

Special issue:

NORDCAN

Cancer data from the Nordic countries

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1 The history of NORDCAN

The Association of Nordic Cancer Registries (ANCR)

The Nordic cancer registries represent countries with similar health care systems and have a high degree of quality compared to many cancer registries in the world. The joint population of the Nordic countries is more than 25 million and there are more than 130 000 patients being diagnosed with cancer each year. A considerable advantage of the Nordic countries is the possibility to track the population from birth to death through the personal identification numbers (Table 1).

Table 1: Year of introduction of personal identification numbers in the Nordic countries

Country	Year of Introduction of personal identification numbers
Sweden	1947
Iceland	1953
Norway	1964
Finland	1967
Denmark	1968

The first collaboration between the national cancer registries took place in the early 1950s, right at the beginning of the registration in the countries. There was from the start exchange of visits, experiences and information between the registries. Systematic annual meeting practice started in 1966 and the aim of the collaboration was to compare the cancer incidence rates in the Nordic countries and to use that comparison in order to detect factors that could explain the differences. It was realized that technical factors, definitions etc. played an important role, and therefore a lot of attention was focused on standardisation of definitions and practices.

The wealth of high quality information available from the Nordic cancer registries is well established. A series of projects has been supported by the Nordic Cancer Union (NCU) which is a collaborative body of the cancer societies in the Nordic countries. Since the 1970s, projects have addressed topics such as time trends in incidence (Hakulinen & al 1986; Tulinius & al 1992), the geographic distribution of cancer (cancer atlases) (Jensen & al 1988; Pukkala & al 2007), future predictions of cancer incidence and mortality burden (Wiklund & al 1992; Engeland & al 1993; Engeland & al 1995; Møller & al 2002), cancer survival (Engeland & al 1995; Engeland & al 1998), avoidable cancers (Olsen & al 1997) and the effectiveness of screening (Hristova & Hakama 1997) Information about cancer incidence, mortality, prevalence and survival combined with studies on risk factors, quality of treatment and cancer care are a sound basis for comprehensive cancer control plans, as a means of providing situation analyses, and as an assessment of the need for specific actions and the impact of subsequent interventions. These results have also been communicated in local languages to national authorities in the Nordic countries. High-quality epidemiological collaboration has been conducted in, for instance, childhood cancer and in using biological specimen banks (biobanks) leading to important discoveries in the aetiology of cancer.

NORDCAN

The ANCR has seen the need for an easily accessible and comprehensive graphical and statistical tool providing descriptive epidemiological analyses of the data from the Nordic cancer registries. Registry data is free for use by everyone and the intention is to share as much of the data as possible. NORDCAN was conceived from this principle with a pilot version in 2002 (Association of Nordic Cancer Registries, 2002) and a full version in 2003 (Storm & al 2003). The ambition was to provide a cancer database available for research, complete with comparable and timely data from each of the Nordic countries in a way that was user-friendly and satisfied most of the needs of policy makers, cancer societies, medical professionals, journalists, and the public (Engholm & al 2010). The project has from the onset been a joint activity of the ANCR and the International Agency for Research on Cancer (IARC), with financial support from the NCU. Data for NORDCAN are delivered from the national cancer registries, and the database and program have been developed in collaboration with the Cancer Information Section at IARC. The NORDCAN project group is comprised of representatives from each of these organizations. The group meets regularly to discuss further improvements in the quality of the Registry data and the functionality of the software.

Language availability

The NORDCAN database is available in all the Nordic languages as well as in English, and can be accessed at <http://www.ancr.nu>

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2 The NORDCAN database and program

The NORDCAN database and program contains data on cancer incidence, mortality, prevalence and survival in the Nordic countries, including the Faroe Islands, from the first year of complete registration through the most recently published year. The data availability per June 2013 is shown in Table 2.

Table 2: Data availability in NORDCAN

The NORDCAN database (Version 5.3, 04.2013)

Data availability				
Country	Incidence	Mortality	Prevalence	Survival*
Nordic countries	1960-2010	1953-2009	1980-2010	-
Denmark, national	1943-2011	1951-2011	1963-2011	1964-2008
Denmark, regional	1971-2011	1971-2011	1991-2011	-
Faroe Islands	1960-2010	1983-2010	-	-
Finland, national	1953-2011	1953-2011	1973-2011	1964-2008
Finland, regional	1953-2011	1953-2011	1973-2011	-
Iceland, national	1955-2011	1951-2009	1975-2011	1964-2008
Iceland, regional	1971-2011	1971-2009	1991-2011	-
Norway, national	1953-2010	1953-2010	1973-2010	1964-2008
Norway, regional	1953-2010	1953-2010	1973-2010	-
Sweden, national	1960-2010	1952-2011	1980-2010	1964-2008
Sweden, regional	1970-2010	1970-2011	1990-2010	-
*Data available by five-year periods				

As the time and pace of the completion of annual data differ between the Nordic countries, the main database and program are updated twice a year. At the updates, both new data, new functionality and new entities might be included.

Most recent updates of the NORDCAN database and program

The NORDCAN program was last updated in May 2013 to version 5.3. Besides the inclusion of data for 2011 for some countries, the update included animated maps of incidence, breakpoint analysis and survival data up until 2008.

A new update is planned in September/October 2013, and will most likely include incidence data for 2011 for all countries, mortality data for 2011 for all countries except Iceland, animated maps of mortality, updated survival, a choice of “all sites including non-melanoma skin cancer” and seven more detailed entities for leukaemia: acute lymphatic, chronic lymphatic, other and unspecified lymphatic, acute myeloid, chronic myeloid, other and unspecified myeloid and unspecified cell leukaemia, as well as three groups of cancers not included in any of the present entities except in the all cancer group: “Other specified cancer”, “Unknown primary cancer”, and “Other ill-defined cancers”.

Contents of the NORDCAN database and program

Three main datasets are delivered to the NORDCAN secretariat from each country:

Population

Population by year, sex, five-year age groups and municipality, county or region. Population data stem from the national population registries.

Mortality

Mortality by year of death, underlying cause of death, sex, five-year age groups and county or regions.

Mortality data stem from the national Causes of Death Registries, except for Finland where the data is based on the cancer registry record indicating if the patient died from the registered cancer.

Cancer cases

De-identified individual records of cancer cases for each year of registration from the national cancer registries. These data are only used for check of data, recoding and construction of the NORDCAN entities, preparation of municipal data for the animated maps, calculation of prevalence and survival and development of new facilities in NORDCAN. The dataset contains information about the cancer at the time of diagnosis (for instance topography, morphology, metastasis and information about diagnostics and treatment) and about the cancer patient (for instance age at time of diagnosis, whether the patient is alive or dead and number of days from time of diagnosis until time of death or end of follow up).

The NORDCAN program is based on tabulated counts on a national or regional level. The cancer diagnosis are currently (June 2013) grouped into forty one entities (see Table 3), and the data are presented in five-year age groups (0-4...80-84, 85+).

Table 3. Entities of NORDCAN (version 5.3)

ICD-7	ICD-10	Label
140	C00	Lip
140-8	C00-14	Lip, oral cavity and pharynx
141	C01-02	Tongue
143-4	C03-06+C46.2	Mouth
142	C07-08	Salivary glands
145-8	C09-14	Pharynx
150	C15	Oesophagus
151	C16	Stomach
152	C17	Small intestine
153	C18	Colon
153-4	C18-21	Colorectal
154	C19-21	Rectum and anus
155.0	C22	Liver
155.1	C23-24	Gallbladder
157	C25	Pancreas
160	C30-31	Nose, sinuses
161	C32	Larynx
162.0,1,8	C33-34	Lung
162.2	C38.4+C45.0	Pleura
196	C40-41	Bone
190	C43	Melanoma of skin
191	C44+C46.0	Skin, non-melanoma
197	C49+C46.1	Soft tissues
170	C50	Breast
176	C51-52,C57.7-9	Other female genital organs
171	C53	Cervix uteri
172	C54	Corpus uteri

ICD-7	ICD-10	Label
173-4	C55+C58	Uterus, other
175	C56,C57.0-4	Ovary etc.
179	C60+C63	Penis etc.
177	C61	Prostate
178	C62	Testis
180	C64	Kidney
181	C65-68+D09.0+D41.4	Bladder etc.
192	C69	Eye
193	C70-72+D32-33+D42-43	Brain, central nervous system
194	C73	Thyroid
201	C81	Hodgkin lymphoma
200+202	C82-85,C96	Non-Hodgkin lymphoma
203	C90	Multiple myeloma
204	C91-95	Leukaemia
204.0-2,8	C91-95\C9X.0	Other leukaemia
204.3	C91.0+C92.0+C93.0+C94.0+C95.0	Acute leukaemia
140-204\191	CXX.X\((C44+C46.0)+D09.0+D41.4+D32-33+D42-43	All sites but non-melanoma skin cancer

Data conversion and comparison

To overcome the differences in registration between countries and over time, the NORDCAN data need to be converted to an international standard applying the same rules to each case and dataset. To accomplish this, all data are coded, recoded or converted into ICD-O-3 and ICD-10, and then checked for the validity and consistency between variables in the datasets. All Nordic registries now either use or deliver data that can be converted to ICD-O-3. All conversions and checks at the secretariat are done using the IARCcrgTools (<http://www.iacr.com.fr/iarcrcrgtools.htm>). The IARCcrgTools also makes it possible to apply the multiple primary rules from IARC/IACR (http://www.iacr.com.fr/MPrules_july2004.pdf) in a consistent manner to all datasets.

The output of the IARCcrgTools is the converted and checked dataset with checkflags for each record indicating whether or not the record matches the logical criteria in the program. In addition, the program produces a logfile with summary statistics of the checks and detailed information about the different errors and warnings. An example of summary statistics is given in figure 1.

```
829018 records processed. Summary statistics:

1247 errors (728 individual records) recorded in
U:\nordcan\no\data\iarc.err:

396 invalid ICD0-3 (T) code
570 invalid ICD0-3 (M) code
281 invalid behaviour code

66890 warnings (66067 individual records) recorded in
U:\nordcan\no\data\iarc.chk:

123 unlikely sex/histology combination
2296 unlikely histology/site combination
31 unlikely behaviour/topography combination
6929 unlikely behaviour/histology combination
56999 unlikely basis/histology combination
512 unlikely age/site/histology combination
```

Figure 1: Example of logfile of IARC crg tools

Each of the Nordic countries go through the errors and warnings produced for their dataset in order to correct errors and to be aware of and be able to explain the coding practice leading to warnings.

Inclusions and exclusions

All data that are flagged “ok” after the IARCcrgTools-check are included in the NORDCAN database. This generally means data that generates no errors or warnings at all and data that only generate warnings. The NORDCAN entity for each registration is returned to the national cancer registries along with a variable indicating if a registration is not included and the reason for this.

Excluded from NORDCAN are:

- All data that generate errors during the check. This is a very low percentage, and are most often due to errors in conversions or coding errors. If corrected, these data might be included later.
- Records that are excluded due to the multiple primary rules.
- Basal cell skin cancers. This is due to heterogeneous and incomplete coding over time and between countries.

In addition, non-melanoma skin cancer is currently (June 2013) excluded from the “all cancers combined”-category. This is due to differences in coding practice between Denmark and the other Nordic countries, and for comparison to registries outside the Nordic countries. More information about this is given below.

Main issues of comparability

There are some main issues of comparability over time and between the countries. This is mainly due to different coding practices and/or missing data, but also – for some sites – because of differences in the onset of different screening programmes.

Incidence data

Bladder tumours

The incidence of bladder tumours may not be comparable between the Nordic countries due to varying coding practice over time concerning non-invasive tumours. Non-invasive tumours have always been included in Denmark and Norway, but never in Finland.

Brain and central nervous system tumours

The incidence of brain and central nervous system tumours may not be comparable between the Nordic countries because of the inclusion of benign or unspecified tumours.

Skin, non-melanoma

The incidence of non-melanoma skin cancer is not comparable between Denmark and the other Nordic countries for the years before 1978. This is because Denmark in the period 1943-1977 was the only country that included basal cell carcinomas in this category.

Mortality data

- Numbers of Danish cancer deaths in 2007-2011 is too low, as 3.3, 3.5, 3.8, 4.6 and 5.6%, respectively, are missing cause of death.
- Gallbladder mortality is missing up till 1957 for Iceland, 1960 for Denmark and Sweden and 1968 for Norway.
- Pleura mortality is missing up till 1960 for Denmark and Sweden and 1968 for Norway.
- Acute and other leukaemia mortality can not be separated with certainty for the early years.

More detailed information might be found at the NORDCAN website, under “The NORDCAN database”.

Main differences between NORDCAN and Cancer in Norway

When comparing incidence data between the Norwegian data in NORDCAN and the Norwegian data in the Cancer in Norway-publications, some differences appear. Most of these differences are due to exclusions in the NORDCAN-dataset because of the use of the IARCcrgTools. In addition, the grouping of some cancer cases and entities are different between NORDCAN and Cancer in Norway. There are more differences for the earlier years of registration than for the latter years.

Multiple primary cancers

The IARC multiple primary rules are used for all Norwegian data in both NORDCAN and Cancer in Norway. Some differences still exists, mostly due to the differences in entities and grouping of cancers in NORDCAN compared to Cancer in Norway.

Lip cancers (C00)

Distinguishing between lip skin and the inner mucosa lining of the lip is difficult, and it is also difficult to distinguish lip cancers from other cancers in the mouth region. For the Cancer in Norway-data, all cases coded to C00 are counted as lip cancers, while in NORDCAN some are counted as cancers of the mouth and some as melanoma skin cancers or non-melanoma skin cancers based on the morphology. Some are also excluded due to being basal cell carcinomas.

Cancers of the pharynx (C14)

Combined for all years, only about 32% of the cancers counted as cancers of the pharynx in Cancer in Norway are included in this entity in NORDCAN. The main proportion of the remaining 68% fall into the category of “other cancers”. Up until the current NORDCAN version (5.3) these were only included in the category of “all cancer sites”, but with the next version these will end up in one or more of the three new entities of “other specified cancer”, “unknown primary cancer” and “other ill-defined cancers”.

Cancers of the pleura (C38)

As for cancers of the pharynx, a large proportion of cancers of the pleura are also defined as “other cancers”. With the new update in the autumn of 2013, these will end up in the entity of “other specified cancers”.

Kaposi sarcoma (C46)

Kaposi sarcoma is reported as a separate group in Cancer in Norway, while in NORDCAN Kaposi sarcoma of the skin (C46.0) is reported as non-melanoma skin cancers, Kaposi sarcoma of soft tissue (C46.1) is reported as soft tissue cancers and Kaposi sarcoma of palate (C46.2) is reported as cancers of the mouth. C46.3-C46.9 is currently only included in “all cancer sites”, but will in the future be reported as “other specified cancers”.

Cancers of peripheral nerves and the autonomic nervous system (C47)

These cancers are reported as a separate group in Cancer in Norway. In NORDCAN, most of them are included as cancers of the brain and central nervous system.

Cancers of peritoneum and retroperitoneum (C48)

In Cancer in Norway, these cancers count as soft tissue cancers along with cancers of other connective and soft tissue (C49). In NORDCAN, most of these are reported as “other specified cancers” and currently only included in the “all cancer sites” entity

Cancers of other and unspecified female genital organs (C57)

In NORDCAN, about 30% of all Norwegian cancers of other and unspecified female genital organs – C57.0-C57.4, are counted as ovarian cancers. In Cancer in Norway, only the germ cell cancers of C57 are included as ovarian cancers. The rest of the cancers registered as C57 are grouped with C51 and C52 as “other female genital cancers”.

Cancers of the renal pelvis, ureter, bladder and other and unspecified urinary organs (C65-C68)

As mentioned earlier, there are differences between different countries and over time regarding the inclusion and exclusion of non-invasive bladder tumours. This leads to differences between the Norwegian data in NORDCAN and Cancer in Norway. Many of these cancers for the earlier years are also excluded in NORDCAN because of the multiple primary rules. For C68, about 36% of the cancers are excluded from the bladder cancer entity and only included in “all cancer sites” entity.

Cancers of spinal cord, cranial nerves and other parts of central nervous system (C72)

About 36% of the cancers counted as C72 in Cancer in Norway are excluded from NORDCAN. This is most likely due to problems regarding inclusion of benign or unspecified tumours, as mentioned earlier.

Cancers of thymus (C37), adrenal gland (C74) and other endocrine glands and related structures (C75)

Cancer in Norway reports these cancers as one group. In NORDCAN, most of them count as “other specified cancers”. 15% of the adrenal gland cancers, however, are counted as non-melanoma skin cancers.

Male extragonadal germ cell cancers

Male extragonadal germ cell cancers are included as testicular cancers in Cancer in Norway, but are excluded from this entity in NORDCAN.

Access to NORDCAN data

Aggregated data on incidence, mortality, prevalence and survival is accessible for everyone from the NORDCAN website (<http://www.ancr.nu>). The next chapter will give a thorough demonstration of the use of different facilities at this website.

A researcher in need of a download of aggregated NORDCAN data for use with other software products may approach the Secretariat in Denmark. In the case where more detailed analysis are required, NORDCAN has a password-only download facility of cancer incidence and mortality data along with corresponding person-year data aggregated by cancer type, year, sex, and five-year age group. The password (of limited duration) should be requested from the NORDCAN secretariat. If individual data is wanted for further analysis, each of the Nordic cancer registries should be contacted directly to discuss the options and the research protocol needed to access such data.

3 A guide on how to use the NORDCAN data

The NORDCAN project contains data for 41 major cancer sites or groups of cancers in the Nordic countries (Denmark, Sweden, Finland, Iceland, Faroe Islands and Norway). The internet application provides access to cancer fact sheets and gives the opportunity to conduct online analyses for incidence, mortality, prevalence and survival of cancer. All analyses, except for the survival analyses, allow stratification on geographical regions. A comprehensive description of the NORDCAN project has been presented by Engholm and colleagues (Engholm & al 2010; Engholm & al 2013). NORDCAN is available in five Nordic languages and English, and the choice of language version is made by clicking the relevant flag on the start page with the red Nordic map as shown below. If you want to change to another language while working in NORDCAN, simply click on the relevant flag in the upper right corner of the NORDCAN website.

In this chapter, we will present a guide on how to utilize some of the possibilities in the NORDCAN project, with examples mostly taken from Norway. Before you start using the NORDCAN internet application, we highly recommend that you read the chapter “About NORDCAN” at the NORDCAN website. With the NORDCAN online. With the NORDCAN online program, you can perform simple analysis or create your own graphs, and data can be expressed as absolute numbers or rates. NORDCAN offers both age-specific rates, crude rates and age-standardised rates. For the latter, standardisation is possible according to the World standard population, the European standard (which resembles Scandinavia in the 1950's) or the Nordic standard (2000). Some variation in rates may occur from one year to the next. The interpretations of cancer statistics and examination of time trends should therefore be based on smoothing of numbers by the past several years, and special caution should be given to the interpretation of results on short and long term predictions and breakpoint analyses.

Using NORDCAN Graphs or tables in presentations or manuscripts

To use a graph in a presentation or a manuscript, simply right click on the graph and choose “copy”. You may then paste the graph into the desired location. It is also possible after the right click on the graph to choose “save image as” for later use as a png or bitmap file.

A table can be saved as a pdf-file by printing it using cufteft or a similar function. A table can by a click in the text-file box be exported to a text file which afterwards can be read from Excel for further tabulation and presentation



NORDCAN

ABOUT NORDCAN

- The NORDCAN project
- The NORDCAN database
- The cancer dictionary
- The NORDCAN group
- Contacts

CANCER FACT SHEETS

-- Select a cancer --
 and
 -- Select a region --

GO

ONLINE ANALYSIS

- Incidence/Mortality
- Prevalence
- Survival

GLOSSARY OF TERMS

LITERATURE

ACKNOWLEDGEMENTS

DOWNLOAD

Last update: 25.04.2013

The NORDCAN project

Welcome to NORDCAN. This project presents the incidence, mortality, prevalence and survival statistics from 41 major cancers in the Nordic countries. This Internet application provides access to summary data with graphic and tabulation facilities. Regional data with up to 6 regions for each country is included for incidence, mortality and prevalence. The database with more detailed geographical information (county) for incidence and mortality and for the period 1972-2006 is only available using the NORDCAN software for PC.

- The Association of the Nordic Cancer Registries (ANCR) has proprietary rights to the materials on the Website. The data extracted from this website is in the public domain. You may use it "as is" but must cite the corresponding reference (see below).
- Systematic retrieval of data to create or compile, directly or indirectly, a collection, database or directory without written permission from ANCR via the [secretariat](#) is prohibited.
- This application has been developed in collaboration with the [Section of Cancer Information \(CIN\)](#) at [IARC](#).
- Nordic Cancer Union (NCU) has financially supported the project.
- Before you start working with NORDCAN, we strongly recommend that you first read the section: The NORDCAN database.
- Tables, graphs and predictions are made based on the selection of the user. It might take a short time to calculate tables, graphs and predictions in the program.

Recommended references

Engholm G, Ferlay J, Christensen N, Johannessen TB, Klint Å, Kettum JE, Møller MC, Ólafsdóttir E, Pukkala E, Storm HH. NORDCAN: Cancer Incidence, Mortality, Prevalence and Survival in the Nordic Countries, Version 5.3 (25.04.2013). Association of the Nordic Cancer Registries. Danish Cancer Society. Available from <http://www.ancr.nu>, accessed on day/month/year.

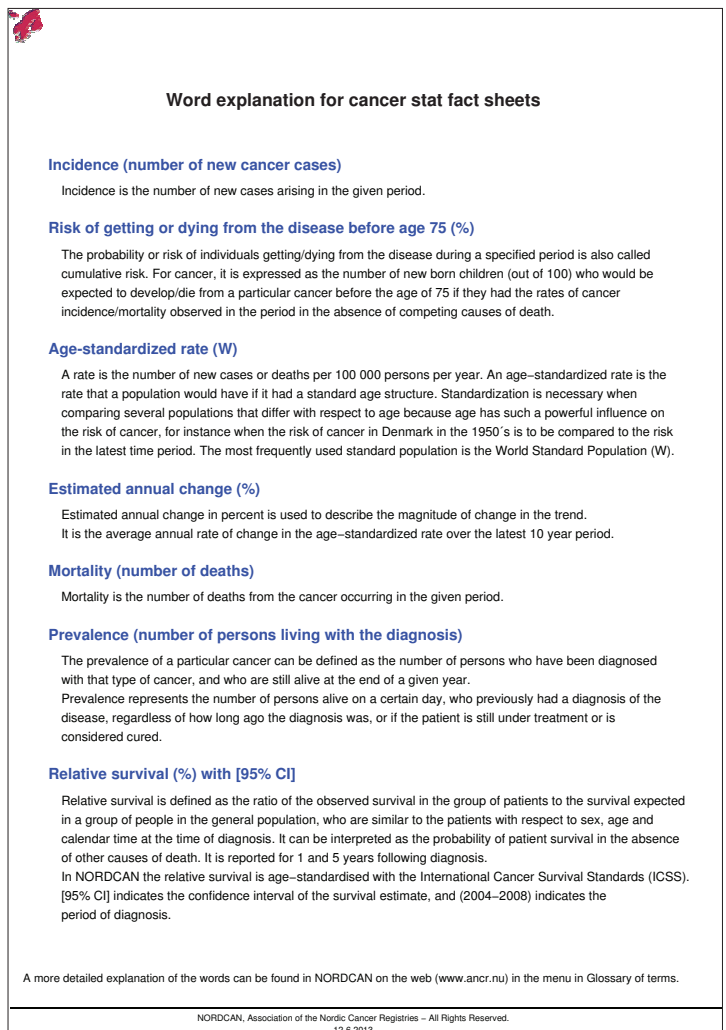
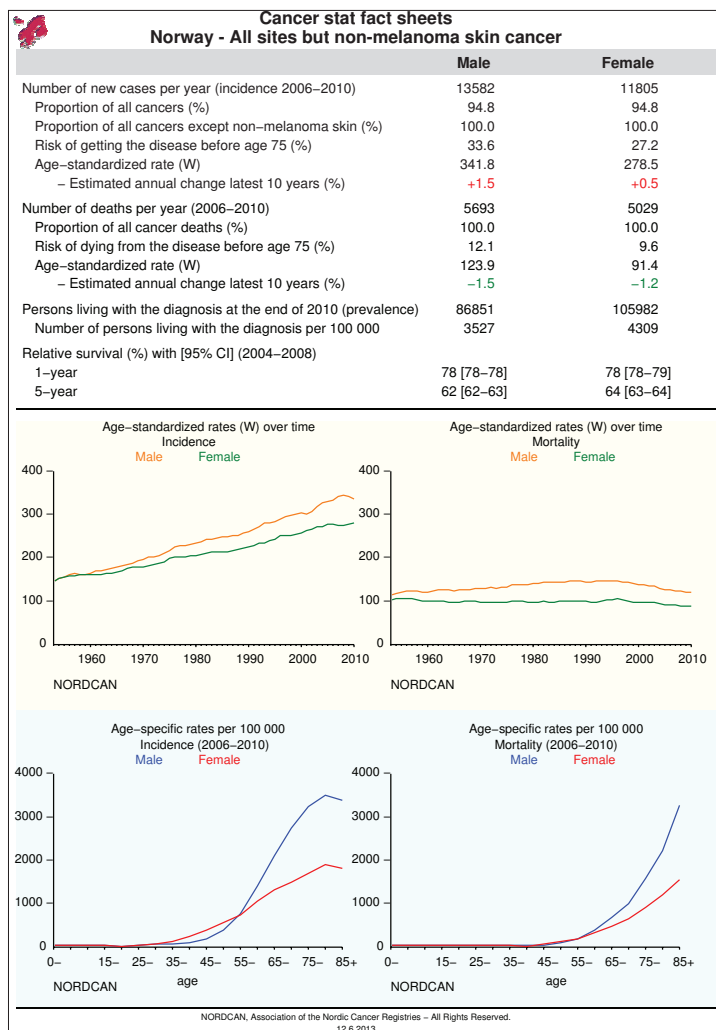
Engholm G, Ferlay J, Christensen N, Bray F, Gjerstorff ML, Klint Å, Kettum JE, Ólafsdóttir E, Pukkala E, Storm HH (2010). NORDCAN-a Nordic tool for cancer information, planning, quality control and research. *Acta Oncol.* 2010 Jun;49(5):725-36.

FACT SHEETS

The cancer facts sheets give quick access to a summary of the cancer burden for specific cancer diseases in the Nordic countries. The sheets provide an overview of the key statistics in terms of incidence, mortality and survival for the latest five-year period and prevalence at the end of the incidence period. It also gives an explanation for the most common measurements used in cancer epidemiology.

Output example: Cancer fact sheet for all sites but non-melanoma skin cancers for Norwegian males and females

During the period 2006–2010, about 25 000 new cases of cancer (excluded non-melanoma skin cancer) were diagnosed per year. The incidence has steadily increased in the past decades, and in the latest 10 years the estimated annual change is 1.5% for men and 0.5% for women. Almost one third of the Norwegian population develops cancer before the age of 75, and the risk of dying from cancer before the age of 75 is 12% in men and 10% in women. Women have a higher probability of surviving a cancer diagnosis. The 1-year relative survival of cancer in total is 73% and 75% in men and women, respectively, whereas the five-year relative survival after the diagnosis is 55% among men and 59% among women.

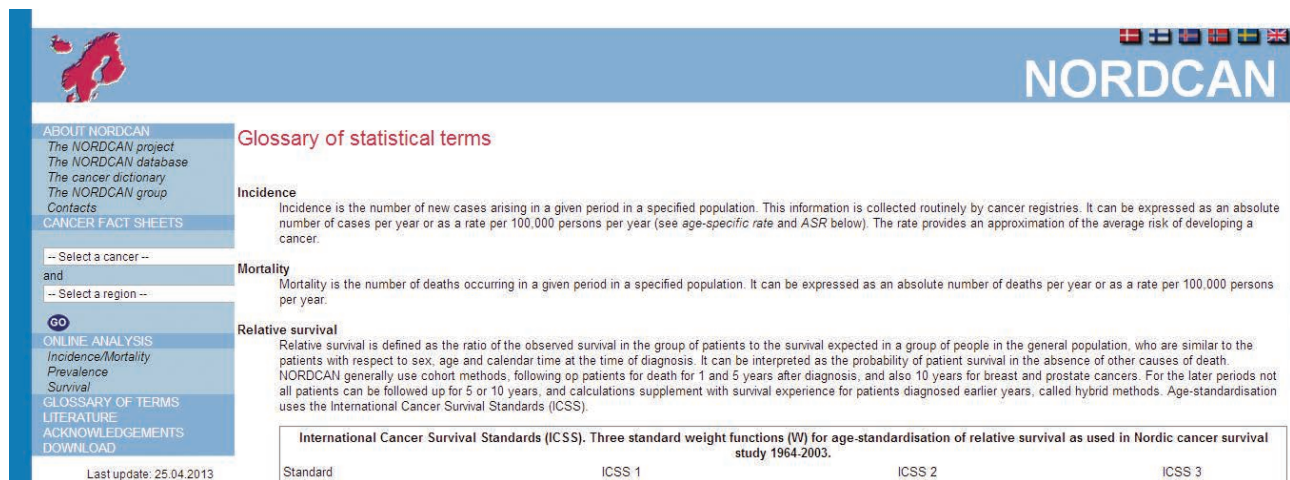


INCIDENCE AND MORTALITY

Definitions¹

Incidence is the number of new cases arising in a given period in a specified population. It can be expressed as an absolute number of cases per year or as a rate per 100,000 persons per year. The rate provides an approximation of the average risk of developing a cancer. Mortality is the number of deaths occurring in a given period in a specified population. It can be expressed as an absolute number of deaths per year or as a rate per 100,000 persons per year. The crude rates are calculated by dividing the number of new cancers (incidence) or cancers deaths (mortality) by the total number of person years at risk in the same period, and may be calculated for a whole population or separately for specific sub-groups, as for example age-specific rates. For comparison between populations or between time periods it is necessary to use age-standardised rates. These rates adjust for population growth and ageing, and give the rates that a population would have with a standard age distribution.

The incidence data is based on registrations in the Nordic cancer registries, whereas cancer mortality data are based on data from death certificates, and might have a lower accuracy than the incidence data due to difficulties in certifying and ascertaining the cause of death.



The screenshot shows the NORDCAN website interface. On the left is a navigation menu with links like 'ABOUT NORDCAN', 'CANCER FACT SHEETS', 'ONLINE ANALYSIS', and 'GLOSSARY OF TERMS'. The main content area is titled 'Glossary of statistical terms' and contains definitions for 'Incidence', 'Mortality', and 'Relative survival'. At the bottom, there is a table titled 'International Cancer Survival Standards (ICSS): Three standard weight functions (W) for age-standardisation of relative survival as used in Nordic cancer survival study 1964-2003.'.

Standard	ICSS 1	ICSS 2	ICSS 3
International Cancer Survival Standards (ICSS): Three standard weight functions (W) for age-standardisation of relative survival as used in Nordic cancer survival study 1964-2003.			

¹ Extracted from the glossary of terms in the NORDCAN project <http://www.ancr.nu>

AGE-SPECIFIC INCIDENCE RATE

Output example: The age-specific incidence rates per 100 000 for selected cancers by age, for Norwegian females, 2006-2010 (combined period)

Cancer is primarily a disease of older people, and for most cancer sites the incidence rates tend to increase with age, with the highest incidence rates occurring at the age of 80 and above. The output table for these analyses give age-standardised rates for all of the three standard populations (World, European and Nordic), and clearly show how the standardised rates (ASR) differs, with lowest rates appearing using the World Standard Population.

Tables

Age-specific rates or numbers

Standardised rates by

- ▶ Countries
- ▶ Cancers
- ▶ Year

Graphs:

Line charts

- ▶ Age-specific curves
- ▶ Cumulative risk by age
- ▶ Time trends
- ▶ Time trends by age
- ▶ Trends by birth cohort

Bar charts by

- ▶ Countries
- ▶ Cancers

Cancer map

Pie chart

Population pyramid

Advanced options:

- ▶ Short or long term predictions.
- ▶ Breakpoint analysis.

Age-specific table (Incidence/Mortality)

Country/Years*
 Norway
 2010
 2009
 2008
 2007
 2006

Sex
 ☐ Male
 ☒ Female

Data type
 ☒ Incidence
 ☐ Mortality

Options
 Results sorted by:
 Cancer (alphabetical)
 Statistic:
 ☒ Rates
 ☐ Numbers

Output
 ☐ Text file

Execute

* Multiple selection is possible using the 'Ctrl' key.
 The output file (text) will be available with a click on the icon that will appear at the bottom of the table.

Norway (2006-2010)																							
Incidence per 100,000 by age - Female																							
Cancer	Total	0-	5-	10-	15-	20-	25-	30-	35-	40-	45-	50-	55-	60-	65-	70-	75-	80-	85+	CR	ASR (W)	ASR (E)	ASR (N)
Acute leukaemia	512	7.2	3.1	2.4	2.1	1.1	0.7	1.1	1.5	1.4	1.6	2.3	3.3	8.0	8.0	9.8	11.0	16.2	18.5	4.3	3.3	3.6	4.0
All sites but non-melanoma skin cancer	59025	20.7	12.3	12.0	19.7	34.2	62.3	99.6	159.2	250.7	406.5	595.9	768.1	1065.1	1336.7	1503.2	1720.8	1905.6	1844.1	493.2	278.5	387.1	471.2
Breast	13775	-	-	-	0.3	1.5	5.4	22.0	44.0	98.0	178.3	229.9	244.2	291.6	320.0	217.5	226.9	278.8	278.4	115.1	73.1	99.2	111.9
Cervix uteri	1508	-	-	-	-	3.1	11.8	19.7	24.9	20.4	19.3	21.0	14.5	16.9	12.2	15.7	18.9	17.6	14.2	12.6	9.6	11.8	12.7
Colon	6424	-	0.1	0.1	0.5	1.1	1.9	2.1	4.4	8.7	14.9	30.3	50.0	84.0	144.6	209.2	254.2	347.9	333.1	53.7	23.5	35.7	49.3
Colorectal	9201	-	0.1	0.1	0.5	1.4	2.6	3.5	7.8	13.9	27.9	52.0	81.2	136.5	212.4	289.9	359.1	456.1	437.4	76.9	35.1	52.7	71.2
Corpus uteri	3506	-	-	-	-	0.4	1.3	3.9	9.5	15.9	38.1	61.9	78.7	106.4	111.3	103.1	92.9	72.4	29.3	16.7	23.8	28.5	
Lung	5661	-	0.1	0.1	0.1	0.4	0.9	1.0	3.1	5.5	18.6	39.9	77.7	129.2	163.4	216.7	233.7	188.5	113.2	47.3	25.2	36.7	46.0
Melanoma of skin	3418	0.1	0.1	-	1.3	5.2	11.6	15.2	24.1	29.8	31.9	39.8	45.3	53.3	65.0	66.5	72.6	74.7	82.9	28.6	18.3	24.1	27.8
Ovary etc.	2337	0.1	0.3	0.9	1.0	1.4	1.4	1.6	3.9	9.2	15.5	29.1	37.8	49.3	59.4	58.2	65.7	63.2	56.6	19.5	11.4	15.9	18.9
Rectum and anus	2777	-	-	-	-	0.3	0.7	1.4	3.4	5.2	13.0	21.7	31.1	52.5	67.7	80.7	104.9	108.2	104.3	23.2	11.6	17.0	21.9

Rates based on less than 10 cases are italicised.

(The output example shows an extraction of the output table for some selected cancers)

STANDARDISED INCIDENCE AND MORTALITY RATES BY COUNTRIES AND REGIONS

Output example: Standardised incidence rates per 100 000 for melanoma of the skin, by country and region, Nordic males, 2006-2010 (grouped period)

Sun exposure is a well-known risk factor for the development of cutaneous malignant melanoma. Within the countries there is a gradient of increasing sun exposure from north to south, and a marked north-south gradient of the incidence of malignant melanoma. In Norway, the incidence rates are almost twice as high in the Western and South-Eastern regions as compared to the Northern region. Such patterns, with highest rates in the southern regions, are also observed within Sweden, Denmark and Finland, but are not observed across the Nordic countries. For example the incidence rates in the southern region of Norway are about the same as the rates in the southern region of Denmark.

Tables

Age-specific rates or numbers

Standardised rates by

- ▶ Countries
- ▶ Cancers
- ▶ Year

Graphs:

Line charts

- ▶ Age-specific curves
- ▶ Cumulative risk by age
- ▶ Time trends
- ▶ Time trends by age
- ▶ Trends by birth cohort

Bar charts by

- ▶ Countries
- ▶ Cancers

Cancer map

Pie chart

Population pyramid

Advanced options:

- ▶ Short or long term predictions.
- ▶ Breakpoint analysis.

Standardised rates by countries (Incidence/Mortality)

Cancer/Years*

Melanoma of skin 2010
2009
2008
2007
2006

Sex

☒ Male
☐ Female

Data type

☒ Incidence
☐ Mortality

Options

Results sorted by:

Country ☐ Standard error



Melanoma of skin, Male
Incidence (2006-2010), age 0-85+

Country	Numbers	Crude Rate	ASR(W)	ASR(E)	ASR(N)	Cumulative Risk
Nordic countries	15915	25.6	15.5	21.5	26.2	-
Denmark	3818	28.1	18.0	24.2	29.0	-
DK, North Jutland region	326	22.4	14.1	18.6	22.3	-
DK, Central Jutland region	751	24.3	15.5	21.4	25.9	-
DK, Southern Denmark region	878	29.5	18.7	25.0	29.5	-
DK, The capital region	1354	33.4	22.6	30.1	36.0	-
DK, Zealand region	509	25.1	14.3	19.7	23.9	-
Faroe Islands	13	10.3	8.8	10.5	10.6	-
Finland	2662	20.4	12.2	17.1	21.0	-
FI, Region Helsinki	1011	23.2	15.1	21.1	26.1	-
FI, Region Kuopio	328	16.2	8.7	12.3	14.8	-
FI, Region Oulu	265	14.5	8.8	12.4	15.6	-
FI, Region Tampere	653	24.6	14.1	19.8	24.4	-
FI, Region Turku	401	18.6	10.7	14.7	18.0	-
Iceland	103	12.9	9.6	13.3	16.2	-
IS, Reykjavik-Reykjanes	73	13.4	9.9	14.2	17.9	-
IS, Outside the capital	30	11.9	9.1	11.6	13.1	-
Norway	3247	27.3	17.3	24.4	30.1	-
NO, Central region	383	23.0	14.4	20.0	24.7	-
NO, Northern region	190	16.3	10.3	14.3	17.0	-
NO, South-Eastern region	1963	29.9	18.7	26.4	32.7	-
NO, Western region	711	28.6	19.2	27.2	33.5	-
Sweden	6085	26.5	15.4	21.3	26.1	-
SE, Northern region	377	17.1	9.3	12.9	15.8	-
SE, Stockholm-Gotland region	1220	24.4	15.9	22.2	27.1	-
SE, Southern region	1080	28.2	16.0	22.3	27.6	-
SE, South-Eastern region	741	30.0	17.2	23.5	28.2	-
SE, Uppsala-Örebro region	1265	26.2	14.2	19.8	24.2	-
SE, Western region	1402	30.5	17.7	24.6	30.2	-

Crude and Age-Standardised Rate per 100,000
Cumulative Risk, percent

Output example: Standardised mortality rates per 100 000 for malignant melanoma by country and regions, Nordic males, 2006-2010 (grouped period)

Norway has the highest mortality rates of malignant melanoma in the Nordic countries. The highest rates in Norway are observed in the South-Eastern and Western regions and reflect the high incidence, but might also be partially driven by unfavourable survival and differences in treatment.

Tables

Age-specific rates or numbers

Standardised rates by

- ▶ Countries
- ▶ Cancers
- ▶ Year

Graphs:

Line charts

- ▶ Age-specific curves
- ▶ Cumulative risk by age
- ▶ Time trends
- ▶ Time trends by age
- ▶ Trends by birth cohort

Bar charts by

- ▶ Countries
- ▶ Cancers

Cancer map

Pie chart

Population pyramid

Advanced options:

- ▶ Short or long term predictions.
- ▶ Breakpoint analysis.

Standardised rates by countries (Incidence/Mortality)

Cancer/years*
Melanoma of skin 2010 2009 2008 2007 2006

Sex
☒ Male
☐ Female

Data type
☐ Incidence
☒ Mortality

Age range
from to
0- 85+

Options
Results sorted by:
Country ☐ Standard error

Output
☐ Text file
☐ Countries
☐ Regions
☒ Both

Execute

* Multiple selection is possible using the 'Ctrl' key.
The output file (text) will be available with a click on the icon that will appear at the bottom of the table.



Melanoma of skin, Male
Mortality (2006-2010), age 0-85+

Country	Numbers	Crude Rate	ASR(W)	ASR(E)	ASR(N)	Cumulative Risk
Denmark	717	5.3	3.0	4.4	5.6	-
DK, North Jutland region	77	5.3	2.8	4.1	5.2	-
DK, Central Jutland region	173	5.6	3.3	4.8	6.3	-
DK, Southern Denmark region	165	5.5	3.2	4.5	5.6	-
DK, The capital region	207	5.1	3.0	4.5	6.0	-
DK, Zealand region	95	4.7	2.6	3.6	4.3	-
Faroe Islands	2	1.6	1.1	1.5	1.5	-
Finland	585	4.5	2.4	3.6	4.8	-
FI, Region Helsinki	201	4.6	2.8	4.2	5.7	-
FI, Region Kuopio	91	4.5	2.3	3.3	4.3	-
FI, Region Oulu	79	4.3	2.4	3.5	4.6	-
FI, Region Tampere	133	5.0	2.5	3.8	5.3	-
FI, Region Turku	81	3.8	1.8	2.7	3.7	-
Norway	867	7.3	4.3	6.3	8.4	-
NO, Central region	98	5.9	3.3	4.9	6.6	-
NO, Northern region	39	3.3	2.1	2.8	3.5	-
NO, South-Eastern region	552	8.4	4.8	7.2	9.7	-
NO, Western region	178	7.2	4.5	6.6	8.7	-
Sweden	1397	6.1	3.1	4.6	6.1	-
SE, Northern region	84	3.8	1.8	2.7	3.5	-
SE, Stockholm-Gotland region	251	5.0	3.0	4.5	6.0	-
SE, Southern region	266	7.0	3.5	5.2	6.8	-
SE, South-Eastern region	172	7.0	3.3	4.9	6.5	-
SE, Uppsala-Orebro region	333	6.9	3.3	4.9	6.4	-
SE, Western region	291	6.3	3.2	4.7	6.4	-

Crude and Age-Standardised Rate per 100,000
Cumulative Risk, percent

AGE-SPECIFIC INCIDENCE AND MORTALITY

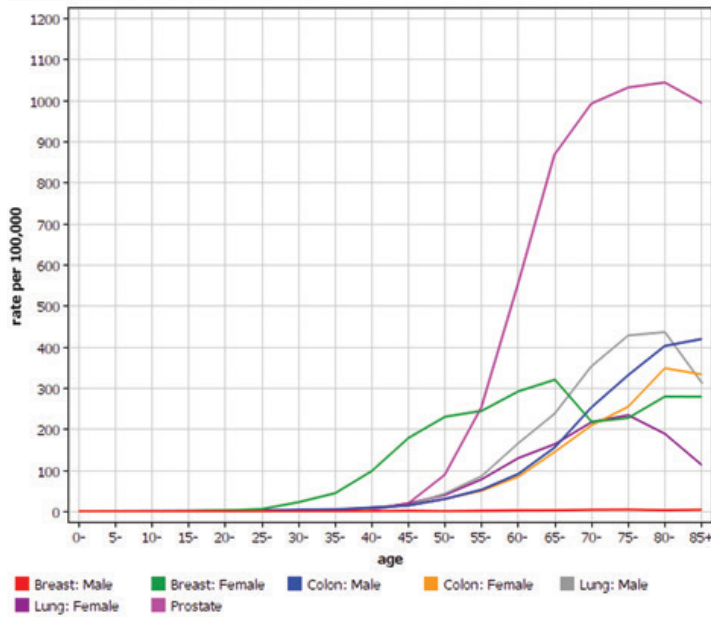
Output example: Age-specific incidence and mortality curves for selected cancers in Norway, 2006-2010

Most cancers in Norway are diagnosed in persons over 50 years, and colorectal, prostate and lung cancers have the highest incidence rates in the oldest age groups (75-85 years). The incidence of breast cancer peaks around 65 years, and reflects the introduction of the Norwegian Breast Cancer Screening program, with detection of tumours at earlier stages and ages. The mortality rates for lung cancer peak around 80 years and are then levelling off, whereas the mortality rates for colorectal, breast and prostate cancers continue to increase and are highest in the oldest age group.

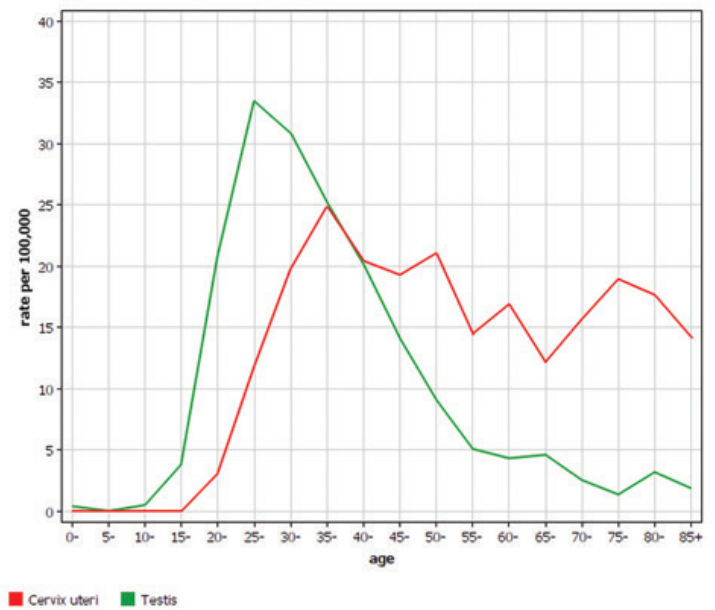
Some cancers, like testicular and cervical cancer, occur more often in younger age groups. Testicular cancer has the highest incidence rates in men between 20-30 years, and the incidence of cervical cancer peaks between 30 and 40 years. The mortality rates for cervical cancer rise until the age of 80, whereas the highest mortality rates for testis cancer occur in age groups between 70 and 80 years.

Tables Age-specific rates or numbers Standardised rates by ▶ Countries ▶ Cancers ▶ Year Graphs: Line charts ▶ Age-specific curves ▶ Cumulative risk by age ▶ Time trends ▶ Time trends by age ▶ Trends by birth cohort Bar charts by ▶ Countries ▶ Cancers Cancer map Pie chart Population pyramid Advanced options: ▶ Short or long term predictions. ▶ Breakpoint analysis.	Age-specific curves (Incidence/Mortality) Cancer*Sex Brain, central nervous system Breast Cervix uteri Colon Colorectal ☒ Male ☒ Female Country*Year* ☐ Outside the capital ☒ Norway ☐ Central region ☐ Northern region ☐ South-Eastern region ☐ Western region ☐ Sweden 2010 2009 2008 2007 2006 ☒ Grouped (period) ☐ Individual years Data type ☒ Incidence ☐ Mortality Age from: 0- to: 85+ Graphic Orientation ☐ Portrait ☒ Landscape Options ☒ Add grid lines ☐ Add symbols Line style ☐ Thin ☒ Medium ☐ Thick Check curves Execute * Multiple selection is possible using the 'Ctrl' key. You can select up to 12 curves (use the 'Check curves' button if necessary).
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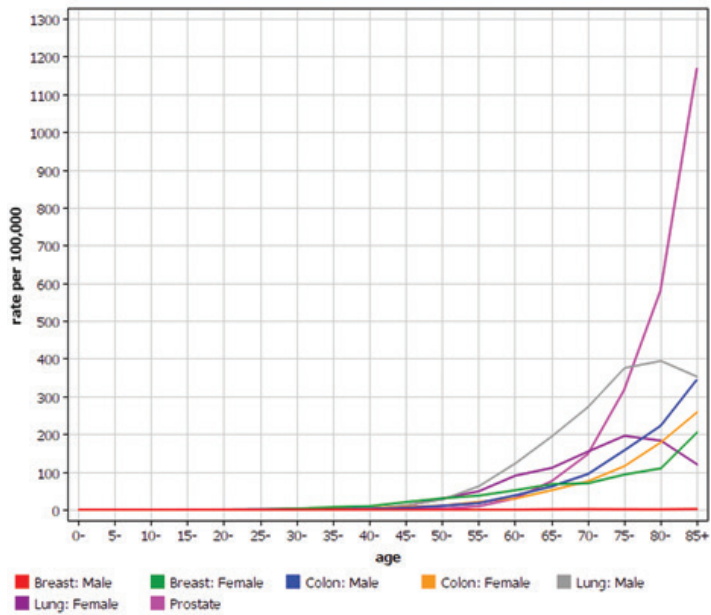
Norway-Incidence (2006-2010)



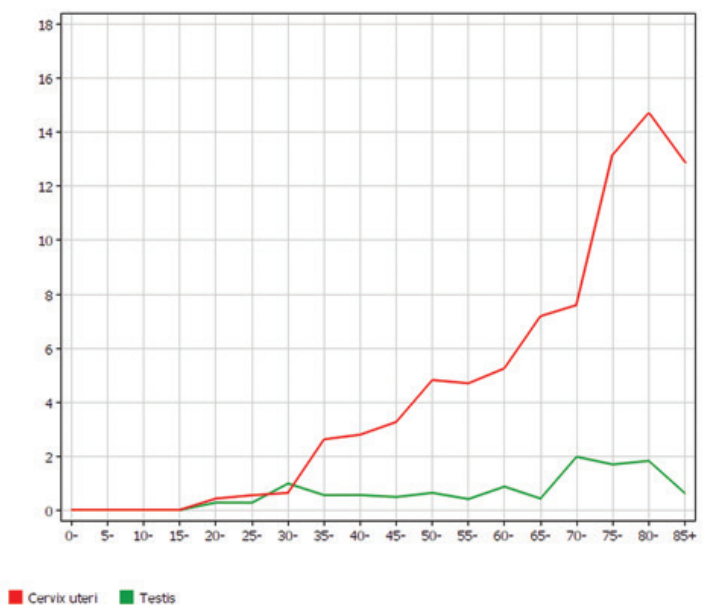
Norway-Incidence (2006-2010)



Norway-Mortality (2006-2010)



Norway-Mortality (2006-2010)



CUMULATIVE RISK BY AGE

Output example: Cumulative incidence for colon, breast, lung and prostate cancer, Norwegian males and females, 2006-2010 (grouped period)

By the age of 75, one out of three Norwegians has developed cancer. The cancer risk increases significantly with age with a steep increase in risk after the age of 60. About 15% of all Norwegian men will be diagnosed with prostate cancer before the age of 75. The cumulative risk for breast cancer starts to rise from the age of 40, and before the age of 75, almost 10 percent of Norwegian women have suffered from this disease.

Tables

Age-specific rates or numbers
Standardised rates by

- Countries
- Cancers
- Year

Graphs:

Line charts

- Age-specific curves
- Cumulative risk by age**
- Time trends
- Time trends by age
- Trends by birth cohort

Bar charts by

- Countries
- Cancers

Cancer map

Pie chart

Population pyramid

Advanced options:

- Short or long term predictions.
- Breakpoint analysis.

Cancer*/Sex

Breast
Cervix uteri
Colon
Colorectal
Corpus uteri

☒ Male
☒ Female

Country/Year*

☐ Outside the capital
☒ Norway
☐ Central region
☐ Northern region
☐ South-Eastern region
☐ Western region
☐ Sweden

2010
2009
2008
2007
2006

☒ Grouped (period)
☐ Individual years

Data type

☒ Incidence
☐ Mortality

Age

from to

0- 85

Graphic

Orientation

☐ Portrait
☒ Landscape

Options

☒ Add grid lines
☐ Add symbols

Line style

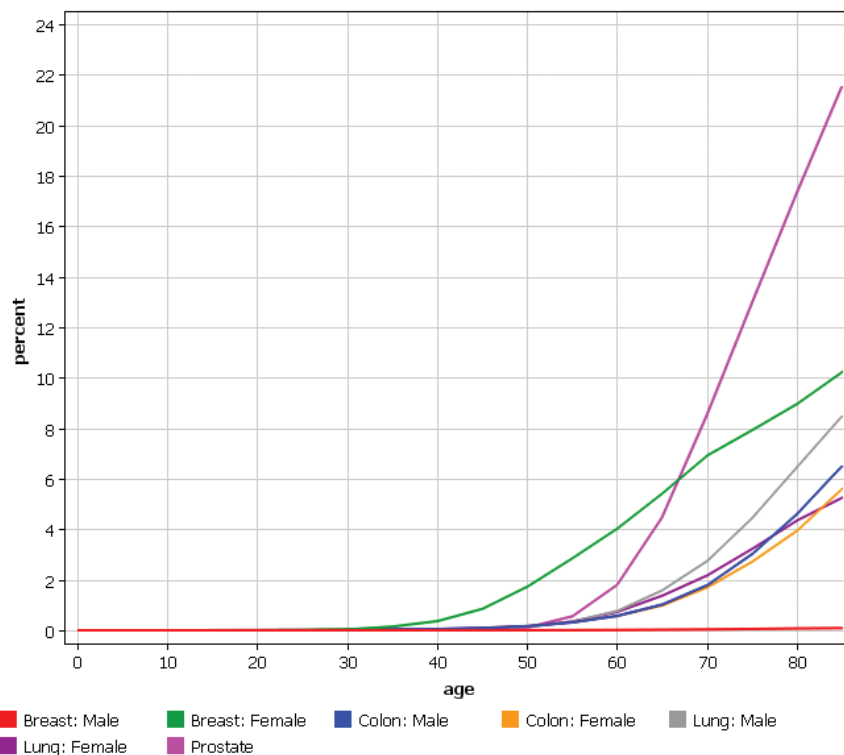
☐ Thin
☒ Medium
☐ Thick

<Check curves>

Execute

* Multiple selection is possible using the 'Ctrl' key.
You can select up to 12 curves (use the 'Check curves' button if necessary).

Norway-Cumulative incidence from age 0 (2006-2010)



TIME TRENDS FOR ONE OR SEVERAL CANCERS

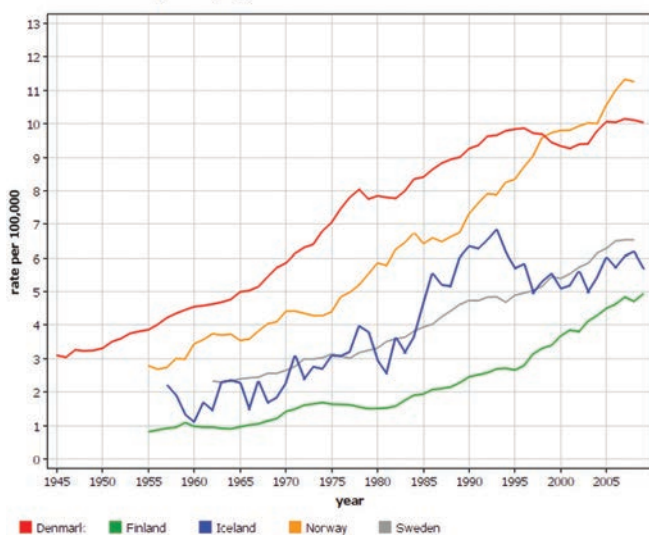
Time trends can, for instance, be used to identify period effects and birth cohort effects. Period effects may act as surrogate measures of events that quickly change rates with the same order of magnitude across all affected age groups under study. Often they transpire from changes in classification criteria or the availability of new diagnostic tests, although the introduction of a powerful carcinogen or screening intervention (affecting all study age groups) may also show up as period effect. Birth cohort effects may provide valuable insight into the nature and intensity of disease-correlated exposures that vary across successive generations (Engholm & al 2010).

Output example: Incidence and mortality trends of testis cancer, Nordic males, 1953-2010

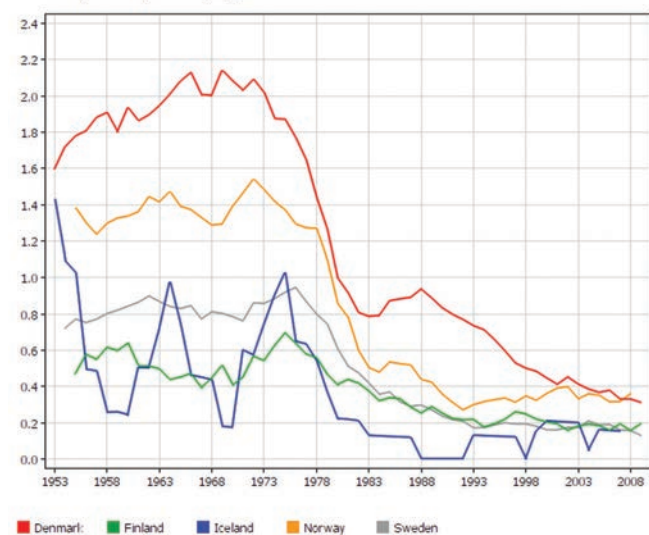
Norway has the highest incidence of testis cancer among the Nordic countries, and the rate is among the highest worldwide. The aetiology of testis cancer is poorly understood, but evidence from epidemiological and biological studies suggests that environmental factors as oestrogens and antiandrogens in early stage of life are potential risk factors. In Norway there has been nearly a four-folded increase in incidence of testis cancer between the first (1953-57) and the last (2006-2010) five-year period. The mortality rates of testis cancer have decreased since the beginning of registration, and are between 0.2 and 0.4 in all Nordic countries.

Tables Age-specific rates or numbers Standardised rates by ▶ Countries ▶ Cancers ▶ Year Graphs: Line charts ▶ Age-specific curves ▶ Cumulative risk by age ▶ Time trends ▶ Time trends by age ▶ Trends by birth cohort Bar charts by ▶ Countries ▶ Cancers Cancer map Pie chart Population pyramid Advanced options: ▶ Short or long term predictions. ▶ Breakpoint analysis.	Time trends (Incidence/Mortality) Cancer/Sex Soft tissues Stomach Testis Thyroid Tongue PCO ☒ Male ☐ Female Country/Period ☒ Norway ☐ Central region ☐ Northern region ☐ South-Eastern region ☐ Western region ☒ Sweden ☐ Northern region Starting: First available Ending: Last available Data type ☒ Incidence ☐ Mortality Statistic/Age range ASR (W) From: 0- To: 85+ Graphic Orientation: ☐ Portrait ☒ Landscape Options: ☒ Add grid lines ☐ Add trend lines ☐ Add symbols Line style: ☐ Thin ☒ Medium ☐ Thick Smoothing: 5 years <Check curves> Execute Multiple selection is possible using the 'Ctrl' key. 1. You can select up to 12 curves (use the 'Check curves' button if necessary).
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Testis
Incidence: ASR (World) age 0-85+



Testis
Mortality: ASR (World) age 0-85+



TIME TRENDS BY AGE OR BIRTH COHORT

Output example: Incidence trends of lung cancer by age and birth cohort, Norwegian males and females, 1953-2010

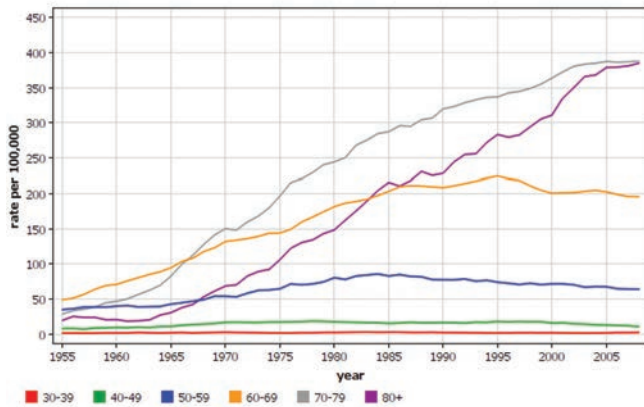
As smoking is a major risk factor for lung cancer, the incidence and mortality trends reflect smoking habits over time. Studies on smoking habits in the Norwegian population have shown that the proportion of smokers among men was 65% up to about 1960, and about 25% in year 2000. Norwegian women had a higher proportion of smokers in year 2000 (above 30%), and women tended to quit smoking at later ages than men (Lund 2009). The total incidence trend of lung cancer among men has been levelling off since the beginning of 1990's.

The age-specific trends, however, show that the incidence in the oldest age groups (70-79 and 80+) has continued to increase. For women, flattening incidence curves is seen in younger women (<59 years), whereas significant increases in incidence are seen for older women.

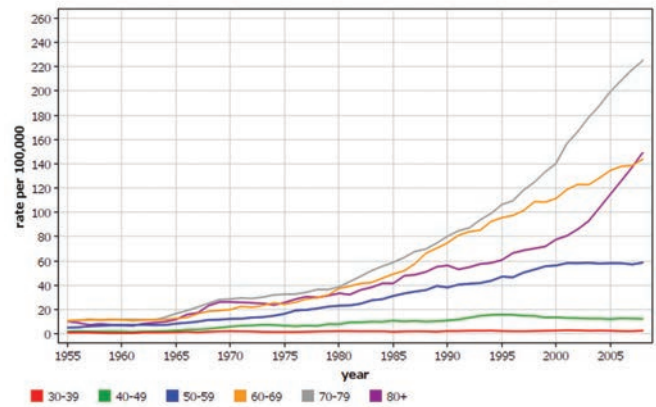
For lung cancer, we see a clear difference between the cohort patterns for men and women. From the cohort plot, it seems the cohort specific risks for men started to level off for those cohorts born around 1920, followed by a decline in the rates for cohorts born after 1946. For women, the risk for consecutive birth cohorts seems to have steadily increased, but with a levelling off of the risk after 1946. These cohort specific risk patterns can be used to make predictions about the future cancer burden. This will be shown later in the section on "short or long term predictions".

Tables Age-specific rates or numbers Standardised rates by ▶ Countries ▶ Cancers ▶ Year Graphs: Line charts ▶ Age-specific curves ▶ Cumulative risk by age ▶ Time trends ▶ Time trends by age ▶ Trends by birth cohort Bar charts by ▶ Countries ▶ Cancers Cancer map Pie chart Population pyramid Advanced options: ▶ Short or long term predictions. ▶ Breakpoint analysis.	Time trends by age (Incidence/Mortality) Cancer/Sex Lung Male Female Country/Period Norway Starting 1953 Ending 2010 Data type ☒ Incidence ☐ Mortality Age From 30- Interval 10 years Number 6 Graphic Orientation ☐ Portrait ☒ Landscape Options ☒ Add grid lines ☐ Add trend lines ☐ Add symbols Line style ☐ Thin ☒ Medium ☐ Thick Smoothing 5 years <Check age-groups> Execute
	Age from: first age-group selected. Age interval: 5, 10, ..., 25 years. Number: number of age groups (ie lines of the chart). You can select a maximum of 12 lines. Smoothing (simple moving average): for each year, the age-specific rate is calculated over a period of 1 (no smoothing), 3 or 5 years.
	Trends by birth cohort Cancer/Sex Lung Male Female Country Norway Data type ☒ Incidence ☐ Mortality Age From 35- To 85+ Graphic Options ☒ Add grid lines ☐ Add symbols Line style ☐ Thin ☒ Medium ☐ Thick Execute

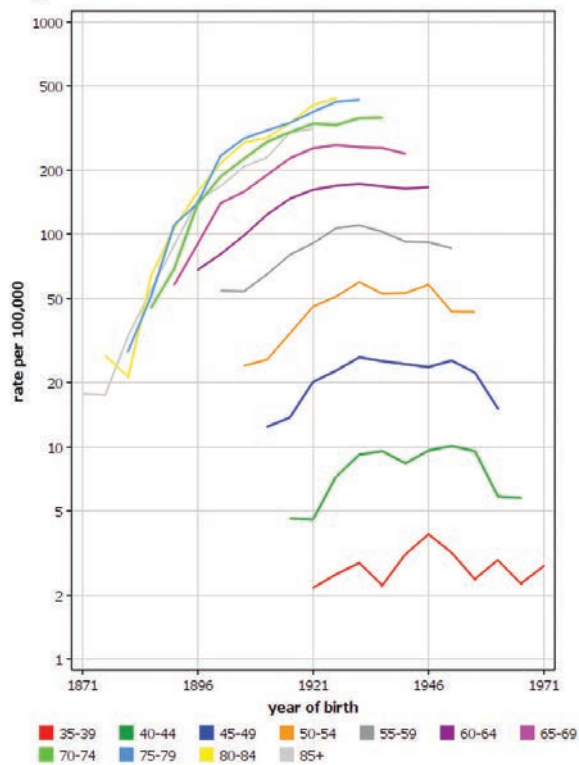
Incidence: Norway
Lung, Male



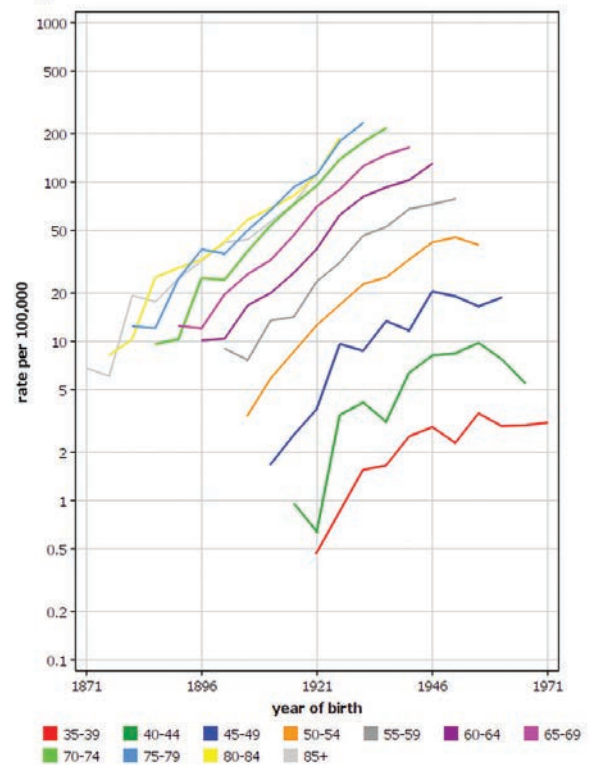
Incidence: Norway
Lung, Female



Norway-Incidence
Lung, Male



Norway-Incidence
Lung, Female



BAR OR PIE CHARTS BY COUNTRIES OR CANCER

Output example: The most frequent cancers in the Nordic countries, 2005-2009 (grouped period)

For both sexes combined, the most common cancers were prostate cancer (113 528 cases, 16.4% of all cancer cases) followed by breast cancer (89 825 cases, 13.0% of all cancer cases), lung cancer (63 779 cases, 9.2% of all cancer cases) and colon cancer (52 041 cases, 7.5% of all cancer cases).

Lung cancer is the leading cause of cancer mortality for both sexes, with 56 511 deaths (18.9% of the total mortality), followed by prostate cancer (27 481 deaths, 9.2%), colon cancer (25 192 deaths, 8.4%), and breast cancer (21 624, 7.2%).

The bar and pie charts show numbers for men and women separately.

Tables

Age-specific rates or numbers

Standardised rates by

▶ Countries

▶ Cancers

▶ Year

Graphs:

Line charts

▶ Age-specific curves

▶ Cumulative risk by age

▶ Time trends

▶ Time trends by age

▶ Trends by birth cohort

Bar charts by

▶ Countries

▶ Cancers

Cancer map

Pie chart

Population pyramid

Advanced options:

▶ Short or long term predictions.

▶ Breakpoint analysis.

Bar chart by cancers

Country/Year*

Nordic countries

2009

2008

2007

2006

2005

Data type

☒ Incidence

☒ Mortality

Statistic/Age range

ASR (W)

From To

0- 85+

Sex

☒ Male

☐ Female

Cancers

Top ten

Graphic

☒ Exclude non-melanoma skin cancers from the chart

☒ Add vertical grid lines

Execute

Pie chart

Country/Year*

Nordic countries

2009

2008

2007

2006

2005

Data type

☒ Incidence

☐ Mortality

Age range

From To

0- 85+

Sex

☒ Male

☐ Female

☐ Both sexes

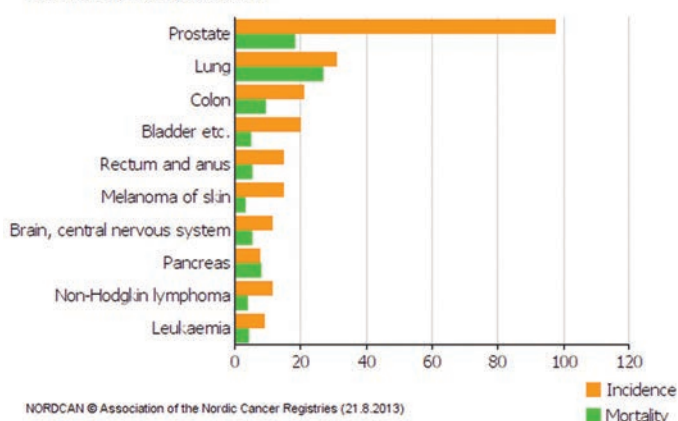
Graphic

☐ Exclude non-melanoma skin cancers from the chart

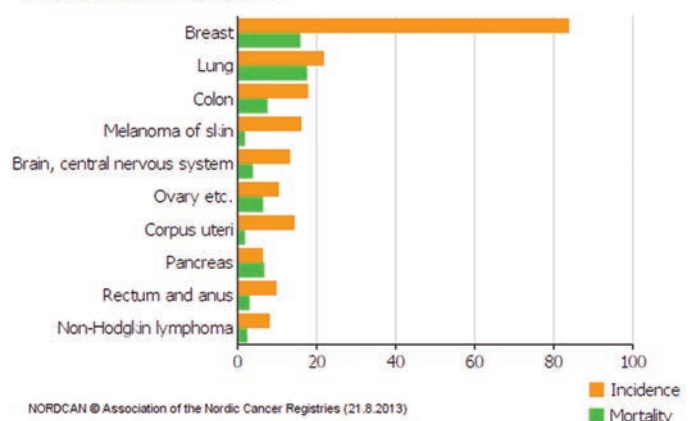
☐ Add join lines to connect the labels to the sectors

Execute

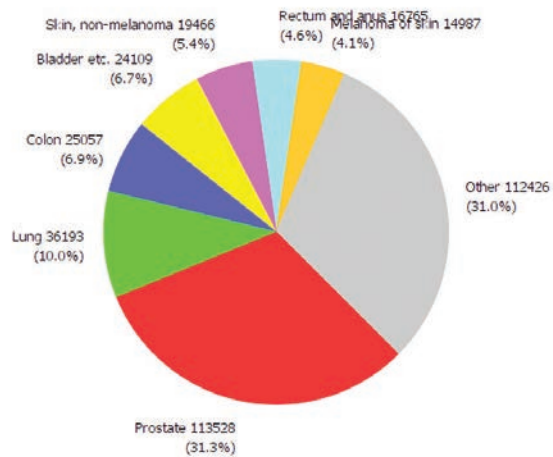
Nordic countries (2005-2009)
Male: ASR (World) age 0-85+



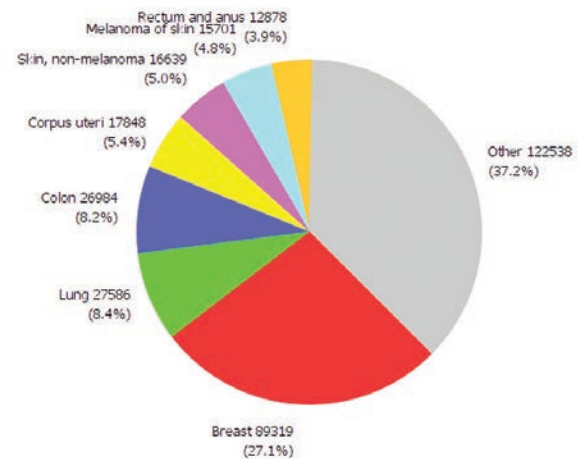
Nordic countries (2005-2009)
Female: ASR (World) age 0-85+



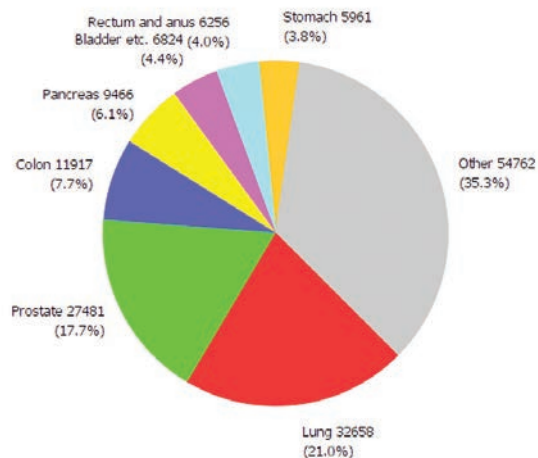
Nordic countries (2005-2009)
Number of cancer cases - Male, age 0-85+



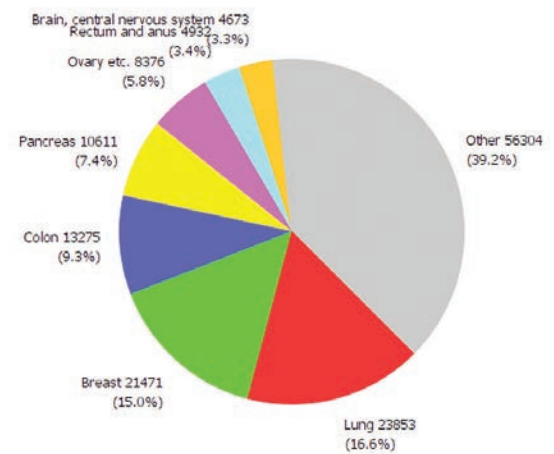
Nordic countries (2005-2009)
Number of cancer cases - Female, age 0-85+



Nordic countries (2005-2009)
Number of cancer deaths - Male, age 0-85+



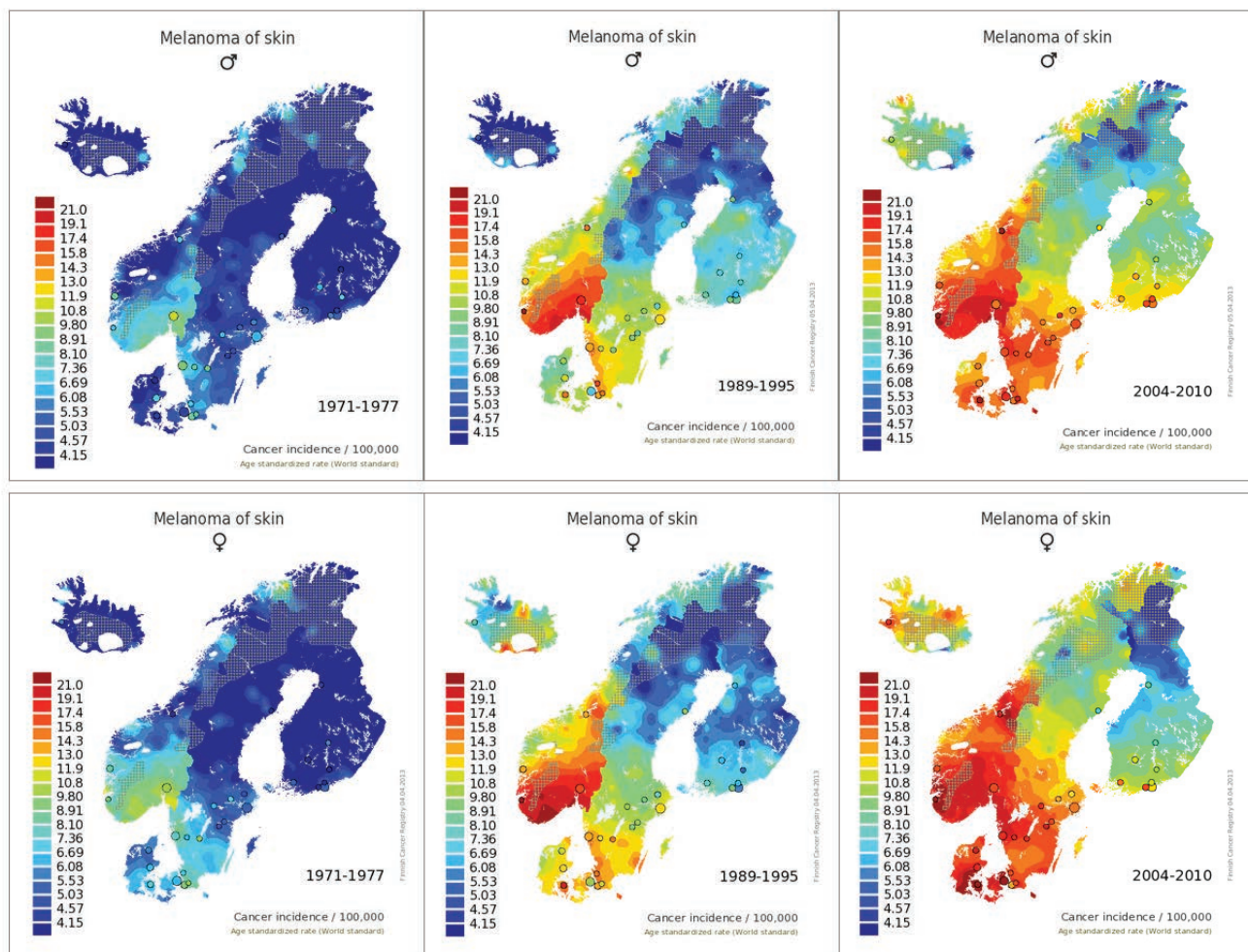
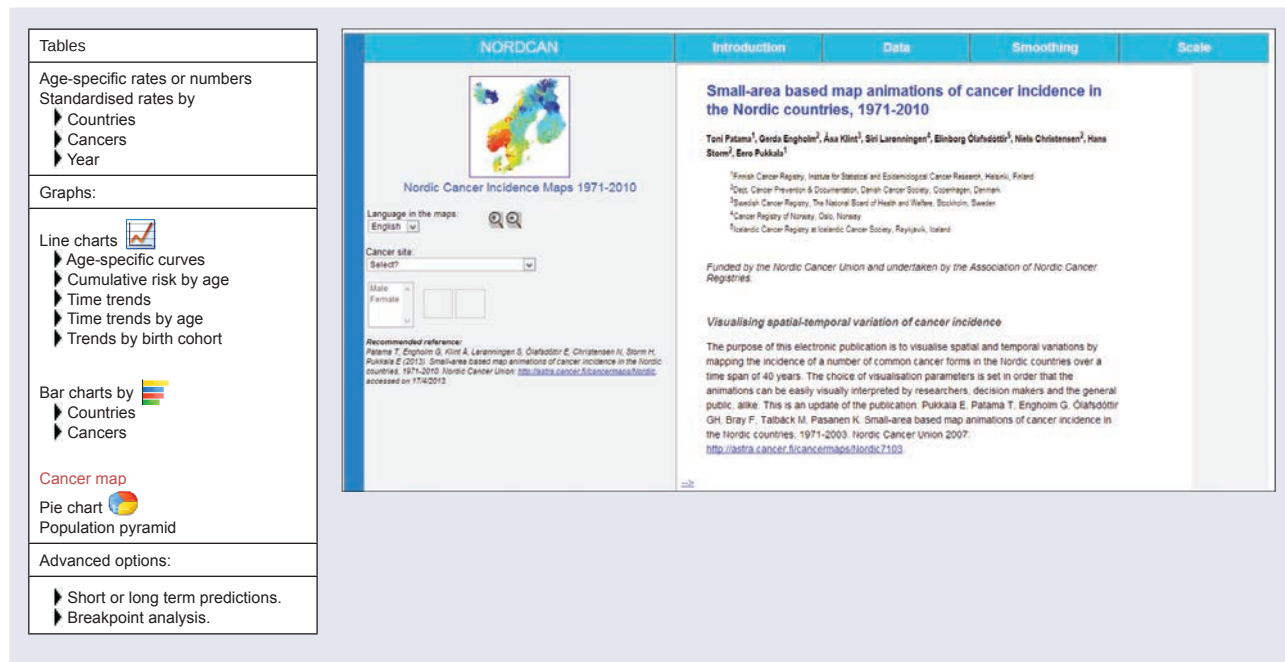
Nordic countries (2005-2009)
Number of cancer deaths - Female, age 0-85+



CANCER MAPS

Output example: The incidence of malignant melanoma in Norway, 1971-77, 1989-95 and 2004-10

Cancer maps are mostly used for illustrating geographical and temporal changes. In this example we have used the incidence of malignant melanoma, due to the significant differences in incidence between north and south, as well as the temporal changes that has been observed during the last decades as described under the section of standardised incidence rates per 100 000 for melanoma of the skin.



POPULATION PYRAMIDS

Output example: The age structure of the Norwegian population in 1953 and in 2010

As most cancers occur in persons over the age of 50, it is important to control for the age structure in the population when comparing incidence rates of cancer at different time periods or between different population (age-standardised incidence rates). Population pyramids presents the age structure of the Nordic population at different years, and results are shown in graphs and in numbers. The example illustrates how the elderly has become a larger proportion of the Norwegian population during the last 60 years. In 1953, 27% of the Norwegian population was 50 years or older, the corresponding number for 2010 is 34%.

Tables

Age-specific rates or numbers
Standardised rates by

- ▶ Countries
- ▶ Cancers
- ▶ Year

Graphs:

Line charts

- ▶ Age-specific curves
- ▶ Cumulative risk by age
- ▶ Time trends
- ▶ Time trends by age
- ▶ Trends by birth cohort

Bar charts by

- ▶ Countries
- ▶ Cancers

Cancer map

Pie chart

Population pyramid

Advanced options:

- ▶ Short or long term predictions.
- ▶ Breakpoint analysis.

Population pyramid

Country/Year* Norway 1962 ^

1961

1960

1959

1958

1957

1956

1955

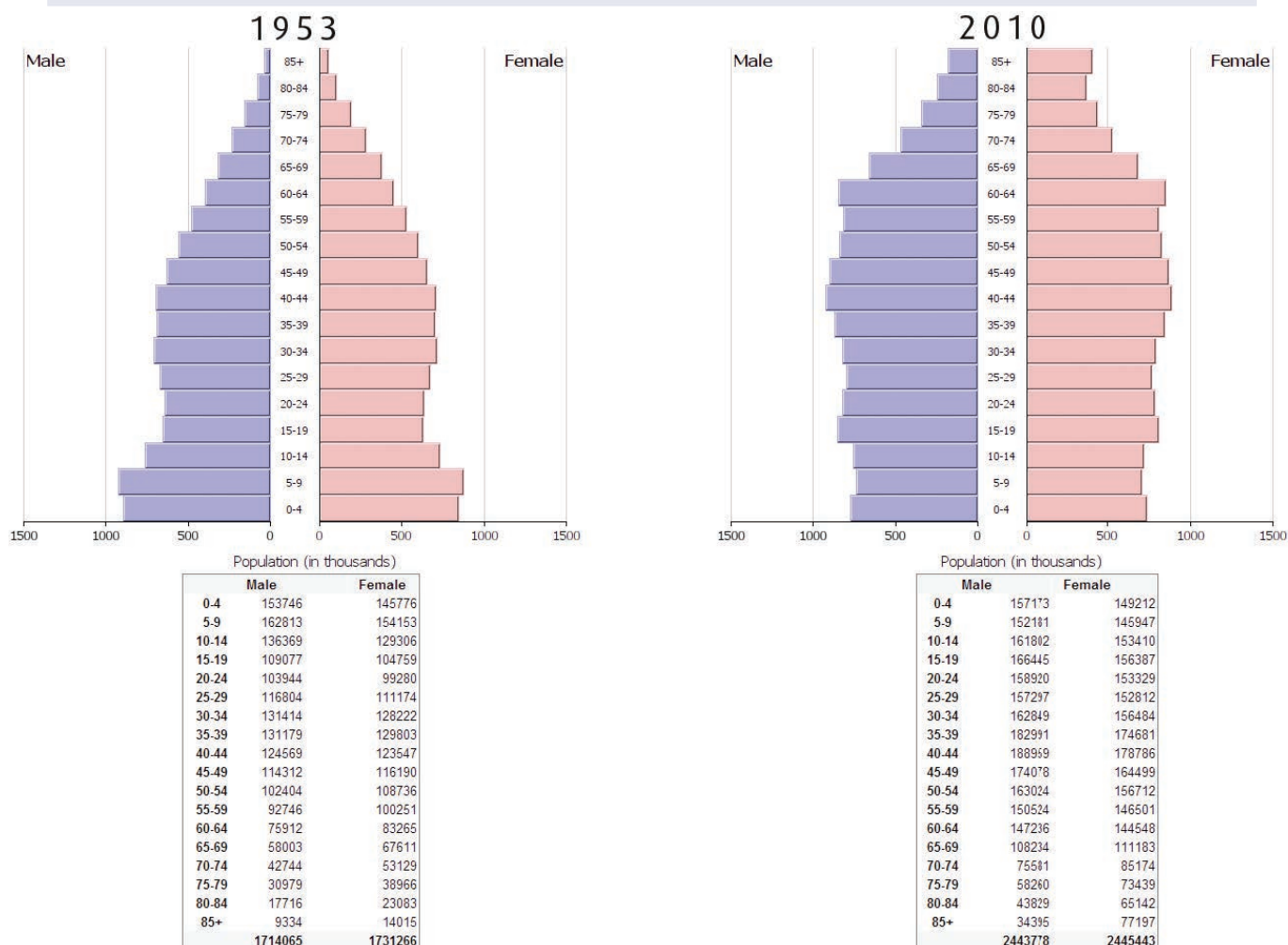
1954

1953 v

Option
☒ Add grid lines

Execute

* Multiple selection is possible using the 'Ctrl' key.



SHORT OR LONG TERM PREDICTIONS

Output example: Long term predictions of male lung cancer in Norway

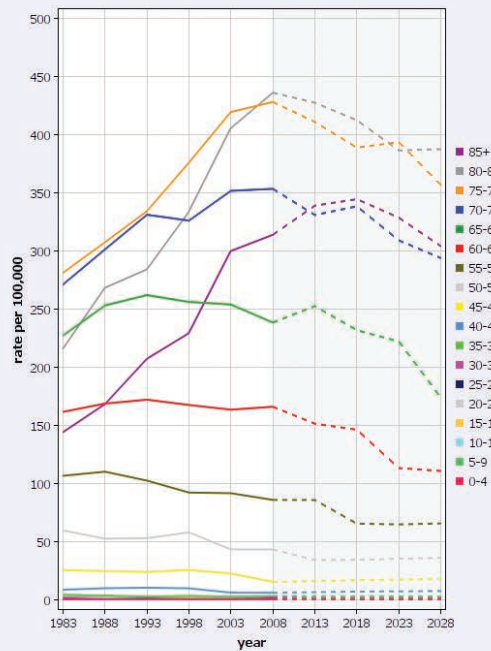
Using the option «Nordpred» shows the current linear trend in incidence rate, including any birth cohort specific patterns observed in the past. For lung cancer, there are large differences in smoking habits from one birth cohort to the next, as seen in the example on “time trends by age or birth cohort”. The plots of the predicted incidence rates indicate that if the current cohort specific pattern of incidence rates continue, we can expect a decline both in the age standardised rates and in all specific age groups except the oldest (85+ years) in the next five years and onwards.

The predicted number of new cancer cases in the future is a product of the predicted incidence rate and the forecasted population size for each age group. For lung cancer, the average annual number of cases is predicted to decline by 445 cases in 2026-2030 due to the predicted decline in the risk component (the incidence rate). However, this is more than compensated for by the increase in the number of cases of 913 due to the forecasted increase in population (the size and age distribution of the population). This means that despite the expected decline in the lung cancer rates for men in Norway, the net (overall) predicted change in the number of new cases in 2026-2030 is an increase of 468 cases, and is due to the increasing age and population size in Norway.

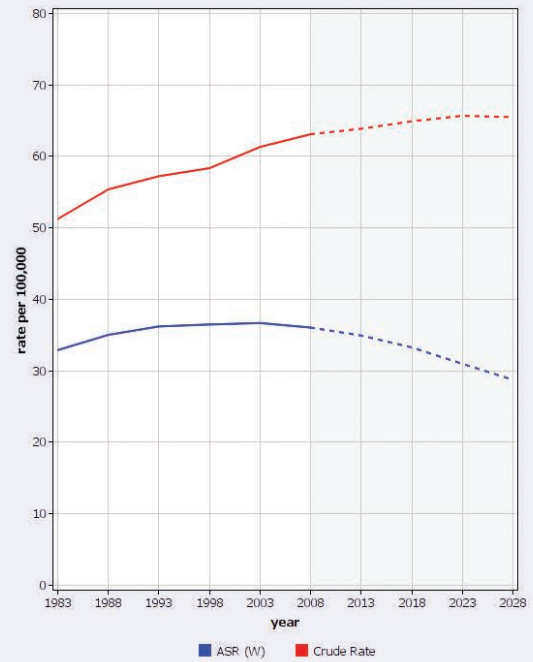
Age-group	1981-1985		2001-2005	2006-2010	2011-2015		2026-2030
0-4	0		0	0	0		0
5-9	0		0	0	0		0
.....							
85+	124		397	506	615		778
Total	5227		6934	7495	8099		9836
Crude rate	51.2		61.3	63.0	63.8		65.4
ASR (W)	32.8		36.6	36.0	34.9		28.7
Average annual	1045		1386	1499	1619		1967
Overall change*	-		-	-	120		468
Change due to change in population*	-		-	-	161		913
Change due to change in risk*	-		-	-	-41		-445

*Compared to the average annual in 2006-2010. Numbers may not add up due to rounding errors.

Prediction of cancer incidence: age-specific rates
Lung: Male
Norway



Prediction of cancer incidence: rates
Lung: Male
Norway



BREAKPOINT ANALYSIS

Output example: The incidence of breast cancer in Norwegian females, 1991-2010

Following steady increases in incidence rates since the start of registration in 1953, a stabilisation and declining in rates was indicated at the beginning of 2000. The breakpoint analysis of breast cancer incidence for the period between 1999 and 2010 shows an estimated annual percentage increase of 3.9% from 1999 to 2002, compared to a decline in rates at 1% for the period from 2002 to 2010.

Tables

Age-specific rates or numbers

Standardised rates by

- ▶ Countries
- ▶ Cancers
- ▶ Year

Graphs:

Line charts

- ▶ Age-specific curves
- ▶ Cumulative risk by age
- ▶ Time trends
- ▶ Time trends by age
- ▶ Trends by birth cohort

Bar charts by

- ▶ Countries
- ▶ Cancers

Cancer map

Pie chart

Population pyramid

Advanced options:

- ▶ Short or long term predictions.
- ▶ Breakpoint analysis.

Breakpoint analysis

This first version of a breakpoint application tests for ONE breakpoint in a time series of data (at least 5-year and maximum 20-year period).

Cancer/Sex

Breast ☐ Male ☒ Female

Country/Period

Norway Starting 1999 Ending 2010

Data type

☒ Incidence ☐ Mortality

Statistic/Age range

ASR (W) From 0- To 85+

Graphic options

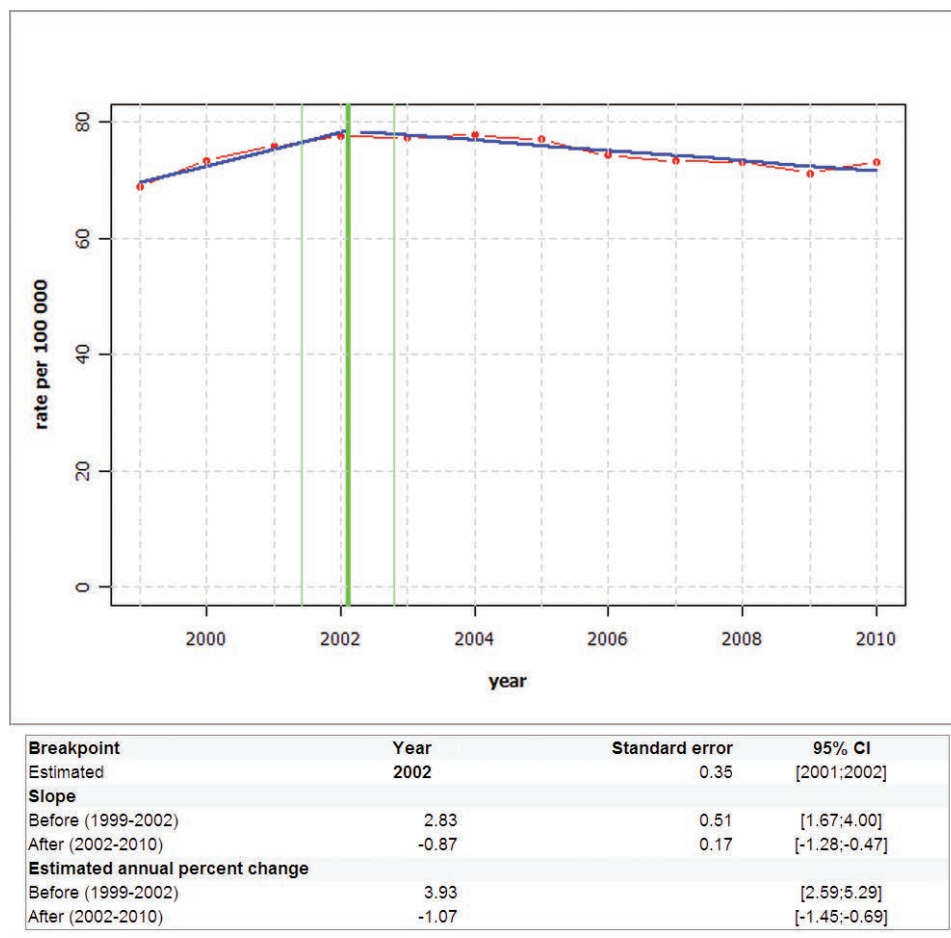
☒ Set arithmetic scale minimum to zero

☒ Add grid lines

References:

Vito M. R. Muggeo (2003). Estimating regression models with unknown break-points. *Statistics in Medicine*, 22, 3055-3071.

Vito M. R. Muggeo (2008). segmented: an R Package to Fit Regression Models with Broken-Line Relationships. *R News*, 8/1, 20-25.



PREVALENCE

Definitions²

Prevalence can be defined as the number of persons in a defined population who have been diagnosed with cancer, and who are still alive at the end of a given year. Total prevalence represents the number of previously diagnosed persons alive at the end of a year regardless of how long ago the diagnosis was, or if the patient is still under treatment or is considered cured. Partial prevalence, which limits the number of patients to those diagnosed during a fixed time in the past, is a particularly useful measure of cancer burden. Prevalence of cancers based on cases diagnosed within one, three, five, ten and all years are presented in NORDCAN, as they are likely to be of relevance to the different stages of cancer therapy, namely, initial treatment (one year), clinical follow-up (three years) and cure (five years). Patients who are still alive five years after diagnosis are usually considered cured as the death rates of these patients are similar to those in the general population. Prevalence is available both as numbers and as proportions per 100 000 persons.

PREVALENCE BY COUNTRIES

Output example: The proportion of cancer survivors in Norway compared to other Nordic countries

In 2010 the total number of cancer survivors in the Nordic countries was 1 030 043, which accounts for about 4% of the total population. Most of them have survived more than five-years after the cancer diagnosis. The corresponding data from Norway was 192 833 cancer survivors, which accounts for 3.9% of the Norwegian population.

Tables by

- Countries
- Cancers
- Year

Graphs:

Line graphs

- Time trends

Prevalence by countries

Cancer/Year
All sites but non-melanoma skin cancer 2010

Sex
☐ Male
☐ Female
☒ Both sexes

Statistic/Age range
from to
Proportion 0- 85+

Option
Results sorted by:
Country

Output
☐ Text file
☒ Countries
☐ Regions
☐ Both

Execute

The output file (text) will be available with a click on the icon that will appear at the bottom of the table.



All sites but non-melanoma skin cancer, Both sexes Prevalence (end of 2010), age 0-85+

Country	Numbers (Proportion per 100,000)									
	1-year		3-year		5-year		10-year		Total	
Nordic countries	101743	(397.7)	267014	(1043.7)	399414	(1561.2)	643131	(2513.8)	1030043	(4026.1)
Denmark	24866	(447.6)	65207	(1173.8)	94722	(1705.1)	144043	(2592.9)	226773	(4082.1)
Finland	19896	(370.1)	51564	(959.3)	77955	(1450.3)	129804	(2414.8)	207211	(3854.9)
Iceland	996	(312.8)	2734	(858.5)	4154	(1304.4)	6800	(2135.2)	10890	(3419.5)
Norway	19028	(386.7)	50000	(1016.0)	75403	(1532.2)	120503	(2448.7)	192833	(3918.4)
Sweden	36957	(392.6)	97509	(1035.8)	147180	(1563.5)	241981	(2570.5)	392336	(4167.7)

Proportions per 100,000

² Extracted from the glossary of terms in the NORDCAN project <http://www.ancr.nu>

PREVALENCE BY CANCER OR BY YEAR

Output example: The prevalence of cancer among Norwegian males and females, 2010, sorted by number of prevalent cases

Prostate cancer is the most prevalent cancer site among males with 177 757 cancer survivors registered at the end of 2010. Of these, 152 970 males were diagnosed with the prostate cancer 10 years ago or more, and 22 139 were alive more than 1 year from the date of diagnosis. A total of 12 691 males were lung cancer survivors, most of them (10 582) had survived more than 10 years, and is thus an accumulation of long term survivors over time, whereas the prevalence of survivors 1, 3 and 5 years after the diagnosis were 4 120, 7 035 and 8 582, respectively, reflecting the poor prognosis.

Tables by

- Countries
- Cancers**
- Year

Graphs:

- Line graphs
- Time trends

Prevalence by cancers
Country/Year
Nordic countries 2010
Sex
☒ Male
☐ Female
☐ Both sexes
Statistic/Age range
Proportion from to
0- 85+
Option
Results sorted by:
Numbers
Output
☐ Text file
Execute
The output file (text) will be available with a click on the icon that will appear at the bottom of the table.

Nordic countries (end of 2010) Prevalence, Male, age 0-85+										
Cancer	Numbers (Proportion per 100,000)									
	1-year		3-year		5-year		10-year		Total	
All sites but non-melanoma skin cancer	52598	(414.0)	137281	(1080.7)	204120	(1606.8)	318657	(2508.4)	449056	(3534.9)
Prostate	22139	(174.3)	63501	(499.9)	97133	(764.6)	152970	(1204.2)	177757	(1399.3)
Colorectal	7441	(58.6)	18841	(148.3)	27417	(215.8)	40902	(322.0)	56753	(446.7)
Bladder etc.	4382	(34.5)	11503	(90.5)	17240	(135.7)	27638	(217.6)	42123	(331.6)
Melanoma of skin	3454	(27.2)	9278	(73.0)	13438	(105.8)	20803	(163.8)	35271	(277.6)
Colon	4559	(35.9)	11383	(89.4)	16400	(129.1)	24221	(190.7)	33522	(263.9)
Skin, non-melanoma	4428	(34.9)	11296	(88.9)	16313	(128.4)	23606	(185.8)	31491	(247.9)
Rectum and anus	3043	(24.0)	7864	(61.9)	11542	(90.9)	17413	(137.1)	24147	(190.1)
Testis	934	(7.4)	2974	(23.4)	4891	(38.5)	9045	(71.2)	23030	(181.3)
Non-Hodgkin lymphoma	2257	(17.8)	5747	(45.2)	8540	(67.2)	13249	(104.3)	19355	(152.4)
Brain, central nervous system	1618	(12.7)	3799	(29.9)	5639	(44.4)	9159	(72.1)	17448	(137.3)
Kidney	1771	(13.9)	4346	(34.2)	6270	(49.4)	9423	(74.2)	13823	(108.8)
Lip, oral cavity and pharynx	1565	(12.3)	3980	(31.3)	5687	(44.8)	8574	(67.5)	13582	(106.9)
Leukaemia	1373	(10.8)	3604	(28.4)	5419	(42.7)	8587	(67.6)	12920	(101.7)
Lung	4120	(32.4)	7035	(55.4)	8592	(67.6)	10582	(83.3)	12691	(99.9)
Other leukaemia	953	(7.5)	2668	(21.0)	4100	(32.3)	6429	(50.6)	8433	(66.4)
Hodgkin lymphoma	319	(2.5)	918	(7.2)	1444	(11.4)	2649	(20.9)	6438	(50.7)
Stomach	999	(7.9)	1974	(15.5)	2592	(20.4)	3612	(28.4)	5474	(43.1)
Larynx	521	(4.1)	1360	(10.7)	2026	(15.9)	3222	(25.4)	4963	(39.1)
Soft tissues	409	(3.2)	1142	(9.0)	1669	(13.1)	2642	(20.8)	4694	(37.0)
Thyroid	312	(2.5)	862	(6.8)	1332	(10.5)	2240	(17.6)	4686	(36.9)
Acute leukaemia	420	(3.3)	940	(7.4)	1323	(10.4)	2162	(17.0)	4492	(35.4)
Multiple myeloma	743	(5.8)	1892	(14.9)	2587	(20.4)	3368	(26.5)	3896	(30.7)
Pharynx	626	(4.9)	1540	(12.1)	2079	(16.4)	2971	(23.4)	3835	(30.2)
Lip	197	(1.6)	591	(4.7)	947	(7.5)	1607	(12.7)	3797	(29.9)
Mouth	365	(2.9)	848	(6.7)	1205	(9.5)	1741	(13.7)	2444	(19.2)
Eye	155	(1.2)	395	(3.1)	617	(4.9)	1074	(8.5)	2283	(18.0)
Penis etc.	223	(1.8)	578	(4.5)	883	(7.0)	1419	(11.2)	2253	(17.7)
Tongue	325	(2.6)	809	(6.4)	1156	(9.1)	1672	(13.2)	2245	(17.7)
Bone	116	(0.9)	318	(2.5)	481	(3.8)	800	(6.3)	2051	(16.1)
Small intestine	296	(2.3)	691	(5.4)	999	(7.9)	1498	(11.8)	1994	(15.7)
Pancreas	818	(6.4)	1258	(9.9)	1402	(11.0)	1608	(12.7)	1797	(14.1)
Oesophagus	647	(5.1)	1108	(8.7)	1281	(10.1)	1571	(12.4)	1781	(14.0)
Salivary glands	123	(1.0)	317	(2.5)	458	(3.6)	764	(6.0)	1453	(11.4)
Liver	450	(3.5)	813	(6.4)	973	(7.7)	1112	(8.8)	1269	(10.0)
Nose, sinuses	119	(0.9)	295	(2.3)	440	(3.5)	658	(5.2)	999	(7.9)
Breast	98	(0.8)	274	(2.2)	415	(3.3)	678	(5.3)	961	(7.6)
Gallbladder	254	(2.0)	431	(3.4)	519	(4.1)	668	(5.3)	828	(6.5)
Pleura	245	(1.9)	383	(3.0)	417	(3.3)	448	(3.5)	481	(3.8)

More than 4% of the Nordic women have suffered from a cancer diagnosis. Most of them are survivors from breast cancer (240 245). The prevalence of breast cancer patients that were alive 1-year after diagnosis (18 730) is almost equal to the number of new cases in 2009 (19 353), reflecting the high 1-year survival.

Tables by

- ▶ Countries
- ▶ **Cancers**
- ▶ Year

Graphs:

Line graphs

▶ Time trends

Prevalence by cancers

Country/Year
 2010

Sex
☐ Male
☒ Female
☐ Both sexes

Statistic/Age range
 Proportion from to

Option
 Results sorted by:

The output file (text) will be available with a click on the icon that will appear at the bottom of the table.

Nordic countries (end of 2010)
Prevalence, Female, age 0-85+

Cancer	Numbers (Proportion per 100,000)									
	1-year		3-year		5-year		10-year		Total	
All sites but non-melanoma skin cancer	49145	(381.5)	129733	(1007.2)	195294	(1516.2)	324474	(2519.1)	580987	(4510.6)
Breast	18730	(145.4)	53077	(412.1)	81635	(633.8)	140601	(1091.6)	240245	(1865.2)
Colorectal	6776	(52.6)	17546	(136.2)	26067	(202.4)	41054	(318.7)	63006	(489.2)
Corpus uteri	3457	(26.8)	9710	(75.4)	14978	(116.3)	26049	(202.2)	49966	(387.9)
Melanoma of skin	3592	(27.9)	9888	(76.8)	15004	(116.5)	24538	(190.5)	47776	(370.9)
Colon	4647	(36.1)	11850	(92.0)	17527	(136.1)	27353	(212.4)	41439	(321.7)
Cervix uteri	1163	(9.0)	3248	(25.2)	5043	(39.2)	9112	(70.7)	28381	(220.3)
Brain, central nervous system	2014	(15.6)	5429	(42.1)	8631	(67.0)	15019	(116.6)	28276	(219.5)
Skin, non-melanoma	3518	(27.3)	9535	(74.0)	14007	(108.7)	20352	(158.0)	28038	(217.7)
Rectum and anus	2250	(17.5)	5950	(46.2)	8894	(69.1)	14215	(110.4)	22264	(172.9)
Ovary etc.	1969	(15.3)	4948	(38.4)	7042	(54.7)	10967	(85.1)	22039	(171.1)
Non-Hodgkin lymphoma	1829	(14.2)	4808	(37.3)	7255	(56.3)	11670	(90.6)	17323	(134.5)
Thyroid	931	(7.2)	2567	(19.9)	3956	(30.7)	7022	(54.5)	17305	(134.4)
Bladder etc.	1565	(12.2)	3964	(30.8)	5853	(45.4)	9484	(73.6)	15268	(118.5)
Lung	3729	(29.0)	6858	(53.2)	8509	(66.1)	10694	(83.0)	12936	(100.4)
Leukaemia	988	(7.7)	2620	(20.3)	4067	(31.6)	6639	(51.5)	10568	(82.0)
Kidney	1007	(7.8)	2769	(21.5)	4145	(32.2)	6423	(49.9)	10406	(80.8)
Lip, oral cavity and pharynx	954	(7.4)	2414	(18.7)	3543	(27.5)	5532	(42.9)	8840	(68.6)
Other leukaemia	646	(5.0)	1852	(14.4)	2949	(22.9)	4736	(36.8)	6363	(49.4)
Hodgkin lymphoma	255	(2.0)	697	(5.4)	1126	(8.7)	2062	(16.0)	5050	(39.2)
Other female genital organs	500	(3.9)	1219	(9.5)	1824	(14.2)	2897	(22.5)	4764	(37.0)
Stomach	604	(4.7)	1273	(9.9)	1741	(13.5)	2575	(20.0)	4447	(34.5)
Soft tissues	377	(2.9)	884	(6.9)	1404	(10.9)	2266	(17.6)	4436	(34.4)
Acute leukaemia	342	(2.7)	768	(6.0)	1118	(8.7)	1903	(14.8)	4205	(32.6)
Multiple myeloma	620	(4.8)	1542	(12.0)	2103	(16.3)	2779	(21.6)	3258	(25.3)
Eye	146	(1.1)	415	(3.2)	653	(5.1)	1140	(8.9)	2400	(18.6)
Mouth	265	(2.1)	676	(5.2)	970	(7.5)	1479	(11.5)	2248	(17.5)
Uterus, other	106	(0.8)	274	(2.1)	410	(3.2)	751	(5.8)	2152	(16.7)
Pancreas	811	(6.3)	1250	(9.7)	1444	(11.2)	1646	(12.8)	1900	(14.8)
Salivary glands	142	(1.1)	334	(2.6)	520	(4.0)	881	(6.8)	1829	(14.2)
Small intestine	210	(1.6)	563	(4.4)	836	(6.5)	1259	(9.8)	1787	(13.9)
Tongue	222	(1.7)	530	(4.1)	773	(6.0)	1180	(9.2)	1701	(13.2)
Bone	98	(0.8)	265	(2.1)	388	(3.0)	647	(5.0)	1680	(13.0)
Pharynx	239	(1.9)	581	(4.5)	801	(6.2)	1168	(9.1)	1606	(12.5)
Lip	124	(1.0)	354	(2.7)	562	(4.4)	925	(7.2)	1566	(12.2)
Gallbladder	319	(2.5)	544	(4.2)	658	(5.1)	840	(6.5)	1182	(9.2)
Larynx	98	(0.8)	264	(2.0)	395	(3.1)	633	(4.9)	1026	(8.0)
Liver	264	(2.0)	451	(3.5)	517	(4.0)	621	(4.8)	746	(5.8)
Oesophagus	223	(1.7)	389	(3.0)	462	(3.6)	590	(4.6)	743	(5.8)
Nose, sinuses	83	(0.6)	206	(1.6)	312	(2.4)	480	(3.7)	724	(5.6)
Pleura	28	(0.2)	53	(0.4)	66	(0.5)	80	(0.6)	104	(0.8)

An output example of prevalence by years is not shown in this chapter.

TIME TRENDS OF PREVALENCE

The time trends of prevalence can be expressed as the total prevalence or prevalence after 1, 3, 5 or 10 years since the diagnosis, and the statistics can be given in proportions, numbers or adjusted rates.

Output example: The prevalence of cancer among Norwegian males and females by region, 1975-2010

In this example, we have shown the proportion of persons in the Norwegian population who is alive after a previous cancer diagnosis, stratified on regions, from 1975 until 2010. As the graph shows, there has been a gradual increase in prevalence in all regions since the beginning of 2000 and the differences between regions are small.

Tables by

- Countries
- Cancers
- Year

Graphs:

Line graphs

► Time trends

Time trends (Prevalence)

Cancer*/Sex
 Acute leukaemia
 All sites but non-melanoma skin cancer
 Bladder etc.
 Bone
 Brain, central nervous system

Country/Period
☐ Outside the capital
☒ Norway
☒ Central region
☒ Northern region
☒ South-Eastern region
☒ Western region
☐ Sweden

Prevalence
 Total

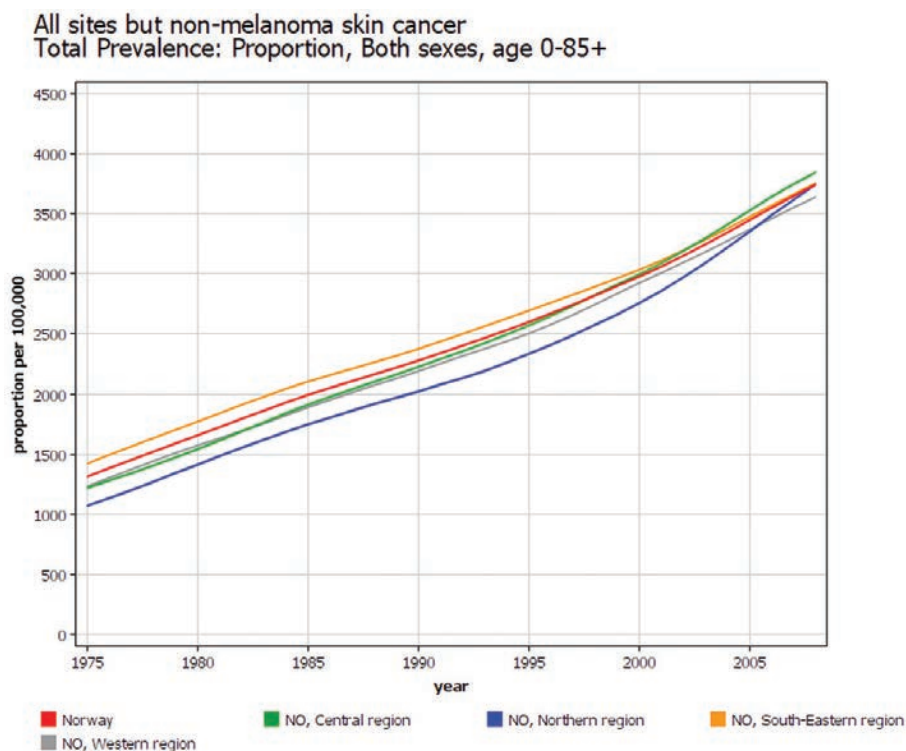
Statistic/Age range
 Proportion

Graphic
 Orientation
☐ Portrait
☒ Landscape
 Options
☒ Add grid lines
☐ Add trend lines
☐ Add symbols
 Line style
☐ Thin
☒ Medium
☐ Thick
 Smoothing
 5 years

From To
 0+ 85+

Execute

* Multiple selection is possible using the 'Ctrl' key.
 1. You can select up to 12 curves (use the 'Check curves' button if necessary).
 2. Smoothing (simple moving average): for each year, the statistic is calculated using the numbers and the corresponding population numbers for 1 (no smoothing), 3 or 5 years.



SURVIVAL

Definitions³

Relative survival is defined as the ratio of the observed survival in the group of patients to the survival expected in a group of people in the general population, who are similar to the patients with respect to sex, age and calendar time at the time of diagnosis. It can be interpreted as the probability of patient survival in the absence of other causes of death. NORDCAN generally use cohort methods, following up patients for death for 1 and 5 years after diagnosis, and also 10 years for breast and prostate cancers. For the later periods not all patients can be followed up for 5 or 10 years, and calculations are supplemented with survival experience for patients diagnosed earlier years, so-called hybrid methods. Age-standardisation uses the International Cancer Survival Standards (ICSS).

RELATIVE SURVIVAL BY PERIOD AND CANCER

Survival by period and cancer is a way of capturing the relative survival in different time periods for most cancer sites. During the last decades, a gradual improvement of survival has been observed for the majority of sites, and except for Hodgkin lymphoma in males, all sites have also improved survival in the last period (2004-2008) compared to the previous five-year period (1999-2003). The wide differential in prognosis according to the type of cancer diagnosed is strikingly illustrated by the differences between five-year survival in cancers with good prognosis (ex. Hodgkin lymphoma, prostate, breast, lip, or testicular cancer) and poor prognosis (liver, lung, pancreas or pleura). The national rates of lung cancer patients that receive surgery have increased (Strand & al 2012), and this might have influenced the positive trends of increasing survival that is observed for lung cancer in the last period.

An output example of these tables is not shown, but some of the cancer sites will be covered under time trends of relative survival in “survival/graphs”.

An output example for survival by country and cancer is not shown in this chapter.

Relative survival by country and period

Output example: five-year age-standardised relative survival of colon cancer in the Nordic countries, 1964-2008

The relative survival of colon cancer has increased markedly since the beginning of the 1960's. The probability of being alive five years after the diagnosis (in the absence of other causes of death) was about 30% for these patients in the period 1964-68, compared to over 60% in the period 2004-08. There is little difference in relative survival of colon cancer between the Nordic countries, except for Denmark, which has had the lowest survival of colon cancer during most of the observation period.

Tables by:

- ▶ Period and cancer
- ▶ Country and cancer
- ▶ Country and period

Graphs:

Line graphs

- ▶ Time trends
- ▶ Age-specific survival by Countries
- Periods
- Country and period

Bar charts by

- ▶ Periods
- ▶ Countries

Table by country and period (Survival)

Cancer

Colon

Survival time

5-year

Output

☐ Text file

The output file (text) will be available with a click on the icon that will appear at the bottom of the table.

³ Extracted from the glossary of terms in the NORDCAN project <http://www.ancr.nu>



5-year age-standardised relative survival in percent [95% CI] Colon, age at diagnosis 0-89

	Denmark	Finland	Iceland	Norway	Sweden
Male					
1964-1968	31 [29;34]	25 [21;29]	43 [30;63]	32 [30;35]	35 [33;37]
1969-1973	30 [29;33]	36 [32;40]	41 [28;60]	38 [35;41]	36 [35;38]
1974-1978	35 [33;36]	38 [34;42]	50 [40;64]	42 [40;45]	39 [37;41]
1979-1983	37 [35;39]	48 [45;52]	46 [38;56]	48 [45;50]	46 [45;48]
1984-1988	39 [38;41]	47 [44;50]	42 [34;53]	46 [44;48]	49 [47;50]
1989-1993	43 [41;45]	51 [49;54]	58 [49;69]	49 [47;51]	52 [50;53]
1994-1998	45 [43;47]	57 [55;60]	50 [42;59]	53 [51;55]	55 [54;57]
1999-2003	50 [48;52]	57 [55;60]	54 [47;61]	56 [54;58]	56 [55;58]
2004-2008	53 [52;54]	60 [58;61]	57 [52;63]	61 [60;63]	63 [62;64]
Female					
1964-1968	33 [31;35]	32 [29;35]	33 [22;49]	34 [32;37]	38 [37;40]
1969-1973	35 [33;37]	36 [33;39]	39 [30;52]	40 [37;42]	39 [37;40]
1974-1978	36 [34;37]	40 [38;43]	55 [46;67]	42 [40;45]	42 [40;43]
1979-1983	41 [40;43]	46 [44;48]	54 [45;66]	47 [45;49]	49 [48;51]
1984-1988	43 [41;44]	51 [49;53]	49 [40;60]	51 [49;53]	52 [51;54]
1989-1993	46 [45;48]	54 [52;56]	61 [52;71]	53 [52;55]	54 [53;56]
1994-1998	49 [47;50]	58 [56;60]	49 [41;58]	57 [55;58]	56 [55;58]
1999-2003	54 [52;56]	63 [61;65]	60 [53;69]	59 [57;61]	61 [60;63]
2004-2008	56 [55;57]	64 [63;66]	64 [59;70]	64 [63;65]	66 [65;67]

Follow-up of patients for death is made through 2010. five-year relative survival 1964-2003 originally stems from the project "The survival of cancer patients diagnosed 1964-2003 in the Nordic countries" originally published in Acta Oncologica 2010 issue 5.

TIME TRENDS OF RELATIVE SURVIVAL

Output example: Trends of relative survival for the most common cancers, males and females, Norway, 1964-2008

Gradual improvement of survival has been observed for most of the common cancers, except for lung cancer where the five-year relative survival has not changed substantively, although a slightly but steadily increase in survival has been observed since the 1990s. In the last period of observation (2004-2008) the relative survival for the most common cancers varied from 13% for lung cancer to 88% for prostate cancer in men. In women, the lowest survival is observed for lung cancer (17%), and malignant melanoma ranks highest with 91% five-year relative survival. In general, women have better survival than men, and for the most common cancers striking differences are seen for malignant melanoma and for cancers in the central nervous system (data not shown). The marked increase in five-year relative survival for prostate cancer partly reflects earlier detection of tumours due to PSA testing.

Tables by:

- ▶ Period and cancer
- ▶ Country and cancer
- ▶ Country and period

Graphs:

Line graphs

- ▶ Time trends
- ▶ Age-specific survival by Countries
- Periods
- Country and period

Bar charts by

- ▶ Periods
- ▶ Countries

Time trends (Survival)

Cancer/Sex

Pharynx
Pleura
Prostate
Rectum and anus
Salivary glands

Male ☒ Female ☐

Country

Denmark ☐
Finland ☐
Iceland ☐
Norway ☒
Sweden ☐

Survival time

5-year

Graphic

Orientation
Portrait ☐
Landscape ☒

Options

Add grid lines ☒
Add trend lines ☐
Add symbols ☐

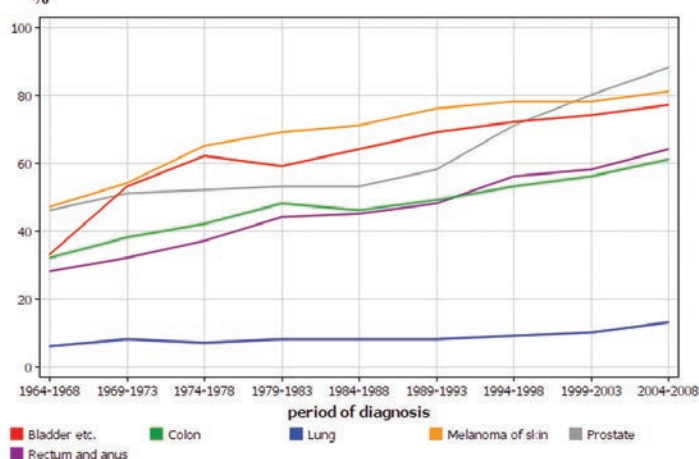
Line style

Thin ☐
Medium ☒
Thick ☐

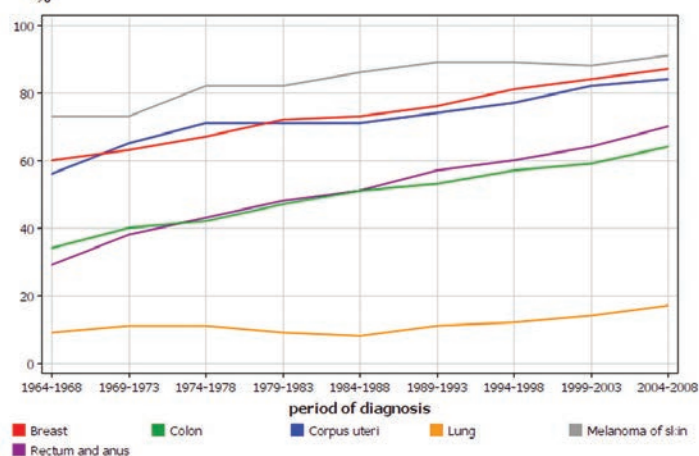
<Check curves> Execute

* Multiple selection is possible using the 'Ctrl' key.
You can select up to 12 curves (use the 'Check curves' button if necessary).

Norway
: Male 5-year age standardised relative survival, age at diagnosis 0-89



Norway
: Female 5-year age standardised relative survival, age at diagnosis 0-89



AGE-SPECIFIC SURVIVAL BY COUNTRIES

Output example: Age-specific relative survival for cervical cancer in females, Nordic countries, 2004-2008

The relative five-year survival for cervical cancer decreases with age. The greatest variation in survival between age groups is observed in Iceland with 96% in the youngest age group (0-49 years) and 18% among the oldest patients (80-89 years). Large variations are also found in the other Nordic countries, and in Norway the range of survival varies twofold (88 - 41). Difference in survival between the countries might reflect differences in the target age range of the national screening programs, as this is an important determinant of risk reduction.

Tables by:

- Period and cancer
- Country and cancer
- Country and period

Graphs:

Line graphs

- Time trends
- Age-specific survival by Countries
- Periods
- Country and period

Bar charts by

- Periods
- Countries

Age-specific survival by countries

Cancer/Sex

Cervix uteri ☐ Male ☒ Female

Period

2004-2008

survival time

5-year

Graphic

Options

☒ Add grid lines

☐ Add trend lines

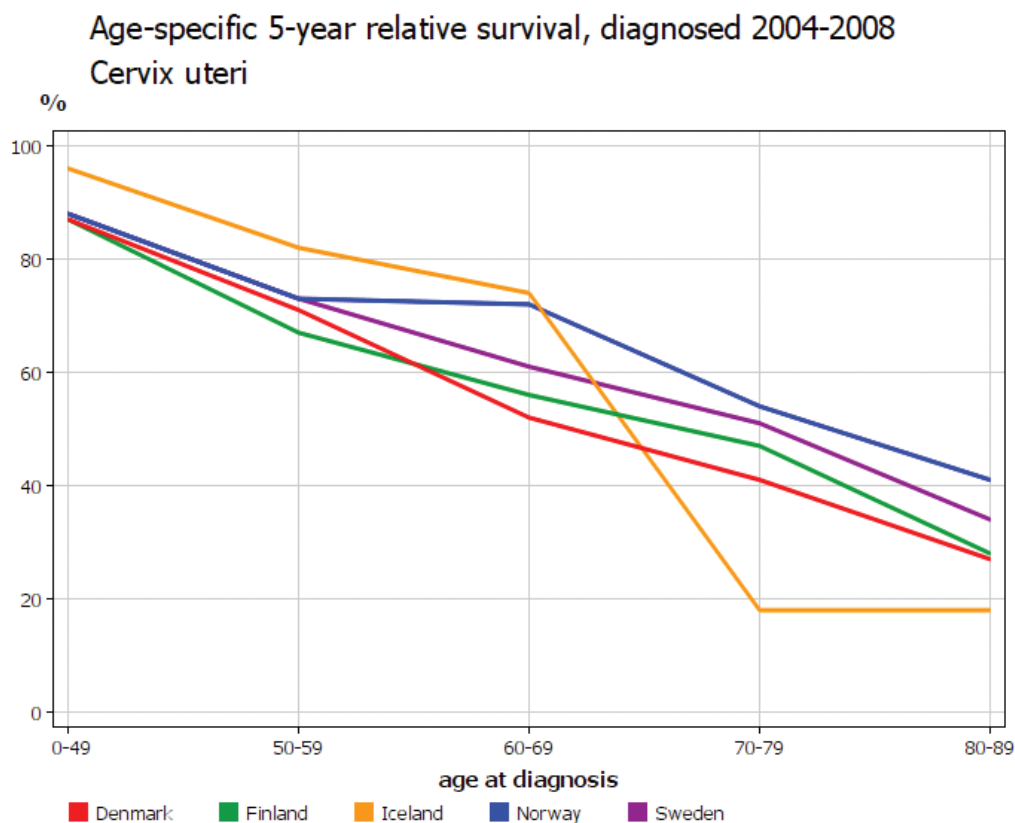
☐ Add symbols

Line style

☐ Thin

☒ Medium

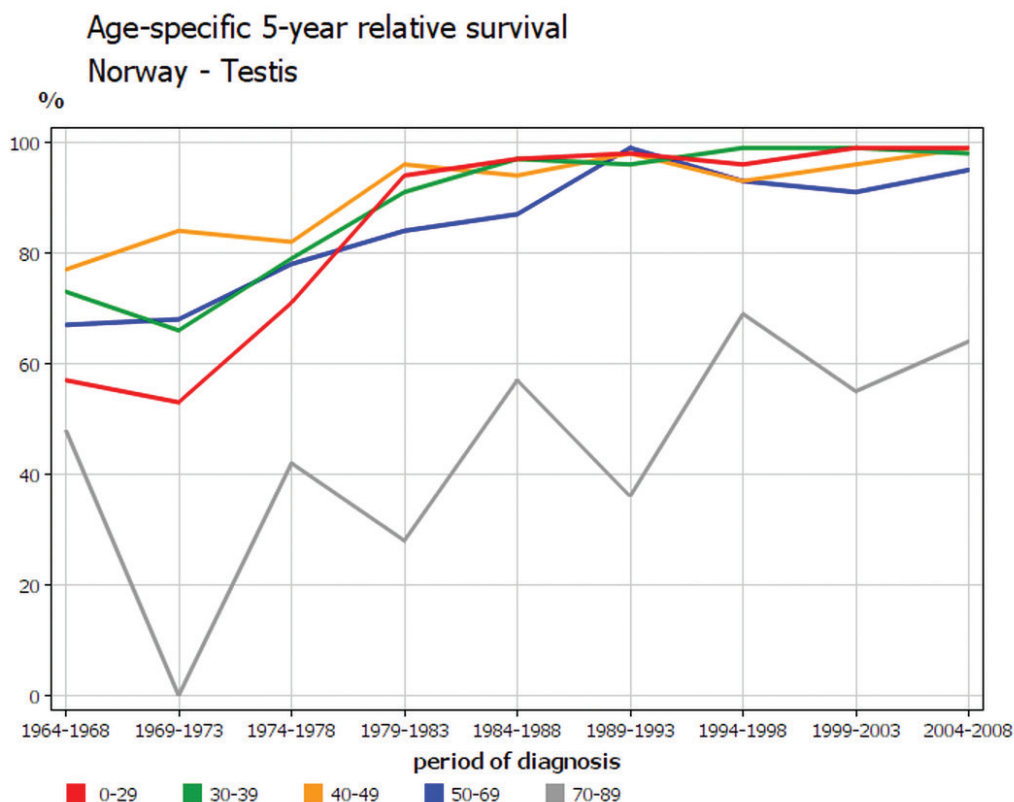
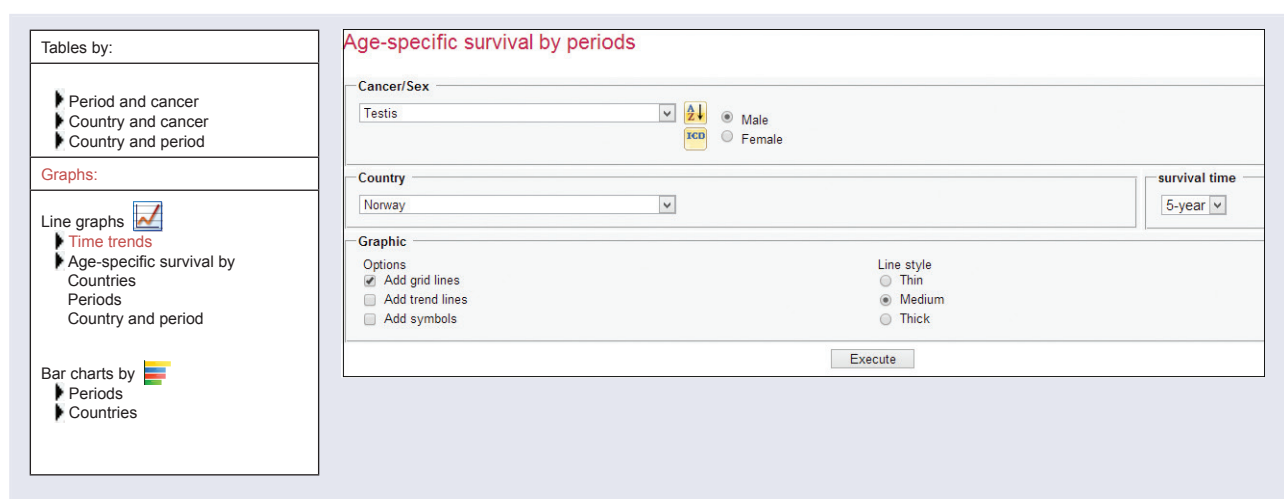
☐ Thick



AGE-SPECIFIC SURVIVAL CURVES BY PERIODS

Output example: Age-specific relative survival trends for testicular cancer in males, Norway, 1964-2008

There was a rapid increase in survival of testicular cancer during the late 1970s and early 1980s particularly for the youngest age groups (0-29 and 30-39 years). This was largely due to the introduction of Cisplatin, which was approved for cancer therapy in 1978, and cured many young men that otherwise would have suffered from a lethal nonseminoma cancer.

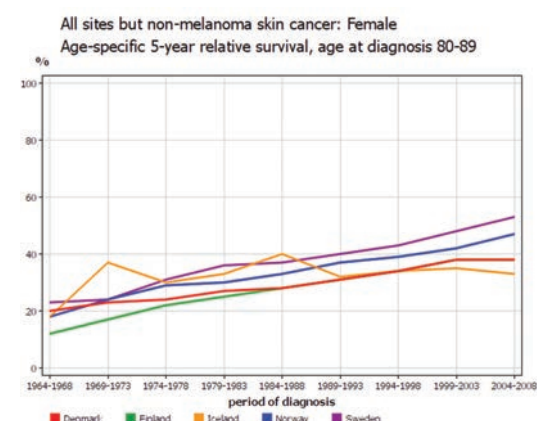
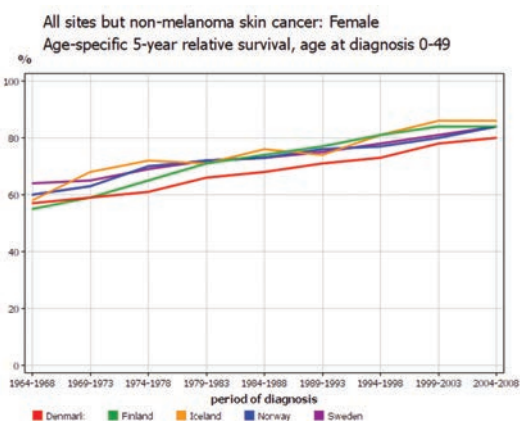
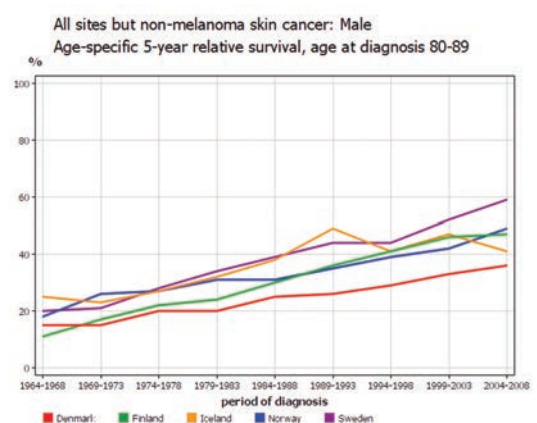
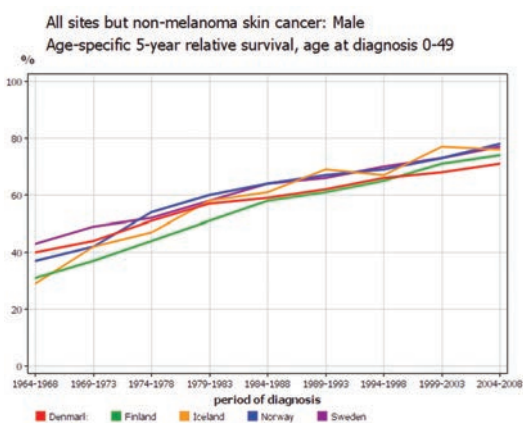


AGE-SPECIFIC SURVIVAL CURVES BY COUNTRY AND PERIOD

Output example: Age-specific relative survival trends for all cancer sites but non-melanoma skin cancer, males and females, Nordic countries 0-49 and 80-89 years, 1964-2008

Analysis on age-specific survival trends also allows stratification on both country and period. This analysis gives results for specific age groups. In the example below we have chosen to present the results for the youngest (0-49 years) and oldest (80-89 years) age groups. There are smaller differences in age-specific survival between younger age groups compared to the oldest groups. This might reflect that the treatment regime is more similar in the Nordic countries for the young patients, whereas larger variation in treatment of older patients occurs between the countries.

Tables by: ▶ Period and cancer ▶ Country and cancer ▶ Country and period Graphs: Line graphs ▶ Time trends ▶ Age-specific survival by Countries - Periods - Country and period Bar charts by ▶ Periods ▶ Countries	Age-specific survival by country and period Cancer/Sex All sites but non-melanoma skin cancer ☒ Male ☐ Female Age-group 0-49 survival time 5-year Graphic Options ☒ Add grid lines ☐ Add trend lines ☐ Add symbols Line style ☐ Thin ☒ Medium ☐ Thick Execute
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BAR CHARTS OF RELATIVE SURVIVAL BY PERIODS OR COUNTRIES

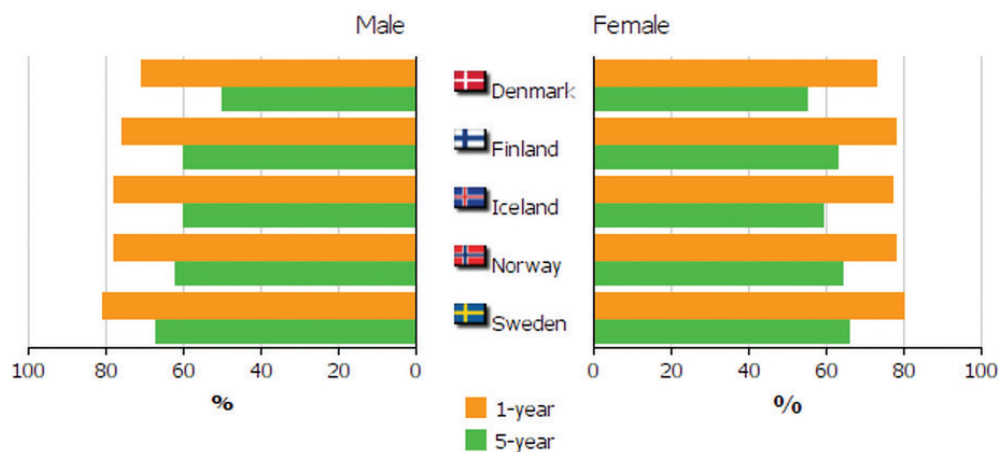
The bar charts express the 1- and five-year relative survival by cancer site.

Output example: Age standardised relative survival of all cancers but non-melanoma skin, males and females, all ages, Nordic countries, 2004-2008

Denmark has the lowest 1- and 5- year survival for both men and women, and Sweden ranks on top with a 1-year relative survival of about 80% for both sexes, and a five-year relative survival of 66% for men and 67% for women. There might be several reasons for differences in survival across the countries, especially the gap between Denmark and the other countries. Possible explanations are changes or differences regarded to diagnostic procedures, time for introduction of screening and age range of the screening population, lifestyle factors related to co-morbidity, or differences in treatment (Storm & al 2010).



All sites but non-melanoma skin cancer: period of diagnosis 2004-2008
Age-standardised relative survival, age at diagnosis 0-89



An output example of bar charts of relative survival by periods is not shown in this chapter.

References

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- Strand TE, Bartnes K, Rostad H. National trends in lung cancer surgery. *Eur.J.Cardiothorac.Surg.* 2012;42(2):355-8.
- Storm HH, Kejs AM, Engholm G, Tryggvadottir L, Klint A, Bray F & al. Trends in the overall survival of cancer patients diagnosed 1964-2003 in the Nordic countries followed up to the end of 2006: the importance of case-mix. *Acta Oncol.* 2010;49(5):713-24.

4 Cancer in the Nordic countries

A comparison of cancer incidence, mortality and survival of cancer in the Nordic countries by using the NORDCAN data

In this section, we will present an overview of the cancer burden in the Nordic countries by utilizing the NORDCAN data. The most common cancers in the Nordic countries for males are prostate, colorectal, and lung cancer, whereas breast, colorectal and lung cancer are the most common cancers in females.

Prostate cancer

The incidence rates of prostate cancer have been increasing steadily in all the Nordic countries up until around 1990, followed by a rapid increase in the early 1990s. In Denmark, the rates have been lower than the other Nordic countries, and an increase occurred some years later. The rapid increase in the 1990s coincided with the introduction of the prostate-specific antigen (PSA) test (Kvale & al 2007). Similarly to the incidence rates, the mortality rates increased steadily up to the 1990s, but in contrast to the incidence rates, the mortality rates started to decline towards the end of the 1990s. The decline was smaller and less marked in Denmark compared to the other Nordic countries. The decline in the mortality rates probably reflect a combination of treatment of early diagnosed prostate cancers and improved treatment of advanced disease. The five-year relative survival mirrors the shape of the incidence rates, with a steady increase up to around 1990, followed by a rapid improvement the last 20 years. For cancers affected by changes in early detection practice, like prostate cancer and the introduction of PSA-testing, it is difficult to interpret changes in patient survival due to lead time bias. This means that the survival increases because some cancers have been detected earlier (giving the patient a longer survival time), also when the time of death is not changed. Prostate cancers initiated by elevated PSA values alone might not give clinical symptoms within the lifetime of the patient.

Breast cancer

The incidence rates of breast cancer have increased during the last 50 years in all the Nordic countries. The introduction of mammographic screening programmes strongly influences the incidence rate (Moller & al 2005), and this has been found to explain half of the recent increase in the incidence rates in Norway (Weedon-Fekjaer & al 2012). The mortality rates however, have been fairly stable up to the late 1990s, when the rates started to decline in all of the Nordic countries. The decline in the mortality rates in recent years is likely due to both improved treatment of breast cancer and treatment of early (screening detected) diagnosed cancers. The five-year relative survival have improved steadily for many decades, but the interpretations is hampered by the lead time bias resulting from introducing an early detection program (see comment on survival trends for prostate above for elaboration).

Colorectal cancer

The incidence rates for colorectal cancer have increased for both men and women in all the Nordic countries the past 50 years, but the increase has been much larger in Norway compared to the other countries. In the 1950s and 60s, the rates in Norway were among the lowest of the Nordic countries with the highest rates found in Denmark. Due to the rapid increase in the rates, Norway has now surpassed Denmark, and has the highest rates in Europe for women (Bray & al 2007). The reason for this rapid increase in the rates in Norway is not known, but is probably partly due to changes in lifestyle, including dietary habits. The mortality rates for women have been declining for decades in all the countries except Norway. In Norway the rates have been steadily increasing up to the 1990s, after which a distinct decline similar to the other countries can be observed. A similar pattern is observed for men, with the exception of Finland where the rates have been fairly stable since the 1970s. The five-year relative survival has increased steadily for all the Nordic countries, both for cancers of the colon and rectum, but at a lower level for Denmark. The improvements in treatment of rectum cancer with the introduction in the mid-1990s of a new surgical technic, total mesorectal excision, and operation of rectum cancer in fewer hospitals have likely contributed to the decline in mortality rates and the corresponding increase in the survival in the past decade (Wibe & al 2002).

Lung cancer

The incidence rates for lung cancer have changed dramatically during the past 50 years, albeit very different for men and women. In Finland, Denmark and Sweden, the rates for men peaked some 30 years ago followed by a steady decline up to present day. In Iceland and Norway, the rates levelled off in the 1980s (Iceland) and 1990s (Norway), but with no marked sign of the age standardised rates to decline. An analysis of the cohort specific patterns however, indicates that the rates are likely to start declining in the coming years (data not shown, see chapters on incidence rates by birth cohort and on incidence predictions earlier in this issue). For women, the rates have been lower than for men, but except for a levelling off in Iceland during the 1990s, the rates have continued to rise in all countries. Smoking is the predominant risk factor for lung cancer, and accounts for about 85% of all lung cancers (Olsen & al 1997). The pattern of lung cancer can to a great extent be explained by the differences in smoking habits between men and women, and between the different countries (Engeland & al 1993). The trends in mortality rates mirror the trends in incidence rates, due to the low survival of lung cancer. The five-year relative survival has been fairly stable between 5-15% in the whole period. A possible slight improvement in the most recent period might be related to an increase in the proportion of patients receiving surgery (Strand & al 2012).

POPULATION PYRAMIDS

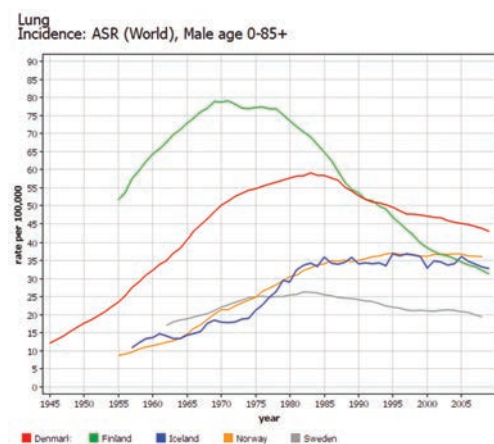
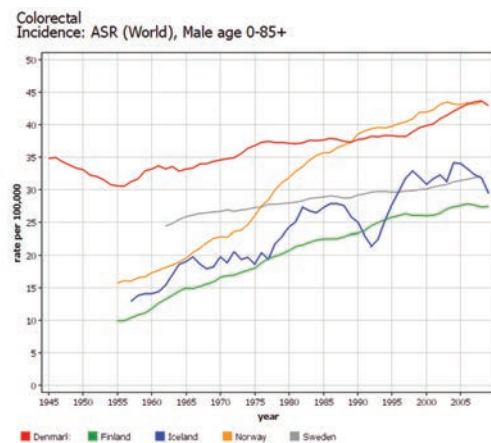
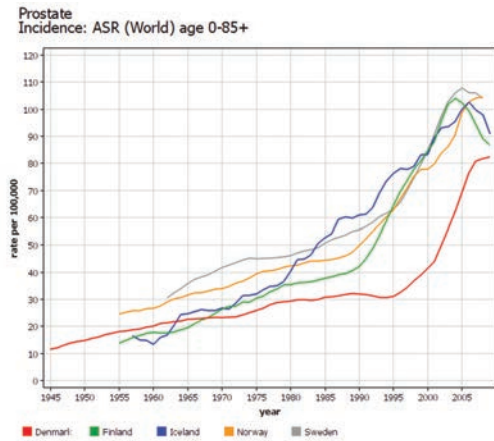
Population pyramids for the Nordic countries, 2010



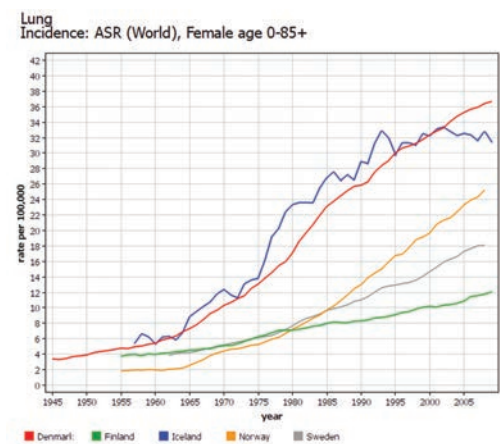
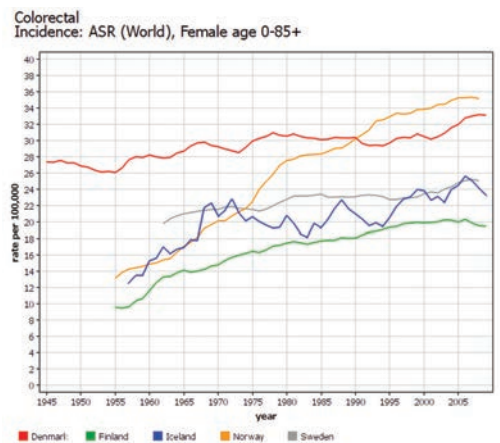
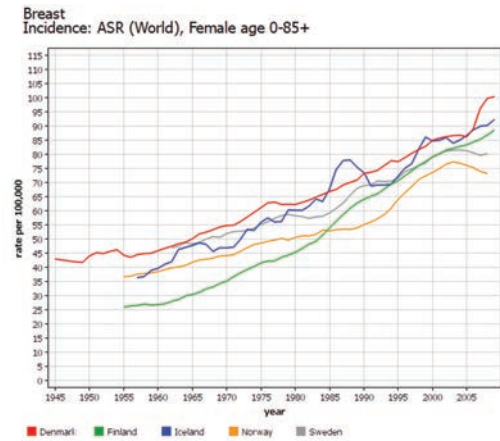
STANDARDISED INCIDENCE TRENDS (WORLD)

Standardised incidence trends (world) for the most common cancers in the Nordic countries, 2006-2010

MALES



FEMALES

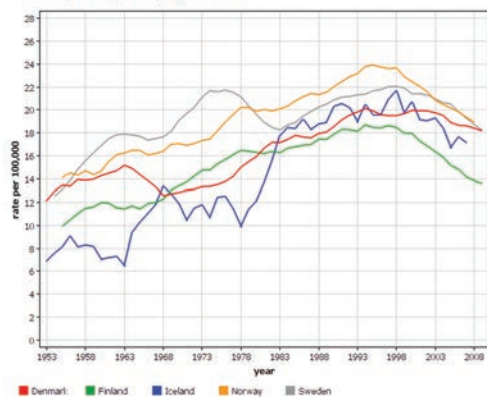


STANDARDISED MORTALITY TRENDS (WORLD)

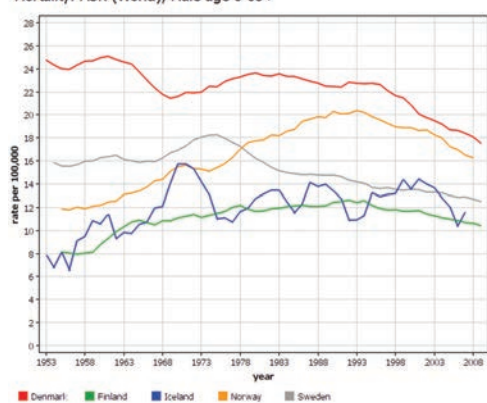
Standardised mortality trends (world) for the most common cancers in the Nordic countries, 2006-2010

MALES

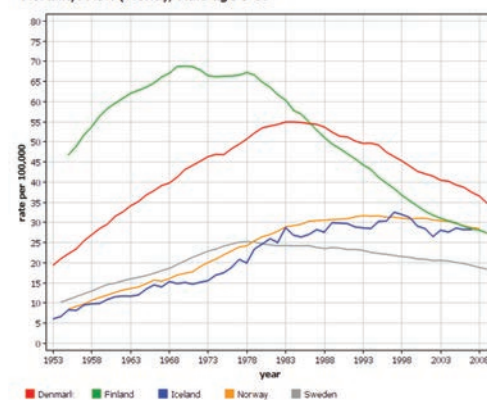
Prostate
Mortality: ASR (World) age 0-85+



Colorectal
Mortality: ASR (World), Male age 0-85+

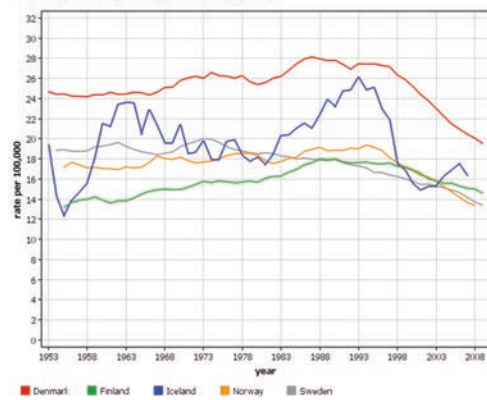


Lung
Mortality: ASR (World), Male age 0-85+

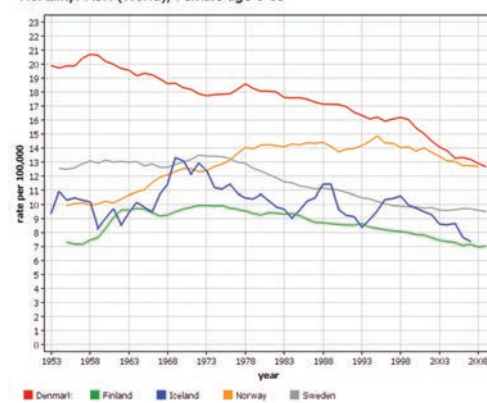


FEMALES

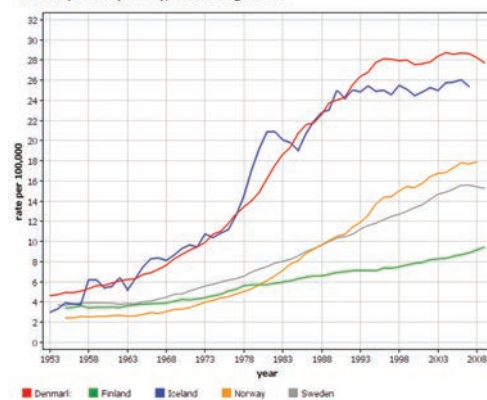
Breast
Mortality: ASR (World), Female age 0-85+



Colorectal
Mortality: ASR (World), Female age 0-85+



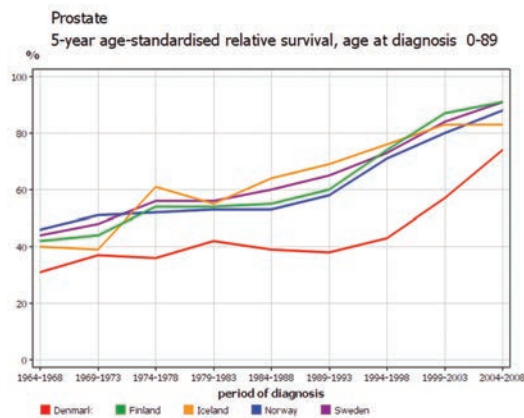
Lung
Mortality: ASR (World), Female age 0-85+



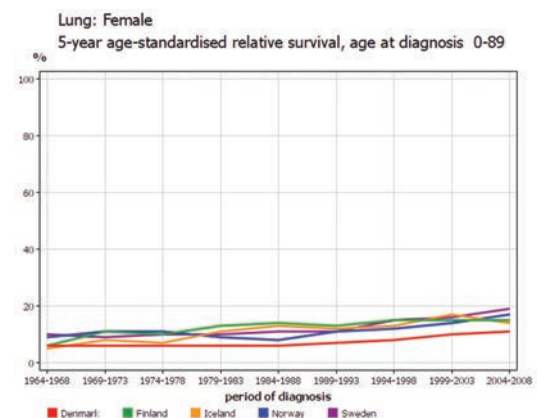
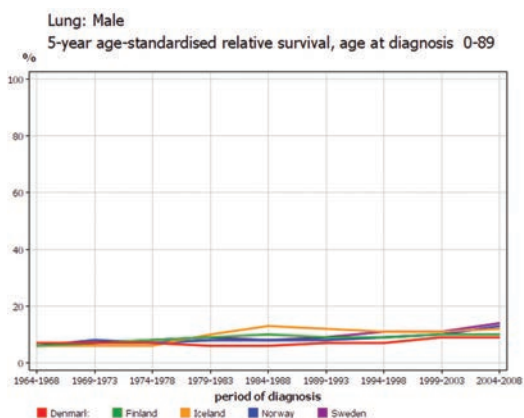
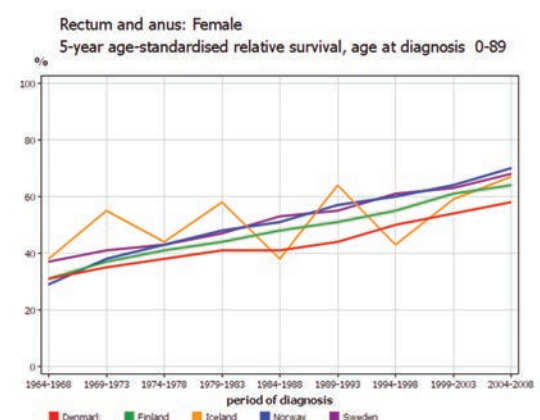
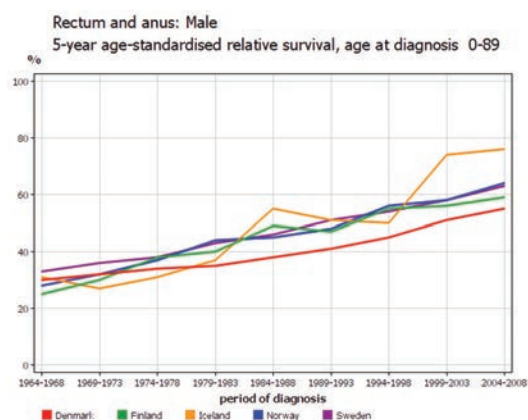
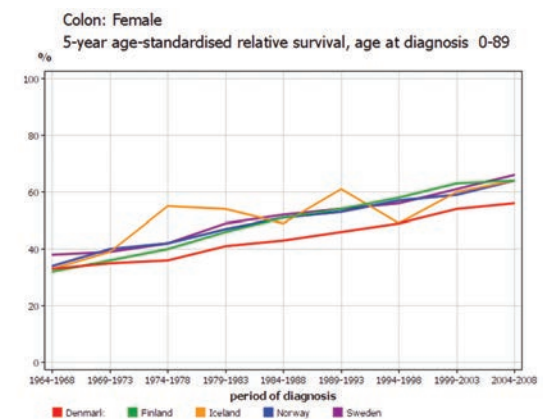
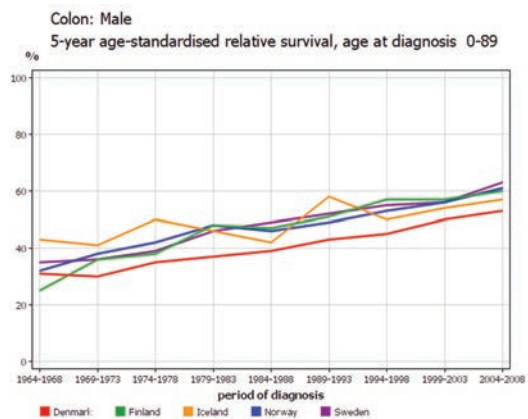
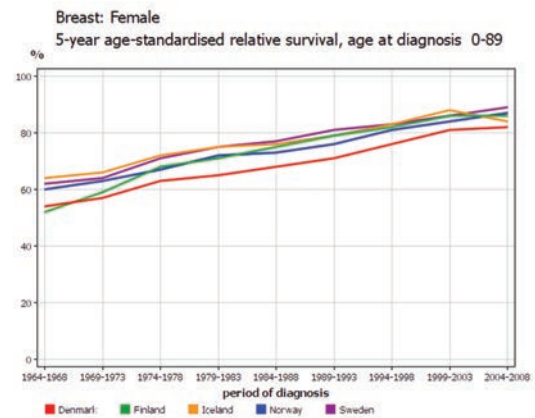
TIME TRENDS OF SURVIVAL

Five-year age-standardised relative survival of the most common cancers, males and females

MALES



FEMALES

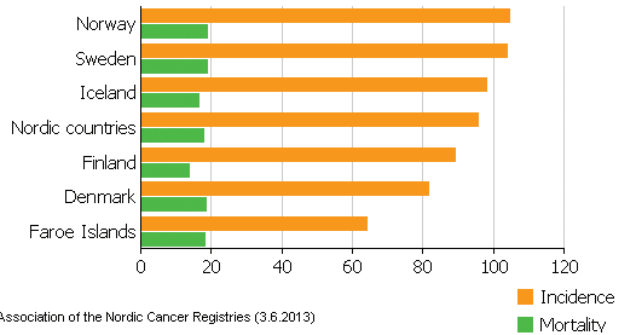


BAR CHARTS BY COUNTRIES

Incidence and mortality trends for the most common cancers, males and females, 2006-2010

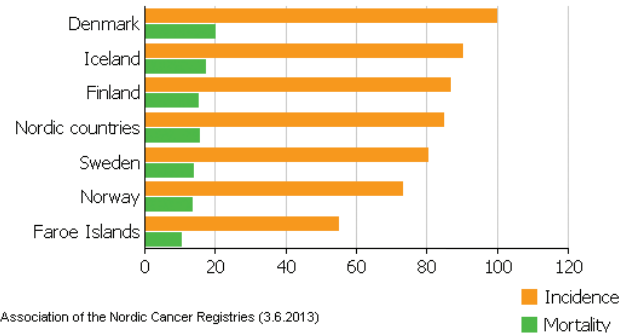
Prostate (2006-2010)

Male: ASR (World) age 0-85+



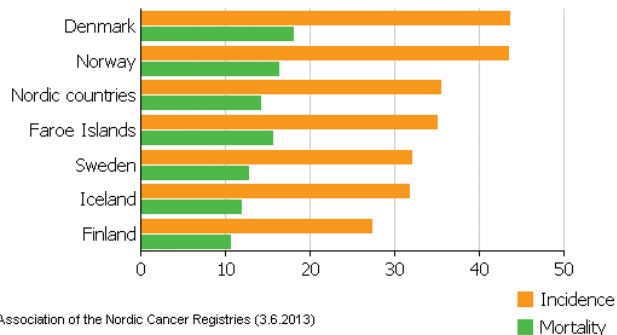
Breast (2006-2010)

Female: ASR (World) age 0-85+



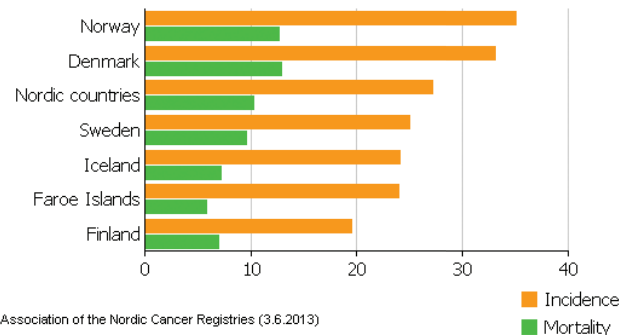
Colorectal (2006-2010)

Male: ASR (World) age 0-85+



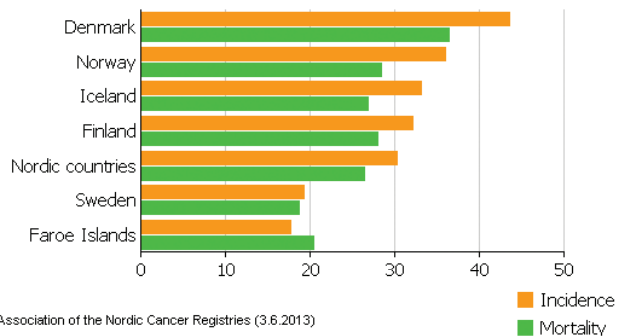
Colorectal (2006-2010)

Female: ASR (World) age 0-85+



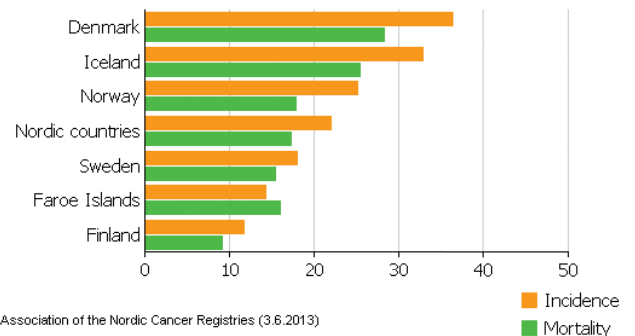
Lung (2006-2010)

Male: ASR (World) age 0-85+



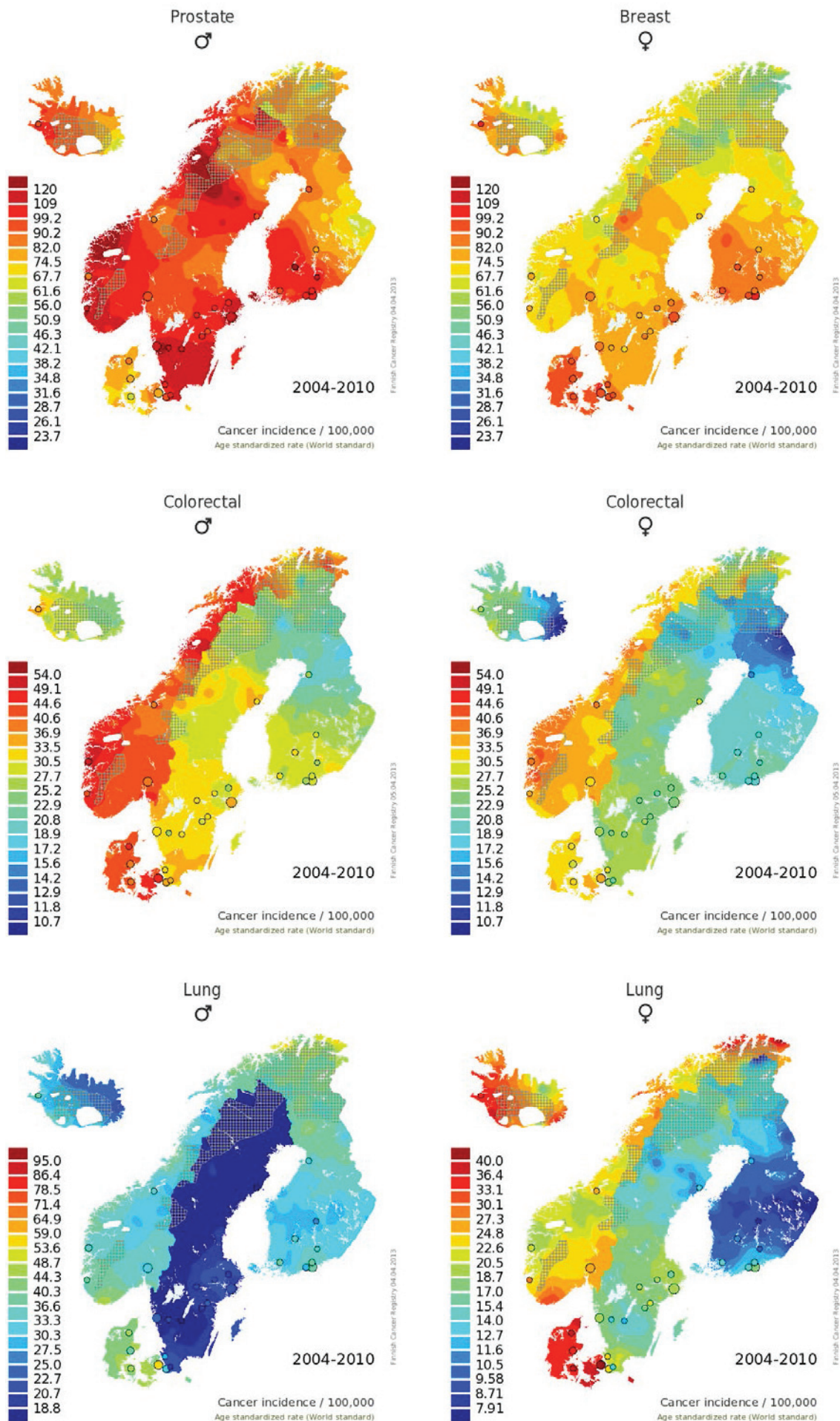
Lung (2006-2010)

Female: ASR (World) age 0-85+



CANCER MAPS

Incidence of the most common cancers, males and females, 2004-2010



Note that the scale and coloring of the different rates differ between the lung cancer map for men and the lung cancer map for women.

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5 The future of NORDCAN

The aim of NORDCAN has, since the start in 2002, been to serve as a research tool for cancer information, planning, quality control and research. We want to provide a cancer database with complete, comparable and timely data from each of the Nordic countries in a user-friendly way to satisfy most of the needs of policy makers, cancer societies, medical professionals, journalists and the general public. The development of new facilities has been driven by the requests from all these groups. NORDCAN is updated twice a year and besides the update, additional new facilities have been included each time.

The completeness of registration and comparability between countries has been a basic quality requirement of further development of NORDCAN. The NORDCAN group, with a representative from each Nordic country, meets twice a year to agree on the further development and studies to elucidate if new facilities are appropriate and the quality is sufficient.

Presently, each of the Nordic cancer registries yearly delivers individual data on incidence, mortality and follow-up to the NORDCAN secretariat for recoding to the NORDCAN entities according to common international rules, followed by tabulation for the web-version of NORDCAN where only tabulated data are included. After recoding, the delivered data is returned to the national cancer registry supplemented with the entity code and a variable that explain the background for a cancer case not being included. This enables delivery of data for research from each cancer registry while researchers still can compare their results with NORDCAN data. It also facilitates Nordic projects like linkage of the national twin registers with cancer registers and use of biobanks.

The individual records delivered to the NORDCAN secretariat is not used for other purposes unless explicitly decided in the NORDCAN group, for instance as preparation of tables and calculations to evaluate possible future facilities.

The focus on continuous development of comparable Nordic cancer statistics and regular meetings in the NORDCAN group has made it possible for NORDCAN to be used as a model for presentation of international cancer statistics like in GLOBOCAN (<http://globocan.iarc.fr/>) and ECO (European Cancer Observatory, <http://eco.iarc.fr/>), and in Italy a database for the regional cancer registers, ITACAN (<http://itacan.ispo.toscana.it>), directly uses the NORDCAN setup.

International Agency for Research on Cancer
 World Health Organization






European Cancer Observatory




European Cancer Observatory (ECO) is a project developed at the International Agency for Research on Cancer (IARC) in partnership with the European Network of Cancer Registries (ENCR) in the framework of the EUROCOURSE project supported by the European Commission. The ECO platform provides a comprehensive system of information on cancer burden in Europe across three web sites: [EUCAN national estimates](#), [EUREG registry data](#) and [EUROCIM downloadable data](#).

EUCAN
national estimates

EUREG
registry data
EUREG permits the exploration of geographical patterns and temporal trends of incidence, mortality and survival observed in European population-based cancer registries for 35 major cancer entities in about 100 registration areas.

EUROCIM
downloadable data







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New facilities in the pipeline

- A new all cancer group including non-melanoma skin.
- Three new groups for cancers only included in the all cancers groups and presently not in a specific cancer entity: unknown primary cancer, other ill-defined cancers and other specified cancers. The all cancer group can then be constructed as the sum of the entities. This will also make it possible to make prediction of the all cancer group as the sum of the predictions of the cancer sites instead of the only present possibility of predicting the all cancer by predicting sum of all cancers.
- Animated cancer mortality maps based on municipality data like the present facility for incidence.
- More detailed subgroups of leukemia as ALL, CLL, AML and CML.
- Update of national relative survival for each cancer site.

Other ideas considered or worked on

- Tables of the distribution of morphology for specific cancer entities.
- Stage distribution using the TNM-system are now included in the Danish and Swedish cancer registers and Iceland and Norway work on inclusion of TNM for some cancer sites. A comparison of the stage distribution and the stage specific survival would be useful.
- Avoidable cancers, how many cancers of specific types could be avoided if the cancer risk was as in the Nordic country with the lowest risk or as a consequence of a scenario changing the distribution of risk factors.
- Avoidable cancer deaths, how many cancer deaths could be avoided if the survival after specific cancers were as in the Nordic country with the highest survival.

Future plans also include collaboration with and between the national clinical cancer quality databases in the Nordic countries; quality databases that contain details of the diagnostics, primary and follow-up treatment and quality of life of the patients. Validation between cancer registers and these clinical databases would improve quality. Collaboration will give more detailed knowledge based on larger patient groups than on the national level, and it will make it possible to improve priorities in cancer diagnostics and treatment and to target cancer prevention activities.

6 Scientific literature and websites using NORDCAN

The statistics and data of NORDCAN have been used for several studies and projects.. The following is a list of all studies and websites that have used or are using NORDCAN-data per June 2013. The list is updated continuously at the NORDCAN website.

Studies using NORDCAN as a primary data source

Storm HH, Engholm G, Hakulinen T, Tryggvadóttir L, Klint A, Gislum M, Kejs AM, Bray F. Survival of patients diagnosed with cancer in the Nordic countries up to 1999-2003 followed to the end of 2006. A critical over-view of the results. *Acta Oncol.* 2010 Jun;49(5):532-44.

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Websites using NORDCAN

<http://www.cancer.dk/Hjaelp+viden/kraeftformer/kraeftsygdomme/> (look under statistics for each of the cancer sites)

www.cancerregistry.fi (Box "Cancer facts in short" in the low-left corner of the main page + a link to NORDCAN in Statistics section). All these are also part www.cancer.fi pages of the Cancer Society of Finland.