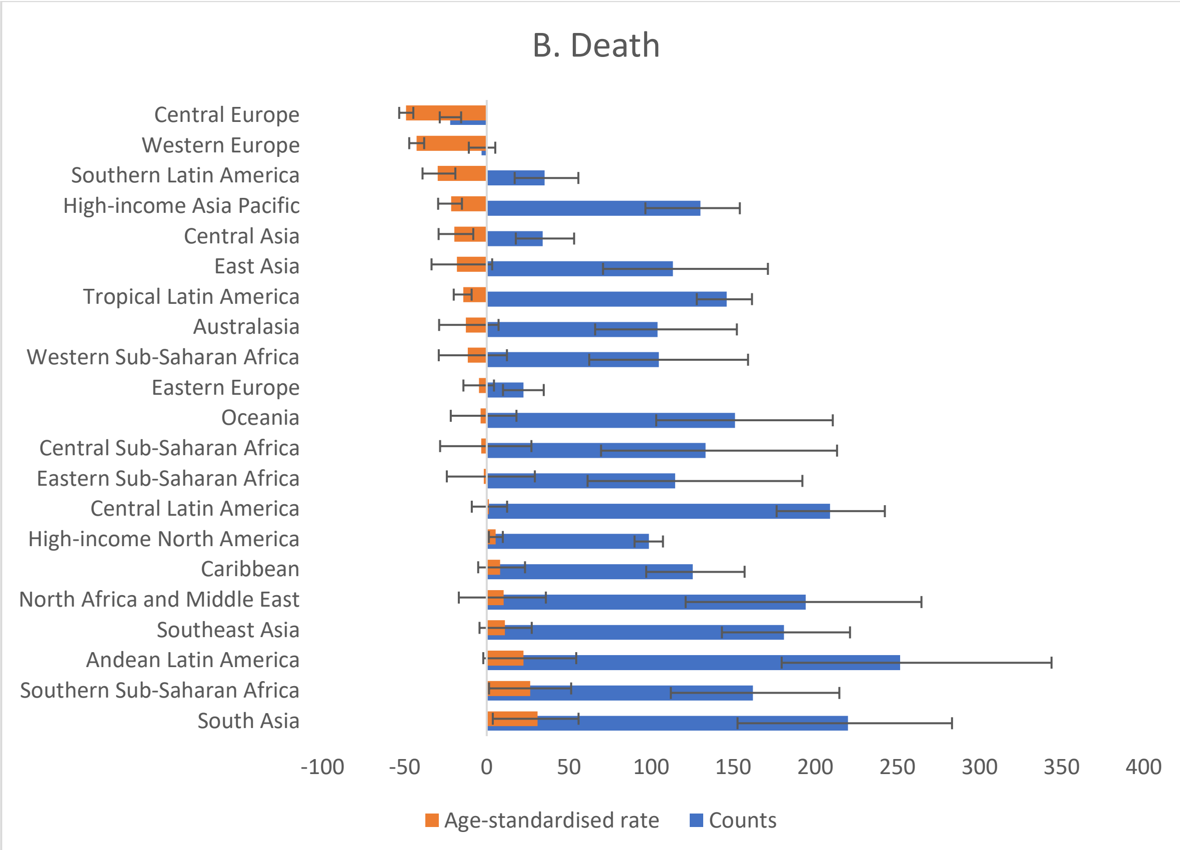


Figure 1a, b,c: Age-standardized rate of thyroid cancer 2021

a.


A. Incidence
Central Europe
Western Europe
Central Asia
Oceania
Southern Latin America
Western Sub-Saharan Africa
Central Sub-Saharan Africa
High-income Asia Pacific
Eastern Europe
Eastern Sub-Saharan Africa
Tropical Latin America
High-income North America
Southern Sub-Saharan Africa
Caribbean
Central Latin America
Australasia
Southeast Asia
East Asia
South Asia
North Africa and Middle East
Andean Latin America
-100
0
100
200
300
400
500
600
700
Age-standardised rate
Counts

b.


B. Death
Central Europe
Western Europe
Southern Latin America
High-income Asia Pacific
Central Asia
East Asia
Tropical Latin America
Australasia
Western Sub-Saharan Africa
Eastern Europe
Oceania
Central Sub-Saharan Africa
Eastern Sub-Saharan Africa
Central Latin America
High-income North America
Caribbean
North Africa and Middle East
Southeast Asia
Andean Latin America
Southern Sub-Saharan Africa
South Asia
-100
-50
0
50
100
150
200
250
300
350
400
Age-standardised rate
Counts

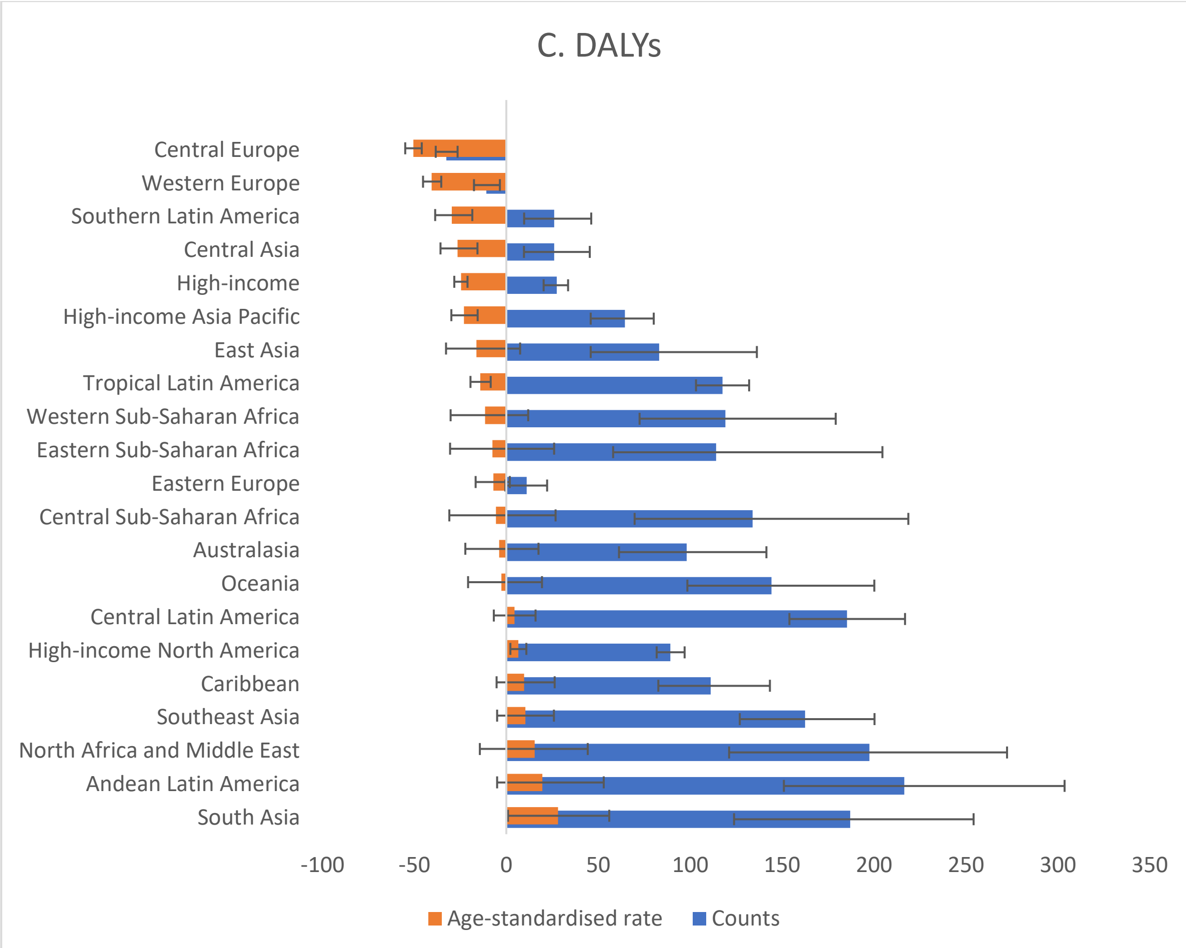
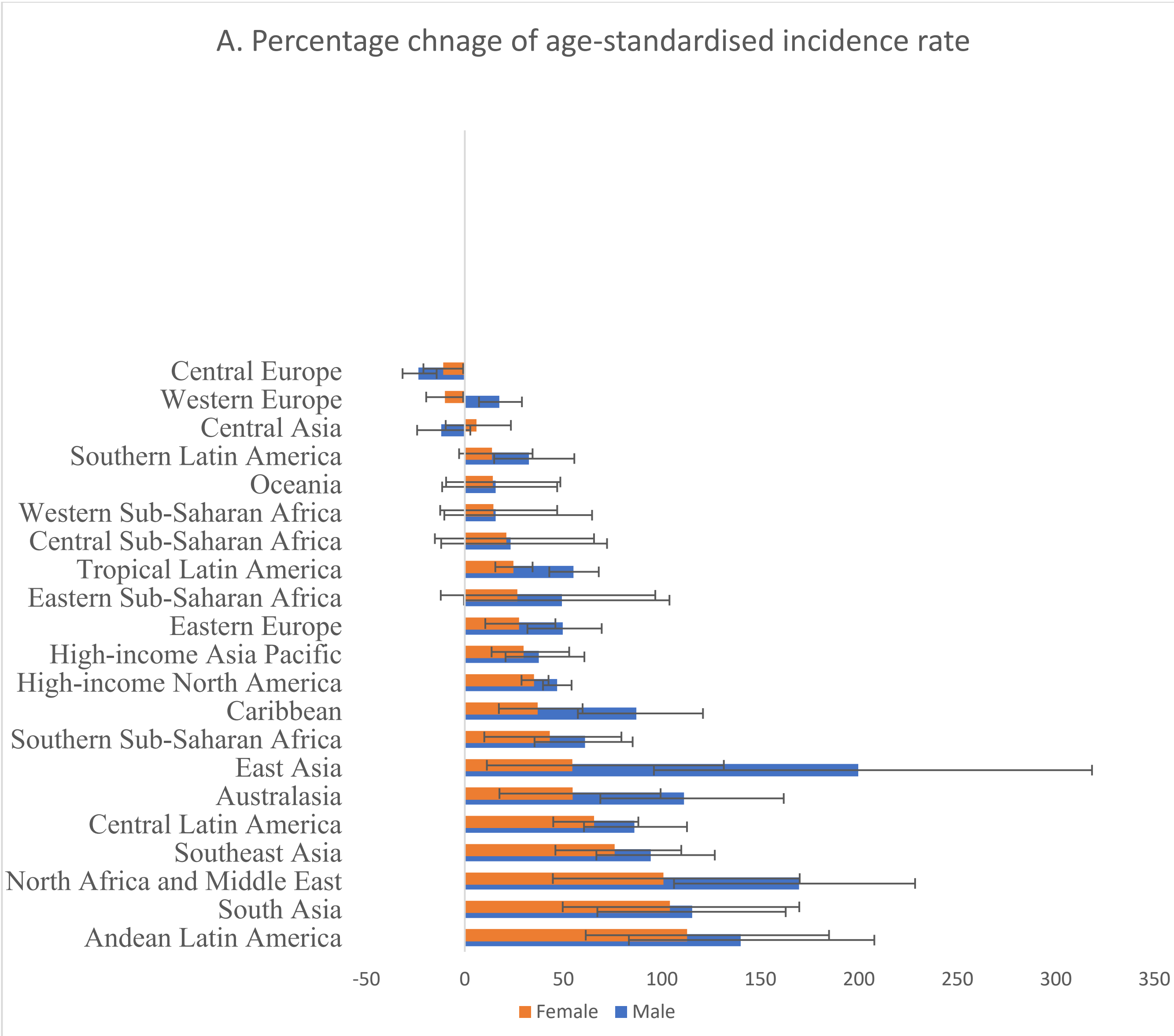


Figure 2: Percentage change in incidence, deaths and DALYs counts and rates associated with Thyroid cancer in 21 regions, 1990-2021

(A) Incidence cases and age-standardised incidence rate (per 100,000),
(B) Death counts and age-standardised death rate (per 100,000).
(C) DALYs counts and age-standardised DALYs rate (per 100,000)

Bars represent mean percentage change, and error bars represent 95% uncertainty intervals.
DALY=disability-adjusted life-year


A. Percentage chnage of age-standardised incidence rate
Central Europe
Western Europe
Central Asia
Southern Latin America
Oceania
Western Sub-Saharan Africa
Central Sub-Saharan Africa
Tropical Latin America
Eastern Sub-Saharan Africa
Eastern Europe
High-income Asia Pacific
High-income North America
Caribbean
Southern Sub-Saharan Africa
East Asia
Australasia
Central Latin America
Southeast Asia
North Africa and Middle East
South Asia
Andean Latin America
-50
0
50
100
150
200
250
300
350
Female
Male

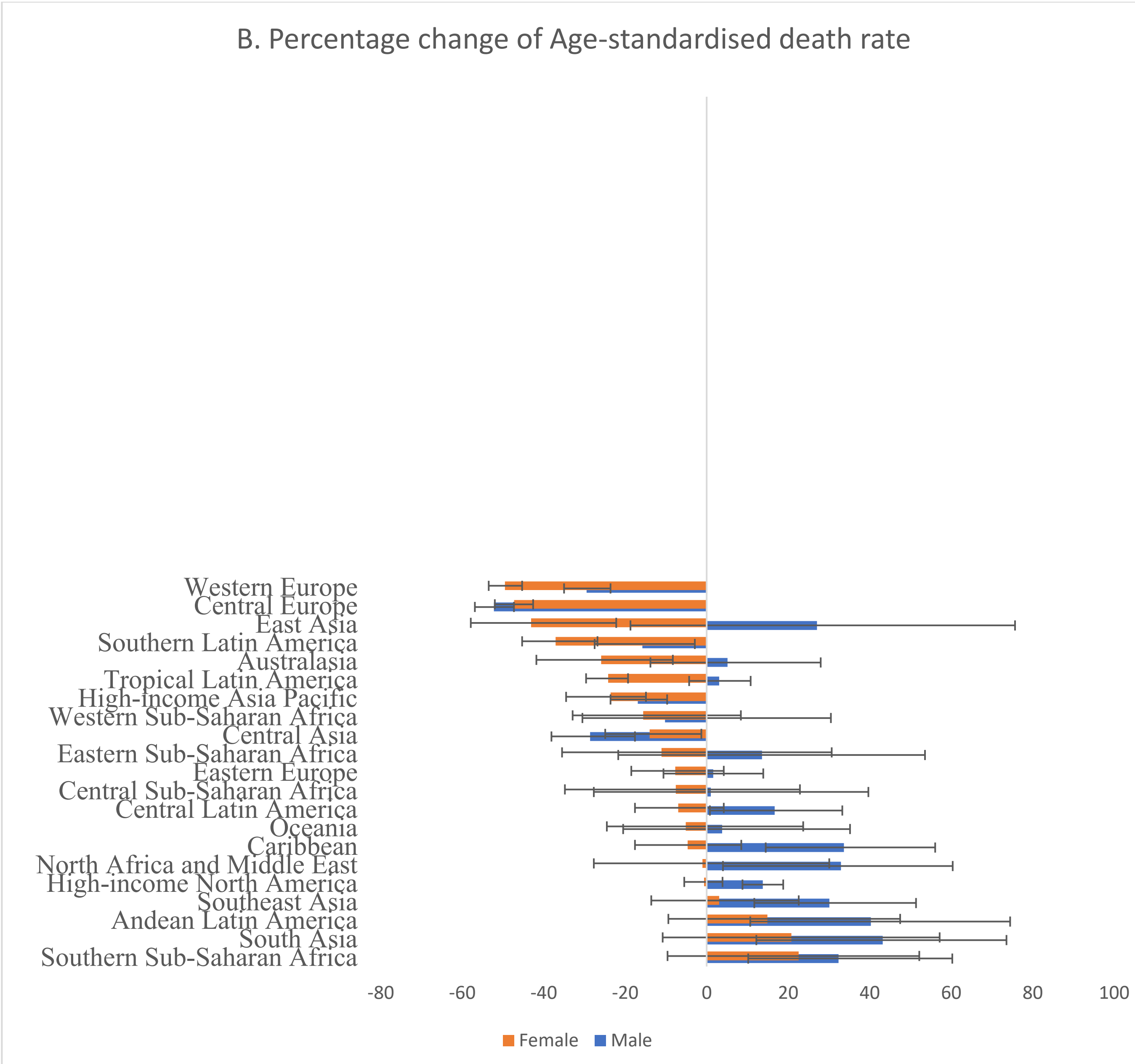


Figure 3: Percentage change of age-standardized incidence (A) and death rate (B) of thyroid cancer in 21 GBD regions by sex, 1990-2021

(A) Incidence cases and age-standardised incidence rate (per 100,000),
(B) Death counts and age-standardised death rate (per 100,000).

Bars represent mean percentage change, and error bars represent 95% uncertainty intervals.

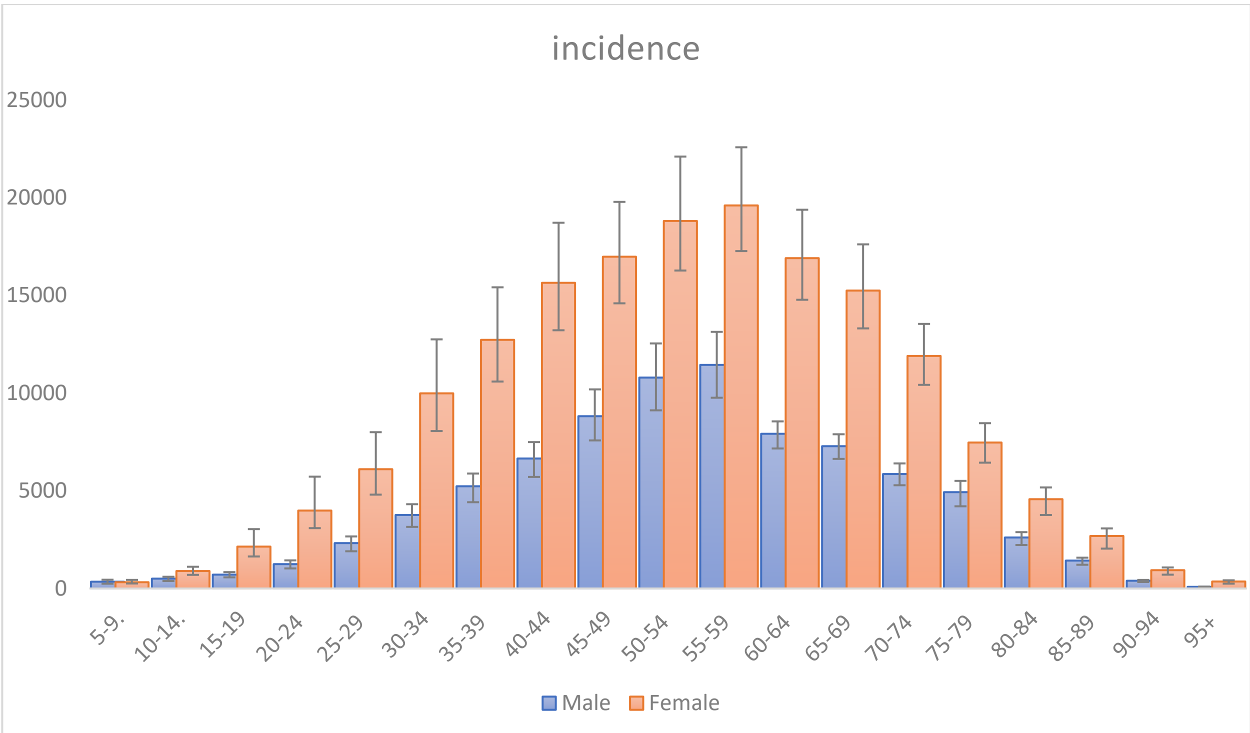


Figure 4: Incidence of Thyroid cancer by age and sex in 2021

In 2021, there were an estimated 250,000 cases of thyroid cancer worldwide (95% UI 223,000–275,000), resulting in an age-standardised incidence rate of 2.9 per 100,000 (2.6–3.2). The global incidence of thyroid cancer saw a significant increase of 177.6% (153.4–203.8) from 1990 to 2021, and a rise of 28.1% (21.4–35.7) from 2010 to 2021. The age-standardised incidence rate also grew by 41.3% (28.8–54.5) between 1990 and 2021, although the growth rate slowed to 2.2% (–3.2 to 8.2) from 2010 to 2021 across all age and both sexes. The global age-standardised incidence rate for thyroid cancer was 3.8 per 100,000 (3.4–4.5) in females and 2.0 per 100,000 (1.7–2.2) in males in 2021. (Table 1, Supplement Table S1, Table S2, and Table S3)

In 2021, an estimated 2.0 million (95% UI 1.8–2.2) people worldwide were living with thyroid cancer, translating to an age-standardised prevalence rate of 23.1 per 100,000 (20.7–25.6) across all ages and both sexes. This represents a significant increase in the global prevalence of thyroid cancer over the past three decades. Between 1990 and 2021, the number of people living with thyroid cancer increased by 193.7% (168.2–221.6), and the age-standardised prevalence rate rose by 55% (41.3–69.9). (Supplement Table S4)

In 2021, there were an estimated 44,800 (95% UI 39,900–48,500) deaths from thyroid cancer globally, resulting in an age-standardised death rate of 0.53 per 100,000 (0.47–0.57) across all ages and both sexes. The number of thyroid cancer deaths has been steadily increasing globally, rising by 104.6% (85.6–121.1) between 1990 and 2021 and 30.1% (23.7–36.3) between 2010 and 2021 in both sexes. However, the age-standardised death rate actually declined slightly over this period, decreasing by 7% (0.1–15.8) between 1990 and 2021 and 3.4% (–1.1 to 7.9) between 2010 and 2021. (Supplement Table S5)

In 2021, thyroid cancer accounted for 1.25 million (95% UI 1.09–1.38) DALYs globally, and the age-standardised DALYs rate of thyroid cancer was 14.6 per 100,000 (12.9–16.1) in 2021 across all ages and both sexes. Thyroid cancer DALY counts increased globally by 92.7% (72.2–112.5) between 1990 and 2021 and 25.1% (18.6–32.3) between 2010 and 2021. The age-standardised DALYs rate of thyroid cancer decreased globally by 4.2% (–5.5 to 14.1) between 1990 and 2021 and 2.7% (–2.8 to 7.7) between 2010 and 2021.(Table 2, Supplement Table S6)

3.2 Thyroid cancer burden at regional level

In 2021, east Asia, south Asia, high-income North America, south Asia, and western Europe reported the highest incident cases of thyroid cancer, while western sub-Saharan Africa, central sub-Saharan Africa, and Oceania reported the lowest incident cases, primarily associated with population size. The highest age-standardised incidence rates of thyroid cancer were observed in high-income North America (5.3 per 100,000 [95% UI 5.1–5.5]), Australasia (4.6 per 100,000 [3.7–5.5]), high-income Asia Pacific (4.4 per 100,000 [3.9–5.2]), and Andean Latin America (3.9 per 100,000 [3.1–4.8]). In contrast, the lowest age-standardised incidence rates were found in southern sub-Saharan Africa (1.6 per 100,000 [1.3–1.9]), Oceania (1.4 per 100,000 [0.9–1.9]), central sub-Saharan Africa (0.7 per 100,000 [0.4–1.1]), and western sub-Saharan Africa (0.3 per 100,000 [0.2–0.3]) in 2021. Between 1990 and 2021, the number of thyroid cancer cases increased globally across all GBD regions, with percentage change ranging from 4.8% (–5.4 to 15.3) in central Europe to 474.1% (343.9–654.5) in Andean Latin America. The regions with the highest percentage change in thyroid cancer incidence between 1990 and 2021 were Andean Latin America (474.1% [343.9–654.5]), north Africa and the Middle East (459.7% [321.5–608.4]), south Asia (375.4% [264.7–495.9]), and central Latin America (352.8% [298.9–406.6]). Conversely, the regions with the lowest percentage change in incidence cases were western Europe (48.7% [32.9–65.2]), eastern Europe (35.4% [23–47.7]), and central Europe (4.8% [–5.4 to 15.3]). Globally, the regions with the highest percentage change in the age-standardised incidence rate of thyroid cancer between 1990 and 2021 were Andean Latin America

(119% [70.6–188.9]), north Africa and the Middle East (115.6% [62.5–172.9]), south Asia (110.9% [62.4–162]), and east Asia (94.5% [52.5–157.3]). However, during this period, the age-standardised incidence rate of thyroid cancer slightly decreased in certain GBD regions, including western Europe, by 1% (–10.1 to 8), and central Europe, by 15% (6.8–23.7).

Between 2010 and 2021, thyroid cancer incident cases increased in 17 GBD regions, with changes ranging from 2.1% (95% UI –18.7 to 27.4) in Australasia to 95.9% (68.0–127.8) in central Asia. However, four GBD regions experienced a decrease in thyroid cancer incidence: central Europe (1.2% decrease [–9.1 to 10.1]), high-income Asia Pacific (11.2% [–6.4 to 25.6]), western Europe (16.6% [9.8–23.3]), and eastern Europe (19.1% [9.8–26.8]). Additionally, a decline in age-standardised incidence of thyroid cancer was observed in high-income North America (1.6% decrease [–2.0 to 5.3]), central Europe (7.6% [–1.7 to 16.1]), Australasia (20.2% [–0.3 to 36.8]), high-income Asia Pacific (23.2% [4.7–37.4]), eastern Europe (24.7% [17.1–32.0]), and western Europe (25.1% [18.8–31.6]) during the same period. In contrast, the remaining GBD regions saw an increase in age-standardised incidence rates of thyroid cancer, ranging from 2.3% (–3.6 to 8.8) in Tropical Latin America to 49.9% (29.6–72.4) in central Asia between 2010 and 2021.

In 2021, the age-standardised death rate of thyroid cancer ranged from 0.1 per 100,000 (95% UI 0.08–0.1) in western sub-Saharan Africa to 1.1 per 100,000 (0.9–1.4) in Andean Latin America across all age and sexes. The highest age-standardised death rates were found in Andean Latin America (1.1 [0.9–1.4]), eastern sub-Saharan Africa (1.0 [0.7–1.3]), and southeast Asia (0.9 [0.7–1.0]) per 100,000 people, whereas the lowest rates were found in Australasia (0.4 (0.3–0.4), central sub-Saharan Africa (0.4 [0.2–0.6]), and western sub-Saharan Africa (0.1 [0.08-0.1]) per 100,000 people.

The global trend in the age-standardised death rate of thyroid cancer has been mixed over the past three decades. Between 1990 and 2021, eight GBD regions experienced an increase in ASDR, with the most substantial rise observed in south Asia (30.9% [95% UI 3.7–55.9]) and non-significant slight increase in central Latin America (1.4% [–9.1 to 12.4]). Conversely, the remaining GBD regions saw a decline in ASDR. The most significant reductions in ASDR were observed in high-income Asia Pacific (21.6% decline [15.1–29.6]), southern Latin America (29.8% [19.1–39.1]), western Europe (44.2% [38.1–47.2]), and central Europe (49.1% [44.7–55.3]). In contrast, notable increases in ASDR were seen in south Asia (30.9% [3.7–55.9]), southern sub-Saharan Africa (26.4% [1.4–55.4]), Andean Latin America (22.4% [–2.1 to 54.5]), and southeast Asia (11.1% [–4.4 to 27.4]).

In 2021, south Asia, east Asia, southeast Asia, and western Europe bore the highest burden of thyroid cancer in terms of DALYs. The highest age-standardised DALYs rates were found in eastern sub-Saharan Africa (27.8 per 100,000 [95% UI 20.6–38.4]), Andean Latin America (27.5 per 100,000 [21.7–34.1]), southeast Asia (23.6 per 100,000 [18.8–27.0]), and central Latin America (20.4 per 100,000 [18.4–22.7]), while the lowest rates were observed in east Asia (10.3 per 100,000 [8.3–12.5]), central sub-Saharan Africa (8.9 per 100,000 [5.8–13.9]), and western sub-Saharan Africa (2.8 per 100,000 [2.2–3.6]). The global trend of DALYs attributed to thyroid cancer has shown mixed trends over time. Between 1990 and 2021, DALYs counts increased in 18 GBD regions, ranging from 11% (–0.5 to 22.2) in eastern Europe to 216.5% (151–303.7) in Andean Latin America. However, two regions experienced decreases in thyroid cancer-related DALYs: western Europe (10.8% [3.5–17.6]) and central Europe (32.6% [26.5–38.4]). Similarly, the age-standardised DALYs rate increased in south Asia (28.2% [0.9–56]), Andean Latin America (19.6% [–5 to 53]), and north Africa and the Middle East (15.4% [–14.4 to 44.3]), but decreased in central Asia (26.5% [15.7–35.8]), southern Latin America (29.6% [18.5–38.7]), western Europe (40.6% [35.4–45.3]), and central Europe (50.6% [46–55]). Between 2010 and 2021, the age-standardised DALYs rate for thyroid cancer saw a rapid increase in some regions, most notably in central Asia (27.7% [11.4–45.9]), the Caribbean (14.2% [2–27.1]), central Latin America (12.3% [0.6–24.6]), and south Asia (8.1% [–3 to 21.4]).

In 2021, incident cases of thyroid cancer were concentrated in middle SDI and high SDI locations. In 2021, the age-standardised incidence rates of thyroid cancer were as follows: 4.5 per 100,000 (95% UI 4.3-4.7) for high SDI, 3.1 (2.8–3.5) for high-middle SDI, 2.8 (2.3–3.5) for middle SDI, 2.7 (2.3–3) for low-middle SDI, and 2.0 (1.7–2.3) for low SDI. From 1990 to 2021, the incidence of thyroid cancer rose significantly across all SDI categories: middle SDI saw an increase of 339.3% (273.5–402.3), low-middle SDI increased by 306.4% (233.3–397.8), low SDI rose by 260% (186.6–382), high-middle SDI increased by 126% (102–157.5), and high SDI experienced a rise of 99.8% (89.8–109.2). Throughout the same period, the age-standardised incidence rates of thyroid cancer also demonstrated significant increases across all SDI categories: middle SDI increased by 100.6% (69.9–129.1), low-middle SDI by 87.6% (55–124.8%), low SDI by 49.4% (19.8–93.9), high-middle SDI by 30.7% (16.7–49.6), and high SDI by 26.7% (21–32.8). However, between 2010 and 2021, there was a slight decline in the age-standardised incidence rates for high-middle SDI (3.2% decline [–6.8 to 12.4]) and high SDI (12.7% decline [7.4–17.2]), while rates continued to increase for middle SDI, low SDI, and low-middle SDI locations during this timeframe.

In 2021, the age-standardised death rate of thyroid cancer ranged from 0.4 per 100,000 (95% UI 0.4–0.5) in high-middle SDI to 0.6 per 100,000 (0.5–0.8) in low SDI in 2021. The percentage change in death counts of thyroid cancer between 1990 and 2021 was 182.9% (135.6–227.4) for low-middle SDI, 178% (138.4–213.2) for middle SDI, 133.2% (86.6–195.4) for low SDI, 50.4% (37.3–65.3) for high-middle SDI, and 49.6% (38.3–57.5) for high SDI. Nonetheless, a considerable age-standardised death rate decrease was noted in high SDI (25.2% [21.6–29.2]) and high-middle SDI (26.1% [19.1–32.3]), while an increase in age-standardised death rates was noted in low-middle SDI (24.1% [3.8–43.1]), low SDI (7.2% [–13.0 to 33.1]), and middle SDI (6.1% [–9.7 to 19.2]) between 1990 and 2021. Between 2010 and 2021, there was slight increase in the age-standardised death rates in low-middle SDI (5.9% [–1.7 to 14.5]), low SDI (7.9% [–1.7 to18.1]), and middle SDI (1% [–5.8 to 8.9]), while there was a slight decrease in the age-standardised death rates in high SDI (13.1% decrease [9.7–16.3]) and high-middle SDI (14.1% decrease [7.6–20.4]).

In 2021, over half of the total DALYs attributed to thyroid cancer occurred in countries reported as middle SDI and low-middle SDI. However, the highest age-standardised DALYs rates were actually observed in low SDI (18 per 100,000 [95% UI 14.2–23.1]) and low-middle SDI countries (16.8 per 100,000 [14.3–19.4]), while the lowest rates were seen in high SDI (11.8 per 100,000 [10.8–12.8]) and high-middle SDI (11.6 per 100,000 [10.4–13]. Further, between 1990 and 2021, the age-standardised DALYs rate of thyroid cancer increased in low-middle SDI countries (21.8% [0.6–42.2]) and middle SDI countries (8.6% [–7.6 to 22.3]), while it decreased significantly in high SDI countries (23.6% [19.7–27.4]) and high-middle SDI countries (25.3% [16.9–32.3]).

(Table 1, 2, supplement Table 1-6, Figure 2, and Figure 3)

3.3 Thyroid cancer burden at national level

In 2021, the highest numbers of incident cases of thyroid cancer were observed in China, India, the USA, Japan, Indonesia, and Viet Nam. In 2021, the highest age-standardised incidence rates of thyroid cancer were observed in Saudi Arabia (7.1 per 100,000 [95% UI 5.4–9.3], France (6.8 [5.5–8.0]), Iceland (6.5 [5.5–8.0]), Viet Nam (6.3 [4.4–8.3]), Qatar (6.0 [4.3–7.9]), Taiwan (province of China) (5.9 [5.0–6.7]), and Libya (5.9 [4.2–8.2]). Conversely, the lowest rates were reported in Ghana (0.1 [0.07–0.1]), Nigeria (0.08 [0.05–0.15]), Kiribati (0.05 [0.03–0.10]), and Tajikistan (0.01 [0.01–0.02]). From 2010 to 2021, 34 countries experienced a decrease in incident cases, ranging from a 0.3% decrease (–15.7 to 15.2) in Luxembourg to 33.1% (18–46.4) in Finland. In contrast, the remaining 170 countries saw an increase in incident cases, with changes ranging from 2.6% (–20.2 to 30.5) in Australia to 219.2% (117.1–386.1) in Uzbekistan over the past decade. The most significant increases in thyroid cancer incident cases from 2010 to 2021 occurred in Uzbekistan (219.2%; 117.1–386.1), Kyrgyzstan (163.6%; 74.9–274.3), Turkmenistan (152%; 87.8–238.1), Zambia (148.1%; 44.9–283.1), and Georgia (129.6%; 75.6–197.8). The largest percentage decreases were observed in South Korea (28.4%; –26.1 to 55.7), Iceland (29.6%; 12.5–42.8), Switzerland (32.1%; 17.2–43.6), and Finland (33.1%; 18–46.4). Overall, the age-standardised incidence rate of thyroid cancer increased in 139 countries from 2010 to 2021, with changes ranging from 0.5% (–28 to 41.8) in Eswatini to 136.2% (78.3–214.3) in Georgia, while the remaining 65 countries and territories experienced a decrease, with reductions ranging from 0.7% (–13.1 to 13.5) in Poland to 44.4% (31.4–54.1) in Switzerland. Globally, the highest percentage changes in age-standardised incidence rates between 2010 and 2021 were seen in Georgia (136.2%; 78.3–214.3), Uzbekistan (125%; 53.9–238), Kyrgyzstan (99.1%; 32.9–181.2), Turkmenistan (95.7%; 46.2–159.6), and Zambia (54%; –4.8 to 127.8). Conversely, the largest decreases were reported in Israel (38.5%; 22.9–50.6), Finland (41.1%; 27.9–53.2), Iceland (41.6%; 26.7–53.1), South Korea (42.9%; –0.2 to 64.2), and Switzerland (44.4%; 31.4–54.1).

In 2021, China, India, the USA, Japan, Indonesia, Pakistan, and Brazil accounted for the highest numbers of deaths attributed to thyroid cancer. While the majority of countries (189) experienced age-standardised death rates (ASDR) below 1 per 100,000 people, 15 countries had ASDRs between 1.0 and 1.6 per 100,000. Ethiopia (1.6 [95% UI 1.1–2.4]), Bolivia (1.6 [1.0–2.2]), Fiji (1.4 [1.0–1.9]), Zimbabwe (1.4 [1.0–1.8]), and Uganda (1.3 [1.0–1.7]) per 100,000 population had the highest ASDRs in 2021. However, the global picture of thyroid cancer mortality is more complex when considering long-term and recent trends. Between 1990 and 2021, thyroid cancer deaths increased in 188 countries, with the most dramatic rise in Cabo Verde (524% [58.2–1198.9]) and a small increase in Niue (1.4% [–30.2 to 46.1]). Between 2010 and 2021, this trend continued, with a rise in death counts in 176 countries. Uzbekistan (187.3% [103.7–317.7]), Turkmenistan (137.2% [82.7–209]), Kyrgyzstan (116.5% [53.6–192.3]), and Georgia (116.3% [65.8–183.3]) had the highest percentage increases in death counts during this period. However, Switzerland (20.4% [6.4–31.8]), Finland (23.4% [8.5–36.8]), San Marino (24.2% [–6.3 to 49.9]), and Iceland (29% [14.9–40.3]) experienced the highest decreases. Looking at ASDR specifically from 2010 to 2021, the rate decreased in 125 countries, with the most significant reductions in Iceland (46.1% [35.3–54.8]) and a small decrease in Somalia (0.3% [–22.7 to 20.2]). Conversely, 79 countries witnessed increases in ASDR, with the most prominent rise in Georgia (124.3% [73.9–192.4]) and a more modest increase in Samoa (0.2% [–18 to 22.9]).

The countries with the highest percentage changes in ASDR from 2010 to 2021 were Georgia (124.3%; 95% UI 73.9–192.4), Uzbekistan (94.9%; 40–180.8), Turkmenistan (74.6%; 34.4–123.6), Kyrgyzstan (64.5%; 18.5–121.4), and Saint Lucia (43.8%; 18.5–72.1). Switzerland (38.7%; 27.9–47.6), Finland (39.8%; 27.9–50.1), Israel (40%; 26.7–50.7), and Iceland (46.1%; 35.3–54.8) exhibited the most significant decreases in ASDR during this period.

Globally, in terms of absolute counts, India, China, the USA, Indonesia, Pakistan, Japan, and Viet Nam had the highest DALYs from thyroid cancer in 2021. However, there was tremendous variation in the age-standardised DALYs rate in 2021, from 0.12 to 44.2 per 100,000 people. Globally, the highest age-standardised DALYs rates for thyroid cancer were found in Ethiopia 44.2 (95% UI 29.8–67.1), Zimbabwe 38.9 (27.4–50.7), Bolivia 38.4 (27.4–50.4), and Uganda 37.6 (26.7–50.8) per 100,000, while the lowest age-standardised DALYs rates were found in Kiribati 0.7 (0.5–1.3), and Tajikistan 0.1 (0.1–0.2) per 100,000 in 2021.

The global DALYs impact of thyroid cancer has shown varied trends over the past three decades. Between 1990 and 2021, DALYs counts attributed to thyroid cancer increased in a majority of countries, with the most significant rise observed in Cabo Verde (748.8% [95% UI 53.7–1876.1]) and the smallest increase in Spain (0.9% [–16.4 to 23.1]). However, 23 countries experienced a decrease in DALYs, with the most notable declines ranging from 44.9% (–30.8 to 44.9) in Hungary to 0.8% in Iceland (–23.2 to 20.4). Looking at the age-standardised DALYs rate, over half of the countries analysed showed a decrease, with the most substantial reductions occurring in Croatia (53.1% decline [–42.7 to 61.7]), Luxembourg (53.2% [45.1–59.7]), Hungary (55.4% [44.7–64.3]), Slovenia (56.3% [40.3–68.4]), and Poland (63.8% [60.1–67.4]). Conversely, several countries experienced significant increases in the age-standardised DALYs rate, most notably Cabo Verde (270.3% [–25.5 to 729%]), Uzbekistan (108.9% [37.3–218.7]), Iran (108.5% [17.3–172.4]), Ecuador (83.1% [41.8–133.9]), and Georgia (76.8% [29.8–138.7])

The global DALYs of thyroid cancer have shown varied trends between 2010 and 2021. While 166 countries saw an increase in DALYs attributed to thyroid cancer, ranging from 0.9% (95% UI –22.8 to 36.3) in the Northern Mariana Islands to a significant 186.3% (97.1–319.4) in Uzbekistan, 38 countries experienced a decline, with the most substantial decreases observed in Finland (30.2% [16.7–42.4]) and minimal change was seen in Bulgaria (0.6% [–29.2 to 23.4]). Globally, the countries with the highest percentage increases in DALYs counts for thyroid cancer between 2010 and 2021 were Uzbekistan (186.3% [97.1–319.4]), Turkmenistan (129.1% [74.8–205.2]), Kyrgyzstan (120.5% [53–202.3]), and Georgia (115.9% [67.9–176.5]). Conversely, the countries with the highest percentage decreases in DALYs counts were France (26.8% decline [13.3–39]), Switzerland (26.9% [13.7–37.4]), Finland (30.2% [16.7–42.4]), and Iceland (29.1% [14.6–40.9]). Between 2010 and 2021, there were declines in the age-standardised DALYs rates of thyroid cancer in 77 countries, ranging from 0.2% (–21.8 to 31.7) in Guinea to 120.2% (72.6–184.8) in Georgia. Significant increases in the age-standardised DALYs rate were seen in Georgia (120.2% [72.6–184.8]), Uzbekistan (97% [38.1–185.7]), Turkmenistan (73% [32.9–127.9]), and Kyrgyzstan (64.7% [15.7–124.9]) between 2010 and 2021. Furthermore, there were declines in the age-standardised DALYs rate of thyroid cancer in 127 countries, with range of –0.2% (–22.9 to 26.3) in Laos to 44.1% (32.3–53.5) in Iceland between 2010 and 2021. Significant declines in the age-standardised DALYs rate of thyroid cancer were seen in Israel (41.2% decrease [27.6–52.8]), Finland (41.9% [30.3–52.3]), Switzerland (42.4% [31.6–50.8]), South Korea (43.6% [12.5–59.6]), and Iceland (44.1% [32.3–53.5]) between 2010 and 2021.

(Table 1, 2, supplement Table 1-6, Figure 1)

3.4 Risk factors

High body-mass index (BMI) played a significant role in the global burden of thyroid cancer in 2021. It was responsible for 11.6% (95% UI 8.8–14.5) of DALYs and 11.7% (8.8–14.6) of deaths related to thyroid cancer across all ages and both sexes. This translates to an estimated 156,000 DALYs (109,000–185,000) related to thyroid cancer and 5260 deaths (3910–6650) attributed to high BMI globally. The impact of high BMI on thyroid cancer mortality varied by sex. Between 1990 and 2021, the age-standardised death rate attributed to high BMI increased by 28.3% (13.1–41.3) in males, whereas it saw a slight decline of 1.8% (–11.4 to 8.1) in females. This trend continued between 2010 and 2021, with an increase of 5.8% (–0.6 to 13.7) in males and minimal change of 0.1% (–5.7 to 6.3) in females. A similar pattern was observed for DALYs, with increases of 30.2% (12.6–43.7) in males and 4.6% (–7.1 to 17.7) in females between 1990 and 2021.

3.5 Age and sex

In 2021, thyroid cancer disproportionately affected women globally. Females accounted for a significant majority of incident cases (66.8%), DALYs (60%), and deaths (60%) related to thyroid cancer. Between 1990 and 2021, the global age-standardised incidence rate of thyroid cancer in females increased by 33.8% (95% UI 20.3–50.5), stabilising with a slight change of 1% (–6.4 to 9.8) from 2010 to 2021. Similarly, the global age-standardised incidence rate for males significantly rose by 62% (40.2–78.9) during the same period, with a modest increase of 4.8% (–3 to 14.1) between 2010 and 2021. The female-to-male ratio for thyroid cancer cases globally was 2.6:1 in 1990, 2.1:1 in 2010, and 2:1 in 2021. Most countries exhibited a female dominance in thyroid cancer incidence. The highest female-to-male ratios were reported in Côte d'Ivoire (9.8:1), Nigeria (9.4:1), American Samoa (8.6:1), Afghanistan (8.5:1), and Libya (6.1:1) in 2021. Conversely, some countries showed a male predominance in thyroid cancer cases, such as São Tomé and Príncipe (0.2:1), Cook Islands (0.3:1), Ghana (0.4:1), Qatar (0.7:1), New Zealand (0.9:1), and Luxembourg (0.9:1) in 2021. Additionally, there were countries with equal incidence, including Kiribati, France, Iceland, and Norway.

Between 1990 and 2021, the global DALYs of thyroid cancer showed contrasting trends for men and women. While the age-standardised DALYs rate for thyroid cancer decreased by 11.3% (95% UI –2.4 to 22.4) in females, it increased by 10.4% (–7.4 to 23.2) in males. This trend continued in the more recent decade, with a further decrease of 3.9% (–3.7 to 10.6) in the age-standardised DALYs rate for women between 2010 and 2021. However, the rate for men was fairly stable, with a 0.7% (–8.4 to 7.9) decrease during the same period. Between 1990 and 2021, the global burden of thyroid cancer mortality showed a significant increase, but with contrasting trends for men and women. For men, death counts attributed to thyroid cancer rose sharply by 144.9% (107.1–172.1), accompanied by an increase in the age-standardised death rate of 10.3% (–6.4 to 22.1). In contrast, while death counts attributed to thyroid cancer also increased for women, the rise was less pronounced at 84.2% (64.4–106.5). However, the age-standardised death rate for women showed a decrease of 14.9% (–5.1 to 23.6).

(Figure 4, Supplement Table S2 and S3)

4 Discussion

Our research provides a concise and up-to-date picture of the global burden and trends in thyroid cancer. Our research findings indicate a concerning trend in the global burden of thyroid cancer, with a significant increase in both prevalence and incidence rates over the past three decades with significant heterogeneity in regions and nations. Our research findings also reveal a complex picture regarding the global progress of thyroid cancer care over the past three decades. While the total number of deaths and DALYs attributed to thyroid cancer have significantly increased, a slight decrease in death and DALY rates suggests a positive trend in survival and management.

The global incidence and prevalence of thyroid cancer have experienced a significant surge over the past three decades, with a dramatic increase of 177.6% from 1990 to 2021. While east Asia, south Asia, high-income North America, and western Europe report the highest incidence cases, regions like western sub-Saharan Africa, central sub-Saharan Africa, and Oceania experience considerably lower rates, primarily due to their smaller populations.

The findings of this study are consistent with previous reports1,8,10,24-27 that the burden of thyroid cancer is rising in almost all parts of the world. The growing global incidence of thyroid cancer is primarily due to an increase in the detection of asymptomatic, small, and subclinical papillary cancer.14,28,29 The observed variations in thyroid cancer trends highlight the need for tailored interventions to address this growing public health challenge. Understanding the specific factors driving these disparities in different regions, such as environmental exposures, genetic predisposition, socioeconomic conditions, and access to health care, is crucial for developing targeted strategies to improve early detection, treatment, and overall outcomes for thyroid cancer patients. The increasing prevalence of thyroid cancer, especially in areas where diagnostic capacities are improving, highlights the need for global cooperation in research to comprehend the worldwide discrepancies and root causes of this pattern.

The global distribution of thyroid cancer incidence in 2021 reveals a strong association with socioeconomic development. High incident cases of thyroid cancer were concentrated in middle and high SDI countries, suggesting a potential link between economic development and the prevalence of thyroid cancer. We observed a positive correlation between the incidence rate of thyroid cancer and SDI as regions classified as high and high-middle SDI exhibited four to six times higher overall age-standardised incidence rates of thyroid cancer compared to those classified as low SDI. This trend indicates a potential influence of factors associated with economic development, such as lifestyle factors, environmental exposures, and access to health care, on thyroid cancer incidence. While thyroid cancer incidence has increased across all SDI categories from 1990 to 2021, the rate of increase varies significantly. Middle SDI countries saw the most significant increase, with a staggering 339.3% rise, followed by low-middle SDI and low SDI countries. High-middle SDI and high SDI countries experienced a more moderate increase. This suggests that the burden of thyroid cancer is growing more rapidly in countries with moderate levels of economic development. The age-standardised incidence rates also reflect this pattern, with the highest increases observed in middle SDI, low-middle SDI, and low SDI countries. However, the trend is not uniform across all SDI categories, as high-middle SDI and high SDI countries experienced a slight decline in age-standardised incidence rates between 2010 and 2021. These findings highlight the complex relationship between socioeconomic development and thyroid cancer incidence. While higher SDI countries generally have higher incidence rates, the most rapid increases in incidence are occurring in middle and low SDI countries. This disparity underscores the importance of addressing both the environmental and socioeconomic factors that contribute to thyroid cancer, especially in countries with moderate to low levels of economic development.

The observed higher incidence rates of thyroid cancer in middle- and high-income countries likely reflect the widespread availability of advanced screening programmes and medical imaging in these regions, underscoring the need for careful evaluation of current screening practices to mitigate overdiagnosis. The notable increase in thyroid cancer incidence rates within middle- and high-income countries can be largely attributed to the extensive availability of advanced screening programmes and medical imaging technologies in these areas, highlighting the importance of critically assessing existing screening methodologies to prevent overdiagnosis. Similar findings were noted from GLOBOCAN report from 185 countries in 2020.6 These observations are consistent with previous GBD studies26,30 and other global investigations.31 This trend of thyroid cancer incidence rate would be explained by launching screening programmes, higher levels of medical care, community health awareness, and advanced medical imaging in high- and high-middle-income countries. Unlike the rising trend of incidence rates, mortality rates of thyroid cancer have remained fairly stable across different health care systems, SDI, and geographical locations.6,12,31 The current study, previous GBD reports,26,30 and the GLOBOCAN study6 confirm that the current change and trend of thyroid cancer has mainly been driven by overdiagnosis and slightly by change in BMI in many high-income countries worldwide.8,28,32

The alarming rise in the prevalence and incidence of thyroid cancer on a global scale has become a pressing concern, particularly as it appears to correlate with socioeconomic development. This trend underscores the urgent need for comprehensive research into various environmental factors, the effects of westernised lifestyles, and the advancements in economic conditions that influence both the diagnosis and treatment of thyroid cancer. Traditional risk factors have long been acknowledged in the context of thyroid cancer.33 These include ionising radiation exposure, advancing age, chronic hypothyroidism, and family history of the disease.33 However, recent studies and our study have expanded our understanding by highlighting the significant role of high BMI as a contributing factor to the thyroid cancer burden. In addition to these established risk factors, certain environmental pollutants34 have also been implicated in the pathogenesis of thyroid cancer.9,20

Our study's findings indicate a rapid increase in the incidence and prevalence of thyroid cancer, which can largely be attributed to overdiagnosis facilitated by advanced diagnostic modalities,15,17-19,35,36 particularly in regions with high SDI. Advanced technology is able to detect early, small, and asymptomatic thyroid cancer, resulting in overdiagnosis.6,8,10,12,14,17-19,25,31,32,37-40 The proliferation of diagnostic imaging techniques, biopsy procedures, screening programmes, and thyroid surgeries has led to increased rates of false positives in these high SDI areas.13,40 While changes in BMI may contribute modestly to this trend, the primary driver appears to be the enhanced ability to detect thyroid cancer rather than an actual increase in disease incidence.

Between 2008 and 2012, high-quality data from population-based cancer registries in 26 countries revealed that overdiagnosis was responsible for 80–95% of newly diagnosed thyroid cancer in women in South Korea, China, Italy, Croatia, Belarus, Slovakia, and France, and 40–70% in Thailand, Denmark, Norway, the UK, Japan, and Ireland.8 Males had a 10% lower overdiagnosis rate, and more than 220,000 men may have been overdiagnosed with thyroid cancer in 26 countries between 2008 and 2012.8 This overdiagnosis reflects advances in imaging, the health-care system, patient literacy, medical education and specialty, improved diagnostic criteria, economic and financial improvement, increased medical registration quality, and increased use of radiation.8,14,17-19,28 These population-based temporal trend studies had reported the increase in age-standardised annual incidence of thyroid cancer was limited to the papillary subtype; incidence of early stages increased sharply, and the incidence of advanced stages increased marginally, leading to three- to fourfold increase in the age-standardised annual thyroidectomy rate in both sexes.41 This observation leads to a paradigm shift in thinking and guidelines for thyroid cancer screening—screening for thyroid cancer has been strongly discouraged in many countries.29,42,43 As a result, the American College of Radiology, the British Thyroid Association,44 the US Preventive Services Task Force,43 and the American Thyroid Association45,46 strongly advise against biopsy for small thyroid nodules unless image modality suggests equivocal, suspicious, or malignant. The advice against regularly screening for thyroid nodules reflects an increasing agreement towards individualized medicine, highlighting the importance of assessing the risk in managing thyroid cancer. The Korean Thyroid Association (KTA) guidelines, along with the European Thyroid Association, strongly advocate for active surveillance of papillary thyroid microcarcinoma. This approach is typically recommended for tumours that are 1 cm or smaller in diameter and do not show aggressive subtypes on cytology, as well as a lack of extrathyroidal extension, lymph node metastasis, or distant metastasis. This strategy aims to prevent overdiagnosis and overtreatment.47

The study also highlights a significant and concerning connection between high BMI and the global burden of thyroid cancer. In 2021, high BMI was linked to a notable proportion of DALYs and deaths associated with thyroid cancer, accounting for approximately 11.6% and 11.7%, respectively. This statistic underscores the substantial number of individuals worldwide who suffer from the adverse health effects of thyroid cancer exacerbated by high BMI. Moreover, the impact of high BMI on thyroid cancer mortality reveals a distinct gender disparity. Between 1990 and 2021, death rates attributed to high BMI increased significantly in men, while women experienced a slight decline. This trend persisted in the more recent period from 2010 to 2021, indicating a growing gap in the effects of high BMI on thyroid cancer mortality between the sexes. Our findings align with previous GBD studies, reinforcing the notion that high BMI is positively associated with thyroid cancer risk.26,30,48,49 The International Agency for Research on Cancer (IARC) has classified high BMI as having "sufficient" evidence of a pathogenic role in thyroid cancer risk, albeit with lower hazard ratios compared to other types of cancers.50 Research such as the National Institutes of Health-AARP Diet and Health Study has indicated that rising rates of overweight and obesity are linked to one in six cases of papillary thyroid cancer and one in three large papillary cancers among individuals aged 60 or older.48,49 Similarly, the European Prospective Investigation into Cancer and Nutrition (EPIC) study found moderate associations between higher weight, height, BMI, waist circumference, and waist-to-hip ratio with differentiated thyroid cancer in women, though not in men.27,51 A comprehensive pooled analysis of 22 prospective cohort studies from North America, Europe, and Asia involving over 2 million participants also established connections between factors like height, baseline BMI, waist circumference, and both young-adult and adulthood BMI gain with various forms of thyroid cancer.27,52 Furthermore, the Asia Cohort Consortium study demonstrated that higher BMI is associated with an increased risk of thyroid cancer across both sexes, although the relationship between underweight BMI and thyroid cancer risk may differ based on sex and histological subtype.53 Understanding the specific mechanisms through which high BMI contributes to the development and progression of thyroid cancer is vital for creating targeted interventions. In individuals with obesity, elevated levels of aromatase activity can lead to an imbalance between estrogens and androgens, resulting in increased estrogen levels. This hormonal imbalance may play a significant role in promoting thyroid carcinogenesis.54 The gender-specific trends observed in this study call for further investigation to uncover the underlying factors that contribute to these disparities, ultimately informing effective public health strategies tailored for both men and women.

Despite the observed global uptick in deaths and DALYs attributed to thyroid cancer, our investigation establishes that thyroid cancer had an age-standardised death rate of less than 0.64 per 100,000 in all SDI groups. Global thyroid cancer trends reveal stark disparities in mortality and disease burden across different SDI levels. In 2021, people in countries with lower SDI faced a significantly higher risk of dying from thyroid cancer, with the highest death rate in low SDI countries (0.64 per 100,000) compared to high-middle SDI countries (0.43 per 100,000). This stark difference reflects the critical impact of socioeconomic factors on cancer outcomes. However, the picture is not entirely bleak. While death counts have risen substantially in all SDI groups since 1990, high SDI and high-middle SDI countries have achieved significant progress in reducing age-standardised death rates. This suggests that advancements in healthcare infrastructure, early detection strategies, and treatment protocols have been effective in improving outcomes in these regions. Conversely, low-middle SDI, low SDI, and middle SDI countries have experienced an increase in age-standardised death rates, indicating a persistent challenge in controlling thyroid cancer mortality. Furthermore, the burden of thyroid cancer, as measured by DALYs, mirrors the disparity in mortality. In 2021, over half of the total DALYs attributed to thyroid cancer occurred in middle and low-middle SDI countries. While the overall burden is significant in these regions, the highest age-standardised DALYs rates were observed in low and low-middle SDI, highlighting a disproportionate impact on health and lifespan in these countries. This suggests a substantial need for addressing the underlying factors contributing to this burden, such as inadequate access to health care, limited screening programmes, advanced chemotherapy, and radioiodine therapy. Despite this challenging situation, there is a glimmer of hope. High and high-middle SDI countries have also made significant progress in reducing their age-standardised DALYs rates since 1990, signifying the effectiveness of comprehensive health-care systems in mitigating the long-term consequences of thyroid cancer. This underscores the crucial role of investing in accessible and equitable health-care systems in lower SDI countries to address the growing burden of thyroid cancer and improve health outcomes for affected individuals. Thyroid cancer had an age-standardised death rate of less than 1 per 100,000 in all GBD regions, almost most countries and territories, and the whole world in 2021. Our current study, previous GBD reports,26,30 and the GLOBOCAN study6 all confirmed that thyroid cancer mortality has been relatively low globally, with significant variation in progress of reduction in mortality of thyroid cancer. Thyroid cancer deaths have increased across all GBD regions, despite inconsistent trends in age-standardised death rates. Thyroid cancer age-standardised death rates have decreased in western Europe, Australasia, high-income Asia Pacific, east Asia, and the Caribbean over the past ten years, while they have increased in the remaining GBD regions. During the past ten years, there has been a notable increase in the age-standardised death rate from thyroid cancer in Andean Latin America, Central America, and north Africa and the Middle East. This finding contradicts previous reports where the mortality rate of thyroid cancer had stable trends in Central and South America.55,56 Thyroid cancer treatment recommendations and options are nearly the same across the globe, even though certain adjuvant treatment options—like radioiodine therapy and external beam therapy—would not be available in low- and middle-income nations. Considering the consistent mortality rates observed globally, our research strongly supports the need to enhance thyroid cancer treatment protocols that prioritise effectiveness and minimise negative effects, particularly in low-resource areas where access to advanced treatments may be restricted

The evolving landscape of thyroid cancer has unveiled a significant gender disparity, particularly evident in the years between 1990 and 2021. By 2021, women accounted for a substantial majority of thyroid cancer cases, representing 66.8% of new incident cases, 60% of DALYs, and 60% of deaths attributed to the disease. This trend is underscored by a notable 33.8% increase in the global age-standardised incidence rate for females during this period, although this rate stabilised with minor fluctuations from 2010 to 2021. In contrast, the incidence rate for males surged by an impressive 62%, albeit with a modest rise in the past decade. This shifting epidemiological pattern is further illustrated by the changing female-to-male ratio, which decreased from 2.6:1 in 1990 to 2:1 in 2021. This narrowing gap indicates a convergence in incidence rates between genders, although most countries still report a predominance of female cases. Interestingly, some regions exhibit a male majority, highlighting significant geographical variations in thyroid cancer incidence that warrant further investigation. Previous epidemiological studies have corroborated these findings, illustrating a similar burden of thyroid cancer among females globally, albeit with substantial regional and national variations.2,26,30 The higher prevalence of thyroid cancer in women, along with the marked difference in incidence rates between genders, calls for additional research into gender-specific risk factors. Understanding these factors could pave the way for new preventive strategies tailored to address these disparities. While many researchers have reported that thyroid cancer is two to three times more common in women than in men, there remains a lack of solid evidence regarding the genetic, environmental, and dietary factors contributing to this gender discrepancy.57,58 Notably, both men and women experience similar rates of more aggressive forms of thyroid tumours—such as anaplastic and medullary thyroid cancer—yet differentiated thyroid cancers like follicular and papillary thyroid cancer are more prevalent among women.58 The gender disparity is often attributed to the detection of small subclinical papillary thyroid cancers,59 which may be influenced by health-care utilisation patterns. Women are more likely to engage with health-care services due to various factors, including cosmetic concerns, leading to potential over-detection of these less aggressive tumours.

While previous studies have touched upon these themes, a deeper exploration into how health-care delivery and societal perceptions impact outcomes could yield valuable insights. Additionally, fluctuations in sex hormones during menstrual cycles and pregnancy have been hypothesised as contributing factors to the observed gender disparity in papillary thyroid cancer. These hormonal changes may influence thyroid function or tumour development, further complicating the understanding of this disease's epidemiology.57,60

When examining the global burden of thyroid cancer through the lens of DALYs, contrasting trends emerge for men and women. Between 1990 and 2021, the age-standardised DALYs rate for females decreased by 11.3%, continuing a downward trend with a further reduction of 3.9% from 2010 to 2021. Conversely, the DALYs rate for males increased by 10.4% during the same time frame. Mortality trends associated with thyroid cancer further illuminate the differing experiences of men and women over the past three decades. For men, death counts attributed to thyroid cancer skyrocketed by 144.9%, alongside a notable increase in the age-standardised death rate. In contrast, while the death counts for women also rose, the increase was less severe at 84.2%, and their age-standardised death rate declined by 14.9%. Over the past three decades, there has been a notable trend in the age-standardised death rates and DALYs associated with thyroid cancer, particularly highlighting a divergence between genders. In women, there has been a significant decline in both age-standardised death rates and DALYs related to thyroid cancer. This decline suggests improvements in early detection, advancements in treatment options, and possibly changes in risk factors or screening practices that have contributed to better outcomes for women diagnosed with this disease. Conversely, the situation appears to be more concerning for men, where age-standardised death rates and DALYs associated with thyroid cancer have shown an increase. This rise may indicate several underlying issues, such as a higher incidence of more aggressive forms of thyroid cancer in men, delayed diagnosis, or less effective treatment outcomes compared to their female counterparts. It could also reflect broader trends in health behaviours, access to health care, or biological differences in how thyroid cancer manifests and progresses in men versus women. These contrasting trends underscore the importance of gender-specific strategies in public health initiatives aimed at thyroid cancer management. Understanding the reasons behind these disparities is crucial for developing targeted interventions, improving screening practices, and ensuring equitable access to care for all patients, regardless of gender. Moreover, this situation calls for further research to explore the biological, environmental, and lifestyle factors that may contribute to these differences in thyroid cancer outcomes between men and women.

In conclusion, the finding indicates that regions with high SDI, such as high-income North America, Australasia, and high-income Asia Pacific, exhibit the highest age-standardised incidence and prevalence rates of thyroid cancer. This trend can be attributed to several factors, including improved health-care systems, advanced diagnostic technologies, and increased awareness of thyroid cancer, which may lead to higher rates of detection, including cases that might otherwise go unnoticed. Conversely, areas with low SDI, such as parts of Oceania and sub-Saharan Africa, show significantly lower age-standardised incidence rates. The disparity in thyroid cancer rates between high and low SDI regions can be linked to various socioeconomic factors, including limited access to health-care services, lower availability of diagnostic resources, and a lack of public health initiatives focused on cancer screening and awareness. Additionally, high BMI is associated with an elevated risk of developing thyroid cancer. The prevalence of obesity in high-income countries may contribute to the rising rates of thyroid cancer in these regions. This relationship underscores the importance of addressing lifestyle factors and public health strategies aimed at promoting healthier weight management as part of comprehensive cancer-prevention efforts. Another significant finding of this study is the observable discrepancy in the burden of thyroid cancer between males and females. The gap in the female-to-male ratio for thyroid cancer incidence has been gradually declining globally for the past three decades

Limitation

Although this study is thorough and extensive in its coverage and examination, it is susceptible to certain constraints. Using registry data and worldwide databases as a primary source may result in inconsistent data quality and completeness across various nations and regions, which could impact the accuracy of our estimates of incidence and mortality. Furthermore, while age-standardised rates are useful for analysing trends across populations and over time, they may mask age-specific changes and trends within certain countries. Furthermore, our research may not comprehensively consider the intricacies of grade and several subtypes of thyroid cancer, each of which may have unique causes and clinical results. The presence of improved diagnostic methods in high-income nations increases the likelihood of overdiagnosis. This implies that the apparent rise in thyroid cancer cases may be due to changes in surveillance procedures rather than an actual increase in the occurrence of the disease. Furthermore, the study's methodology does not allow for a thorough analysis of specific risk variables, such as genetic predispositions, lifestyle factors, and environmental exposures, which are essential for comprehending the intricate causes of thyroid cancer. Furthermore, insufficient data regarding the availability and standard of health care, especially in low- and middle-income nations, hampers our capacity to fully comprehend the worldwide discrepancies in thyroid cancer outcomes. This emphasises the necessity for more extensive data gathering and analysis to guide focused interventions and policy making

Policy Implications

The global surge in thyroid cancer incidence, marked by significant regional and national variations, raises critical concerns regarding current screening protocols and practices. A substantial portion of this increase can be attributed to overdiagnosis, which often leads to unnecessary interventions such as premature thyroidectomies, TSH suppression therapies, and Iodine-131 treatments. This reality highlights the need for a comprehensive reassessment of existing guidelines for thyroid nodule screening and biopsy. Policy makers must prioritise the development of evidence-based protocols that balance the early detection of clinically significant cases with the risks associated with overdiagnosis and overtreatment. The findings of this study emphasise that the rapid rise in thyroid cancer rates is not solely a consequence of overdiagnosis: obesity also has been identified as a key driver of thyroid cancer incidence, and there is an urgent call for a dual strategy aimed at addressing both screening practices and public health initiatives. Policy makers should consider implementing refined screening guidelines that focus on risk stratification, ensuring that only high-risk individuals undergo extensive evaluation and treatment. This could involve the use of advanced imaging technologies and biomarkers to better differentiate between aggressive and indolent forms of thyroid cancer. In tandem with these refined screening practices, public health campaigns targeting obesity management are essential. Such campaigns can promote healthy lifestyle choices, including increased physical activity and improved dietary habits, to mitigate the risk of obesity-related thyroid cancer. Policies could include community-based exercise programmes, nutritional education in schools, and incentives for workplaces to promote health and wellness initiatives. By fostering an environment that encourages healthier choices, policy makers can play a pivotal role in reducing the incidence of obesity and, consequently, its associated health risks, including thyroid cancer. Ultimately, the interplay between overdiagnosis and rising obesity rates necessitates a multifaceted approach from policy makers. By refining thyroid cancer screening protocols and implementing robust public health initiatives focused on obesity management, we can create a more effective health-care system that minimises unnecessary treatments while addressing the underlying factors contributing to rising cancer rates to improve patient outcomes and enhance the overall efficiency of health-care resources, ensuring that interventions are both necessary and beneficial for the population.

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AI was used to correct grammar and spelling only.

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