The Circumpolar Health Observatory

Monitoring the Health of Circumpolar Regions and Populations

2000-2014

January 2019

Preface

This is a progress report on the state of health of circumpolar regions and populations, based on data collected by the Circumpolar Health Observatory (CircHOB) http://circhob.circumpolarhealth.org/. CircHOB is a web-based resource for individuals and organizations interested in circumpolar health. Data tables can be freely downloaded and detailed descriptions on the concepts, definitions and data sources are provided in the methodological notes.

This report is a compendium of the data on a variety of health indicators covering the period from 2000 to 2014. Due to the small population of some of the regions, mean values for 5-year periods rather than single years are presented to smooth year-to-year fluctuations. Not shown are the calculations and formulae used to derive some of the rates and proportions.

The following individuals provided valuable assistance in the preparation of this report:

- Robin Young, research assistant, in data collection and management
- Natalia Fedkina, research assistant, in navigating Russian-language websites and documents
- Winfried Dallmann, research consultant, in the preparation of maps

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Questions regarding the data can be directed to kue.young@ualberta.ca.

Kue Young

Professor and former Dean
School of Public Health
University of Alberta

Professor emeritus
Dalla Lana School of Public Health
University of Toronto

View of Canada's Arctic Archipelago from space

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Fig.1.1 The Arctic States and their norther regions

Note: Abbreviations and names of regions can be found in the text (p.2)

1. Introduction

1.1 Rationale and Objectives

While health priorities are generally similar among circumpolar countries and regions, health and social policies, service delivery systems, available resources, and population characteristics vary considerably across regions, resulting in substantial disparities in health outcomes. Monitoring, documenting, and disseminating health data can contribute to improvements in formulating policies, planning services, and evaluating programs by government agencies, non-governmental organizations, academic institutions, and communities across the Arctic. The Circumpolar Health Observatory [CircHOB] is intended to provide a single convenient source of health statistics to serve the needs of a diversity of users.

CircHOB compiles and makes freely available a set of statistical tables in a standardized and consistent manner, summarizing their health status, health determinants and health care. CirHOB can serve as a tool in training and research in population health and health systems, and enhances partnerships and collaborations among circumpolar regions and countries.

CircHOB is revised and updated at regular intervals, with a progress report after each 5-year period. With this 2000-2014 report, there is now a continuous data series for many health indicators spanning over the first 15 years of the 21st century.

1.2 Origins and Development

CircHOB has its origins in the compendium *Circumpolar Health Indicators: Sources, Data and Maps*, published as a supplement of the *International Journal of Circumpolar Health* in 2008, covering the 2000-04 period https://doi.org/10.1080/22423982.2007.11864605.

In 2009, the Arctic Human Health Expert Group was created by the intergovernmental Arctic Council. CircHOB was proposed as a flagship project of the group, and was subsequently authorized by the Arctic Council at its Senior Arctic Officials meeting in May 2010.

In 2011, Sustaining Arctic Observing Networks (SAON) was initiated by the Arctic Council and the International Arctic Science Committee to support and strengthen the development of multinational pan-Arctic collaborations in observing and data sharing systems www.arcticobserving.org. CircHOB was designated an official Canadian SAON Task http://projects.amap.no/project/circumpolar-health-observatory-circhob-circhob/.

CircHOB was featured at the 2013 Arctic Observing Summit in Vancouver organized by SAON. A "community white paper" was presented which was subsequently published in:
Young TK, Chatwood S, Bjerregaard P. *Arctic* 2015;68(Suppl 1)1-5 https://doi.org/10.14430/arctic4474

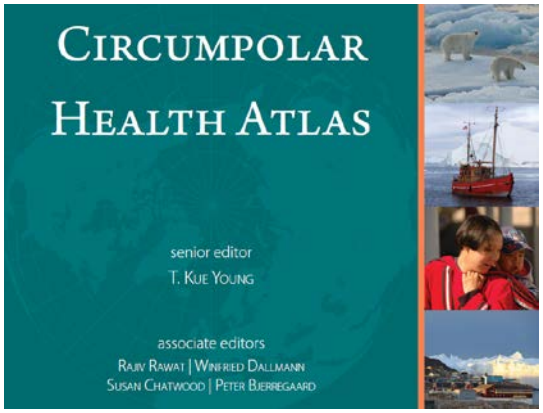
The CircHOB website http://circhob.circumpolarhealth.org/ is hosted by the Institute for Circumpolar Health Research in Yellowknife www.ichr.ca. Members of the Circumpolar Health Research Network www.chrn.org have provided advice regarding data sources and facilitated access to national databases. Over the years, financial support for CircHOB has been provided by a contract from Health Canada and various grants from the Canadian Institutes of Health Research (CIHR).

Three Data Briefs describing and presenting data in CircHOB have been published in the *International Journal of Circumpolar Health*:

- Young TK, Chatwood S, Rawat R. Introduction and population [2010:1]. *International Journal of Circumpolar Health* 2010;69:4, 404-408 https://doi.org/10.3402/ijch.v69i4.17667
- Young TK. Health expenditures [2010:2]. *International Journal of Circumpolar Health* 2010; 69:5, 417-423, https://doi.org/10.3402/ijch.v69i5.17682
- Young TK. Infectious diseases [2011:1]. *International Journal of Circumpolar Health* 2011; 70:5, 450-456 https://doi.org/10.3402/ijch.v70i5.17852

More detailed articles that draw on CircHOB data include:

- Young TK, Revich B, Soininen L. Suicide in circumpolar regions: an introduction and overview. *International Journal of Circumpolar Health* 74:1, https://doi.org/10.3402/ijch.v74.27349
- Young TK, Kelly JJ, Friborg J, Soininen L, Wong KO. Cancer among circumpolar populations: an emerging public health concern. *International Journal of Circumpolar Health* 2016;75:1 https://doi.org/10.3402/ijch.v75.29787
- Young TK, Fedkina N, Chatwood S, Bjerregaard P. Comparing health care workforce in circumpolar regions: patterns, trends and challenges. *International Journal of Circumpolar Health* 2018;77:1 https://doi.org/10.1080/22423982.2018.1492825



Health data from CircHOB updated to 2009 were incorporated in the book *Circumpolar Health Atlas* (University of Toronto Press, 2012).

1.3 Geographical Coverage

CircHOB covers the northernmost regions of the 8 member states of the Arctic Council (the Arctic States), including their self-governing territories (Fig.1.1):

[**US**] *United States*	[**DK**] *Denmark*	[**RU**] *Russian Federation*
[Ak] Alaska	[Gl] Greenland	[Mu] Murmansk Oblast
[**CA**] *Canada*	[Fo] Faroe Islands	[Ka] Kareliya Republic
[Yk] Yukon	[**IS**] *Iceland*	[Ar] Arkhangelsk Oblast
[Nt] Northwest Territories	[**NO**] *Norway*	- [Ne] Nenets AO
[Nu] Nunavut	[Nd] Nordland	[Ko] Komi Republic
	[Tr] Troms	[Yn] Yamalo-Nenets AO
	[Fm] Finnmark	[Km] Khanty-Mansi AO
	[**SE**] *Sweden*	[Kr] Krasnoyarsk Kray†
	[Vb] Västerbotten	- [Tm] Taymyr AO†
	[Nb] Norrbotten	- [Ev] Evenk AO†
	[**FI**] *Finland*	[Sk] Sakha Republic
	Pohjois-Suomi* [Ou]	[Ma] Magadan Oblast
	Lappi [La]	[Kc] Kamchatka Kray†
		- [Ky] Koryak AO†
		[Ck] Chukotka AO

AO = autonomous okrug; † In 2007, Taymyr, Evenk, and Koryak AOs were absorbed into the Krasnoyarsk kray and Kamchatka kray; * Refers to Oulun lääni from 2000-09 and Pohjois-Suomi AVI after 2010
The whole of Alaska is included. Northern Canada includes only the three northern territories.

The northernmost counties in Norway, Sweden, and Finland constitute the northern regions of those countries. “County” here refers to fylke in Norway, län in Sweden, and lääni in Finland. In Finland, the lääni was abolished in 2010 and replaced by the regional state administrative agency (aluehallintovirasto or AVI). There was, however, no change to the boundaries of the two northernmost regions of Oulu (now called Pohjois-Suomi) and Lappi.

The Kingdom of Denmark is composed of Denmark and the two self-governing territories of Greenland and Faroe Islands. Their health data are compared to Denmark’s. Greenland and Faroe Islands have their own health care and statistical agencies, and data from these regions are not reported by Danish agencies. Iceland is treated as a country when comparing with the other sovereign Arctic States but also as a region when compared to subnational northern regions.

The Russian Federation is composed of different types of administrative divisions called federal “subjects” (subyekty), including republic, kray, oblast, autonomous okrug, and federal city, with varying degrees of autonomy, but all sending representatives to the Federal Council (Sovet Federatsii), the upper house of the Russian parliament. Autonomous okrugs (hereafter AO), with the exception of Chukotka, are generally part of some higher-level units such as oblasts or krays, and usually represent the traditional territories of some indigenous ethnic groups. Demographic and health data are usually available for these AO separately. As of January 1, 2007, the Taymyr, Evenk and Koryak AO ceased to exist as distinct federal subjects and data on these AOs are no longer reported separately. CircHOB continues to list these three AOs but includes data for the 2000-04 period only.

1.4 Themes and Contents

The choice of health indicators for monitoring by CircHOB is limited by what is consistently available across the circumpolar North and where there is a high degree of comparability. Health indicators monitored by CirHOB are organized into the following modules:

- Population: Size, age-sex distribution, density
- Fertility: Crude birth rate, secondary sex ratio, age-specific fertility rate, total fertility rate
- Mortality: Crude death rate, infant mortality rate, age-standardized mortality rates by cause, life expectancy at birth
- Reproductive Outcomes: Perinatal mortality rate
- Disease Incidence: Tuberculosis, gonorrhea, and cancer by site
- Socioeconomic Conditions: Gross Domestic Product, attainment of tertiary education, employment
- Health Behaviours: Smoking prevalence
- Health Care Resources: Health expenditures, health workforce, health facilities

Each module contains detailed methodological notes on the concepts, definitions, and data sources.

This report is directed at the non-specialist, who may find it useful as an introduction to community health assessment and public health surveillance and monitoring as applied to the circumpolar regions.

There is deliberately a minimum of interpretation of the data. The report is intended as a tool for users, who should “draw their own conclusions”. However, key patterns, especially disparities among northern regions, and disparities between “the North” and the larger nation-states to which they belong, are illustrated by graphs and colour maps and briefly summarized in the commentary sections.

In bar graphs, there are different colour codes for North America, the Nordic countries, Russia and Greenland. Greenland is given its own colour code as it is demographically very different from the other Nordic countries, while Faroe Islands is coded the same as the other Nordic countries.

1.5 Data Sources

CircHOB extracts different types of health data from existing sources managed by different agencies in different countries, including:

- National population registries, censuses and intercensal estimates
- Vital statistics (births and deaths)
- Disease registries
- Health care utilization databases
- National and regional health surveys

Data from these sources are usually available in publicly accessible databases. Rarely, requests are made to the official agencies for special custom tabulations. Certain data are only available in reports published online. While most but not all websites are available in English, special efforts are needed to translate some tables and reports available in other languages.

URL links to the databases and reports are provided in this document but they are liable to be changed. Some agencies only post their more recent reports and do not archive older reports. At periodic updates, CircHOB checks and revises weblinks and also reviews all data retrospectively to 2000, as some agencies constantly update their archived data.

CircHOB does not involve access to individual-level health records nor do any such records cross national borders. It is involved in the preparation of tables of aggregate data only.

The following is a list of organizations and agencies from which statistical data have been obtained, together with their web addresses. In the tables, countries and regions are arranged from west to east, starting with Alaska. Additional agencies are listed in the different modules.

International

- Association of Nordic Cancer Registries (NORDCAN) www-dep.iarc.fr/nordcan
- Nordic Medico-Statistical Committee (NOMESCO) http://nowbase.org
- Nordic Council of Ministers www.norden.org/en/statisticsnordcan
- Organization of Economic Cooperation and Development (OECD) http://stats.oecd.org
- Statistical Agency of the European Communities (EUROSTAT) https://ec.europa.eu/eurostat/data/database
- World Bank https://datacatalog.worldbank.org

United States

- Center for Disease Control and Prevention (CDC) http://wonder.cdc.gov
- U.S. Census Bureau http://factfinder.census.gov
- Health Resources and Services Administration of the Department of Health and Human Services https://data.hrsa.gov
- Centers for Medicare and Medicaid Services www.cms.gov

Canada

- Statistics Canada www.statcan.ca
- Canadian Institute of Health Information (CIHI) www.cihi.ca
- Public Health Agency of Canada (PHAC) https://www.canada.ca/en/public-health.html

Denmark

- Statistics Denmark (Danmarks Statistik) www.statbank.dk
- Statens Serum Institut www.ssi.dk/Smitteberedskab

Greenland

- Statistics Greenland (Grønlands Statistik / Kalaallit Nunaanni Naatsorsueqqissaartarfik) http://nank.stat.gl

- Chief Medical Officer (Landslægeembedet / Nunatsinni Nakorsaaneqarfik) http://nun.gl

Faroe Islands
- Statistics Faroe Islands (Hagstova Føroya) http://statbank.hagstova.fo
- Chief Medical Officer (Landslæknin í Føroyum) www.landslaeknin.fo

Iceland
- Statistics Iceland (Hagstofa Íslands) www.statice.is
- Directorate of Health (Landlæknisembættið) www.landlaeknir.is

Norway
- Statistics Norway (Statistisk sentralbyrå) http://statbank.ssb.no
- Norwegian Institute of Public Health (Nasjonalt folkehelseinstituttet) http://statistikkbank.fhi.no
- Norhealth (Norgeshelsa) http://norgeshelsa.no

Sweden
- Statistics Sweden (Statistika centralbyrån) www.ssd.scb.se/databaser
- National Board of Health and Welfare (Socialstyrelsen) www.socialstyrelsen.se
- Swedish Association of Local Authorities and Regions (Sveriges Kommuner och Landsting) http://skl.se
- Public Health Agency of Sweden https://www.folkhalsomyndigheten.se

Finland
- Statistics Finland (Tilastokeskus) http://statfin.stat.fi
- National Institute of Health and Welfare (Terveyden ja hyvinvoinnin laitos) https://thl.fi
- SOTKANet www.sotkanet.fi

Russia
- Federal State Statistics Service (Federal'naia sluzba gosydarstvennoi statistiki, formerly Goskomstat Rossii), or Rosstat www.gks.ru

1.5 Future Directions

There are many data gaps in CircHOB, especially health-related behaviours collected by health surveys. However, published data are not always directly comparable, due to differences in the construction of variables, sampling techniques, and contextual meanings of the underlying concepts. Substantial international comparative research is needed before such data can meaningfully be presented. Access to the original microdata is also needed to generate tables of comparable data.

The scope of the health indicators compiled could be expanded considerably to include:
- Health behaviours: alcohol and drug use, physical activity, sexual behaviour, diet;
- Physiological measures: blood pressure, obesity, plasma cholesterol, glucose;
- Measures of mental health and well-being;
- Health care utilization: hospital and primary care;
- Health system performance

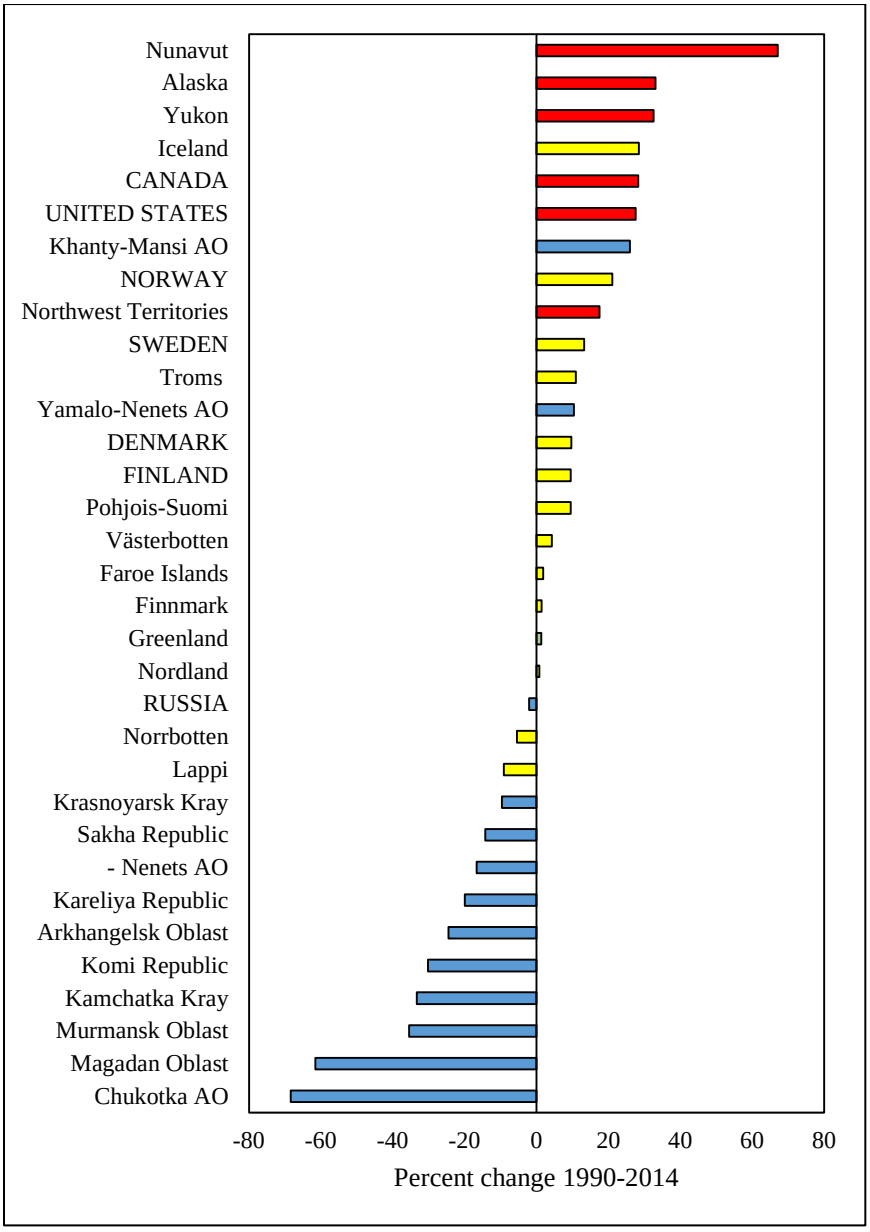


Fig.2.1 Population gains and losses, 1990-2014

2. Population and Health Status

2.1 Population Characteristics

Concepts and Definitions

In assessing the health of a population, accurate enumeration of the population is needed to provide the denominator for the rates and proportions which constitute many health indicators.

Most health indicators are aggregated on an annual basis, with the number of events occurring in a year (numerator) divided by the **mean population** of that period (year). Depending on how population is reported by the particular statistical agency:

Mean population for year X
= population on July 1 for year X; or
= [population on Jan 1 for year X + population on Jan 1 for year (X+1)] / 2; or
= [population on Dec 31 for year X + population on Dec 31 for year (X-1)] / 2

As most health events tend to vary according to age and sex, the **age-sex distribution** of a population is needed to compute age-specific and age-standardized rates and proportions. Age data may be aggregated in 5-year age-groups (0-4, 5-9, …80-84, 85+), or other groupings. Of particular interest to health planning are the proportions of the population aged <15 years and ≥65.

Circumpolar regions are known for their vast expanses and small populations, reflected in a generally low **population density**, expressed as persons per sq.km:

Population density = (mean annual population) / (land area in sq.km)

In the Arctic, there are large, uninhabited ice-covered areas. In the towns and villages where people live, the density is substantially higher than the population density for the region as a whole.

Data Sources and Limitations

There are two sources of information on population – the census and population registry. Both are in use in the circumpolar countries.

The Nordic countries have well established population registries, which are continuously updated. Canada, United States and Russia rely on periodic censuses. Canadian censuses are conducted every 5 years in the years ending in "1" and "6". In the United States, a census is conducted once every 10 years in the year ending in "0". Russian censuses are irregular – the last Soviet census was completed in 1989, the first post-Soviet census was conducted in 2002, followed by a second one in 2010. In the "intercensal" years, these jurisdictions produce annual estimates of the population, taking into account data on births, deaths, and migrations. It is these annual estimates that are used in CircHOB.

United States
Population data are from the National Center for Health Statistics, bridged-race population estimates, accessed from CDC Wonder https://wonder.cdc.gov/bridged-race-population.html
Land area data are from US Census Bureau QuickFacts, converted from square miles
https://www.census.gov/quickfacts

Canada
Population data are from Statistics Canada: Table 17-10-0005-01 (formerly CANSIM Table 051-0001)
https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000501
Land area data are from Statistics Canada, 2016 Census Profile
https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E

Denmark
Population data are from Statistics Denmark's Statbank table BEF6 [2000-06] http://www.statbank.dk/BEF6; BEF607 [2007-08] www.statbank.dk/BEF607; and FOLK1A [2009+] www.statbank.dk/FOLK1A. Land area data from Statistics Denmark: *Denmark Statistical Yearbook 2017*, table 399 http://www.dst.dk/yearbook

Greenland
Population data are from Statistics Greenland's Statbank http://bank.stat.gl/pxweb/en/Greenland/
Population > Population of Greenland > Jan 1 (BEEST1) - for 2000-2010
Population > Population of Greenland > Mid year (BEESTM1) - for 2011+
Land area data are from Statistics Greenland: *Greenland in Figures 2018*
http://www.stat.gl/publ/en/GF/2018/pdf/Greenland%20in%20Figures%202018.pdf

Faroe Islands
Population data are from Statistics Faroe Islands' Statbank table IB01030
https://statbank.hagstova.fo/pxweb/en/H2/H2__IB/.
Land area data are from Statistics Faroe Islands: *Faroe Islands in Figures 2018*
http://www.hagstova.fo/sites/default/files/Faroe_Islands_in_figures_2018.pdf

Iceland
Population data are from Statistics Iceland: Table MAN 08000
https://statice.is/statistics/population/inhabitants/overview/
Land area data are from table UMH01001
https://statice.is/statistics/environment/geographical-data/geographical-data/

Norway
Population data are from Statistics Norway, calculated from StatBank table 7459
https://www.ssb.no/en/statbank/list/folkemengde
Land area data are from Statistics Norway: *Statistical Yearbook of Norway 2010*, table 19
http://www.ssb.no/english/yearbook/tab/tab-019.html

Sweden
Population data are from Statistics Sweden's statistical database http://www.statistikdatabasen.scb.se
> Population > Population statistics> Number of inhabitants
> Environment > Land and water area

Finland
Population data are from Statistics Finland StaFin database > Population > Population structure table 004 http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/. Land area data were from *Statistical Yearbook of Finland 2017*, table 25.2 http://pxhopea2.stat.fi/sahkoiset_julkaisut/vuosikirja2017/html/engl0007.htm

Russia
Population data are from Federal State Statistics Service (Rosstat) www.gks.ru. Only the Russian website contains the interactive database for regional data, which requires registration and login
http://www.gks.ru/dbscripts/Cbsd/DBInet.cgi?pl=2403012

Data on age-sex distribution for the Russian Federation are available from the bilingual *Demographic Yearbook of Russia* (Pub.No. 1137674209312). Regional data are reported in *Chiselennost' naseleniia Rossiikoi Federatsii po polu i vozrastu: Statisticheski biulleten* (Bulletin of the population of the Russian Federation by sex and age, Pub.No.11400957). Land area data are from *Regiony Rossii: Sotsial'no-ekonomischeskie pokazateli 2007* (Regions of Russia: Socio-economic characteristics Pub.No. 11386235)
http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/
> doc_1137674209312; > doc_1140095700094; > doc_1138623506156

Table 2.1 Mean annual population and proportion under 15 and 65+ years

Country/Region	Mean annual population (persons)			Proportion <15 (%)			Proportion ≥65 (%)		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	287533958	301198643	313955659	21.0	20.2	19.5	12.4	12.6	13.8
Alaska	642343	681780	728283	24.1	22.2	21.6	6.1	7.1	8.6
Canada	31328876	32915028	34757263	18.6	17.1	16.3	12.7	13.4	14.9
Yukon	30664	32709	35834	20.1	17.8	16.7	6.1	7.4	9.4
Northwest Territories	41784	43290	43603	25.7	22.7	21.2	4.2	4.8	5.9
Nunavut	28727	31408	34747	35.8	32.7	31.4	2.3	2.8	3.4
Northern Canada	*101174*	*107407*	*114184*	26.9	24.1	22.9	4.2	5.0	6.2
Denmark	5371006	5463285	5589253	18.7	18.5	17.6	14.9	15.5	17.6
Greenland	56571	56583	56562	26.2	24.0	21.8	5.3	6.1	7.2
Faroe Islands	47141	48355	48298	23.6	22.4	21.4	13.4	13.8	15.7
Iceland	287125	310039	321777	22.9	21.2	20.7	11.7	11.6	12.8
Norway	4539928	4718012	5015701	20.0	19.3	18.5	14.9	14.7	15.5
Nordland	237555	235724	239013	20.1	18.9	17.6	16.1	16.6	18.0
Troms	152055	154507	159729	20.4	19.3	18.0	13.6	14.1	15.7
Finnmark	73622	72692	74235	21.2	19.9	18.1	13.1	14.2	15.3
Northern Norway	*463232*	*462922*	*472977*	20.4	19.2	17.8	14.8	15.4	16.8
Sweden	8928960	9155264	9528640	18.1	17.0	16.3	17.2	17.5	19.6
Västerbotten	255689	257670	260147	18.0	16.2	15.4	17.4	18.0	20.3
Norrbotten	254565	250942	248873	17.4	15.7	14.5	18.3	19.6	22.5
Northern Sweden	*510254*	*508612*	*509021*	17.7	16.0	14.9	17.9	18.8	21.4
Finland	5201200	5290670	5413215	17.9	17.0	16.5	15.3	16.4	18.5
Pohjois-Suomi	460122	469285	480108	20.4	19.8	19.5	13.8	14.9	16.6
Lappi	189230	184837	182985	17.9	16.2	15.5	15.7	17.8	20.0
Northern Finland	*649352*	*654122*	*663093*	19.7	18.8	18.4	14.4	15.8	17.6
Russian Federation	145253395	142316340	143497240	16.4	14.9	15.8	13.0	13.7	13.0
Murmansk Oblast	901069	853937	783301	16.2	14.6	15.7	7.1	8.2	9.0
Kareliya Republic	718707	692494	638845	16.1	14.4	15.6	12.2	12.6	12.6
Arkhangelsk Oblast	1343517	1276993	1208580	16.8	15.2	16.3	11.5	12.2	12.1
- Nenets AO	41385	42023	42620	23.1	20.8	21.8	6.5	6.9	6.8
Komi Republic	1024285	972030	885990	17.7	16.2	17.3	8.1	8.8	9.0
Yamalo-Nenets AO	506984	538112	534966	22.7	19.7	20.6	1.6	2.3	2.3
Khanty-Mansi AO	1420777	1499100	1569266	20.6	18.5	20.0	3.0	3.8	4.1
Krasnoyarsk Kray	2967685	2850347	2842520	17.7	15.7	16.7	10.2	10.9	10.8
- Taymyr AO	39069	38036	-	23.4	21.2	-	2.9	3.3	-
- Evenki AO	17771	16852	-	24.4	22.7	-	4.2	5.2	-
Sakha Republic	952630	950221	956423	24.3	21.9	22.3	5.3	5.9	6.0
Magadan Oblast	185933	167371	153445	17.2	15.7	16.5	4.6	6.1	7.0
Kamchatka Kray	358916	330814	320489	17.1	15.5	16.3	5.2	7.3	8.3
- Koryak AO	25214	22167	-	22.3	20.1	19.8	4.2	5.4	-
Chukotka AO	54710	50089	50706	21.1	20.2	20.9	1.9	2.6	3.2
Northern Russia	*10435212*	*10181508*	*9944531*	*18.6*	*16.7*	*17.8*	*7.9*	*8.6*	*8.6*

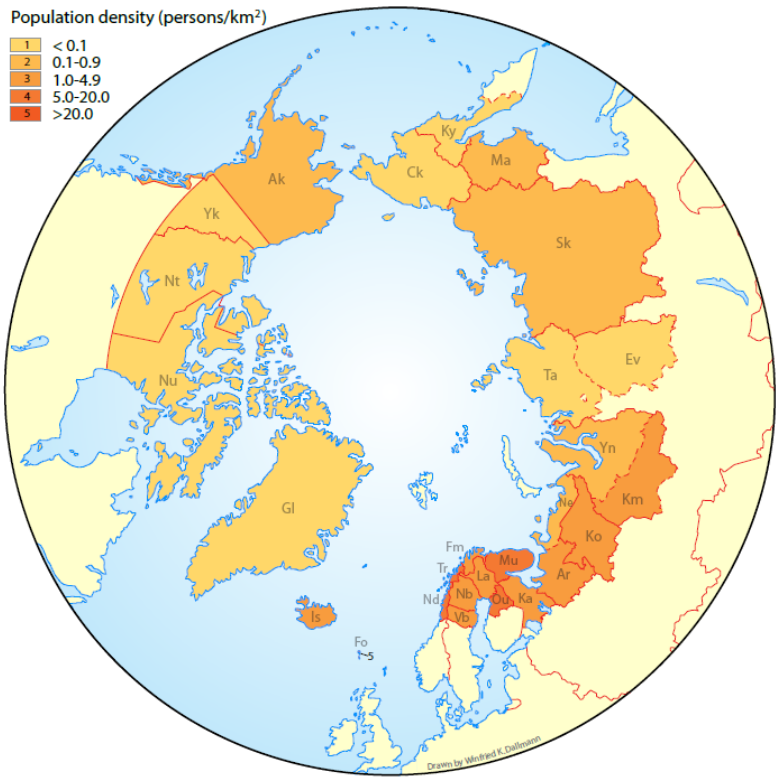


Fig.2.2 Population density, 2010-14

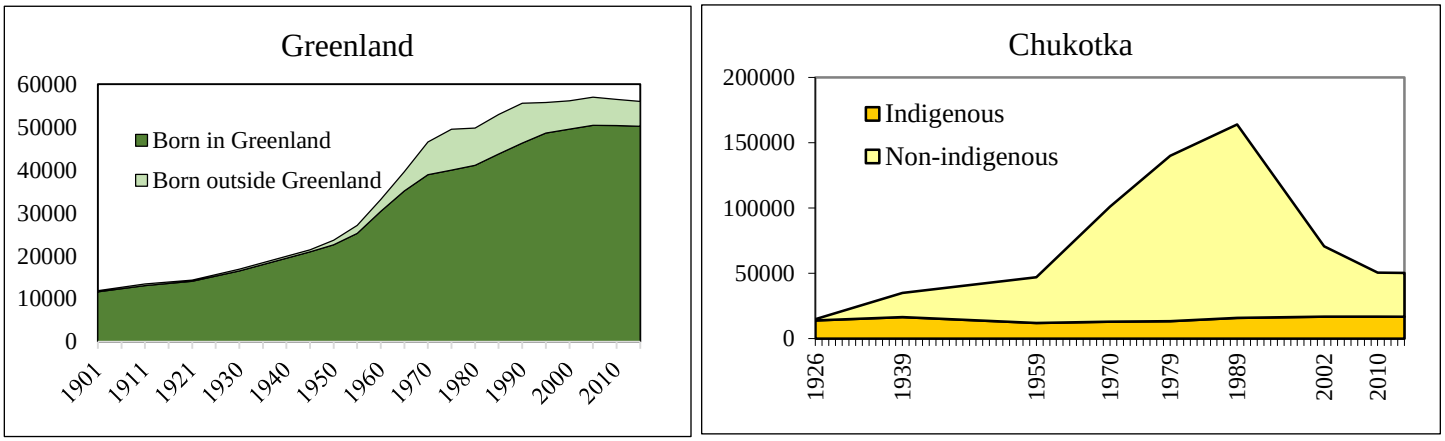


Fig.2.3 Population trends in Greenland and Chukotka

These two graphs depict two different patterns of colonization and internal migration. In Greenland, “born in Greenland” is used as a surrogate identifier for indigenous Greenlanders. The region experienced a steep growth in the 1950s, with an influx of Danes. In the mid-1970s, the proportion of non-indigenous people in the population reached a peak of almost 20%. In Chukotka, the proportion of indigenous people was ascertained by periodic censuses (the years are shown on the graph – intercensal estimates are interpolated). From being almost exclusively indigenous in the 1920s, influx of non-indigenous people from European Russia reached a peak in the 1980s but the population crashed after the dissolution of the Soviet Union. Indigenous people account for about a third of the population in the 2010s.

Table 2.2 Population density and population growth

Country/Region	Land area (sq.km)	Population density (persons/sq.km)			Population growth (relative to 1990 = 100)					
		2000-4	2005-9	2010-4	1990	1994	1999	2004	2009	2014
United States	9147590	31	33	34	100	105.4	111.8	117.3	122.9	127.6
Alaska	1477950	0.4	0.5	0.5	100	109.0	112.9	119.2	126.3	133.1
Canada	8965590	3.5	3.7	3.9	100	104.7	109.8	115.3	121.4	128.3
Yukon	474710	0.06	0.07	0.08	100	106.9	110.8	113.2	121.5	132.6
Northwest Territories	1143790	0.04	0.04	0.04	100	108.7	108.9	116.0	115.6	117.5
Nunavut	1877780	0.02	0.02	0.02	100	113.2	124.3	138.4	151.1	167.1
Northern Canada	*3496280*	0.03	0.03	0.03	100	109.2	113.3	120.7	126.3	134.7
Denmark	42930	125	127	130	100	101.2	103.5	105.1	107.4	109.7
Greenland	2166090	0.03	0.03	0.03	100	100.0	100.9	102.4	101.3	101.3
Faroe Islands	1400	33.7	34.5	34.5	100	95.2	94.7	101.4	102.2	101.9
Iceland	103000	2.8	3.0	3.1	100	104.4	108.8	114.8	125.3	128.5
Norway	365270	12.4	12.9	13.7	100	102.2	105.2	108.3	113.8	121.1
Nordland	36090	6.6	6.5	6.6	100	100.7	99.7	98.9	98.5	100.8
Troms	24870	6.1	6.2	6.4	100	102.4	102.7	104.1	106.4	110.9
Finnmark	45760	1.6	1.6	1.6	100	102.9	99.6	98.4	97.7	101.4
Northern Norway	*106720*	4.3	4.3	4.4	100	101.6	100.7	100.5	100.9	104.1
Sweden	441340	20.2	20.7	21.6	100	102.6	103.5	105.1	108.6	113.3
Västerbotten	55190	4.6	4.7	4.7	100	103.2	102.5	102.1	102.8	104.3
Norrbotten	98250	2.6	2.6	2.5	100	101.6	98.5	96.0	94.7	94.6
Northern Sweden	*153440*	3.3	3.3	3.3	100	102.3	100.4	99.0	98.7	99.3
Finland	303910	17.1	17.4	17.8	100	102.0	103.6	104.8	107.1	109.5
Pohjois-Suomi	57010	8.1	8.2	8.4	100	102.3	103.3	104.7	107.1	109.5
Lappi	92670	2.0	2.0	2.0	100	101.1	97.6	93.2	91.8	90.9
Northern Finland	*149680*	4.3	4.4	4.4	100	101.9	101.5	101.1	102.3	103.7
Russian Federation	17098200	8.5	8.3	8.4	100	100.3	99.5	97.2	95.9	98.0
Murmansk Oblast	144900	6.2	5.9	5.4	100	91.1	80.0	73.6	70.5	64.6
Kareliya Republic	180500	4.0	3.8	3.5	100	97.8	93.4	89.2	86.6	80.0
Arkhangelsk Oblast	589900	2.3	2.2	2.0	100	95.9	89.2	83.4	80.0	75.5
- Nenets AO	176800	0.2	0.2	0.2	100	87.8	79.8	80.8	81.3	83.3
Komi Republic	416800	2.5	2.3	2.1	100	94.4	85.8	80.4	76.7	69.8
Yamalo-Nenets AO	769300	0.7	0.7	0.7	100	96.7	101.8	106.2	111.5	110.4
Khanty-Mansi AO	534800	2.7	2.8	2.9	100	101.0	106.7	114.9	120.1	126.0
Krasnoyarsk Kray	2339700	1.3	1.2	1.2	100	99.0	96.1	92.3	89.7	90.4
- Taymyr AO	879900	0.04	-	-	100	85.8	75.3	76.8	71.8	-
- Evenki AO	763200	0.02	-	-	100	87.8	77.6	72.3	67.8	-
Sakha Republic	3083500	0.31	0.31	0.31	100	94.2	87.0	85.2	85.1	85.7
Magadan Oblast	462500	0.40	0.36	0.33	100	73.2	53.4	45.6	41.8	38.5
Kamchatka Kray	472300	0.76	0.70	0.68	100	90.1	78.8	72.7	67.9	66.7
- Koryak AO	292600	0.09	0.08	-	100	85.3	71.8	64.0	55.0	-
Chukotka AO	721500	0.08	0.07	0.07	100	64.7	40.2	31.9	30.6	31.6
Northern Russia	*9715700*	*1.07*	*1.05*	*1.02*	*100*	*95.2*	*90.0*	*87.0*	*85.4*	*83.7*

The Arctic is home to a diversity of cultural and ethnic groups, including Indigenous peoples, as shown in the map below. Accurate counts are not available for all groups. CircHOB publishes a separate report on the health of Indigenous peoples based on the limited data available.

Fig.2.4 Ethno-linguistic groups in the Arctic

2.2 Fertility

Concepts and Definitions

A population changes in size and composition by the number of people who are born into it, die in it, and move in and out of it. The **number of livebirths** provides the basic information from which various measures of fertility can be constructed. Most statistical agencies have similar definitions of a "livebirth", based on the WHO one:

The complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life such as heartbeat, umbilical cord pulsation, or definite movement of voluntary muscles, whether the umbilical cord has been cut or the placenta is attached.

WHO *Reproductive Health Indicators*, 2006, p.32
http://whqlibdoc.who.int/publications/2006/924156315X_eng.pdf

The simplest fertility indicator to compute is the **crude birth rate**, expressed as births per 1000 persons. Its denominator, however, is the total population, thus including those who do not contribute to births such as females outside their reproductive age and males.

Crude birth rate = (number of livebirths during year X) / (mean population of year X)

The ratio of male to female livebirths is known as the **secondary sex ratio** and is usually expressed as the number of males per 100 females (sometimes also simply as the number of males or per female).

Secondary sex ratio = (number of male livebirths) / (number of female livebirths) x 100

It is remarkably consistent across populations, between 105-107 males for every 100 females born. In the absence of selective termination of pregnancy favouring one sex over another for sociocultural reasons, substantial deviation of the ratio from this "norm" is suggestive of threats to human reproductive health from the external environment or health conditions in the parents.

Children are not born to women equally throughout their reproductive careers, and populations differ in terms of the peak ages of childbearing. The number of **livebirths by mother's age** is needed to generate the **age-specific fertility rates** (ASFR), expressed as births per 1000 women of a specific age or age group. Mother's ages are usually aggregated into 5-year age groups. The under-15 and 50+ groups are not consistently reported by statistical agencies. The 15-49 age group is generally taken arbitrarily as the "reproductive age" range. The 15-19 age group is often used to assess childbirth among young girls and adolescents, even though girls younger than 15 do give birth.

Age-specific fertility rate = (number of births to women in age group *i* during year X) / (mean number of women in age group *i* during year X)

ASFRs can be aggregated into the **total fertility rate** (TFR), which can be interpreted as the mean number of children that would be born alive to a woman during her lifetime if she were to progress through her childbearing years experiencing the age-specific fertility rates (ASFR) of the population in a given year. It is therefore a purely hypothetical rate. A TFR of 2.0 is considered the replacement level for the population, since a couple will need two children to replace themselves (when childhood mortality is taken into account, a population will need a TFR of 2.1 or 2.2 to replace itself). A population at replacement level will eventually stop growing, if there is no immigration. The TFR can be calculated as:

Total fertility rate = [sum of age-specific fertility rates for age group (15-19), (20-24)… (45-49)] x 5

Since the ASFR for each 5-year age group is in fact the average of the ASFR for 5 single years of age, to obtain the sum of all single-year rates for ages 15 to 49, one needs to multiply by 5. The formula as stated above produces a TFR expressed as births per 1,000 women. However, TFR is more often expressed as

births per woman, in which case the above quantity needs to be divided by 1,000. The TFRs reported by CircHOB are calculated from the ASFRs. They may differ slightly from the TFRs published by some statistical agencies.

Data Sources and Limitations

Birth data are collected from birth certificates and recorded by vital statistics agencies, a legal requirement in all circumpolar countries. There is near complete (although not always timely) registration of all births, even in the most remote communities. Births are attributed to the mothers' usual region of residence.

United States
Data on the sex of the livebirth and age of the mother (and also several other characteristics) are available from CDC Wonder https://wonder.cdc.gov/natality.html

Canada
Livebirths by age of mother are available from Statistics Canada: Table 13-10-0416-01 (formerly CANSIM 102-4503) https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310041601 and by sex in table 13-10-0422 (formerly CANSIM 102-4509)
https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310042201

Denmark
The number of livebirths by sex and age of mother is available fro Statistics Denmark's Statbank Table FOD http://www.statbank.dk/FOD

Greenland
Birth data are available from Statistics Greenland http://bank.stat.gl/pxweb/en/Greenland/
> Population > Vital statistics >Births > Livebirths (BEEBBL0)
Note that the 45-49 age group actually refers to age 45+.

Faroe Islands
The number of births by and sex and age of mother are from Statistics Faroe Islands
http://statbank.hagstova.fo/pxweb/en/H2/H2__IB/
> Population and elections > Vital statistics > Livebirths by mother's age IB02020

Iceland
Birth data from Iceland are from Statistics Iceland www.statice.is/Statistics/Population/Births-and-deaths
> Births > Births > Livebirths by age of mother MAN05101
> Births > Births > Livebirths and late fetal deaths by sex MAN05100

Norway
Birth data are available from Statistics Norway https://www.ssb.no/en/statbank/list/fodte
Livebirths, by sex in Table 4231 https://www.ssb.no/en/statbank/table/04231/
Livebirths, by mother's age in Table 6990 https://www.ssb.no/en/statbank/table/06990/

Sweden
Birth data are available from Statistics Sweden www.ssd.scb.se/databaser
> Population > Population statistics > Livebirths > Livebirths by region, mother's age and child's sex

Finland
Birth data are available from Statistics Finland's Statfin database
http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/
> Population > Births > Livebirths by sex, age of mother, and area – 006

Russia
The number of livebirths by sex www.gks.ru/dbscripts/Cbsd/DBInet.cgi?pl=2401002 and age-specific-fertility rates www.gks.ru/dbscripts/Cbsd/DBInet.cgi?pl=2415058 can be found in the Federal State Statistics Service interactive database in Russian only.

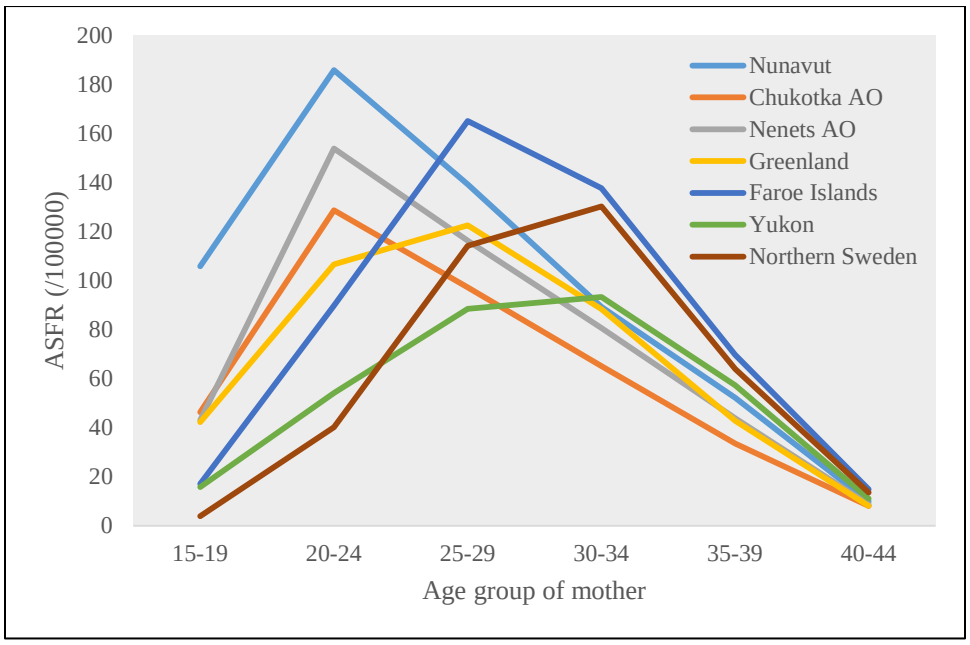


Fig.2.5 Age-specific fertility rates for selected regions, 2010-14

Chukchi girls in Chukotka, Russia

Chukotka suffered a loss of 60% of its population after the collapse of the Soviet Union. The massive out-migration involved mainly the non-Indigenous population, while the Indigenous population has remained stable, resulting in an increasing share of the total regional population

Table 2.3 Crude birth rate, secondary sex ratio, and total fertility rate

Country/Region	Crude birth rate (/1000)			Secondary sex ratio (/100F)			Total fertility rate (/woman)		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	14.1	14.0	12.6	104.8	104.8	104.8	2.04	2.07	1.88
Alaska	15.7	16.2	13.0	105.3	107.4	105.1	2.30	2.32	2.24
Canada	10.6	11.1	10.9	105.4	105.3	105.4	1.52	1.64	1.61
Yukon	11.4	11.0	11.4	106.5	108.5	113.1	1.57	1.56	1.60
Northwest Territories	15.9	16.4	15.7	97.3	106.6	104.7	1.95	2.06	1.93
Nunavut	25.5	25.0	24.9	110.9	105.8	105.0	3.03	2.89	2.92
Northern Canada	*17.3*	*17.3*	*17.1*	*104.7*	*106.6*	*106.5*	*2.19*	*2.21*	*2.20*
Denmark	12.1	11.8	10.5	105.3	105.4	105.0	1.76	1.85	1.73
Greenland	16.1	15.2	14.5	104.9	107.0	109.1	2.39	2.27	2.05
Faroe Islands	14.6	13.7	12.9	108.4	101.1	107.5	2.51	2.50	2.47
Iceland	14.5	14.9	14.1	104.3	104.8	103.8	2.00	2.12	2.02
Norway	12.5	12.6	12.0	105.2	105.5	105.4	1.81	1.91	1.84
Nordland	11.3	10.8	10.4	107.5	106.8	105.7	1.82	1.91	1.83
Troms	12.4	12.4	11.3	103.5	107.4	104.4	1.80	1.95	1.80
Finnmark	13.2	12.2	10.9	105.1	105.6	94.3	1.91	1.98	1.83
Northern Norway	*12.0*	*11.6*	*10.7*	*105.7*	*106.8*	*103.4*	*1.83*	*1.94*	*1.82*
Sweden	10.7	11.7	11.9	106.2	106.0	105.6	1.64	1.86	1.91
Västerbotten	9.8	10.9	11.0	103.7	107.8	106.6	1.56	1.77	1.80
Norrbotten	9.3	9.5	9.8	104.0	109.4	103.5	1.67	1.82	1.89
Northern Sweden	*9.6*	*10.2*	*10.4*	*103.8*	*108.5*	*105.1*	*1.60*	*1.78*	*1.83*
Finland	10.9	11.2	11.0	105.2	104.3	104.0	1.74	1.83	1.79
Pohjois-Suomi	12.9	13.7	13.3	107.0	104.0	104.7	2.14	2.32	2.26
Lappi	9.6	9.9	10.0	105.9	102.9	105.7	1.84	1.95	1.92
Northern Finland	*12.0*	*12.7*	*12.4*	*106.7*	*103.7*	*104.9*	*2.06*	*2.22*	*2.17*
Russian Federation	9.6	11.3	13.0	106.2	105.8	105.9	1.26	1.42	1.68
Murmansk Oblast	9.5	10.3	11.7	106.0	107.5	104.9	1.22	1.29	1.57
Kareliya Republic	9.8	10.6	12.2	105.7	105.2	106.5	1.28	1.31	1.67
Arkhangelsk Oblast	10.1	11.5	12.6	106.5	105.6	106.5	1.33	1.45	1.74
- Nenets AO	14.5	15.4	16.5	111.6	97.4	105.9	1.91	1.97	2.23
Komi Republic	10.6	11.7	13.7	105.2	104.2	104.8	1.31	1.41	1.84
Yamalo-Nenets AO	13.1	14.1	16.3	105.6	104.7	106.4	1.53	1.67	1.98
Khanty-Mansi AO	13.0	14.6	17.0	105.7	106.2	105.2	1.48	1.66	1.98
Krasnoyarsk Kray	10.4	12.1	14.1	105.0	106.4	105.9	1.30	1.45	1.73
- Taymyr AO	14.8	15.1	-	103.5	102.3	-	1.79	1.88	-
- Evenki AO	14.9	17.4	-	100.3	103.3	-	1.96	2.36	-
Sakha Republic	14.5	15.6	17.4	105.6	104.4	105.2	1.82	1.87	2.14
Magadan Oblast	10.6	11.1	12.1	109.1	107.6	104.1	1.34	1.39	1.59
Kamchatka Kray	10.3	11.9	12.7	102.4	108.2	103.5	1.31	1.49	1.70
- Koryak AO	11.9	12.4	-	96.9	99.9	-	1.71	1.86	-
Chukotka AO	12.9	15.2	13.8	102.1	104.8	105.1	1.69	2.09	1.90
Northern Russia	*11.1*	*12.5*	*14.4*	*105.5*	*105.8*	*105.6*	-	-	-

Table 2.4 Age-specific fertility rates (per 1000 women) for selected age groups of mothers

Country/Region	ASFR 15-19			ASFR 20-24			ASFR 25-29			ASFR 30-34		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	43.3	40.1	29.2	104.2	102.1	83.4	115.1	115.8	106.6	93.5	98.6	97.7
Alaska	43.3	42.4	33.6	137.2	133.7	119.4	132.1	136.2	126.2	94.2	91.0	105.1
Canada	15.2	13.7	11.8	54.7	51.9	44.2	99.0	101.0	94.8	92.1	104.7	107.0
Yukon	24.2	19.1	15.7	77.2	59.5	54.2	89.8	89.5	88.5	79.5	88.8	93.3
Northwest Territories	47.8	35.9	32.0	100.3	99.4	84.9	104.5	109.5	101.8	88.5	103.0	103.6
Nunavut	120.4	109.8	105.8	197.8	186.4	185.9	142.8	130.5	139.3	88.4	92.0	89.3
Northern Canada	*65.0*	*58.0*	*55.2*	*125.3*	*118.0*	*112.2*	*112.5*	*111.1*	*110.4*	*85.9*	*95.7*	*96.2*
Denmark	6.7	5.8	4.4	49.1	43.6	37.5	126.0	126.0	112.8	118.1	130.5	125.4
Greenland	68.4	57.9	42.2	146.7	127.4	106.6	132.5	128.8	122.5	85.5	90.3	88.3
Faroe Islands	15.9	14.6	17.0	106.9	86.9	89.8	168.8	170.9	165.0	134.1	143.0	137.7
Iceland	18.3	14.2	10.1	78.7	78.1	65.0	127.9	133.5	128.2	110.6	121.4	119.3
Norway	10.0	9.0	6.4	61.6	60.6	51.7	124.4	125.8	117.1	111.6	123.4	123.2
Nordland	15.5	14.6	11.1	74.7	77.8	73.8	126.1	131.9	121.3	99.0	107.1	105.4
Troms	13.8	13.3	9.8	69.8	71.1	58.6	113.4	123.6	113.6	104.5	115.6	113.3
Finnmark	17.9	18.1	12.0	79.7	78.7	77.4	121.4	125.2	108.3	104.9	111.1	106.1
Northern Norway	*15.3*	*14.7*	*10.8*	*73.8*	*75.7*	*69.1*	*120.7*	*127.8*	*116.4*	*101.9*	*110.9*	*108.4*
Sweden	4.6	4.2	3.9	41.5	43.8	41.2	101.9	106.2	107.1	114.2	133.2	136.1
Västerbotten	3.1	4.2	3.7	31.6	32.9	33.6	106.3	111.7	107.5	113.2	133.9	133.0
Norrbotten	4.6	4.5	4.1	49.7	51.2	48.6	118.9	122.8	123.3	105.7	117.2	126.7
Northern Sweden	*3.8*	*4.4*	*3.9*	*38.9*	*40.3*	*40.1*	*111.9*	*116.3*	*114.2*	*109.5*	*126.1*	*130.2*
Finland	10.6	9.2	7.7	58.5	58.6	53.1	114.8	115.6	110.1	105.0	117.3	116.0
Pohjois-Suomi	13.8	11.9	10.7	87.4	89.5	83.3	141.0	149.7	143.5	118.5	132.4	128.5
Lappi	12.3	10.7	8.9	75.4	75.7	66.0	126.0	132.1	124.2	97.2	111.5	114.9
Northern Finland	*13.4*	*11.5*	*10.3*	*84.3*	*85.9*	*78.6*	*137.4*	*145.5*	*138.6*	*112.8*	*127.5*	*125.2*
Russian Federation	26.7	29.2	26.7	93.4	88.0	89.2	73.5	85.4	104.7	40.6	54.2	73.2
Murmansk Oblast	25.7	24.0	22.7	91.7	81.9	87.0	72.6	81.0	99.5	40.0	49.6	69.4
Kareliya Republic	27.0	27.5	23.9	95.3	78.3	89.1	75.8	80.7	105.6	41.6	51.9	75.2
Arkhangelsk Oblast	28.4	29.6	26.9	102.9	93.5	99.7	77.7	88.0	107.2	42.0	54.6	75.4
- Nenets AO	51.5	47.5	43.0	142.1	134.5	153.9	103.7	110.0	116.3	56.0	64.5	80.6
Komi Republic	31.5	30.9	32.0	99.2	90.9	107.0	74.5	83.8	111.2	41.4	52.8	76.0
Yamalo-Nenets AO	32.0	26.4	27.6	112.9	111.4	128.2	85.1	101.0	116.2	51.6	62.8	77.9
Khanty-Mansi AO	32.5	28.6	28.3	108.2	108.4	114.9	85.1	102.2	120.5	50.4	63.0	84.7
Krasnoyarsk Kray	31.6	32.1	30.5	97.6	93.0	93.0	73.1	86.0	106.8	40.1	53.1	74.8
- Taymyr AO	47.7	42.5	-	129.7	134.1	-	90.8	99.3	-	56.6	62.0	-
- Evenki AO	50.3	52.1	-	145.1	175.5	-	91.8	124.8	-	67.8	71.4	-
Sakha Republic	38.6	36.6	35.5	126.8	122.1	125.1	97.1	103.0	120.2	62.5	68.3	87.7
Magadan Oblast	35.0	31.3	31.2	94.3	84.5	90.2	74.9	82.1	92.4	45.8	50.7	64.4
Kamchatka Kray	32.1	34.5	29.5	91.8	92.9	95.4	73.8	85.2	99.9	44.3	54.9	71.8
- Koryak AO	58.1	47.3	-	122.1	134.6	-	85.1	103.2	-	46.4	48.3	-
Chukotka AO	49.7	50.0	46.3	115.9	142.6	128.6	82.8	115.8	97.2	59.0	70.3	65.1
Northern Russia	-	-	-	-	-	-	-	-	-	-	-	-

2.3 Mortality

Concepts and Definitions

Measuring the pattern of mortality in a population is an important aspect of assessing the health status of a population, although death represents only the severest consequence of ill health. The most basic information required is the **number of deaths**, which when divided by the size of the population, produces the **crude death rate**, expressed as deaths per 1000 persons.

Crude death rate = (number of deaths during year X) / (mean population of year X)

Because infancy, defined as age under 1 year, is a particularly vulnerable period in a person's life, the **number of infant deaths** is recorded, from which the **infant mortality rate** (IMR) is constructed, expressed as deaths per 1000 livebirths. IMR is widely used in international comparisons.

Infant mortality rate = (number of deaths under 1 year of age during year X) /
(number of livebirths during year X)

Among infant deaths during year X, some were born in year (X-1), and among livebirths in year X, some may go on to die in year (X+1). Some statistical agencies can track a cohort of newborn infants for one year after birth using electronic data linkage between birth and death databases.

Examining the **causes of death** provides more detailed information on the relative importance of different health problems. Because populations differ in their age-sex composition, and death is very much age-dependent, simple comparisons of crude death rates among populations can be misleading. A more meaningful comparison utilizes **age-standardized mortality rates** (ASMR). ASMRs adjust for differences in the age distribution of the population by applying the observed age-specific mortality rates for each population (the study population) to a standard population, referred to as the "direct" method:

Age-standardized mortality rate = $\Sigma(r_i N_i) / \Sigma N_i$

Where r_i is the age-specific mortality rate for the *i*th age group of the study population
N_i is the number of persons in the *i*th age group of the standard population

The rate is usually expressed as deaths per 100000 persons. Any population can serve as a standard. When comparing regions within a country, the national population tends to be used as the standard. For international comparisons, there are hypothetical or artificially constructed populations. For ASMR, the standard population used in CircHOB is the European Standard Population (ESP) used by Eurostat until 2013, when it changed the number of people in each age group, which adds up to 100000. CircHOB continues to use the pre-2013 ESP to ensure comparison with previous years' data without re-calculating all rates. Note that the World Standard Population of the International Agency for Research on Cancer (IARC) is used for computing age-standardized cancer incidence rates.

The age distribution of the European Standard Population used in CircHOB is as follows:

0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
8000	7000	7000	7000	7000	7000	7000	7000	7000
45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
7000	7000	6000	5000	4000	3000	2000	1000	1000

Source: Eurostat (2013). *Revision of the European Standard Population.* Annex C shows the pre-2013 age distribution *https://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/KS-RA-13-028*

The causes of death are coded according to the International Classification of Diseases, 10th edition (ICD-10). This is a system of alphanumeric codes, organized into chapters (I to XX).
http://apps.who.int/classifications/icd10/browse/2016/en

CircHOB computes ASMRs for several important groups of causes at the ICD-10 chapter level:

- All Causes A00-Y89 [Chapters I-XX]
- Neoplasms C00-D48 [Chapter II]
- Diseases of the circulatory system I00-I99 [Chapter IX]
- Diseases of the respiratory system J00-J99 [Chapter X]
- Injury V01-Y89 [Chapter XX]

A widely used health indicator is **life expectancy at birth** (LE_0) which summarizes the mortality experience of a population that prevails across all age groups. It can be defined as the average number of years that a newborn is expected to live if current mortality rates continue to apply. Life expectancy can be computed for other ages, eg. at age 65. The computation of LE is complex, and requires the construction of a life table consisting of the probability of dying, the death rate and the number of survivors for each age or age group. LE at birth is heavily influenced by the extent of deaths among infants and the very young, but is not affected by the different age structures of the populations being compared.

Life tables using 5-year intervals of data (except <1 and 1-4 years) are termed abridged life tables. CircHOB uses the templates for computing abridged life tables described in Toson B, Baker A. *Life Expectancy at Birth: Methodological Options for Small Populations*, United Kingdom Office of National Statistics, National Statistics Methodological Series No.33, 2003.
www.ons.gov.uk/ons/guide-method/method-quality/specific/gss-methodology-series/index.html

Data Sources and Limitations

United States
United States data for deaths and their causes are available from CDC Wonder http://wonder.cdc.gov/ucd-icd10.html > Underlying Cause of Death. Infant mortality data are from https://wonder.cdc.gov/lbd.html > Linked Birth/Infant Death Records.

LE_0 for the US nationally are reported in the annual report *Health United States* by the National Center for Health Statistics https://www.cdc.gov/nchs/data/hus/2017/015.pdf. Abridged life tables are specially constructed for Alaska based on age-specific mortality rates.

Canada
Mortality data for Canada and its northern territories are from Statistics Canada: Table 13-10-0710-01 (formerly CANSIM 102-0504) https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310071001
Infant mortality rates are from table 13-10-0713-01 (formerly CANSIM 102-0507)
https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310071301

ASMRs reported by Statistics Canada are standardized to the 2011 population of Canada, and thus need to be re-calculated to the European Standard Population. Deaths by cause, age and sex are publicly accessible only for Canada nationally from a series of tables from Table 13-10-0141-01(CANSIM 102-0522) https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310014101 to Table 13-10-0156-01(CANSIM 102-0540) https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310015601
Data for the territories are accessed from the branch research data centre located in ICHR in Yellowknife.

Life expectancy data for 2000-04 are available by single years from Table 13-10-0032-01 (CANSIM 102-0511) https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310003201
From 2005 on, data are reported as 3-year rolling averages, in Table 13-10-0063-01 (CANSIM 102-4308)
https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1310006301

Denmark
Data on the number of deaths by age and sex are from Statistics Denmark's Statbank table DOD http://www.statbank.dk/DOD. IMRs are calculated from death data in DOD and livebirth data in FOD http://www.statbank.dk/FOD. Life expectancy is available from HISB7 http://www.statbank.dk/HISB7

Causes of death data are from Eurostat https://ec.europa.eu/eurostat/data/database >Population and social conditions > Health > Causes of death > General mortality > hlth_cd_aro

Greenland
Statistics Greenland publishes the number and causes of death by age and sex, and life expectancy (5 years' data combined) http://bank.stat.gl/pxweb/en/Greenland/
> Population > Vital statistics > Deaths and mean population (BEEBBDM1)
> Population > Vital statistics > Mortality table (BEEDT)
> Population > Vital statistics >Births > Livebirths (BEEBBL0)
> Health > National Board of Health > Causes of death (SUELDA1)

Faroe Islands
The number of deaths by age and sex and life expectancy (2-year rolling average) are from Statistics Faroe Islands http://statbank.hagstova.fo/pxweb/en/H2/H2__IB/
> Population and elections > Vital statistics > Livebirths and deaths IB02010
> Population and elections > Vital statistics > Life expectancy IB02050
> Population and elections > Vital statistics > Causes of death IB02090 (Only data after 2006 are available; earlier years' data are from NOMESCO, no longer archived).

Iceland
Mortality data are from Statistics Iceland www.statice.is/Statistics/Population/Births-and-deaths
> Deaths > Causes of death > Deaths by sex, age and main causes MAN05301
> Deaths> Deaths > Deaths and crude death rate by age and sex MAN05210
> Deaths > Deaths > Infant mortality and late fetal deaths MAN05321
> Deaths > Deaths > Life expectancy and number of survivors MAN05401

Norway
Mortality data are available from Statistics Norway https://www.ssb.no/en/statbank/list/dode
Deaths by age and sex in Table 8462 https://www.ssb.no/en/statbank/table/08426/
Life expectancy in Table 5797 https://www.ssb.no/en/statbank/table/05797/
Infant mortality rates in Table 5378 https://www.ssb.no/en/statbank/table/05378/

Causes of death data are from Eurostat https://ec.europa.eu/eurostat/data/database >Population and social conditions > Health > Causes of death > General mortality > hlth_cd_aro. Regional data are requested from the National Institute of Public Health.

Sweden
Mortality data are from Statistics Sweden www.ssd.scb.se/databaser
> Population > Population statistics > Deaths > Deaths by region, age (during the year)
> Population > Population statistics > Deaths > Life expectancy at birth by county and sex
> Population > Population statistics > Livebirths > Livebirths by region, mother's age and child's sex

Causes of death data are from the National Board of Health statistical database
https://www.socialstyrelsen.se/statistics/statisticaldatabase/causeofdeath

Finland
Mortality data are available from Statistics Finland's Statfin database
http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/
> Population > Deaths > Deaths by age, sex and area – 004
> Population > Births > Livebrths by sex, age of mother, and area – 006
> Population > Deaths > Life expectancy at birth – 006 [national only]

Causes of death data for Finland nationally are from Eurostat https://ec.europa.eu/eurostat/data/database >Population and social conditions > Health > Causes of death > General mortality > hlth_cd_aro

Regional data are requested from Statistics Finland.

Russia

Mortality data are from Federal State Statistics Service (Rosstat) www.gks.ru. Only the Russian website contains the interactive database for regional data, which requires registration and login www.gks.ru/dbscripts/Cbsd/DBInet.cgi?pl=2401004

Causes of death data for Russia and its regions are available from the *Demographic Yearbook*, various years. Causes are presented at the level of ICD-10 chapters only, not for individual causes. http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1137674209312. Suicide data for some northern regions are from the Russian Ministry of Health, courtesy of Prof. Boris Revich of the Laboratory of Environmental Health, Russian Academy of Sciences, Moscow.

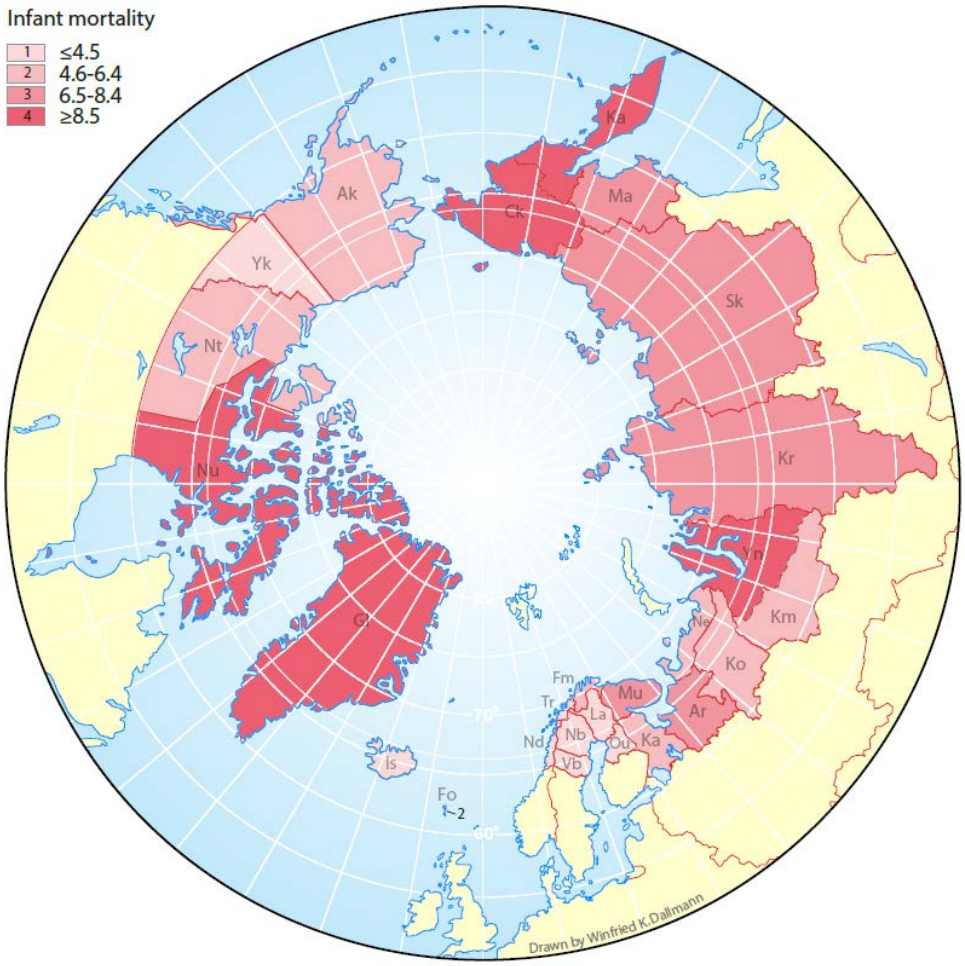


Fig.2.6 Infant mortality rates, 2010-14

Table 2.5 Crude death rate, infant mortality rate, and all-cause ASMR

Country/Region	Crude death rate (/1000)			Infant mortality rate (/1000 livebirths)			All-cause ASMR (/100000)		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	8.4	8.1	8.1	7.6	6.7	6.0	704	648	610
Alaska	4.7	5.0	4.5	6.8	6.5	5.0	689	646	620
Canada	7.1	7.1	7.1	5.3	5.1	4.9	586	530	487
Yukon	4.8	5.7	5.7	7.4	6.1	2.9	722	742	629
Northwest Territories	4.0	4.1	4.5	6.0	8.7	5.3	824	698	673
Nunavut	4.4	4.3	*4.8*	15.3	14.0	19.4	1100	1026	989
Northern Canada	*4.4*	*4.7*	*5.0*	*10.2*	*10.5*	*11.0*	*843*	*784*	*723*
Denmark	10.7	10.1	9.4	4.7	3.9	3.6	739	667	589
Greenland	8.0	7.9	8.3	12.8	9.7	8.8	1437	1297	1162
Faroe Islands	8.0	8.2	7.9	2.9	5.7	6.1	609	595	500
Iceland	6.3	6.2	6.3	2.6	2.0	1.6	560	520	479
Norway	9.5	8.8	8.2	3.6	3.0	2.5	625	555	508
Nordland	10.3	9.9	9.8	3.3	3.7	3.0	633	579	535
Troms	8.9	8.6	*8.0*	3.7	3.4	1.8	649	600	512
Finnmark	9.2	8.8	8.9	4.3	3.4	5.0	744	739	619
Northern Norway	*9.7*	*9.3*	*9.0*	*4.1*	*3.6*	*2.9*	*654*	*555*	*540*
Sweden	10.4	10.0	9.5	3.3	2.5	2.4	591	540	501
Västerbotten	10.3	10.0	10.1	3.8	1.9	2.7	604	543	520
Norrbotten	11.0	11.0	11.2	4.6	3.0	3.0	643	585	551
Northern Sweden	*10.7*	*10.5*	*10.6*	*4.2*	*2.4*	*2.9*	*624*	*570*	*515*
Finland	9.4	9.2	9.5	3.3	2.8	2.2	670	599	547
Pohjois-Suomi	8.6	8.3	8.6	2.7	2.8	2.2	692	605	547
Lappi	9.5	9.9	10.6	4.2	2.1	1.7	714	639	576
Northern Finland	*8.8*	*8.8*	*9.1*	*3.0*	*2.6*	*2.1*	*699*	*616*	*556*
Russian Federation	15.8	14.9	13.4	13.3	9.3	7.8	1613	1441	1195
Murmansk Oblast	12.8	12.4	11.4	11.8	9.5	6.6	1779	1695	1324
Kareliya Republic	18.2	16.5	15.1	10.8	6.9	6.2	1980	1693	1371
Arkhangelsk Oblast	17.1	15.3	13.8	12.9	10.0	7.0	1855	1599	1280
- Nenets AO	13.2	12.4	10.4	20.3	12.1	6.3	1934	1758	1310
Komi Republic	14.4	13.4	12.4	10.1	7.0	5.3	1881	1733	1386
Yamalo-Nenets AO	5.8	5.5	5.3	13.8	11.8	10.3	1435	1168	1127
Khanty-Mansi AO	6.9	6.8	6.5	8.4	5.8	4.7	1505	1317	1112
Krasnoyarsk Kray	15.1	14.1	13.0	16.9	11.6	8.6	1800	1552	1325
- Taymyr AO	10.3	9.5	-	21.4	12.2	-	1929	1779	-
- Evenki AO	12.6	14.4	-	22.0	21.2	-	2026	2371	-
Sakha Republic	10.1	9.9	9.2	15.3	9.9	8.1	1610	1696	1306
Magadan Oblast	12.5	13.4	12.5	13.0	12.3	8.0	1887	1882	1575
Kamchatka Kray	11.8	12.2	11.8	14.5	10.1	10.3	1808	1678	1462
- Koryak AO	16.5	17.3	-	21.9	28.3	-	2801	2590	-
Chukotka AO	11.2	12.1	11.5	28.9	16.3	20.9	2040	2119	1931
Northern Russia	*13.1*	*12.2*	*11.2*	*13.3*	*9.5*	*7.3*	-	-	-

Table 2.6 Age-standardized mortality rate (per 100000) for selected causes of death

Country/ Region	Neoplasms			Circulatory diseases			Respiratory diseases			Injury		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	178	164	152	250	204	178	64	60	57	53	56	56
Alaska	175	163	154	211	174	157	61	58	53	86	82	83
Canada	185	171	158	186	148	124	45	43	40	40	39	39
Yukon	225	245	198	209	177	135	55	60	52	92	83	68
Northwest Territories	219	189	201	236	170	168	99	98	75	84	74	66
Nunavut	378	365	301	249	163	159	210	190	176	149	114	138
Northern Canada	*247*	*243*	*217*	*229*	*173*	*153*	*96*	*95*	*78*	*110*	*92*	*90*
Denmark	219	204	187	238	180	139	68	63	61	42	36	30
Greenland	360	327	302	426	342	291	145	133	90	198	161	131
Faroe Islands	168	170	154	237	189	130	49	58	39	32	42	31
Iceland	168	162	156	214	178	151	43	42	38	40	37	36
Norway	176	165	155	226	172	142	54	50	46	43	41	39
Nordland	172	172	157	242	193	151	50	52	44	45	38	44
Troms	169	169	148	257	206	152	57	53	46	40	41	39
Finnmark	184	169	168	287	248	183	64	84	61	53	58	51
Northern Norway	*173*	*165*	*156*	*253*	*172*	*156*	*54*	*50*	*47*	*44*	*41*	*43*
Sweden	161	154	144	240	201	172	36	32	30	40	38	36
Västerbotten	154	145	140	252	203	173	32	29	25	40	37	32
Norrbotten	149	143	133	266	226	198	41	35	33	46	43	47
Northern Sweden	*151*	*145*	*133*	*259*	*217*	*177*	*37*	*33*	*28*	*43*	*40*	*39*
Finland	151	142	137	271	229	197	48	25	20	70	67	54
Pohjois-Suomi	143	133	130	299	243	206	52	23	20	66	66	59
Lappi	156	144	138	289	246	215	50	28	21	78	67	60
Northern Finland	*147*	*137*	*132*	*296*	*244*	*209*	*51*	*25*	*20*	*69*	*66*	*59*
Russian Federation	211	202	191	885	799	626	77	62	52	229	182	132
Murmansk Oblast	222	215	195	1044	1035	805	59	56	36	196	149	110
Kareliya Republic	236	223	224	1114	921	722	69	59	49	309	226	155
Arkhangelsk Oblast	210	217	218	1046	912	702	70	57	50	289	228	167
- Nenets AO	253	215	188	1186	1025	702	41	28	43	318	285	202
Komi Republic	215	219	230	986	873	649	84	74	58	299	236	180
Yamalo-Nenets AO	207	191	193	745	603	613	59	47	50	194	145	119
Khanty-Mansi AO	251	226	202	829	724	581	56	53	55	175	150	108
Krasnoyarsk Kray	229	233	237	890	764	626	100	83	78	279	234	175
- Taymyr AO	222	291	-	1091	905	-	70	91	-	332	252	-
- Evenki AO	203	250	-	849	1217	-	78	63	-	432	484	-
Sakha Republic	226	211	187	775	930	687	58	50	44	249	245	176
Magadan Oblast	280	278	251	1001	1007	796	133	113	95	256	231	170
Kamchatka Kray	239	239	220	1042	975	841	72	53	42	208	176	133
- Koryak AO	320	161	-	1426	1407	-	141	122	-	433	448	-
Chukotka AO	234	266	264	1060	1100	1024	149	123	85	310	336	237
Northern Russia	-	-	-	-	-	-	-	-	-	-	-	-

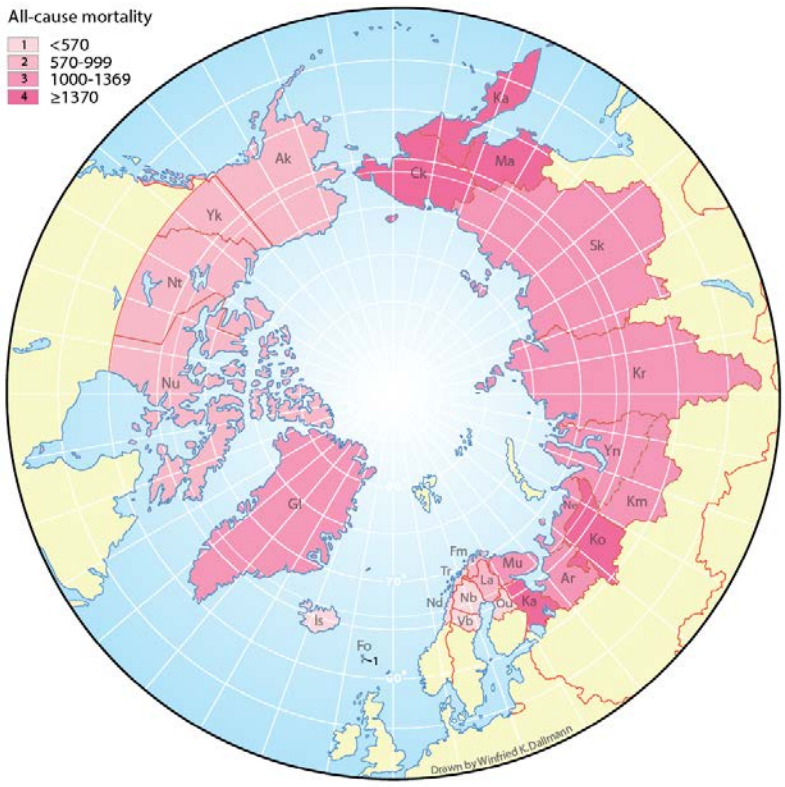


Fig.2.7 Age-standardized mortality rate for all causes, 2010-14

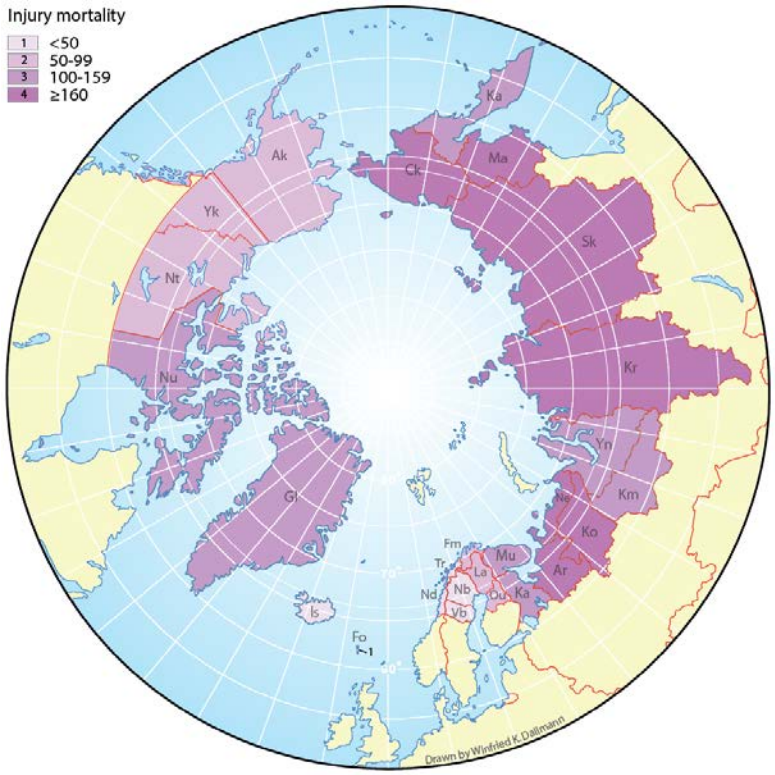


Fig.2.8 Age-standardized mortality rate for injury, 2010-14

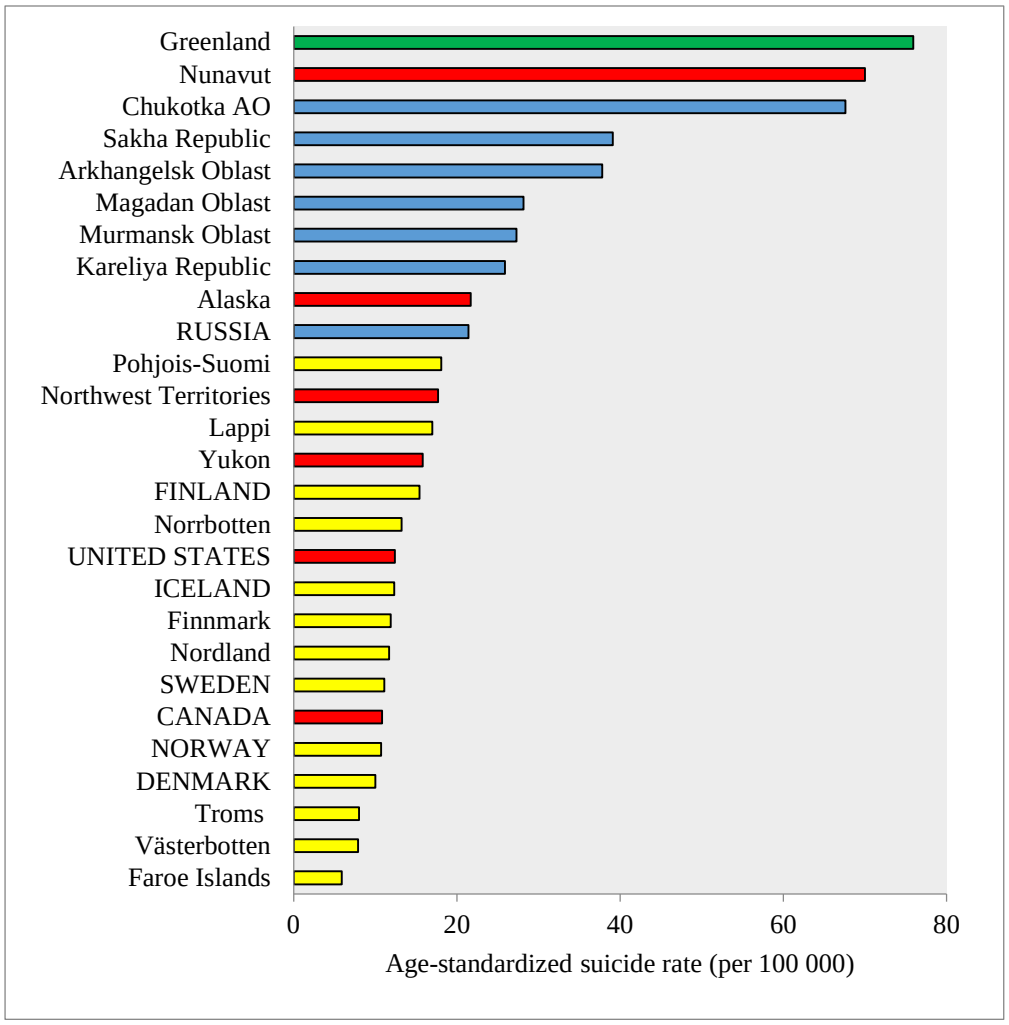


Fig.2.9 Age-standardized mortality rate for suicide, 2010-14

Youth suicide: a child's perspective

In an art exhibition in Nuuk, Greenland, a child's drawing showed Superman flying to save a boy from hanging

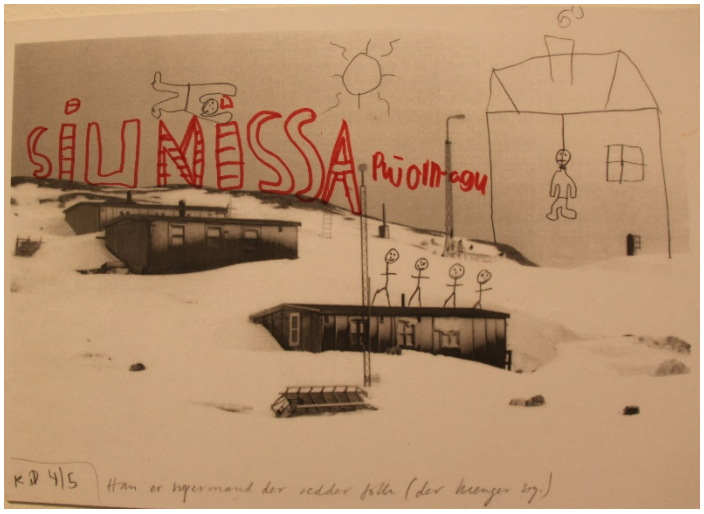


Table 2.7 Life expectancy at birth for males and females

Country/Region	Life expectancy at birth M (years)			Life expectancy at birth F (years)		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	74.5	75.5	76.4	79.6	80.5	81.3
Alaska	74.7	75.9	76.4	80.1	80.6	81.3
Canada	77.2	78.3	79.5	82.2	82.9	83.7
Yukon	74.9	74.4	75.9	80.1	79.5	81.3
Northwest Territories	74.6	74.1	75.5	78.8	80.5	80.1
Nunavut	66.6	68.5	68.8	70.9	75.1	73.9
Northern Canada	-	-	-	-	-	-
Denmark	75.0	76.3	78.1	79.6	80.7	82.1
Greenland	65.5	67.9	69.1	71.0	72.2	73.7
Faroe Islands	77.2	77.2	78.8	81.6	82.9	83.8
Iceland	78.6	79.5	80.4	82.6	83.1	83.7
Norway	76.6	78.2	79.4	81.7	82.8	83.5
Nordland	76.7	78.3	79.0	82.0	82.7	83.3
Troms	76.5	78.0	79.6	81.5	82.7	83.9
Finnmark	74.6	76.3	77.2	80.6	81.6	82.3
Northern Norway	-	-	-	-	-	-
Sweden	77.8	78.9	79.9	82.3	83.0	83.9
Västerbotten	77.6	78.9	79.7	82.1	83.1	83.2
Norrbotten	76.6	78.0	78.3	81.6	82.4	83.2
Northern Sweden	-	-	-	-	-	-
Finland	74.8	76.0	78.0	81.6	82.8	83.0
Pohjois-Suomi	74.3	75.9	77.5	81.6	83.0	84.1
Lappi	73.3	74.8	77.0	81.3	83.1	83.6
Northern Finland	-	-	-	-	-	-
Russian Federation	58.8	61.1	64.4	72.1	73.7	75.8
Murmansk Oblast	57.6	59.9	63.8	70.5	72.1	75.0
Kareliya Republic	55.1	58.1	61.8	69.6	71.7	74.6
Arkhangelsk Oblast	55.9	59.2	63.3	70.5	74.2	75.6
- Nenets AO	53.8	56.2	61.3	69.0	71.4	74.4
Komi Republic	56.6	58.9	62.2	69.5	71.7	74.6
Yamalo-Nenets AO	61.8	65.6	66.2	72.2	74.5	75.5
Khanty-Mansi AO	61.3	63.8	66.5	73.0	75.0	76.4
Krasnoyarsk Kray	56.7	59.8	62.7	70.1	72.3	74.3
- Taymyr AO	54.2	57.5	-	67.5	69.3	-
- Evenki AO	53.6	53.7	-	64.6	64.0	-
Sakha Republic	57.9	60.0	62.6	70.4	72.0	74.3
Magadan Oblast	56.6	57.8	60.9	69.4	69.8	72.3
Kamchatka Kray	57.8	59.7	61.9	69.7	71.2	73.0
- Koryak AO	49.9	50.1	-	61.7	61.6	-
Chukotka AO	53.6	54.5	56.9	63.7	64.6	65.6
Northern Russia	-	-	-	-	-	-

2.4 Disease Incidence

Concepts and Definitions

The occurrence of new cases of diseases, not all of which result in death, is another important dimension in the assessment of health in a population. CircHOB monitors the incidence of cancer and two infectious diseases – tuberculosis and gonorrhea.

Infectious Diseases

Although the public health significance of infectious diseases has decreased substantially in recent decades, the overall burden of infectious diseases in the Arctic remains high, especially among the indigenous populations in some regions. Disease surveillance is an integral part of public health practice in the national and regional health care systems of circumpolar countries. Tuberculosis (TB) and gonorrhea are socially and epidemiologically important diseases which are reported consistently and regularly by all the regions. As both diseases are treatable and preventable, their incidence also reflects on the performance of the health system.

Infectious diseases are defined on the basis of their causative microorganisms, *Mycobacterium tuberculosis* for tuberculosis and *Neisseria gonorrhœae* for gonorrhea. There are operational case definitions used by public health agencies for the purpose of surveillance – see, for example, the ones used by the Centers for Disease Control and Prevention (CDC) of the United States https://wwwn.cdc.gov/nndss/conditions/.

Inclusion and exclusion criteria vary across different jurisdictions, and in the absence of laboratory confirmation, cases defined on the basis of clinical signs and symptoms and other investigations (such as X-ray) may not be completely comparable internationally. CircHOB accepts as confirmed cases those that are reported by the various public health agencies.

The annual incidence rate of a disease = (number of new cases reported in year X) / (mean population of year X)

This is usually expressed as cases per 100000 persons. Crude rather than age-standardized rates are reported for TB and gonorrhea.

Cancer

Cancer is one of the few chronic, non-communicable diseases for which population-based registries have been in existence for decades, at least among the developed countries. Cancer registration is complex and requires an adequate health care infrastructure to maintain and sustain it. Registries differ in their comprehensive coverage of cases and the quality of the data captured. CircHOB reports **age-standardized incidence rates (ASIR) of cancer**, both for all cancers combined, and several more common sites, including lung, colon and rectum (the last two tend to be combined in some countries) in both sexes, prostate in men, and breast and cervix in women. A "case" refers to the anatomical site on which a new primary case occurs, and not from secondary spread from some other site. Only malignant cases (ICD-10 codes C00-C96) are reported - benign and in-situ neoplasms are excluded.

For age-standardization, a hypothetical standard population known as the "world standard population" is widely used in international comparisons of cancer incidence rates, developed by the International Agency for Research on Cancer (IARC) http://www-dep.iarc.fr/WHOdb/glossary.htm. The age distribution in a population of 100000 people is as follows:

0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
12000	10000	9000	9000	8000	8000	6000	6000	6000
45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
6000	5000	4000	4000	3000	2000	1000	500	500

The "European standard population" is used by CircHOB to compare age-standardized mortality rates (ASMR) – see Methodological Notes: Mortality Module. The calculation for ASIR is the same as that for ASMR. The ASIRs can only be compared among themselves, or with any of the published rates in IARC or other scientific publications that use the same world standard population. They cannot be compared with published rates by agencies that use a country's population from a specific year as the standard.

Data Sources and Limitations

The Nordic countries collaborate in the Association of Nordic Cancer Registries (NORDCAN) database, which reports on national data as well as those of Faroe Islands and Greenland. Regional data for Norway, Sweden and Finland are not reported by NORDCAN after 2005 and are available from the respective national cancer registries.

United States
Data from the National Program of Cancer Registries are available from CDC Wonder http://wonder.cdc.gov/cancer.html.

Data from the CDC On-Line Tuberculosis Information System http://wonder.cdc.gov/tb.html and Sexually Transmitted Disease Morbidity database http://wonder.cdc.gov/std.html are available from CDC Wonder.

Canada
Statistics Canada maintains the Canadian Cancer Registry. Age-sex specific data are available from Table 13-10-0111-01 (formerly CANSIM 103-0550) from which ASIR using the world standard population can be calculated https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1310011101. The practice of random rounding to 5 and 10 renders unusable reported data for the small populations of Yukon, Northwest Territories and Nunavut, where many age-sex categories have few cases. Exact case numbers by age and sex for the territories are accessed from the branch research data centre located in ICHR in Yellowknife.

Infectious diseases data are extracted from *Tuberculosis in Canada* and *Report on Sexually Transmitted Infections in Canada*, various years, occasionally published by the Public Health Agency of Canada https://www.canada.ca/en/services/health/publications/diseases-conditions.html

Denmark
Cancer data are from NORDCAN http://www-dep.iarc.fr/nordcan.htm

Tuberculosis and gonorrhea data are available from the Statens Serum Institute www.ssi.dk/Smitteberedskab/Sygdomsovervaagning.aspx
>Smitteberedskab> Overvågning i tal, grafer og kort.

Greenland
Cancer data are from NORDCAN http://www-dep.iarc.fr/nordcan/English/frame.asp

TB data are available from the annual report (*Årsberetning*) of the Chief Medical Officer (Landslægeembedet), various years http://nun.gl Landslægeembedet > Udgivelser > Landslægeembedets Årsberetninger. Sexually transmitted diseases data are available from Statistics Greenland http://bank.stat.gl/pxweb/en/Greenland/Greenland__BE Health > National Board > STD (SUELSKS2)

Faroe Islands
Cancer data are from NORDCAN http://www-dep.iarc.fr/nordcan/English/frame.asp

Infectious disease data are published in the annual report *Sundhedsberetning* of the Chief Medical Officer (Landslæknin í Føroyum) https://stps.dk/da/om-os/landslaeknin/dansk-danskt/udgivelser (2000-14 data are reported in the 2014 report).

Iceland
Cancer data are from NORDCAN http://www-dep.iarc.fr/nordcan/English/frame.asp

The Directorate of Health provides an annually updated spreadsheet containing all notifiable communicable diseases https://www.landlaeknir.is/english/statistics/diseases/

Norway
National data for cancer are from NORDCAN http://www-dep.iarc.fr/nordcan/English/frame.asp
Regional data are available from the annual report *Cancer in Norway*
https://www.kreftregisteret.no/en/General/Publications/Cancer-in-Norway/

Both tuberculosis and gonorrhea are among the diseases listed in the Surveillance System for Communicable Diseases (Meldingssystem for smittsomme sykdommer, or MSIS) of the Norwegian Institute of Public Health (Folkehelseinstituttet) www.msis.no

Sweden
National data for cancer are from NORDCAN http://www-dep.iarc.fr/nordcan/English/frame.asp
Regional data are available from Socialstyrelsen's statistical database
http://www.socialstyrelsen.se/statistics/statisticaldatabase/cancer

Tuberculosis and gonorrhea cases are reported by the Swedish Public Health Agency;
https://www.folkhalsomyndigheten.se/folkhalsorapportering-statistik/statistikdatabaser-och-visualisering/sjukdomsstatistik/tuberkulos/
https://www.folkhalsomyndigheten.se/folkhalsorapportering-statistik/statistikdatabaser-och-visualisering/sjukdomsstatistik/gonorre/

Data on pre 2007 gonorrhea cases and pre-2010 TB cases were retrieved from the former Swedish Institute for Infectious Disease Control (Smittskyddsinstitutet), no longer archived.

Finland
National data for cancer are from NORDCAN http://www-dep.iarc.fr/nordcan/English/frame.asp
Regional data are from the Finnish Cancer Registry https://cancerregistry.fi/statistics/cancer-statistics/

Communicable disease surveillance is the responsibility of the National Institute of Health and Welfare (Terveyden ja hyvinvoinnin laitos, or THL), https://thl.fi/ttr/gen/rpt/tilastot.html - data are available from the Finnish and Swedish websites only.

NORCAN, the Finnish Cancer Registry, and THL report regional data by hospital districts. For CircHOB, data for Pohjois-Suomi AVI (former Oulun lääni) are obtained by combining the hospital districts of Pohjois-Pohjanmaa and Kainuu, while those of Lappi are rom the Lansi-Pohja and Lappi hospital districts.

Russia
Cancer data are available from the annual report *Malignant neoplasms in Russia (incidence and mortality)* (in Russian) published by the P.A. Hertzen Research Institute of Oncology in Moscow www.oncology.ru

TB and gonorrhea data are from a variety of Russian sources:
- Rosstat www.gks.ru
- The Central Research Institute of the Ministry of Health and Social Development (Central'nyi nauchno-issledovatel'skii institut organizatsii i informatizatsii zdravoohranenija Ministerstva zdravoohranenija i social'nogo razvitiia Rossiskoi Federatsii) www.mednet.ru/en/statistika.html
- The report *Zdravookhranenie v Rossii: Statisticheskii sbornik* (*Health Care in Russia*), various years http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1139919134734

Only the Russian website of Rosstat contains the interactive database for regional data, which requires registration and login. Mednet also requires login.

Table 2.8 Incidence rates (per 100000) of selected infectious diseases

Country/Region	Tuberculosis			Gonorrhea		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	5.3	4.3	3.2	121.2	112.3	105.1
Alaska	9.7	7.8	7.4	80.9	99.1	124.6
Canada	5.4	5.0	4.7	24.2	41.9	37.5
Yukon	5.2	12.8	9.5	41.7	61.9	58.4
Northwest Territories	21.1	25.4	17.4	357.1	626.6	410.6
Nunavut	106.5	151.6	223.9	249.2	944.8	1438.5
Northern Canada	*40.5*	*58.5*	*77.8*	*230.9*	*547.7*	*611.8*
Denmark	8.4	7.0	6.5	4.1	8.1	12.9
Greenland	137.5	126.2	180.3	1502.6	1539.0	2421.0
Faroe Islands	3.4	1.7	4.6	1.7	0.8	0.4
Iceland	3.6	3.4	3.9	2.3	13.6	8.8
Norway	6.2	6.6	7.1	5.8	5.6	9.6
Nordland	4.8	5.5	7.5	3.4	2.6	4.6
Troms	5.7	5.0	9.3	4.5	5.2	6.9
Finnmark	9.8	5.0	5.4	5.4	4.1	4.0
Northern Norway	*5.9*	*5.3*	*7.8*	*4.1*	*3.7*	*5.3*
Sweden	4.9	6.0	6.8	6.3	7.3	11.2
Västerbotten	5.2	4.0	5.9	2.8	1.9	3.0
Norrbotten	3.3	3.7	6.2	2.6	3.4	4.2
Northern Sweden	*4.2*	*3.9*	*6.1*	*2.7*	*2.7*	*3.6*
Finland	8.6	6.7	5.4	4.5	4.1	5.2
Pohjois-Suomi	9.5	6.6	5.8	2.5	2.3	3.0
Lappi	9.1	9.6	5.7	3.0	2.1	1.9
Northern Finland	*9.4*	*7.5*	*5.8*	*2.6*	*2.2*	*45.0*
Russian Federation	85.2	83.4	68.2	96.1	60.1	34.0
Murmansk Oblast	67.6	57.5	41.2	133.6	76.0	38.9
Kareliya Republic	78.4	68.2	54.2	198.8	121.3	68.9
Arkhangelsk Oblast	84.8	62.5	46.2	170.0	103.9	78.8
- Nenets AO	49.8	46.2	44.7	128.5	152.8	85.4
Komi Republic	92.8	88.2	70.8	193.2	127.1	73.9
Yamalo-Nenets AO	88.2	80.9	62.7	89.0	64.0	44.8
Khanty-Mansi AO	87.2	88.7	69.0	137.1	86.8	43.8
Krasnoyarsk Kray	104.7	107.6	96.0	96.2	65.5	49.3
- Taymyr AO	70.1	65.7	-	190.9	98.6	-
- Evenki AO	172.2	142.4	-	108.0	127.6	-
Sakha Republic	88.5	83.2	78.8	245.6	163.9	127.7
Magadan Oblast	86.3	82.9	70.6	202.9	102.9	79.9
Kamchatka Kray	90.8	94.9	86.8	105.5	161.9	65.7
- Koryak AO	333.9	451.1	-	172.1	166.9	-
Chukotka AO	68.4	74.3	130.2	291.5	270.3	129.8
Northern Russia	*90.3*	*87.2*	*72.5*	*147.6*	*98.8*	*63.4*

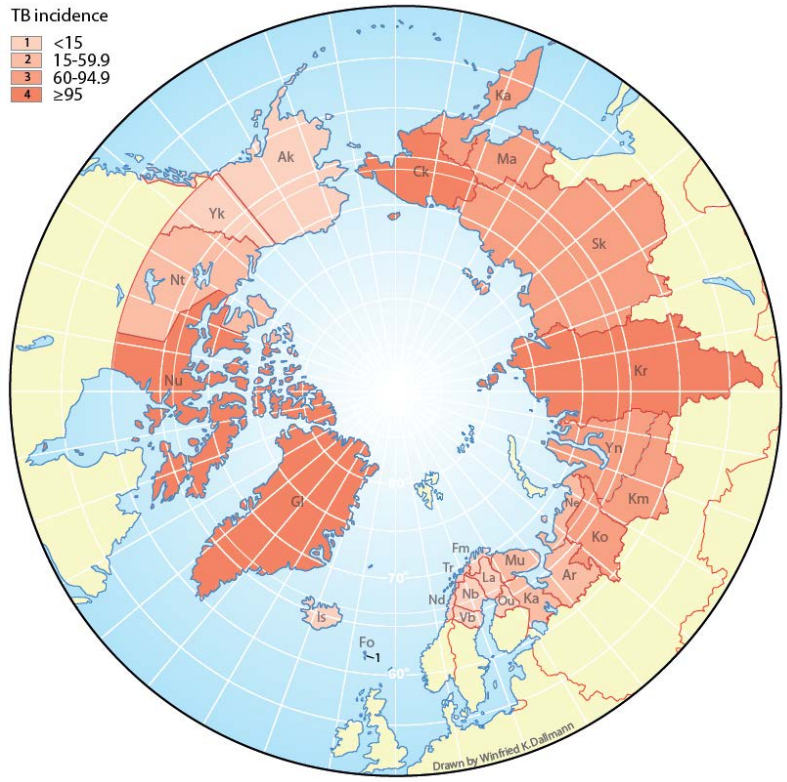


Fig.2.10 Incidence of tuberculosis (per 100000), 2010-14

Fig.2.11 Incidence of gonorrhea (per 100000), 2010-14

Table 2.9 Age-standardized incidence rates (per 100000) of selected cancer by site and sex (a)

Country/Region	Cancer lung M			Cancer lung F			Cancer breast F		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	56.6	51.4	44.1	36.5	36.3	33.2	92.2	88.9	88.8
Alaska	55.0	50.1	39.1	39.1	39.6	32.3	100.2	93.0	89.9
Canada	50.9	46.0	50.2	34.0	34.7	41.6	81.7	78.3	98.5
Yukon	56.6	39.0	42.5	30.3	42.0	37.9	79.5	75.4	98.7
Northwest Territories	48.8	47.8	63.1	55.6	40.6	42.0	102.3	70.1	107.1
Nunavut	163.2	131.9	123.0	184.0	115.0	121.6	32.8	56.0	39.0
Northern Canada	-	-	-	-	-	-	-	-	-
Denmark	46.6	44.3	28.9	33.2	36.0	34.1	86.1	96.1	94.2
Greenland	105.0	88.7	71.6	69.8	67.1	63.2	48.8	37.2	46.7
Faroe Islands	22.7	17.2	17.7	11.6	15.4	15.6	60.1	55.0	52.9
Iceland	34.5	34.4	28.9	33.3	31.9	34.1	85.9	89.8	86.1
Norway	36.6	36.1	34.2	21.3	24.4	26.7	76.5	73.9	77.1
Nordland	38.4	35.1	33.5	23.1	26.9	23.4	72.4	71.5	67.1
Troms	37.7	41.0	33.9	22.0	22.0	24.2	72.5	66.1	66.4
Finnmark	53.3	43.4	51.2	21.8	31.8	26.4	64.9	63.5	58.5
Northern Norway	-	-	-	-	-	-	-	-	-
Sweden	21.2	20.1	19.0	15.9	18.2	18.5	81.1	79.7	84.7
Västerbotten	17.4	17.1	16.4	11.5	16.2	14.1	73.3	94.7	116.2
Norrbotten	15.6	16.7	17.8	13.8	17.2	16.8	74.2	72.4	86.5
Northern Sweden	-	-	-	-	-	-	-	-	-
Finland	36.6	33.3	29.6	10.3	11.6	12.9	81.4	85.3	90.1
Pohjois-Suomi	38.5	34.6	31.9	9.3	10.9	11.2	62.5	73.7	85.9
Lappi	38.3	38.9	32.7	11.8	12.5	14.5	64.6	72.1	84.4
Northern Finland	-	-	-	-	-	-	-	-	-
Russian Federation	61.3	55.9	50.6	7.0	6.8	7.1	39.1	42.4	46.6
Murmansk Oblast	66.5	68.3	64.8	7.2	8.2	9.6	42.2	49.2	55.1
Kareliya Republic	69.0	67.7	62.2	4.1	5.3	6.6	37.7	42.2	49.0
Arkhangelsk Oblast	67.8	66.3	66.3	6.5	5.5	7.1	33.5	36.5	42.4
- Nenets AO	-	-	-	-	-	-	-	-	-
Komi Republic	73.1	70.1	64.9	8.8	9.6	9.5	33.5	40.1	47.1
Yamalo-Nenets AO	-	-	-	-	-	-	-	-	-
Khanty-Mansi AO	-	-	-	-	-	-	-	-	-
Krasnoyarsk Kray	71.6	65.9	59.8	9.1	8.9	9.9	37.1	42.2	49.1
- Taymyr AO	-	-	-	-	-	-	-	-	-
- Evenki AO	-	-	-	-	-	-	-	-	-
Sakha Republic	58.6	60.4	53.1	21.9	17.6	14.5	30.0	30.3	34.2
Magadan Oblast	73.5	75.5	78.8	13.5	15.0	16.1	40.6	46.0	49.4
Kamchatka Kray	55.8	61.4	57.5	6.6	8.5	9.3	40.6	46.5	57.0
- Koryak AO	-	-	-	-	-	-	-	-	-
Chukotka AO	54.0	67.8	110.5	18.0	28.8	32.4	38.4	43.1	51.0
Northern Russia	-	-	-	-	-	-	-	-	-

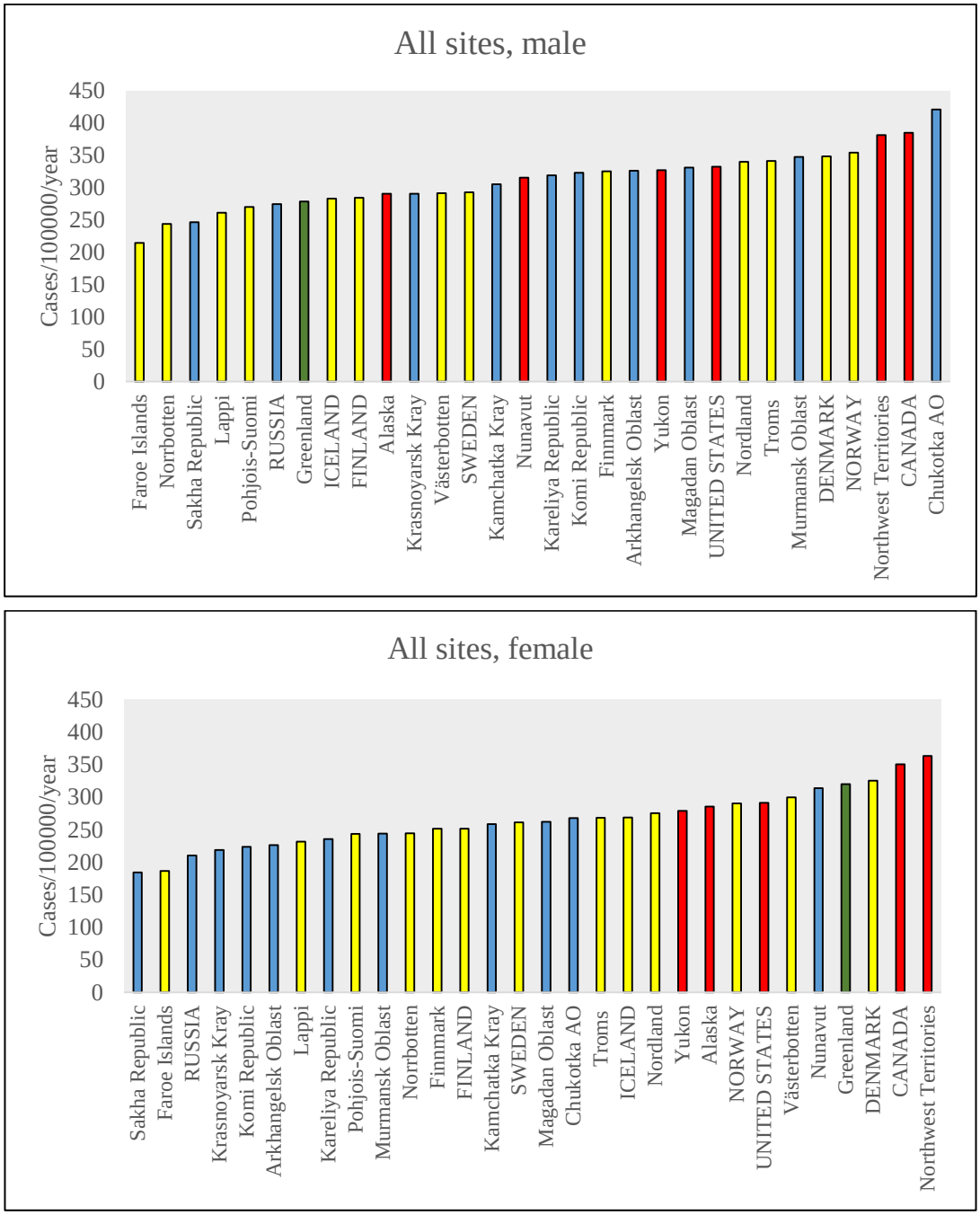


Fig.2.12 Age-standardized incidence rate of cancer, all sites combined, 2010-14

Table 2.10 Age-standardized incidence rates (per 100000) of selected cancer by site and sex (b)

Country/Region	Cancer colon/rectum M			Cancer colon/rectum F			Cancer prostate M		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	39.0	34.0	29.3	28.0	25.1	21.9	110.2	104.7	79.5
Alaska	40.7	33.7	29.1	31.2	27.1	26.2	113.8	92.4	63.0
Canada	42.8	42.1	48.7	29.2	28.1	34.1	88.0	87.2	88.6
Yukon	49.8	31.5	45.0	36.9	32.7	32.6	59.2	60.2	76.9
Northwest Territories	84.7	52.9	72.5	49.4	55.9	66.4	61.1	84.9	61.5
Nunavut	54.2	73.0	53.6	80.0	61.3	60.2	22.9	20.8	32.4
Northern Canada	-	-	-	-	-	-	-	-	-
Denmark	40.9	43.3	43.6	30.4	32.8	33.8	49.9	81.2	77.4
Greenland	42.3	37.4	36.1	42.2	32.6	43.3	9.9	13.3	20.2
Faroe Islands	23.7	30.7	34.0	29.5	29.7	23.7	20.2	66.2	59.0
Iceland	32.0	32.5	30.6	23.1	25.2	22.2	93.1	100.5	81.4
Norway	43.1	43.1	44.8	34.3	35.3	36.2	84.0	104.2	107.3
Nordland	42.4	45.9	43.7	33.5	35.9	36.4	77.0	43.4	98.0
Troms	39.7	40.7	48.4	30.3	30.9	33.2	78.0	35.9	105.6
Finnmark	38.7	88.7	34.5	27.1	24.8	33.8	55.4	70.8	84.7
Northern Norway	-	-	-	-	-	-	-	-	-
Sweden	30.6	31.8	31.4	23.5	25.3	24.9	97.4	106.2	101.9
Västerbotten	33.2	33.5	36.1	24.8	28.6	29.5	99.4	100.2	101.1
Norrbotten	22.8	25.5	24.3	20.7	18.7	18.9	67.7	79.1	78.3
Northern Sweden	-	-	-	-	-	-	-	-	-
Finland	26.4	28.0	28.3	20.0	20.3	20.6	95.6	94.1	85.2
Pohjois-Suomi	20.5	20.9	21.5	17.3	16.3	13.9	72.4	82.6	73.4
Lappi	22.1	21.4	18.7	15.8	14.8	13.0	93.6	86.0	77.8
Northern Finland	-	-	-	-	-	-	-	-	-
Russian Federation	26.3	28.8	30.2	19.5	20.8	21.7	16.0	24.1	33.9
Murmansk Oblast	37.7	39.6	42.2	24.5	28.4	27.8	18.2	35.6	54.5
Kareliya Republic	34.0	34.2	38.1	20.2	24.5	25.4	13.4	29.6	33.7
Arkhangelsk Oblast	27.7	32.4	38.2	22.1	24.8	26.7	14.3	26.7	36.7
- Nenets AO	-	-	-	-	-	-	-	-	-
Komi Republic	31.1	40.4	40.3	22.9	24.9	25.1	12.1	19.1	30.7
Yamalo-Nenets AO	-	-	-	-	-	-	-	-	-
Khanty-Mansi AO	-	-	-	-	-	-	-	-	-
Krasnoyarsk Kray	22.6	27.0	29.2	18.4	19.9	21.8	15.8	23.5	36.9
- Taymyr AO	-	-	-	-	-	-	-	-	-
- Evenki AO	-	-	-	-	-	-	-	-	-
Sakha Republic	19.5	23.4	21.9	17.5	20.2	18.8	7.9	8.1	14.8
Magadan Oblast	38.4	32.3	37.1	27.8	27.9	28.8	16.9	13.7	22.6
Kamchatka Kray	29.0	27.5	31.5	20.6	24.5	25.3	10.4	20.4	33.8
- Koryak AO	-	-	-	-	-	-	-	-	-
Chukotka AO	18.9	33.1	38.3	35.3	36.4	43.0	8.8	12.4	50.3
Northern Russia	-	-	-	-	-	-	-	-	-

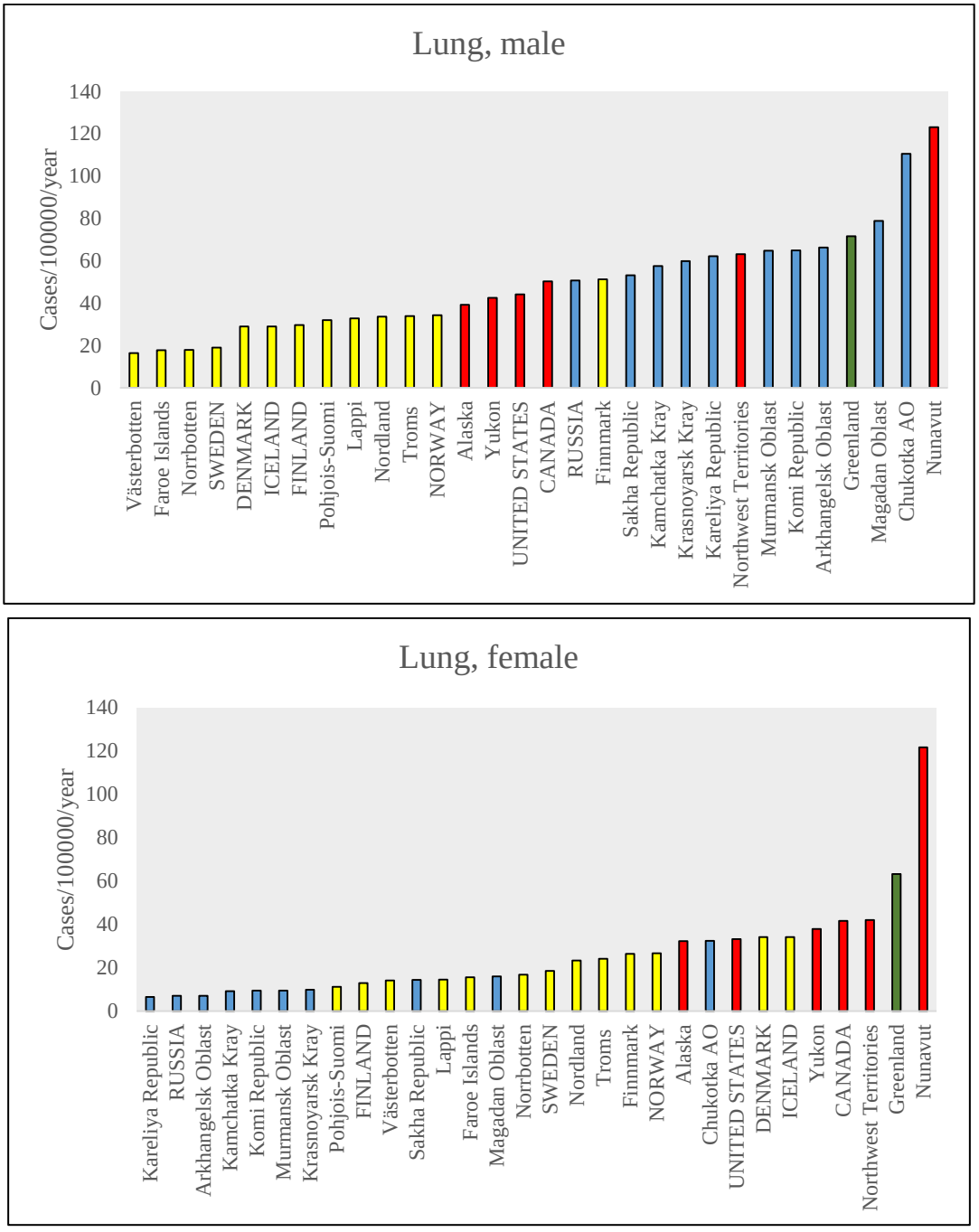


Fig.2.13 Age-standardized incidence rate of lung cancer, 2010-14

2.5 Reproductive Outcomes

Concepts and Definitions

An important measure of reproductive outcome, the survival of the fetus while still *in utero* and shortly after birth, is the **number and rate of perinatal deaths**. International comparisons of perinatal mortality have been hampered by variable definitions across national jurisdictions.

WHO defines the perinatal period as commencing at 22 completed weeks (154 days) of gestation, and ending at 7 completed days after birth. This definition dates from ICD-10 and is recommended in its guidelines for reproductive health indicators http://whqlibdoc.who.int/publications/2006/924156315X_eng.pdf.

A perinatal death is thus a death (of a fetus or a neonate) within this perinatal period. WHO also specifies that the fetus should weigh at least 500 grams or has a crown-heel length of 25 cm or more. A neonate who dies between birth and 7 completed days (called **early neonatal death**) clearly had to be born alive first, and counted originally as a livebirth. An alternative definition of perinatal death includes fetal deaths of 28 weeks or more gestation (called **late fetal deaths**) and early neonatal deaths.

The WHO definition of a fetal death:

Death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles.

Fetal death is the preferred term, and should replace others such as "stillbirth", "miscarriage" or "spontaneous abortion". Fetal deaths do not include induced terminations of pregnancy (induced abortions).

CircHOB reports two sets of perinatal mortality rates based on the two definitions, PMR-1 and PMR-2:

PMR-1 = (fetal deaths of **22**+ weeks gestation) + (early neonatal deaths <7 days) in year X) / (sum of livebirths and fetal deaths in year X)

PMR-2 = (fetal deaths of **28**+ weeks gestation) + (early neonatal deaths <7 days) in year X) / (sum of livebirths and fetal deaths in year X)

Both rates are expressed as per 1000 total births. Region of residence refers to that of the mother. WHO's "22+ weeks" definition is adhered to by the Nordic countries, Greenland and Faroe Islands. Canada and the United States report fetal deaths from 20 weeks and also from 28 weeks. Russia changed from the 28+ weeks definition to the 22+ weeks one in 2012. In general PMR-1 tend to be higher than PMR-2 due to the longer period and larger number of fetal deaths.

Other commonly used indicators of reproductive outcomes include the distribution of livebirths by **birthweight** (low birth weight and high birth weight) and **gestational age**. CircHOB has discontinued monitoring them due to gaps in the availability of publicly accessible data, especially for the regions.

Data Sources and Limitations

In calculating rates and proportions, the number of livebirths used in this module of CircHOB may differ from those reported in the fertility module, derived from the various national statistical agencies. In the case of the United States and Canada, these agencies are also the source of information on perinatal deaths, and hence the livebirth counts are identical. For the other jurisdictions, the medical births registry or office of the chief medical officer is used as the source of both the number of livebirths and number of perinatal deaths. The livebirth counts from these sources differ from those of their national statistical agencies in that the birth registries tend to record and report only on births occurring within the country, whereas the national statistical agencies record and report on births to mothers who are citizens/permanent

residents regardless of the place of delivery. Because of incomplete data capture from health care institutions, the livebirth counts in the medical births registry also tend to be lower than the counts reported by the national statistical agencies.

United States
Perinatal mortality data are available from CDC Wonder https://wonder.cdc.gov/
Mortality > Fetal deaths; Mortality > Infant deaths; Births
Fetal deaths of 20+ weeks (not 22+ weeks) and 28+ weeks are reported. The database reports data only from 2005 onwards. Data for 2000-04 were obtained by special request to the National Center of Health Statistics. CircHOB uses the 20+ weeks data in place of 22+ weeks in calculating PMR-1.

Canada
Data on perinatal deaths to calculate PMR-1 and PMR-2 are available from Statistics Canada. It is 20+weeks rather than 22+ weeks that are used in calculating PMR-1,.

Late fetal deaths (28+weeks) and early neonatal deaths are reported in the table on perinatal mortality (13-10-0714-01, formerly CANSIM 102-0508)
https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310071401
Fetal deaths (20+ weeks and 28+ weeks) are available from the table on stillbirths (13-10-0427-01, formerly CANSIM 102-4514) https://www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=1310042701
Livebirths data are from Table 13-10-0416-01 (formerly CANSIM 102-4503)
https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310041601

Denmark
PMR-1 data are obtained from the report *Nordic Perinatal Statistics* compiled by the National Institute of Health and Welfare of Finland http://www.julkari.fi/handle/10024/136095
PMR-2 data are obtained from OECD https://stats.oecd.org/ Health > Health status > Maternal and infant mortality.

Greenland
Perinatal mortality data (PMR-1) are reported in the annual report of the Chief Medical Officer of the Chief Medical Officer (Landslægeembedet), http://nun.gl Landslægeembedet > Udgivelser > Landslægeembedets Årsberetninger, various years

Faroe Islands
Perinatal mortality data (PMR-1) are provided by the Chief Medical Officer in the annual report *Sundhedsberetning* https://stps.dk/da/om-os/landslaeknin/dansk-danskt/udgivelser/

Iceland
PMR-1 data are from the report *Nordic Perinatal Statistics* http://www.julkari.fi/handle/10024/136095
PMR-2 data are from Statistics Iceland www.statice.is/Statistics/Population/Births-and-deaths
Deaths > Deaths > Infant mortality and late fetal deaths MAN05321

Norway
PMR-1 data are available from the Medical Births Registry of the Norwegian Institute of Public Health http://statistikkbank.fhi.no/mfr/
PMR-2 data are available only for Norway nationally from OECD https://stats.oecd.org/ Health > Health status > Maternal and infant mortality

Sweden
PMR-1 data are from the Medical Births Registry at the National Board of Health and Welfare http://www.socialstyrelsen.se/statistik/statistikdatabas/graviditeter-forlossningarochnyfodda
PMR-2 data are available only for Sweden nationally from OECD https://stats.oecd.org/ Health > Health status > Maternal and infant mortality

Finland
National data on perinatal mortality (PMR-1) are available from the THL report *Perinatal Statistics* https://thl.fi/en/web/thlfi-en/statistics/statistics-by-topic Sexual and reproductive health > Parturients, deliveries and births > Perinatal statistics

Regional data for 2000-05 are from the report *Parturients, Deliveries and Births*, various years, and 2006-14 data are from the biennial report *Newborns*, various years http://www.julkari.fi/handle/10024/129578

PMR-2 data for Finland nationally only are obtained from OECD https://stats.oecd.org/ Health > Health status > Maternal and infant mortality

Russia
Russian national and regional data were from the *Demographic Yearbook*, various years http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1137674209312

Note that Russia changed the definition from PMR-2 to PMR-1 in 2012 but subsequent reports did not revise old data using PMR-2. For the years 2010-14, CircHOB presents both PMR-2 (based on 2010-11 data) and PMR-1 (based on 2012-14 data).

City of Tromsø (69°41'N), population 70000, in Troms, Norway

Although population density is generally low in the Arctic, there are large cities, such as Anchorage in Alaska (61°13′N, pop 300000) and Arkangelsk in northwestern Russia (64°32′N, pop 360000). In many regions, more than half of the population resides in their largest cities.

Table 2.11 Perinatal mortality rates (per 1000 total births)

Country/Region	Perinatal mortality rate (PMR-1)			Perinatal mortality rate (PMR-2)		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	10.1	9.6	9.3	6.9	6.4	6.2
Alaska	7.3	7.1	7.0	5.2	4.9	4.5
Canada	9.3	10.0	10.7	6.3	6.2	6.0
Yukon	10.8	10.0	11.6	8.5	6.7	3.9
Northwest Territories	12.2	14.5	11.3	8.7	10.6	5.8
Nunavut	13.2	17.9	22.2	9.5	11.7	14.7
Northern Canada	12.4	15.0	16.2	9.0	10.3	9.4
Denmark	6.5	6.5	5.6	6.5	5.3	4.8
Greenland	15.5	15.5	13.3	-	-	-
Faroe Islands	3.4	5.6	4.4	-	-	-
Iceland	5.2	5.2	3.3	4.0	3.4	2.3
Norway	6.8	5.9	5.2	5.7	5.1	4.5
Nordland	7.7	5.6	6.1	-	-	-
Troms	6.0	5.1	5.0	-	-	-
Finnmark	4.7	5.0	7.2	-	-	-
Northern Norway	6.6	5.4	5.9	-	-	-
Sweden	5.1	4.6	6.1	5.4	4.6	5.0
Västerbotten	6.6	5.0	4.5	-	-	-
Norrbotten	5.3	4.5	4.7	-	-	-
Northern Sweden	6.0	4.7	4.6	-	-	-
Finland	5.4	5.0	3.9	4.9	3.8	3.4
Pohjois-Suomi	5.4	5.0	4.0	-	-	-
Lappi	5.9	5.2	3.6	-	-	-
Northern Finland	5.5	5.1	3.9	-	-	-
Russian Federation	-	-	9.5	11.9	8.9	7.3
Murmansk Oblast	-	-	7.8	9.7	7.6	5.8
Kareliya Republic	-	-	9.9	11.3	7.6	6.3
Arkhangelsk Oblast	-	-	9.7	13.5	10.0	6.8
- Nenets AO	-	-	8.2	16.8	9.2	5.2
Komi Republic	-	-	8.2	8.1	5.9	4.6
Yamalo-Nenets AO	-	-	8.3	9.7	7.6	7.4
Khanty-Mansi AO	-	-	4.7	7.8	5.8	4.5
Krasnoyarsk Kray	-	-	10.1	11.1	10.0	8.0
- Taymyr AO	-	-	-	12.0	10.9	-
- Evenki AO	-	-	-	12.1	15.8	-
Sakha Republic	-	-	10.8	15.2	9.8	8.1
Magadan Oblast	-	-	9.1	13.1	11.1	8.5
Kamchatka Kray	-	-	13.1	10.6	10.2	8.6
- Koryak AO	-	-	-	9.3	8.7	-
Chukotka AO	-	-	15.4	15.0	7.3	11.1
Northern Russia	-	-	8.8	10.9	8.4	6.7

Note: PMR-1 based on fetal deaths from 22+ weeks; PMR-2 based on late fetal deaths from 28+ weeks

2.6 Commentary

Population

- Circumpolar regions vary in population size substantially, with regions such as Yukon, Nunavut and Chukotka having fewer than 35000 inhabitants, while several Russian regions have population exceeding 1 million people
- Population density is generally low, with regions in northern Canada and Greenland having less than 0.1 person per sq.km. The northern regions of the Nordic countries are generally more densely populated. The Faroe Islands report the highest population density, exceeding 35 people per sq.km.
- Most northern regions in Russia lost substantial proportion of their population after the collapse of the Soviet Union. Comparing 2014 with 1990, Chukotka lost 60% of its population. Two resource-rich regions (Khanty-Mansi and Yamalo-Nenets) were spared the population loss. Alaska and northern Canada has gained population, with Nunavut increasing by 60% during the 1990-2014 period.
- The age-structure in northern Fennoscandia mirrors that of their respective national populations, characterized by a high proportion of people aged 65+. The proportion is highest in northern Sweden. Alaska, Northwest Territories. Nunavut and Greenland are the most youthful, with Nunavut reporting >30% of its population under the age of 15.

Fertility

- The northern regions of Sweden and Norway (but not northern Finland and the Faroe Islands) and Russia have total fertility rate below replacement level (2.0). TFR is highest in Nunavut, at 2.9.
- Peak fertility in Nunavut occurs in the age group 20-24, but is a decade later in northern Sweden.

Mortality

- Infant mortality rates are highest in Chukota and Nunavut, around 20/1000 livebirths. There has been little improvement over the 15-year period. Lowest among circumpolar regions is Iceland, with rates <2/1000.
- There is substantial disparities among circumpolar regions. Life expectancy at birth for males is 80 years in Iceland, more than 20 years longer than that of Chukotka. The universal phenomenon of women having longer LE than men is also observed in the Arctic.
- All-cause mortality is highest across the Russian North, followed by Greenland and Nunavut. The same regions experience high injury mortality. Greenland, Nunavut and Chukotka report the highest rate of suicide.

Disease Incidence

- Considerable variation in the incidence of tuberculosis exists across circumpolar regions, with Nunavut, Greenland and the Russian North reporting the highest rates. Nunavut's rate is almost 50 times that of Canada, while Greenland's is about 28 times that of Denmark. In both regions, the rates have continued to increase over the 3 5-year periods.
- Greenland is the hotspot for gonorrhea, with rates exceeding 2400 cases/100000 per year, followed by Nunavut with 1400 cases/100000. At the other extreme is Faroe Islands (0.4/100000) and other Nordic regions (<10/100000).
- There is a general downward trend in the incidence of cancer. Among cancer sites, Nunavut reports the highest rates for lung cancer among both men and women.

Reproductive Outcomes

- Despite the inconsistent definitions of perinatal mortality, it is clear that Nunavut has the highest rate, followed by Greenland, other regions in the Russian and Canadian North, and Alaska. The Nordic regions occupy the low end of the spectrum.

3. Health Determinants

3.1 Socioeconomic Conditions

Concepts and Definitions

Socioeconomic conditions are widely recognized to be important determinants of health. Although there are many measures, the number that can be used for international comparisons is limited. Variables such as income, education and employment are measured differently in different countries and they have different contexts. CircHOB selects for monitoring measures on the economy, education and employment.

The **gross domestic product** (GDP) is a well-established economic indicator, and is a measure of the goods and services produced within a country or region within a time period. "Domestic" refers to production occurring within the country or region, including activities of foreign-owned firms or migrant workers. GDP is to be contrasted with gross national product (GNP) which encompasses also production by a country's citizens abroad. The GDP divided by the population produces the per capita GDP.

Cross-national comparisons require the conversion of multiple currencies to a common standard. While the US dollar at market exchange rates is often used, economists construct "purchasing power parities" (PPP) to adjust for price differences among countries. As Arctic-regional PPP-factors have not been developed, it is the PPP-factors of the national economies that are used, which could be a potential source of bias, especially if price levels are different among regions within countries.

GDP can be expressed either in current prices, i.e. prices in effect during the year in question, or constant prices, based on the prices in effect during a specified base year (2010 is used by both OECD and World Bank). GDP based on constant prices is called "real" GDP, which has been adjusted for price changes (inflation or deflation) over time. In CircHOB, real GDP is used to track time trend within a country or region. GDP based on current prices is used to compare countries/regions during the same time period,.

The use of GDP as a measure of economic well-being has well-known shortcomings:

- Non-market transactions (child rearing, homemaking, etc) are excluded
- Economic activities that are detrimental (eg. to the environment) are included
- Value of leisure and other aspects of quality of life are excluded
- Income distribution across the population is not measured
- The sustainability of production is not considered

For northern regions, there are additional issues:

- A sizable proportion of the workforce in the north consists of seasonal workers from outside the region, while many firms are owned by non-residents and their profits leave the region. The regional GDP thus does not reflect the true income accruing to the residents of the region. On the other hand, a region such as Alaska, with its Alaska Permanent Fund, generates billions of dollars of investment income outside the state which is not captured by the state's GDP
- Many northern regions are subsidized by the national governments, and such public sector spending are included in the regional GDP
- Subsistence activities, especially by Indigenous people, may not be consistently counted or valued
- Northern economies that are dependent on a few natural resources (eg. oil and gas) may be subject to substantial year-to-year variation due to market price fluctuations

A full discussion and explanation of these issues can be found in the Statistics Norway report *The Economy of the North 2015*
https://www.ssb.no/en/natur-og-miljo/artikler-og-publikasjoner/the-economy-of-the-north-2015

Another measure of economic well being, but at the individual level, is the **employment status**. While the **un**employment rate is well known, it is often misunderstood. It is the proportion of unemployed people in the labour force, consisting of the employed, unemployed and those looking for work. For many

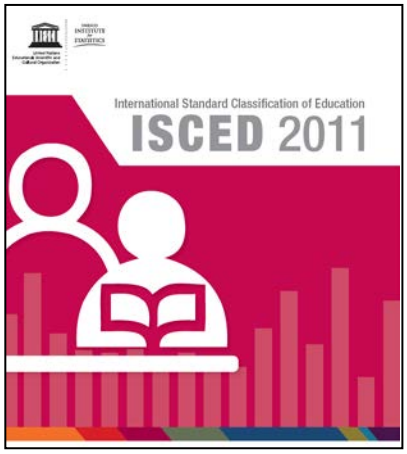
economically depressed regions where there are few employment opportunities, many people have given up on job-seeking and thus not counted in the denominator. In contrast, the **employment rate** measures the proportion of employed people among the total population. It reflects better the economic well being of the population. Note that the employment is not 100% minus the unemployment rate.

Defining who is employed can vary across jurisdictions. It usually refers to the noninstitutionalized, civilian population, but may include also members of the armed forces. The reference period is usually 1 week prior to the survey. Paid employment and self-employment, part-time and full-time work, people who work without pay for family members and people on leave are included, while volunteers are not.

For more details, see the OECD document *Labour Force Statistics in OECD Countries: Sources, Coverage and Definitions* http://www.oecd.org/els/emp/LFS%20Definitions%20-%20Tables.pdf.

Along with employment, education is also recognized as an important determinant of health. International comparison of educational levels of individuals is complicated by the vastly different educational systems in operation in different countries. CircHOB monitors **tertiary education attainment**, the proportion of the adult population who have completed tertiary education or attained qualifications at that level. Tertiary education is generally more easily identifiable and comparable across education systems. Disparities in tertiary education attainment are likely to be more pronounced across countries and regions than secondary education, which is likely to be uniformly high in the circumpolar countries.

Some statistical agencies report their results on the population aged 15 and above, or 25 and above, with some restricting to only the "working age" (up to age 65), and others up to age 75. In young adulthood, many individuals are still engaged in formal schooling, and may not have completed their highest level of education. Setting the lower age limit at 25 reduces this problem. CircHOB presents education attainment data for the age range of 25-64, or as closely as possible to ensure comparability.



The International Standard Classification of Education (ISCED), developed by UNESCO and last revised in 2011, is based on the duration of training, age at entry and completion, academic content, etc, and attempts to encompass variation in educational systems in the world http://uis.unesco.org/en/topic/international-standard-classification-education-isced. Levels 6,7, and 8 refer to programs leading to the bachelor's, master's and doctoral degree or their equivalents, respectively. Level 5 refers to "short-cycle tertiary education" which is more technical or practical than academic or theoretical, and of shorter duration. ISCED levels 5 – 8 according to the 2011 edition are equivalent to levels 5 and 6 in the earlier 1997 version.

Data Sources and Limitations

Gross domestic product
GDPs for countries and their regions are calculated from national and regional accounts by national statistical agencies. Data for circumpolar regions are available from OECD and the World Bank. In CircHOB data for **Canada**, **Denmark**, **Finland**, **Iceland**, **Norway**, **Sweden**, **Russia**, the **United States** and their respective northern regions are obtained from OECD https://stats.oecd.org/
Regions and Cities > Regional statistics > Regional economy > Regional Gross Domestic Product

Data for **Greenland** and **Faroe Islands** are available from the World Bank World Development Indicators https://datacatalog.worldbank.org/dataset/world-development-indicators

Employment status
Information on employment status in most countries is obtained from labour force surveys, conducted at various intervals, as frequently as monthly in some jurisdictions. Data for men and women are presented

separately, and the age range is 15-64. Data sources reporting only 15+ cannot be used as the rates for 15-64 is generally higher than those for 15+. Some countries also have employment registries but the data are not comparable to those from labour force surveys and are not used in CircHOB.

Data for **Denmark**, **Iceland**, **Norway, Sweden** and **Russia** are from OECD https://stats.oecd.org/ Regions and Cities > Regional statistics > Regional labour > Employment at place of residence. There are gaps for the northern regions of Norway and Sweden; however, data are available at the higher level of northern Norway and northern Sweden.

Although **United States** data are available from OECD, Alaska data are available for age 15+ only. Only national data for the 2000-04 from OECD are presented. For the 2005-09 and 2010-14 periods, the 5-year aggregate data from the annual American Community Survey for the respective period, in the age range 16-64, are used https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
> Advanced search > enter table name B23001 in search term.

For **Canada**, data for the territories by age and sex are not available from OECD. Data from the 2001 Census are used for the 2000-04 period, the 2006 Census for the 2005-09 period, and the 2011 National Household Survey for the 1010-14 period
https://www12.statcan.gc.ca/census-recensement/index-eng.cfm?HPA=1 Census datasets >
Select 2001 Census from filter > enter Cat. No. 95F0377XCB2001001
Select 2006 Census from filter > enter Cat. No. 97-559-XCB2006016
Select 2011 NHS from filter > enter Cat. No. 99-012-X2011037

Greenland data (from 2008 onwards) are from Statistics Greenland's StatBank
http://bank.stat.gl/pxweb/en/Greenland/ Labour market > Employment > Table AREBFB1
Values for the 2005-09 period are the mean of 2008 and 2009 values. Of the two variables available, the "number of main employed persons in average per month" is used rather than "number of main employed persons at least one month in the year". The former is closer to the definition used by OECD.

Faroe Islands data (from 2005 onwards) are from Statistics Faroe Islands
https://statbank.hagstova.fo/pxweb/en/H2/H2__AM/ Labour and wages > Labour force > Table AM01020

National data for **Finland** are obtained from OECD. For the regions, OECD provides sex-specific employment rates for age 15-74 and not 15-64. Regional employment rates for age 15-64 (M and F combined) are available from Statistics Finland's StatFin database
http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/ Labour market > Labour force survey.
To estimate regional sex-specific employment rates for age 15-64, the ratios of male/total and female/total rates for age 15-74 from OECD are applied to the StatFin combined rates.

Tertiary education attainment
The sources of educational attainment data include censuses, labour force surveys, and particularly in the Nordic countries, education registers. Unless otherwise specified, the age range is 25-64, and tertiary education corresponds to ISCED (2011) levels 5-8. Data for men and women are presented separately.

United States data are available from the US Census Bureau's annual American Community Survey
https://factfinder.census.gov/faces/nav/jsf/pages/guided_search.xhtml Guided search > People > Education > Education attainment. The age range is 25+. The definition of tertiary degree includes an "associate" degree or higher (bachelor's, master's, and doctorate).

For **Canada**, data from the 2001 Census are used for the 2000-04 period, the 2006 census are used for the 2005-09 period, and the 2011 National Household Survey for the 1010-14 period
https://www12.statcan.gc.ca/census-recensement/index-eng.cfm?HPA=1 Census datasets >
Select 2001 Census from filter > enter Cat. No. 97F0017XCB2001006
Select 2006 Census from filter > enter Cat. No. 97-560-XCB2006007
Select 2011 NHS from filter > enter Cat. No. 99-012-X2011040

Individuals who have attained tertiary education comprise those aged 25-64 with degrees, diplomas or certificates from community colleges and universities.

Denmark data are available from OECD https://stats.oecd.org/
> Education and training > Education at a glance > Educational attainment and outcomes > Educational attainment and labour force status

Greenland, **Faroe Islands**, and **Iceland** data are from Nordic Statistics https://www.norden.org/en/statistics Nordic statistics > Education > Level of education, Table EDUC01. Age range is 25-64.

Norway national and regional data are from Statistics Norway's StatBank https://www.ssb.no/en/statbank Education > Level of education > Educational attainment of the population > Table 08921. Individuals aged 25-66 are covered. The Statistics Norway table is based on the National Education Database, whereas OECD data for Norway are derived from labour surveys.

Sweden data are from Statistics Sweden's Statbank www.ssd.scb.se/databaser/makro/start.asp?lang=2 Education and research > Population 16-74 years of age by highest level of education, age and sex, extracting those aged 25-64. However, ISCED 1997 is used, with categories 4 and 5B combined in one category, thus including some individuals in the "post-secondary, non-tertiary" category in ISCED 2011.

Finland data are from Statistics Finland's StaFin database http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/ Education > Educational structure of the population. The data are based on Statistics Finland's Register of Completed Education and Degrees.

Russia educational data have been reported by OECD since 2010, but only nationally and not for the regions. Regional data are available from the Russian census of 2002 and 2010, with categories of "postgraduate" and "higher". The number of people in these categories, however, are substantially lower than those in ISCED levels 5-8 reported by OECD. The 2002 census data are used to represent the 2000-04 period, and the 2010 census data for the 2010-14 period.

2002 Census: www.perepis2002.ru/ct/doc/TOM_03_01.xls (national)
www.perepis2002.ru/ct/doc/TOM_03_03.xls (regional)
2010 Census: http://www.gks.ru/free_doc/new_site/perepis2010/croc/perepis_itogi1612.htm
> Volume 3: Education > Table 1.

A series of steps are undertaken to extrapolate ISCED-comparable data for Russia and its regions, based on the mean of the 2010-14 values for Russia nationally from OECD. Several ratios are first computed: (1) The ratio of the 2002 census values to the 2010 census values for Russia nationally; (2) the ratio of each region's value to the national value for the 2002 and 2010 census:

- To obtain the national value for the 2000-04 period, the 2010-14 OECD national value is applied to the 2002/2010 census ratio.
- To obtain regional values for the 2000-04 period, the 2010-14 OECD national value is applied to the regional/national ratios from the 2002 census
- To obtain regional values for the 2010-14 period, the 2010-14 OECD national value is applied to the regional/national ratios from the 2010 census
- No attempt is made to extrapolate national or regional values for the 2005-09 period.

Table 3.1 Per capita gross domestic product in US dollars purchasing-power-parities

Country/Region	GDP (current USD-PPP)			GDP (constant USD-PPP) relative to 2000							
	2000-4	2005-9	2010-4	2000	2002	2004	2006	2008	2010	2012	2014
United States	38484	46565	51088	100	103	110	116	118	118	122	127
Alaska	47452	70364	66705	100	107	120	144	170	163	171	165
Canada	31281	38562	42702	100	105	110	117	120	120	126	133
Yukon	35802	46681	57769	100	101	106	116	130	146	154	160
Northwest Territories	67963	85931	86406	100	117	155	143	151	144	126	132
Nunavut	28305	35798	50572	100	111	114	120	141	171	188	197
Northern Canada	*46956*	*59318*	*66514*	*100*	*112*	*134*	*132*	*144*	*150*	*145*	*151*
Denmark	30518	38446	45421	100	101	104	111	111	108	110	112
Greenland	23711	39382	47044	100	100	107	117	122	127	131	126
Faroe Islands	28239	44045	51973	-	-	-	-	-	-	-	-
Iceland	32189	40013	41059	100	104	115	129	143	129	133	141
Norway	38766	55034	63788	100	104	109	114	118	117	121	125
Nordland	23985	33046	41258	100	106	110	108	109	118	113	125
Troms	25414	33189	43030	100	114	114	108	106	122	121	134
Finnmark	21634	30501	41584	100	105	103	103	104	124	124	150
Northern Norway	*24080*	*32694*	*41908*	*100*	*109*	*110*	*107*	*107*	*120*	*117*	*132*
Sweden	30921	38715	44464	100	104	111	119	123	123	126	131
Västerbotten	26078	33431	38343	100	106	118	130	126	127	130	128
Norrbotten	28066	37487	47202	100	104	112	127	133	140	136	131
Northern Sweden	*27070*	*35432*	*42674*	*100*	*105*	*115*	*129*	*130*	*134*	*133*	*129*
Finland	28649	36385	40574	100	104	111	118	125	118	120	118
Pohjois-Suomi	25129	31684	33853	100	108	118	121	129	118	118	113
Lappi	23385	29528	34720	100	97	104	116	111	106	111	112
Northern Finland	*24621*	*31075*	*34092*	*100*	*105*	*114*	*119*	*124*	*114*	*116*	*113*
Russian Federation	7377	15060	19979	100	113	132	155	172	163	171	178
Murmansk Oblast	9065	15457	19500	100	92	123	113	114	107	103	102
Kareliya Republic	6059	10340	13555	100	109	104	118	120	108	114	116
Arkhangelsk Oblast	7205	14516	20840	100	100	125	138	138	152	153	154
- Nenets AO	52212	149929	210845	100	103	180	223	226	309	263	272
Komi Republic	9584	18508	27354	100	107	120	145	144	150	161	143
Yamalo-Nenets AO	49704	80660	118594	100	166	165	184	181	169	203	243
Khanty-Mansi AO	46485	82953	87535	100	102	128	156	141	123	134	123
Krasnoyarsk Kray	9595	16725	23274	100	80	92	108	101	124	110	117
- Taymyr AO	-	-	-	-	-	-	-	-	-	-	-
- Evenki AO	-	-	-	-	-	-	-	-	-	-	-
Sakha Republic	13129	19598	29825	100	104	102	100	111	119	132	142
Magadan Oblast	11674	16109	27857	100	128	103	95	95	116	120	131
Kamchatka Kray	7858	14997	21095	100	106	105	122	126	144	140	141
- Koryak AO	-	-	-	-	-	-	-	-	-	-	-
Chukotka AO	17937	36128	49295	100	192	171	156	229	250	232	254
Northern Russia	*16312*	*29505*	*38451*	*100*	*105*	*121*	*139*	*133*	*131*	*137*	*139*

Fig.3.1 Per capita GDP (USD-PPP), 2010-14

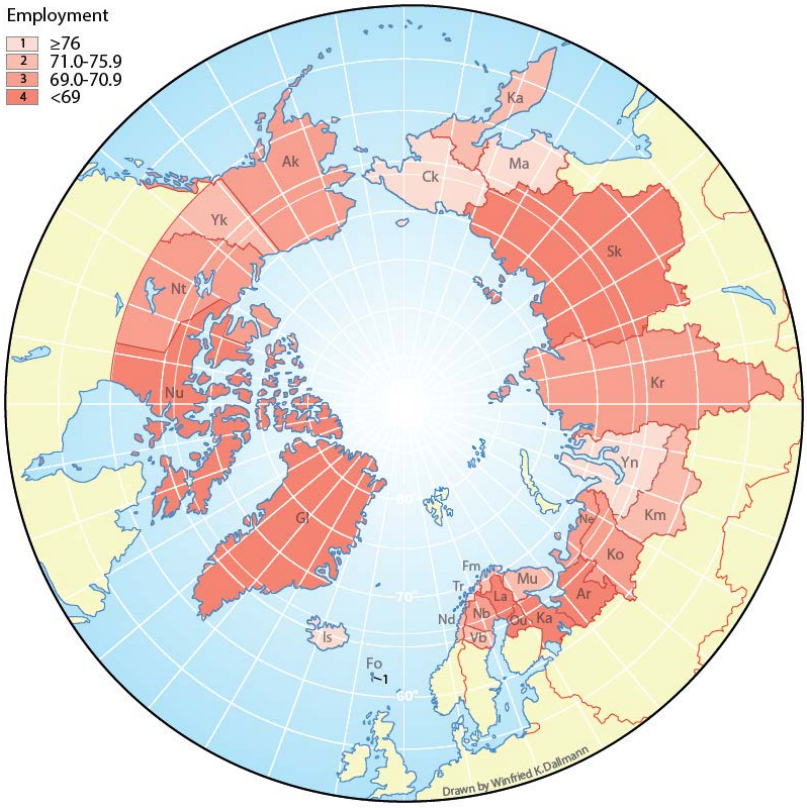


Fig.3.2 Employment rate among population aged 15-64, 2010-14

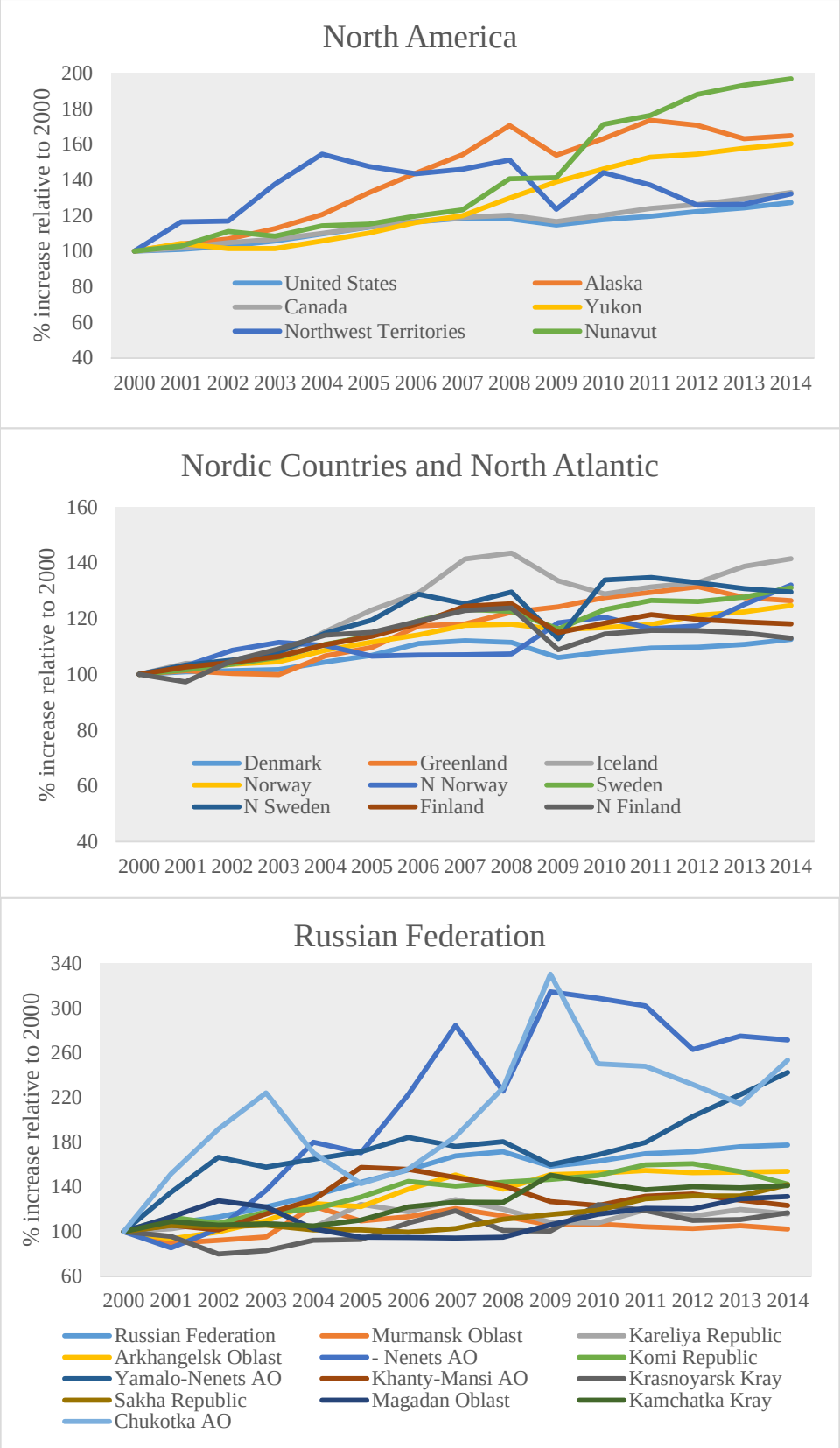


Fig.3.3 Trend in real per capita GDP, 2000-2014

Table 3.2 Employment rate (%) among population aged 15-64

Country/Region	Employment - Total			Employment - Male			Employment - Female		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	69.5	69.2	67.0	74.4	73.7	70.7	64.7	64.7	63.3
Alaska	-	70.5	70.4	-	73.9	73.6	-	66.7	66.7
Canada	71.6	71.4	70.8	76.2	75.2	73.9	67.2	67.8	67.9
Yukon	75.2	75.1	75.0	75.2	75.7	75.1	75.3	74.5	74.8
Northwest Territories	72.4	70.8	70.2	74.4	72.0	71.3	70.4	69.5	69.1
Nunavut	57.1	55.6	54.7	58.5	55.5	53.9	55.6	53.7	53.7
Northern Canada	*69.4*	*68.0*	*67.2*	*70.4*	*68.7*	*67.5*	*68.2*	*67.2*	*66.9*
Denmark	75.4	76.4	72.7	79.5	79.9	75.3	71.2	72.7	70.1
Greenland	-	64.1	61.6	-	66.6	63.3	-	61.2	59.7
Faroe Islands	-	86.7	83.3	-	88.6	85.1	-	84.6	81.3
Iceland	80.3	78.4	76.0	83.6	81.5	77.6	76.9	75.0	74.3
Norway	75.7	75.9	75.2	78.6	78.3	77.0	72.7	73.4	73.4
Nordland	-	75.1	75.2	-	76.4	77.5	-	73.7	72.5
Troms	-	77.1	*76.6*	-	79.3	76.6	-	74.8	77.0
Finnmark	-	74.4	75.7	-	76.0	75.1	-	73.6	75.6
Northern Norway	*74.4*	*75.7*	*75.8*	*75.4*	*77.3*	*76.8*	*73.4*	*74.1*	*74.5*
Sweden	73.1	73.2	73.9	74.6	77.9	75.9	71.5	68.7	71.8
Västerbotten	-	-	74.1	-	-	75.8	-	-	72.4
Norrbotten	-	-	72.7	-	-	74.6	-	-	70.7
Northern Sweden	*69.7*	-	*72.1*	-	-	*73.0*	-	-	*71.1*
Finland	67.4	69.1	68.4	69.3	70.5	69.2	65.4	67.8	67.6
Pohjois-Suomi	*62.3*	*65.0*	*64.5*	62.8	63.5	62.3	56.1	58.0	59.8
Lappi	58.3	60.1	61.9	56.2	58.8	58.6	53.5	56.0	58.6
Northern Finland	*61.1*	*63.6*	*63.8*	*60.9*	*62.2*	*61.3*	*55.3*	*57.5*	*59.5*
Russian Federation	63.4	67.6	68.1	67.3	71.0	73.3	59.8	64.4	64.6
Murmansk Oblast	66.5	72.0	73.0	70.7	75.0	76.4	62.3	69.9	69.6
Kareliya Republic	66.9	69.8	66.5	70.1	72.9	70.5	63.9	66.9	62.9
Arkhangelsk Oblast	66.4	69.4	68.7	69.2	71.6	71.6	63.7	67.3	65.9
- Nenets AO	69.6	71.3	69.5	69.9	71.8	69.7	69.2	70.7	69.5
Komi Republic	62.7	67.0	69.5	66.6	69.1	71.9	58.8	65.0	67.4
Yamalo-Nenets AO	73.9	73.8	76.0	78.0	77.5	80.2	69.7	70.1	71.8
Khanty-Mansi AO	66.5	70.3	71.8	71.9	74.2	77.1	61.0	66.5	66.8
Krasnoyarsk Kray	65.7	67.7	69.1	69.4	71.3	72.4	62.2	64.4	66.0
- Taymyr AO	-	-	-	-	-	-	-	-	-
- Evenki AO	-	-	-	-	-	-	-	-	-
Sakha Republic	65.6	64.8	66.2	68.4	67.2	69.0	62.8	62.4	63.5
Magadan Oblast	69.1	72.9	80.1	72.3	77.0	83.5	65.9	68.9	76.8
Kamchatka Kray	65.3	70.0	72.3	68.6	72.9	74.8	61.7	67.0	69.8
- Koryak AO	-	-	-	-	-	-	-	-	-
Chukotka AO	75.4	79.8	81.1	76.9	81.5	82.2	73.9	78.0	80.0
Northern Russia	*65.9*	*67.9*	*69.5*	*69.8*	*70.9*	*73.0*	*62.2*	*65.0*	*66.2*

Table 3.3 Tertiary education attainment (%) among population aged 25-64

Country/Region	Tertiary education - Total			Tertiary education - Male			Tertiary education - Female		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	32.8	34.9	37.2	34.0	35.0	36.3	31.7	35.0	38.0
Alaska	34.5	34.5	35.9	33.8	32.2	32.5	35.2	36.8	39.4
Canada	40.5	48.2	52.0	37.6	44.8	47.4	43.3	51.5	61.5
Yukon	44.1	50.3	53.8	37.5	43.7	44.4	50.7	56.5	64.7
Northwest Territories	37.6	46.9	47.9	32.8	42.1	40.8	42.5	52.0	55.0
Nunavut	28.6	34.3	31.6	26.6	31.5	27.8	*31.0*	37.4	35.5
Northern Canada	*37.7*	*45.0*	*45.9*	*32.9*	*40.0*	*38.7*	*42.8*	*50.1*	*53.7*
Denmark	29.7	32.6	34.6	27.8	30.0	30.2	31.6	35.3	39.1
Greenland	11.2	12.3	13.9	10.7	11.3	11.8	11.9	13.6	16.4
Faroe Islands	-	31.4	37.1	-	32.6	39.3	-	30.2	34.5
Iceland	26.0	31.1	35.0	24.7	27.9	29.0	27.1	34.4	40.8
Norway	28.8	32.3	35.9	27.4	29.3	31.3	30.3	35.4	40.7
Nordland	22.5	25.2	29.3	20.6	21.5	23.9	24.6	29.1	35.0
Troms	28.2	32.2	36.0	25.6	27.8	29.8	*30.9*	36.8	42.6
Finnmark	24.2	27.9	30.9	19.6	21.1	22.8	29.3	35.2	45.2
Northern Norway	*24.7*	*28.5*	*31.9*	*22.1*	*24.1*	*27.0*	*27.5*	*33.1*	*38.4*
Sweden	31.9	36.0	39.8	29.4	32.4	35.1	34.5	39.7	44.5
Västerbotten	34.3	36.3	41.8	30.6	32.1	35.9	*38.2*	40.7	48.0
Norrbotten	27.6	29.4	34.1	24.1	25.3	28.0	31.4	33.8	40.6
Northern Sweden	*30.9*	*32.8*	*38.0*	*27.3*	*28.7*	*32.0*	*34.8*	*37.2*	*44.4*
Finland	32.5	35.2	37.7	28.7	30.0	31.4	36.5	40.3	44.1
Pohjois-Suomi	30.3	33.1	35.6	26.2	28.0	29.6	*34.6*	38.6	42.2
Lappi	27.8	30.0	31.9	23.0	24.0	24.5	33.0	36.4	39.8
Northern Finland	*29.5*	*32.2*	*34.6*	*25.3*	*26.9*	*28.1*	*34.1*	*38*	*41.5*
Russian Federation	38.7	-	50.9	33.8	-	42.4	42.9	-	58.3
Murmansk Oblast	36.7	-	46.4	33.8	-	38.8	38.5	-	53.0
Kareliya Republic	33.3	-	42.5	25.9	-	32.1	40.0	-	51.7
Arkhangelsk Oblast	29.2	-	39.6	25.2	-	31.8	32.6	-	46.7
- Nenets AO	23.6	-	39.3	18.2	-	29.0	28.6	-	49.2
Komi Republic	29.5	-	40.3	23.7	-	31.0	34.9	-	48.7
Yamalo-Nenets AO	38.9	-	57.9	30.9	-	44.9	46.7	-	70.2
Khanty-Mansi AO	37.0	-	52.2	29.5	-	40.2	44.5	-	63.5
Krasnoyarsk Kray	35.7	-	46.2	30.2	-	36.8	40.3	-	54.8
- Taymyr AO	31.4	-	-	24.5	-	-	37.8	-	-
- Evenki AO	28.5	-	-	22.0	-	-	35.3	-	-
Sakha Republic	36.0	-	50.7	27.9	-	36.9	43.8	-	63.9
Magadan Oblast	36.5	-	54.1	28.8	-	40.2	44.1	-	67.9
Kamchatka Kray	38.4	-	50.3	34.1	-	41.3	41.6	-	59.0
- Koryak AO	23.6	-	-	19.0	-	-	27.9	-	-
Chukotka AO	33.6	-	46.2	28.5	-	36.9	38.5	-	55.4
Northern Russia	*34.6*	-	*46.9*	*28.8*	-	*36.8*	*40.0*	-	*56.3*

3.2 Health Behaviours

Concepts and Definitions

It is well established that some personal behaviours or lifestyles are associated with the development of certain diseases and health problems. Of particular importance are such behaviours as smoking, diet, alcohol and drug use, physical activity, sexual behaviour, and safety practices. The modification of such behaviours has become the core activity of health promotion programs.

Monitoring such behaviours usually requires surveys based on interviews with respondents who are asked specific questions. Despite the existence of numerous health interview surveys in all the developed countries, international standardization is rare. Only one behaviour is included in CircHOB for the time being – smoking. Smoking is among the most important health determinants or risk factors, and it is basic information collected by most health surveys. Even so, there is considerable inconsistency in how smoking is measured and categorized.

On the basis of a set of questions, individuals can be categorized into never smokers, former smokers, and current smokers. Among the last group, it can be further divided into those who smoke daily and those only irregularly, or occasionally. The **prevalence of daily smoking among adults** are more comparable across countries and surveys, although there are still significant differences, and caution is needed when interpreting the data.

Although cigarettes are the most widely used vehicles in delivering tobacco, other forms such as pipes, cigars and smokeless tobacco are also used. Although it is not always explicitly stated in survey reports, it is cigarette smoking that is usually asked and recorded.

In addition to frequency, estimates of the duration of use and the amount consumed per day can also be derived from surveys. Increasingly issues such as ages of initiation and cessation, attempt at quitting, attitudes towards smoking, knowledge of its health effects, and exposure to passive smoking at home and at work are also part of smoking surveys.

Data Sources and Limitations

CircHOB presents the proportion of daily smokers in the adult population, separately for men and women. The lower limit of "adult" differs – 15, 16, 18, etc. Some surveys have no upper age limits, while other surveys are truncated at 75 or even 65. In the case of annual surveys, data are pooled or averaged into 5-year periods. Where surveys are conducted less frequently, data from a year close to the midpoint of each period are presented. The upper age limit is set to be as close to 75 as possible, to achieve comparability of the "adult" rate. Where available, "youth" smoking prevalence (age group 15-24) is also presented.

National smoking prevalence data are available from OECD https://stats.oecd.org/ Health > Non-medical determinants of health > Tobacco consumption. Regional data are obtained from national surveys.

United States

For the United States nationally, data are as reported by OECD, based on annual results of the National Health Interview Survey (NHIS). Daily smokers are defined as current smokers who have smoked 100 cigarettes in their lifetime and still smoke everyday. The age range is 18 and above. The NHIS is a major national survey of a representative sample of the U.S. civilian, noninstitutionalized household population.

Alaska data are from analyses of downloaded datasets from the Behavioral Risk Factor Surveillance System. BRFSS is an annual telephone survey conducted by the CDC and state health departments https://www.cdc.gov/brfss/ Survey data and documentation > Annual survey data

Canada

Canadian national and territorial data are based on special analyses of Statistics Canada's Canadian Community Health Survey (CCHS). Although the surveys covered ages 12 and above, only data from individuals aged 15 and above are presented. For the 2000-04 period, data are pooled from cycles

2000/01, 2003 and 2005; the 2005-09 data are pooled from cycles 2007, 2008, and 2009; and the 2010-14 period from the 5 annual cycles.

Denmark
The source is OECD, based on polling firm data conducted for the Danish Council on Smoking and Health. Lower age limit is 16.

Greenland
Data on smoking habits are available from 3 waves of health surveys among Indigenous Greenlanders conducted by the National Institute of Public Health during 1999-2002 in West Greenland, and in 2005-09 and 2014, covering the whole of Greenland. Data were provided by Prof. Peter Bjerregaard.

Statistics Greenland produces figures on the importation of tobacco and alcohol, available in the English language publication *Greenland in Figures*, various years.

Faroe Island
Data for Faroes Islands are available for all adults aged 15+, as reported by NOMESCO in the annual publication *Health Statistics in Nordic Countries*
http://nowbase.org/publications/health-statistics-nordic-countries

Iceland
Data are as reported in OECD, based on surveys conducted for the Public Health Institute and the Directorate of Health.

Norway
Norwegian national and regional data can be accessed from the Norgeshelsa website
www.norgeshelsa.no/norgeshelsa/
Norhealth > Living habits > Smoking and snus use. Age range is 16-74.

Sweden
National and regional data for 2000-09 are based on the annual Survey of Living Conditions (Undersökningarna av levnadsförhållanden, or ULF) www.scb.se/ULF conducted annually among adults aged 16-84. The data shown in CircHOB are by special request to Statistics Sweden for custom tabulation. 2010-14 data are from the National Public Health Survey by the Public Health Agency of Sweden https://www.folkhalsomyndigheten.se/folkhalsorapportering-statistik/statistikdatabaser-och-visualisering/folkhalsodata/databas/ Nationalle folkhälsoenkäten > Levnadsvanor > Tobak

Finland
Data for 2000-09 are from the published reports of the annual survey Health Behaviour and Health among Finnish Adult Population (Suomalaisen aikuisväestön terveyskäyttäytyminen ja terveys, or AVTK), conducted by the National Institute of Health and Welfare.
https://thl.fi/en/tutkimus-ja-kehittaminen/tutkimukset-ja-hankkeet/aikuisten-terveys-hyvinvointi-ja-palvelututkimus-ath/aiemmat-tutkimukset/suomalaisen-aikuisvaeston-terveyskayttaytyminen-ja-terveys-avtk

Data are available only for a combined northern region. Daily smokers are defined as individuals who have ever smoked at least 100 times, who have ever smoked daily, and who last smoked either today or yesterday. This survey only covers the age group 15-64. For the elderly aged 65-84, there is a separate survey. However, the two surveys cannot be combined to produce an “adult” population that is comparable to the other countries. Separate data for the North are not reported in the survey on the elderly.

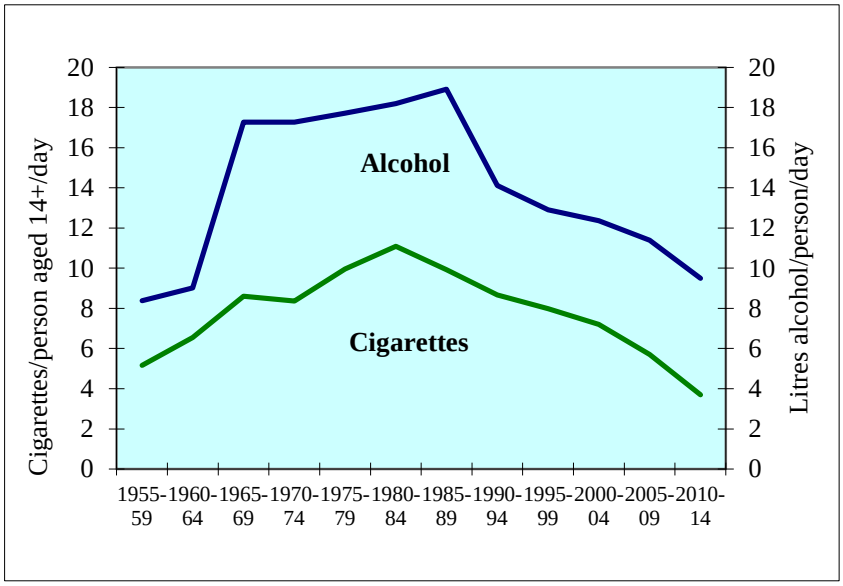
From 2013 on, smoking prevalence data (age 20+) from the National FinSote Survey are available in Sotkanet http://www.sotkanet.fi
Alcohol, tobacco and addiction > Smoking and use of snuff > Daily smokers (Indicator # 4404).

Russia

Russian data are available from OECD only at the national level. For the 2000-04 period, data are from WHO European Office Health for All database https://gateway.euro.who.int/en/datasets/european-health-for-all-database/#life-styles-

For the 2005-09 period, data from the Russia country report from the 2009 Global Adult Tobacco Survey (GATS) are used www.who.int/tobacco/surveillance/en_tfi_gats_russian_countryreport.pdf. Several northern regions were sampled: Arkhangelsk Oblast, Komi Republic, Taymyr AO, and Evenkia AO but separate regional data were not reported.

No data are available for 2010-14. A new GATS was completed in 2016 with data on Russia.



Importation of alcohol and tobacco into Greenland

Inuit couple smoking at home, Northern Canada, circa 1946

Tobacco was a trade goods in the Canadian fur trade but the epidemic of smoking, in both men and women, is a recent phenomenon, related to the widespread availability of imported cigarettes. In an isolated region such as Greenland where there is no local production, import trade figures can serve as a surrogate measure of consumption.

Table 3.4 Prevalence (%) of current daily smoking in population aged 15+

Country/Region	Smoking – Total			Smoking – M			Smoking – F			Smoking – Youths		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	18.1	16.3	14.1	20.1	18.2	15.7	16.3	14.5	12.6	19.9	16.2	12.8
Alaska	19.0	16.1	15.0	20.2	17.5	15.8	17.8	14.6	14.1	21.4	19.8	13.5
Canada	20.6	17.3	15.0	21.4	19.5	17.1	17.5	15.1	12.9	18.7	15.5	11.5
Yukon	25.8	29.7	22.8	28.0	30.6	23.9	23.6	28.8	21.6	24.3	26.0	22.7
Northwest Territories	32.9	29.9	28.0	33.6	32.1	30.2	32.2	27.6	25.7	35.9	26.3	24.5
Nunavut	55.7	*55.8*	*55.1*	56.2	52.8	52.2	55.2	58.9	58.1	65.5	61.4	61.2
Northern Canada	*35.1*	*35.0*	*33.7*	*36.3*	*35.7*	*33.3*	*33.9*	*34.2*	*32.0*	*40.1*	*36.2*	*36.5*
Denmark	28.4	23.4	19.0	31.2	25.6	20.7	25.7	21.4	17.4	21.2	17.0	12.5
Greenland	58.1	62.5	57.4	60.6	60.4	56.5	56.0	64.1	57.9	63.3	68.9	70.3
Faroe Islands	35.8	25.4	26.2	35.8	24.3	26.4	35.8	26.5	26.0	-	-	-
Iceland	21.6	18.0	13.3	22.9	19.2	13.3	20.5	16.8	13.2	20.9	17.8	10.5
Norway	28.0	24.0	16.0	28.0	25.0	16.0	27.0	23.0	16.0	26.0	23.0	8.0
Nordland	31.0	26.0	18.0	29.0	23.0	17.0	34.0	28.0	18.0	27.0	22.0	-
Troms	31.0	24.0	16.0	31.0	23.0	15.0	30.0	24.0	17.0	32.0	23.0	-
Finnmark	34.0	32.0	23.0	37.0	30.0	23.0	32.0	32.0	22.0	33.0	37.0	-
Northern Norway	*32.0*	*26.0*	*18.0*	*31.0*	*24.0*	*17.0*	*32.0*	*28.0*	*18.0*	*30.0*	*25.0*	-
Sweden	18.0	15.3	10.0	16.7	13.8	12.0	19.3	16.9	11.0	14.3	12.5	-
Västerbotten	12.4	9.8	7.0	12.2	10.4	8.0	12.7	9.3	8.0	7.8	6.0	-
Norrbotten	16.8	*14.2*	*13.0*	13.6	12.6	12.0	19.3	15.8	13.0	12.8	11.2	-
Northern Sweden	*14.4*	*11.9*	-	*12.8*	*11.4*	-	*16.0*	*12.4*	-	*9.7*	*8.2*	-
Finland	23.2	20.6	14.7	27.3	24.4	17.4	19.7	17.5	12.2	23.5	17.8	-
Pohjois-Suomi	-	-	15.5	-	-	18.4	-	-	12.8	-	-	-
Lappi	-	-	*17.9*	-	-	20.6	-	-	15.3	-	-	-
Northern Finland	*25.3*	*19.8*	-	*30.2*	*23.8*	-	*21.0*	*16.2*	-	*24.9*	*14.9*	-
Russian Federation	35.3	39.4	-	61.3	60.7	-	14.4	21.7	-	22.1	34.2	-
Murmansk Oblast	-	-	-	-	-	-	-	-	-	-	-	-
Kareliya Republic	-	-	-	-	-	-	-	-	-	-	-	-
Arkhangelsk Oblast	-	-	-	-	-	-	-	-	-	-	-	-
- Nenets AO	-	-	-	-	-	-	-	-	-	-	-	-
Komi Republic	-	-	-	-	-	-	-	-	-	-	-	-
Yamalo-Nenets AO	-	-	-	-	-	-	-	-	-	-	-	-
Khanty-Mansi AO	-	-	-	-	-	-	-	-	-	-	-	-
Krasnoyarsk Kray	-	-	-	-	-	-	-	-	-	-	-	-
- Taymyr AO	-	-	-	-	-	-	-	-	-	-	-	-
- Evenki AO	-	-	-	-	-	-	-	-	-	-	-	-
Sakha Republic	-	-	-	-	-	-	-	-	-	-	-	-
Magadan Oblast	-	-	-	-	-	-	-	-	-	-	-	-
Kamchatka Kray	-	-	-	-	-	-	-	-	-	-	-	-
- Koryak AO	-	-	-	-	-	-	-	-	-	-	-	-
Chukotka AO	-	-	-	-	-	-	-	-	-	-	-	-
Northern Russia	-	-	-	-	-	-	-	-	-	-	-	-

3.3 Commentary

Socioeconomic Conditions

- Most northern regions, with the exception of those in the Nordic countries, tend to report higher per capita GDP than their respective countries. This is particularly true for regions with extensive oil and gas developments.
- Over the entire 15-year period, all regions experienced economic growth in real terms. The global financial crisis of 2008/09 affected circumpolar regions differently. Iceland bore the brunt of the downturn, whereas northern Sweden, Norway and Canada were largely spared.
- Nunavut and Greenland have the lowest employment rates (<60%). Low employment also affects northern Finland, unlike in other Nordic countries. There has been little improvement in most circumpolar regions over the 15-year period.
- The proportion of the adult population who have attained tertiary education ranged from 35-45%. In most circumpolar regions. Greenland is the outlier with <15%. Women are better educated than men in all regions (except the Faroe Islands).

Health Behaviours

- Smoking prevalence has declined in all regions except Grenland and Nunavut, which also report the highest prevalence exceeding 55% among adults, in men, women and youths. Elsewhere, the prevalence is below 20%.
- While regional data are lacking for Russia, if national data are any indication, smoking among men (at 60%) greatly exceeds that of women (about 20%), but it appears to be rising among women.

4. Health Care Resources

4.1 Health Expenditures

Concepts and Definitions

A major challenge in an international comparison of health care expenditures is to ensure that what is counted as health care is the same entity in different countries, with different health care systems and financial management practices. OECD developed *A System of Health Accounts* in 2000 (SHA 1.0) to facilitate international comparisons. A new edition was published in 2011, in collaboration with Eurostat and WHO https://www.oecd-ilibrary.org/social-issues-migration-health/a-system-of-health-accounts_9789264116016-en.

According to SHA 2011, there are 3 axes – health care functions (HC), health care providers (HP), and financing schemes (HF), with the following primary (first-digit) codes:

HC.1	Curative care
HC.2	Rehabilitative care
HC.3	Long-term nursing care
HC.4	Ancillary services
HC.5	Medical goods
HC.6	Prevention care
HC.7	Governance and health system and financing administration
HC.9	Other services

HP.1	Hospitals
HP.2	Residential long-term care facilities
HP.3	Ambulatory care providers
HP.4	Ancillary services providers
HP.5	Retailers and providers of medical goods
HP.6	Preventive care providers
HP.7	Providers of health system administration
HP.8	Rest of the economy

HF.1	Government schemes and compulsory contributing health care financing schemes
HF.2	Voluntary health care payment schemes
HF.3	Household out-of-pocket payment
HF.4	Rest of the world financing schemes

An important difference between SHA 1.0 and SHA 2011 is the discontinuation of aggregating "capital formation" and "total current health expenditures" into "total health expenditures". The former refers to demand for capital goods by health providers, whereas the latter is the demand for goods and services by consumers. The two entities thus represent different timings in consumption, as capital expenditures represent investment for future provision to consumers. The focus of CircHOB is on current health expenditures.

Several categories of health-related expenditures are NOT included under SHA: Education and training of health personnel, research and development, environmental health protection and safety, and social services. Establishing boundaries, while complicated, is necessary, otherwise the entire economy can be considered to play a role in promoting or reducing health. The boundary between health care and social services is difficult to delineate in some jurisdictions where the two are integrated. This is especially true of the care of the elderly.

Multiple national currencies can be converted into a single, comparable currency - the US dollar purchasing power parities

(USD-PPP) - which recognizes the fact that the same amount of currency can buy more things in some countries than others. This permits a common standard against which to compare per capita health expenditures in circumpolar countries. PPPs, however, are established for national economies, and assume homogeneity across the country that is not necessarily valid for northern regions within countries.

In addition to per capita health expenditures, the health care system can also be characterised by **health care's share of the GDP** and the **distribution of private and public financing**. Data are only available for the 8 Arctic States but not their northern regions.

Data Sources and Limitations

Health care expenditures reported by OECD based on SHA are largely comparable across countries but not generally available for regions within countries. For within-country comparisons, the OECD method may not be consistently applied or used at all and only certain types of expenditures are available.

In order to compare circumpolar regions, the following steps are adopted by CircHOB:

- The total current health expenditures (all functions, all providers, and all financing schemes) in USD-PPP for the 8 Arctic States are extracted from OECD https://stats.oecd.org/ > Health > Health expenditure and financing
- The national and regional expenditures in the national currency based on the type of expenditures available are estimated from data in the national statistical or health administration agencies. A regional/national ratio is computed for each country
- The regional/national ratios are then applied to the OECD data for the countries to yield the regional expenditures in USD-PPP

United States

United States national and state data (in US dollars) are available from the National Health Expenditures Accounts maintained by the Centers for Medicare and Medicaid Services www.cms.gov/NationalHealthExpendData/. Only data on personal health care (ie. HC.1 to HC.5) are available by state of residence, i.e. services provided to state residents anywhere in the United States.

Canada

Canadian national, provincial and territorial data (in Canadian dollars) are available from the Canadian Institute for Health Information's National Health Expenditure Database https://www.cihi.ca/en/national-health-expenditure-trends. Capital expenditures are subtracted from total health expenditures to produce total current health expenditures.

Denmark, Greenland and Faroe Islands

Data for Denmark and its two self-governing territories of Greenland and Faroe Islands (in Danish kroner) are available from NOMESCO's Social and Health Indicators database, http://nowbase.org/ supplemented by the annual report *Health Statistics in the Nordic Countries* http://nowbase.org/publications/health-statistics-nordic-countries

Iceland

Data for Iceland are from OECD https://stats.oecd.org/ > Health > Health expenditure and financing.

Norway

In Norway the delivery of primary health care and public health services is the responsibility of municipalities, whereas "specialized health services" (which include general and psychiatric hospitals, ambulances, substance abuse treatment, and patient transportation) are provided by regional health authorities. Data are available from Statistics Norway's Statbank https://www.ssb.no/en/statbank/
Health > Health services > Municipal health services > Table 4904
Health > Health services > Specialist health services > Table 6464 (from 2005 onwards)
Earlier years data on specialist health services are obtained from the published table
www.ssb.no/speshelseregn_en/tab-2009-06-18-01-en.html

For municipal health services, net operating expenditures (in Norwegian kroner) in the three northernmost counties are compared to Norway as a whole. For specialized health services (all expenditures inclusive of depreciation), the three counties constitute a single northern health region (Helse Nord). The per capita specialized health services for the northern health region is added to the per capita municipal health services of each of the three counties.

Sweden

In Sweden, total health expenditures (in Swedish kronor) are available at the level of the county, which is responsible for primary care, specialized somatic and psychiatric care (ie. hospitals), dental and other services. Net costs for health care to the county councils are reported annually by the Swedish Association of Local Authorities and Regions (Sveriges Kommuner och Landsting, SKL) http://skl.se/ekonomijuridikstatistik/statistik/ekonomiochverksamhetsstatistik/landstingekonomiochverksamhet/tabellbilagortidigarear.3771.html Select year – only 10 most recent years archived.

Finland

For Finland, the comparison (in euros) was for "net expenditures of the municipal health sector", available from SOTKAnet, the indicator bank of the National Institute for Health and Welfare http://www.sotkanet.fi Services and resources > Municipal finances in social and health care > Indicators on municipal social welfare and health care finances > Operating net expenditure of municipal health care (Indicator # 3268). Data refer to health services provided by the municipality to its inhabitants or purchased from other municipalities, the central government or private providers. Net expenditures refer to operating costs less operating income (such as payment transfers).

Russia

Expenditures (in rubles) of the "consolidated budget for health care and physical education" (regional and federal) by regions are available from the periodic publication *Health Care in Russia* http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1139919134734

Fig.4.1 Per capita total current health expenditures (USD-PPP), 2010-14

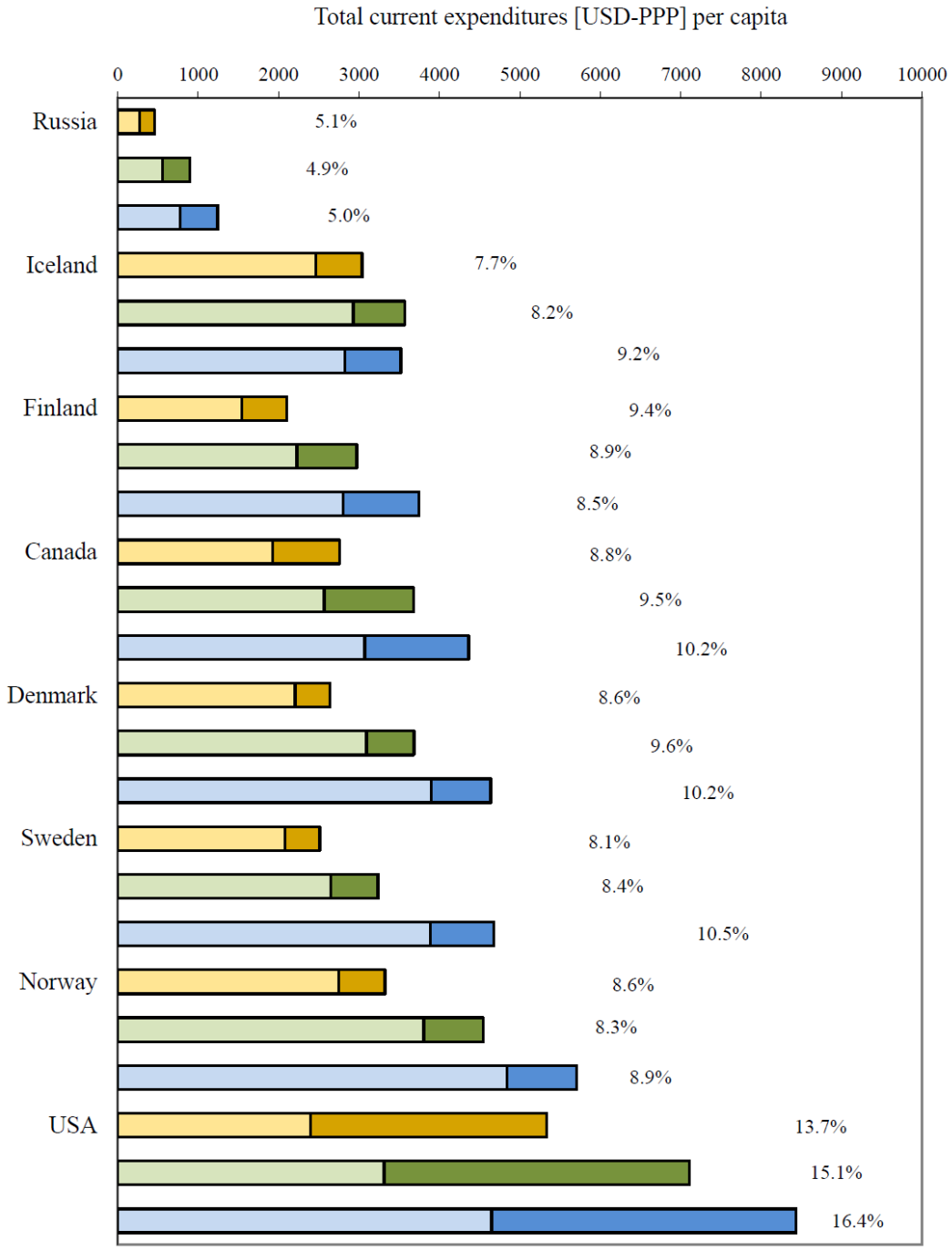


Fig.4.2 **Per capita current health expenditures, distribution of public/private financing and share of gross domestic product,, 2000-04, 2005-09, 2010-14**

Note: 2000-04 , 2005-09 , and 2010-14 - darker shade refers to private sector funding; percentages to the right of bars are the share of GPD

Table 4.1 Total per capita current health expenditures in USD-PPP

Country/Region	Current health expenditures		
	2000-4	2005-9	2010-4
United States	5331	7105	8436
Alaska	6262	8931	11609
Canada	2756	3677	4362
Yukon	3678	5271	6754
Northwest Territories	4552	6610	8830
Nunavut	6097	8413	9815
Northern Canada	*4701*	*6709*	*8487*
Denmark	2639	3683	4638
Greenland	1746	2294	2819
Faroe Islands	1764	2547	2885
Iceland	3038	3567	3521
Norway	3323	4545	5705
Nordland	3798	5550	7101
Troms	3793	5516	7040
Finnmark	3898	5650	7263
Northern Norway	*3812*	*5554*	*7106*
Sweden	2510	3236	4676
Västerbotten	2614	3403	4868
Norrbotten	2818	3566	5129
Northern Sweden	*2716*	*3483*	*4995*
Finland	2104	2971	3742
Pohjois-Suomi	2119	2961	3900
Lappi	2237	3220	4303
Northern Finland	*2153*	*3034*	*4011*
Russian Federation	458	893	1241
Murmansk Oblast	601	1214	1584
Kareliya Republic	556	1045	1431
Arkhangelsk Oblast	486	831	1332
- Nenets AO	1981	3828	5474
Komi Republic	739	1042	1750
Yamalo-Nenets AO	1991	3077	4194
Khanty-Mansi AO	2175	3768	3747
Krasnoyarsk Kray	554	967	1446
- Taymyr AO	3091	-	-
- Evenki AO	2311	-	-
Sakha Republic	1321	1640	2404
Magadan Oblast	1419	2632	4642
Kamchatka Kray	622	1512	3024
- Koryak AO	2039	3776	-
Chukotka AO	3877	3794	5680
Northern Russia	*966*	*1747*	*2194*

4.2 Health Workforce

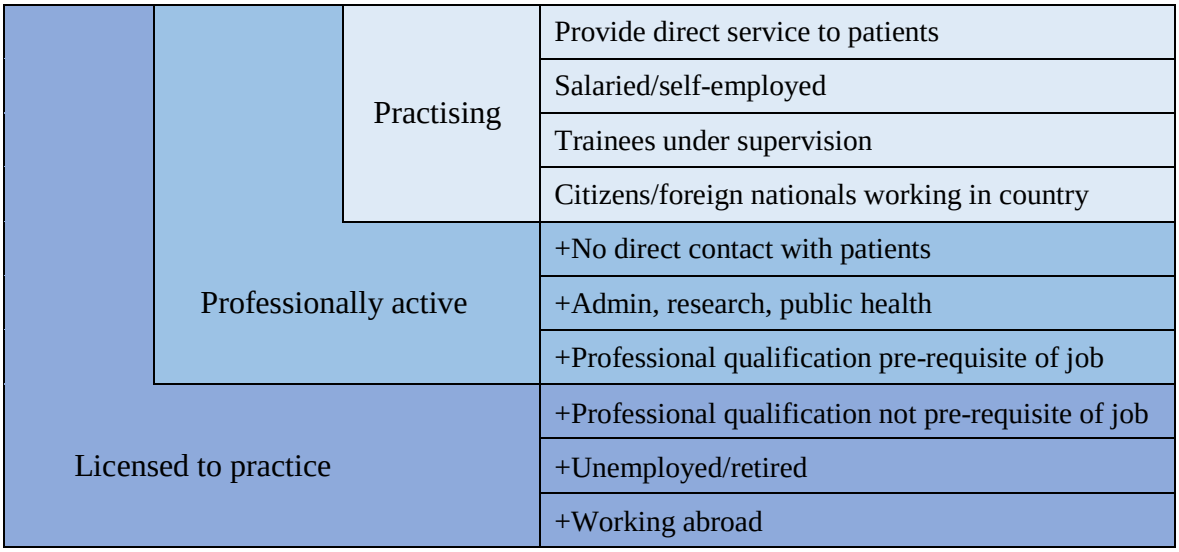
Concepts and Definitions

The health workforce is made up of many different types of workers. WHO's *International Classification of Health Workers* recognizes five broad categories: (1) health professionals, (2) health associate professionals, (3) personal care workers in health services, (4) health management and support personnel, and (5) other health service providers http://www.who.int/hrh/statistics/Health_workers_classification.pdf.

Health professionals vary substantially in their training, licensure and registration requirements, and how statistics on employment are collected. The names of selected health professionals in the official languages of circumpolar countries are shown below:

English	French	Danish	Finnish	Icelandic	Norwegian	Swedish	Russian
physician	médecin	læge	lääkäri	læknir	lege	läkare	vrach
dentist	dentiste	tandlæge	hammaslääkäri	tannlæknir	tannlege	tandläkare	stomatolog
nurse	infirmière	sygeplejerske	sairaanhoitaja	hjúkrunarfræðingur	sykepleier	sjuksköterska	medicinskaya sestra
midwife	sage-femme	jordemoder	kätilö	ljósmóðir	jordmor	barnmorska	akusherka

OECD makes the distinction among the categories of "practising", "professionally active", and "licensed to practise". This is summarized in the figure below.



There are usually two ways to count workers, by a head count or the number of full-time equivalent (FTE). It is difficult to apply the FTE concept to self-employed professionals who do not have regular

hours of work. The data presented in CircHOB are based on head counts. Some countries provide data from employment records, some conduct surveys, and some include only public sector employees.

Among the many types of health professionals, CircHOB selects physicians, dentists and nurses for monitoring. Physicians and dentists include interns/residents, defined as trainees who have graduated but are undergoing further clinical training under supervision. Both generalists and specialists are included. The United States is unique in including doctors of osteopathy (DO) as physicians. DOs are now indistinguishable in training and scope of practice from doctors of medicine (MDs), whereas outside the U.S. osteopathy tends to treat only musculoskeletal disorders. Dentists (or stomatologists) are not included under physicians, although in some countries (such as Russia) they are considered medical specialists.

OECD includes under "professional nurses" clinical nurses, district nurses, nurse-anesthetists, nurse-educators, nurse-practitioners, public health nurses, and specialist nurses. Excluded are midwives (unless they are also registered as nurses and working as nurses), nursing aides, associate professional nurses, practical and vocational nurses.

The measure used to compare the availability or supply of health professionals is **density**, expressed as number of professionals per 100000 people in the population. Where possible, it is data on practicing professionals that are presented, however, some countries do not distinguish between the "practising" and "professionally active" categories.

Data Sources and Limitations

United States

There is no single source of information on health human resources. For physicians, the source is the American Medical Association, accessible from the Area Health Resources File (AHRF) distributed by the Health Resources and Services Administration of the Department of Health and Human Services https://data.hrsa.gov/topics/health-workforce/ahrf. For dentists, pre-2009 data are from the American Dental Association's publication *Distribution of Dentists in the United States*. From 2009 on, they are available from ARF.

Data on nurses are obtained from the Occupational Employment Statistics database of the Bureau of Labor Statistics http://www.bls.gov/oes/tables.htm. Only salaried employees of health care institutions are included. Before 2012 there was one code (291111) for all registered nurses (RN), including nurse-anesethetists (NA), nurse-midwives (NM) and nurse-practitioners (NP). From 2012 on, there are separate codes for NAs (291151), NMs (291161), NPs (291171), and all other RNs, including clinical nurse specialists (291141). These categories are aggregated to be comparable to previous years' data.

Canada

Data on physicians are from the Canadian Institute of Health Information's annual report *Supply, Distribution and Migration of Canadian Physicians*
https://secure.cihi.ca/estore/productSeries.htm?pc=PCC34.
Data on dentists are from *Canada's Health Care Providers*, periodically updated
https://secure.cihi.ca/estore/productSeries.htm?locale=en&pc=PCC56.
Data on nurses are from *Regulated Nurses: Trends*, published annually
https://secure.cihi.ca/estore/productSeries.htm?pc=PCC449.

For physicians, interns and residents data are included under Canada but not in the North. Northwest Territories and Nunavut data are combined for nurses, and for dentists prior to 2004. Only Registered Nurses (RN) employed in nursing (including administration and research) are included. Although CIHI includes separate data for nurse-practitioners, these individuals are also registered nurses.

CIHI data refer to professionals registered to practise in the territories, who may only work part-time or make multiple short visits, which may explain the high rate of supply (especially for dentists).

Denmark, Greenland, Faroe Islands
Data for Denmark, Greenland and Faroe Islands are available from NOMESCO's Social and Health Indicators database, http://nowbase.org/ supplemented by the annual report *Health Statistics in the Nordic Countries* http://nowbase.org/publications/health-statistics-nordic-countries

Iceland
Iceland data are from OECD https://stats.oecd.org/ Health > Health care resources.

Norway
Data are from Statistics Norway's Statbank https://www.ssb.no/en/statbank/ Labour market and earnings > Employment > Health care personnel. Tables 3448 and 3491 cover national and regional data pre-2008 (discontinued), replaced by Tables 7939 and 7936 from 2008 onward. Health professionals refer to "persons with health care education employed in region". Nurses include public health nurses and physicians include generalists and specialists.

Sweden
Swedish national and regional data are from the National Board of Health and Welfare database http://www.socialstyrelsen.se/statistics/statisticaldatabase/healthcarepractitioners

Finland
Finnish data are from SOTKAnet http://www.sotkanet.fi Services and resources > Personnel > Health services personnel.

Data for 2000-07 refer to only public sector employees employed by municipal health services (indicator no. 2621, 2647-49, 3325, no longer available). From 2010 onward data are available separately for public and private sectors.

Russia
Data are as reported in the publication *Health Care in Russia* http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1139919134734 Included under "dentists" are stomatologists (stomatologi) but not middle-level dentists (zubnye vrachi). The number of stomatologists, however, is deducted from the total number of physicians. Nurses (medicinskie sestry) and midwives (akusherki) are middle-level health staff.

Graduates of the University of Greenland's bachelor of nursing program

Table 4.2 Density of selected health professionals (per 1000)

Country/Region	Physicians			Dentists			Nurses		
	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4	2000-4	2005-9	2010-4
United States	280	289	299	59	60	60	779	822	881
Alaska	230	248	229	73	75	68	766	758	704
Canada	189	195	216	57	59	60	755	785	787
Yukon	171	218	194	81	106	118	909	1007	1061
Northwest Territories	107	107	89	64	115	127	1101	1413	1410
Nunavut	29	36	36		142	209			
Northern Canada	104	120	106	69	120	149	1043	1290	1300
Denmark	298	336	358	85	84	78	963	974	1014
Greenland	148	178	171	53	50	48	397	473	448
Faroe Islands	192	188	245	82	83	88	756	603	906
Iceland	354	362	358	100	94	87	829	855	894
Norway	359	427	487	85	92	98	1596	1830	1971
Nordland	309	375	453	70	83	95	1502	1835	2106
Troms	539	662	746	89	100	124	1875	2449	2422
Finnmark	336	393	490	71	76	84	1495	1685	1965
Northern Norway	389	474	558	76	88	103	1623	2017	2191
Sweden	329	368	405	82	81	81	1024	1093	1113
Västerbotten	403	447	508	91	85	89	1270	1354	1396
Norrbotten	243	267	292	76	76	83	1054	1111	1147
Northern Sweden	323	358	402	84	81	86	1162	1234	1274
Finland	217	226	305	43	42	73	671	757	981
Pohjois-Suomi	259	263	336	53	55	82	749	858	1085
Lappi	158	181	213	48	47	70	669	781	993
Northern Finland	229	239	302	51	53	79	726	836	1060
Russian Federation	431	451	456	40	44	43	709	738	738
Murmansk Oblast	438	433	477	43	42	47	923	941	1050
Kareliya Republic	477	477	448	17	14	22	829	836	859
Arkhangelsk Oblast	448	469	467	62	64	62	918	978	992
- Nenets AO	321	433	428	40	43	47	590	695	822
Komi Republic	383	417	405	42	41	39	882	916	987
Yamalo-Nenets AO	434	441	445	38	42	43	883	901	915
Khanty-Mansi AO	409	470	517	41	51	51	890	1002	1054
Krasnoyarsk Kray	435	458	462	42	51	49	718	779	840
- Taymyr AO	471	478	-	44	39	-	740	848	-
- Evenki AO	527	549	-	34	35	-	423	613	-
Sakha Republic	449	508	533	28	34	36	862	892	930
Magadan Oblast	524	508	507	37	30	36	883	999	1040
Kamchatka Kray	464	473	467	39	42	40	833	857	869
- Koryak AO	543	393	-	46	44	-	882	878	-
Chukotka AO	584	723	668	60	74	64	846	1063	1045
Northern Russia	436	463	473	41	46	46	837	892	941

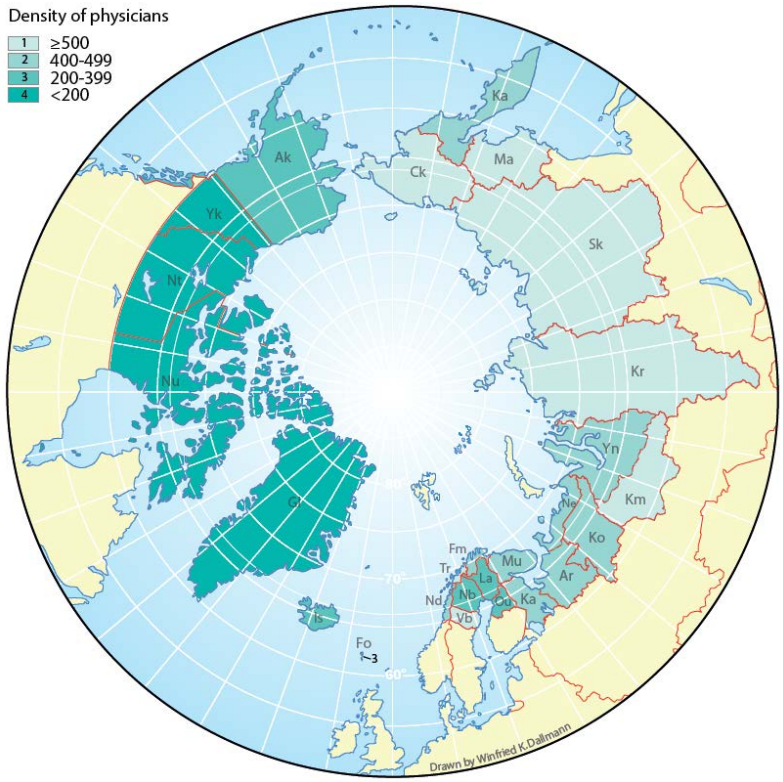


Fig.4.3 Density of physicians (per 1000), 2010-14

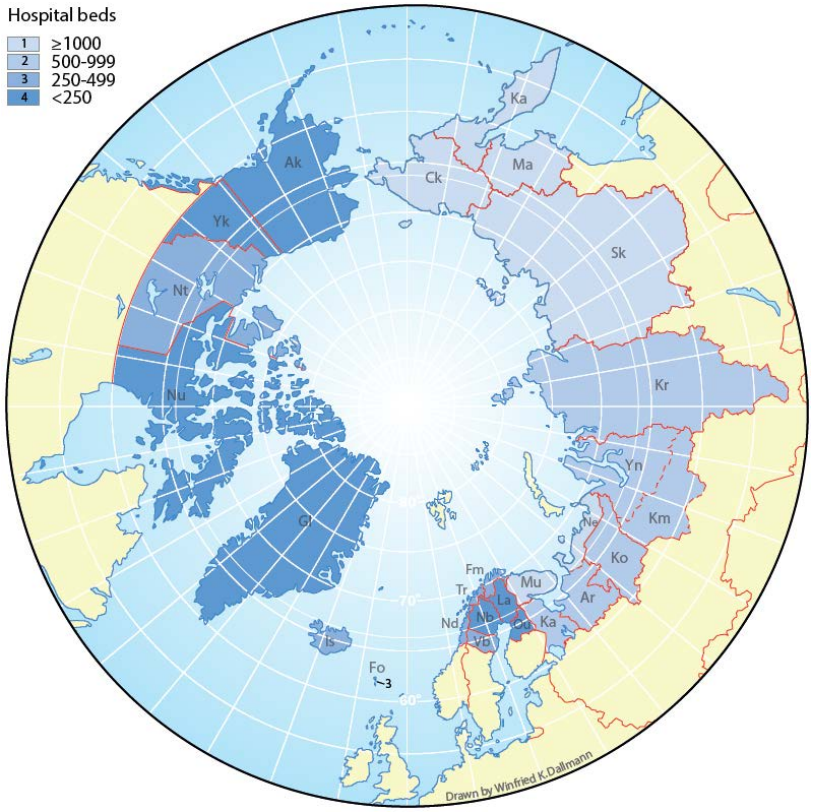


Fig.4.4 Rate of hospital beds (per 1000), 2010-14

4.3 Health Facilities

Concepts and Definitions

Health services are delivered in a variety of facilities, the most important (and costly) of which are hospitals. CircHOB collects data only on hospitals in circumpolar regions, which are broadly comparable internationally.

A variety of hospitals exist in circumpolar regions, from highly specialized ones such as the Alaska Native Medical Center in Anchorage, and university hospitals in Tromsø, Umeå, and Oulu, to small ones in remote towns of Greenland.

There are different categories of hospital beds, serving acute care, psychiatric care, rehabilitation, long-term care and palliative care, which may be located in general hospitals or specialized institutions. Acute care beds are further allocated to different medical and surgical specialties. In the Nordic countries, the term "specialized health services" is used to refer to hospital-based care, in distinction from primary care. In Finland, Iceland and Greenland, a number of beds are attached to health centres, some of which are used for the care of elderly people. In Finland such beds account for over half of all beds in the country.

According to OECD, "curative (acute) care beds" include beds in general and specialty hospitals, but exclude beds for other functions (such as psychiatry, rehabilitation, long-term and palliative care) in such hospitals and all beds in mental health/substance abuse institutions. Within the Nordic countries, the term "somatic" care or beds is used, which corresponds to general acute care hospitals elsewhere, and excludes psychiatric and long-term care beds. When accessing national databases, the type of hospital bed closest to the OECD definition is selected where possible.

Data Sources and Limitations

United States
Data for hospital beds are produced by the American Hospital Association from its annual survey of hospitals. They are available from the Area Health Resource File (AHRF) of the Health Resources and Services Administration of the Department of Health and Human Services https://data.hrsa.gov/topics/health-workforce/ahrf. Beds refer to medical and surgical beds in short-term general hospitals.

Canada
Hospital beds data are available from the Canadian Institute of Health Information's Canadian Management Information System Database (CMDB). https://www.cihi.ca/en Access Data and Reports > Search BSIO (Beds-staffed and in operations). Current year's data are available from the spreadsheet; archived tables from earlier years can be obtained by special request to CIHI. Data are for all beds in general hospitals.

Denmark, Greenland and Faroe Islands
Data on the total number of medicine and surgery beds, excluding psychiatry and long-term care, are obtained from NOMESCO's Social and health indicators database http://nowbase.org/, supplemented by the annual report *Health Statistics in the Nordic Countries* http://nowbase.org/publications/health-statistics-nordic-countries

Iceland
Data from 2007 onward are available from OECD https://stats.oecd.org/ Health > Health care resources > Hospital beds

Norway
Hospital care (i.e. specialized health services), is delivered by health regions through health enterprises (helseforetak) and private institutions. The Northern Health Region (Helseregion Nord) comprises the three counties of Nordland, Troms and Finnmark. Hospital care data are available only for the health region and not the three counties individually. Data are available from Statistics Norway's StatBank

https://www.ssb.no/en/statbank
Health > Health services > Specialist health services > Table 4434. Hospital beds refer to those in "somatic institutions" (somatiske institusjoner), equivalent to general hospitals. Private hospital beds are included.

Sweden
In Sweden hospitals are operated by county and municipal governments, with a small number of private hospitals. Data on specialized somatic care beds are available from the *Statistical Yearbook* published by Statistics Sweden
https://www.scb.se/en/finding-statistics/statistics-by-subject-area/other/other/statistical-yearbook-of-sweden/
The yearbook was discontinued after 2014. Most recent 3 years' data are available from the statistical database of the Swedish Association of Local Authorities and Regions (Sveriges Kommuner och Landsting) www.kolada.se > search by region and year.

Finland
Hospital beds data from both public and private sectors are from SOTKAnet of the National Institute for Health and Welfare, http://www.sotkanet.fi Services and resources > Inpatient health care > Specialised somatic health care > Care days > Indicator #1259.
Excluded are psychiatric beds and nursing-home type beds operated by municipal health centres. The hospital beds number reported to both OECD and NOMESCO is actually calculated by dividing the total number of bed-days by 365.

Russia
Data are reported in the Rosstat publication *Health Care in Russia* (*Zdravookhranenie v Rossii*) http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1139919134734 The number of beds in psychiatric and "narcological" hospitals are subtracted from the total number of beds.

Hospital in Ilulissat, Greenland

The Alaska Native Medical Center, Anchorage

Table 4.3 Availability of hospital beds (per 1000)

Country/Region	Hospital beds (per 100000)		
	2000-4	2005-9	2010-4
United States	287	269	252
Alaska	252	233	219
Canada	156	165	161
Yukon	188	167	156
Northwest Territories	487	388	304
Nunavut	114	111	98
Northern Canada	*291*	*239*	*194*
Denmark	333	263	231
Greenland	185	182	185
Faroe Islands	403	333	382
Iceland	-	313	273
Norway	371	338	280
Nordland	-	-	-
Troms	-	-	-
Finnmark	-	-	-
Northern Norway	*362*	*335*	*287*
Sweden	263	234	221
Västerbotten	379	325	288
Norrbotten	302	241	249
Northern Sweden	*341*	*284*	*269*
Finland	216	190	162
Pohjois-Suomi	240	195	166
Lappi	246	243	209
Northern Finland	*242*	*208*	*178*
Russian Federation	1017	899	820
Murmansk Oblast	1028	942	1000
Kareliya Republic	1043	897	863
Arkhangelsk Oblast	1137	973	937
- Nenets AO	1378	1351	1216
Komi Republic	1052	1009	975
Yamalo-Nenets AO	1112	960	851
Khanty-Mansi AO	964	848	778
Krasnoyarsk Kray	1090	949	847
- Taymyr AO	2342	1781	-
- Evenki AO	2673	2615	-
Sakha Republic	1373	1209	1078
Magadan Oblast	1488	1355	1180
Kamchatka Kray	1517	1334	1160
- Koryak AO	3387	2530	-
Chukotka AO	2264	2111	1266
Northern Russia	*1122*	*986*	*912*

4.4 Commentary

Health Expenditures

- The United States and Russia are at two extremes in terms of per capita health expenditures ($8400 in the US vs $1240 in Russia); however, expenditures have increased 2.7 times in Russia between the 2000-04 and 2010-14 periods.
- Both the US and Russia have a large private sector in health care – 50% in US and 40% in Russia. In the other countries, the private sector accounts for only 15-30% of total health expenditures.
- Health care consumed more than 15% of the United States' GDP, compared to about 5% of Russia's. In the other Arctic States, this proportion ranges between 8% and 10%.

Health Workforce

- The Nordic countries consistenly exceed North America in the density of all physicians, nurses and dentists, whereas Russia reports the highest density of physicians but among the lowest in terms of dentists and nurses.
- The largest disparities are observed in the Northwest Territories and Nunavut compared to Canada for physicians, and between Greenland and Denmark in all three categories.
- The disparity is much less pronounced in the northern regions of the Nordic countries, while Arctic Russia tends to be oversupplied in all categories.

Health Facilities

- Russia and its regions have a substantially larger availability of hospital beds, between 800 and 1200 beds/100000 people, compared to between 150 and 380 beds in the other circumpolar regions.
- There is a general decrease in hospital beds, perhaps indicative of a shift from in-hospital care to ambulatory care. The decrease is especially steep in the Nordic regions, some 25-30% between the 2000-04 and 2010-14 periods.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