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Supplementary appendix

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Supplement to: Rey Brandariz J, Rumgay H, Ayo-Yusuf O, et al. Estimated impact of a tobacco-elimination strategy on lung-cancer mortality in 185 countries: a population-based birth-cohort simulation study. *Lancet Public Health* 2024; **9:** e745–54.

Supplementary material

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Appendix 1. Norpred model and estimates of lung cancer mortality by country

Prediction of sex- and age-specific lung cancer rates up to 2040–2044 for the 82 countries was performed using the Nordpred software package in R version 4.3.0. The Norpred model is based on the age-period- cohort model in which a power function instead of a logarithmic function was used to level off the exponential growth of future rates. The model, mathematically, is written as: Rap = (Aa + D · p + Pp + Cc), where Rap is defined as the mortality rate in the age group (a) and in the calendar period (p). D is defined as the common drift parameter. Aa is defined as the age component of the age group (a). Pp is defined as the non-linear period component of the period (p). Cc is defined as the non-linear cohort component of the cohort (c). A drift reduction of 25% in the second period, 50% in the third period and 75% in the fourth and fifth periods was applied in order to reduce the influence of the current trend on predictions as recommended by the authors of the model.[1]

To perform the prediction of lung cancer mortality rates using the Nordpred model[1] lung cancer mortality data in periods of five years were extracted from different data sources:

Mortality Data

Lung cancer mortality data for 75 countries were extracted from the World Health Organization (WHO) mortality database. Data were extracted for 15 to 25 years divided into 5-year periods, depending on availability, from the most recent to the oldest data.

Incidence Data

Lung cancer incidence data were extracted for 7 countries which did not have lung cancer mortality data available (i.e., Belarus, China, India, Kuwait, Thailand, Turkey and Uganda) from the Cancer Incidence Five Continents (CI5plus) database. These data are from subnational registries. China: Cancer registry of Hong Kong and Shanghai; India: Cancer registry of Chenna; Kuwait: Kuwaitis; Thailand: Cancer registry of Chiang Mai, Khon Kaen, Songkhla and Lampang; Turkey: Antalya and Izmir. In Uganda, data between the years 2013-2015 were obtained from the Kampala Cancer Registry. A total of 25 years of data were also extracted, divided into 5-year periods from the most recent data, except for Thailand, where 20 years of incidence data were available and for Kuwait and Turkey, where 15 years were available.

Supplementary Table 1.1. Data sources, observed and predicted time periods for prediction of lung cancer mortality or incidence for 82 countries.

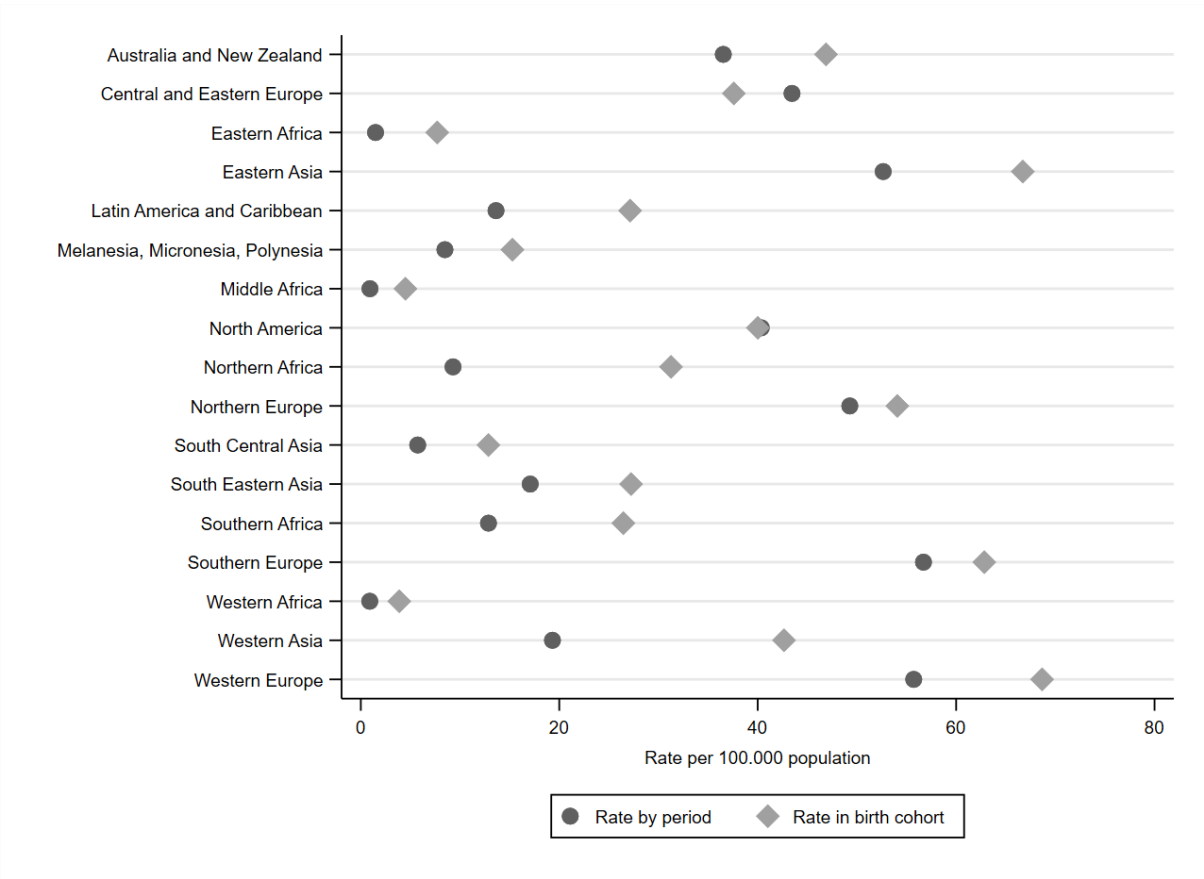
Country	Observed mortality	Predicted mortality	Data source
Albania	1996-2010	2020-2044	WHO mortality database
Argentina	1994-2018	2020-2044	WHO mortality database
Australia	1994-2018	2020-2044	WHO mortality database
Austria	1995-2019	2020-2044	WHO mortality database
Azerbaijan	1988-2002	2020-2044	WHO mortality database
Bahamas	1996-2015	2020-2044	WHO mortality database
Bahrain	2000-2014	2020-2044	WHO mortality database
Belarus	1988-2012	2020-2044	*Cancer Incidence in Five Continents* (CI5*plus*)
Belgium	1992-2016	2020-2044	WHO mortality database
Belize	1997-2016	2020-2044	WHO mortality database
Brazil	1994-2018	2020-2044	WHO mortality database
Brunei Darussalam	2000-2019	2020-2044	WHO mortality database
Bulgaria	1994-2018	2020-2044	WHO mortality database
Canada	1993-2017	2020-2044	WHO mortality database
Chile	1994-2018	2020-2044	WHO mortality database
China	1988-2012	2020-2044	*Cancer Incidence in Five Continents* (CI5*plus*)
Colombia	1993-2017	2020-2044	WHO mortality database
Costa Rica	1993-2017	2020-2044	WHO mortality database
Croatia	1993-2017	2020-2044	WHO mortality database
Cuba	1993-2017	2020-2044	WHO mortality database
Cyprus	2004-2018	2020-2044	WHO mortality database
Czechia	1995-2019	2020-2044	WHO mortality database
Denmark	1994-2018	2020-2044	WHO mortality database
Dominican Republic	1994-2018	2020-2044	WHO mortality database
Ecuador	1993-2017	2020-2044	WHO mortality database
Egypt	2000-2019	2020-2044	WHO mortality database
El Salvador	1999-2018	2020-2044	WHO mortality database
Estonia	1995-2019	2020-2044	WHO mortality database
Finland	1994-2018	2020-2044	WHO mortality database
France	1992-2016	2020-2044	WHO mortality database
Germany	1994-2018	2020-2044	WHO mortality database
Greece	1993-2017	2020-2044	WHO mortality database
Guatemala	1996-2020	2020-2044	WHO mortality database
Hungary	1995-2019	2020-2044	WHO mortality database
Iceland	1995-2019	2020-2044	WHO mortality database
India	1988-2012	2020-2044	*Cancer Incidence in Five Continents* (CI5*plus*)
Ireland	1991-2015	2020-2044	WHO mortality database
Israel	1994-2018	2020-2044	WHO mortality database
Italy	1993-2017	2020-2044	WHO mortality database
Japan	1994-2018	2020-2044	WHO mortality database
Kazakhstan	1996-2020	2020-2044	WHO mortality database

Korea, Republic of	1995-2019	2020-2044	WHO mortality database
Kuwait	1998-2012	2020-2044	*Cancer Incidence in Five Continents* (CI5*plus*)
Kyrgyzstan	1992-2016	2020-2044	WHO mortality database
Latvia	1994-2018	2020-2044	WHO mortality database
Lithuania	1995-2019	2020-2044	WHO mortality database
Luxembourg	1995-2019	2020-2044	WHO mortality database
Malaysia	2000-2014	2020-2044	WHO mortality database
Malta	1993-2017	2020-2044	WHO mortality database
Mauritius	1996-2020	2020-2044	WHO mortality database
Mexico	1993-2017	2020-2044	WHO mortality database
The Netherlands	1994-2018	2020-2044	WHO mortality database
New Zealand	1992-2016	2020-2044	WHO mortality database
Nicaragua	2000-2019	2020-2044	WHO mortality database
Norway	1992-2016	2020-2044	WHO mortality database
Panama	2000-2019	2020-2044	WHO mortality database
Paraguay	1995-2019	2020-2044	WHO mortality database
Peru	1994-2018	2020-2044	WHO mortality database
Poland	1994-2018	2020-2044	WHO mortality database
Portugal	1994-2018	2020-2044	WHO mortality database
Puerto Rico	1993-2017	2020-2044	WHO mortality database
Romania	1994-2018	2020-2044	WHO mortality database
Russian Federation	1995-2019	2020-2044	WHO mortality database
Saint Lucia	1991-2015	2020-2044	WHO mortality database
Serbia	2001-2020	2020-2044	WHO mortality database
Singapore	1993-2017	2020-2044	WHO mortality database
Slovakia	1995-2014	2020-2044	WHO mortality database
Slovenia	1995-2019	2020-2044	WHO mortality database
South Africa	1994-2018	2020-2044	WHO mortality database
Spain	1993-2017	2020-2044	WHO mortality database
Suriname	1995-2014	2020-2044	WHO mortality database
Sweden	1994-2018	2020-2044	WHO mortality database
Switzerland	1993-2017	2020-2044	WHO mortality database
Trinidad and Tobago	1988-2012	2020-2044	WHO mortality database
Thailand	1993-2012	2020-2044	*Cancer Incidence in Five Continents (CI5plus)*
Turkey	1998-2012	2020-2044	*Cancer Incidence in Five Continents (CI5plus)*
Turkmenistan	1991-2015	2020-2044	WHO mortality database
Uganda	1991-2015	2020-2044	*Cancer Incidence in Five Continents* (CI5*plus*) and Kampala Registry Cancer
Ukraine	1995-2009	2020-2044	WHO mortality database
United Kingdom	1992-2016	2020-2044	WHO mortality database
United States of America	1993-2017	2020-2044	WHO mortality database
Uruguay	1993-2017	2020-2044	WHO mortality database

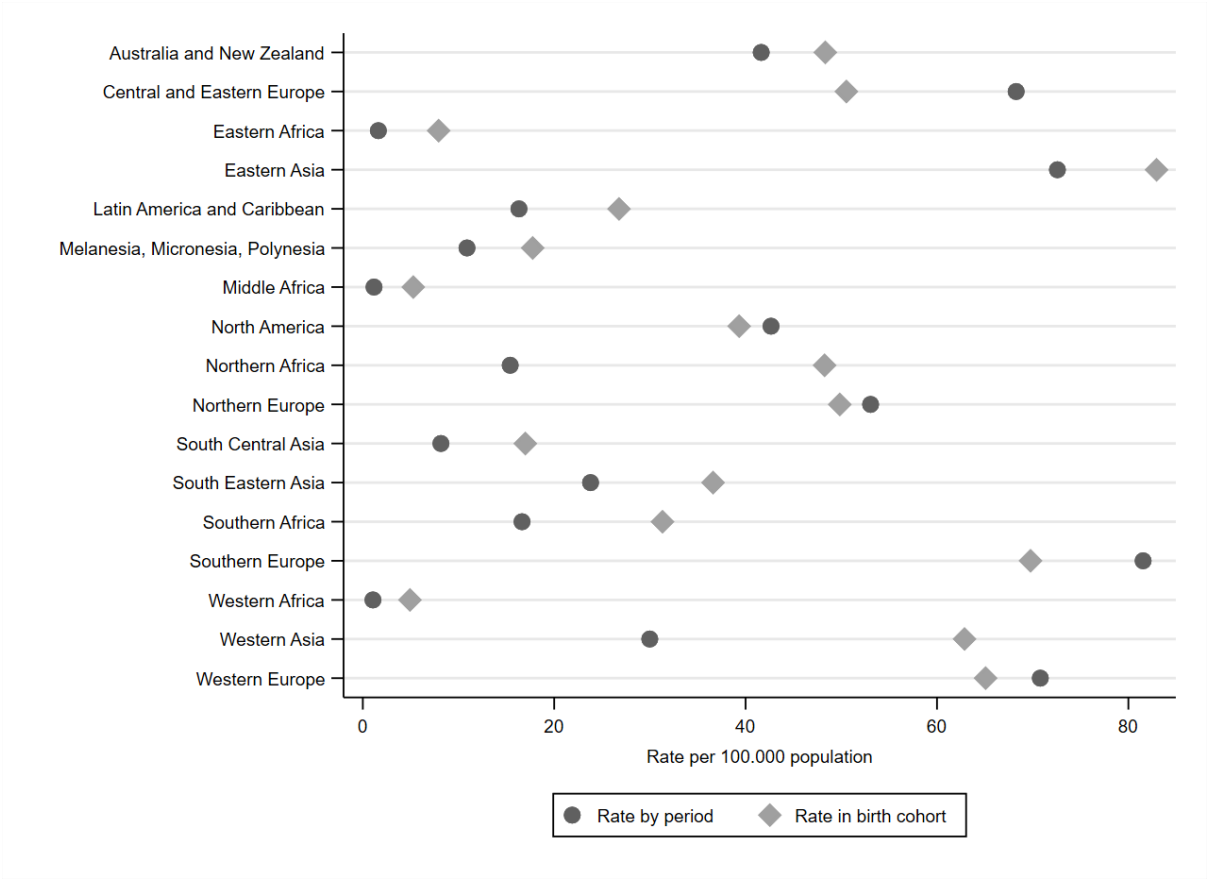
Appendix 2. Estimated lung cancer mortality rate in 2022 (by period) and in the birth cohort studied (for those born in 2006-2010)

The following figures show age-standardised lung cancer mortality rates in 2022 in the world regions (rate by period) and the age-standardised lung cancer mortality rate in the cohort analysed (rate among cohort born in 2006-2010, who were at the age of smoking initiation in 2022, and therefore targeted by the tobacco-free generation), for both sexes combined (2.1), men (2.2) and women (2.3).

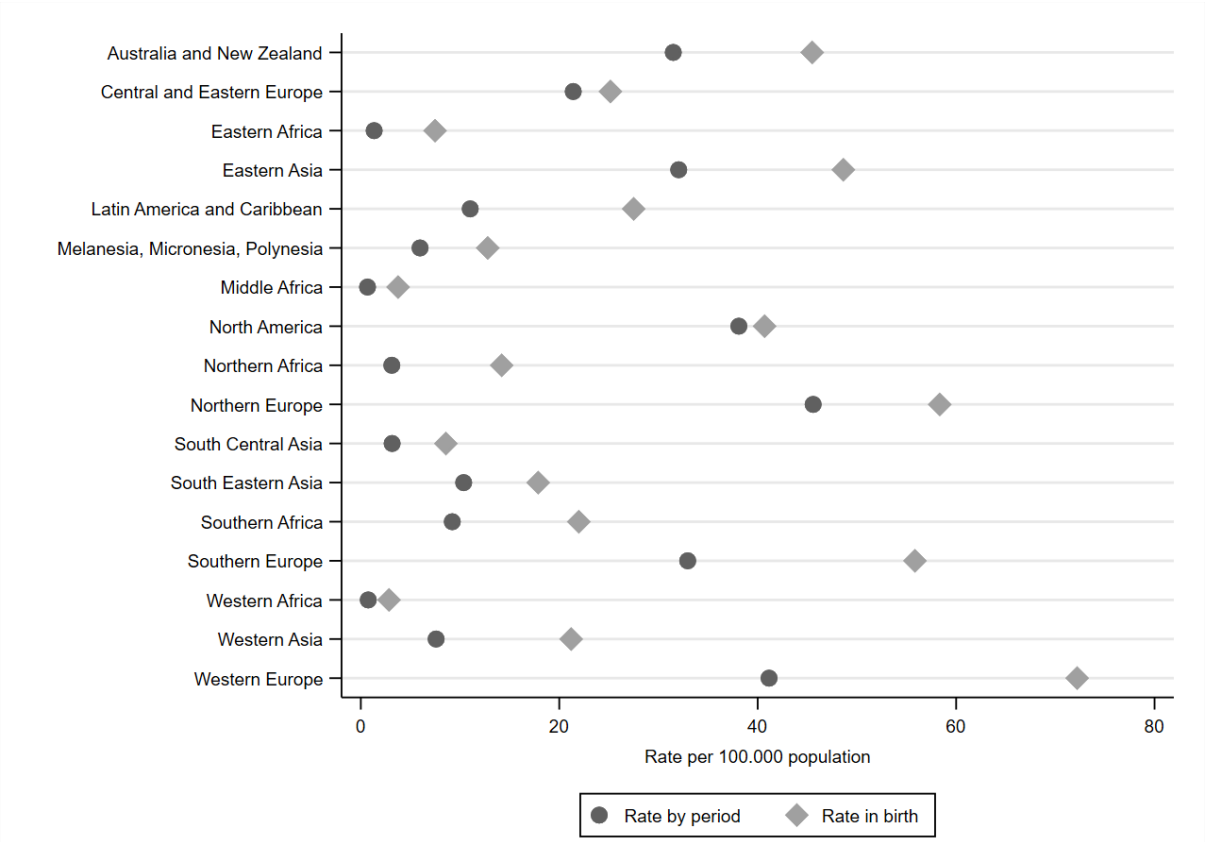
Supplementary Figure 2.1. Lung cancer mortality rate by period and in the birth cohort using data from GLOBOCAN 2022, by world region.



Supplementary Figure 2.2. Lung cancer mortality rate by period and in the birth cohort in men using data from GLOBOCAN 2022, by world region.



Supplementary Figure 2.3. Lung cancer mortality rate by period and in the birth cohort in women using data from GLOBOCAN 2022, by world region.



Appendix 3. Period/cohort ratio estimation

Ratio selection to convert period rates to cohort rates

Lung cancer mortality rates were obtained from the GLOBOCAN 2022 database[2] by sex for each of the 185 countries included. Countries were ordered from lowest lung cancer mortality rate to highest rate by sex and categorised according to bands of 5 deaths per 100,000. Thus, for example, the first group included countries with lung cancer mortality rates between 0 and 4.9, the second group included countries with rates between 5.0 and 9.9, and so on. Once the groups were created, the 82 countries with period to cohort rate ratios were located. For the 82 countries, their own ratio was used. For the remaining countries that did not have period to cohort rate ratios (103 out of 185 countries), the decision of which ratio to use was based on using the ratio of those countries that were located in the same geographical region and were also in the same lung cancer mortality rate division group. In some cases, the criterion of being in the same region prevailed over the criterion of having similar lung cancer mortality rates in 2022 (GLOBOCAN data).[2] Thus, when countries from the same region were not located in a group, the ratios of the countries from the same region in the previous group were used. In addition, when there was more than one country from the same geographic region in the same group, an average of the ratios of those countries was used. Table 3.1 shows the sources of the period to cohort rate ratios that were used for each of the 185 countries.

Limit application on ratios

After calculating the period to cohort rate ratios for each of the age groups, a limit was applied to those ratios that were ≥5 to limit the influence of extremely low rates which produced high ratios, since this could distort the cohort estimates, especially in women. In those age groups where the calculated ratio was ≥5 this ratio was replaced by the ratio of the previous age group. In those cases, in which the previous age group also had a ratio ≥5, the ratio of the preceding group was applied for both. Thus, for example, if the 10-14 age group had a ratio of 7 and the 5-9 age group had a ratio of 6, the ratio of the 0-4 age group that had a ratio of less than 5 was applied.

Supplementary Table 3.1. Countries included and the reference countries for the period to cohort rate ratios by sex.

MEN		**WOMEN**	
Country	**Country ratio selection**	**Country**	**Country ratio selection**
Niger	Uganda	Sierra Leone	Average of Uganda, Mauritius, Egypt
Nigeria	Uganda	Niger	Average of Uganda, Mauritius, Egypt
Congo, Republic of	Uganda	Chad	Average of Uganda, Mauritius, Egypt
Cape Verde	Uganda	Mozambique	Average of Uganda, Mauritius
Benin	Uganda	Congo, Republic of	Average of Uganda, Mauritius, Egypt
Malawi	Uganda	Togo	Average of Uganda, Mauritius, Egypt
South Sudan	Uganda	The Republic of the Gambia	Average of Uganda, Mauritius, Egypt
Mozambique	Uganda	Malawi	Average of Uganda, Mauritius
Tanzania, United Republic of	Uganda	Benin	Average of Uganda, Mauritius, Egypt
Central African Republic	Uganda	Mauritania	Average of Uganda, Mauritius, Egypt
Comoros	Uganda	Comoros	Average of Uganda, Mauritius
Congo, Democratic Republic of	Uganda	Côte d'Ivoire	Average of Uganda, Mauritius, Egypt
Madagascar	Uganda	Guinea-Bissau	Average of Uganda, Mauritius, Egypt
Sierra Leone	Uganda	Rwanda	Average of Uganda, Mauritius
Mauritania	Uganda	Senegal	Average of Uganda, Mauritius, Egypt
Equatorial Guinea	Uganda	Cape Verde	Average of Uganda, Mauritius, Egypt
Togo	Uganda	Madagascar	Average of Uganda, Mauritius
Sudan	Uganda	Angola	Average of Uganda, Mauritius, Egypt
Angola	Uganda	Congo, Democratic Republic of	Average of Uganda, Mauritius, Egypt
Burkina Faso	Uganda	Liberia	Average of Uganda, Mauritius, Egypt
Eritrea	Uganda	Nigeria	Average of Uganda, Mauritius, Egypt
Gabon	Uganda	Central African Republic	Average of Uganda, Mauritius, Egypt
Ghana	Uganda	South Sudan	Average of Uganda, Mauritius
Guinea-Bissau	Uganda	Botswana	Average of Uganda, Mauritius, Egypt
Uganda	Uganda	Sudan	Egypt
Côte d'Ivoire	Uganda	Djibouti	Average of Uganda, Mauritius
Djibouti	Uganda	Guinea	Average of Uganda, Mauritius, Egypt
Kenya	Uganda	Cameroon	Average of Uganda, Mauritius, Egypt
Chad	Uganda	Ghana	Average of Uganda, Mauritius, Egypt
Somalia	Uganda	Zambia	Average of Uganda, Mauritius
Ethiopia	Uganda	Tanzania, United Republic of	Average of Uganda, Mauritius
Liberia	Uganda	Mali	Average of Uganda, Mauritius, Egypt

Senegal	Uganda	Pakistan	Average of Turkmenistan, India, Kazakhstan
Burundi	Uganda	Saudi Arabia	Average of Kuwait, Azerbaijan
Rwanda	Uganda	**Uganda**	Uganda
Cameroon	Uganda	Eswatini	Average of Uganda, Mauritius, Egypt
Guatemala	Guatemala	Guyana	Average of Saint Lucia, Guatemala, Costa Rica, Panama, Mexico, El Salvador, Bahamas, Paraguay, Nicaragua, Trinidad and Tobago and Tobago, Ecuador
Zambia	Uganda	Equatorial Guinea	Average of Uganda, Mauritius, Egypt
Mali	Uganda	Burundi	Average of Uganda, Mauritius
Lesotho	Uganda	Eritrea	Average of Uganda, Mauritius
El Salvador	El Salvador	Gabon	Average of Uganda, Mauritius, Egypt
Yemen	Kuwait	Oman	Average of Kuwait, Azerbaijan
Saudi Arabia	Kuwait	**India**	India
Guinea	Uganda	Algeria	Egypt
Haiti	Average of Ecuador, Peru, Costa Rica, Nicaragua, Mexico, Panama	Sri Lanka	Average of Turkmenistan, India, Kazakhstan
Honduras	Average of Ecuador, Peru, Costa Rica, Nicaragua, Mexico, Panama	**Guatemala**	Guatemala
Guyana	Average of Ecuador, Peru, Costa Rica, Nicaragua, Mexico, Panama	Kenya	Average of Uganda, Mauritius
Qatar	Kuwait	Libya	Egypt
United Arab Emirates	Kuwait	**Saint Lucia**	Saint Lucia
Botswana	Uganda	Somalia	Average of Uganda, Mauritius
Ecuador	Ecuador	Yemen	Average of Kuwait, Azerbaijan
Peru	Peru	Solomon Islands	Australia
Tajikistan	India	Iraq	Average of Kuwait, Azerbaijan
Bhutan	India	Lesotho	Average of Uganda, Mauritius, Egypt
Oman	Kuwait	Vanuatu	Australia
Costa Rica	Costa Rica	Ethiopia	Average of Uganda, Mauritius
Nicaragua	Nicaragua	**Costa Rica**	Costa Rica
Mexico	Mexico	Afghanistan	Average of Turkmenistan, India, Kazakhstan
Kuwait	Kuwait	**Panama**	Panama
Panama	Panama	Uzbekistan	Average of Turkmenistan, India, Kazakhstan
Solomon Islands	Australia	Tajikistan	Average of Turkmenistan, India, Kazakhstan
Eswatini	Uganda	Zimbabwe	Average of Uganda, Mauritius
India	India	**Mexico**	Mexico
Namibia	Uganda	Morocco	Egypt
Pakistan	India	Bangladesh	Average of Turkmenistan, India, Kazakhstan
Zimbabwe	Uganda	**El Salvador**	El Salvador
Fiji	Australia	**Kuwait**	Kuwait
The Republic of the Gambia	Uganda	**Turkmenistan**	Turkmenistan

Bolivia	Average of Ecuador, Peru, Costa Rica, Nicaragua, Mexico, Panama	**Bahamas**	Bahamas
Barbados	Average of Puerto Rico, Bahamas, Colombia, Belize, Dominican Republic, Saint Lucia	**Paraguay**	Paraguay
Afghanistan	India	**Nicaragua**	Nicaragua
Sri Lanka	India	Tunisia	Egypt
Puerto Rico	Puerto Rico	**Belarus**	Belarus
Bahamas	Bahamas	**Egypt**	Egypt
Colombia	Colombia	Georgia	Average of Kuwait, Azerbaijan
Uzbekistan	India	**Belize**	Belize
Mauritius	Mauritius	Namibia	Average of Uganda, Mauritius, Egypt
France, Martinique	Average of Puerto Rico, Bahamas, Colombia, Belize, Dominican Republic, Saint Lucia	**Kazakhstan**	Kazakhstan
Nepal	India	**Trinidad and Tobago**	Trinidad and Tobago
Vanuatu	Australia	**Azerbaijan**	Azerbaijan
Belize	Belize	Burkina Faso	Average of Uganda, Mauritius, Egypt
Papua New Guinea	Australia	United Arab Emirates	Average of Kuwait, Azerbaijan
Bangladesh	India	**Mauritius**	Mauritius
Egypt	Egypt	Honduras	Average of Saint Lucia, Guatemala, Costa Rica, Panama, Mexico, El Salvador, Bahamas, Paraguay, Nicaragua, Trinidad and Tobago
Dominican Republic	Dominican Republic	Fiji	Australia
Bahrain	Bahrain	Qatar	Average of Kuwait, Azerbaijan
Sweden	Sweden	**Ukraine**	Ukraine
Timor-Leste	India	**Bahrain**	Bahrain
Saint Lucia	Saint Lucia	Jordan	Average of Kuwait, Azerbaijan
Iran, Islamic Republic of	Bahrain	**Ecuador**	Ecuador
Chile	Chile	France, Martinique	Average of Saint Lucia, Guatemala, Costa Rica, Panama, Mexico, El Salvador, Bahamas, Paraguay, Nicaragua, Trinidad and Tobago, Ecuador
Turkmenistan	Turkmenistan	Bolivia	Average of Puerto Rico, Peru, Colombia, Chile, Dominican Republic, Argentina, Brazil, Suriname
Trinidad and Tobago	Trinidad and Tobago	**Puerto Rico**	Puerto Rico
Brazil	Brazil	Barbados	Average of Puerto Rico, Peru, Colombia, Chile, Dominican Republic, Argentina, Brazil, Suriname
Iceland	Iceland	**Kyrgyzstan**	Kyrgyzstan
Sao Tome and Principe	Average of Egypt, Mauritius	Mongolia	Average of Japan, Republic of Korea
Jamaica	Average of Chile, Brazil, Trinidad and Tobago, Paraguay	Timor-Leste	Average of Thailand, Malaysia
France, Guadeloupe	Average of Chile, Brazil, Trinidad and Tobago, Paraguay	Haiti	Average of Puerto Rico, Peru, Colombia, Chile, Dominican Republic, Argentina, Brazil, Suriname
Maldives	Turkmenistan	Indonesia	Average of Thailand, Malaysia
Venezuela	Average of Chile, Brazil, Trinidad and Tobago, Paraguay	Nepal	Kyrgyzstan

Algeria	Egypt	France, Guadeloupe	Average of Puerto Rico, Peru, Colombia, Chile, Dominican Republic, Argentina, Brazil, Suriname
Paraguay	Paraguay	**Malaysia**	Malaysia
Australia	Australia	Republic of Moldova	Average of Latvia, Lithuania, Estonia, Malta, Albania
Israel	Israel	**Russian Federation**	Russian Federation
Norway	Norway	Maldives	Kyrgyzstan
Indonesia	Turkmenistan	**Peru**	Peru
United States of America	United States of America	Palestine	Israel
Switzerland	Switzerland	French Guiana	Average of Puerto Rico, Peru, Colombia, Chile, Dominican Republic, Argentina, Brazil, Suriname
Finland	Finland	**Colombia**	Colombia
French Guiana	Average of Chile, Brazil, Trinidad and Tobago, Paraguay	**Korea, Republic of**	Korea, Republic of
Myanmar	Turkmenistan	**Latvia**	Latvia
Kyrgyzstan	Kyrgyzstan	Iran, Islamic Republic of	Kyrgyzstan
Suriname	Suriname	**Japan**	Japan
Malaysia	Malaysia	Papua New Guinea	Australia
Cambodia	Average of Malaysia, Thailand, Brunei Darussalam	**Lithuania**	Lithuania
Ireland	Ireland	France, La Réunion	Israel
Thailand	Thailand	Armenia	Israel
New Zealand	New Zealand	Bhutan	Kyrgyzstan
Iraq	Kyrgyzstan	**Estonia**	Estonia
United Kingdom	United Kingdom	Jamaica	Average of Puerto Rico, Peru, Colombia, Chile, Dominican Republic, Argentina, Brazil, Suriname
Malta	Malta	Lao People's Democratic Republic	Average of Thailand, Malaysia
Jordan	Kyrgyzstan	Syrian Arab Republic	Israel
Japan	Japan	**Chile**	Chile
Lebanon	Kyrgyzstan	**Suriname**	Suriname
Brunei Darussalam	Brunei Darussalam	**Malta**	Malta
Argentina	Argentina	Cambodia	Average of Thailand, Malaysia
Austria	Austria	**Portugal**	Portugal
Lao People's Democratic Republic	Average of Malaysia, Thailand, Brunei Darussalam	**Israel**	Israel
Canada	Canada	**Dominican Republic**	Dominican Republic
Luxembourg	Luxembourg	Sao Tome and Principe	Average of Uganda, Mauritius, Egypt
South Africa	South Africa	**Finland**	Finland
Denmark	Denmark	**Albania**	Albania
Italy	Italy	**Thailand**	Thailand
The Netherlands	The Netherlands	**Argentina**	Argentina
Czechia	Czechia	**Brazil**	Brazil

Germany	Germany	Viet Nam	Singapore
Syrian Arab Republic	Azerbaijan	**Turkey**	Turkey
Belgium	Belgium	**Slovakia**	Slovakia
Viet Nam	Singapore	Venezuela	Uruguay
Libya	Egypt	**South Africa**	South Africa
Korea, Republic of	Korea, Republic of	**Spain**	Spain
Portugal	Portugal	**Cyprus**	Cyprus
France, La Réunion	France	**Bulgaria**	Bulgaria
Azerbaijan	Azerbaijan	Myanmar	Singapore

Cuba	Cuba	**Greece**	Greece
Slovakia	Slovakia	Philippines	Singapore
Mongolia	Average of Kazakhstan, Azerbaijan	**Italy**	Italy
Spain	Spain	**Romania**	Romania
Singapore	Singapore	Bosnia and Herzegovina	Average of Slovakia, Bulgaria, Czechia
Slovenia	Slovenia	North Macedonia	Average of Slovakia, Bulgaria, Czechia
Palestine	Average of Kazakhstan, Azerbaijan	**Uruguay**	Uruguay
Philippines	Singapore	Lebanon	Israel
Tunisia	Egypt	**Australia**	Australia
Kazakhstan	Kazakhstan	**Switzerland**	Switzerland
Morocco	Egypt	**Singapore**	Singapore
France	France	**Czechia**	Czechia
Ukraine	Ukraine	**Sweden**	Sweden
Cyprus	Cyprus	Samoa	Australia
Republic of Moldova	Average of Bulgaria, Ukraine, Cyprus, Estonia, Lithuania, Latvia, Albania	**China**	China
Bulgaria	Bulgaria	**United States of America**	United States of America
Samoa	Australia	**France**	France
Georgia	Average of Kazakhstan, Azerbaijan	**Iceland**	Iceland
Estonia	Estonia	**Austria**	Austria
Lithuania	Lithuania	Montenegro	Average of Austria, Croatia, Slovenia, Serbia
Russian Federation	Russian Federation	**Belgium**	Belgium
Latvia	Latvia	**Germany**	Germany
China	China	**Croatia**	Croatia
Albania	Albania	**Luxembourg**	Luxembourg
Greece	Greece	**Norway**	Norway
Uruguay	Uruguay	**United Kingdom**	United Kingdom

Korea, Democratic Republic of	China	**Ireland**	Ireland
North Macedonia	Average of Greece, Romania, Poland	**New Zealand**	New Zealand
Romania	Romania	Guam	New Zealand
Guam	Australia	**Cuba**	Cuba
France, New Caledonia	Australia	French Polynesia	New Zealand
Poland	Poland	New Caledonia	New Zealand
Croatia	Croatia	**Brunei Darussalam**	Brunei Darussalam

Bosnia and Herzegovina	Average of Belarus, Serbia, Croatia	**Slovenia**	Slovenia
Belarus	Belarus	**Canada**	Canada
Armenia	Average of Kazakhstan, Azerbaijan	**Poland**	Poland
Montenegro	Average of Belarus, Serbia, Croatia	**Serbia**	Serbia
Serbia	Serbia	**The Netherlands**	The Netherlands
French Polynesia	Australia	**Denmark**	Denmark
Hungary	Hungary	Korea, Democratic Republic of	China
Turkey	Turkey	**Hungary**	Hungary

Countries marked in bold had their own lung cancer predictions and thus utilised its own period to cohort rate ratio.
The countries are ordered from lowest to highest lung cancer mortality rate according to GLOBOCAN 2022 data.

Appendix 4. Lung cancer mortality rates in never-smokers

We used lung cancer mortality rates in never-smokers from the Cancer Prevention Study phase II (CPS-II) with follow-up from 1982-2003, from the Korean Cancer Prevention Study (KCPS) with follow-up from 1992-2004 and from the average rates of lung cancer incidence in the low-smoking prevalence population of women in four cancer registries in China (Qidong city, Shanghai, Tianjin and Hong Kong) 1983-1987. All rates were extracted from the article entitled "Lung Cancer Occurrence in Never-Smokers: An Analysis of 13 Cohorts and 22 Cancer Registry Studies" published by Thun et al.[3]

Cancer Prevention Study phase II

Lung cancer mortality rates in never smokers from the CPS-II were used in the following countries for both men and women: Albania, Australia, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czechia, Denmark, Estonia, Fiji, Finland, France, France New Caledonia, French Polynesia, Germany, Guam, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Republic of Moldova, Montenegro, New Zealand, North Macedonia, Norway, Papua New Guinea, Poland, Portugal, Romania, Russian Federation, Samoa, Serbia, Slovakia, Slovenia, Solomon Islands, Spain, Sweden, Switzerland, The Netherlands, Ukraine, United Kingdom, United States of America and Vanuatu.

Korean Cancer Prevention Study

Lung cancer mortality rates in never smokers from the KCPS were used in the following countries for both men and women: Afghanistan, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belize, Benin, Bhutan, Plurinational State of Bolivia, Botswana, Brazil, Brunei Darussalam, Burkina Fasso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Republic, Chad, Chile, Colombia, Comoros, Democratic Republic of Congo, Republic of Congo, Costa Rica, Côte d'Ivoire, Cuba, Djibouti, Ecuador, Egypt, El Salvador, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, France Guadeloupe, France La Réunion, France Martinique, French Guiana, Gabon, Gaza Strip and West Bank, Georgia, Ghana, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, India, Indonesia, Islamic Republic of Iran, Iraq, Israel, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Republic of Korea, Kuwait, Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Lesotho, Liberia, Libya, Madagascar, Malawi, Malaysia, Maldives, Mali, Mauritania, Mauritius, Mexico, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Nigeria, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Puerto Rico, Qatar, Rwanda, Saint Lucia, Sao Tome and Principe, Saudi Arabia, Senegal, Sierra Leone, Singapore, Somalia, South Africa, South Sudan, Sri Lanka, Sudan, Suriname, Syrian Arab Republic, Tajikistan, United Republic of Tanzania, Thailand, The Republic of the Gambia, Timor-Leste, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Uganda, United Arab Emirates, Uruguay, Uzbekistan, Bolivarian Republic of Venezuela, Viet Nam, Yemen, Zambia and Zimbabwe. In China and the Democratic Republic of Korea these rates were only used for men.

Cancer Incidence in Five Continents

The average lung cancer incidence rates in women in Qidong city, Shanghai, Tianjin and Hong Kong was used for women in the following countries: China and Democratic Republic of Korea.

The rates in never smokers used are presented below.

Supplementary Table 4.1. Lung cancer mortality rates in never smokers from the Cancer Prevention Study phase II (CPS-II), the Korean Cancer Prevention Study (KCPS) and four cancer registries in China by sex and age group.

	CPS-II		KCPS		CI5 (four registries in China)
Age group	**Men**	**Women**	**Men**	**Women**	**Women**
0-4	0	0	0	0	0
5-9	0	0	0	0	0
10-14	0	0	0	0	0
15-19	0	0	0	0	0
20-24	0	0	0	0	0.6
25-29	0	0	0	0	1.3
30-34	0	0	0	0.7	2.2
35-39	4.0	1.9	1.3	2.3	4.5
40-44	2.4	0.0	2.3	3.2	10.8
45-49	5.0	2.1	6.5	5.2	19.7
50-54	5.1	6.3	9.9	9.2	37.7
55-59	7.4	8.1	19.2	12.4	65.3
60-64	14.3	13.2	29.2	21.9	112.0
65-69	18.6	18.0	56.9	31.6	156.8
70-74	33.1	27.9	96.5	41.2	195.3
75-79	46.5	35.6	141.4	59.7	194.1
80-84	80.4	54.3	159.2	89.8	200.7
85+	127.4	73.0	159.2	89.8	164.8

CI5: Cancer Incidence in Five Continents

Because in some countries, such as Spain, lung cancer incidence rates and smoking prevalence in women were lower than in the US, an additional analysis was conducted to assess if the results presented were robust. We assessed whether the results obtained for women in Spain differed when we used the lung cancer mortality rates in never smokers from the CPS-II (study carried out in the United States population) and lung cancer incidence rates for women in the Basque Country (North of Spain) – a population with low smoking prevalence and low risk of lung cancer. We extracted both sets of rates from the study by Thun et al.[3] Data from Basque Country (Spain) were from a population-based cancer registry in the region.

The resulting number of prevented deaths, the corresponding PIFs and ASRs did not differ greatly when using the external rates (CPS-II, as in our main results) or the internal rates (Spanish, as in this analysis). The PIF increased by less than 10 percentage points when using low-risk lung cancer data from the Spanish population, while the ASR of prevented deaths was very similar independent of the data used.

Supplementary Table 4.2. Application of lung cancer rates from different sources.

NS rate source	Expected deaths	Prevented deaths	PIF	ASR expected deaths	ASR prevented deaths
CPS-II	14100	10300	73.1	15.8	12.4
CI5	14100	11500	81.9	15.8	12.2

ASR: age-standardised rates, CI5: Cancer Incidence in Five Continents, CPS-II: Cancer Prevention Study-II, NS: never-smokers, PIF: population impact fraction

Appendix 5. Population impact fraction

The population impact fraction (PIF) measures the proportional change in lung cancer mortality from a change in tobacco use due to the implementation of the tobacco-free generation strategy.[4] In this study, PIF is interpreted as the percentage of lung cancer deaths that would be avoided by preventing the generation born between 2006-2010 from taking up tobacco smoking. To calculate it, two parameters are needed namely: the number of lung cancer deaths expected to occur in the study cohort in each of the 185 countries and the number of lung cancer deaths that would be avoided by applying the tobacco free-generation strategy. Thus, the PIF was calculated as:

$$PIF = \frac{\text{Lung cancer deaths prevented}}{\text{Lung cancer deaths expected}} * 100$$

Appendix 6. Sensitivity analyses

In this study, two sensitivity analyses were chosen to assess the robustness of the estimates instead of presenting the estimates with uncertainty intervals (UI) or confidence intervals (CI) due to several reasons. The ratio of UI or CI would not provide a satisfactory estimate as all data sources used provide parameters using different methods to obtain UI or CI of their estimates. For example, the GLOBOCAN database from which we based our mortality rates at baseline has uncertainty estimates, calculated based on data quality indicator of each national data point, rather than based on statistical modeling. On the other hand, the statistical modelling of the Nordpred package used to perform the prediction provides a CI based on the variance of the data. In addition, never-smoking rates also have CIs, but these are based on a very small proportion of the population.

The two sensitivity analyses performed are presented below:

Sensitivity analysis 1

To provide a more conservative estimate of prevented lung cancer deaths, we ran a further scenario in which the reduction in lung cancer mortality was less effective than the main analysis where a complete reduction to the rates of never smokers was achieved. For this, lung cancer mortality rates in never smokers were increased by 25%.[5] The results by sex, region and income group are presented below**.**

Supplementary Table 6.1. Sensitivity analysis with a lower success rate in the implementation of tobacco-free generation. Number of expected and prevented deaths, population impact fraction (PIF) and age-standardised rates (ASR) of expected and prevented deaths in men, women by world region and income group.

	MEN					WOMEN					TOTAL				
World region	**Expected deaths**	**Prevented deaths**	**PIF**	**ASR expected deaths**	**ASR prevented deaths**	**Expected deaths**	**Prevented deaths**	**PIF**	**ASR expected deaths**	**ASR prevented deaths**	**Expected deaths**	**Prevented deaths**	**PIF**	**ASR expected deaths**	**ASR prevented deaths**
Africa															
Eastern Africa	32600	1200	3.7	3.5	0.1	32400	250	0.8	2.6	0.1	65000	1500	2.2	3.0	0.1
Middle Africa	8600	120	1.4	2.8	0.1	6400	50	0.8	1.6	0.0	15000	170	1.1	2.1	0.0
Northern Africa	90400	36300	40.1	17.0	6.9	26500	1900	7.0	4.1	0.1	116900	38100	32.6	10.4	3.5
Southern Africa	14300	4700	33.1	17.7	6.5	10900	3200	29.3	8.1	1.8	25100	7900	31.5	12.3	4.0
Western Africa	17200	890	5.2	2.7	0.2	10000	290	2.9	1.5	0.1	27200	1200	4.3	2.1	0.1
America															
Latin America and Caribbean	115100	7900	6.9	8.3	0.7	120900	38300	31.7	7.4	2.1	236000	46300	19.6	7.8	1.5
North America	91200	34300	37.6	10.3	5.2	94900	51000	53.7	9.1	4.9	186100	85300	45.8	9.7	5.0
Asia															
Eastern Asia	702800	352200	50.1	28.2	16.3	369600	15800	4.3	13.3	0.2	1072400	367900	34.3	21.1	8.6
South Central Asia	251700	8300	3.3	7.1	0.4	122300	7300	6.0	3.5	0.2	374000	15600	4.2	5.2	0.3
South East Asia	161400	33900	21.0	16.2	5.3	78800	6600	8.4	6.6	0.9	240200	40500	16.9	11.3	3.1
Western Asia	134300	78200	58.2	21.4	12.7	42700	14300	33.5	7.3	2.7	177000	92500	52.2	14.3	7.7
Europe															
Central and Eastern Europe	65800	45300	68.9	22.6	17.4	34000	17400	51.1	7.9	4.0	99800	62700	62.8	14.9	10.4
Northern Europe	30700	15500	50.5	13.1	8.0	35600	24100	67.8	11.8	7.7	66200	39600	59.8	12.5	7.9
Southern Europe	51200	33500	65.4	18.7	13.5	40700	26600	65.3	13.7	9.5	91900	60000	65.4	16.2	11.5

Western Europe	64200	39200	61.1	19.6	14.3	72300	52200	72.2	17.2	12.9	136400	91400	67.0	18.4	13.7
Oceania															
Australia and New Zealand	9900	4500	45.5	13.0	7.8	9500	5200	54.8	10.5	6.3	19400	9700	50.0	11.7	7.0
Melanesia. Micronesia. Polynesia	1700	810	48.6	10.1	5.4	1200	350	29.5	5.7	1.8	2800	1200	40.6	7.9	3.6
Income group															
High income	356000.0	167800.0	47.1	13.4	7.3	321600.0	186900.0	58.1	10.5	6.2	677600.0	354700.0	52.3	11.9	6.7
Upper middle income	959500.0	453300.0	47.2	22.5	12.3	522600.0	65900.0	12.6	10.5	1.2	1482200.0	519200.0	35.0	16.6	6.8
Lower middle income	457600.0	66600.0	14.6	8.7	1.8	205200.0	9000.0	4.4	3.8	0.2	662700.0	75600.0	11.4	6.2	1.0
Low income	69800.0	9000.0	13.0	4.8	0.8	59100.0	2900.0	4.9	3.0	0.1	128900.0	11900.0	9.3	3.8	0.4
World	**1842900**	**696800**	**37.8**	**13.2**	**5.7**	**1108500**	**264700**	**23.9**	**6.7**	**1.4**	**2951400**	**961500**	**32.6**	**9.9**	**3.6**

Sensitivity analysis 2

We assessed whether the results obtained would change if we assumed lung cancer mortality rates remained stable after 2022. For this purpose, instead of using lung cancer mortality rates for the birth cohort, we used lung cancer mortality rates for the 2022 period (GLOBOCAN 2022) to calculate both prevented lung cancer deaths and PIF.

For men, the data for the parameters analysed increase in all regions except Eastern Africa, Middle Africa, Northen Africa and Western Africa. These increases are highest in the European regions and North America.

Supplementary Table 6.2. Sensitivity analysis assuming stable lung cancer mortality rates in men by world region

World region	Expected deaths	Prevented deaths	PIF	ASR expected deaths	ASR prevented deaths
Eastern Africa	27200	660	2.4	18.7	6.3
Middle Africa	7700	100	1.4	2.7	0.1
Northern Africa	73700	29200	39.6	16.3	8.0
Southern Africa	17800	10100	56.8	22.9	13.8
Western Africa	14570	505	3.5	2.4	0.1
Latin America and Caribbean	167100	49800	29.8	12.4	4.3
North America	180500	134200	74.3	19.6	15.4
Eastern Asia	1044800	763600	73.1	38.3	28.7
South Central Asia	290300	37000	12.7	9.0	1.6
South East Asia	251800	129900	51.6	23.6	13.9
Western Asia	162700	112300	69.0	29.8	21.7
Central and Eastern Europe	110000	92100	83.7	39.4	35.0
Northern Europe	53300	41100	77.1	21.3	17.1
Southern Europe	79100	64900	82.0	31.9	27.7
Western Europe	95500	75500	79.1	29.5	25.3
Australia and New Zealand	16800	12400	74.1	19.0	14.6
Melanesia, Micronesia, Polynesia	2500	1700	68.2	14.7	10.5

ASR: age-standardised rates; PIF: population impact fraction

For women, the estimated parameters including expected and prevented deaths as well as the PIF increased in five regions: Southern Africa, North America, Eastern Asia, Australia and New Zealand and Melanesia, Micronesia, Polynesia.

Supplementary Table 6.3. Sensitivity analysis assuming stable lung cancer mortality rates in women by world region

World region	Expected deaths	Prevented deaths	PIF	ASR expected deaths	ASR prevented deaths
Eastern Africa	23100	140	0.6	2.4	0.0
Middle Africa	4800	40	0.8	1.4	0.0
Northern Africa	15600	60	0.4	3.2	0.0
Southern Africa	11600	5400	46.5	9.5	4.3
Western Africa	8200	120	1.5	1.4	0.0
Latin America and Caribbean	100400	26400	26.3	7.1	2.3
North America	143700	108500	75.5	15.2	11.8
Eastern Asia	417400	88200	21.1	14.1	1.0
South Central Asia	103700	5500	5.3	3.1	0.1
South East Asia	100500	27700	27.5	8.3	2.8
Western Asia	37400	11000	29.3	6.2	1.9
Central and Eastern Europe	31400	16300	51.9	9.0	5.7
Northern Europe	42500	33300	78.4	16.6	13.2
Southern Europe	27300	16100	58.9	11.7	8.3
Western Europe	48900	32800	67.1	15.9	12.5
Australia and New Zealand	11700	8300	70.6	13.7	10.3
Melanesia, Micronesia, Polynesia	1500	810	54.0	7.4	4.2

ASR: age-standardised rates; PIF: population impact fraction

We also assessed whether the results obtained for Brazil and South Africa differed if we assumed lung cancer mortality rates remained stable after 2022.

The results showed important differences between the two scenarios, with diverging patterns by sex. When a stabilization in lung cancer mortality rates is assumed, the estimates for all parameters studied increased markedly in men in both Brazil and South Africa and women in South Africa, while in women in Brazil they decreased.

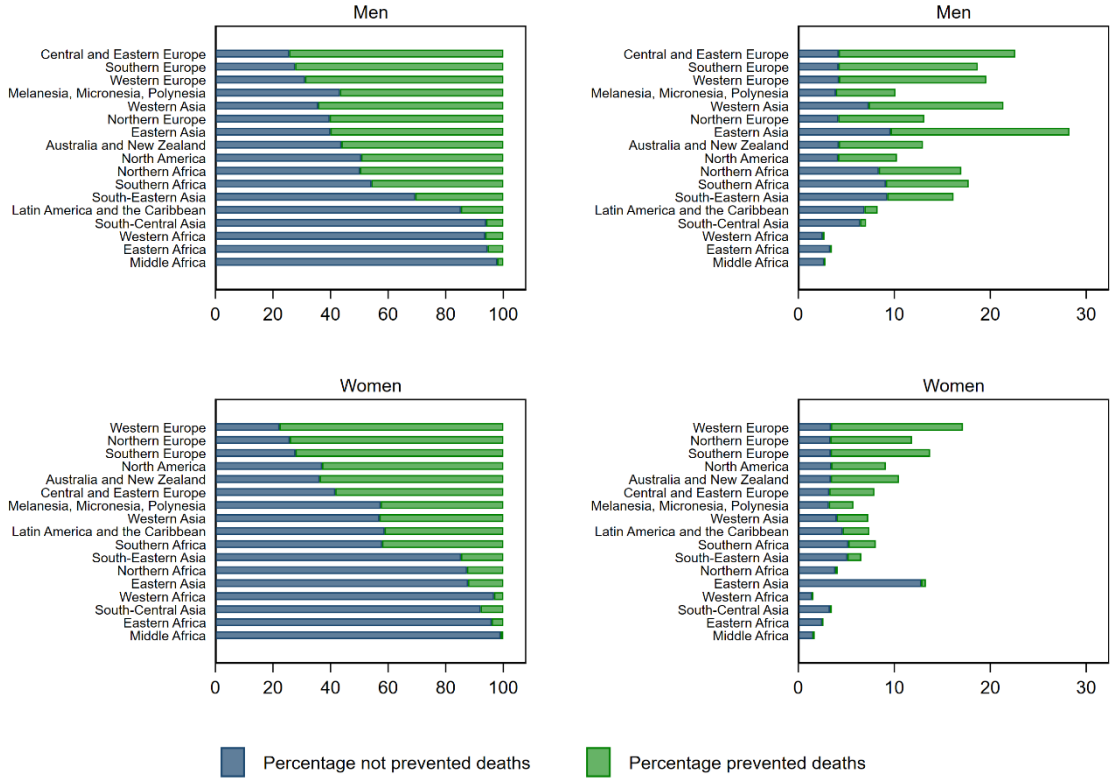
Supplementary Table 6.4. Sensitivity analysis assuming stable lung cancer mortality rates in men and women in Brazil and South Africa.

Results	Country	Sex	Expected deaths	Prevented deaths	PIF	ASR expected deaths	ASR prevented deaths
Main results	Brazil	Men	47300	7700	16.3	11.0	1.8
	Brazil	Women	53800	27500	51.1	10.8	5.2
	South Africa	Men	13500	6400	47.6	19.4	9.8
	South Africa	Women	10300	4500	43.8	8.8	3.3
Sensitivity analysis	Brazil	Men	64200	23400	36.5	18.7	6.3
	Brazil	Women	41200	14900	36.1	11.6	4.4
	South Africa	Men	17100	10100	58.8	25.5	15.9
	South Africa	Women	11200	5400	48.0	12.6	4.9

ASR: age-standardised rates; PIF: population impact fraction

Appendix 7. Percentage and age-standardised rates (ASRs per 100,000) of lung cancer deaths expected and prevented if tobacco smoking was eliminated in the 2006-2010 birth cohort by sex and world region.

Supplementary Figure 7.1. Percentage and age-standardised rates (ASRs per 100,000) of lung cancer deaths expected and prevented if tobacco smoking was eliminated in the 2006-2010 birth cohort by sex and world region



Appendix 8. Number of expected and prevented lung cancer deaths, population impact fraction and age-standardised rate of expected and prevented lung cancer deaths in men, women, and total by country.

Supplementary Table 8.1. Number of expected and prevented lung cancer deaths, population impact fraction (PIF) and age-standardised rate (ASR) of expected and prevented lung cancer deaths in men, women, and total by country.

		MEN					WOMEN					TOTAL				
Country	**Income**	**Expected deaths**	**Prevented deaths**	**PIF**	**ASR expected deaths**	**ASR prevented deaths**	**Expected deaths**	**Prevented deaths**	**PIF**	**ASR expected deaths**	**ASR prevented deaths**	**Expected deaths**	**Prevented deaths**	**PIF**	**ASR expected deaths**	**ASR prevented deaths**
Africa																
Eastern Africa																
Burundi	Low income	1200	50	4.3	4.6	0.2	760	0	0.4	2.7	0.0	1900	50	2.7	3.5	0.1
Comoros	Low income	30	0	0.0	2.4	0.0	10	0	0.0	0.8	0.0	40	0	0.0	1.5	0.0
Djibouti	Lower middle income	50	0	4.0	3.2	0.2	40	0	0.0	2.0	0.0	90	0	2.2	2.6	0.1
Eritrea	Low income	250	0	0.1	3.1	0.0	330	0	0.0	2.9	0.0	580	0	0.0	3.0	0.0
Ethiopia	Low income	10100	150	1.5	3.8	0.1	13800	750	5.4	3.8	0.2	24000	900	3.7	3.8	0.2
Kenya	Lower middle income	3000	0	0.1	3.1	0.0	3100	0	0.0	2.8	0.0	6100	0	0.0	2.9	0.0
Madagascar	Low income	2100	10	0.7	2.9	0.1	800	10	1.6	1.3	0.1	2900	30	0.9	2.1	0.1
Malawi	Low income	1200	0	0.0	2.3	0.0	1200	0	0.2	1.3	0.0	2400	0	0.1	1.8	0.0
Mauritius	Upper middle income	190	30	14.2	10.9	2.5	90	0	1.0	4.2	0.1	280	30	9.9	7.4	1.3
Mozambique	Low income	1300	0	0.3	2.5	0.0	190	20	10.9	0.5	0.1	1500	30	1.7	1.3	0.1
France, La Reunion	High income	410	200	49.2	22.0	12.4	150	20	13.5	6.1	0.6	560	220	39.6	13.8	6.4
Rwanda	Low income	1400	20	1.6	4.2	0.2	520	0	0.8	1.4	0.0	1900	30	1.4	2.7	0.1
Somalia	Low income	860	10	1.2	3.9	0.1	910	0	0.3	3.1	0.0	1800	10	0.7	3.5	0.0
South Sudan	Low income	340	10	2.1	2.2	0.1	360	0	0.3	1.8	0.0	700	10	1.1	2.0	0.0
Tanzania	Low income	2800	70	2.3	2.5	0.1	3100	60	2.0	2.0	0.1	5900	130	2.1	2.2	0.1
Uganda	Low income	2700	50	2.0	3.2	0.1	4500	150	3.3	2.9	0.1	7200	200	2.8	3.1	0.1
Zambia	Lower middle income	2400	490	20.9	5.6	1.0	820	10	0.8	2.1	0.0	3200	500	15.7	3.3	0.4
Zimbabwe	Low income	2400	670	28.1	9.9	2.5	1600	280	17.1	4.3	0.5	4000	1000	23.7	6.6	1.3
Middle Africa																

Angola	Lower middle income	430	40	8.7	1.0	0.1	480	0	0.0	0.8	0.0	900	40	4.1	0.9	0.1
Cameroon	Lower middle income	2000	50	2.6	4.6	0.1	1200	0	0.3	2.2	0.0	3100	50	1.7	3.3	0.1
Central African Republic	Low income	150	0	0.0	2.4	0.0	160	0	0.0	1.8	0.0	310	0	0.0	2.1	0.0
Chad	Low income	780	20	3.0	3.2	0.2	340	0	0.0	1.0	0.0	1100	20	2.1	2.1	0.1
Congo, Republic of	Lower middle income	170	0	0.0	1.8	0.0	70	0	0.0	0.7	0.0	240	0	0.0	1.2	0.0
Congo, Democratic Republic of	Low income	4900	50	1.0	2.9	0.1	3900	10	0.3	1.8	0.0	8800	60	0.7	2.3	0.0
Equatorial Guinea	Upper middle income	60	0	0.0	2.5	0.0	60	10	12.8	2.8	0.6	120	10	6.6	2.6	0.2
Gabon	Upper middle income	90	0	1.3	2.9	0.1	140	10	3.9	3.2	0.3	230	10	2.9	3.1	0.2
Sao Tome and Principe	Lower middle income	40	20	50.1	14.6	8.1	50	30	61.9	9.7	5.5	90	50	56.3	12.2	6.9
Northern Africa																
Algeria	Upper middle income	17800	7100	40.1	18.1	8.5	3800	10	0.3	3.5	0.1	21600	7200	33.1	10.8	4.3
Egypt	Lower middle income	27700	8000	29.2	13.2	3.6	14000	3200	22.5	5.1	0.6	41700	11200	26.9	9.0	2.1
Libya	Upper middle income	6000	4700	77.6	33.8	24.1	550	0	0.0	3.6	0.0	6600	4700	71.1	17.7	11.2
Morocco	Lower middle income	29400	20700	70.3	35.4	25.7	3600	20	0.5	4.4	0.1	33000	20700	62.6	20.1	13.0
Sudan	Lower middle income	2600	10	0.2	3.1	0.0	3400	140	4.1	2.6	0.1	6000	150	2.4	2.8	0.1
Tunisia	Lower middle income	6800	4400	64.7	33.7	24.0	1000	0	0.3	4.7	0.1	7900	4400	56.2	19.4	12.2
Southern Africa																
Botswana	Upper middle income	280	20	7.4	6.4	0.4	80	0	0.0	1.7	0.0	360	20	5.7	3.8	0.2
Eswatini	Lower middle income	150	70	46.3	11.2	5.7	70	10	14.3	3.2	0.7	220	80	35.8	5.4	1.8
Lesotho	Lower middle income	110	10	6.0	5.2	0.4	150	30	20.8	4.2	0.6	260	40	14.7	4.7	0.5
Namibia	Upper middle income	280	30	10.2	8.2	1.0	210	0	0.5	4.2	0.0	500	30	6.0	5.9	0.5

South Africa	Upper middle income	13500	6400	47.6	19.4	9.8	10300	4500	43.8	8.8	3.3	23800	10900	45.9	13.4	6.2
Western Africa																
Benin	Low income	290	270	29.4	3.3	1.0	270	0	1.0	1.1	0.0	1200	270	23.0	2.0	0.4
Burkina Faso	Low income	440	0	1.0	1.1	0.0	1200	10	1.2	2.4	0.1	1600	20	1.1	1.8	0.0
Cape Verde	Lower middle income	390	310	78.1	21.7	14.2	200	150	71.7	9.6	5.8	600	450	76.0	14.7	9.2
Cote d'Ivoire	Lower middle income	1300	20	1.4	3.5	0.1	540	0	0.2	1.3	0.0	1800	20	1.0	2.3	0.0
Gambia, The Republic of the	Low income	400	90	23.2	10.1	2.1	40	0	0.0	0.9	0.0	450	90	20.9	5.0	0.9
Ghana	Lower middle income	1400	40	2.5	3.1	0.1	1400	110	7.9	2.4	0.5	2800	150	5.2	2.8	0.3
Guinea	Low income	840	120	13.8	4.7	0.9	270	20	6.0	1.7	0.1	1100	130	11.9	3.1	0.5
Guinea-Bissau	Low income	60	0	7.2	2.7	0.2	30	0	0.0	1.1	0.0	90	0	4.9	1.9	0.1
Liberia	Low income	300	10	3.6	3.6	0.2	120	0	0.0	1.5	0.0	420	10	2.5	2.5	0.1
Mali	Low income	1300	30	2.4	4.3	0.2	660	30	4.2	2.1	0.1	2000	60	3.0	3.2	0.1
Mauritania	Lower middle income	210	0	1.4	2.8	0.1	100	0	0.0	1.2	0.0	310	0	0.9	1.9	0.0
Niger	Low income	860	20	1.9	1.9	0.1	90	0	0.0	0.1	0.0	950	20	1.8	1.0	0.0
Nigeria	Lower middle income	6900	0	0.0	2.3	0.0	4600	0	0.0	1.5	0.0	11400	0	0.0	1.9	0.0
Senegal	Low income	1100	40	3.4	3.7	0.2	380	0	0.8	1.4	0.0	1500	40	2.8	2.5	0.1
Sierra Leone	Low income	180	20	8.0	1.9	0.2	0	0	0.0	0.0	0.0	190	20	8.0	0.9	0.1
Togo	Low income	570	110	19.4	3.9	0.9	150	0	0.0	0.8	0.0	720	110	15.5	2.2	0.4
America																
Latin America and Caribbean																
Argentina	High income	11800	2400	20.6	13.0	3.5	1700	4700	44.0	9.6	4.1	22500	7100	31.7	11.3	3.8
Bahamas	High income	40	0	4.7	5.8	0.5	30	0	11.8	2.8	0.2	70	10	7.6	4.3	0.4
Barbados	High income	30	0	7.6	7.1	1.4	30	10	16.0	5.2	0.6	60	10	11.9	6.2	1.0
Belize	Upper middle income	60	20	24.0	9.2	3.0	20	0	15.7	2.8	0.9	80	20	22.1	5.9	1.9
Bolivia	Lower middle income	2100	150	7.1	6.3	0.2	1700	180	10.4	5.3	0.3	3800	320	8.6	5.8	0.2
Brazil	Upper middle income	47300	7700	16.3	11.0	1.8	53800	27500	51.1	10.8	5.2	101100	35200	34.8	10.9	3.6

Chile	High income	4400	430	9.8	9.6	0.7	3900	1400	37.1	7.3	2.1	8300	1900	22.6	8.4	1.4
Colombia	Upper middle income	9500	180	1.9	8.0	0.2	7400	1000	14.0	5.4	0.4	16800	1200	7.2	6.7	0.3
Costa Rica	Upper middle income	570	0	0.7	4.9	0.2	480	0	0.2	3.6	0.0	1100	10	0.5	4.3	0.1
Cuba	Upper middle income	4000	2200	55.6	20.5	11.1	3200	2200	68.8	15.6	10.2	7200	4400	61.5	18.0	10.6
Dominican Republic	Upper middle income	1700	30	1.6	8.4	0.5	2000	650	32.5	8.1	2.4	3700	680	18.1	8.3	1.5
Ecuador	Upper middle income	2000	10	0.5	3.7	0.1	2400	150	6.2	4.2	0.1	4500	160	3.6	3.9	0.1
El Salvador	Lower middle income	320	10	1.6	3.4	0.2	330	0	0.4	2.1	0.0	640	10	1.0	2.7	0.1
France, Guadalupe	High income	70	10	15.6	11.7	3.4	40	0	6.3	5.8	1.2	110	10	11.9	8.7	2.2
France, Martinique	High income	50	10	12.0	8.4	1.5	30	0	1.6	4.2	0.2	80	10	8.5	6.1	0.8
French Guiana	High income	160	60	38.4	14.4	5.3	50	10	26.8	6.0	1.7	210	80	35.5	10.0	3.4
Guatemala	Upper middle income	1700	10	0.8	3.4	0.1	1700	0	0.2	3.1	0.0	3400	20	0.5	3.2	0.1
Guyana	Upper middle income	30	0	6.2	3.8	0.5	20	0	0.0	2.0	0.0	50	0	4.2	2.9	0.3
Haiti	Low income	600	0	0.3	3.6	0.0	1300	350	26.8	6.1	1.6	1900	350	18.5	4.9	0.9
Honduras	Lower middle income	930	0	0.5	3.5	0.1	1000	10	1.2	4.0	0.2	2000	20	0.8	3.8	0.1
Jamaica	Upper middle income	410	50	13.1	11.6	2.6	440	190	42.1	8.5	2.9	850	240	28.3	10.0	2.8
Mexico	Upper middle income	11100	50	0.5	4.3	0.1	8300	20	0.2	3.0	0.0	19300	70	0.4	3.6	0.0
Nicaragua	Lower middle income	800	10	0.7	4.7	0.1	590	20	2.7	3.9	0.3	1400	20	1.5	4.3	0.2
Panama	High income	400	0	0.3	3.6	0.0	400	0	1.1	3.4	0.2	780	10	0.7	3.5	0.1
Paraguay	Upper middle income	2100	760	35.4	14.8	5.5	700	0	0.3	3.9	0.0	2800	760	26.7	9.2	2.7
Peru	Upper middle income	3100	20	0.8	4.3	0.1	4400	210	4.7	5.1	0.2	7500	230	3.1	4.7	0.2
Puerto Rico	High income	410	0	0.6	6.6	0.1	260	0	0.0	3.1	0.0	670	0	0.4	4.8	0.1
Saint Lucia	Upper middle income	50	30	68.8	9.4	4.8	10	0	9.5	1.1	0.1	60	40	61.1	5.1	2.4

Suriname	Upper middle income	320	230	71.7	34.1	24.5	180	120	65.3	15.8	10.3	500	350	69.5	24.2	16.9
Trinidad and Tobago	High income	220	40	18.8	12.0	3.0	90	0	0.0	3.7	0.0	310	40	13.4	7.6	1.4
Uruguay	High income	1500	860	58.4	26.7	17.3	1200	830	67.4	19.2	13.5	2700	1700	62.5	22.8	15.4
Venezuela	Upper middle income	7300	1600	22.1	12.8	3.3	14100	10200	72.2	16.8	11.2	21400	11800	55.1	15.0	7.7
North America																
Canada	High income	16500	11100	67.7	12.0	7.8	22400	18300	81.5	12.1	8.7	38900	29400	75.7	12.1	8.3
United States of America	High income	74700	33800	45.3	10.0	5.9	72400	41400	57.2	8.7	5.3	147200	75300	51.2	9.4	5.6
Asia																
Eastern Asia																
China	Upper middle income	628300	379500	60.4	29.4	19.7	329900	30400	9.2	14.0	0.4	958100	409900	42.8	22.2	10.6
Japan	High income	45600	26100	57.3	15.9	7.1	23200	11000	47.5	5.2	1.1	68800	37200	54.0	10.3	3.9
Korea, Democratic Republic of	Low income	10100	6200	61.8	31.4	21.8	9900	2100	21.4	24.1	2.6	20000	8400	41.8	27.7	12.1
Korea, Republic of	High income	18100	9900	54.7	13.9	5.1	6400	1800	27.9	3.7	0.4	24500	11700	47.7	8.6	2.6
Mongolia	Lower middle income	660	160	24.3	14.4	5.0	250	0	0.0	3.3	0.0	910	160	17.6	8.4	2.4
South-Central Asia																
Afghanistan	Low income	5700	450	7.9	8.6	1.3	2200	50	2.4	3.0	0.2	7900	500	6.3	5.6	0.7
Bangladesh	Lower middle income	35930	4200	11.7	10.3	1.4	8100	190	2.4	3.2	0.1	44000	4400	10.0	6.7	0.8
Bhutan	Lower middle income	120	0	0.0	5.5	0.0	100	20	20.6	6.1	1.0	220	20	9.6	5.8	0.5
India	Lower middle income	153600	3100	2.0	6.5	0.4	81500	1100	1.3	3.6	0.1	235100	4200	1.8	5.1	0.3
Iran	Upper middle income	7700	2100	26.9	3.9	0.8	16300	7300	45.0	6.2	1.6	24000	9400	39.2	5.1	1.2
Kazakhstan	Upper middle income	3000	790	26.3	12.3	4.4	580	10	1.1	1.9	0.1	3600	800	22.2	6.9	2.2
Kyrgyzstan	Lower middle income	1200	250	21.8	12.7	3.8	590	10	1.3	4.3	0.1	1700	260	14.8	8.3	1.9
Maldives	Upper middle income	120	10	6.4	10.6	1.4	70	20	26.5	5.0	0.6	190	30	14.0	8.0	1.1
Nepal	Low income	6500	1200	18.6	10.3	1.5	4100	740	18.0	4.8	0.4	10600	1900	18.4	7.3	0.9

Pakistan	Lower middle income	28600	1900	6.7	7.4	0.6	5800	100	1.7	1.8	0.1	34400	2000	5.9	4.4	0.3
Sri Lanka	Lower middle income	3500	440	12.5	9.0	0.8	810	0	0.4	2.5	0.0	4400	450	10.3	5.5	0.4
Tajikistan	Low income	840	30	4.0	5.5	0.6	580	10	2.5	3.1	0.3	1400	48	3.4	4.2	0.4
Turkmenistan	Upper middle income	600	120	19.8	9.8	2.6	260	20	6.8	3.4	0.3	860	140	15.8	6.3	1.5
Uzbekistan	Lower middle income	4200	340	8.1	9.3	1.2	1400	30	2.1	3.1	0.2	5600	370	6.6	6.0	0.7
South-Eastern Asia																
Brunei Darussalam	High income	130	50	35.5	18.6	9.1	130	80	63.7	17.2	11.8	260	130	49.3	17.9	10.5
Cambodia	Lower middle income	4200	1400	33.9	17.7	8.2	2000	330	16.8	7.4	2.1	6200	1800	28.4	12.2	5.0
Indonesia	Lower middle income	52800	7000	13.2	11.9	2.7	25500	80	0.3	4.7	0.0	78300	7000	9.0	8.3	1.4
Lao People's Democratic Republic	Lower middle income	2000	810	40.1	20.0	10.5	790	90	11.9	6.6	1.4	2800	900	32.2	13.0	5.9
Malaysia	Upper middle income	11900	300	36.0	17.6	8.0	3800	90	2.3	5.5	0.2	15700	4400	27.8	11.6	4.1
Myanmar	Lower middle income	8000	1500	18.1	12.4	3.1	7300	2000	27.7	8.5	3.0	15300	3500	22.7	10.2	3.0
Philippines	Lower middle income	38500	18000	46.6	23.4	13.7	19000	4700	24.7	8.8	3.1	57500	22600	39.4	15.8	8.3
Singapore	High income	3000	1600	55.1	20.3	10.8	1600	860	53.1	9.8	4.2	4600	2500	54.4	15.2	7.6
Thailand	Upper middle income	16800	5000	29.7	14.2	4.6	8400	1400	16.3	6.9	1.4	25200	6400	25.2	10.4	3.0
Timor-Leste	Lower middle income	290	50	15.8	11.0	1.4	130	0	0.2	4.5	0.0	420	50	11.0	7.5	0.6
Vietnam	Lower middle income	23700	9700	41.0	21.7	13.0	10100	2000	19.3	7.8	2.6	33900	11700	34.5	14.8	7.9
Western Asia																
Armenia	Upper middle income	730	320	43.6	22.3	12.7	360	100	29.1	6.4	1.1	1100	420	38.8	14.2	6.9
Azerbaijan	Upper middle income	2300	830	35.8	18.3	8.6	530	10	1.7	4.4	0.2	2800	840	29.5	11.4	4.5
Bahrain	High income	440	240	56.3	3.6	1.7	170	120	67.1	2.8	1.4	610	360	59.4	3.3	1.6
Georgia	Lower middle income	590	220	37.2	17.8	9.1	150	0	0.5	3.3	0.1	740	220	29.6	10.4	4.5

Iraq	Upper middle income	12100	4100	33.6	14.7	5.3	2300	10	0.4	2.7	0.0	14500	4100	28.2	8.3	2.5
Israel	High income	3500	870	24.7	13.8	4.2	2700	1200	44.9	7.7	2.7	6200	2100	33.4	10.8	3.5
Jordan	Upper middle income	3000	850	28.2	14.9	5.9	780	10	1.5	3.9	0.1	3800	860	22.7	9.3	3.0
Kuwait	High income	640	20	3.6	4.9	0.2	210	0	0.0	2.2	0.0	850	20	2.7	3.7	0.1
Lebanon	Upper middle income	2200	940	42.4	15.8	6.2	1300	590	47.0	10.2	4.6	3500	1500	44.1	13.1	5.4
Oman	High income	870	20	1.9	4.0	0.2	170	0	0.0	2.2	0.0	1000	20	1.6	3.4	0.1
Palestine	Lower middle income	1800	440	24.4	15.5	5.9	780	20	3.1	5.0	0.2	2600	470	18.0	10.2	3.1
Qatar	High income	610	20	3.6	3.8	0.1	190	30	13.3	3.9	0.7	800	50	6.0	3.8	0.3
Saudi Arabia	High income	3200	0	0.0	3.2	0.0	970	10	1.0	1.8	0.1	4200	10	0.3	2.6	0.0
Syrian Arab Republic	Low income	5700	1600	27.5	16.5	7.4	4300	1300	30.0	6.8	1.3	10000	2900	28.6	11.6	4.4
United Arab Emirates	High income	960	60	6.5	4.5	0.2	430	0	0.0	3.5	0.0	1400	60	4.5	4.0	0.1
Turkey	Upper middle income	94700	75900	80.1	50.8	41.4	26500	14800	56.0	15.8	10.1	121200	90700	74.9	32.9	25.4
Yemen	Low income	890	10	1.2	2.1	0.1	940	150	16.2	2.9	0.6	1800	160	8.9	2.4	0.3
Europe																
Central and Eastern Europe																
Belarus	Upper middle income	3100	2600	82.5	36.9	32.5	490	120	25.2	4.9	1.8	3600	2700	74.7	20.1	16.4
Bulgaria	Upper middle income	1600	1200	73.9	21.5	17.2	910	580	63.7	13.5	10.0	2500	1700	70.2	17.4	13.5
Czechia	High income	1700	740	42.7	10.0	5.9	1900	1200	59.9	9.2	5.9	3700	1900	51.8	9.6	5.9
Hungary	High income	3600	2900	80.9	28.4	24.3	3500	3000	84.0	20.7	17.4	7100	5800	82.5	24.6	20.8
Moldova	Lower middle income	660	500	75.2	22.2	18.1	260	80	31.3	5.6	2.2	910	570	62.9	13.5	9.8
Poland	High income	10700	7900	73.8	20.3	16.2	12000	9600	80.1	16.9	13.5	22700	17500	77.1	18.6	14.9
Romania	Upper middle income	6200	4900	78.6	26.1	21.9	3100	2000	65.1	12.6	9.1	9400	6900	74.1	19.2	15.3
Russian Federation	Upper middle income	30100	22400	74.2	23.2	19.0	9400	2400	25.7	5.2	2.0	39600	24800	62.7	13.6	9.9
Slovakia	High income	1300	910	70.1	15.7	11.6	1100	750	70.3	11.1	7.8	2400	1700	70.2	13.3	9.7
Ukraine	Lower middle income	6800	5000	73.3	20.5	16.5	1300	140	11.1	3.2	0.6	8100	5100	63.3	11.3	8.1
Northern Europe																

Denmark	High income	1800	1200	63.9	14.9	10.7	1800	1300	72.2	12.0	8.6	3700	2500	68.1	13.4	9.6
Estonia	High income	250	150	61.3	12.0	7.9	130	50	37.2	5.0	1.9	380	200	53.0	8.3	4.8
Finland	High income	1200	640	51.8	11.2	7.1	1300	860	64.1	7.5	4.3	2600	1500	58.2	9.3	5.8
Iceland	High income	60	10	24.2	7.7	3.6	110	70	69.3	7.2	3.9	160	90	53.2	7.5	3.8
Ireland	High income	1800	1100	62.6	14.0	9.9	2300	1800	78.0	13.7	10.3	4100	3000	71.2	13.9	10.2
Latvia	High income	380	280	72.7	22.3	18.0	170	70	44.4	7.6	4.1	550	350	64.1	14.6	10.8
Lithuania	High income	390	260	67.0	20.7	16.5	220	100	45.6	8.9	5.4	610	360	59.3	14.5	10.7
Norway	High income	2000	1200	61.4	9.9	6.0	2900	2400	80.7	11.1	7.9	4900	3600	72.8	10.5	7.0
Sweden	High income	1900	670	34.8	7.6	3.5	3400	2400	72.2	8.5	5.3	5300	3100	58.6	8.1	4.5
United Kingdom	High income	20800	12900	62.3	14.0	9.8	23200	17300	74.7	12.9	9.5	43900	30300	68.8	13.4	9.7
Southern Europe																
Albania	Upper middle income	450	300	66.8	19.0	15.1	70	10	7.0	3.1	0.5	530	310	58.5	11.7	8.4
Bosnia and Herzegovina	Upper middle income	1400	1100	81.1	31.3	27.0	570	370	65.4	12.1	8.7	1900	1500	76.5	21.6	17.8
Croatia	High income	1700	1400	82.4	28.2	24.0	1100	840	77.9	18.7	15.3	2800	2200	80.6	23.3	19.5
Cyprus	High income	1200	1100	87.3	41.9	37.6	460	330	73.3	12.5	9.1	1700	1400	83.5	27.0	23.1
Greece	High income	5900	4900	83.0	28.6	24.5	2800	2100	72.6	15.0	11.6	8700	6900	79.7	21.6	17.9
Italy	High income	16000	10100	63.3	13.5	9.3	16200	11600	71.5	11.8	8.4	32200	21800	67.5	12.7	8.9
Malta	High income	90	50	53.6	9.5	5.5	70	40	54.5	10.7	7.3	160	90	54.0	10.0	6.3
Montenegro	Upper middle income	280	220	81.3	31.9	27.6	160	120	76.6	15.4	12.0	440	350	79.5	23.8	20.0
North Macedonia	Upper middle income	550	410	74.6	23.8	19.6	280	170	61.5	12.1	8.7	830	580	70.2	18.0	14.1
Portugal	High income	4300	3400	78.9	25.4	21.1	2100	1300	64.1	10.0	6.5	6300	4700	74.0	17.6	13.8
Serbia	Upper middle income	2700	2100	78.4	28.7	24.6	2000	1600	77.8	19.1	15.7	4700	3600	78.1	23.9	20.2
Slovenia	High income	520	340	65.1	14.9	10.6	800	640	81.5	17.2	13.9	1300	980	75.0	16.1	12.4
Spain	High income	16200	11600	71.9	17.6	13.4	14100	10300	73.1	15.8	12.4	30300	21900	72.4	16.6	12.9
Western Europe																
Austria	High income	2300	1400	60.8	14.9	10.8	2700	2000	74.5	15.3	11.9	4900	3400	68.3	15.1	11.4
Belgium	High income	3700	2500	65.9	16.4	12.2	4200	3200	76.5	16.0	12.6	8000	5700	71.6	16.2	12.4
France	High income	28200	21100	75.0	25.0	20.7	30300	24100	79.5	20.3	16.9	58400	45200	77.3	22.6	18.8
Germany	High income	22200	14400	64.8	17.6	13.4	24100	18100	75.3	15.3	11.9	46200	32500	70.3	16.5	12.7
Luxembourg	High income	180	100	53.0	12.7	8.5	280	210	76.2	12.0	8.6	450	310	67.1	12.5	8.6

The Netherlands	High income	5700	3800	67.7	17.1	12.9	7800	6400	82.6	17.8	14.4	13400	10300	76.3	17.5	13.7
Switzerland	High income	2000	930	46.8	10.5	6.4	2900	2100	71.3	9.7	6.4	4900	3020	61.4	10.2	6.5
Oceania																
Australia and New Zealand																
Australia	High income	8200	4500	55.0	12.4	8.2	7900	4900	62.6	10.0	6.6	16100	9500	58.7	11.2	7.4
New Zealand	High income	1700	1000	62.4	16.6	12.3	1600	1100	69.5	13.2	9.8	3300	2200	65.9	14.9	11.0
Melanesia, Micronesia and Polynesia																
Fiji	Upper middle income	60	20	29.0	5.9	2.0	40	10	22.7	3.6	0.9	100	30	26.4	4.6	1.4
France, New Caledonia	High income	150	120	76.6	31.7	27.4	100	70	71.7	13.6	10.1	250	190	74.6	22.7	18.8
France, Polynesia	High income	160	130	79.4	36.8	32.7	60	40	61.6	13.0	9.6	220	170	74.2	24.9	21.1
Guam	High income	90	80	80.9	30.4	26.6	70	60	79.5	13.6	10.4	170	130	80.3	22.1	18.6
Papua New Guinea	Lower middle income	1000	510	50.8	8.6	4.7	820	280	34.8	5.6	2.2	1800	800	43.6	7.0	3.4
Samoa	Upper middle income	80	60	78.5	25.3	21.0	40	30	70.4	11.0	7.9	120	90	75.6	18.2	14.5
Solomon Islands	Lower middle income	70	10	18.1	5.0	1.4	30	0	5.1	2.4	0.2	90	10	14.4	3.7	0.8
Vanuatu	Lower middle income	50	20	50.2	8.3	4.8	20	10	50.2	2.5	1.1	60	30	50.2	5.4	3.0

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