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Cancer survival in Norway 1965–2021: Extending standard reporting to improve communication of survival statistics

Cancer in Norway 2021 Special issue

Guest editor:
Paul W Dickman

Editorial team:
B Aagnes[1], TML Andersson[2], PW Dickman[2], ALV Johansson,[1,2] PC Lambert[2,3], TÅ Myklebust[1],
B Møller[1], Y Nilssen[1], MJ Rutherford[3,4]

[1] Department of Registration, Cancer Registry of Norway, Oslo, Norway
[2] Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden
[3] Biostatistics Research Group, Department of Health Sciences, University of Leicester, UK
[4] International Agency for Research on Cancer, Lyon, France

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Contents

List of Figures

List of Tables

Measures of patient survival

This chapter provides the motivation for population-based studies (i.e., using data collected by population-based cancer registries) of cancer patient survival and an overview of the statistical methods used in population-based studies of cancer patient survival. An important message is that the different target audiences are best served by different measures, which is why a range of measures of patient survival are presented in this special issue.

The role of survival analysis in cancer control

Population-based cancer registries play a vital role in cancer control by providing population-based measures of cancer that both inform clinicians and patients and provide a basis for controlling the impact of cancer in the population. Cancer control activities include the prevention and treatment of cancer, and improvements in the survival and quality of life of cancer patients, by transferring knowledge obtained from research, surveillance and outcomes evaluation into policies and actions [1, pp. 185]. Each of the components of cancer control - primary prevention, screening, early diagnosis, treatment, rehabilitation, and palliative care - should be measured and evaluated and each requires a different measure. The focus of this report is on patient survival, but we also report trends in incidence and mortality since trends in survival can only be appropriately interpreted in the context of trends in incidence and mortality [2, 3].

Patient survival is also estimated in clinical trials, but the estimates of survival in clinical studies serve a very different purpose than estimates of survival from population-based registers. Many clinical survival studies aim to evaluate the effect of an intervention (including treatment) on patient survival. It is not essential that the patients under study be representative of any population or population group. It is, however, essential that the treatment groups are comparable in all aspects other than the intervention, which is best achieved by randomisation. Randomisation assures balance between the treatment groups with respect to known and unknown explanatory variables. Consequently, any major observed differences in the outcome may be attributed to a causal effect of the intervention. In clinical studies, patients are followed more closely and accurately with respect to clinical outcomes than in population-based survival studies. As such, information on cause of death, relapses, remissions, side effects, etc. is more readily available than in population-based studies and can be used to define study endpoints other than death. The methods used in this report – described later in this section – are specifically tailored for register data, where information on cause of death is less reliable than in clinical studies and information on other clinical outcomes – such as progression, relapse, remission – is not available.

Population-based studies of patient survival, using data collected by population-based cancer registries, provide a measure of the effectiveness of the health care system in diagnosing and treating those cancers that arise in the population. Note that this includes the efforts of the health care system in promoting public awareness of cancer, recognising symptoms, and consulting a health professional when symptoms occur. Estimates of survival are also of interest for physicians and patients. The same measures of survival are, however, not optimal for all target audiences. In this report we present a range of different measures of patient survival targeted at different audiences. This chapter describes the motivation for these measures and how they should be interpreted.

We use the term 'cancer patient survival' (or 'patient survival') rather than 'cancer survival' to emphasise that it is the survival of the patient, and not the cancer, that is of interest and also that which is measured. The term 'cancer patient survival' also captures the fact that 'survival' provides a measure of mortality among patients diagnosed with cancer, in contrast to 'mortality' that provides a measure of cancer mortality in the entire population. This distinction is described in the next section.

Population-based measures of cancer burden

The three main population-based measures used in cancer control are incidence, mortality, and survival. Some authors have attempted to rank these in order of importance. We argue that attempting to rank the measures or search for a 'single best measure' is misguided; all three measures are valuable and none are fully interpretable without knowledge of the other two [2].

Incidence represents the rate at which individuals in the population are diagnosed with cancer. It is driven by changes in the prevalence of (or exposure to) risk factors along with the intensity and accuracy of diagnostic methods (including screening). Survival represents the rate at which patients with a cancer diagnosis die of that cancer. Survival is influenced by treatment effectiveness, but also the incidence. Because survival, in this context, is estimated based on cancer patients, changes in the characteristics of the patients and their tumors will affect survival. For example, improved diagnostic techniques may result in a shift toward detection at an earlier stage and of more indolent tumors and therefore improved survival. Changes in the definition of what is considered cancer of a particular type, or introduction of a screening program, will also potentially affect incidence, survival, and mortality.

Mortality represents the rate at which individuals in the population die of cancer. It is evident that, to die of cancer, one must first develop cancer but mortality is typically estimated from death certificate data without any reference to incidence. That is, mortality for a particular cancer type is typically calculated by dividing the number of individuals registered as having died of that cancer by the number of individuals (technically, person-years) in the population. Incidence and mortality are therefore calculated in a similar fashion, events divided by person-time in the population, where the events are incident cases of cancer and deaths due to cancer for incidence and mortality respectively. When studying time trends in incidence and mortality it is important to recognise that, for a given year, incidence represents the incidence rate for patients diagnosed that year whereas mortality represents the mortality rate of individuals who are diagnosed over a range of years. The practical calculation of incidence and mortality are more complex – estimation is typically performed within subgroups defined by age and sex and standardisation employed – but the purpose of this section is to present an overview of concepts rather than technical detail.

Survival represents the proportion of patients diagnosed with cancer who survive a specified period of time. Although survival and mortality are related – since more patients surviving implies fewer individuals in the population are dying – the two measures are very different due to the different denominators and their relation is more complex. The denominators for incidence and mortality are the entire population, whereas the denominator for survival is only patients with a cancer diagnosis. Mortality is affected by both factors that impact incidence and factors that impact survival. If, for example, incidence is decreasing over time while survival remains constant, mortality will decrease over time. The same reduction in mortality over time might also be observed if incidence were constant but survival were improving.

For illustration, incidence, mortality, and 5-year survival for males for two selected sites are shown in figures 2 (lung cancer) and 1 (rectal cancer). We see in figure 2 that lung cancer mortality among Norwegian males increased steadily from 1965 until around 2005. Survival remained relatively constant during this period; the increasing mortality was driven almost exclusively by an increasing incidence which, in turn, was driven by trends in smoking prevalence. At around 2005 we see a turning point after which incidence starts to decline, driven by the success of smoking cessation programs, so mortality also starts to decline. At this same point, we see improvements in survival which lead to further reductions in mortality. That is, up until 2005 the trends in mortality mirror the trends in incidence, but the improving survival seen after 2005 lead to mortality declining at a faster rate than incidence. We see in figure 1 that the incidence of rectal cancer among Norwegian males has increased from 1965 to 2020, although incidence has been close to constant during the last decade. Mortality rates increased during the first two decades, but continual improvements in survival, resulting from improvements in diagnosis and treatment, combined with stabilising incidence lead to a reduction in mortality rates from the mid 1990s.

We hope these examples illustrate our point that evaluating progress against cancer requires the simultaneous interpretation of trends in incidence, mortality, and survival. Patient survival provides a measure of the effectiveness of the health care system in diagnosing and treating cancer that can not be measured with incidence and mortality. Although survival is driven primarily by trends in diagnosis and treatment it is important to recognise that it measures more than just those aspects of care. Patient survival provides a measure of the effectiveness of the entire health care system in diagnosing and treating cancer including, for example, programs promoting public awareness of cancer.

Figure 1: Rectum cancer: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

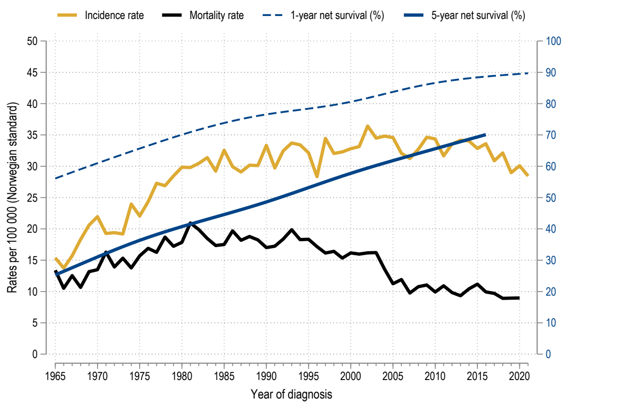
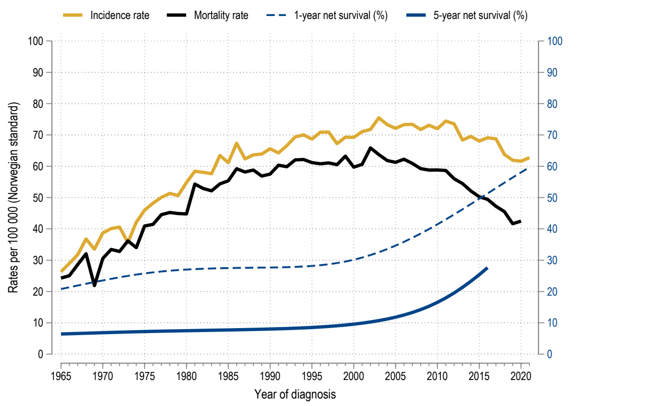


Figure 2: Lung cancer: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males



Measures of patient survival

Each of the three main population-based measures used in cancer control – incidence, mortality, survival – can be expressed as either the rate at which the respective event occurs (also called the intensity or hazard) or the probability at which it occurs. Rates and probabilities are mathematically related [4, 5], and we may present either (or both). It is, however, more common to present incidence and mortality as rates (i.e., using person-time as the denominator) and survival as a probability/proportion (using number of individuals as the denominator). We note that 'mortality' is the cancer mortality rate among the entire population, whereas 'survival' can also be thought of as (a transformation of) the cancer mortality rate among only those individuals with a cancer diagnosis. Although incidence is commonly reported as a rate, it is sometimes also reported as a proportion/probability. For example, we may see reports of the 'lifetime risk of being diagnosed with breast cancer' (where the denominator is the number of individuals alive at a certain age or time)—the quantity epidemiologists call the cumulative incidence or incidence proportion and where 'lifetime' may be defined as, for example, 'up to age 75'.

It is important to recognise the distinction between rates and proportions. In epidemiology, 'risk' is defined as 'the probability of an event during a specified period of time' [4]. This is a probability, taking values between 0 and 1, or can be expressed as a percentage between 0 and 100. Rates, on the other hand, are measures of the change in one quantity per unit of another quantity; rates are calculated as the number of events divided by person-time and have no upper bound [5].

Competing risks – crude and net survival

When presenting the trends in figures 1 (rectal cancer) and 2 (lung cancer) we glossed over the precise measure used for patient survival, namely 5-year net survival. The technical definition of five-year net survival is the probability of surviving 5-years or more without dying of the specific cancer of interest in the hypothetical scenario where the cancer of interest is the only possible cause of death.

A competing risk is an event that either precludes the observation of the event of interest or modifies the chance that the event of interest occurs. If, for example, we are interested in estimating the proportion of women who will be diagnosed with breast cancer before age 75 then death is a competing risk. In a competing risk scenario, we can estimate two different types of probabilities: the real-world probability (called the crude probability) and the hypothetical world probability (called the net probability). We can choose to estimate either the real-world proportion of women who will be diagnosed with breast cancer before age 75 in the presence of competing risks of death (where death due to other causes precludes a diagnosis of breast cancer), or we can estimate the hypothetical proportion of women who will be diagnosed with breast cancer in the scenario where women cannot die of other causes before age 75 (i.e., under the assumption that competing risks are eliminated). The real-world estimate is more relevant for planning health services and cancer control activities, but the hypothetical estimate may be more relevant for comparing different populations, or temporal trends, to facilitate comparisons that are independent of mortality that is potentially different between groups.

If we are interested in the scientific, or etiological, question of 'are women more likely to be diagnosed with breast cancer now compared to 50 years ago' because of, for example, changes in lifestyle then we would use a hypothetical world (net) measure. Women live longer now, compared to 50 years ago, so if incidence remained constant we would expect more women to be diagnosed with breast cancer. If our interest is in assessing the impact of changes in lifestyle on risk of breast cancer then we would estimate the net probability of being diagnosed with breast cancer up to age 75 (or some other selected age) in the hypothetical scenario where one cannot die. The actual research question is more complex due to the impact of screening, but we hope it illustrates the type of scenario where a 'hypothetical world' measure is warranted. If we were, on the other hand, interested in planning health services then we would want a real-world measure, the crude probability of being diagnosed with breast cancer. Competing risks must also be considered when estimating cancer patient survival. Patients can potentially die due to the cancer of interest or due to other, non-related causes. We can choose to estimate any, or all, of the following three measures of survival:

All-cause survival: the probability of surviving beyond a given time (*e.g.*, 5 years) without dying of any specific cause.

Net survival: the probability of surviving beyond a given time (*e.g.*, 5 years) without dying of the specific cancer of interest in the hypothetical scenario where the cancer of interest is the only possible cause of death because competing risks are assumed to be eliminated.

Crude survival: the probability of surviving beyond a given time (*e.g.*, 5 years) without dying of the specific cancer of interest in the real-world scenario where it is possible to die from other causes of death. That is, cause-specific survival in the presence of competing risks. In practice, we usually estimate the complement of crude survival – the crude probability of death – as described in the next section.

Hence, net survival is a hypothetical world probability and crude survival is a real-world probability. The term 'crude' is sometimes used to mean 'unadjusted'; this is not what we mean here by crude survival. The terms crude and net come from the theory of competing risks [6]; it is unfortunate that crude is used in another context but net survival and crude survival, as defined above, are standard terms when studying the survival of cancer patients.

When studying the survival of cancer patients, we are usually interested in the probability of surviving without dying of cancer so our choice is between net and crude survival. It is important to emphasise that we may choose either or both measures; having competing risks does not mean one must do a 'competing risks analysis' (whatever that means). The two measures - crude and net survival - measure different concepts and are useful for different research questions.

Net survival is the most commonly reported measure of population-based cancer patient survival; it provides an estimate of cancer patient survival that is independent of non-cancer mortality and therefore facilitates the comparison of patient survival over time without confounding by changes in non-cancer mortality. The hypothetical framework is not, however, optimal for healthcare professionals and patients who live in the real world. For this reason we present estimates of both net and crude survival in this report. Following is an illustration of the two measures, and how they are interpreted, for men with prostate cancer in Norway.

In summary, net measures are used when we wish to estimate the probability of a specific event in the hypothetical scenario where competing risks are eliminated. Net measures are appropriate for studying disease etiology, temporal trends or other comparisons (*e.g.*, by hospitals, regions, countries etc.) where mortality from other causes may differ across time or groups. Crude measures are used when we wish to quantify the probability of a specific event in the real world in the presence of competing risks. Crude measures are appropriate for risk communication between patients and clinicians, where the goal is to quantify the real-world probability of experiencing the event of interest in the presence of competing risks. Crude measures are optimal for resource allocation, that require estimates of disease-specific survival in a well-defined cohort that takes into account that not all patients will live long enough to experience the event of primary interest.

Illustration of crude and net probabilities of death for men diagnosed with prostate cancer in Norway

Figure 3–A illustrates the conceptual framework used when we estimate net probabilities. At diagnosis (time zero) all patients are alive and we estimate the proportion who, over time, die due to the cancer of interest. Deaths due to other causes are assumed to be eliminated so patients can be in only one of two states; alive or dead due to the cancer of interest. The left-hand panel in (Figure 4) shows an example of net survival estimated for Norwegian men diagnosed with prostate cancer at age 75 years or older. We estimate that, after 10 years follow-up, 30 % of these men will have died of prostate cancer in a scenario where prostate cancer is the only possible cause of death.

Figure 3–B illustrates the conceptual framework used when we estimate crude probabilities. All patients are alive at diagnosis and we estimate the proportion of pa-

tients, over time, who die of either prostate cancer or other causes. The right-hand panel in figure 4 shows an example of crude survival estimated for Norwegian men diagnosed with prostate cancer at age 75 years or older. We previously (in the left-hand figure) estimated that 30 % of men would have died of prostate cancer within 10 years if competing risks were eliminated. We see that, in the real world, only 20 % of these men are estimated to die of prostate cancer within 10 years of diagnosis. The crude probability of death is lower because death due to other causes precludes many men from subsequently dying of prostate cancer.

Rather than presenting crude survival (as defined in the previous section), it is more common to present the crude probability of death due to cancer (1 minus crude survival) due to the awkward interpretation of crude survival. Figure 5 shows such graphs corresponding to those in 4. Crude probabilities of death are preferred because 'dying of cancer' is relatively well defined, whereas 'not dying of cancer' encompasses both being alive and dying of other causes. The crude probability of death due to cancer is also known to epidemiologists as the cumulative incidence of death due to cancer, but the terms crude and net are well established in the cancer patient survival literature so are used in this report.

The crude probability of cancer death is the probability of dying of the cancer of interest before a specified time where it is possible to die from competing causes of death. The crude probability of death is perhaps more relevant in a clinical setting but is affected by both cancer and non-cancer mortality rates and therefore less relevant for comparisons between different groups or populations. Even if two groups of cancer patients have a similar cancer-specific mortality, the group with a higher non-cancer mortality will have a lower crude probability of death due to cancer because death due to other causes will 'prevent' them dying of cancer.

Figure 3: From one state (alive) to either one single absorbing event (death), or to multiple competing events (competing risk)

Figure 3–A: Only one possible event (cancer death)

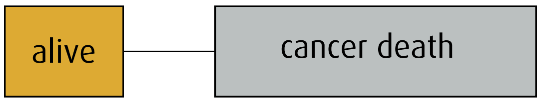


Figure 3–B: Several competing events (causes of death)

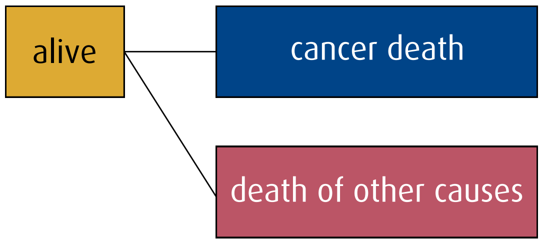


Figure 4: Net survival (hypothetical world), and real world all-cause survival (yellow area) and crude survival (red and yellow area).

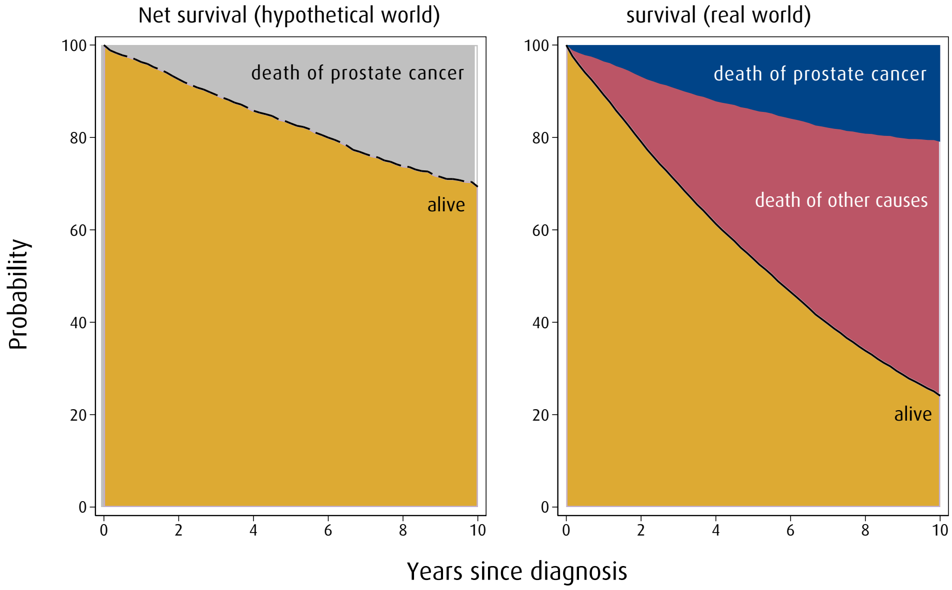
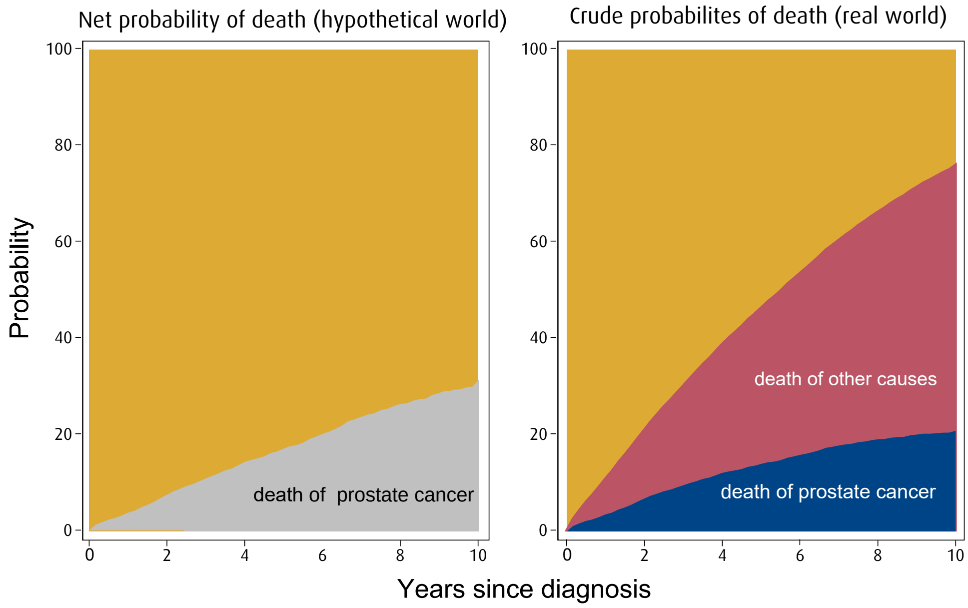


Figure 5: Net probability of death (hypothetical world), and crude probabilities of death (real world) with competing causes of death.



Illustrations above are based on prostate cancer patients 75 year or older at diagnosis. For young patients, or cancer disease with very high mortality the difference between net and crude survival will be small due to little competing risk of dying from other causes.

Reference-adjusted measures

For all measures where mortality from causes other than cancer plays a role, we need to consider how to handle differences in other cause mortality when comparing groups of cancer patients. As an example, if we were interested in comparing all-cause survival between patients diagnosed with colon cancer in 1960 and 2020, we must take into account that mortality from other causes has changed markedly over the period. Hence, only comparing all-cause survival as it is, will reflect changes both in colon cancer mortality and other cause mortality. If we were interested in measuring differences in all-cause survival that are caused by differences in colon cancer mortality rates we need to fix the level of other cause mortality so that it is the same in both groups. We call this reference-adjustment since we fix the other cause mortality to be equal to a chosen reference level [7]. In theory one can choose any reference, but the most natural for our example would be to use the other cause mortality in 1960 or in 2020, as this ensures that the overall survival in one of the groups can be interpreted as the actual all-cause survival experienced by that group.

Conditional measures

For many cancer sites, the future survival depends on how long you have lived since the date of diagnosis. Often, mortality is high during the first weeks/months after diagnosis, and declines thereafter. This is particularly true for patients diagnosed with more advanced stages. Thus, providing updated estimates for patients surviving a given time after diagnosis is important. This is called conditional measures, since we are conditioning on the time survived, *e.g.*, the number of years survived, since diagnosis.

Expectation of life time and proportion of expected life time lost

Crude probabilities of death, or survival, provide a measure of cancer patient survival within a fixed time period (*e.g.*, 5 years) after diagnosis or, with conditional estimates, for an additional fixed period given one has already survived an initial period following diagnosis. Expectation of life, and related measures such as the proportion of expected life time lost, provide an alternative approach to presenting estimates of cancer patient survival that have the advantage of being interpretable across the entire remaining life span as well as being interpretable in the real world. In studies of cancer patient survival, life expectancy is typically estimated from the date of cancer diagnosis until death (irrespective of cause of death) and gives a prediction of the average number of life years that remain for patients after they have been diagnosed with cancer. Contrasting the remaining life expectancy amongst cancer patients to that in the general population gives an estimate of the loss in life expectancy due to cancer and proportion of expected life time lost. These are interpreted as the number of life years, or proportion of expected life years, a cancer patient is expected to lose, on average, due to the cancer diagnosis.

The advantage of these measures, compared to probabilities, is that they are interpretable across the entire life span rather than within a specific time period. This advantage is also the greatest challenge; we cannot follow recently diagnosed patients across the entire life span so these estimates are based on statistical extrapolation and prediction. It has been shown, however, that survival of cancer patients can be extrapolated with reasonable precision by partitioning the all-cause survival into two components, the expected survival and the net survival, and extrapolating these functions independently [8, 9].

Frameworks for estimation: cause-specific and relative survival

So far we have discussed the conceptual measures of net and crude survival, but not how they are estimated. Estimation can be performed in one of two frameworks, and within each framework there are a number of different estimators (the mathematical rules for calculating the estimates). The two frameworks, that may be used for estimating both net and crude survival, are the cause-specific framework and the relative survival framework. In the cause-specific framework, each death must be classified as either (a) death due to cancer, or (b) something other than cancer. This classification is typically made based on routinely recorded information in cause of death registers or medical records. In the statistical analysis, cancer deaths are denoted as events and deaths due to any other causes are treated as censored observations and standard methods (*e.g.*, Kaplan–Meier) can be applied.

The relative survival framework provides an alternative to the cause-specific survival framework that does not require cause of death information. The relative survival framework is most commonly used in population-based studies of patient survival, including in this report. Several estimation methods for net survival in a relative survival framework exist, a method that was commonly used in the past was to calculate the ratio between the observed all-cause survival amongst the cancer patients, and the expected survival in a comparable group in the general population (usually obtained from population life tables). This is the estimator known as relative survival. If, for example, the one-year relative survival ratio is 1.0, the survival proportion in the group of cancer patients coincides with that in the general population, suggesting that there is no excess mortality associated with the cancer during the first year of follow-up. A relative survival ratio lower than 1.0 means that cancer patients have inferior survival compared to the general population, and we typically assume that the survival deficit is due to excess mortality from the cancer. As a consequence, the excess mortality thus captures both the direct and indirect mortality associated with the cancer. The mortality that is directly related to the cancer includes all causes of death that would typically be classified as death due to cancer on the death certificate. Indirect mortality due to cancer encompasses death due to treatment toxicity, suicides and late effects such as cardiovascular disease, second malignancies or infections. These are events that are unlikely to be classified as cancer deaths on the death certificate and would not therefore be captured in a cause-specific analysis. As cause of death information is not always readily available or reliable, relative survival has become the preferred approach for obtaining estimates of cancer patient survival in population-based investigations, as well as by cancer registries worldwide.

The terminology (measures, frameworks, estimators) can be confusing, but it is important to understand the distinctions. Relative survival (observed survival divided by expected survival) is an estimator within the relative survival framework (the framework where population life tables are used to capture non-cancer mortality rather than death certificates). That is, relative survival is the name of both a framework and a specific estimator within that framework. In this report we use a relative survival framework, but we do not use relative survival as the estimator. Relative survival is a non-parametric estimator and was used in early Cancer in Norway publications. In 2010 a new non-parametric estimator, with better statistical properties, was presented [10] and this so-called Pohar Perme estimator is now used in the Cancer in Norway publications. The Pohar Perme estimator provides estimates of net survival using a relative survival framework (i.e., it makes use of population life tables) but it is not relative survival (the estimator).

Estimation using parametric models

The estimates of patient survival presented in this report are made within a relative survival framework, but are estimated using a flexible parametric statistical model [11] rather than non-parametrically. Statistical models are a powerful tool to estimate a range of useful measures – including life expectancy, loss in life expectancy, and reference adjusted measures – but application of statistical models requires additional assumptions (i.e., the chosen models provide a good fit to the data). Several authors have shown that flexible parametric models are reasonably robust to the choice of modelling assumptions with Syriopoulou and colleagues [12] providing one of the most extensive studies. The paper by Syriopoulou and colleagues [12] also provides an introduction to the use of flexible parametric models for estimating net survival. As is recommended with any statistical analysis, we conducted extensive sensitivity analyses of modelling assumptions that included comparison of the model-based estimates to non-parametric estimates.

Assumptions

Statistical analysis typically involves making assumptions, and an appropriate statistical analysis includes a statement on the assumptions that have been made and an evaluation of their appropriateness. The assumptions made in the analyses presented in this report can be classified into two areas; assumptions inherent in the estimation framework and assumptions associated with the modelling approach.

Each of the two frameworks for estimating net survival requires specific assumptions. The cause-specific framework requires accurate classification of cause of death, whereas the relative survival framework requires appropriate estimation of the expected survival, stratified by age, sex, and calendar year, in the absence of cancer. We use national life tables to estimate expected survival. This requires two assumptions: (a) that mortality due to the specific cancer constitutes a negligible proportion of total mortality since we are using the entire population to represent a population without the specific cancer; and (b) that the cancer patients would experience the same mortality as the general population if they were not diagnosed with cancer. In most scenarios, the use of national life tables results in a negligible bias, although it can result in a bias in net survival for common cancers among the elderly, and an even larger bias in net survival for all cancers combined because they account for a substantial proportion of all deaths in the general population.

For smoking-related cancers, using national life tables may not be appropriate. If, for example, individuals with lung cancer, predominantly caused by smoking, had not developed this malignancy, we would expect them to have higher mortality than the general population because smoking increases the risk of numerous lethal diseases, including several other sites of cancer as well as cardiovascular and pulmonary diseases. One study showed that, despite the concerns with using relative survival for lung cancer, the resulting bias was negligible due to the high fatality of lung cancer [13] and another found no evidence of a bias due to ignoring the effect of smoking for bladder cancer [14].

Although smoking serves as an obvious example of how the assumptions are violated, using the relative survival framework is most problematic for early-stage screen-detected cancers. For example, white males aged 65 years and older, diagnosed with localized/regional prostate cancer in the United States, had relative survival of 104 % and cause-specific survival of 95 % [15]. The corresponding figures for black males were 101 % and 93 %. The men with prostate cancer experienced better survival than the age–sex–year–race-matched general population because they were presumably more health conscious (and healthier) than the corresponding general population. Cause-specific survival, on the other hand, is likely a slight underestimate of net survival because there is evidence from many populations that cancer is over-reported as a cause of death among elderly individuals with a cancer diagnosis [16].

Introduction to figures

Short introduction

In this report, we present sets of figures with different survival measures for 23 cancer sites. Below you will find a short description of the methods, highlighting differences compared with the standard Cancer in Norway report, followed by short descriptions of the graphs.

For each cancer site, you will also find a one-page description of the results. For most cancer sites differences in survival may be related to differences in factors like treatment, diagnostics and genetics. We do not go into details on such explanations, as this is too comprehensive for this report.

Statistical analyses

The relative survival framework is frequently used for analyses of cancer registry data. Rather than using causes of death obtained from the death certificates, the relative survival framework uses expected mortality rates to estimate *excess mortality*, meaning that we get the mortality in excess of that expected in a similar group of people in the general population without the cancer disease in question. Expected mortality rates come from life tables, which provide the probability that a person of a given sex and age in a given year survives the coming year. Life tables may be stratified by additional variables, such as socioeconomic status, smoking or county of residence. In this report, we use national life tables stratified by sex, age (1-year intervals) and calendar year (1-year intervals).

A relative survival function may be estimated with models, or by non-parametric methods that make no assumptions about the characteristics of the sample. In this report we use flexible parametric survival models which use splines to model the baseline cumulative excess mortality [11]. Such models are useful for modelling interaction effects between covariates and follow-up time, also referred to as time-dependent effects. We used two sets of models with different aims. One aim was to provide up-to-date estimates that are relevant for recently diagnosed patients, and another aim was to estimate trends over time (1965–2021).

For the first aim, we used models that included age at diagnosis (using restricted cubic splines), sex and stage at diagnosis as covariates. If data allowed, we also included interaction effects between age and stage as well as time-dependent effects of sex, age and stage. We automized model selection by specifying a list of 22 different models, starting with the most complicated model, as just described, and gradually simplifying model specification by removing interaction effects and/or reducing degrees of freedom for spline basis functions for age, the baseline hazard and time-dependent effects. The chosen model was the first model that converged. All models were estimated separately for each cancer site, using a five-year period window (2017–2021) with maximum 15 years follow-up after diagnosis. Using this so-called period approach [17] imply that all patients contribute only their survival experience during the chosen window. The method has been shown to be useful for providing up-to-date survival estimates [18]. See Table (1) for an overview of the model specifications for each cancer site.

For the second aim, we used models that included sex, age at diagnosis (using restricted cubic splines) and year of diagnosis (using restricted cubic splines) as covariates. If data allowed, we also included interaction effects between age and calendar year as well as time-dependent effects of all covariates. Stage was not included in these models, as changes in stage distribution over time may occur as a natural consequence of development in cancer diagnostics. One exception was for cancer of the central nervous system (CNS), where the distribution of stage has changed due to less complete reporting of benign tumours to the registry. Thus, stage (malignant/non-malignant) was included as a covariate for CNS in the trend analyses. We automized model selection by specifying a list of 9 different models, starting with the most complicated model, as just described , and gradually simplifying model specification by removing interaction effects and/or reducing degrees of freedom for spline basis functions for age, year, baseline hazard and time-dependent effects. The chosen model was the first model that converged. Models were estimated separately for each cancer site. See Table (2) for an overview of the model specifications for each cancer site.

When we estimated time trends, we age-standardised estimates for each year to the age-distribution of patients diagnosed in 2017–2021. This was done to eliminate any effects of change in age distribution over time. For measures that depend on other cause mortality we also have to take into account that the probability of dying from other causes may change over time, and thus affect the probability of dying from cancer. In this report, we accounted for this competing risk situation by forcing mortality from other causes to be constant over time and equal to the mortality of other causes during the most recent year (2021). Measures that are estimated by this method are called *reference-adjusted measures*. We present trends in reference-adjusted all-cause survival, crude probabilities of death from cancer, as well as absolute numbers and proportions of life-years lost.

Net survival is the survival in a hypothetical world where it is impossible to die from other causes. Net survival is a useful measure to make fair comparisons of cancer survival across time, between countries, or between geographical regions with varying mortality from other causes. With net survival, only the excess mortality related to the cancer diagnosis is estimated, and differences in mortality from other causes are disregarded. Net survival is, however, less useful for communicating prognosis, as death from other causes may play an important role in the real world, especially for elderly patients. Alternative measures such as all-cause survival, crude probabilities of death from cancer and death from other causes, expected remaining life-years, or life-years lost may be better alternatives. After fitting relative survival models, all these quantities can be predicted from the models. As prognosis typically differs by age and stage, and potentially also by sex, we present some results stratified by these factors. Results for all ages combined are age-standardised to the age distribution of patients diagnosed during 2017–2021. Furthermore, prognosis might depend on time since diagnosis. We therefore also include results stratified by stage and years since diagnosis.

All analyses were conducted with the statistical software Stata 17 [19]. Excess mortality regression models were estimated using stpm2 [20], and estimates of various measures were predicted from the models using standsurv [21].

Special Issue *versus* Cancer in Norway 2021 (CIN)

Estimates of net survival are non-parametric in CIN, but based on fitting relative survival models in this report. The differences between these approaches are particularly evident when we compare trends in net survival. The model-based trends are smooth, whereas the non-parametric trends are jagged.

When we use life tables to obtain expected mortality rates, a key assumption is that the life table is correct in the sense that the expected mortality rates reflect the mortality that a cohort of cancer patients would have had if they were cancer free. For most cancer sites, we assume that this assumption is fulfilled when we take into account age, sex and calendar year. However, we know that the assumption does not hold for lung cancer and prostate cancer. The risk of lung cancer is closely related to individual smoking history. Since smoking is also strongly related to mortality of other causes, the use of a standard life tables will likely underestimate the probability of dying from other causes and thus overestimate the probability of dying from lung cancer. If we had information on smoking habits for lung cancer patients, and a life table stratified by smoking habits, we could solve this problem. Since this information was not available, we calibrated the mortality rates by multiplying the survival probabilities in the standard life table with a constant factor of 0.968. This factor was chosen so that the five-year non-parametric net survival matched the five-year cause-specific survival for the most recently diagnosed lung cancer patients. Five-year net survival was estimated using the Pohar-Perme estimator [22] implemented in the user-written Stata program stnet [23]. In CIN, the standard life table was used when estimating net survival for lung cancer.

For prostate cancer, the challenge was related to PSA-testing. We expect that the use of PSA-testing is related to socioeconomic status, so expect more low-risk prostate cancer to be diagnosed in men with higher socioeconomic status. As higher socioeconomic status also is related to lower mortality of other causes, we expect that the use of a standard life table would lead to an overestimation of the probability of dying from other causes, and, correspondingly, an underestimation of the probability of dying from the cancer itself. If we had information on socioeconomic status of patients and in life tables, we could potentially solve the problem. As for smoking habits, this information was not available to us, so we calibrated the mortality rates by multiplying the survival probabilities in the standard life table by a constant factor of 1.0035. This factor was chosen so that the average net survival for patients with localised prostate cancer across the five first years after diagnosis was 100 %. Using the standard life table, net survival was constantly higher than 100 % during the first five years after diagnosis for this patient group. The calibrated life table was used only for localised prostate cancer. For regional and distant prostate cancer, we used the standard life table.

Cancer of the pancreas (ICD10-C25) registered in the Cancer Registry, and reported in CIN, exists with different histological subgroups, such as pancreatic ductal adenocarcinoma (PDAC) or pancreatic neurendocrine neoplasms (PNET/NEN) originating in pancreas. The proportion of NEN has increased over time and comprised 7 % of the total number of pancreatic cancers registered during 2017–2021. Patients with NEN in pancreas have a much better prognosis compared to patients with PDAC, and we therefore have removed NENs from the survival analyses in this report. We follow the definition of pancreatic cancer used in the *clinical registry for pancreatic cancer*.

Information on stage is missing for some patients, and the proportion with unknown stage varies across cancer sites and calendar years. For this report, we completed stage information by using multiple imputation. The imputation models were estimated separately for each cancer site using multinomial logistic regressions with age at diagnosis, sex, calendar period of diagnosis (5-year periods), death from any cause (yes/no) and the Nelson-Aalen estimate of cumulative hazard as covariates. In CIN, estimates are presented separately for unknown stage.

In this report we use slightly different labels for cancer sites, i.e., 'Lung' rather than 'Lung, trachea' used in CIN. The inclusion criteria are, however, identical, except for pancreatic cancer as described above.

Short description of the following figures for each cancer sites

Net survival 0–10 years

Net survival is a concept which can be interpreted as the probability of surviving in the hypothetical situation where the cancer disease is the only possible cause of death. This measure is useful for comparing populations of cancer patients with different risk of dying from other causes than the cancer disease. Figure #.1.A shows net survival up to ten years after diagnosis (averaged over the patient group).

Crude probabilities 0–10 years

In real life cancer patients may die of other causes than the cancer disease. *Crude probabilities* of death refer to this competing risk situation. Figure #.1.B shows the estimated probabilities of being alive, dying from the cancer disease, and dying from other causes, up to ten years after diagnosis (averaged over the patient group). This figure describe survival in the presence of competing risks. The yellow area is the all-cause survival, while the red and yellow area together is the crude survival.

5-year crude probabilities by age and stage. (Males/Females)

Cancer survival varies with age and extent of disease. Figures #.1.C and D show the estimated probabilities of being alive, dying from the cancer disease, and dying from other causes, five years after diagnosis for each combination of age, stage and sex (averaged over the patient group).

Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis for median aged patients. (Males/Females)

Typically, the most frail patients die early and patients surviving for some time will have a better prognosis. Figures #.1.E and F show five-year probabilities of being alive, dying from the cancer disease, and dying from other causes, conditioned on being alive at 0–5 years after diagnosis. These estimates are for the median aged patient for both sexes combined. Typically, the probability of dying from the cancer will decrease, and the probability of dying from other causes will increase, with increasing time since diagnosis.

Life expectancy by age and stage. Males/Females

Figures #.2.A/B show expected remaining life-years and life-years lost due to the cancer disease by age-group and stage, for males and females.

Proportion of life-years lost. Males/Females

Figures #.2.C/D show proportion (%) of life-years lost due to the cancer disease by age-group and stage, for males and females.

Conditional proportion of life-years lost by stage and years (0–5) since diagnosis for median aged patients. Males/Females

Figures #.2.E/F show the proportion (%) of life-years lost due to the cancer disease by stage, conditioned on being alive at 0–5 years after diagnosis, for males and females.

Trends in incidence and mortality rates and 1- and 5-year net survival (%). (Males/Females)

Figures #.3-A/B depict time trends in incidence, mortality and survival for the period 1965–2021, for males and females. The survival estimates are 1-year net survival (blue/red dashed lines) and 5-year net survival (blue/red solid lines). Both are probabilities, and the levels are shown in the right axis (0–100 %). The net survival estimates are age standardised using the age distribution of the cancer patients in 2017–2021 for each cancer site, and sex, separately. The other two measures shown are age standardised incidence (yellow solid line) and mortality (black solid line). Both incidence and mortality are expressed as rates *per* 100 000 person-years using the age distribution of the Norwegian population (both sexes combined) in 2014 as standard population. The level of the rates is shown in the left axis. The net survival estimates are model-based, hence they are smoother, in contrast to the estimates of incidence and mortality, which are not smoothed in order to illustrate some of the fluctuation in those measures, especially for cancer sites with few cases. The five year net survival estimates are not shown for the last five years to avoid presenting estimates which are based on model extrapolations, and not governed by real data, as these date are not yet available.

Trends in reference-adjusted all-cause survival

Reference adjusted all-cause survival is an estimate of the survival where one can die of the cancer disease or competing causes of death, but competing causes death are adjusted to a common standard. This measure is useful for surveillance of progress in cancer treatment, and for comparing populations with varying degree of non-cancer mortality. We forced mortality from other causes to be constant over time, and equal to mortality from other causes in the most recent year (2021). Estimates were age standardised using the age distribution of the cancer patients in 2017–2021 for each cancer site, and sex, separately.

Trends in reference-adjusted crude probability of cancer death

Crude probability of cancer death is the probability of dying from the cancer disease in the presence of competing risks of death. The figures show trends in probabilities of dying from the cancer disease in the presence of competing risks of death, while adjusting the competing causes of death to a common standard, here equal to the competing cause mortality in the most recent year (2021). Estimates were age standardised using the age distribution of the cancer patients in 2017–2021 for each cancer site, and sex, separately.

Trends in reference-adjusted life-years lost

The figure show estimates of life-years lost due to cancer, fixing other cause mortality to the 2021-level.

The figure shows estimated life-years lost due to cancer, while adjusting other cause mortality to the 2021-level. Expected remaining life-years can be estimated as the area under a survival curve. For a comparable general population without cancer, expected remaining life-years can be calculated from mortality rates in population life tables. For the cancer cohort, the expected remaining life-years can be found by combining relative survival with expected survival obtained from life tables. The number of life-years lost due to cancer is the difference between the expected remaining life-years for the comparable cancer free population and the expected remaining life-years for the cancer patients. As mortality from other causes plays an important role when estimating life-years lost, we need to adjust for changes in mortality from other causes. This is done by forcing mortality from other causes to be constant over time. Estimates were age standardised using the age distribution of the cancer patients in 2017–2021 for each cancer site, and sex, separately.

Trends in reference-adjusted life-years lost (%)

The figure shows estimated relative loss in life-years due to cancer, while adjusting mortality from other causes to the 2021-level. Estimates were age standardised using the age distribution of the cancer patients in 2017–2021 for each cancer site, and sex, separately.

Mouth, pharynx

1.1 Net survival and crude probabilities

Cancers of the mouth and pharynx includes cancers of the lip (ICD10-C00), oral cavity (ICD10-C02–06), salivary glands (ICD10-C07–C08), oropharynx (ICD10-C09–10), nasopharynx (ICD10–C11) and hypopharynx (ICD10-C12–C13), with cancers of the lip, tongue and oropharynx as the largest groups.

Net survival for patients with mouth/pharynx cancer declines the first years after diagnosis with a five year net survival estimate of 72 %. After five years the net survival continues to decline without reaching a plateau, with a ten year net survival equal to 61.2 % for both sexes combined (Figure 1.1–A). Women have a slightly higher net survival compared to men.

The probability of surviving 5 years after diagnosis is 65 % (Figure 1.1–B). The probability of dying from mouth/pharynx cancer within five years is 26.9 % and the additional probability of dying from other causes is 8.1 %. In comparison to net survival, the crude probability of dying from cancer is slightly lower since patients may also die from other causes.

Crude probabilities of mouth/pharynx cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 1.1–D and 1.1–C). However, the probability of dying from mouth/pharynx cancer also, to some extent, depends on age with poorer survival in the oldest age groups. In women with localised cancer, the five year crude probability of death due to mouth/pharynx cancer is 15 % at ages 80–89, while the corresponding probability is 3.5 % at ages 0–49. Among patients with distant metastases at diagnosis, the probability of cancer death is 87.5 % in the ages 80–89 and 48.6 % at ages 0–49.

Having survived mouth/pharynx cancer for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years if diagnosed with localised or regional stage (Figures 1.1–F and 1.1–E). If diagnosed with distant stage, the future five year survival are greatly impacted by the number of years survived since diagnosis. For a median aged, female mouth/pharynx cancer patient with distant metastases at the time of diagnosis, the five year risk of dying from mouth/pharynx cancer is 87.8 %. If surviving five years from diagnosis the future five year risk of dying from mouth/pharynx cancer is reduced to 45.1 %. The longer a patient survives the more similar future survival becomes across stages.

1.2 Life expectancy and life-years lost

The differences in prognosis across stages of mouth/pharynx cancer leads to differences in life-years lost. Patients with localised mouth/pharynx cancer lose few of their remaining life-years, whereas patients with distant mouth/pharynx cancer lose many life-years (Figures 1.2–B and 1.2–A). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. The proportions of life-years lost are similar across ages for localised and regional mouth/pharynx cancer, but increasing with age for distant mouth/pharynx cancer (Figures 1.2–D and 1.2–C). These plots also shows the large difference in prognosis across stages, with patients with distant mouth/pharynx cancer losing a much larger proportion of their remaining lifetime compared to regional and localised mouth/pharynx cancer.

The proportion of life-years lost decreases only slightly with the number of years survived for all stages (Figures 1.2–F and 1.2–E). The proportion does not approach zero for any stages, meaning that the cancer diagnosis continues to influence expected remaining lifetime despite surviving several years after diagnosis.

1.3 Time trends

Net survival of mouth/pharynx cancer has been stable over time, with a slight tendency to increase in the last two decades (Figures 1.3–B and 1.3–A). Correspondingly, the all-cause survival has increased and the crude probability of dying from mouth/pharynx cancer has declined over the past two decades (Figures 1.3–C and 1.3–D). This has marginally affected life-years lost, with both the number and proportion of life-years lost slightly declining recent years (Figures 1.3–E and 1.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 9.3 years in 1965 and expected to be 7 years in 2016. Correspondingly, the proportion of life-years lost due to mouth/pharynx cancer has decreased, for women, from 43.5 % in 1965 to an expected 32.8 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 1.1: Mouth, pharynx: net and crude probabilities

Figure 1.1–A: Net survival 0–10 years

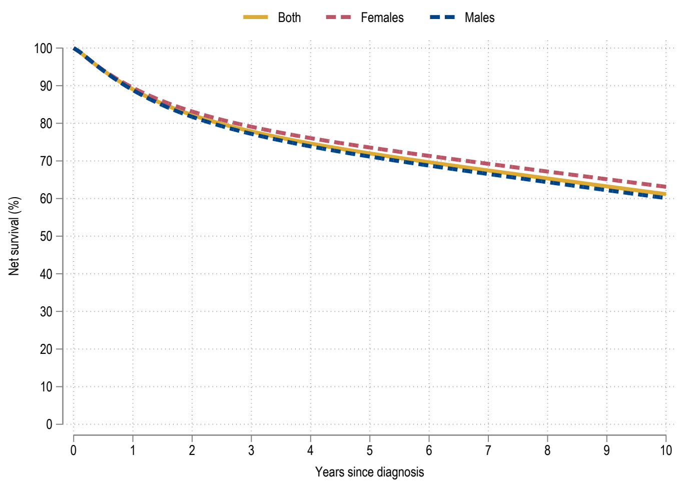


Figure 1.1–B: Crude probabilities 0–10 years

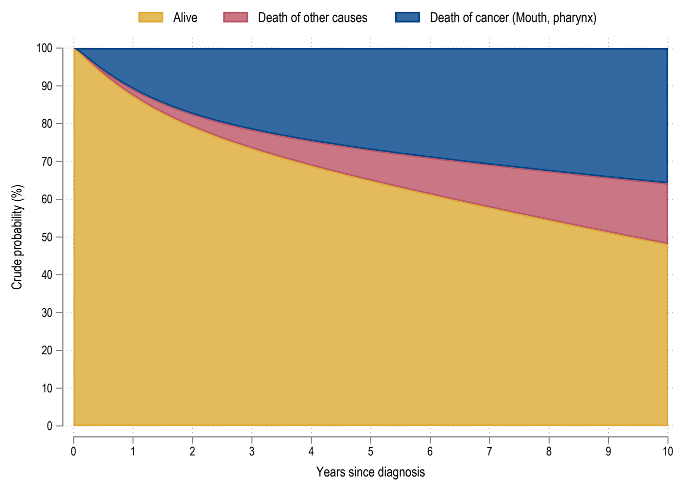


Figure 1.1–C: 5-year crude probabilities by age and stage. Males

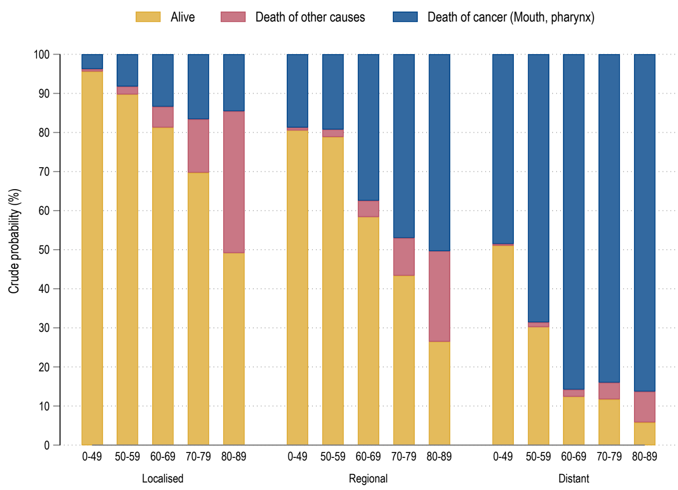


Figure 1.1–D: 5-year crude probabilities by age and stage. Females

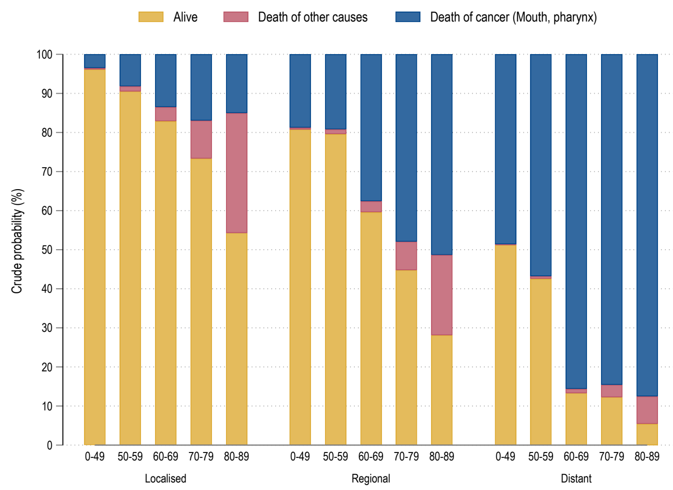


Figure 1.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Males

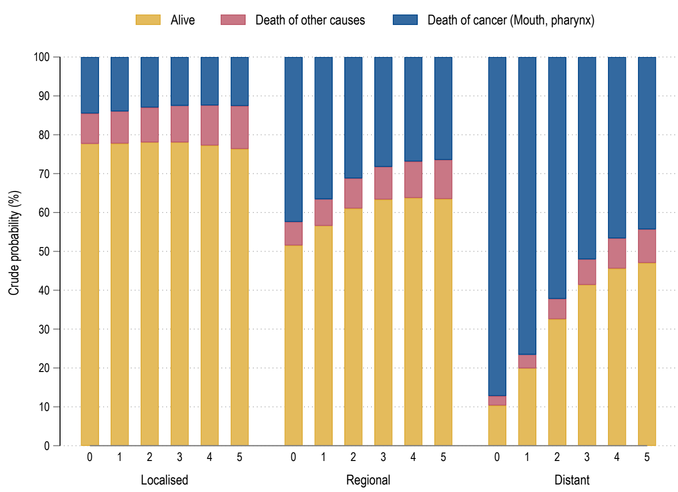


Figure 1.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Females

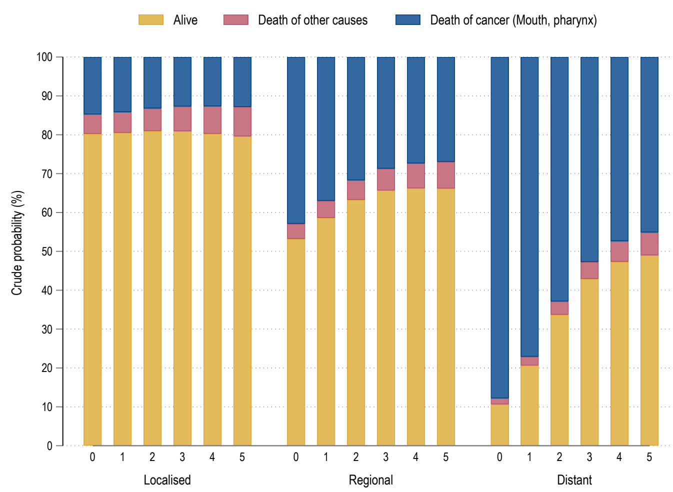


Figure 1.2: Mouth, pharynx: life expectancy and life-years lost

Figure 1.2–A: Life expectancy by age and stage. Males

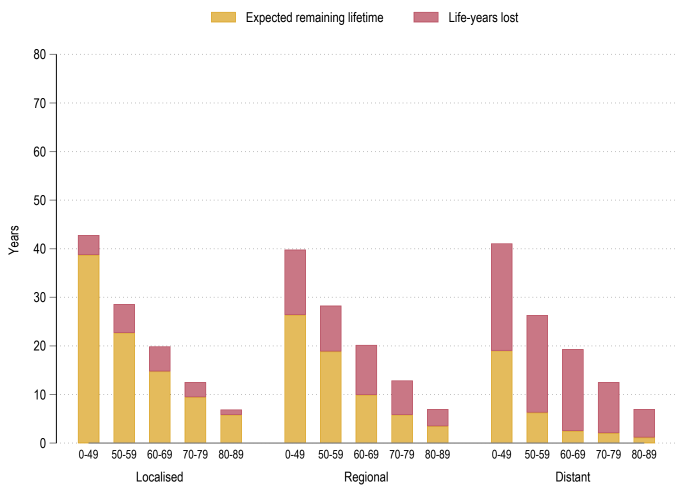


Figure 1.2–B: Life expectancy by age and stage. Females

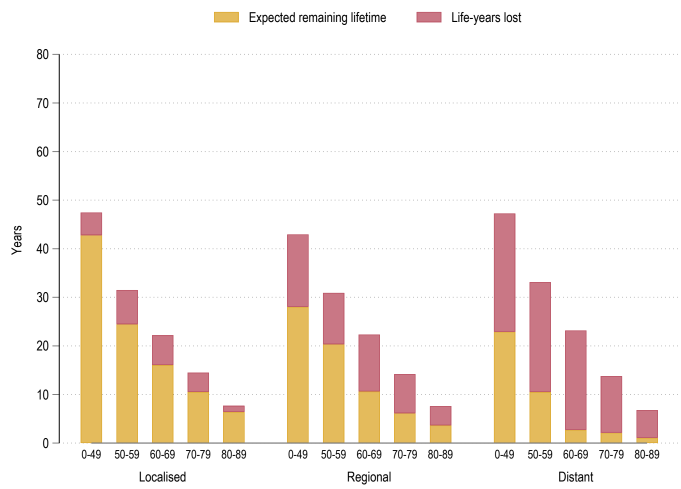


Figure 1.2–C: Proportion of life-years lost. Males

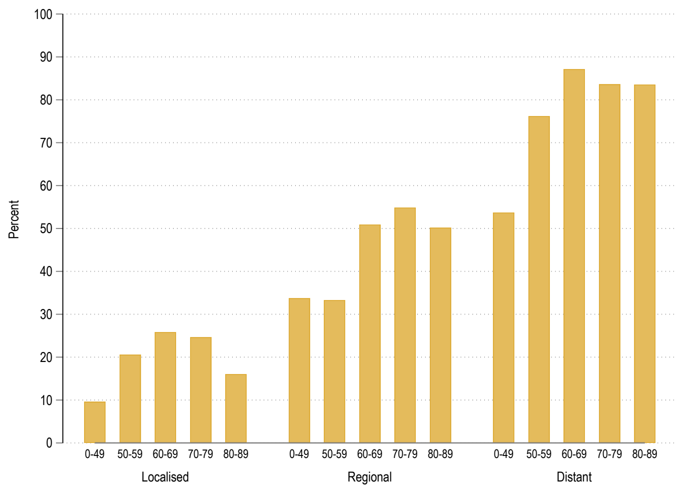


Figure 1.2–D: Proportion of life-years lost. Females

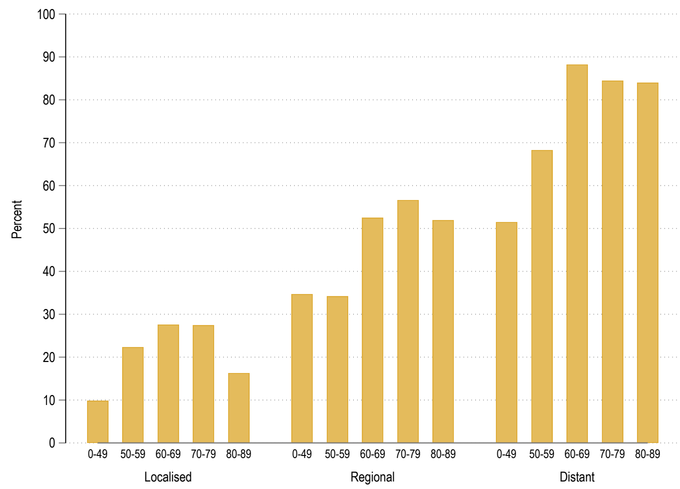


Figure 1.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Males

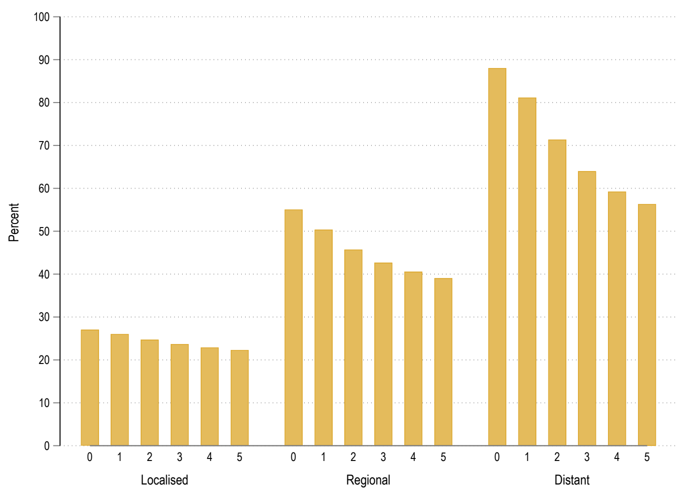


Figure 1.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Females

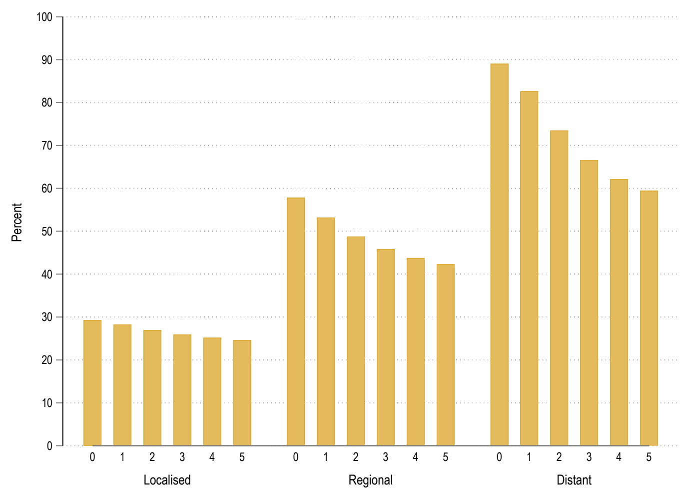


Figure 1.3: Mouth, pharynx: trends

Figure 1.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

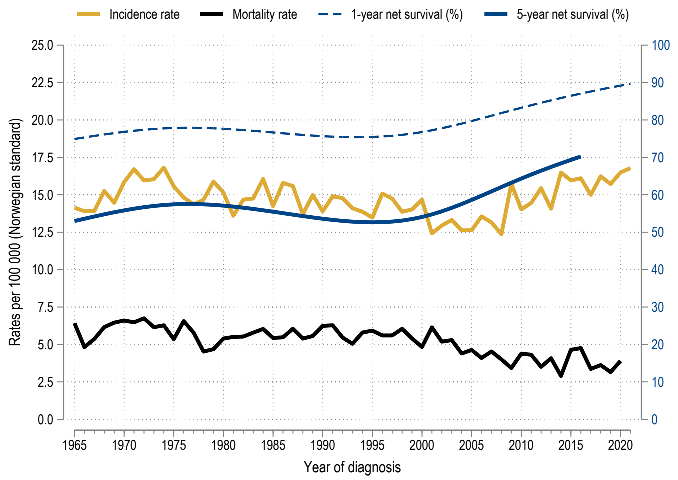


Figure 1.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

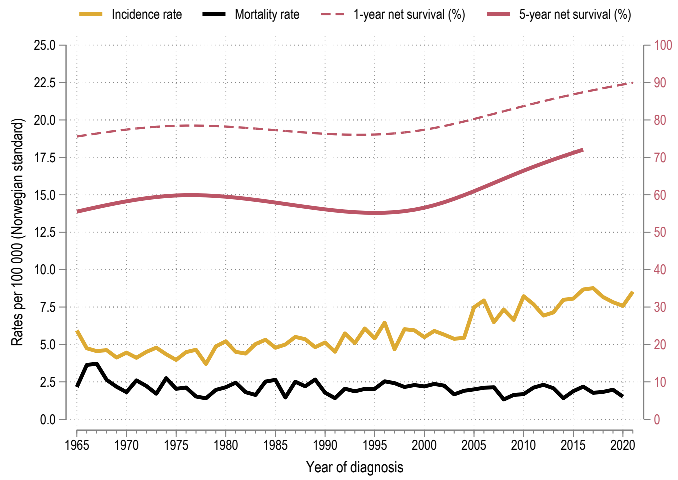


Figure 1.3–C: Trends in reference adjusted all-cause survival

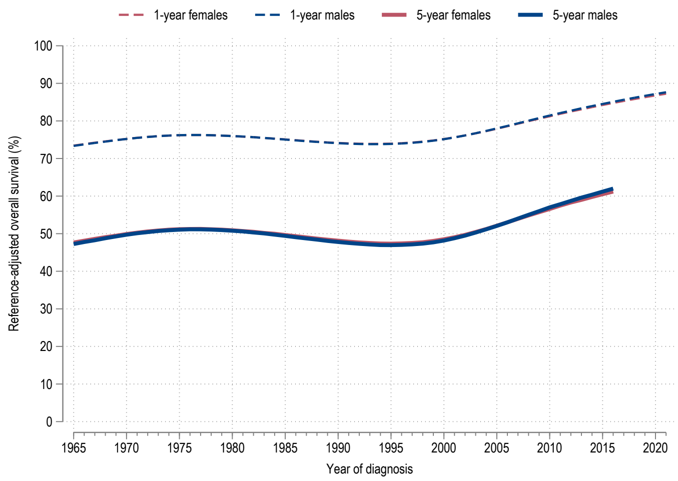


Figure 1.3–D: Trends in reference adjusted crude probability of cancer death

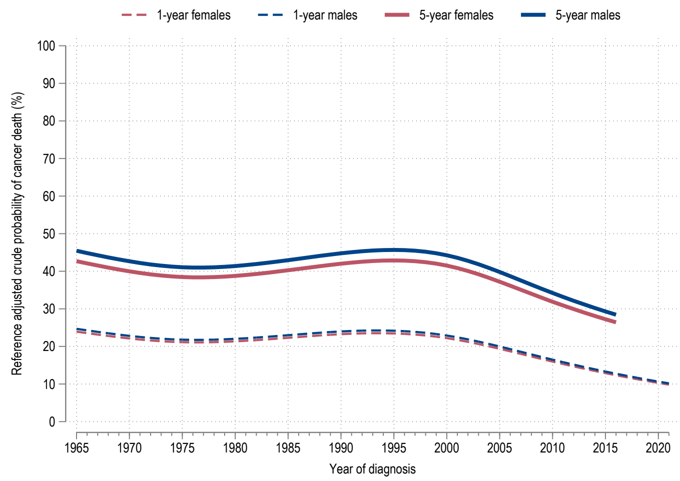


Figure 1.3–E: Trends in reference adjusted life-years lost

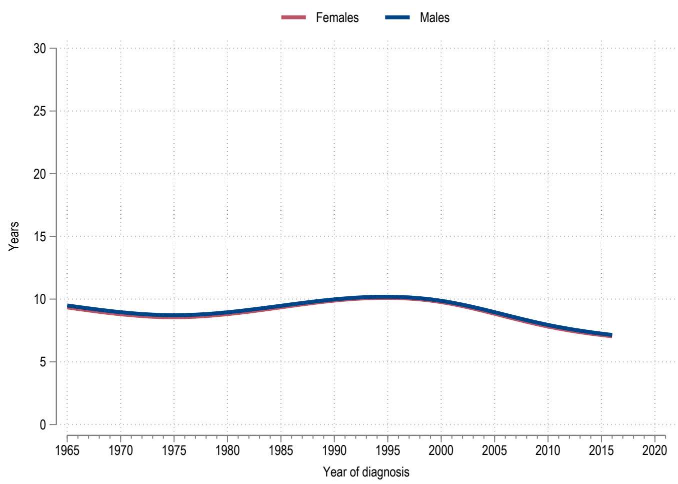
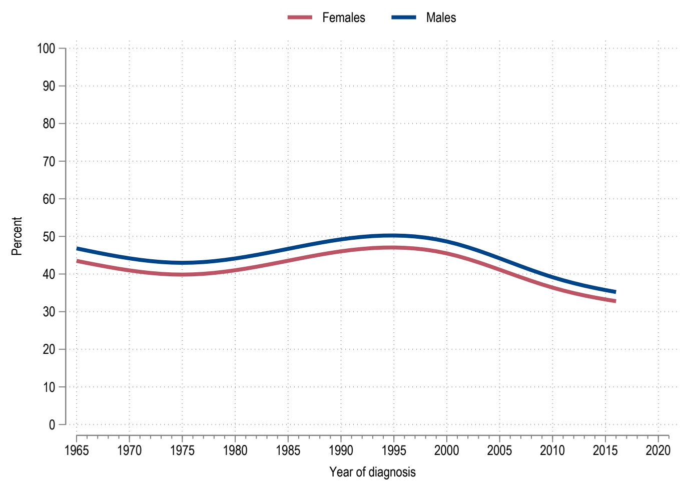


Figure 1.3–F: Trends in reference adjusted life-years lost (%)



Oesophagus

2.1 Net survival and crude probabilities

Net survival among oesophageal cancer patients declines sharply the first years after diagnosis, and the five year net survival estimate equals 23.3 %. After five years the net survival levels off, with a tendency of reaching a plateau, with ten year net survival equal to 18.8 % for both sexes combined (Figure 2.1–A). Women have a higher net survival compared to men.

The probability of surviving five years is 21 % (Figure 2.1–B). This is quite similar to the net survival estimate, reflecting the fact that most oesophageal cancer patients dying the first five years after diagnosis are dying from their cancer.

Crude probabilities of oesophageal cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 2.1–D and 2.1–C). The probability of dying from localised and regional oesophageal cancer also depends on age with poorer survival in the oldest patients. In women with localised cancer, the five year crude probability of death due to oesophageal cancer is 57.2 % at ages 80–89, while the corresponding probability is 27.1 % at ages 0-49. In contrast, among patients with distant metastases at diagnosis, where the risk of death due to cancer is very high, the age gradient is small.

Having survived oesophageal cancer for one, two or up to five years after diagnosis, has a considerable impact on your survival the coming five years (Figures 2.1–F and 2.1–E). This is true for all stages, and the longer time since diagnosis, the more similar future survival is across stages. When interpreting these results, one should bear in mind that very few patients with distant oesophageal cancer will survive up to five years after diagnosis.

2.2 Life expectancy and life-years lost

The high risk of oesophageal cancer death leads to a considerable loss in life-years in all age groups and for all stages, with larger losses if diagnosed with more advanced stage (Figures 2.2–B and 2.2–A). The proportion of life-years lost due to cancer increases with age for patients diagnosed with localised or regional cancer, whereas there are no such age gradient for distant oesophageal cancer (Figures 2.2–D and 2.2–C).

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 2.2–F and 2.2–E). However, this proportion does not approach zero for any of the stages, reflecting the fact that a median aged patient surviving five years after diagnosis, still have a non-negligible risk of dying from oesophageal cancer.

2.3 Time trends

Net survival of oesophageal cancer was stable at a low level for many years, but increased in the last two decades (Figures 2.3–B and 2.3–A). Correspondingly, the all-cause survival has increased and the crude probability of dying from esophageal cancer has declined over the past two decades (Figures 2.3–C and 2.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining the most recent years (Figures 2.3–E and 2.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 15.8 years in 1965 and expected to be 12.4 years in 2016. Correspondingly, the proportion of life-years lost due to oesophageal cancer has decreased from 92.2 % in 1965 to an expected 72.2 % in 2016, when averaging across all ages and stage at diagnosis.

Figure 2.1: Oesophagus: net and crude probabilities

Figure 2.1–A: Net survival 0–10 years

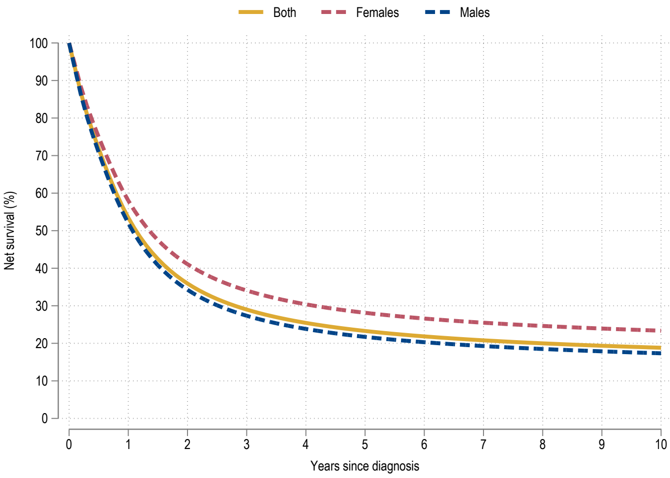


Figure 2.1–B: Crude probabilities 0–10 years

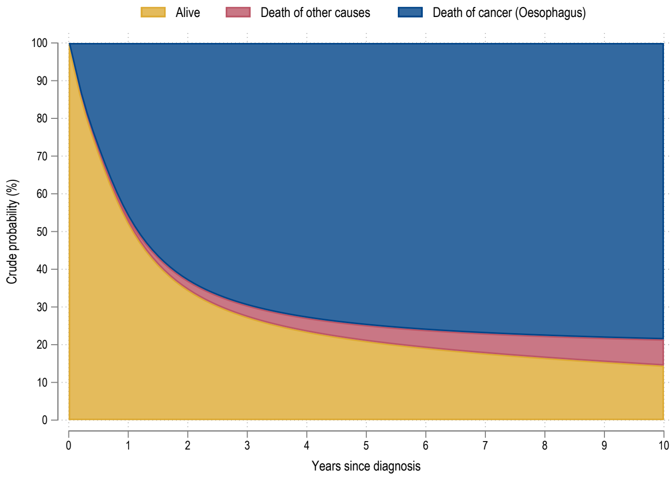


Figure 2.1–C: 5-year crude probabilities by age and stage. Males

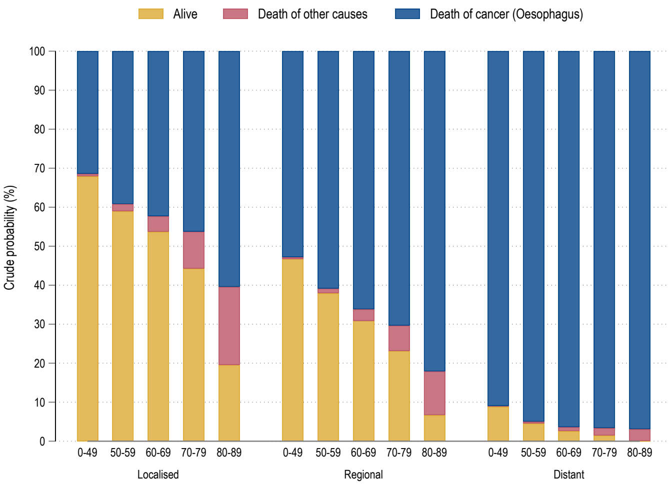


Figure 2.1–D: 5-year crude probabilities by age and stage. Females

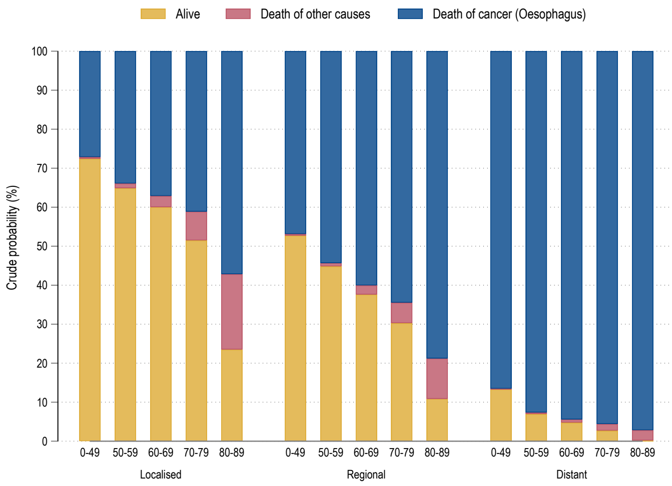


Figure 2.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Males

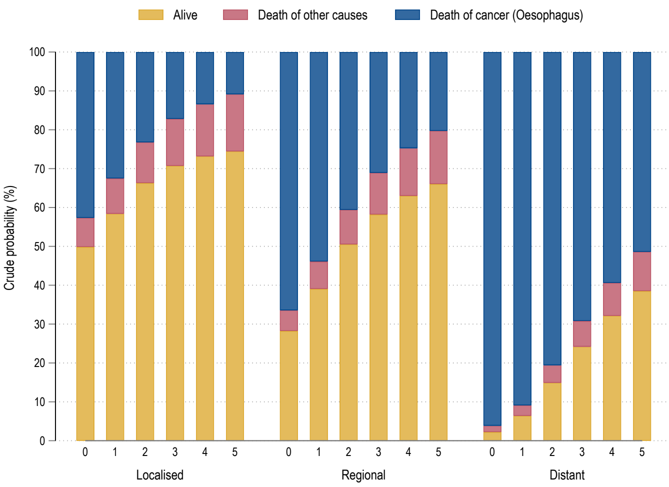
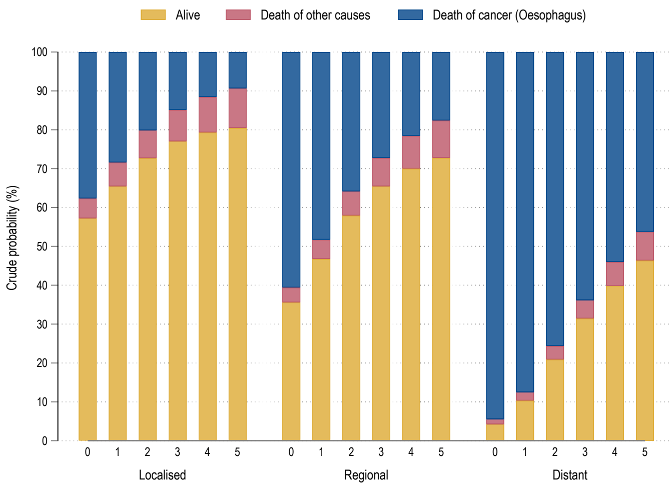


Figure 2.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Females



Oesophagus

Figure 2.2: Oesophagus: life expectancy and life-years lost

Figure 2.2–A: Life expectancy by age and stage. Males

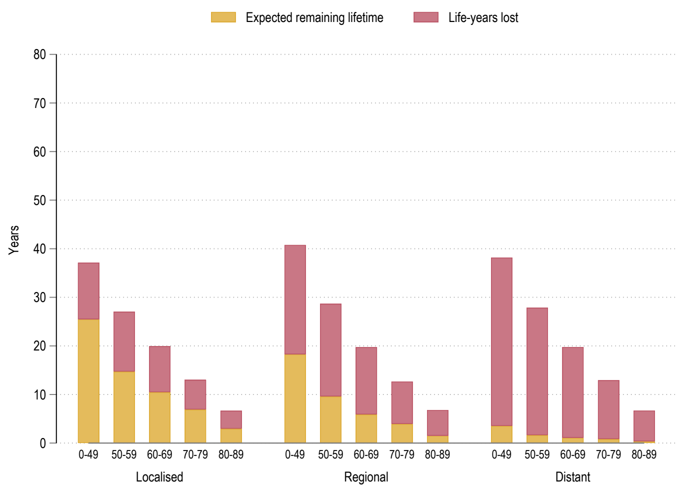


Figure 2.2–B: Life expectancy by age and stage. Females

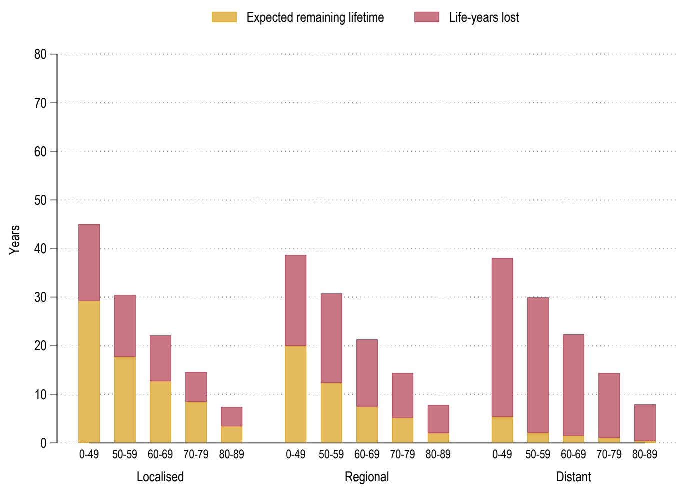


Figure 2.2–C: Proportion of life-years lost. Males

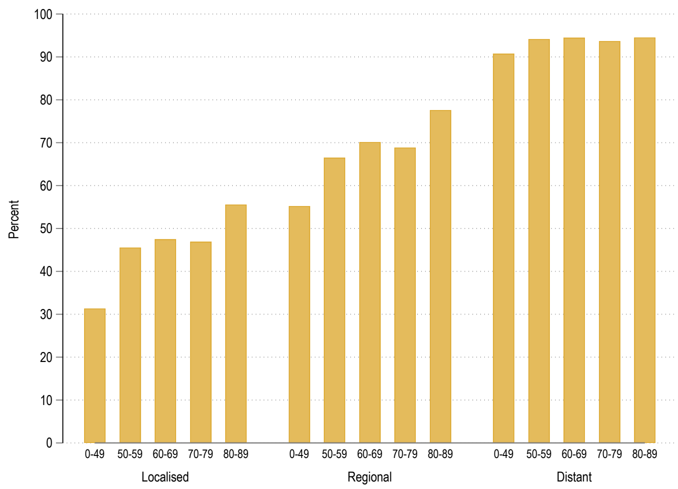


Figure 2.2–D: Proportion of life-years lost. Females

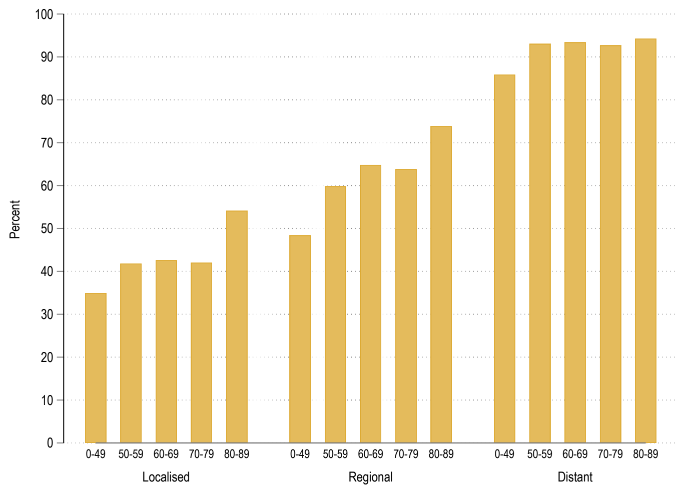


Figure 2.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Males

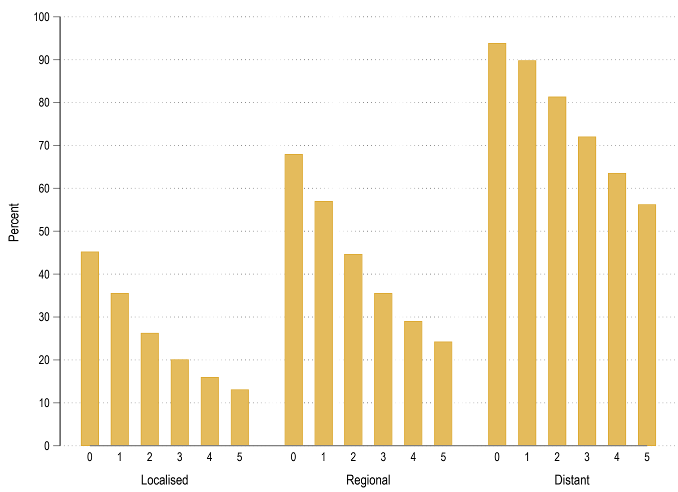


Figure 2.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Females

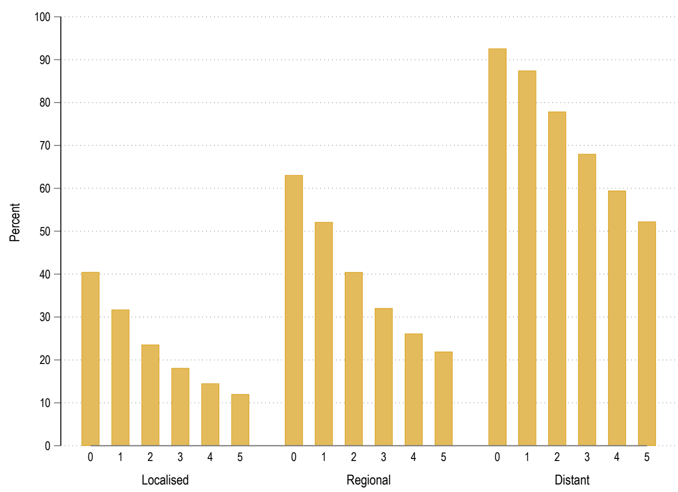


Figure 2.3: Oesophagus: trends

Figure 2.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

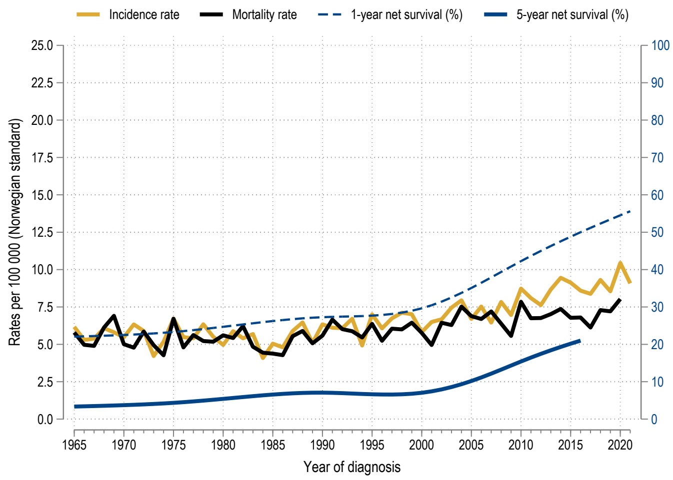


Figure 2.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

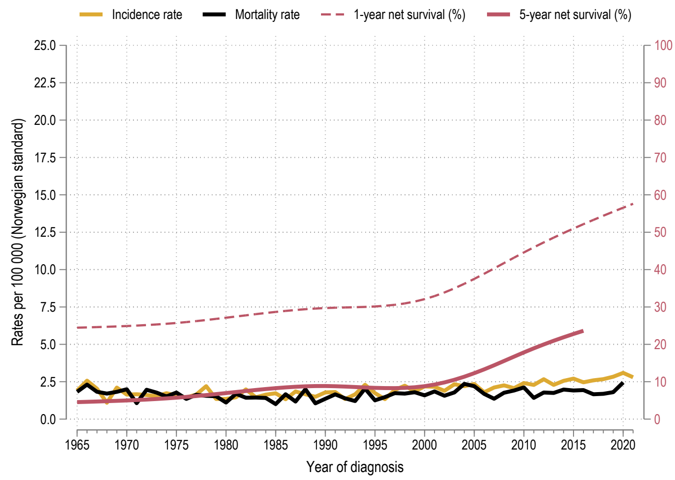


Figure 2.3–C: Trends in reference adjusted all-cause survival

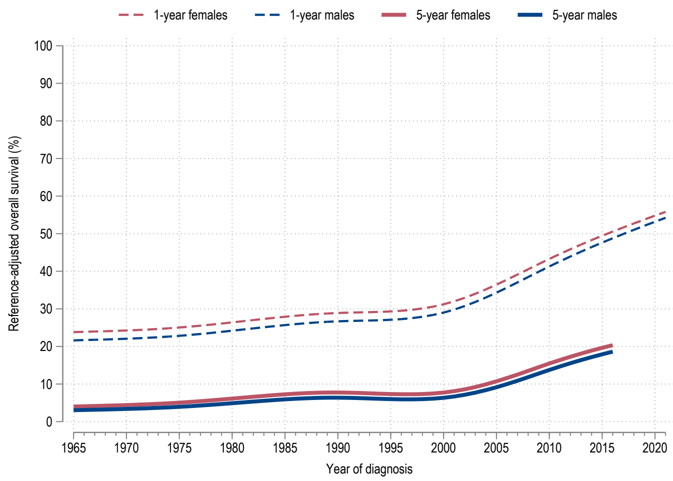


Figure 2.3–D: Trends in reference adjusted crude probability of cancer death

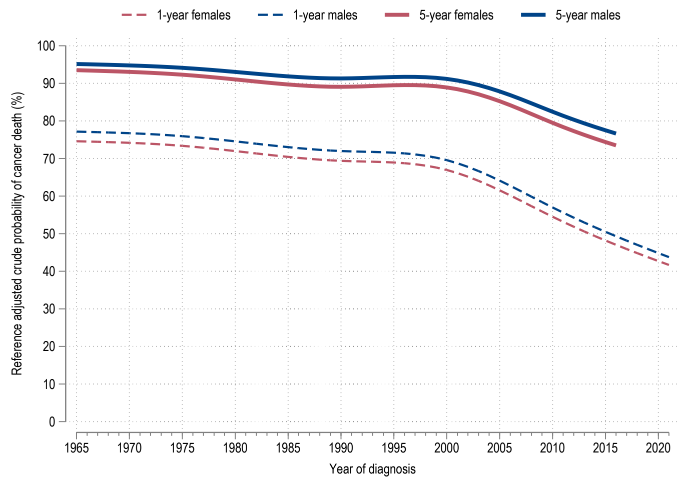


Figure 2.3–E: Trends in reference adjusted life-years lost

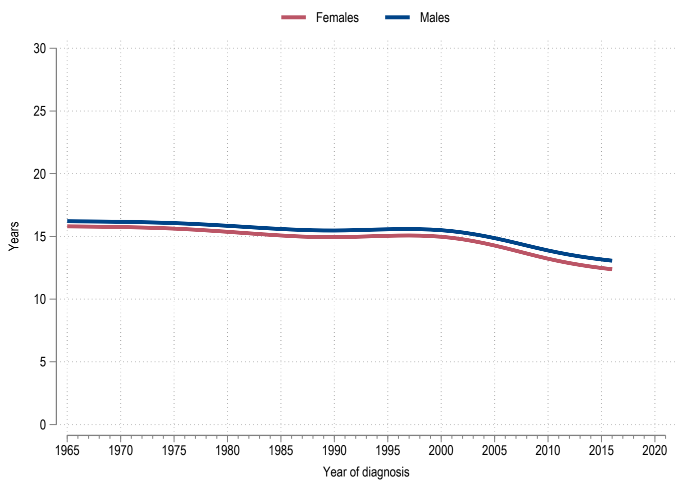
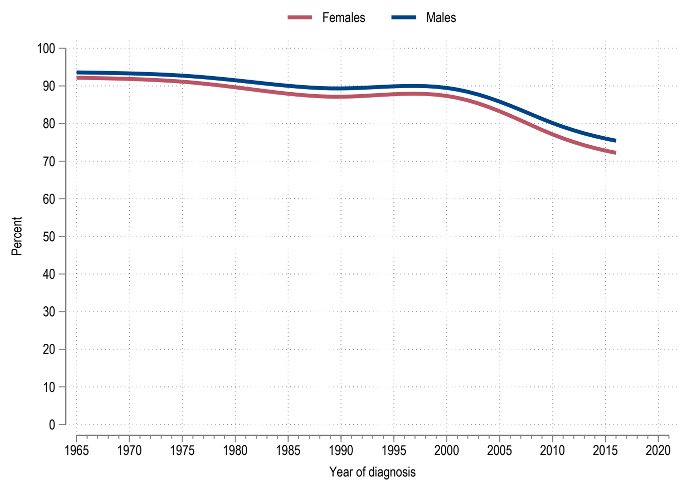


Figure 2.3–F: Trends in reference adjusted life-years lost (%)



Stomach

3.1 Net survival and crude probabilities

Net survival among stomach cancer patients declines sharply the first three years after diagnosis, and the five year net survival estimate equals 30.5 %. After five years the net survival levels off, with a tendency of reaching a plateau, and the ten year net survival equals 24.7 % for both sexes combined (Figure 3.1–A). There are only small differences between sexes.

The probability of surviving five years is 26.8 % (Figure 3.1–B). This is quite similar to the net survival estimate, reflecting the fact that most stomach cancer patients dying the first five years after diagnosis are dying from their cancer.

Crude probabilities of stomach cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 3.1–D and 3.1–C). However, the probability of dying from localised and regional stomach cancer also depends on age with poorer survival in the oldest patients. In women with localised cancer, the five year crude probability of death due to stomach cancer is 38.3 % at ages 80–89, while the corresponding probability is 5 % at ages 0–49. In contrast, among patients with distant metastases at diagnosis, where the risk of death due to cancer is very high, the age gradient is small.

Having survived a localised stomach cancer for one, two or up to five years after diagnosis, has a considerable impact on your survival the coming five years (Figures 3.1–F and 3.1–E). The same is true for regional and distant stage, but one should bear in mind that very few patients will survive up to five years when diagnosed with distant stomach cancer.

3.2 Life expectancy and life-years lost

The high risk of stomach cancer death leads to a considerable loss in life-years in all age groups and for all stages, with larger losses if diagnosed with an advanced stage (Figures 3.2–B and 3.2–A). The proportion of life-years lost due to cancer is increasing with age for localised stomach cancer. For more advanced stages these proportions are generally high for all ages (Figures 3.2–D and 3.2–C).

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 3.2–F and 3.2–E). However, this proportion does not approach zero for any of the stages, reflecting the fact that a median aged patient surviving five years after diagnosis, still have a considerable risk of dying from stomach cancer. This is especially true for regional and distant stomach cancer.

3.3 Time trends

Net survival of stomach cancer has increased steadily for both sexes (Figures 3.3–B and 3.3–A).Correspondingly, all-cause survival has increased and the crude probability of dying from stomach cancer has declined (Figures 3.3–C and 3.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time. As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 16.9 years in 1965 and expected to be 13.3 years in 2016 (Figure 3.3–E). Correspondingly, the proportion (Figure 3.3–F) of life-years lost due to stomach cancer has decreased from 85.5 % in 1965 to an expected 67.3 % in 2016, when averaging across all ages and stage at diagnosis.

Figure 3.1: Stomach: net and crude probabilities

Figure 3.1–A: Net survival 0–10 years

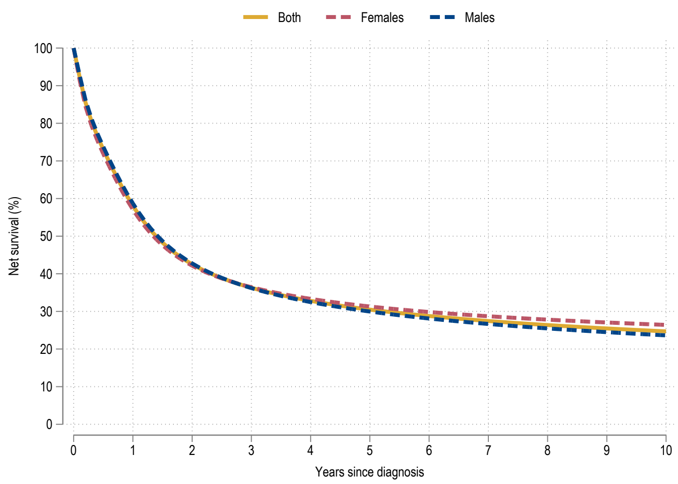


Figure 3.1–B: Crude probabilities 0–10 years

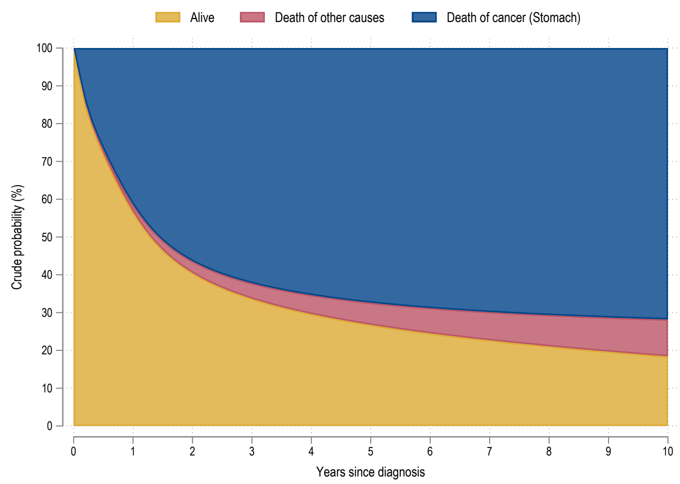


Figure 3.1–C: 5-year crude probabilities by age and stage. Males

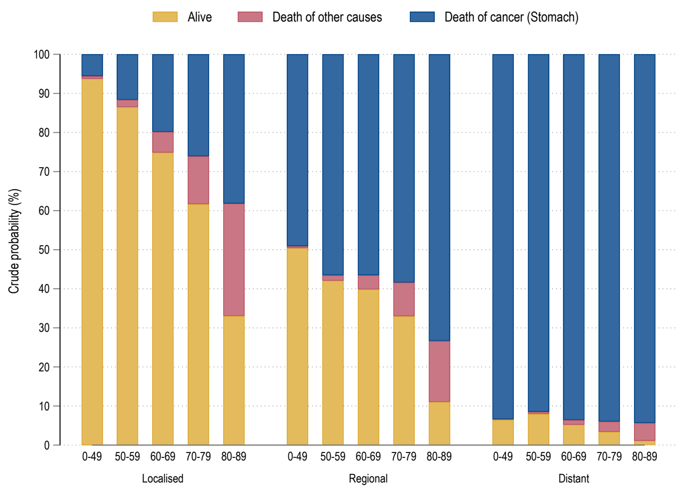


Figure 3.1–D: 5-year crude probabilities by age and stage. Females

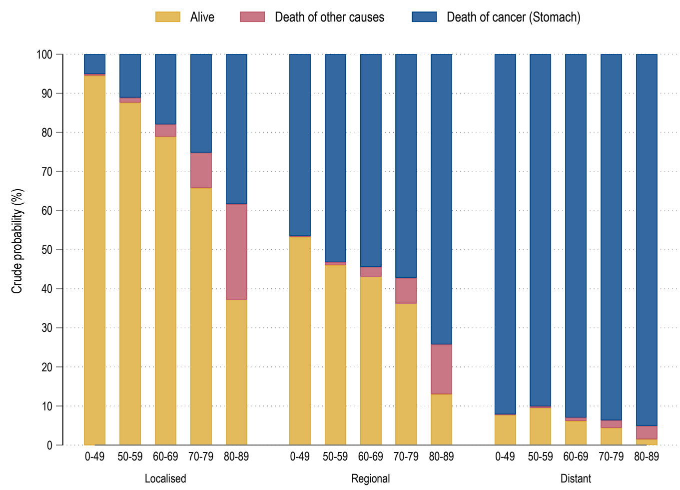


Figure 3.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 72 years at diagnosis (median age). Males

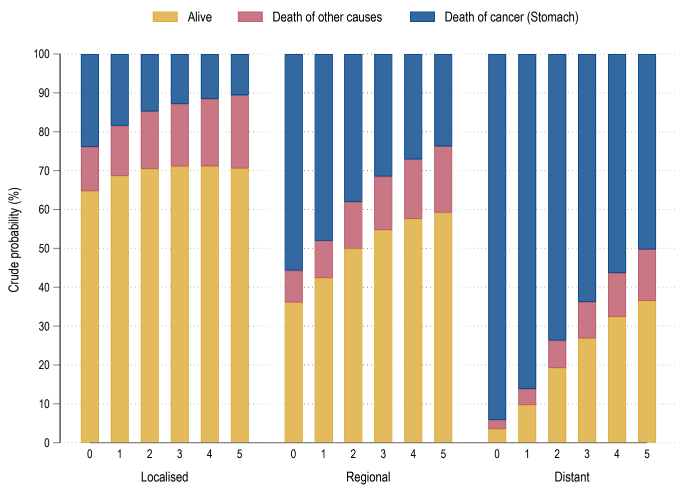
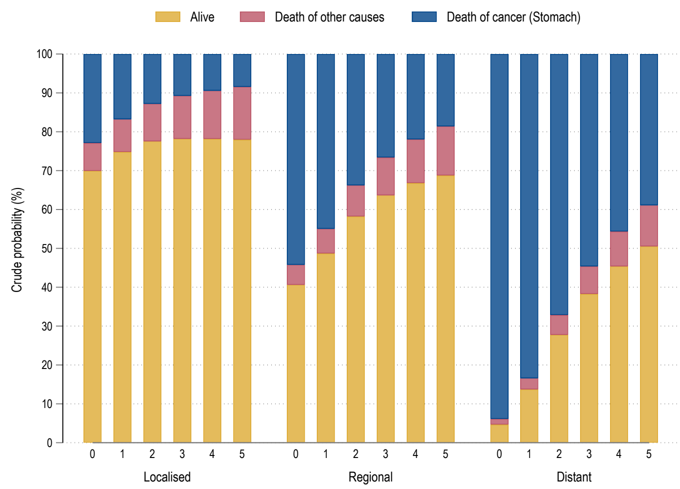


Figure 3.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 72 years at diagnosis (median age). Females



Stomach

Stomach

Figure 3.2: Stomach: life expectancy and life-years lost

Figure 3.2–A: Life expectancy by age and stage. Males

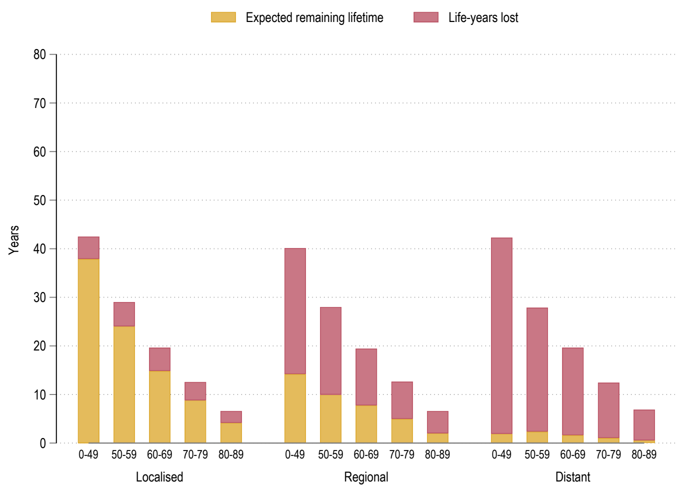


Figure 3.2–B: Life expectancy by age and stage. Females

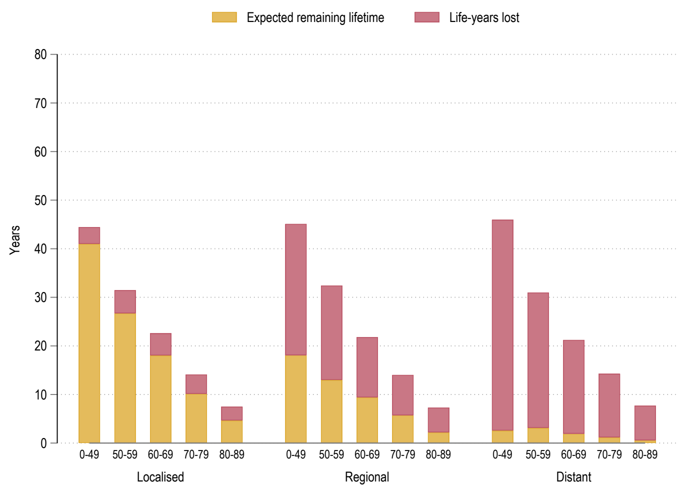


Figure 3.2–C: Proportion of life-years lost. Males

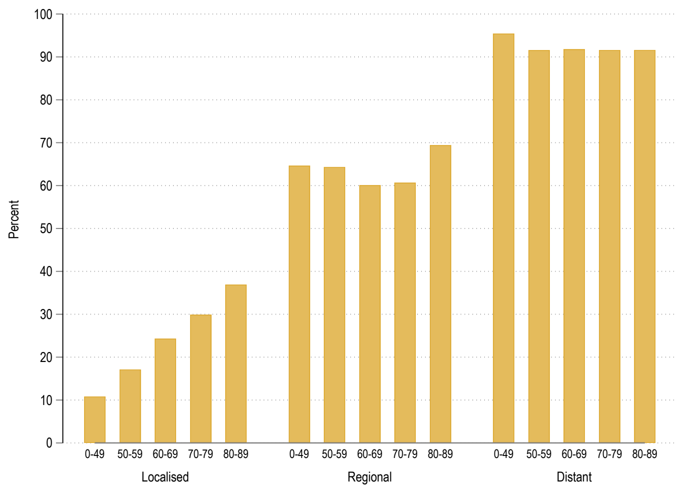


Figure 3.2–D: Proportion of life-years lost. Females

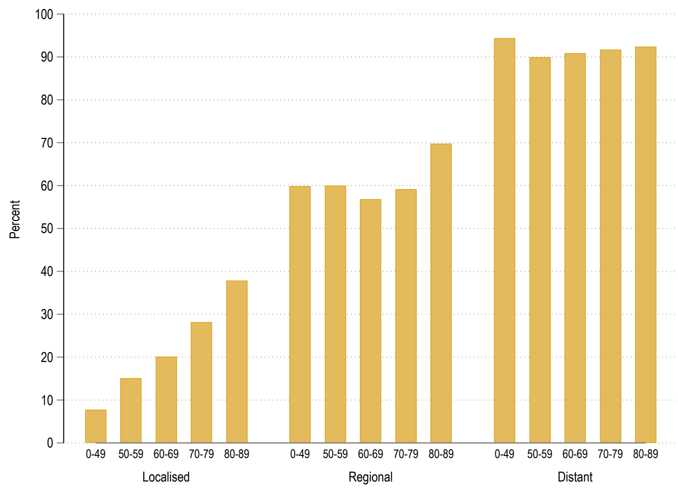


Figure 3.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 72 years at diagnosis (median age). Males

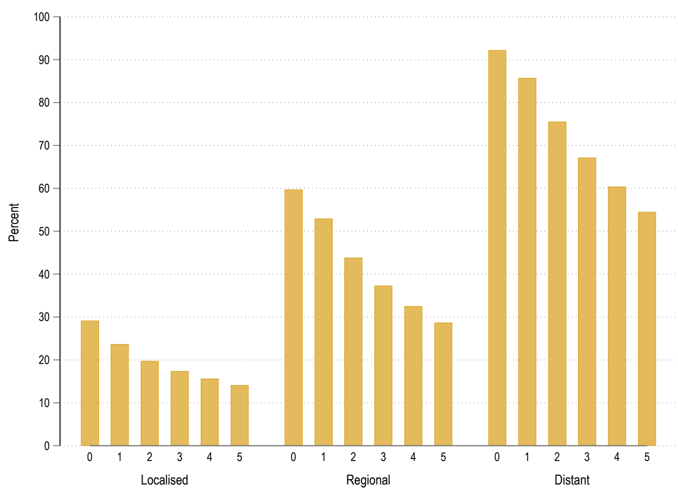


Figure 3.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 72 years at diagnosis (median age). Females

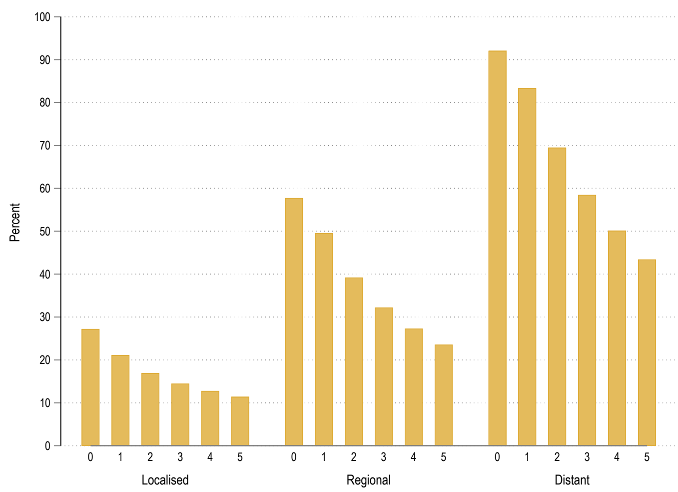


Figure 3.3: Stomach: trends

Figure 3.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

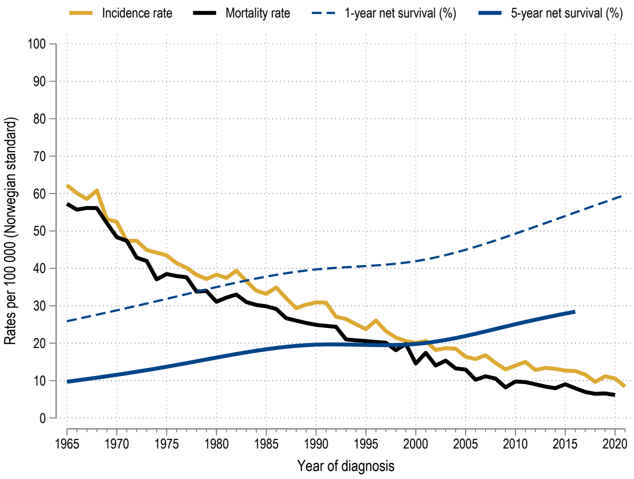


Figure 3.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

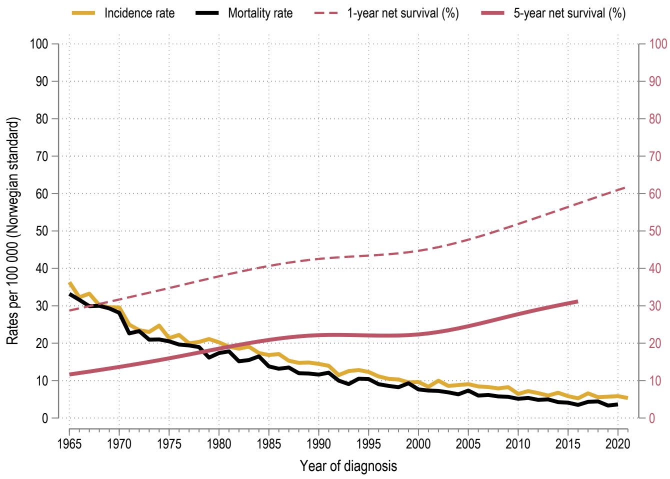


Figure 3.3–C: Trends in reference adjusted all-cause survival

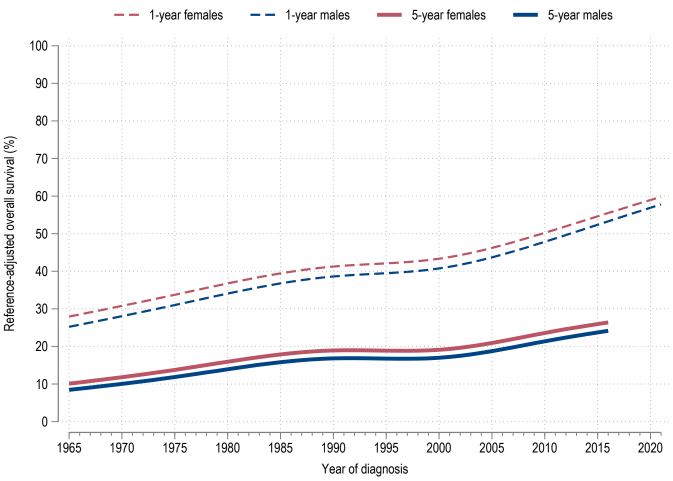


Figure 3.3–D: Trends in reference adjusted crude probability of cancer death

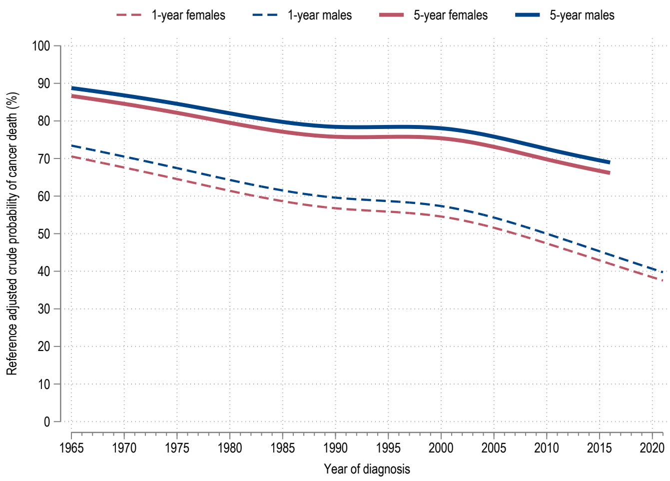


Figure 3.3–E: Trends in reference adjusted life-years lost

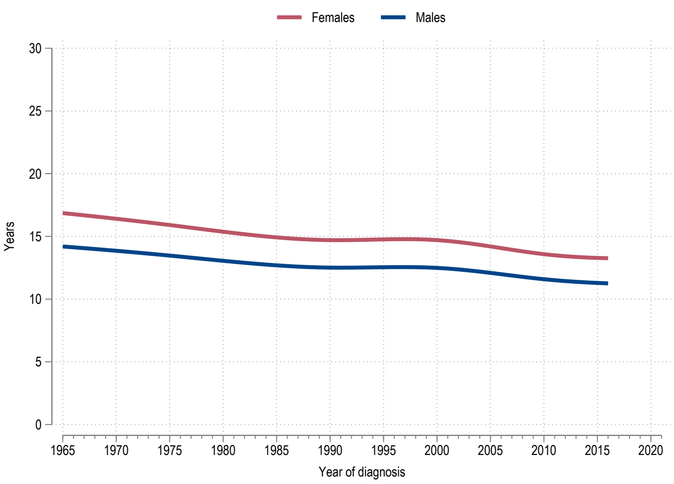
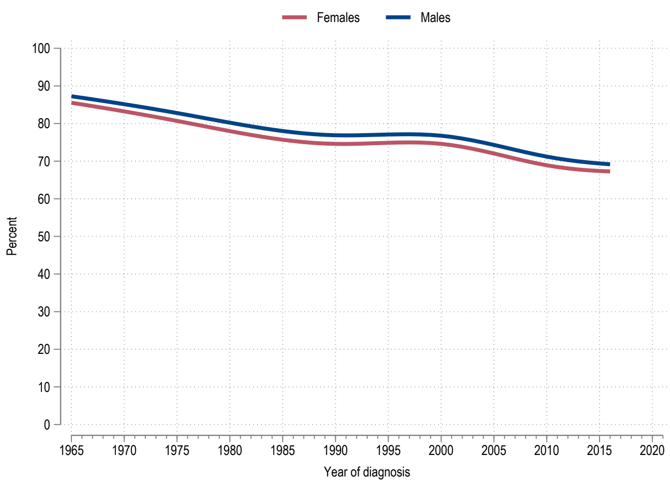


Figure 3.3–F: Trends in reference adjusted life-years lost (%)



Colon

4.1 Net survival and crude probabilities

Net survival among colon cancer patients declines the first years after diagnosis with a five year net survival estimate of 69.3 %. After five years the net survival levels off, reaching a plateau, with ten year net survival equal to 64.3 % for both sexes combined (Figure 4.1–A). There are only small differences between sexes, with women having a marginally higher net survival the first ten years after diagnosis compared to men.

The probability of surviving five years after diagnosis is 58.8 % (Figure 4.1–B). The probability of dying from colon cancer within five years is 29.5 % and the additional probability of dying from other causes is 11.7 %. In comparison to net survival, the crude probability of dying from cancer is markedly lower since patients may also die from other causes.

Crude probabilities of colon cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 4.1–D and 4.1–C). However, the probability of dying from colon cancer also, to some extent, depends on age with poorer survival in the oldest age groups. In women with localised cancer, the five year crude probability of death due to colon cancer is 8.1 % at ages 80–89, while the corresponding probability is 1.5 % at ages 0–49 (Figure 4.1–D). Among patients with distant metastases at diagnosis, where the risk of dying from colon cancer is higher, the age gradient is larger.

Having survived a localised colon cancer for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 4.1–F and 4.1–E). However, if distant metastases were present at the time of diagnosis the prognosis will strongly depend on how long you have survived since diagnosis. For a median aged female colon cancer patient with distant metastases at the time of diagnosis, the five year risk of dying from colon cancer is 80.3 %. If surviving five years from diagnosis the future five year risk of dying from colon cancer is reduced to 29.3 %. The longer a patient survives the more similar future survival becomes across stages.

4.2 Life expectancy and life-years lost

The differences in prognosis across stages of colon cancer leads to differences in life-years lost. Patients with localised colon cancer lose few of their remaining life-years, whereas patients with distant colon cancer lose many life-years (Figures 4.2–B and 4.2–A). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. The proportion of life-years lost are similar across ages for localised and regional colon cancer, but increasing with age for distant colon cancer (Figures 4.2–D and 4.2–C). These plots also shows the large difference in prognosis across stages, with patients with distant colon cancer losing a much larger proportion of their remaining lifetime compared to regional and localised colon cancer.

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 4.2–F and 4.2–E). For localised colon cancer this proportion approaches zero for a median aged patient. For distant colon cancer the proportion declines a lot, for a median aged women from 79.5 % at diagnosis to 31 % having survived five years after diagnosis.

4.3 Time trends

Net survival of colon cancer has increased steadily over time for both sexes (Figures 4.3–B and 4.3–A). Correspondingly, the all-cause survival has increased and the crude probability of dying from colon cancer has declined (Figures 4.3–C and 4.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time. As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 11.6 years in 1965 and expected to be 5.7 years in 2016 (Figure 4.3–E). Correspondingly, the proportion of life-years lost due to colon cancer has decreased from 65.9 % in 1965 to an expected 32.5 % in 2016, when averaging across all ages and stage at diagnosis (Figure 4.3–F).

Figure 4.1: Colon: net and crude probabilities

Colon

Figure 4.1–A: Net survival 0–10 years

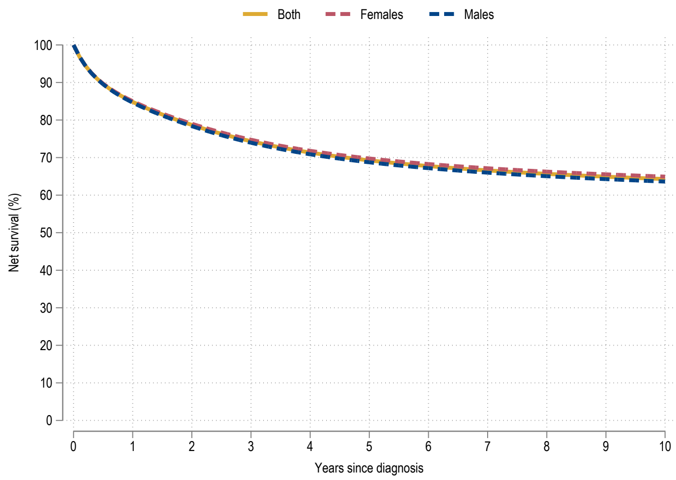


Figure 4.1–B: Crude probabilities 0–10 years

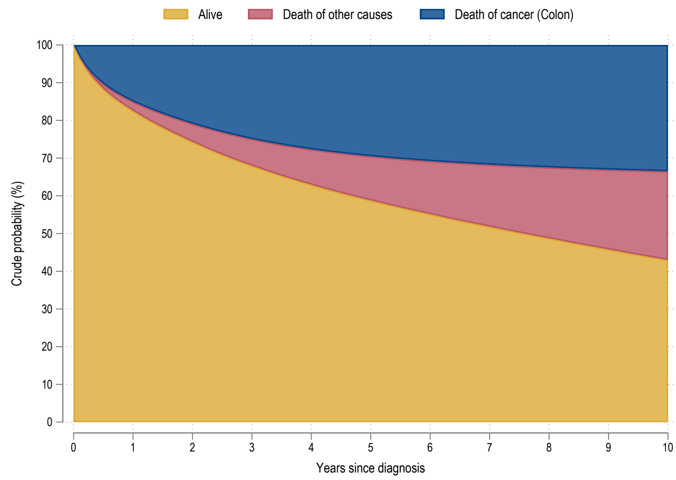


Figure 4.1–C: 5-year crude probabilities by age and stage. Males

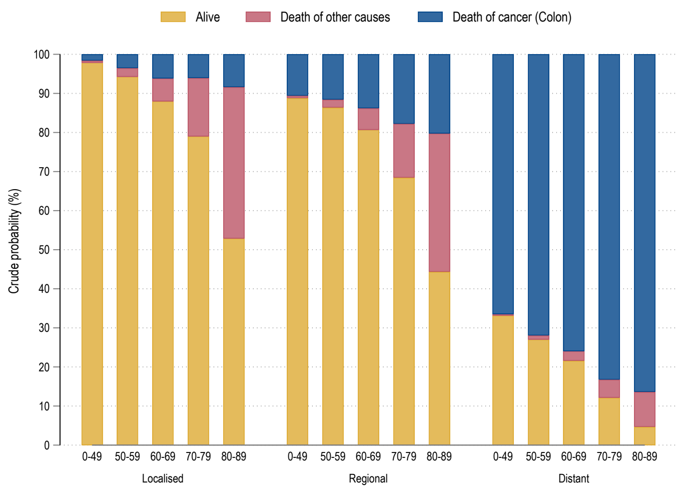


Figure 4.1–D: 5-year crude probabilities by age and stage. Females

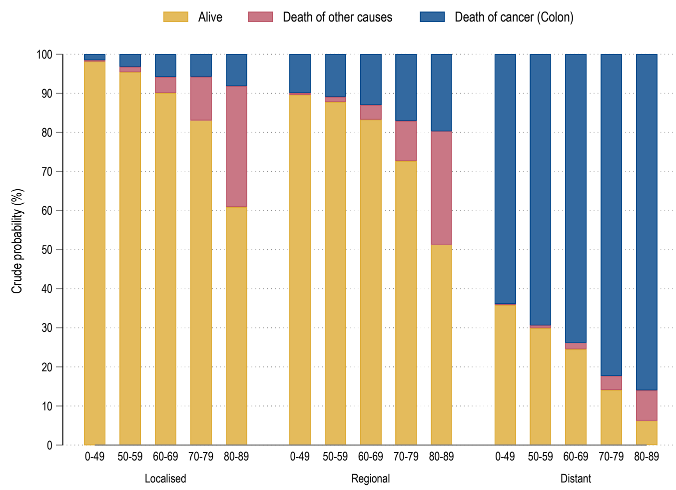


Figure 4.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 73 years at diagnosis (median age). Males

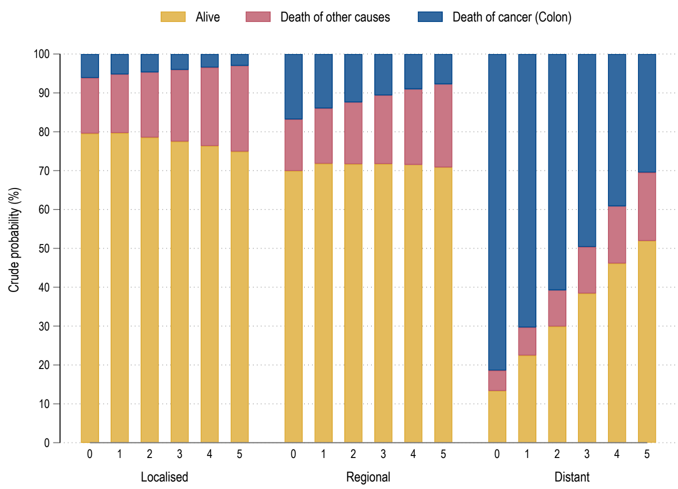
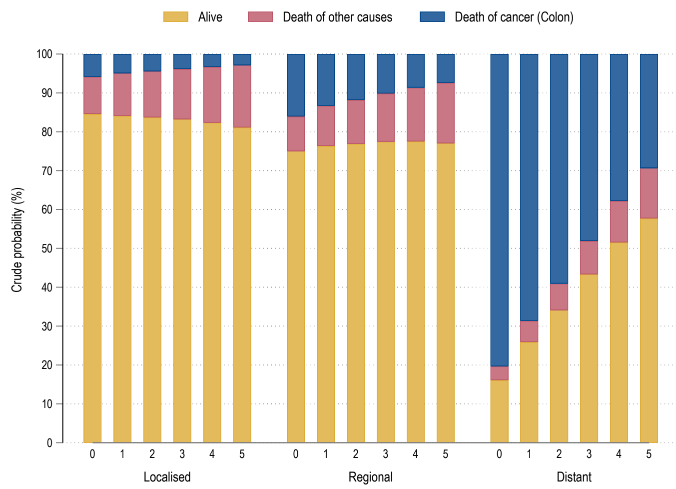


Figure 4.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 73 years at diagnosis (median age). Females



Colon

Figure 4.2: Colon: life expectancy and life-years lost

Figure 4.2–A: Life expectancy by age and stage. Males

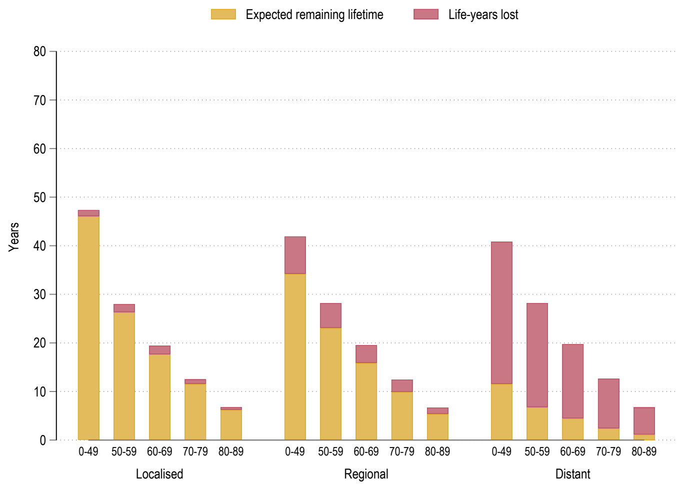


Figure 4.2–B: Life expectancy by age and stage. Females

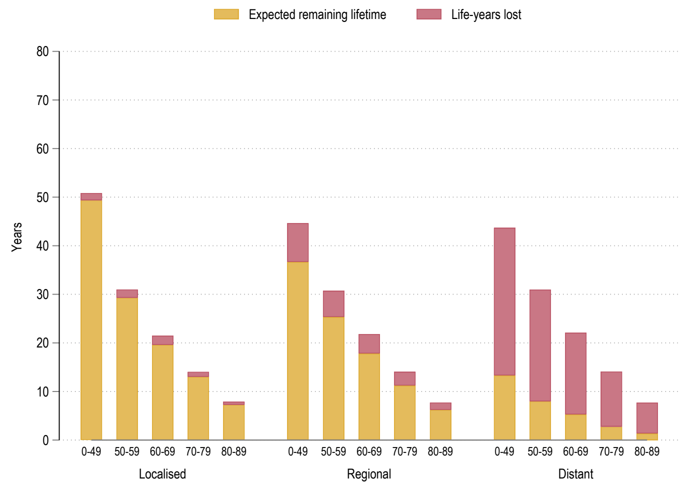


Figure 4.2–C: Proportion of life-years lost. Males

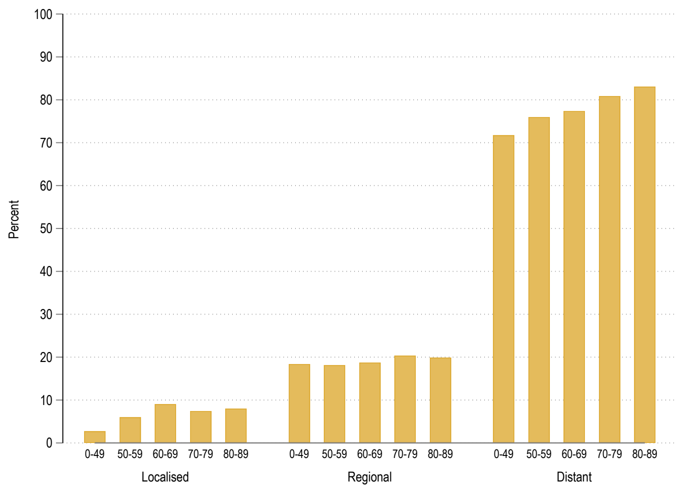


Figure 4.2–D: Proportion of life-years lost. Females

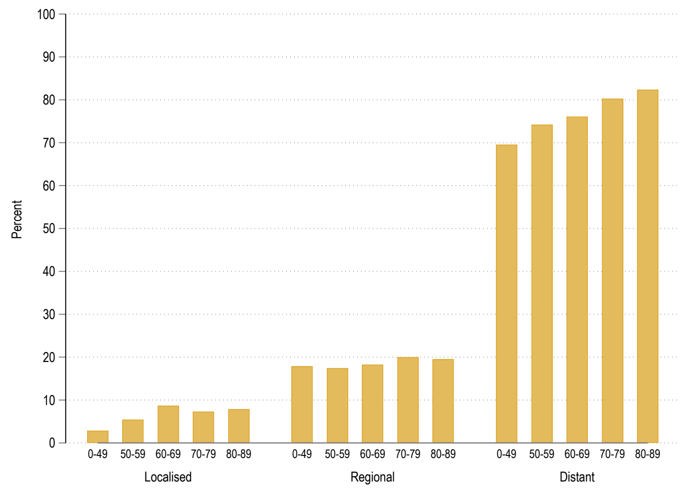


Figure 4.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 73 years at diagnosis (median age). Males

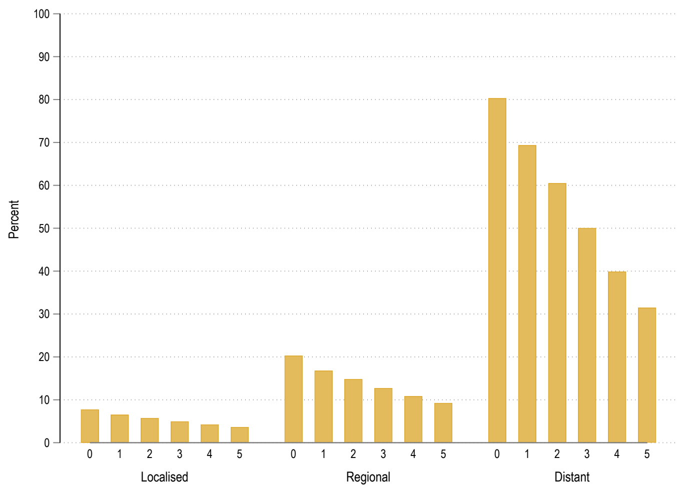


Figure 4.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 73 years at diagnosis (median age). Females

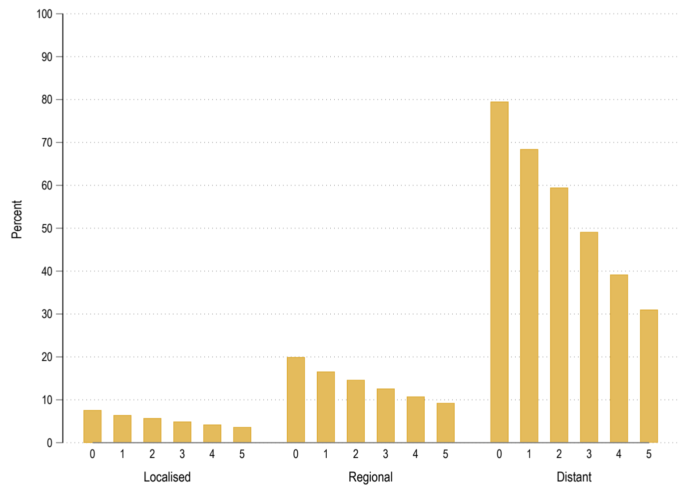


Figure 4.3: Colon: trends

Figure 4.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

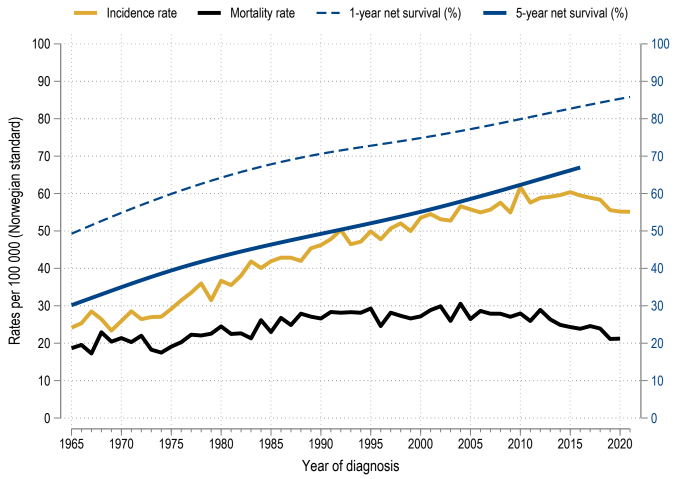


Figure 4.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

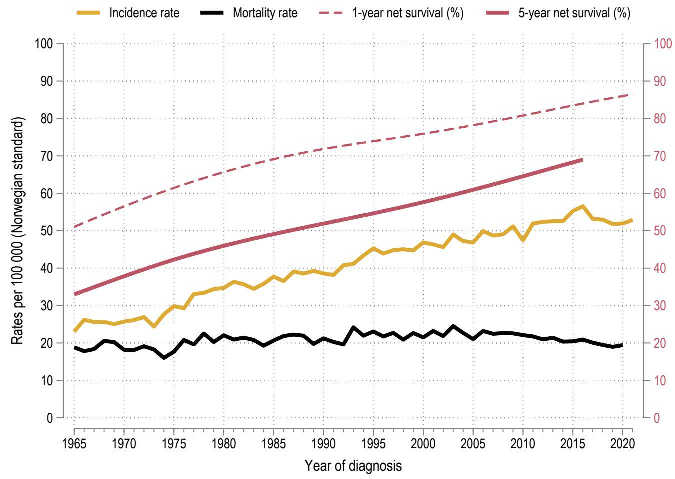


Figure 4.3–C: Trends in reference adjusted all-cause survival

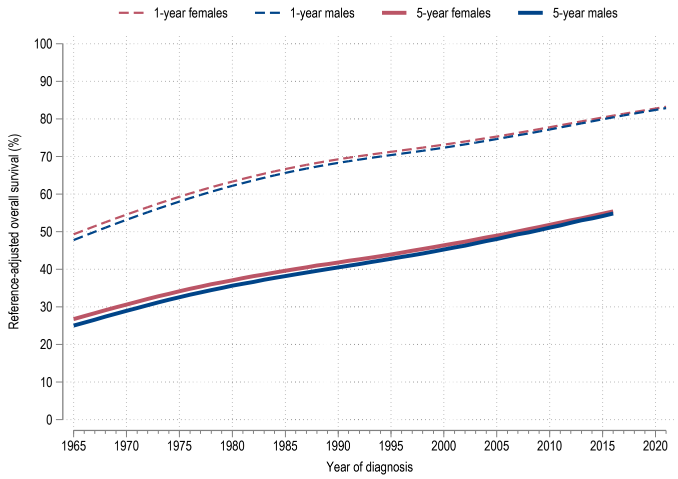


Figure 4.3–D: Trends in reference adjusted crude probability of cancer death

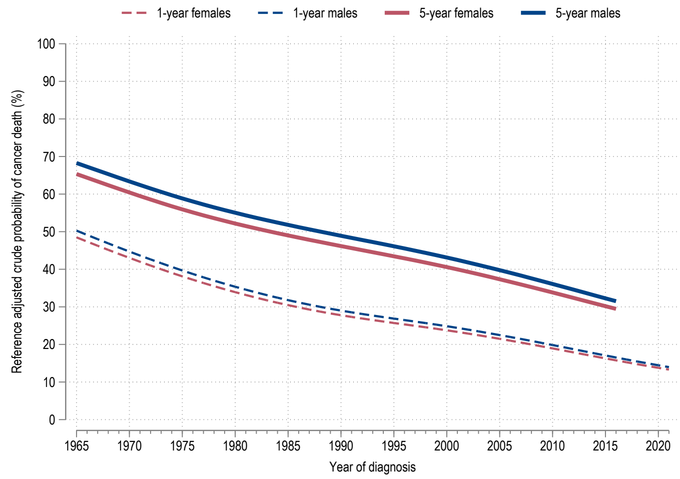


Figure 4.3–E: Trends in reference adjusted life-years lost

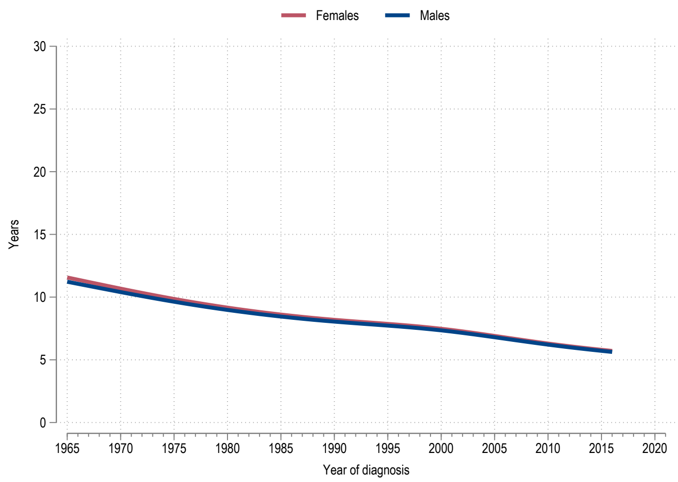
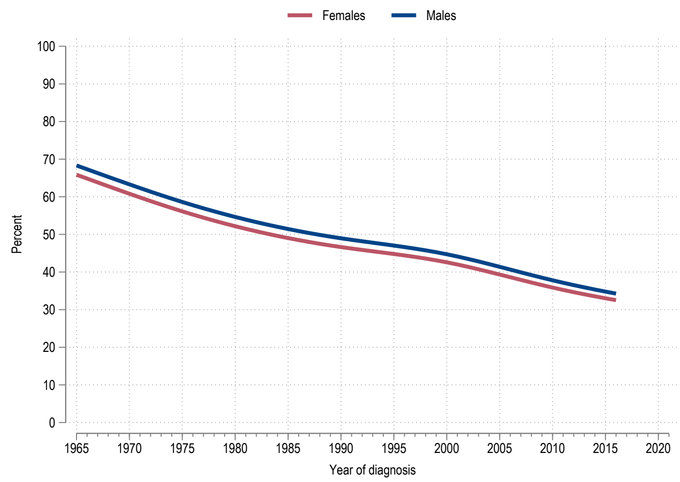


Figure 4.3–F: Trends in reference adjusted life-years lost (%)



Rectum

5.1 Net survival and crude probabilities

Although cancers of the rectosigmoid (ICD10-C19) make up approximately 10 % of these cancers we will refer to the group as a whole as rectum cancers. Net survival among rectum cancer patients declines the first years after diagnosis with a five year net survival estimate of 71.8 %. After five years the net survival declines somewhat with a tendency to level off, with ten year net survival equal to 64.8 % for both sexes combined (Figure 5.1–A). There are almost no differences between sexes.

The probability of surviving five years after diagnosis is 63.6 % (Figure 5.1–B). The probability of dying from rectum cancer within five years is 26.8 % and the additional probability of dying from other causes is 9.6 %. In comparison to net survival, the crude probability of dying from cancer is somewhat lower since patients may also die from other causes.

Crude probabilities of rectum cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 5.1–D and 5.1–C). However, the probability of dying from rectum cancer also, to some extent, depends on age with poorer survival in the oldest age groups. In women with localised cancer, the five year crude probability of death due to rectum cancer is 9 % at ages 80–89, while the corresponding probability is 3.1 % at ages 0–49. In contrast, the five year crude probability of death from rectum cancer, if diagnosed with distant metastases is 84.8 % for the oldest women, and 61.5 % for the youngest women.

Having survived a localised rectum cancer for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 5.1–F and 5.1–E). However, if distant metastases were present at the time of diagnosis the prognosis will strongly depend on how long you have survived since diagnosis. For a median aged, female rectum cancer patient with distant metastases at the time of diagnosis, the five year risk of dying from rectum cancer is 74 %. If surviving five years from diagnosis the future five year risk of dying from rectum cancer is reduced to 32.8 %. The longer a patient survives the more similar future survival becomes across stages, but still patients with distant metastases fare considerably worse compared to localised and regional stage.

5.2 Life expectancy and life-years lost

The differences in prognosis across stages of rectum cancer leads to differences in life-years lost. Patients with localised rectum cancer lose few of their remaining life-years, whereas patients with distant rectum cancer lose many life-years (Figures 5.2–B and 5.2–A). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. The proportions of life-years lost are similar across ages for each stage (Figures 5.2–D and 5.2–C). These plots also shows the large difference in prognosis across stages, with patients with distant rectum cancer losing a much larger proportion of their remaining lifetime compared to regional and localised rectum cancer.

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 5.2–F and 5.2–E). For localised rectum cancer this proportion approaches zero for a median aged patient. For distant rectum cancer the proportion declines a lot, for a median aged women from 75.8 % at diagnosis to 37 % having survived five years after diagnosis.

5.3 Time trends

Net survival of rectal cancer has increased steadily over time for both sexes (Figures 5.3–B and 5.3–A). Correspondingly, the all-cause survival has increased and the crude probability of dying from rectum cancer has declined (Figures 5.3–C and 5.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 5.3–E and 5.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 13.8 years in 1965 and expected to be 5.4 years in 2016. Correspondingly, the proportion of life-years lost due to rectum cancer has decreased from 68.2 % in 1965 to an expected 26.8 % in 2016, when averaging across all ages and stage at diagnosis.

Figure 5.1: Rectum: net and crude probabilities

Figure 5.1–A: Net survival 0–10 years

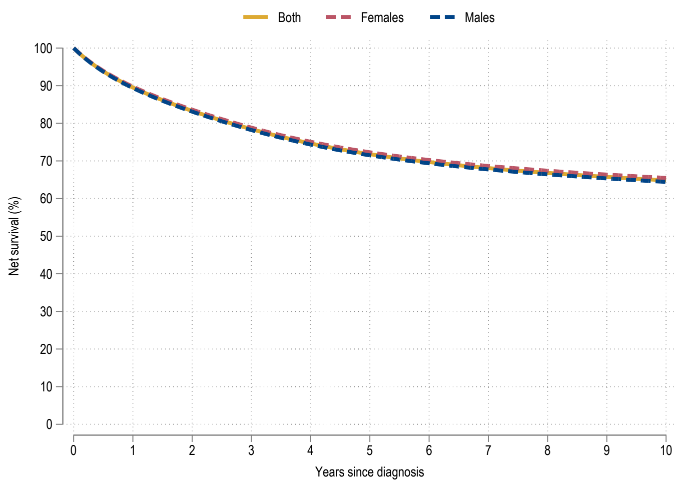


Figure 5.1–B: Crude probabilities 0–10 years

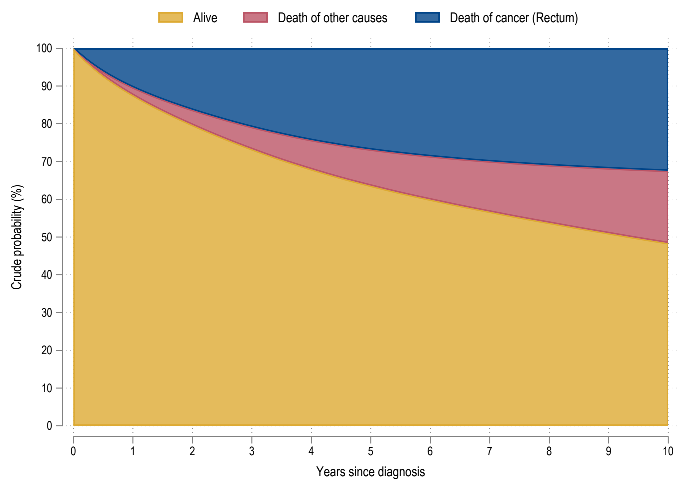


Figure 5.1–C: 5-year crude probabilities by age and stage. Males

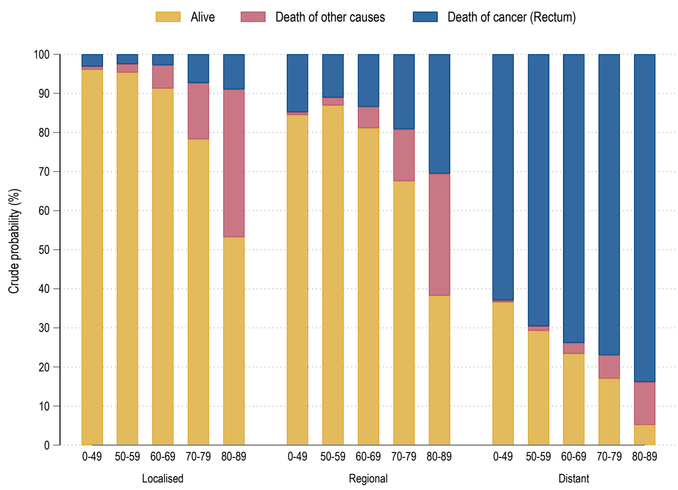


Figure 5.1–D: 5-year crude probabilities by age and stage. Females

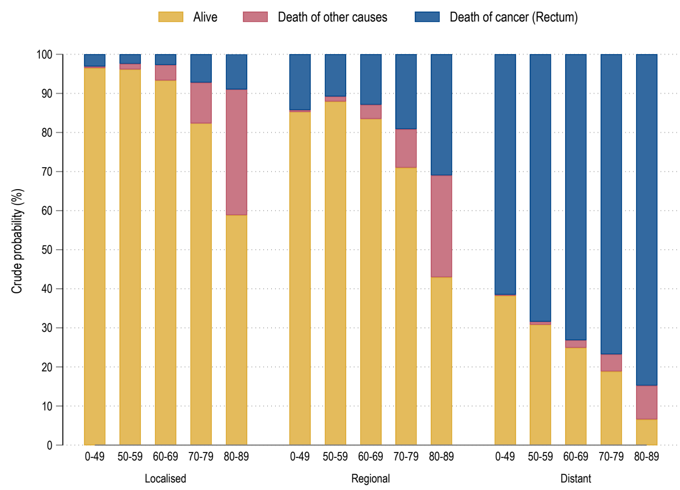


Figure 5.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Males

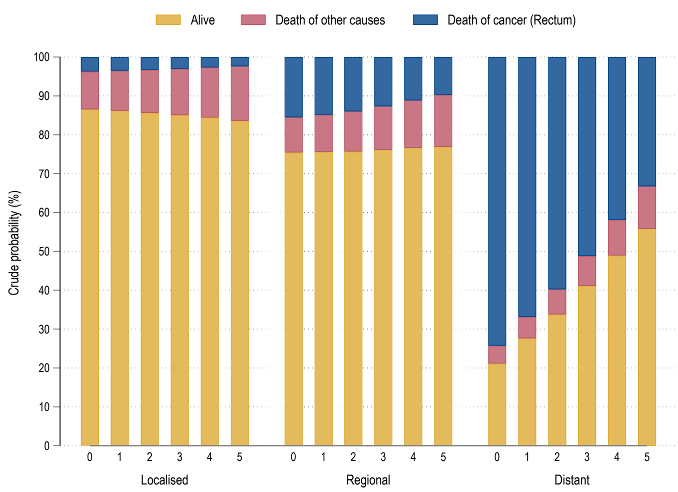


Figure 5.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Females

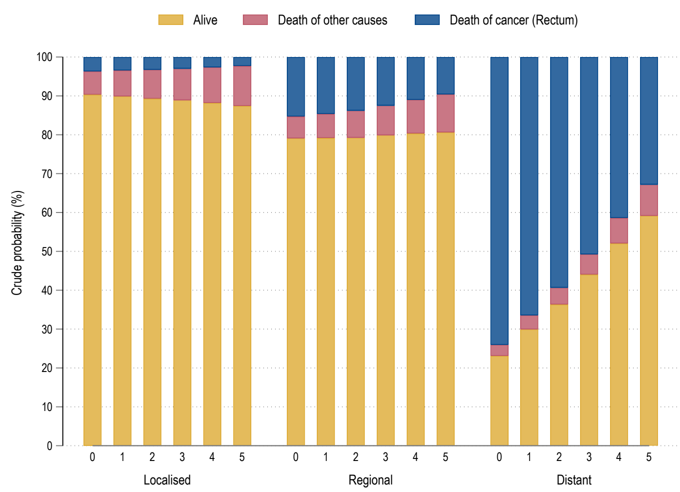


Figure 5.2: Rectum: life expectancy and life-years lost

Figure 5.2–A: Life expectancy by age and stage. Males

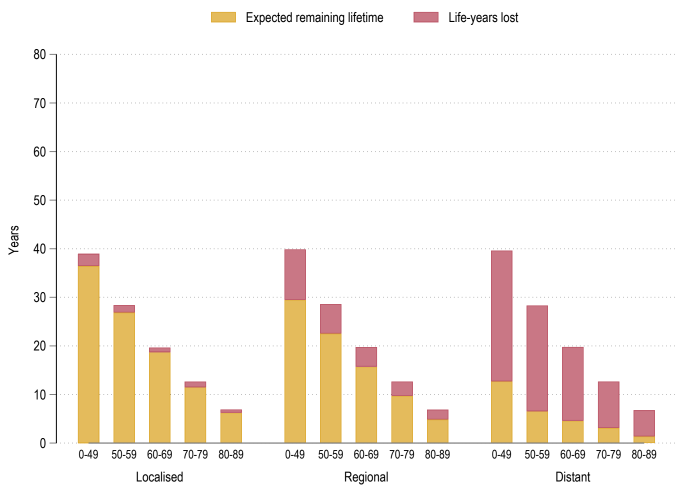


Figure 5.2–B: Life expectancy by age and stage. Females

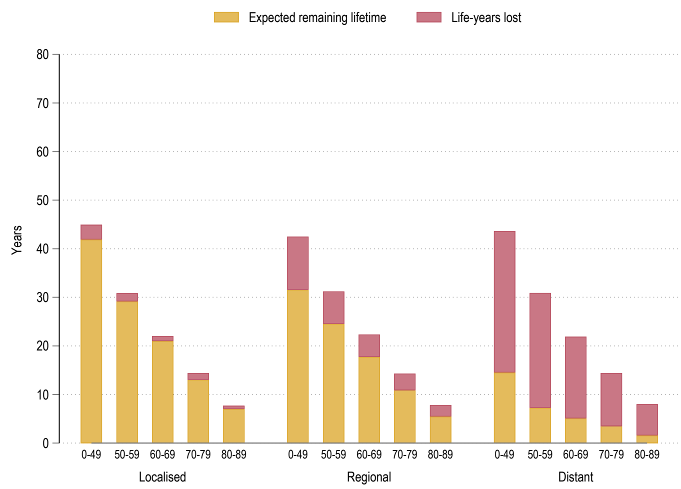


Figure 5.2–C: Proportion of life-years lost. Males

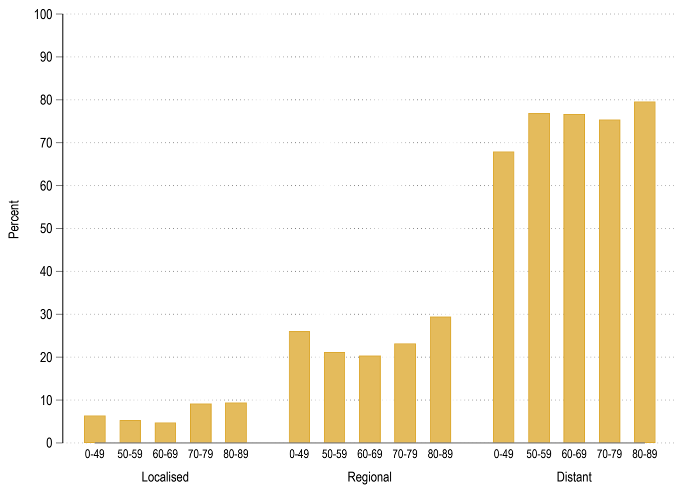


Figure 5.2–D: Proportion of life-years lost. Females

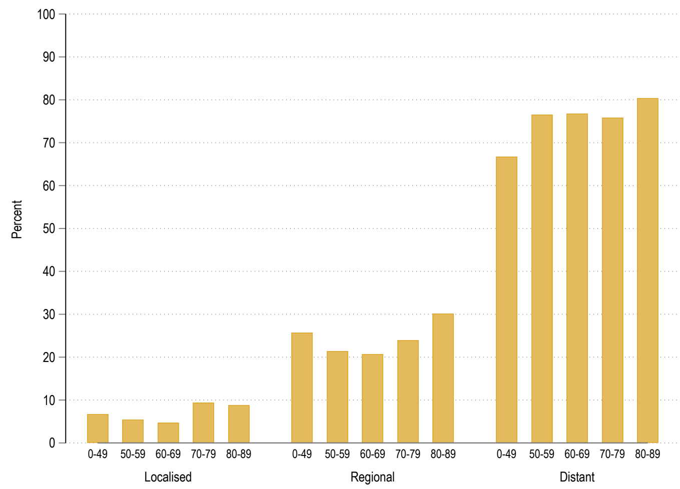


Figure 5.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Males

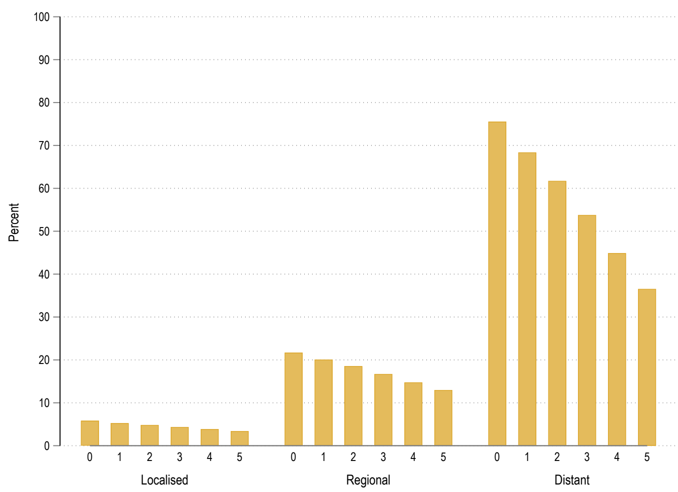
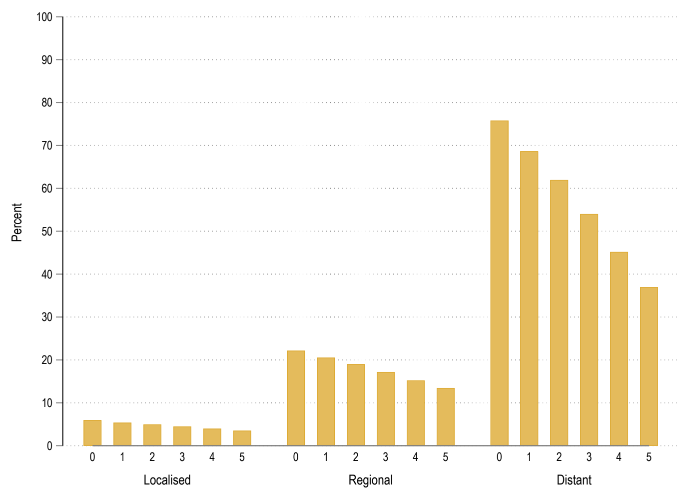


Figure 5.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Females



Rectum

Figure 5.3: Rectum: trends

Figure 5.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

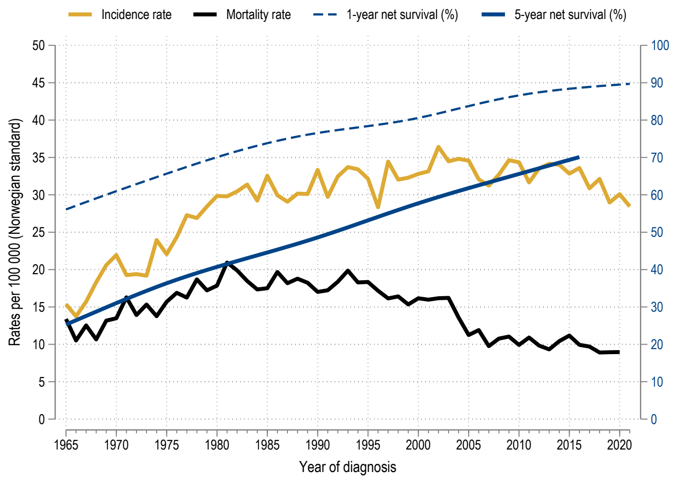


Figure 5.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

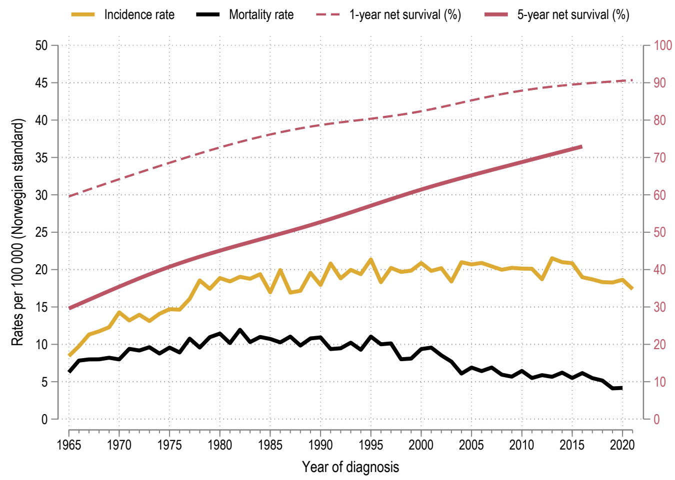


Figure 5.3–C: Trends in reference adjusted all-cause survival

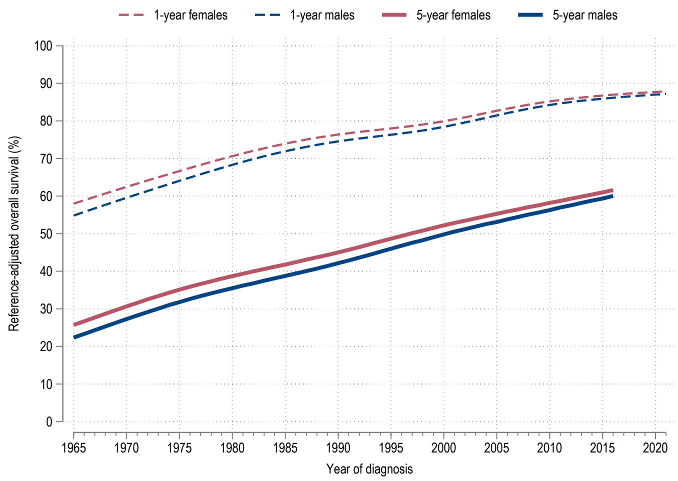


Figure 5.3–D: Trends in reference adjusted crude probability of cancer death

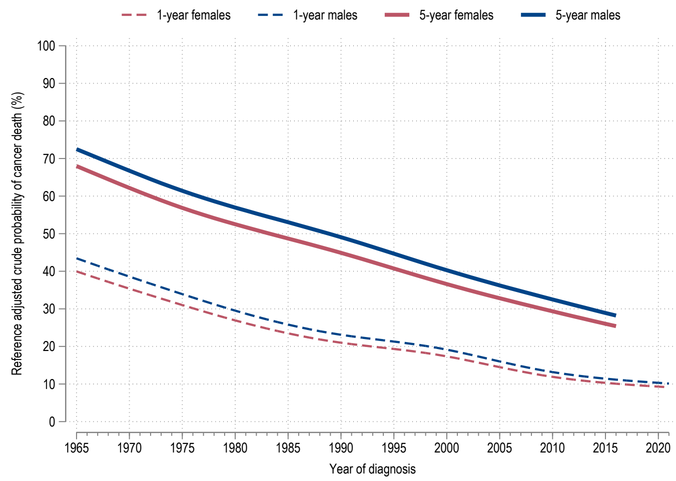


Figure 5.3–E: Trends in reference adjusted life-years lost

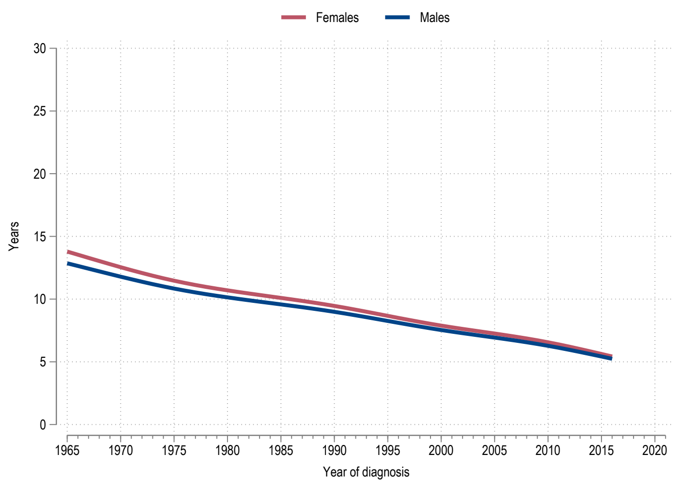
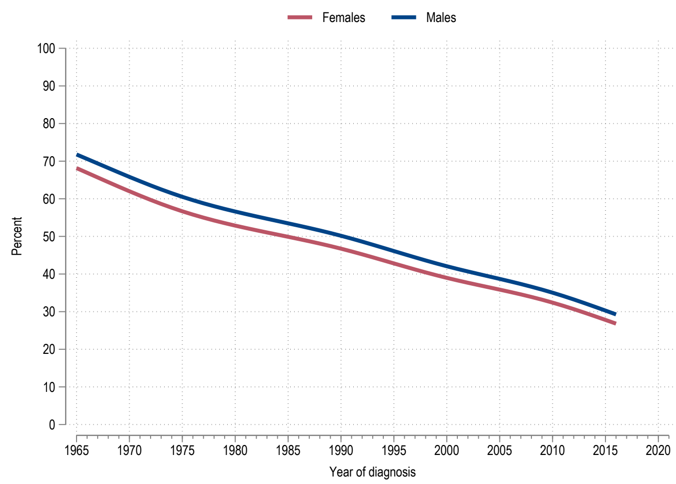


Figure 5.3–F: Trends in reference adjusted life-years lost (%)



Liver

6.1 Net survival and crude probabilities

Net survival among liver cancer patients declines sharply the first years after diagnosis, and the five year net survival estimate equals 24.5 %. After five years the net survival levels off, without reaching a plateau, with ten year net survival equal to 17.7 % for both sexes combined (Figure 6.1–A). There are virtually no differences between sexes.

The probability of surviving five years is 22.1 % (Figure 6.1–B). This is quite similar to the net survival estimate, reflecting the fact that most liver cancer patients dying the first five years after diagnosis are dying from their cancer.

Crude probabilities of liver cancer death depend on stage at diagnosis, while death due to other causes increases with age (Figures 6.1–D and 6.1–C). The probability of dying from localised and regional liver cancer also depends on age with slightly poorer survival in the oldest patients. In women with localised cancer, the five year crude probability of death due to liver cancer is 56.7 % at ages 80–89, while the corresponding probability is 35.2 % at ages 0–49. In contrast, among patients with distant metastases at diagnosis, where the risk of death due to cancer is very high, the age gradient is small.

Having survived a localised liver cancer for one, two or up to five years after diagnosis, has a considerable impact on your survival the coming five years (Figures 6.1–F and 6.1–E). The same is true for regional and distant cancer, but one should bear in mind that very few patients will survive up to five years when diagnosed with more advanced stages.

6.2 Life expectancy and life-years lost

The high risk of liver cancer death leads to a considerable loss in life-years in all age groups and for all stages, with larger losses if diagnosed with an advanced stage (Figures 6.2–B and 6.2–A). The proportion of life-years lost due to cancer only marginally varies between age groups, but increases with stage (Figures 6.2–D and 6.2–C).

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 6.2–F and 6.2–E). However, this proportion does not approach zero for any of the stages, reflecting the fact that a median aged patient surviving five years after diagnosis, still have a considerable risk of dying from liver cancer. For regional and distant liver cancer the proportion remains at a high level, also after surviving five years, still keeping in mind that very few survive up to five years for these stages.

6.3 Time trends

Net survival of liver cancer has increased from a low level, especially the last two decades (Figures 6.3–B and 6.3–A). Correspondingly, the all-cause survival has increased and the crude probability of dying from liver cancer has declined over the past two decades (Figures 6.3–C and 6.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining the most recent years (Figures 6.3–E and 6.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 20.2 years in 1965 and expected to be 15.6 years in 2016. Correspondingly, the proportion of life-years lost due to liver cancer has decreased from 96.4 % in 1965 to an expected 74.3 % in 2016, when averaging across all ages and stage at diagnosis.

Figure 6.1: Liver: net and crude probabilities

Figure 6.1–A: Net survival 0–10 years

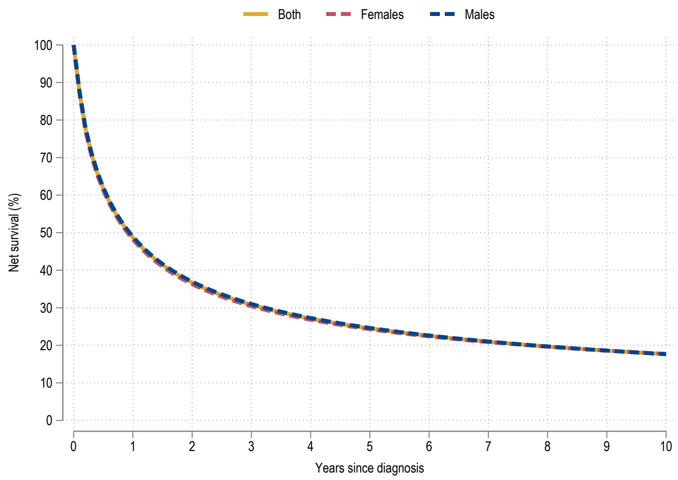


Figure 6.1–B: Crude probabilities 0–10 years

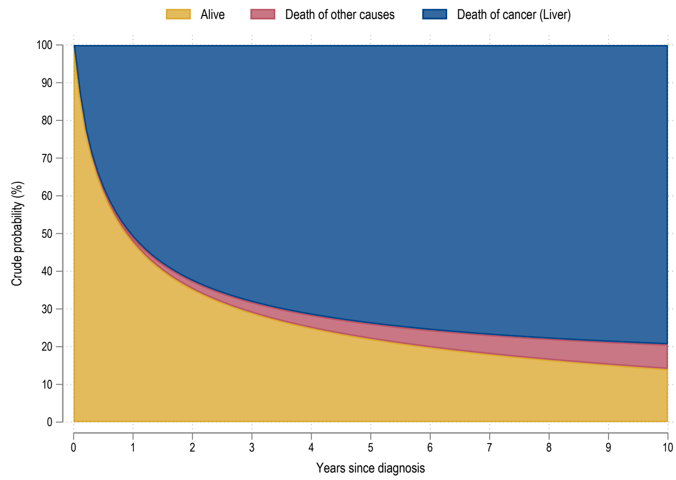


Figure 6.1–C: 5-year crude probabilities by age and stage. Males

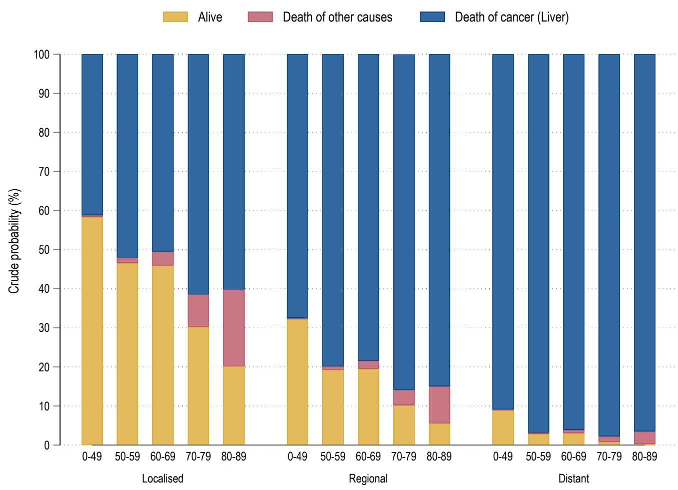


Figure 6.1–D: 5-year crude probabilities by age and stage. Females

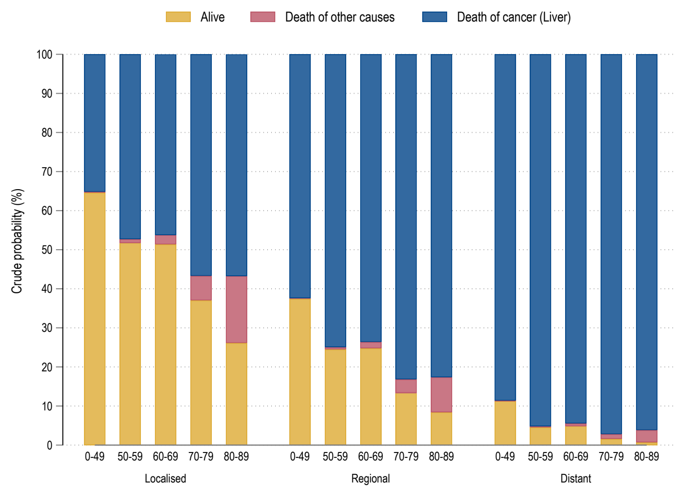


Figure 6.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Males

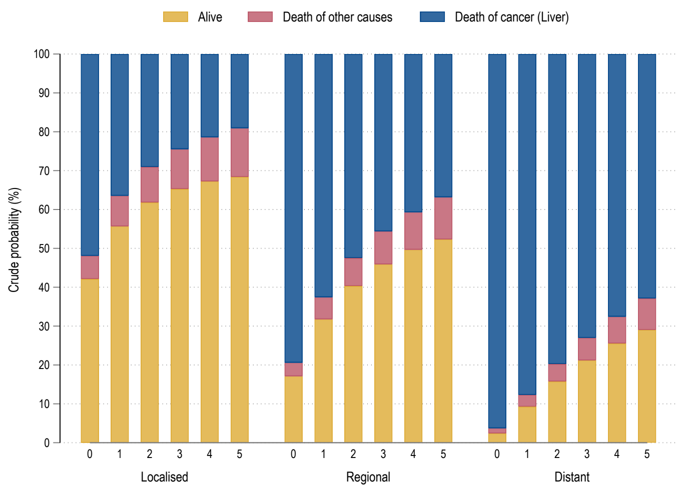
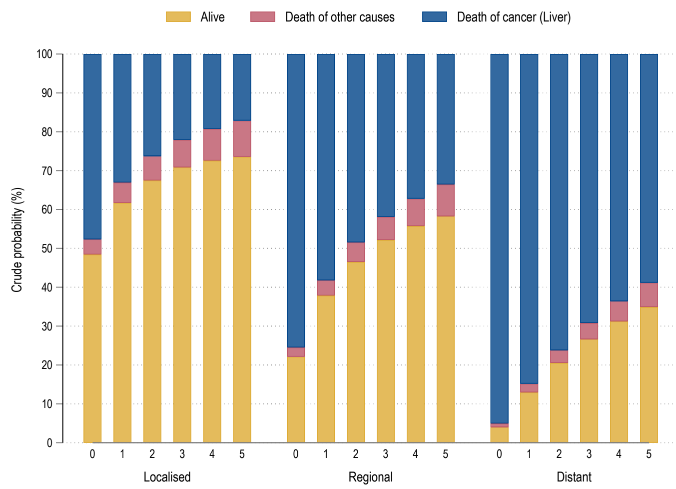


Figure 6.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Females



Liver

Figure 6.2: Liver: life expectancy and life-years lost

Figure 6.2–A: Life expectancy by age and stage. Males

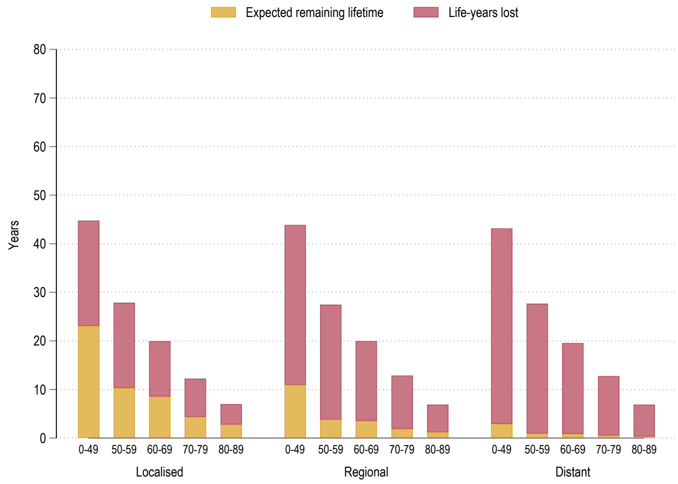


Figure 6.2–B: Life expectancy by age and stage. Females

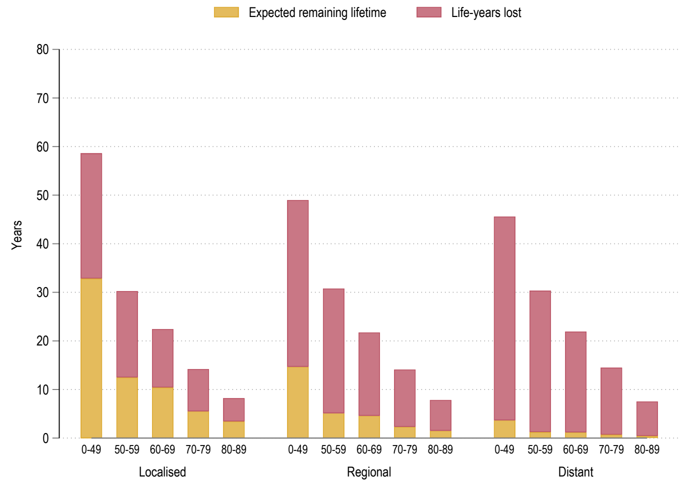


Figure 6.2–C: Proportion of life-years lost. Males

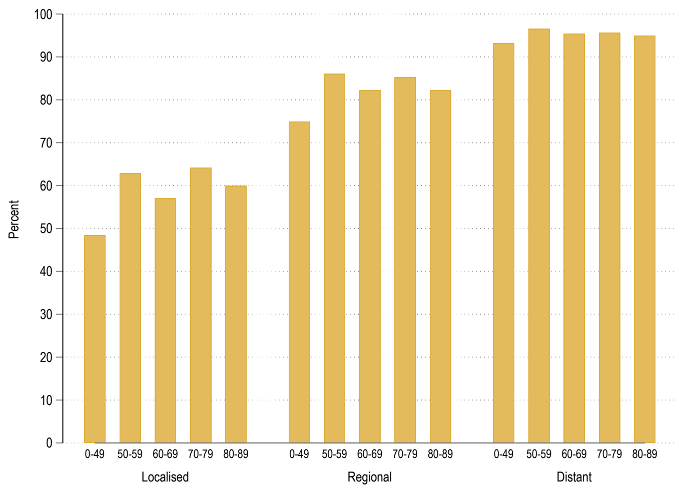


Figure 6.2–D: Proportion of life-years lost. Females

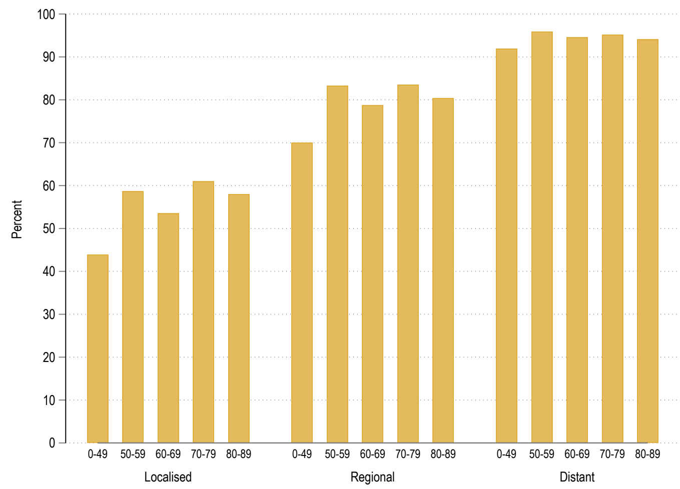


Figure 6.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Males

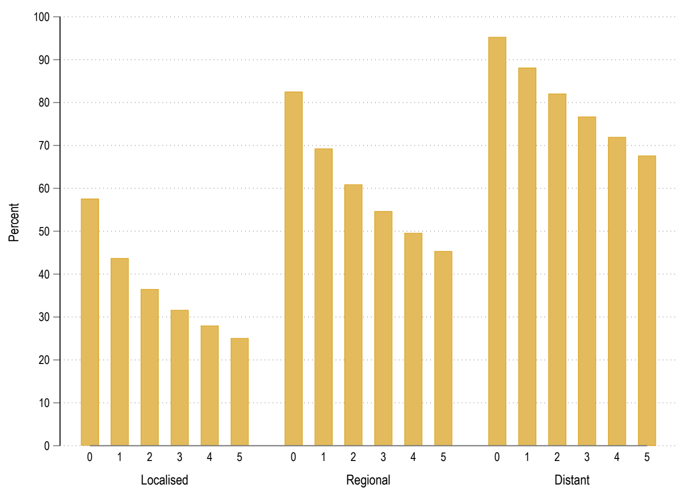


Figure 6.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Females

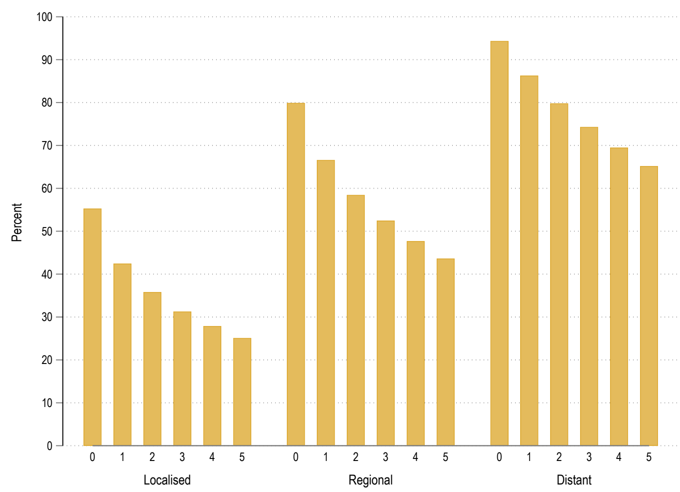


Figure 6.3: Liver: trends

Figure 6.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

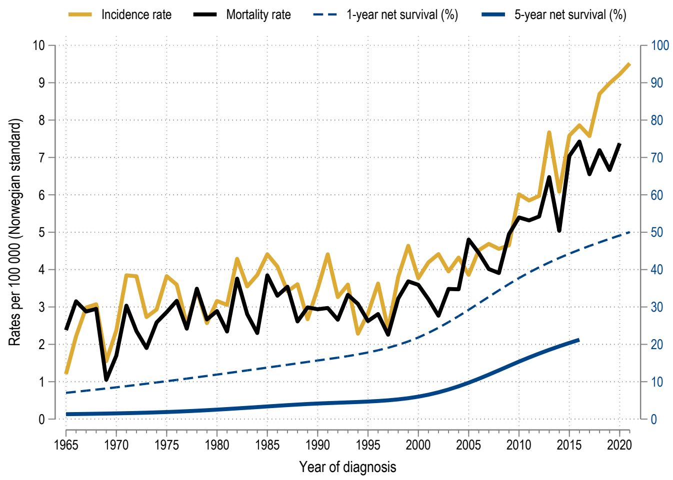


Figure 6.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

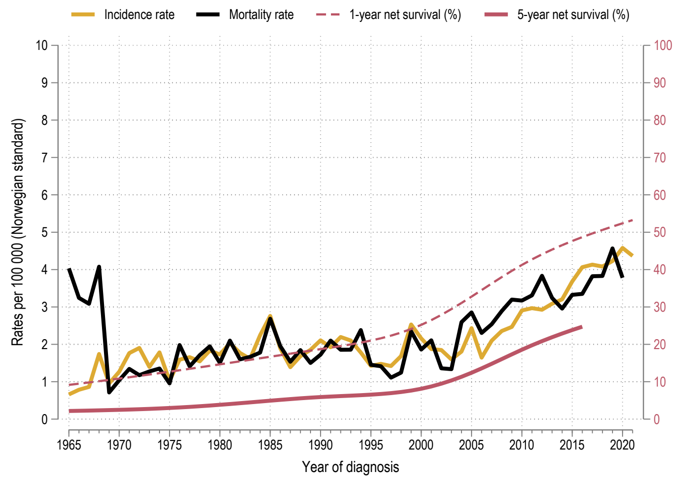


Figure 6.3–C: Trends in reference adjusted all-cause survival

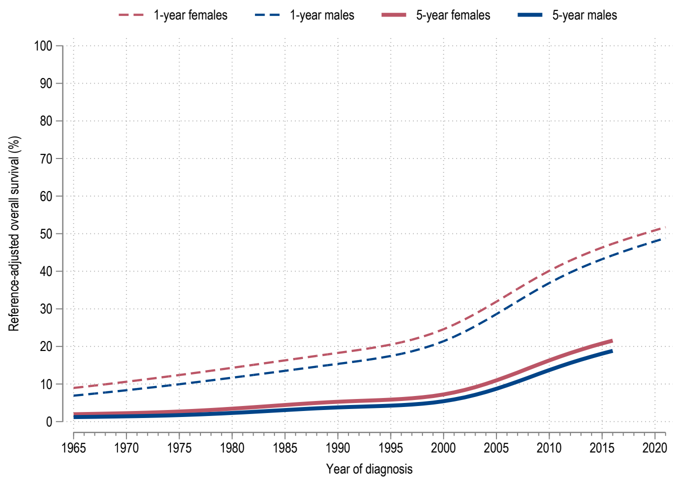


Figure 6.3–D: Trends in reference adjusted crude probability of cancer death

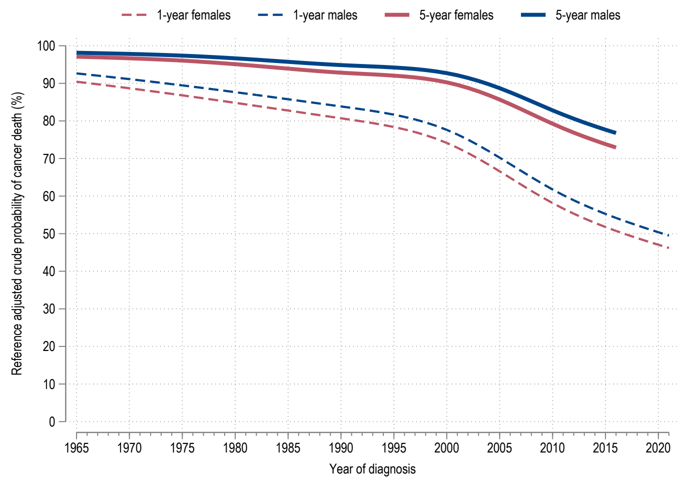


Figure 6.3–E: Trends in reference adjusted life-years lost

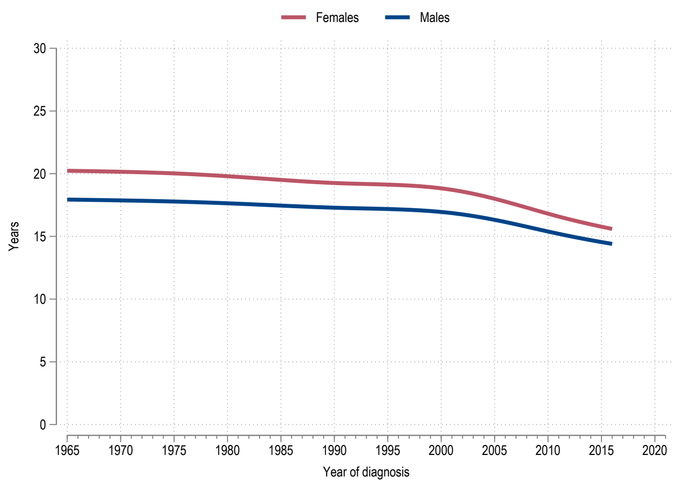
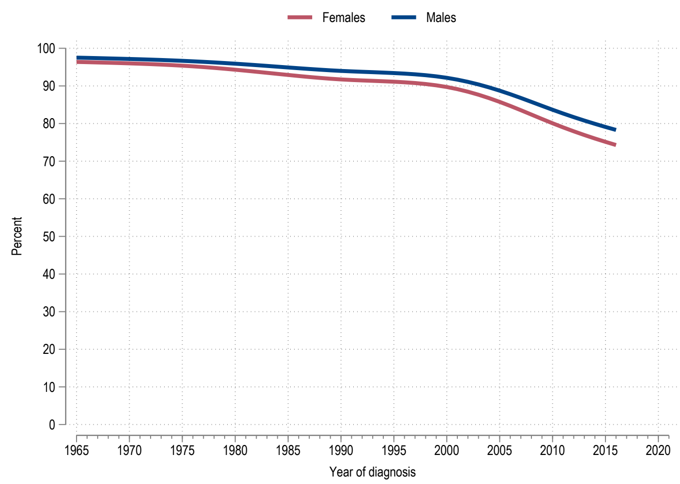


Figure 6.3–F: Trends in reference adjusted life-years lost (%)



Liver

Gallbladder

Gallbladder

7.1 Net survival and crude probabilities

Net survival among gallbladder cancer patients declines sharply the first years after diagnosis, and the five year net survival estimate equals 25.8 %. After five years the net survival levels off, reaching a plateau and the ten year net survival equals 21.1 % for both sexes combined (Figure 7.1–A). There are virtually no differences between sexes.

The probability of surviving five years is 23.2 % (Figure 7.1–B). This is quite similar to the net survival estimate, reflecting the fact that most gallbladder cancer patients dying the first five years after diagnosis are dying from their cancer.

Crude probabilities of gallbladder cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 7.1–D and 7.1–C). However, the probability of dying from localised and regional gallbladder cancer also depends on age with poorer survival in the oldest patients. In women with localised cancer, the five year crude probability of death due to gallbladder cancer is 47.9 % at ages 80–89, while the corresponding probability is 21.7 % at ages 0–49. In contrast, among patients with distant metastases at diagnosis, where the risk of death due to cancer is very high, the age gradient is small.

Having survived a localised gallbladder cancer for one, two or up to five years after diagnosis, has a considerable impact on your survival the coming five years (Figures 7.1–F and 7.1–E). The same is true for regional and distant cancer, but one should bear in mind that very few patients will survive up to five years when diagnosed with more advanced stages.

7.2 Life expectancy and life-years lost

The high risk of gallbladder cancer death leads to a considerable loss in life-years in all age groups and for all stages, with larger losses if diagnosed with an advanced stage (Figures 7.2–B and 7.2–A). The proportion of life-years lost due to cancer is increasing with age for localised gallbladder cancer. For more advanced stages these proportions are generally high for all ages (Figures 7.2–D and 7.2–C).

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 7.2–F and 7.2–E). However, this proportion does not approach zero for any of the stages, reflecting the fact that a median aged patient surviving five years after diagnosis, still have a considerable risk of dying from gallbladder cancer. For regional and distant gallbladder cancer the proportion remains at a high level, also after surviving five years, still keeping in mind that very few survives up to five years for these stages.

7.3 Time trends

Net survival of gallbladder cancer has been stable on a low level for both sexes. In the more recent years there are signs of increased short-term survival, but less so when looking at longer term survival (Figures 7.3–B and 7.3–A). This reflects the fact that many gallbladder cancer patients are diagnosed with advanced stage, where curative treatment options are scarce. The rise in short-term survival is likely a result of more use of palliative chemotherapy. Correspondingly, the all-cause survival has been stable at a very low level, with some signs of an increase the more recent years, particularly for short-term survival (Figure 7.3–C). The crude probability of dying from gallbladder cancer has been stable at a high level with some signs of declining the most recent years (Figure 7.3–D). Looking at the number and proportion of life-years lost, these have remained stable over time, illustrating the limited improvement in prognosis for this patient group (Figures 7.3–E and 7.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 17.4 years in 1965 and expected to be 14.1 years in 2016. Correspondingly, the proportion of life-years lost due to gallbladder cancer has decreased from 94.9 % in 1965 to an expected 76.7 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 7.1: Gallbladder: net and crude probabilities

Figure 7.1–A: Net survival 0–10 years

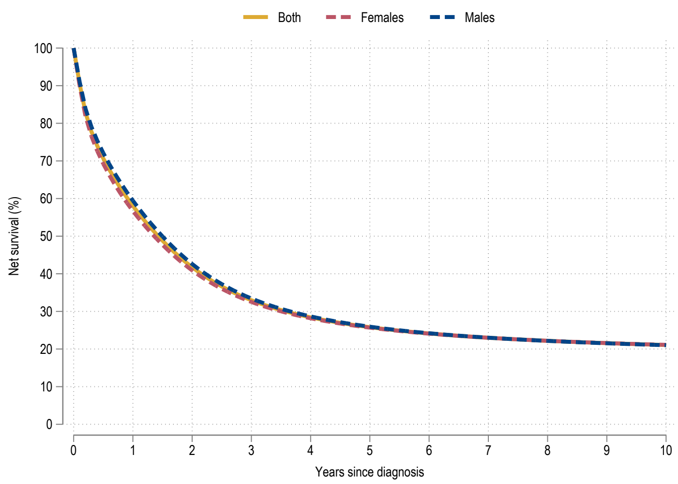


Figure 7.1–B: Crude probabilities 0–10 years

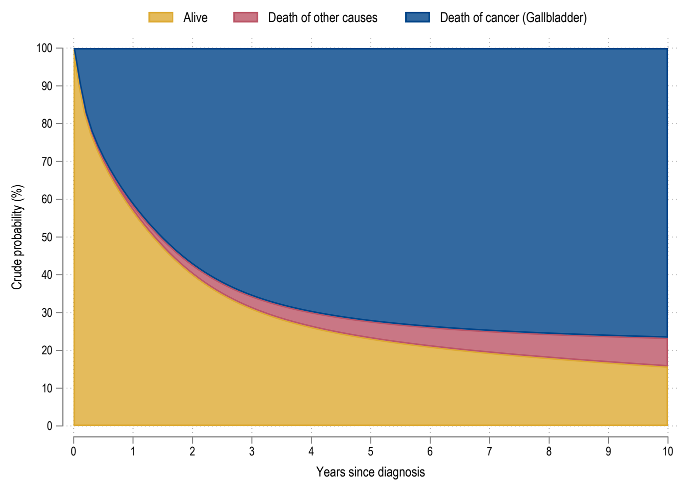


Figure 7.1–C: 5-year crude probabilities by age and stage. Males

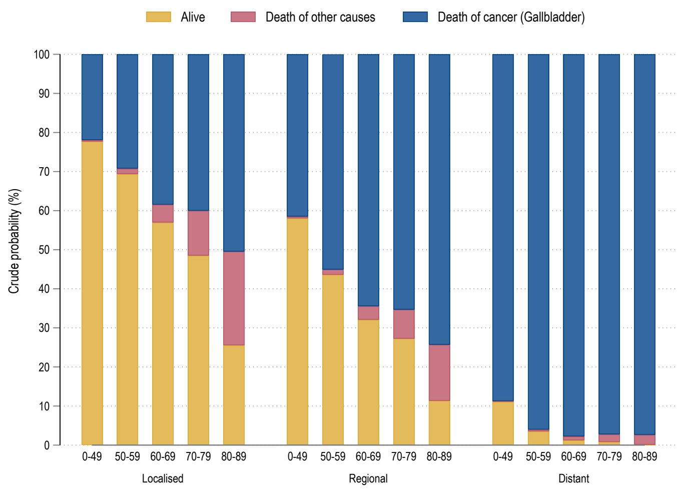


Figure 7.1–D: 5-year crude probabilities by age and stage. Females

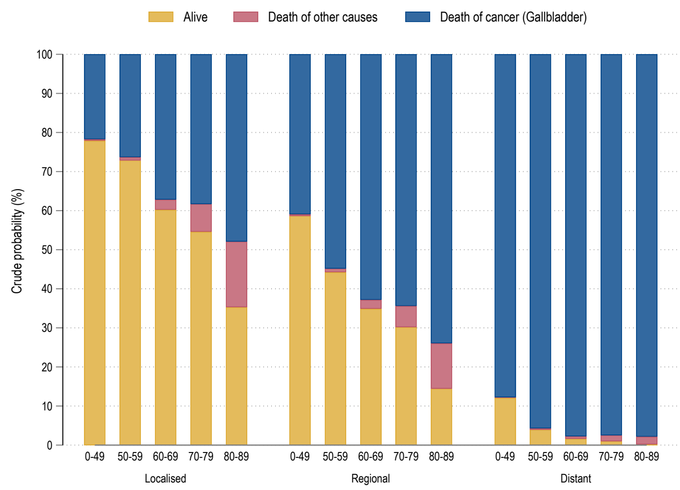


Figure 7.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Males

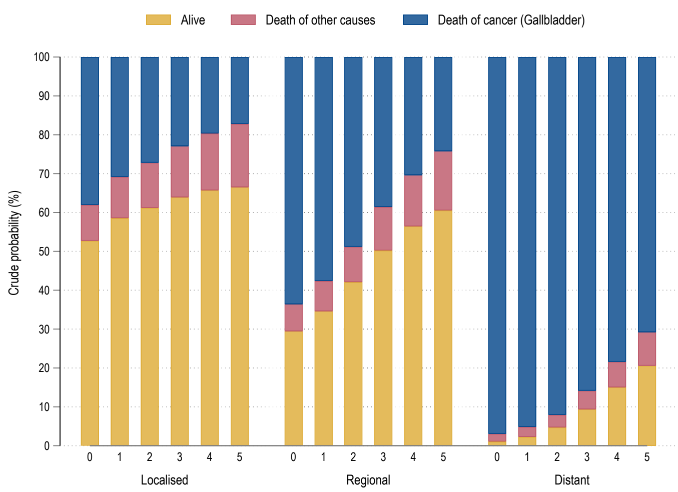
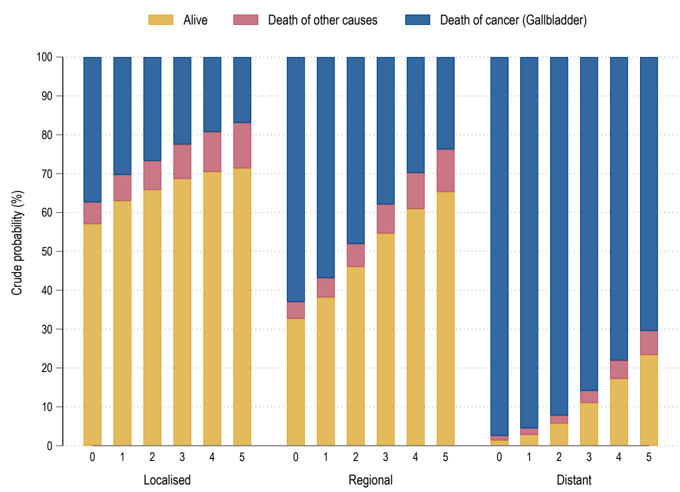


Figure 7.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Females



Gallbladder

Gallbladder

Figure 7.2: Gallbladder: life expectancy and life-years lost

Figure 7.2–A: Life expectancy by age and stage. Males

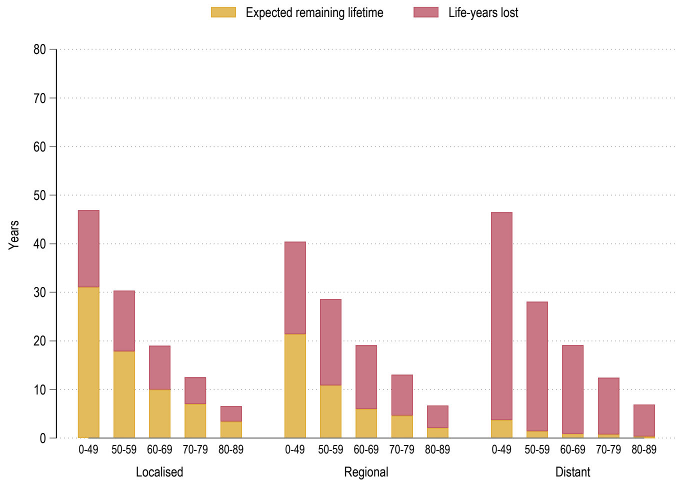


Figure 7.2–B: Life expectancy by age and stage. Females

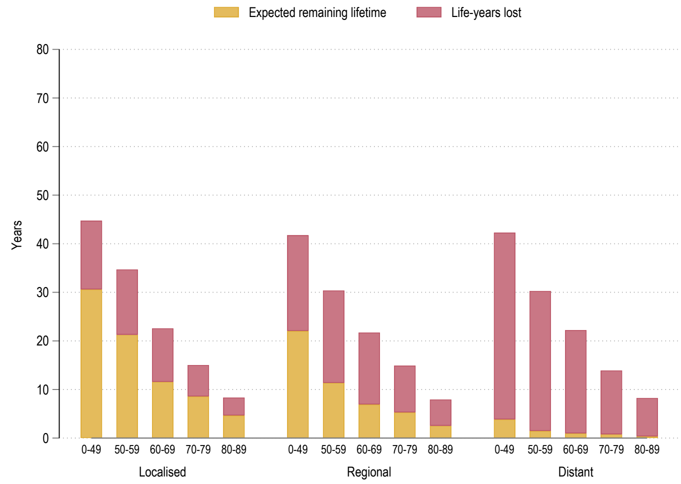


Figure 7.2–C: Proportion of life-years lost. Males

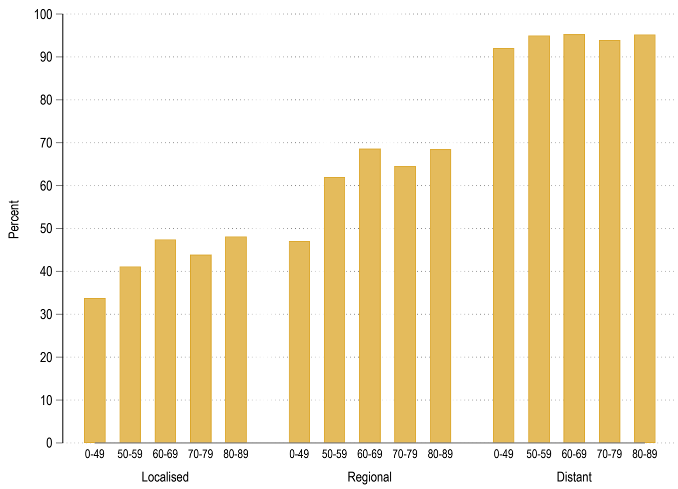


Figure 7.2–D: Proportion of life-years lost. Females

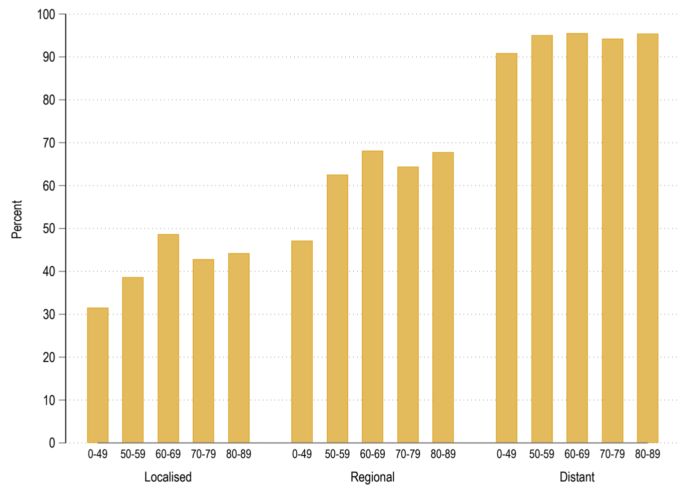


Figure 7.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Males

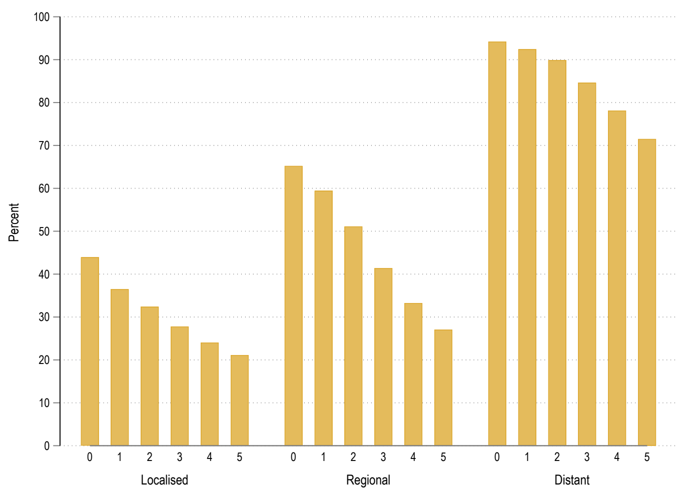


Figure 7.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Females

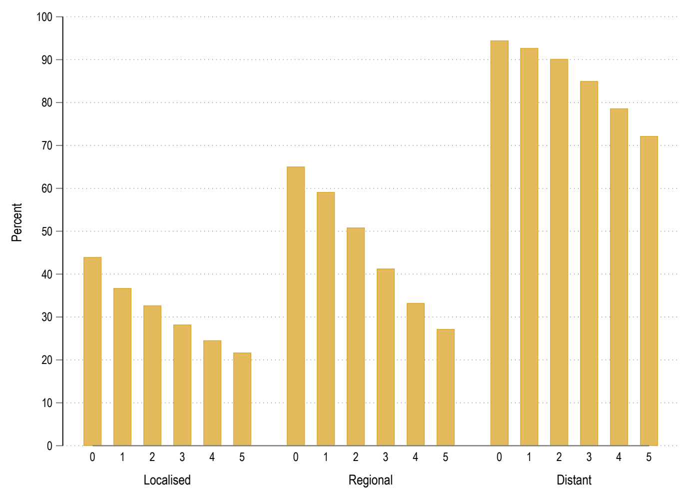


Figure 7.3: Gallbladder: trends

Figure 7.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

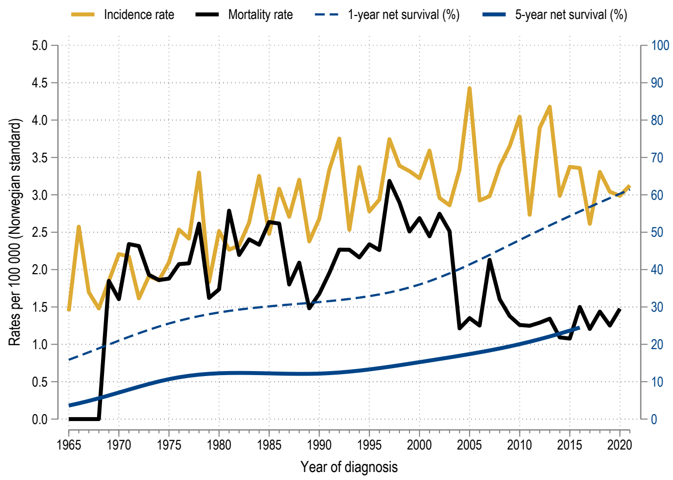


Figure 7.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

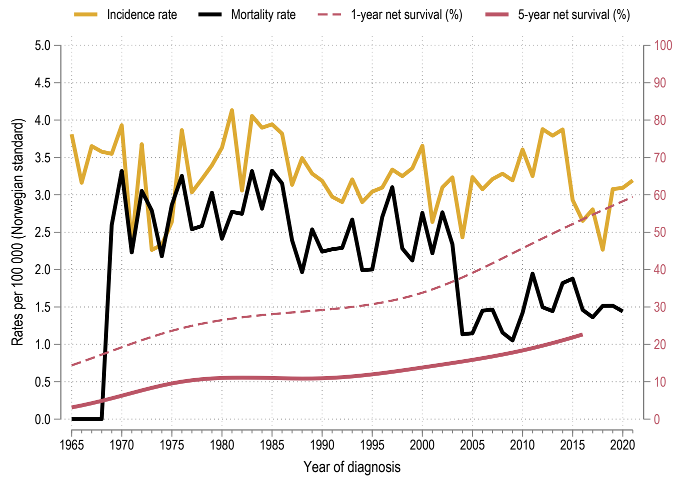


Figure 7.3–C: Trends in reference adjusted all-cause survival

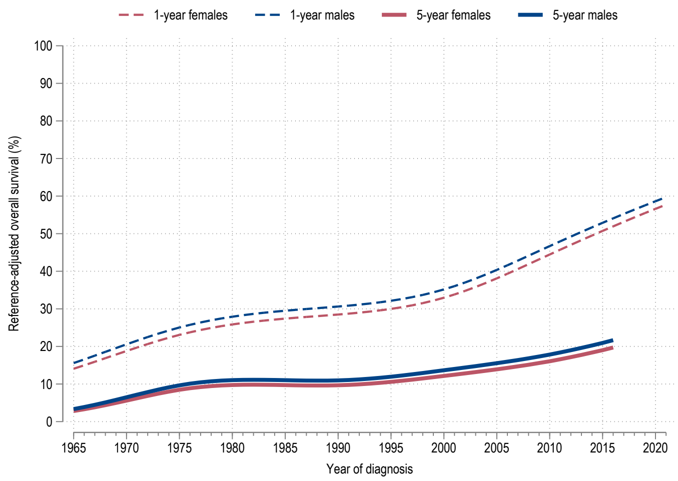


Figure 7.3–D: Trends in reference adjusted crude probability of cancer death

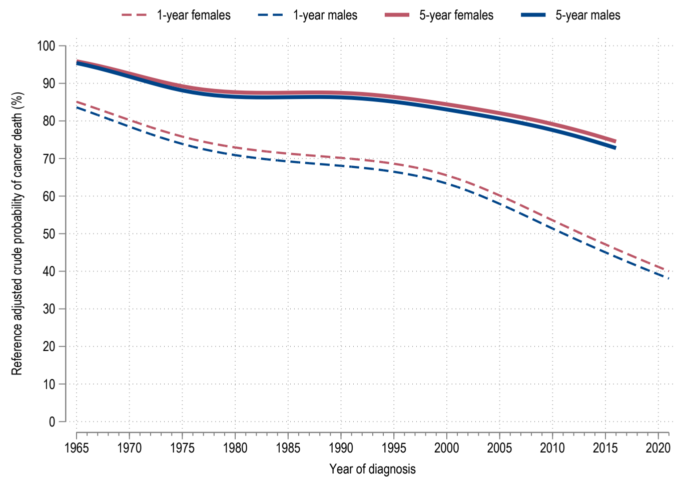


Figure 7.3–E: Trends in reference adjusted life-years lost

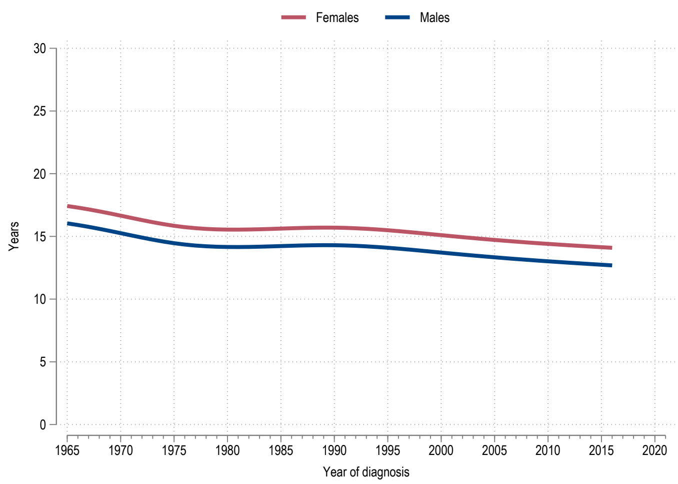
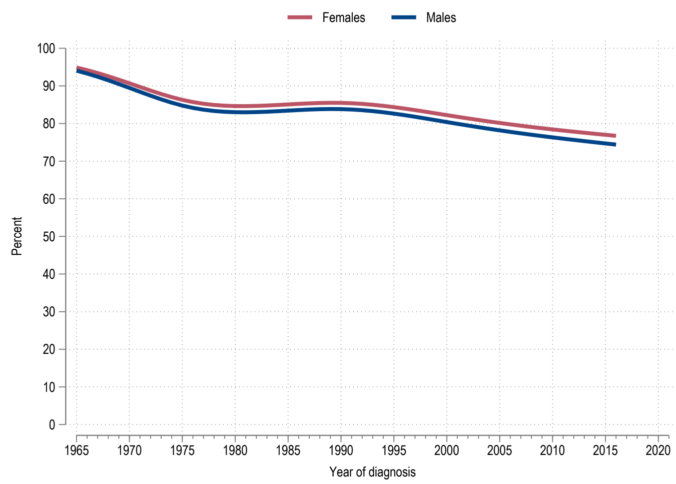


Figure 7.3–F: Trends in reference adjusted life-years lost (%)



Pancreas

8.1 Net survival and crude probabilities

Cancer in the pancreatic organ includes pancreatic ductal adenocarcinoma (PDAC) and neuroendocrine neoplasms (NEN/NET). The latter constitutes around 6-7 % of the total number of cases the last five-year period. In this report, NENs are excluded from the analyses as they are a very different group of cancers.

Net survival among pancreatic cancer patients declines sharply the first three years after diagnosis, and the five year net survival estimate equals 8 %. After five years the net survival levels off, reaching a plateau and the ten year net survival equals 5.1 % for both sexes combined (Figure 8.1–A). There are virtually no differences between sexes.

The probability of surviving five years is 7.3 % (Figure 8.1–B). This is quite similar to the net survival estimate, reflecting the fact that most pancreatic cancer patients dying the first five years after diagnosis are dying from their cancer.

Crude probabilities of pancreatic cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 8.1–D and 8.1–C). However, the probability of dying from localised and regional pancreatic cancer also depends on age with poorer survival in the oldest patients. In women with localised cancer, the five year crude probability of death due to pancreatic cancer is 88 % at ages 80–89, while the corresponding probability is 43 % at ages 0–49. In contrast, among patients with distant metastases at diagnosis, where the risk of death due to cancer is very high, the age gradient is small.

Having survived a localised pancreatic cancer for one, two or up to five years after diagnosis, has a considerable impact on your survival the coming five years (Figures 8.1–F and 8.1–E). The same is true for regional and distant cancer, but one should bear in mind that very few patients will survive up to five years when diagnosed with more advanced stages.

8.2 Life expectancy and life-years lost

The high risk of pancreatic cancer death leads to a considerable loss in life-years in all age groups and for all stages, with larger losses if diagnosed with an advanced stage (Figures 8.2–B and 8.2–A). The proportion of life-years lost due to cancer is increasing with age for localised pancreatic cancer. For more advanced stages these proportions are generally high for all ages (Figures 8.2–D and 8.2–C).

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 8.2–F and 8.2–E). However, this proportion does not approach zero for any of the stages, reflecting the fact that a median aged patient surviving five years after diagnosis, still have a considerable risk of dying from pancreatic cancer. For regional and distant pancreatic cancer the proportion remains at a high level, also after surviving five years, still keeping in mind that very few survives up to five years for these stages.

8.3 Time trends

Net survival of pancreatic cancer has been stable on a low level for both sexes. In the more recent years there are signs of increased short-term survival, but less so when looking at longer term survival (Figures 8.3–B and 8.3–A). This reflects the fact that many pancreatic cancer patients are diagnosed with advanced stage, where curative treatment options are scarce. The rise in short-term survival is likely a result of more use of palliative chemotherapy. Correspondingly, the all-cause survival has been stable at a very low level, with some signs of an increase in short-term survival (Figure 8.3–C). The five-year crude probability of dying from pancreatic cancer has been stable at a high level (Figure 8.3–D). Looking at the number and proportion of life-years lost, these have remained stable over time, illustrating the limited improvement in prognosis for this patient group (Figures 8.3–E and 8.3–F) . As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 16.9 years in 1965 and expected to be 16.2 years in 2016. Correspondingly, the proportion of life-years lost due to pancreatic cancer has decreased from 95.3 % in 1965 to an expected 91.1 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 8.1: Pancreas: net and crude probabilities

Figure 8.1–A: Net survival 0–10 years

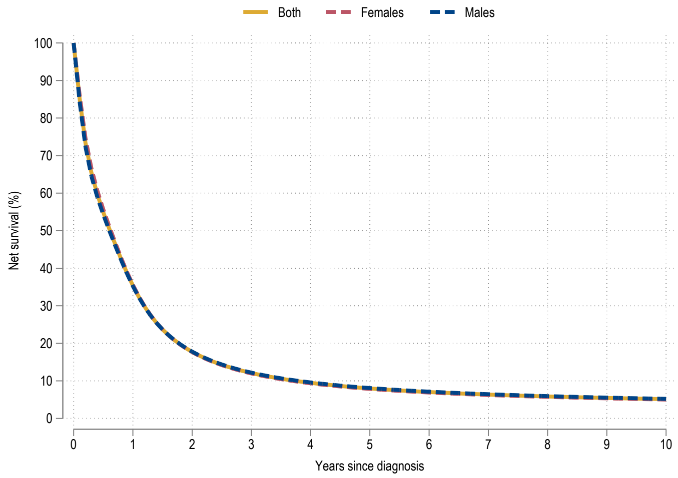


Figure 8.1–B: Crude probabilities 0–10 years

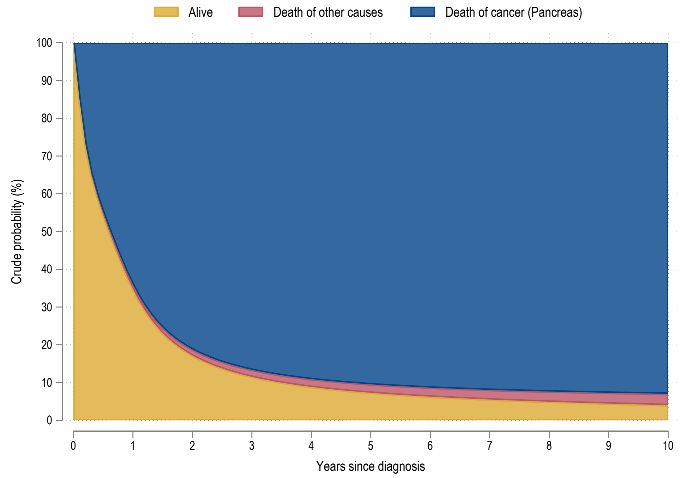


Figure 8.1–C: 5-year crude probabilities by age and stage. Males

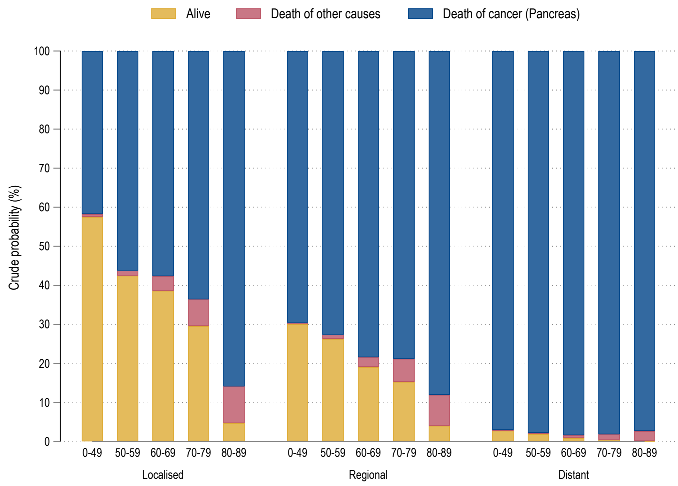


Figure 8.1–D: 5-year crude probabilities by age and stage. Females

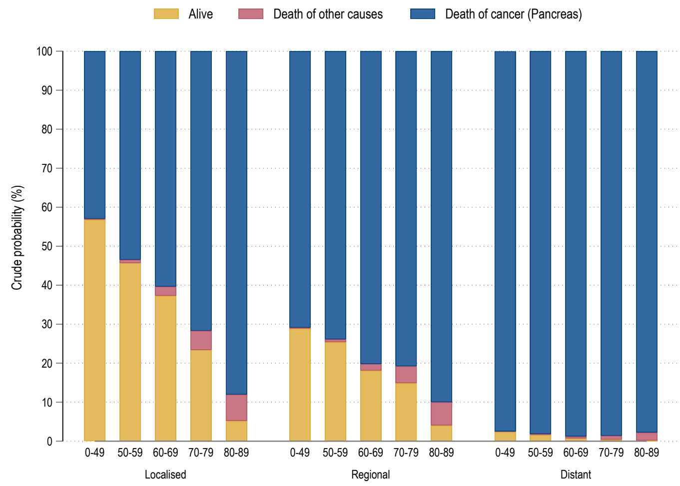


Figure 8.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Males

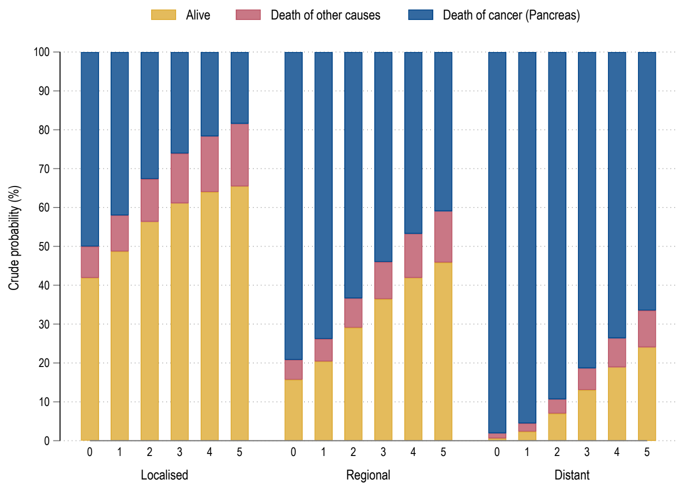
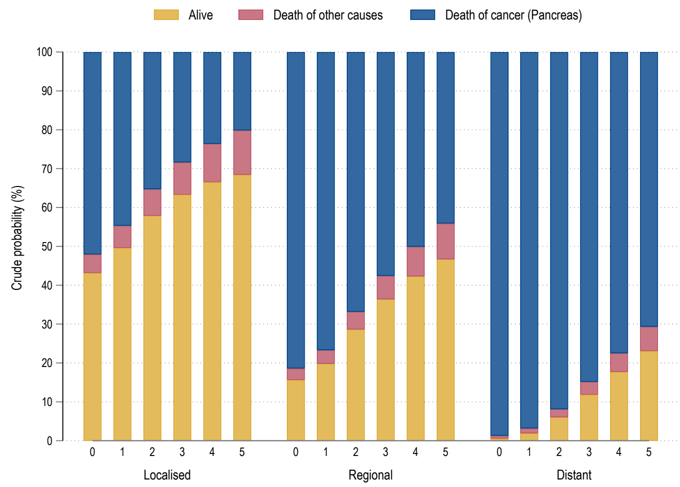


Figure 8.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Females



Pancreas

Figure 8.2: Pancreas: life expectancy and life-years lost

Figure 8.2–A: Life expectancy by age and stage. Males

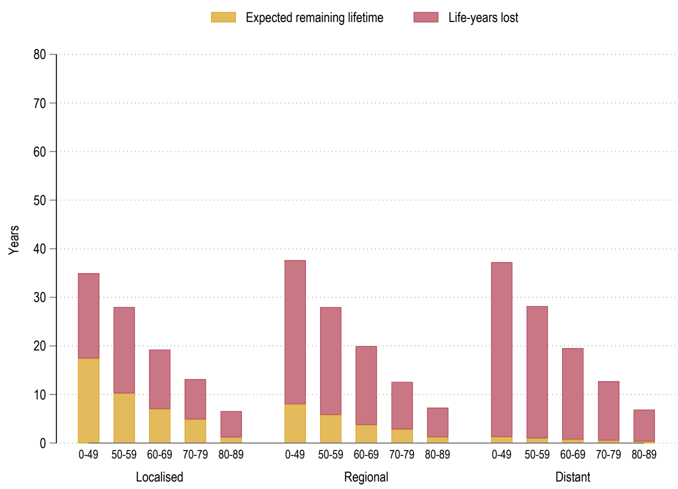


Figure 8.2–B: Life expectancy by age and stage. Females

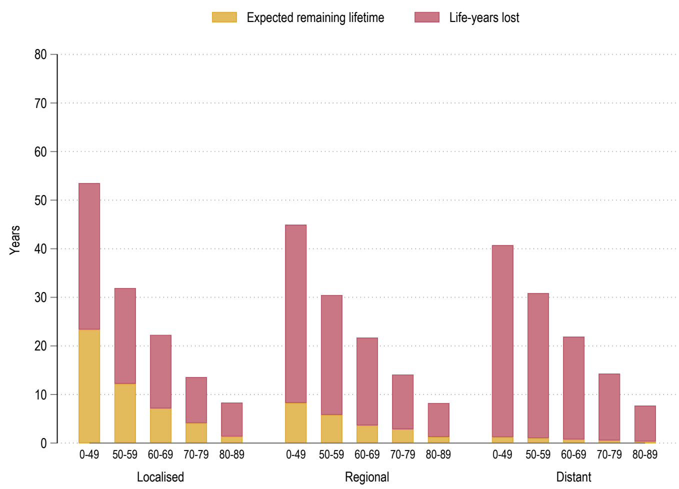


Figure 8.2–C: Proportion of life-years lost. Males

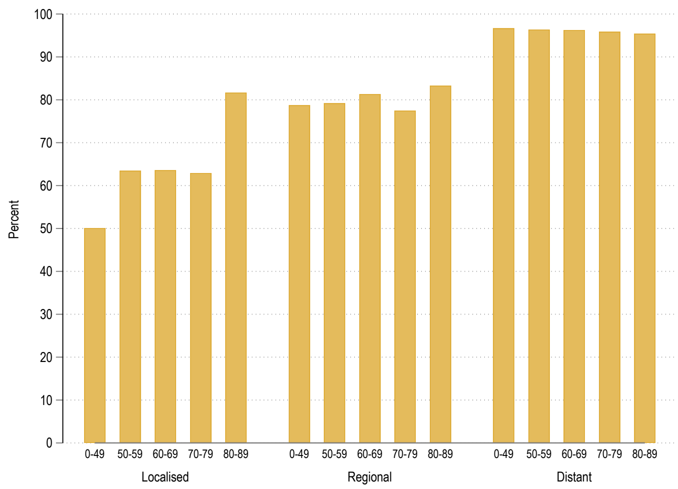


Figure 8.2–D: Proportion of life-years lost. Females

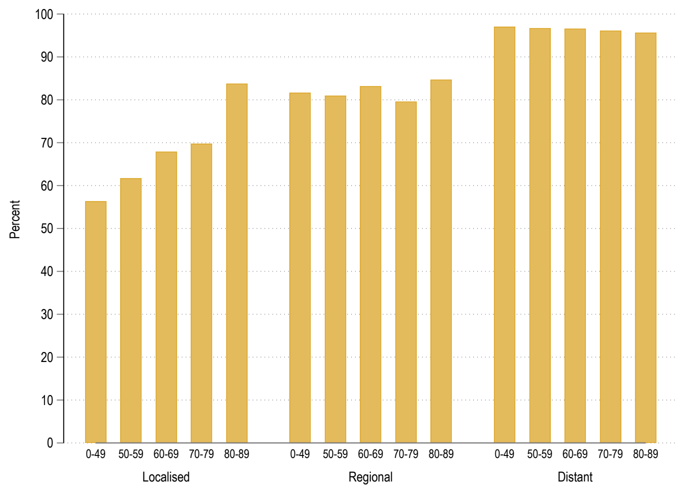


Figure 8.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Males

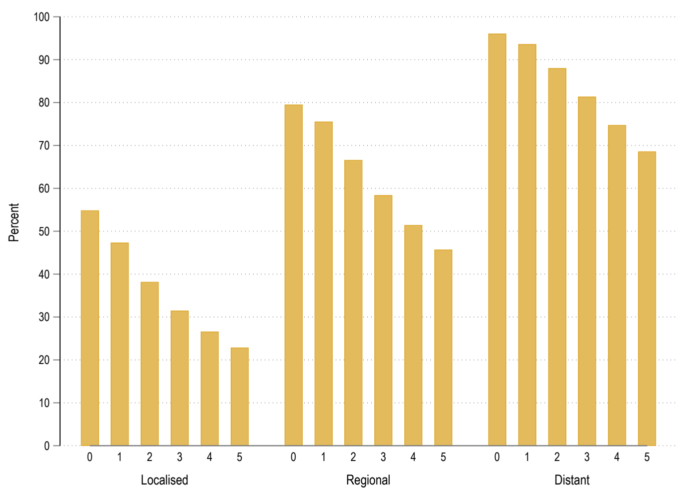


Figure 8.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Females

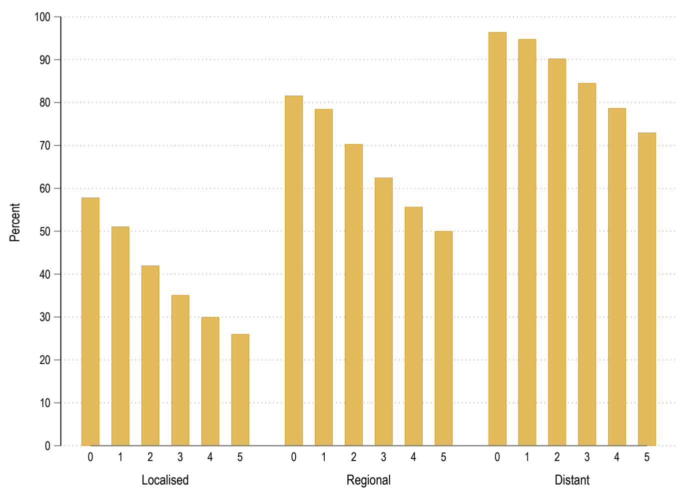


Figure 8.3: Pancreas: trends

Figure 8.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

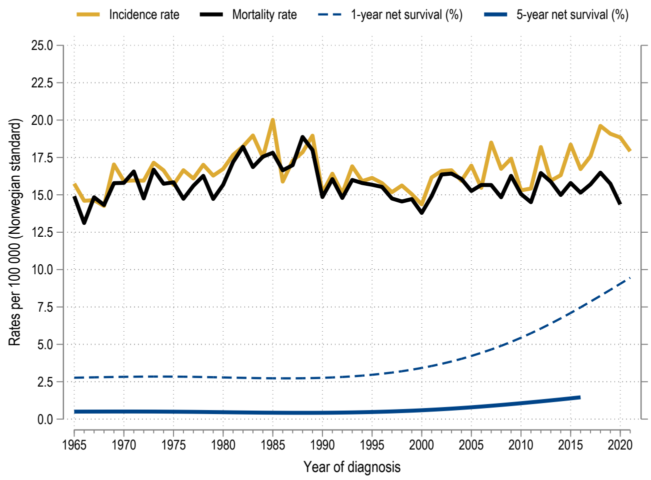


Figure 8.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

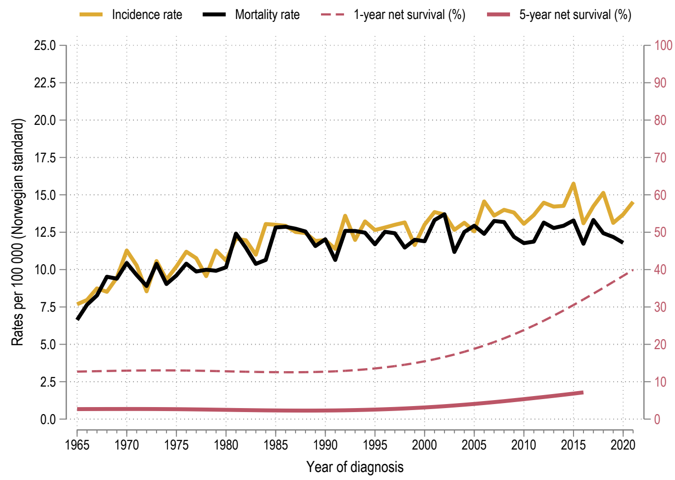


Figure 8.3–C: Trends in reference adjusted all-cause survival

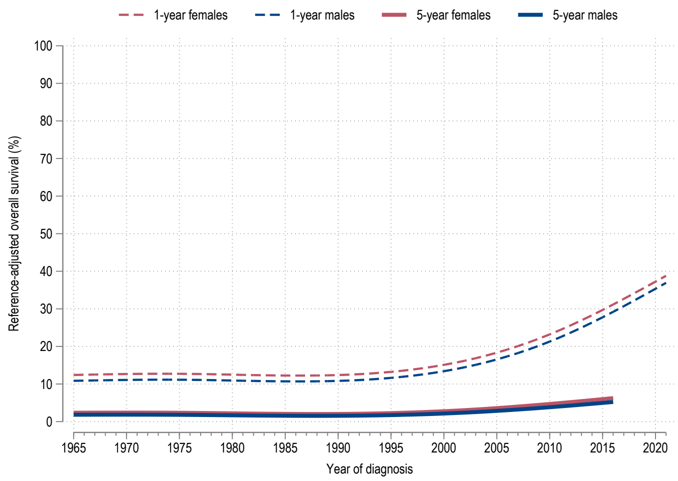


Figure 8.3–D: Trends in reference adjusted crude probability of cancer death

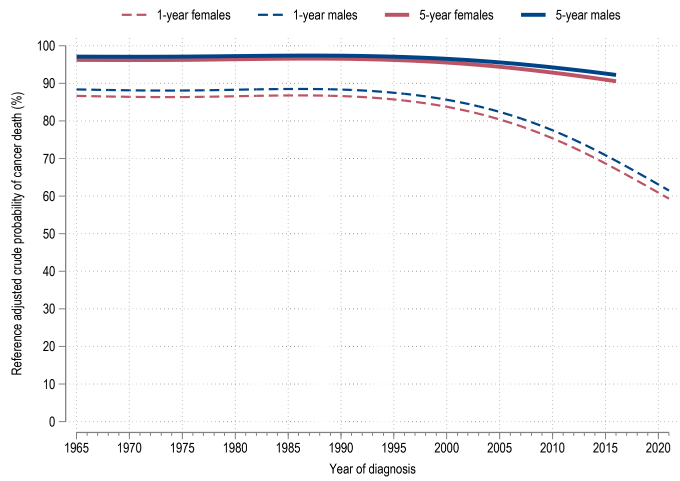


Figure 8.3–E: Trends in reference adjusted life-years lost

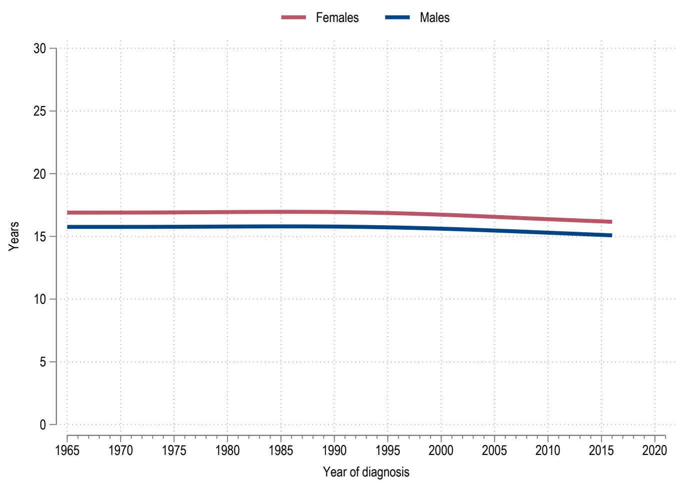
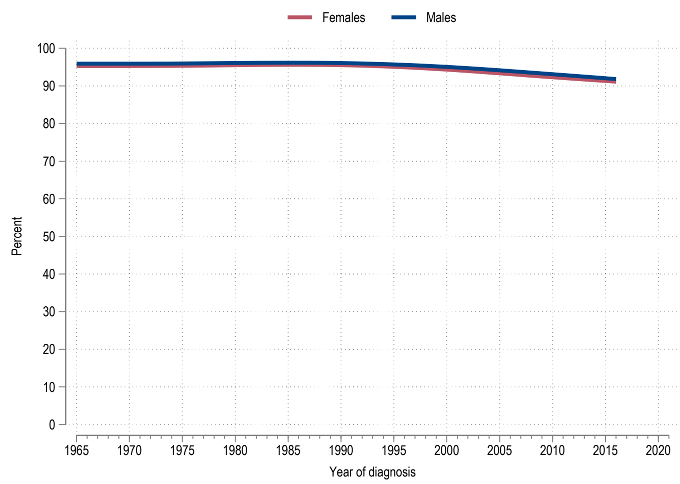


Figure 8.3–F: Trends in reference adjusted life-years lost (%)



Lung

9.1 Net survival and crude probabilities

Net survival among lung cancer patients declines steadily the first years after diagnosis and then levels off without reaching a plateau (Figure 9.1–A). At five years since diagnosis, the net survival is 33.4 % (both sexes combined), while at ten years it is 25.2 %. Women have a somewhat better survival than men throughout the first ten years after diagnosis.

The probability of surviving five years is 25.2 % (Figure 9.1–B). This is quite similar to the net survival estimate, reflecting the fact that most lung cancer patients dying the first five years after diagnosis are dying from their lung cancer.

Crude probabilities of lung cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 9.1–D and 9.1–C). However, the probability of dying from lung cancer also depends on age with poorer survival in the oldest patients. Among patients with localised cancer, old age is associated with much poorer survival compared to younger patients. In women with localised cancer, the five year crude probability of death due to lung cancer is 30.6 % at ages 80–89, while the corresponding probability is 0.1 % at ages 0–49. In contrast, among patients with distant metastases at diagnosis, where the risk of death due to cancer is higher, the age gradient is smaller.

Having survived a localised lung cancer for one, two or up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 9.1–F and 9.1–E). However, if regional or distant metastases were present at time of diagnosis it will strongly influence the future five-year survival conditioning on surviving one, two or up to five years. The longer a patient survives the better future survival and the more similar future survival across stages. When interpreting these results it is important to remember that only very few patients with distant lung cancer will survive one or more years after diagnosis.

9.2 Life expectancy and life-years lost

The high risk of lung cancer death leads to a loss in life-years in all age groups, with larger losses if diagnosed with an advanced stage (Figures 9.2–B and 9.2–A). The proportion of remaining life-years that are lost due to cancer is therefore particularly high in patients with regional and distant lung cancer (Figures 9.2–D and 9.2–C).

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 9.2–F and 9.2–E). However, this proportion does not approach zero for any of the stages, reflecting the fact that a median aged patient surviving five years after diagnosis, still have a considerable risk of dying from lung cancer. For distant lung cancer the proportion declines but remains at a fairly high level also after surviving five years.

9.3 Time trends

Net survival of lung cancer has increased, in particular over the past two decades, for both sexes (Figures 9.3–B and 9.3–A). Correspondingly, the all-cause survival has increased and the crude probability of dying from lung cancer has declined (Figures 9.3–C and 9.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 9.3–E and 9.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 10.8 years in 1965 and expected to be 7.8 years in 2016. Correspondingly, the proportion of life-years lost due to lung cancer has decreased from 85.9 % in 1965 to an expected 62.6 % in 2016, when averaging across all ages and stage at diagnosis.

Figure 9.1: Lung: net and crude probabilities

Figure 9.1–A: Net survival 0–10 years

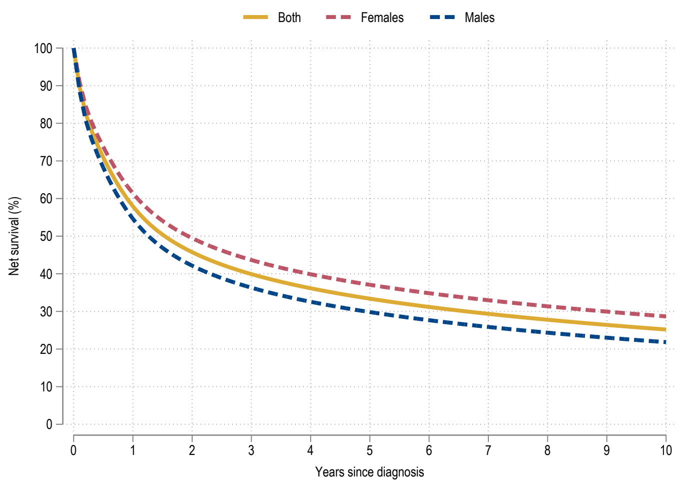


Figure 9.1–B: Crude probabilities 0–10 years

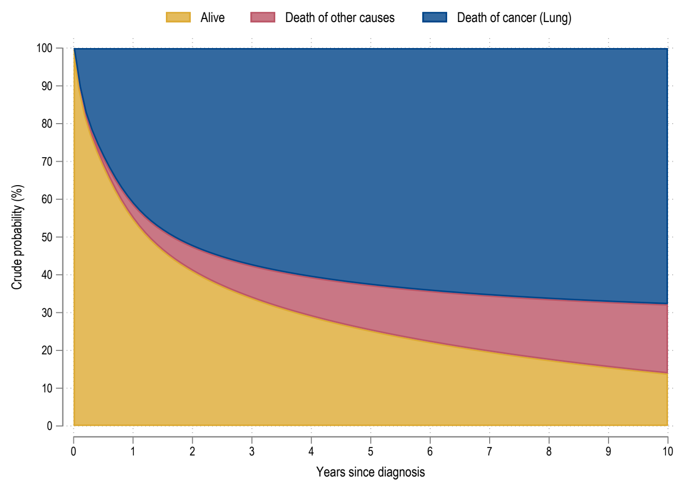


Figure 9.1–C: 5-year crude probabilities by age and stage. Males

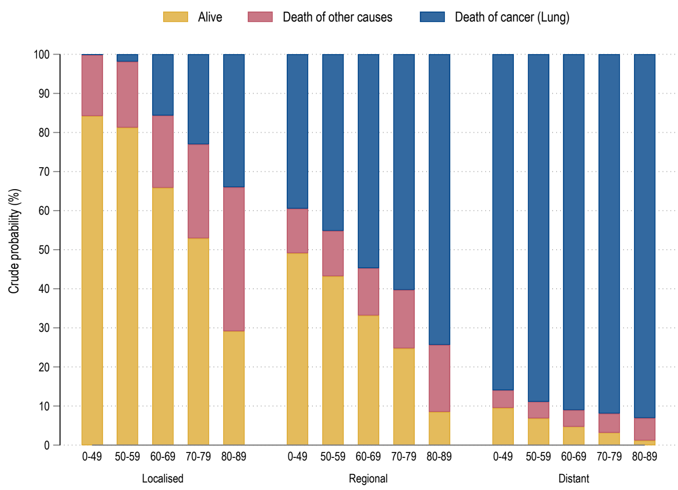


Figure 9.1–D: 5-year crude probabilities by age and stage. Females

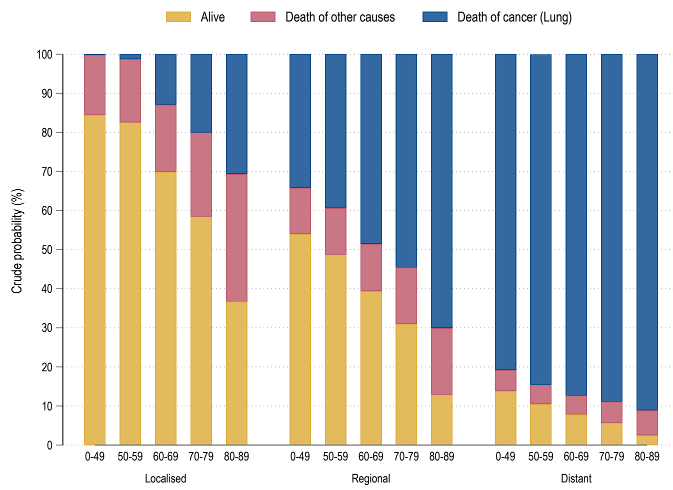


Figure 9.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Males

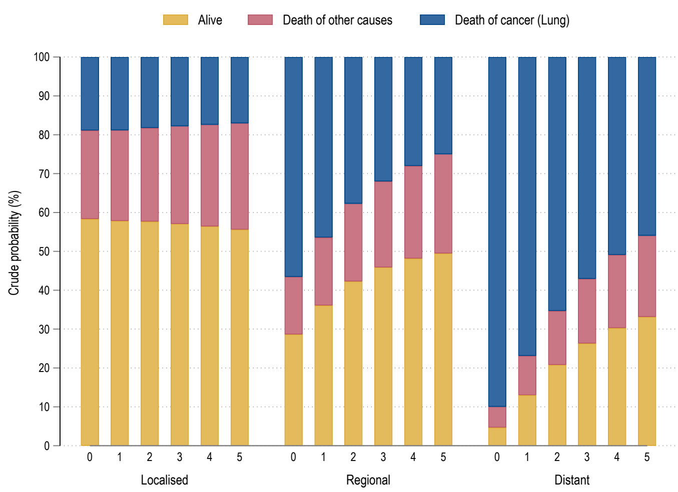
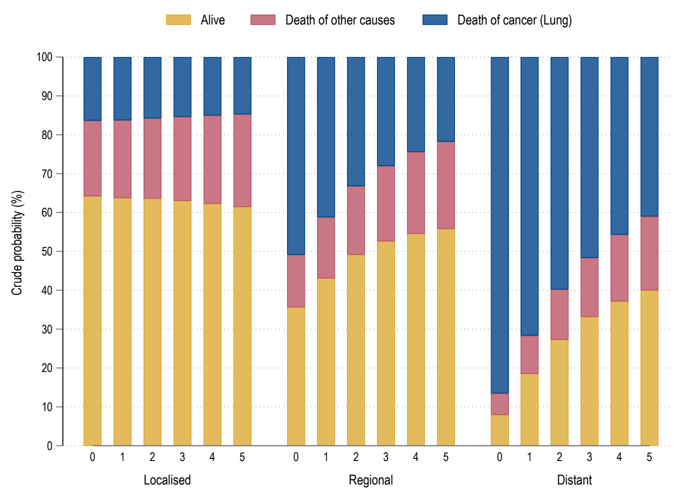


Figure 9.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Females



Lung

Figure 9.2: Lung: life expectancy and life-years lost

Figure 9.2–A: Life expectancy by age and stage. Males

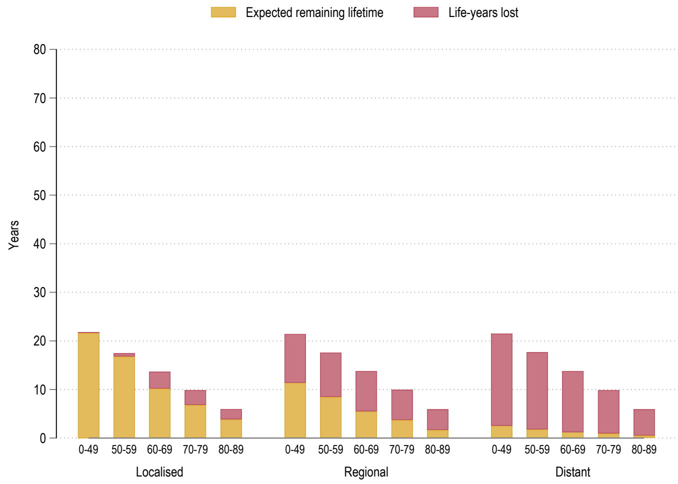


Figure 9.2–B: Life expectancy by age and stage. Females

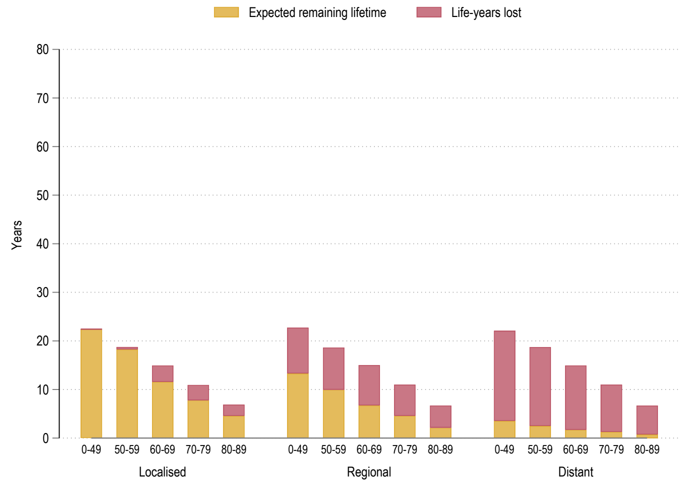


Figure 9.2–C: Proportion of life-years lost. Males

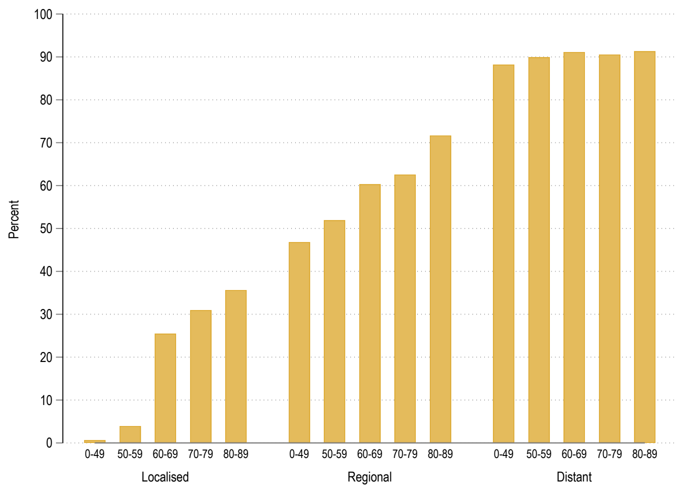


Figure 9.2–D: Proportion of life-years lost. Females

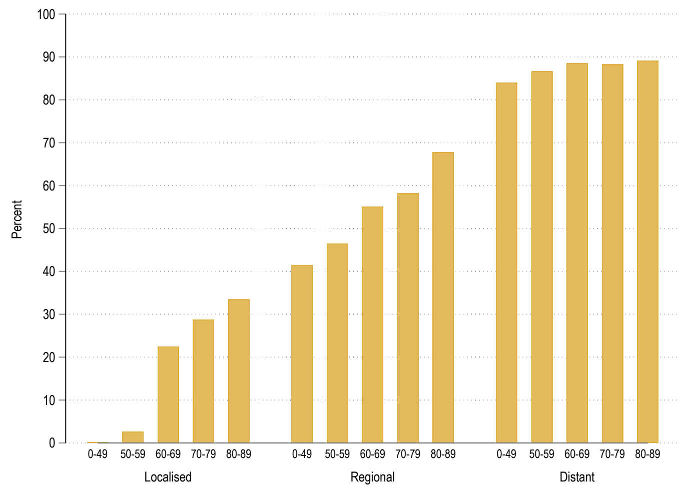


Figure 9.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Males

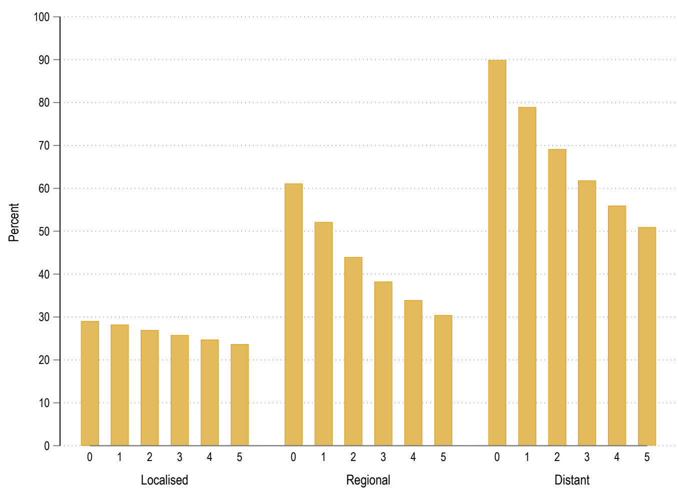
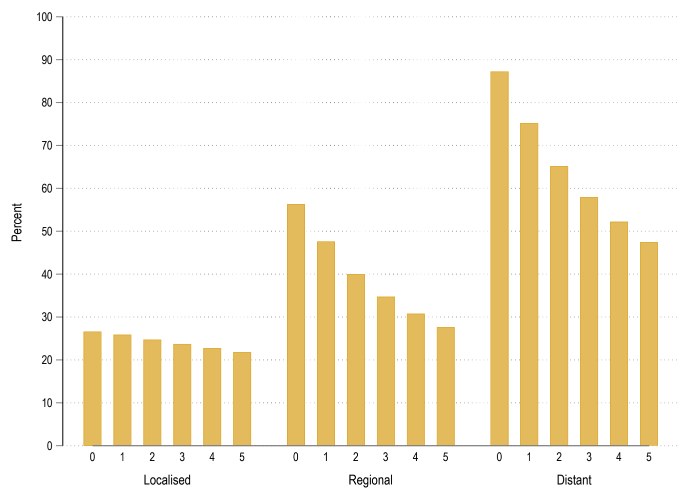


Figure 9.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 71 years at diagnosis (median age). Females



Lung

Figure 9.3: Lung: trends

Figure 9.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

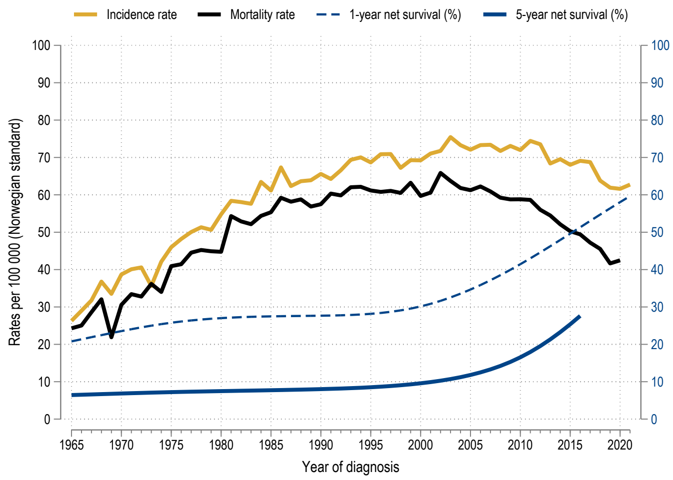


Figure 9.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

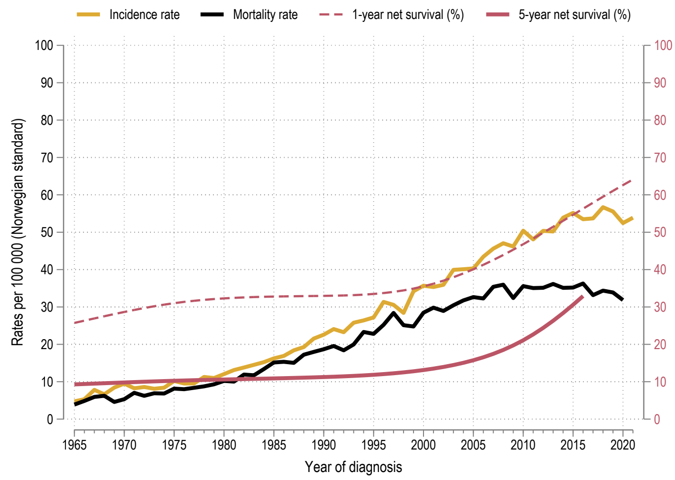


Figure 9.3–C: Trends in reference adjusted all-cause survival

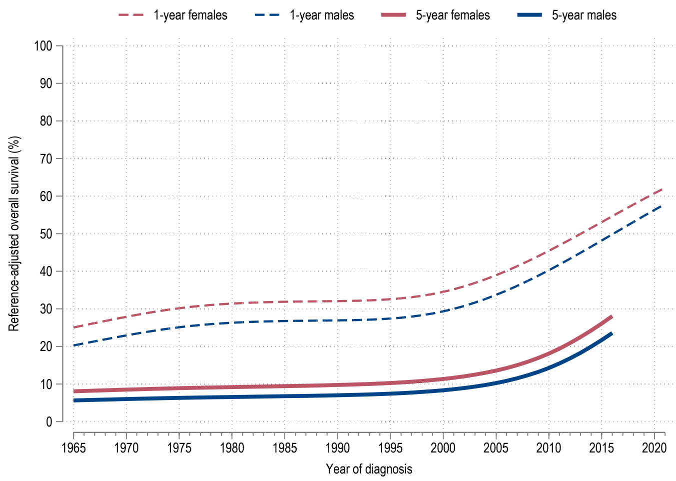


Figure 9.3–D: Trends in reference adjusted crude probability of cancer death

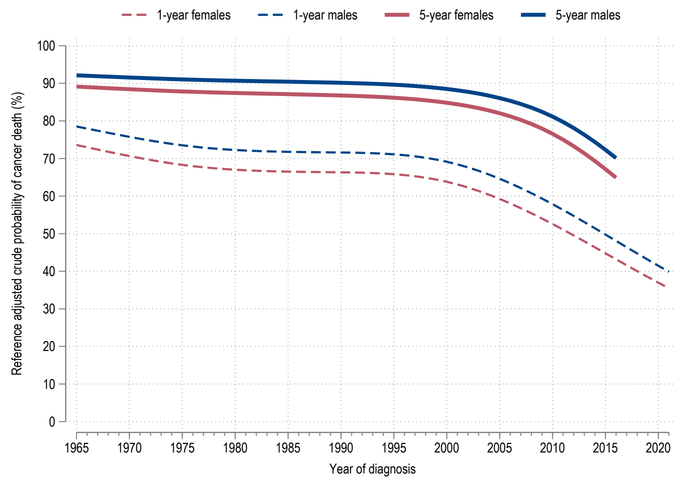


Figure 9.3–E: Trends in reference adjusted life-years lost

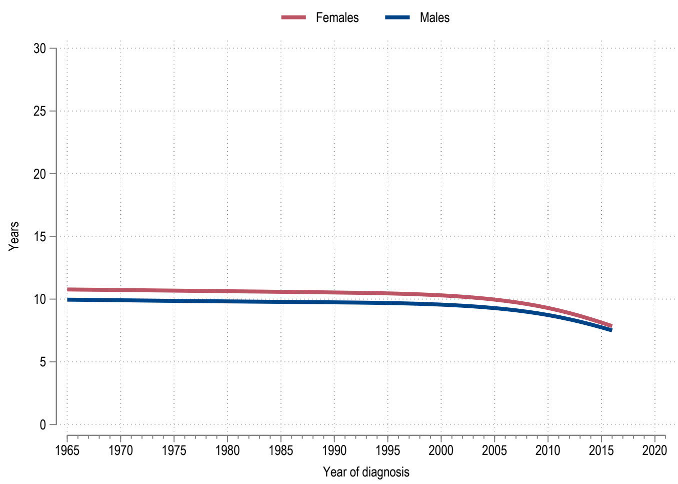
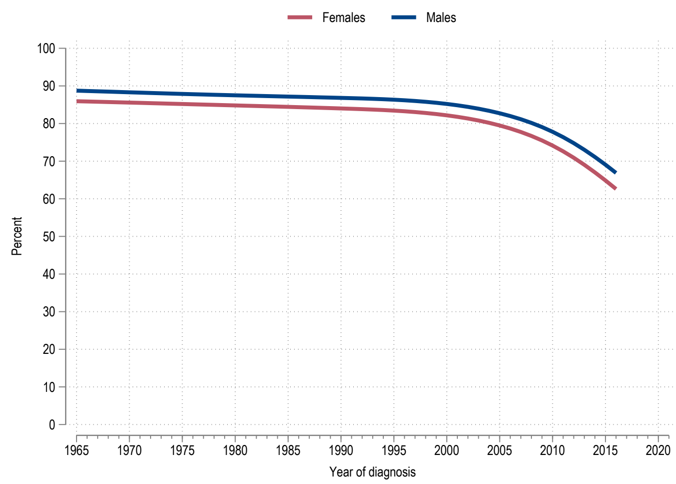


Figure 9.3–F: Trends in reference adjusted life-years lost (%)



Melanoma of the skin

10.1 Net survival and crude probabilities

Net survival among patients with malignant melanoma declines the first years after diagnosis with a five year net survival estimate of 92.1 %. After five years the net survival levels off, with a tendency of reaching a plateau, with ten year net survival equal to 92.1 % for both sexes combined (Figure 10.1–A). There are significant differences between sexes, with women having a higher net survival the first ten years after diagnosis compared to men.

The probability of surviving five years after diagnosis is 82.7 % (Figure 10.1–B). The probability of dying from malignant melanoma within five years is 7.4 % and the additional probability of dying from other causes is 9.9 %. In comparison to net survival, the crude probability of dying from cancer is markedly lower since patients may also die from other causes.

Crude probabilities of malignant melanoma death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 10.1–D and 10.1–C). However, the probability of dying from melanoma also, to some extent, depends on age, with poorer survival in the oldest age groups. In women with localised cancer, the five year crude probability of death due to malignant melanoma is 4.5 % at ages 80–89, while the corresponding probability is 1.6 % at ages 0–49. Among patients with distant metastases at diagnosis, where the risk of dying from cancer is higher, the age gradient is smaller, likely affected by differences in risk of dying from other causes.

Having survived a localised malignant melanoma for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 10.1–F and 10.1–E). However, if distant metastases were present at the time of diagnosis the prognosis will depend on how long you have survived since diagnosis. The largest improvement in prognosis comes from surviving the first two years.As an example, a median aged women with distant metastases at the time of diagnosis, face a five year risk of dying from cancer of 43 %. If surviving five years from diagnosis the future five year risk of dying from melanoma is reduced to 15.2 %. Despite surviving several years after diagnosis, differences in prognosis across stages pertains.

10.2 Life expectancy and life-years lost

The differences in prognosis across stages of malignant melanoma leads to differences in life-years lost. Patients with localised melanoma lose few of their remaining life-years, whereas patients with distant melanoma lose many life-years (Figures 10.2–B and 10.2–A). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. The proportion of life-years losth are similar across ages for all stages (Figures 10.2–D and 10.2–C). These plots also shows the large difference in prognosis across stages, with patients with distant melanoma losing a much larger proportion of their remaining lifetime compared to regional and localised stage melanoma.

The proportion of life-years lost decreases with the number of years survived, for all stages (Figures 10.2–F and 10.2–E). For localised melanoma this proportion approaches zero for a median aged patient. For distant melanoma the proportion declines a lot, for a median aged women from 50.6 % at diagnosis to 22.4 % having survived five years after diagnosis.

10.3 Time trends

Net survival of malignant melanoma has increased over time for both sexes, particularly over the past two decades (Figures 10.3–B and 10.3–A). Correspondingly, the all-cause survival has increased and the crude probability of dying from malignant melanoma has declined (Figures 10.3–C and 10.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 10.3–E and 10.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 8.1 years in 1965 and expected to be 1.4 years in 2016. Correspondingly, the proportion of life-years lost due to malignant melanoma has decreased from 31.9 % in 1965 to an expected 5.6 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 10.1: Melanoma of the skin: net and crude probabilities

Figure 10.1–A: Net survival 0–10 years

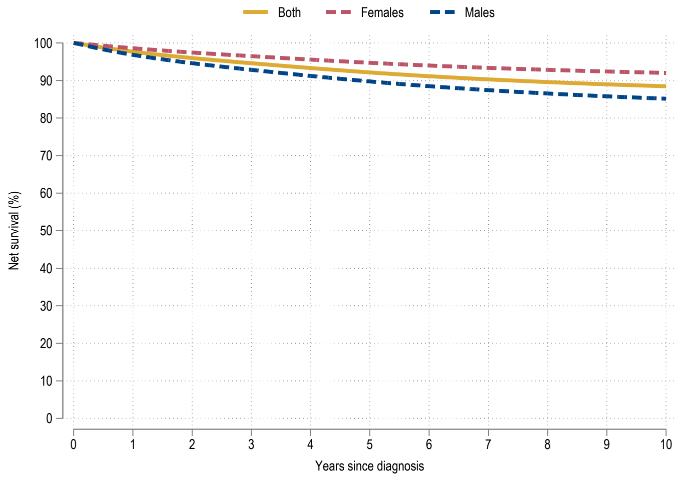


Figure 10.1–B: Crude probabilities 0–10 years

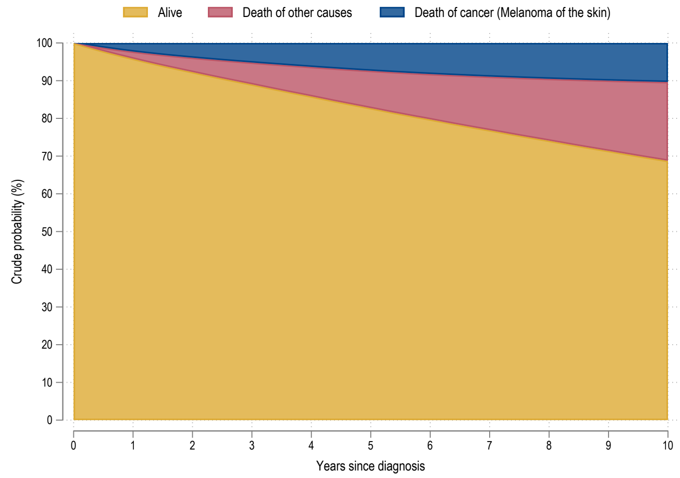


Figure 10.1–C: 5-year crude probabilities by age and stage. Males

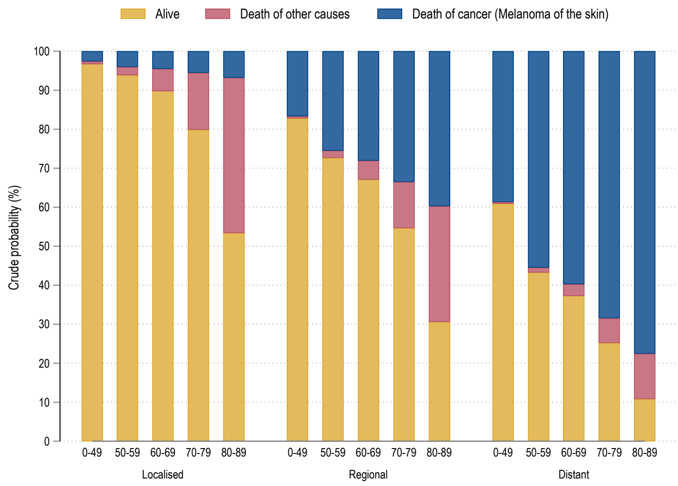


Figure 10.1–D: 5-year crude probabilities by age and stage. Females

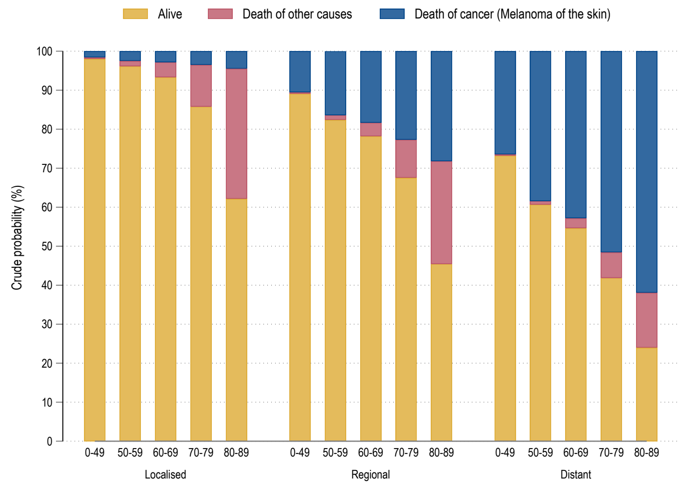


Figure 10.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 66 years at diagnosis (median age). Males

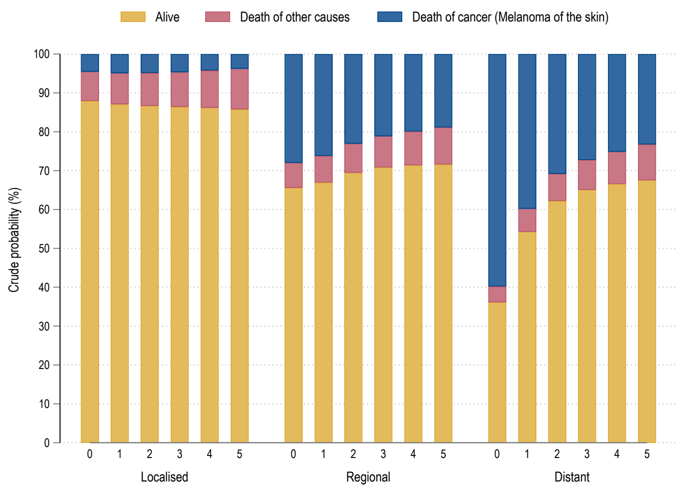
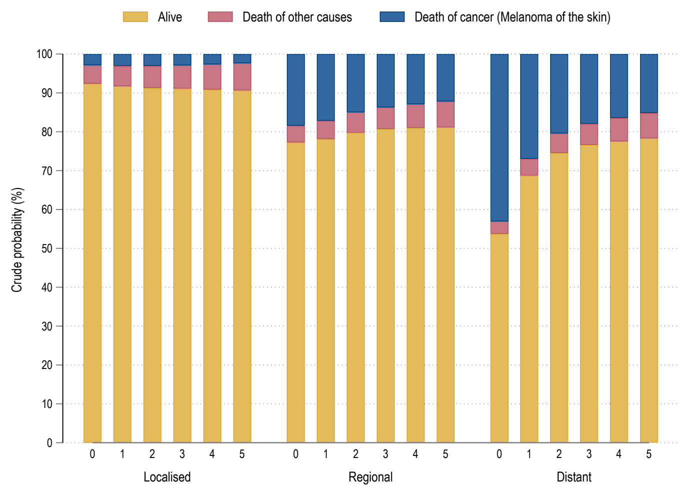


Figure 10.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 66 years at diagnosis (median age). Females



Melanoma of the skin

Figure 10.2: Melanoma of the skin: life expectancy and life-years lost

Figure 10.2–A: Life expectancy by age and stage. Males

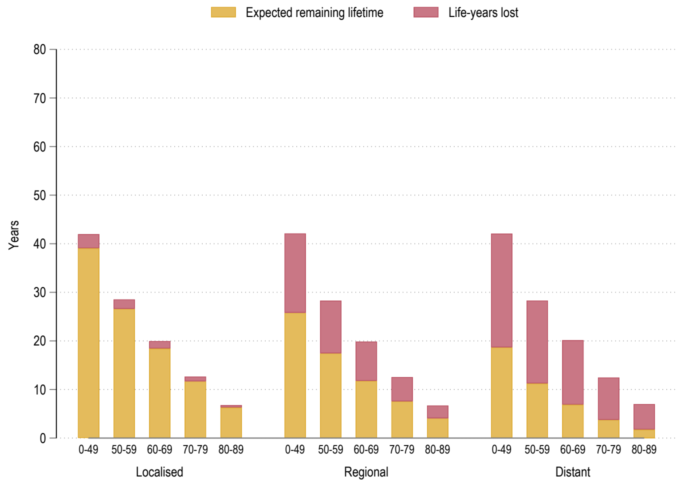


Figure 10.2–B: Life expectancy by age and stage. Females

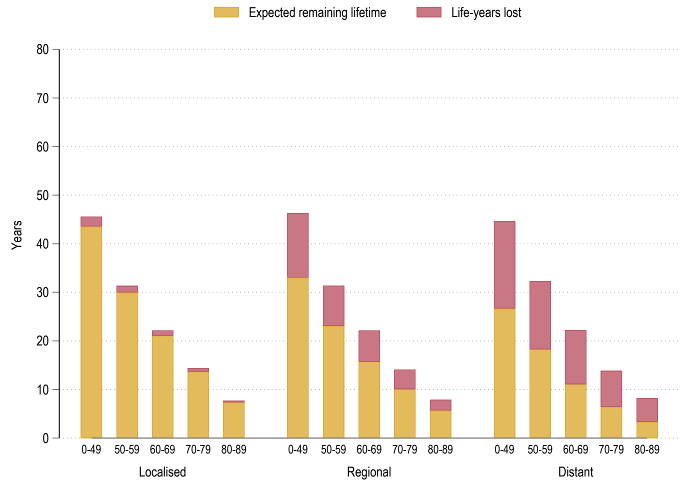


Figure 10.2–C: Proportion of life-years lost. Males

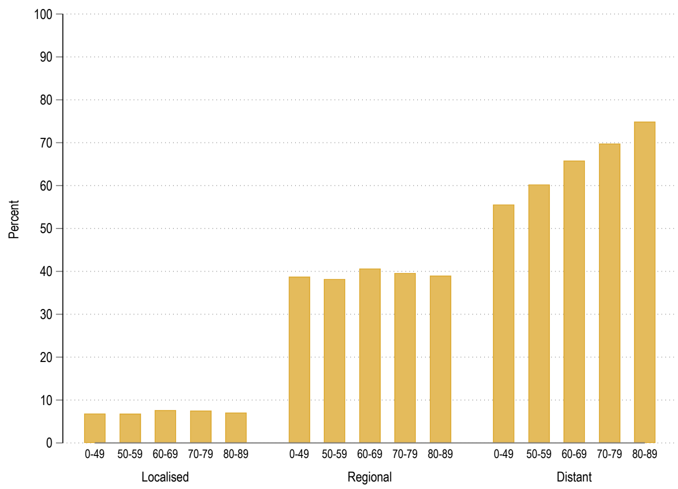


Figure 10.2–D: Proportion of life-years lost. Females

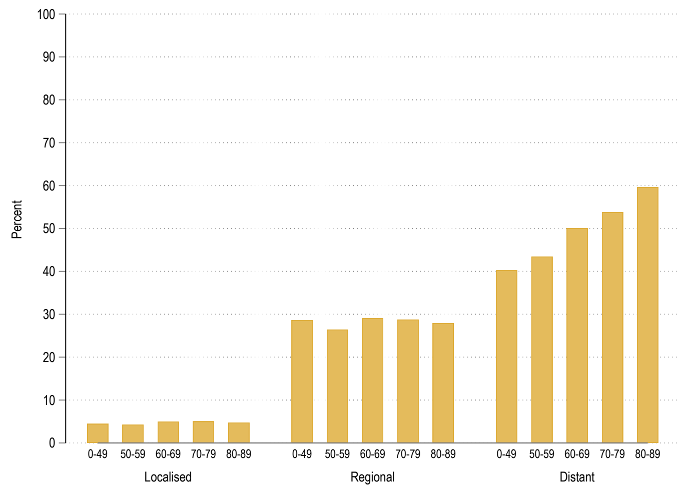


Figure 10.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 66 years at diagnosis (median age). Males

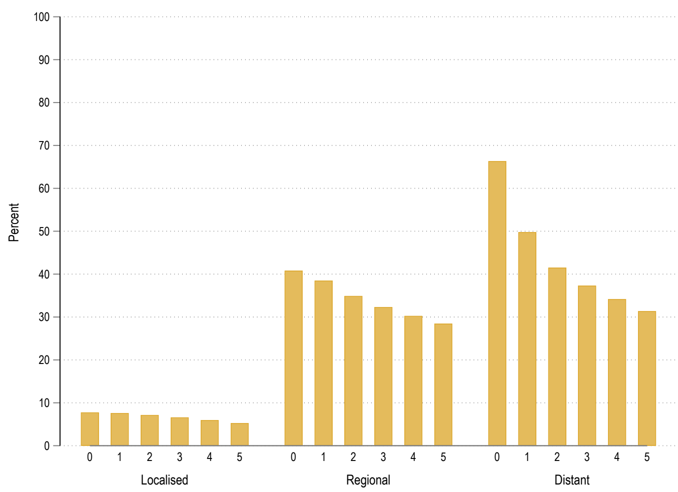


Figure 10.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 66 years at diagnosis (median age). Females

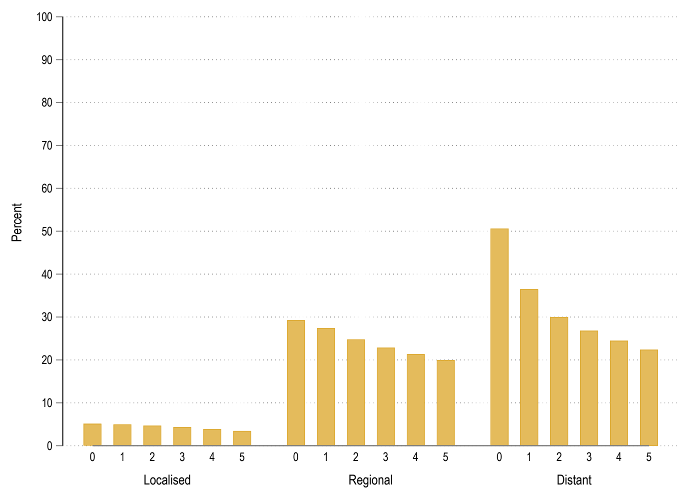


Figure 10.3: Melanoma of the skin: trends

Figure 10.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

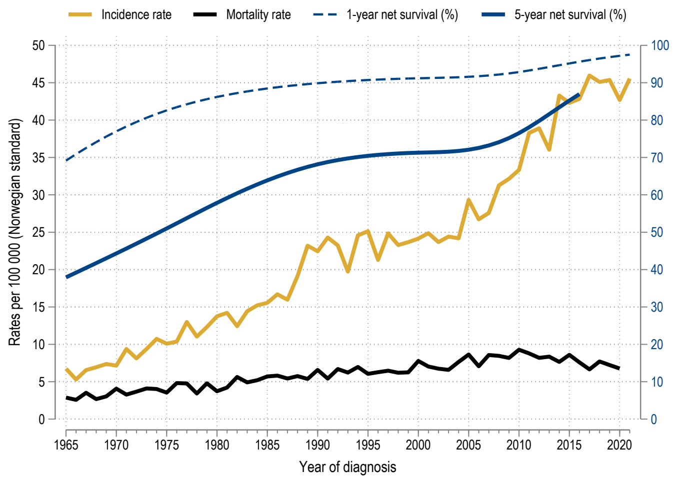


Figure 10.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

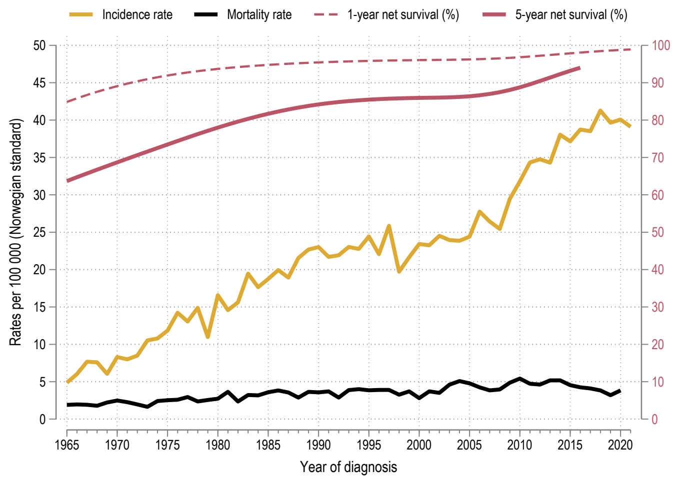


Figure 10.3–C: Trends in reference adjusted all-cause survival

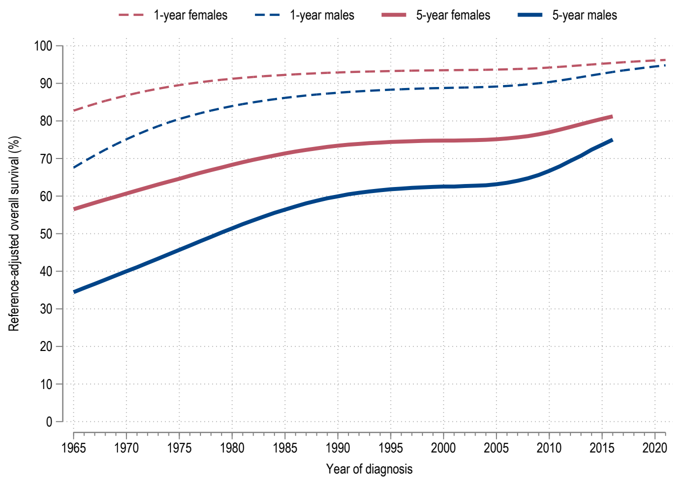


Figure 10.3–D: Trends in reference adjusted crude probability of cancer death

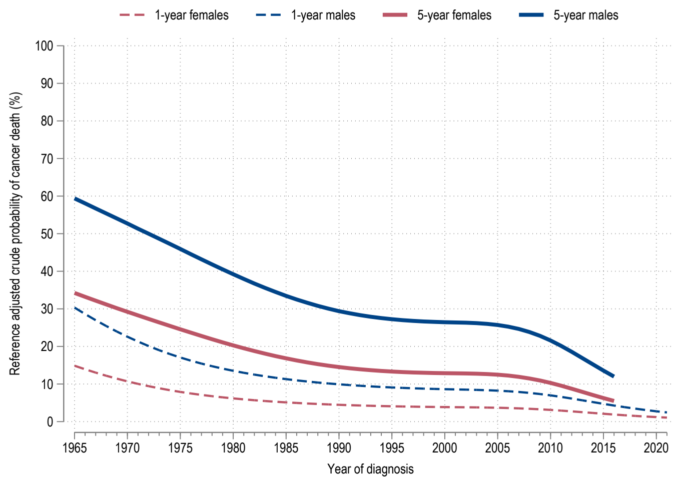


Figure 10.3–E: Trends in reference adjusted life-years lost

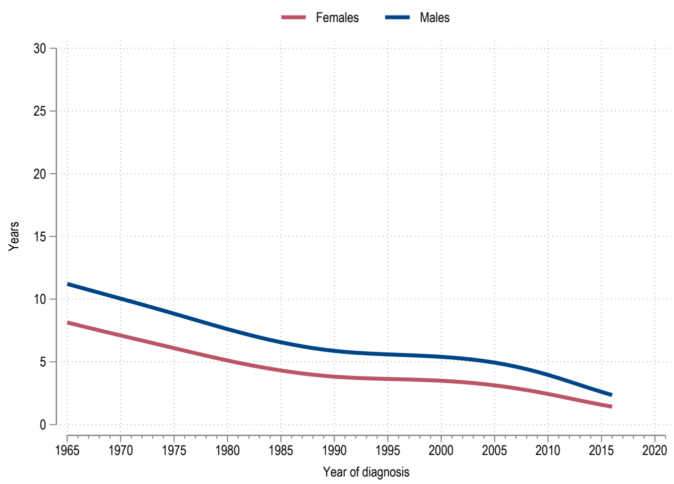
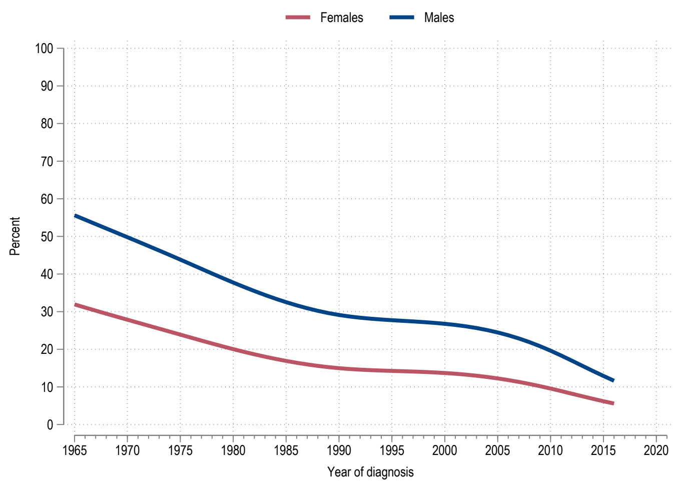


Figure 10.3–F: Trends in reference adjusted life-years lost (%)



Melanoma of the skin

Breast

11.1 Net survival and crude probabilities

Net survival among breast cancer patients steadily declines after diagnosis with a five year net survival estimate of 91.7 %. After five years the net survival continue to decline, without reaching a plateau, with ten year net survival equal to 85.6 % (Figure 11.1–A). This reflect a rather good prognosis for many breast cancer patients, but also illustrates that some of these patients dies from their cancer, or of causes indirectly related to the cancer a long time after diagnosis.

The probability of surviving five years after diagnosis is 86 % (Figure 11.1–B). The probability of dying from breast cancer within five years is 7.9 % and the additional probability of dying from other causes is 6.1 % In comparison to net survival, the crude probability of surviving after breast cancer is only marginally lower, reflecting that a substantial proportion of these patients are younger and therefore at low risk of dying from other causes.

Crude probabilities of breast cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figure 11.1–D). For stage I breast cancer, the five year crude probability of death due to cancer is 0.6 % at ages 60–69, while the corresponding probability is 63.1 % for stage IV breast cancer (Figure 11.1–D). There is also a clear age pattern, where older patients are at a higher risk of dying from breast cancer, especially for more advanced stages.

The probability of dying from breast cancer is only marginally influenced by the number of years survived since diagnosis (Figure 11.1–F). For a median aged, stage I breast cancer patient, the probability of dying from breast cancer within five years after diagnosis is 0.5 %. If surviving five years after diagnosis, the future five-year risk of dying from breast cancer is 1.3 %. In comparison, the probability of dying from stage IV breast cancer within five years after diagnosis is 60.5 %. If surviving five years from diagnosis the future five year risk of dying from breast cancer is 46.1 %.

11.2 Life expectancy and life-years lost

The differences in prognosis across stages of breast cancer leads to differences in life-years lost. Except for the youngest age group, women with stage I breast cancer generally lose few of their remaining life-years, whereas women with stage IV breast cancer lose many life-years (Figure 11.2–B). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. However, the proportion of life-years lost are varying across age groups. Except for stage IV, the youngest women are losing a larger proportion of their remaining lifetime for all stages, possibly reflecting different patterns in aggressiveness across ages (Figure 11.2–D). These plots also shows the large difference in prognosis across stages, with women with stage IV breast cancer losing a much larger proportion of their remaining lifetime compared to less advanced stages.

The proportion of life-years lost is quite similar across number of years survived for stage I and II breast cancer. For more advanced stages, this proportion declines with number of years survived since diagnosis (Figure 11.2–F). A median aged patient with stage IV breast cancer is expected to lose 74.9 % of their remaining lifetime at the time of diagnosis. If surviving five years after diagnosis this proportion declines to 58.9 %.

11.3 Time trends

Net survival of breast cancer has increased over time, and in particular the last two decades (Figure 11.3–B). These improvements must be seen in light of the gradual introduction of organized screening, leading to a large increase in incidence of lower stage breast cancer. In addition, continuous improvement in treatment have occurred, particularly during over the past two decades. Correspondingly, all-cause survival has increased and the crude probability of dying from breast cancer has declined (Figures 11.3–C and 11.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 11.3–E and 11.3–F). As an example, the number of life-years lost, if life expectancy is held constant at 2021-level, was on average 12.5 years in 1965 and expected to be 3.1 years in 2016. Correspondingly, the proportion of life-years lost due to breast cancer has declined from 48.4 % in 1965 to an expected 12.2 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 11.1: Breast: net and crude probabilities

Figure 11.1–A: Net survival 0–10 years

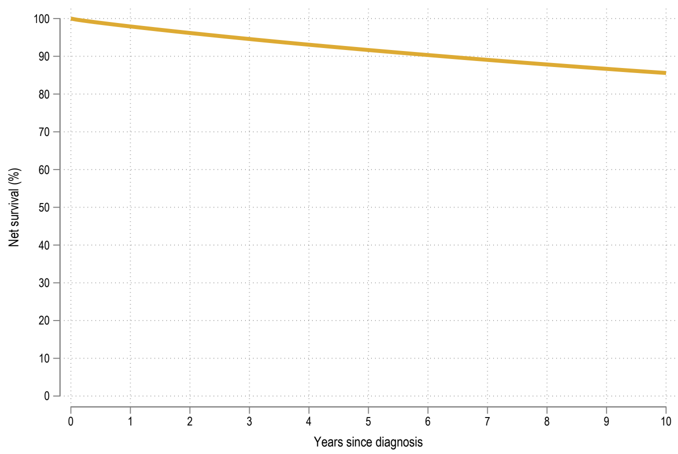


Figure 11.1–B: Crude probabilities 0–10 years

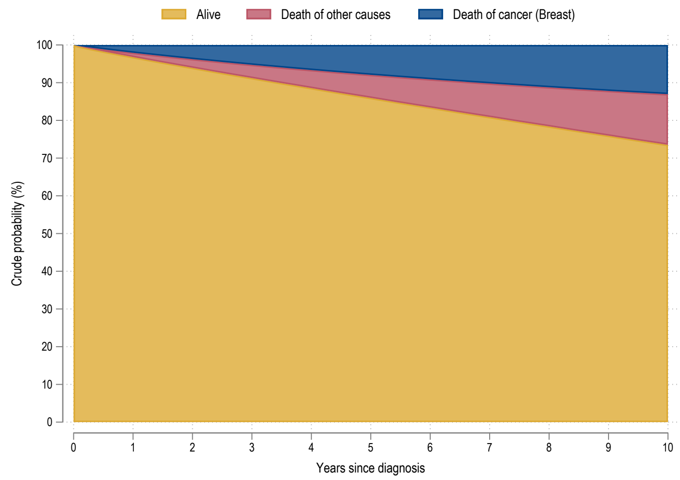


Figure 11.1–C: 5-year crude probabilities by age and stage. Males

Figure 11.1–D: 5-year crude probabilities by age and stage. Females

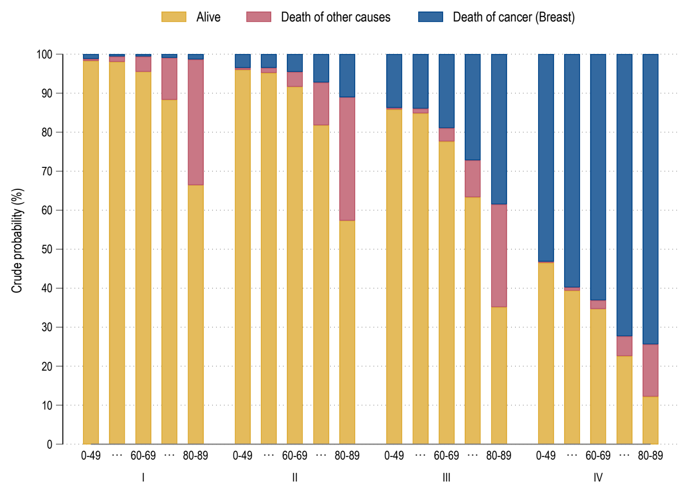
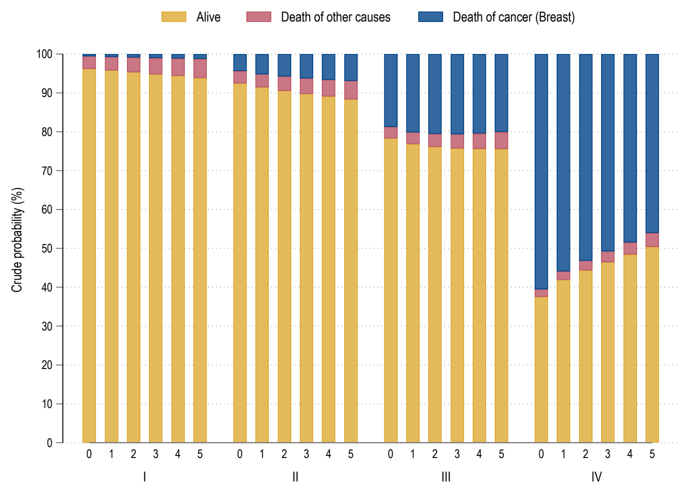


Figure 11.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 62 years at diagnosis (median age). Males

Figure 11.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 62 years at diagnosis (median age). Females



Breast

Figure 11.2: Breast: life expectancy and life-years lost

Figure 11.2–A: Life expectancy by age and stage. Males

Figure 11.2–B: Life expectancy by age and stage. Females

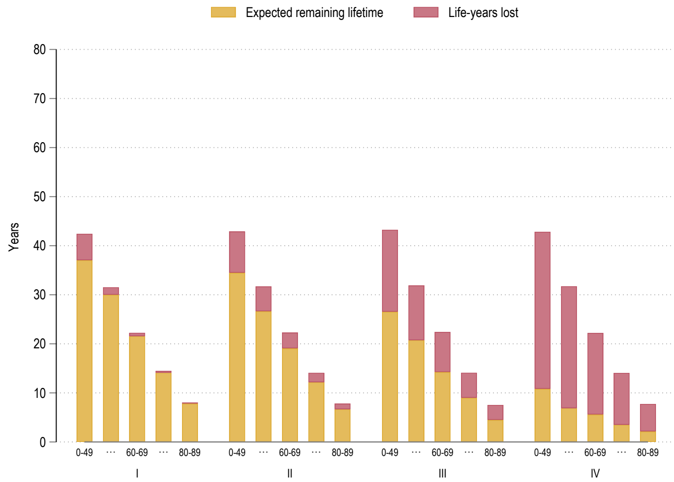


Figure 11.2–C: Proportion of life-years lost. Males

Figure 11.2–D: Proportion of life-years lost. Females

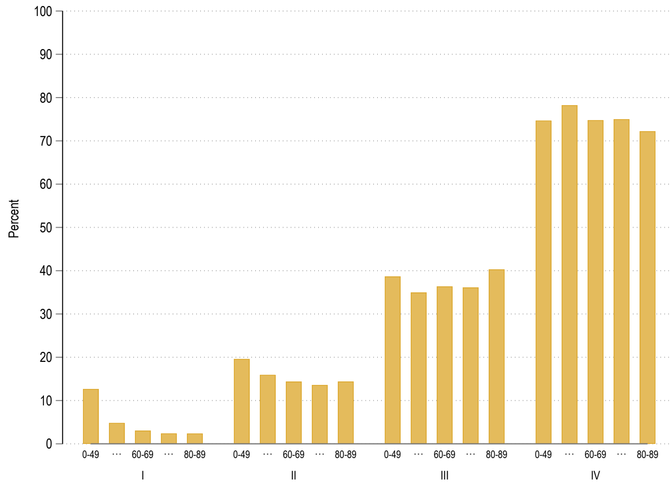
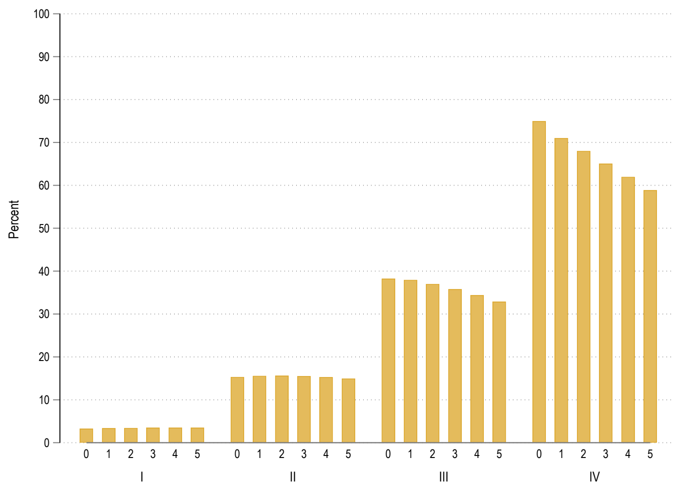


Figure 11.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 62 years at diagnosis (median age). Males

Figure 11.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 62 years at diagnosis (median age). Females



Breast

Figure 11.3: Breast: trends

Figure 11.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

Figure 11.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

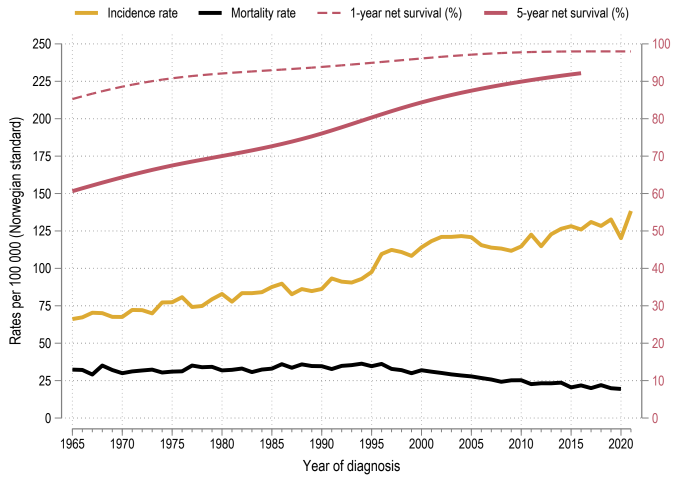


Figure 11.3–C: Trends in reference adjusted all-cause survival

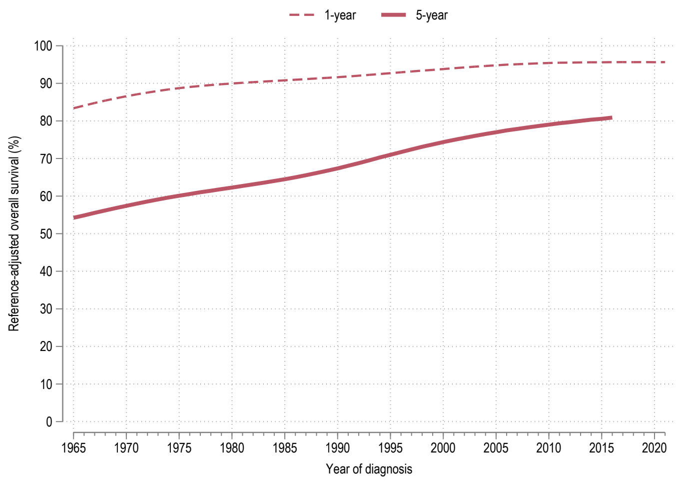


Figure 11.3–D: Trends in reference adjusted crude probability of cancer death

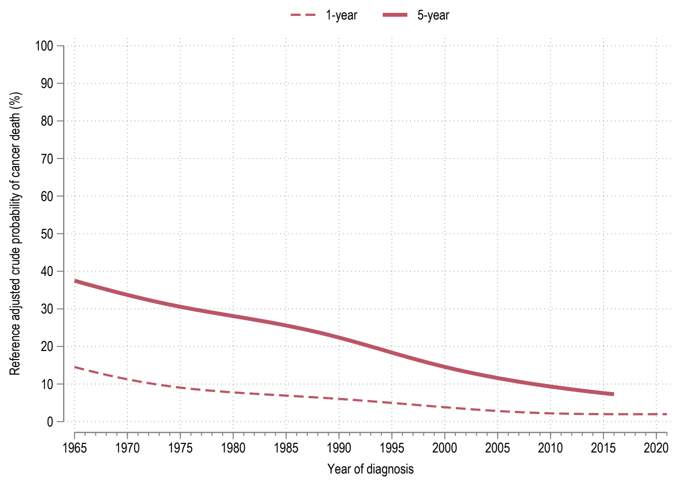


Figure 11.3–E: Trends in reference adjusted life-years lost

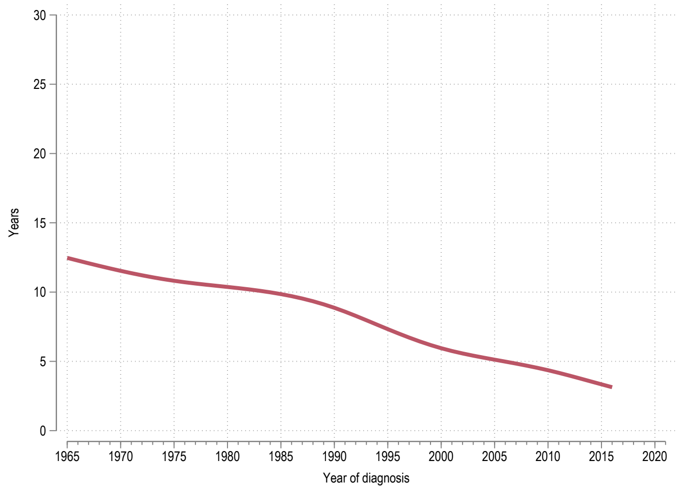
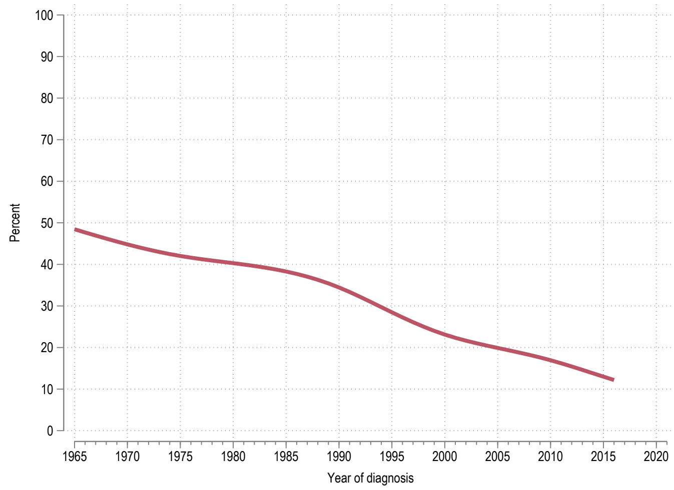


Figure 11.3–F: Trends in reference adjusted life-years lost (%)



Breast

Cervix uteri

12.1 Net survival and crude probabilities

Net survival among cervical cancer patients declines somewhat after diagnosis with a five year net survival estimate of 82 %. After five years the decline levels off, but without reaching a plateau, with ten year net survival equal to 77.5 % (Figure 12.1–A). This reflect a rather good prognosis for many cervical cancer patients, related to many patients being diagnosed at en early stage where the disease is possible to treat curative.

The probability of surviving five years after diagnosis is 80.1 % (Figure 12.1–B). The probability of dying from cervical cancer within five years is 17.7 % and the additional probability of dying from other causes is 2.2 % In comparison to net survival, the crude probability of surviving after cervical cancer is only marginally lower, reflecting that a substantial proportion of these patients are younger and therefore at low risk of dying from other causes.

Crude probabilities of cervical cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figure 12.1–D). For stage I cervical cancer, the five year crude probability of death due to cancer is 4 % at ages 45–54, while the corresponding probability is 76.9 % for stage IV cervical cancer (Figure 12.1–D). There is also a clear age pattern, where older patients are at a higher risk of dying from cervical cancer, especially for more advanced stages.

The probability of dying from cervical cancer is influenced by the number of years survived since diagnosis (Figure 12.1–F). For a median aged patient with stage I cervical cancer the future five year survival after surviving one, two and up to five years after diagnosis is generally high. For more advanced stages the future five year survival increases with number of years survived. For a median aged stage IV cervical cancer patient, the probability of dying from cervical cancer within five years after diagnosis is 80.6 %. If surviving five years after diagnosis, the future five year survival is 39.7 %.

12.2 Life expectancy and life-years lost

The differences in prognosis across stages of cervical cancer leads to differences in life-years lost. Women with stage I cervical cancer generally lose few of their remaining life-years, whereas women with stage IV cervical cancer lose many life-years (Figure 12.2–B). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. The proportion of life-years lost increases slightly with age (Figure 12.2–D). These plots also shows the large difference in prognosis across stages, with women with more advanced cervical cancer losing a much larger proportion of their remaining lifetime compared to less advanced stages.

The proportion of life-years lost is affected by the number of years survived for all cervical cancer stages (Figure 12.2–F). For a median aged patient with stage I cervical cancer this proportion approaches zero. For more advanced stages this proportion stays well above zero also after surviving the first five years. A median aged patient with stage IV cervical cancer is expected to lose 88 % of her remaining lifetime at the time of diagnosis. If surviving five years after diagnosis this proportion declines to 60.9 %.

12.3 Time trends

Net survival of cervical cancer has been quite high throughout time, but has also increased, in particular the last three decades (Figure 12.3–B). Organized screening for the age group 25-69 years old was introduced in 1995. The relationship between a national cervical cancer screening program and national survival statistics are, however, not straightforward [24].

Correspondingly, the all-cause survival has increased and the crude probability of dying from cervical cancer has declined (Figures 12.3–C and 12.3–D). This has also, to some extent, affected life-years lost, with both the number and proportion of life-years lost declining somewhat over time (Figures 12.3–E and 12.3–F). As an example, the number of life-years lost, if life expectancy is held constant at 2021-level, was on average 12 years in 1965 and expected to be 8.5 years in 2016. Correspondingly, the proportion of life-years lost due to cervical cancer has declined from 31.7 % in 1965 to an expected 22.5 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 12.1: Cervix uteri: net and crude probabilities

Figure 12.1–A: Net survival 0–10 years

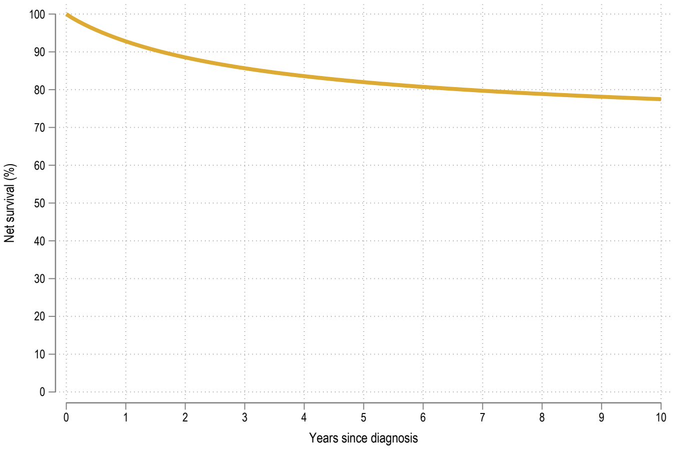


Figure 12.1–B: Crude probabilities 0–10 years

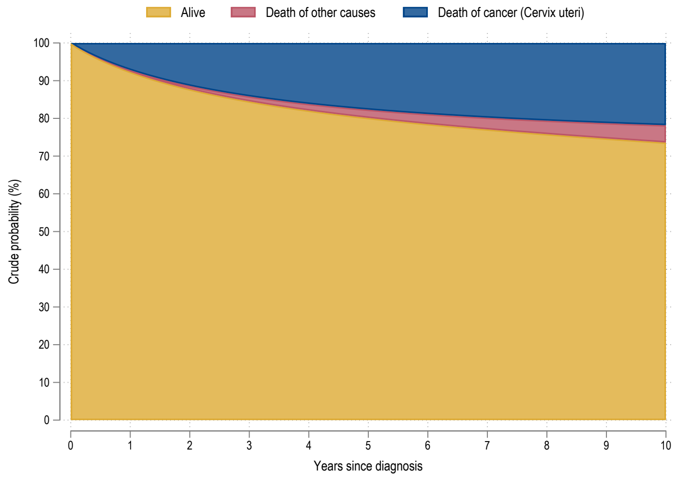


Figure 12.1–C: 5-year crude probabilities by age and stage. Males

Figure 12.1–D: 5-year crude probabilities by age and stage. Females

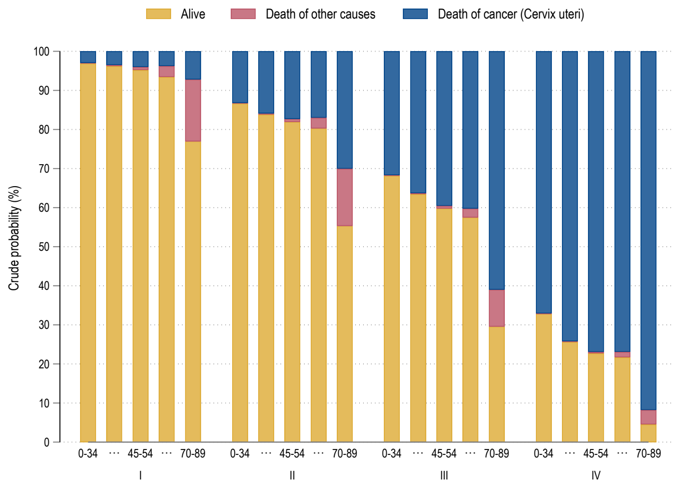


Figure 12.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 46 years at diagnosis (median age). Males

Figure 12.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 46 years at diagnosis (median age). Females

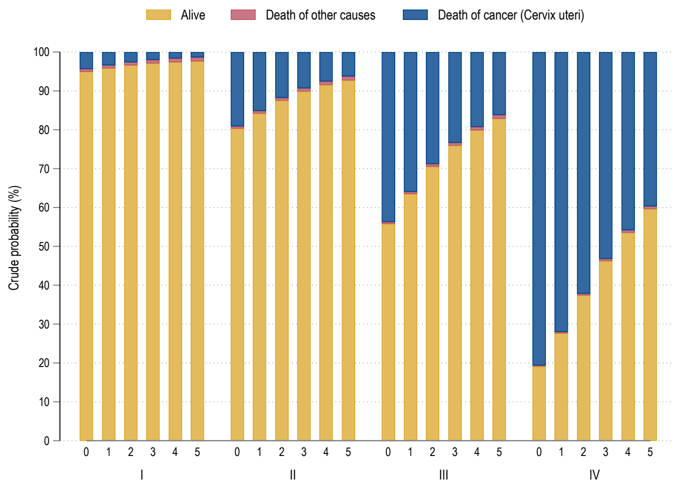


Figure 12.2: Cervix uteri: life expectancy and life-years lost

Figure 12.2–A: Life expectancy by age and stage. Males

Figure 12.2–B: Life expectancy by age and stage. Females

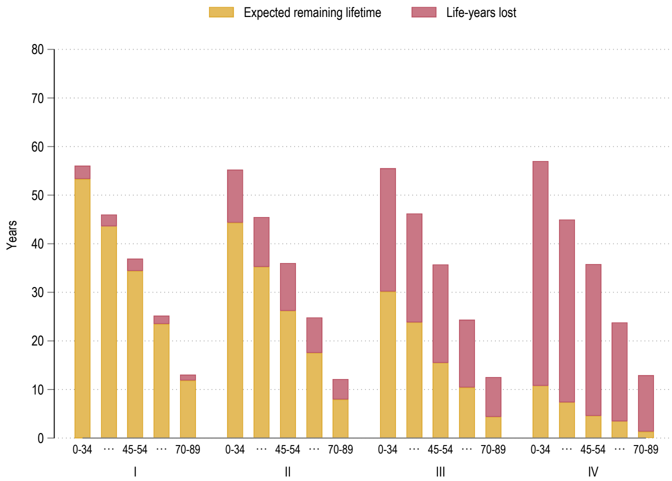


Figure 12.2–C: Proportion of life-years lost. Males

Figure 12.2–D: Proportion of life-years lost. Females

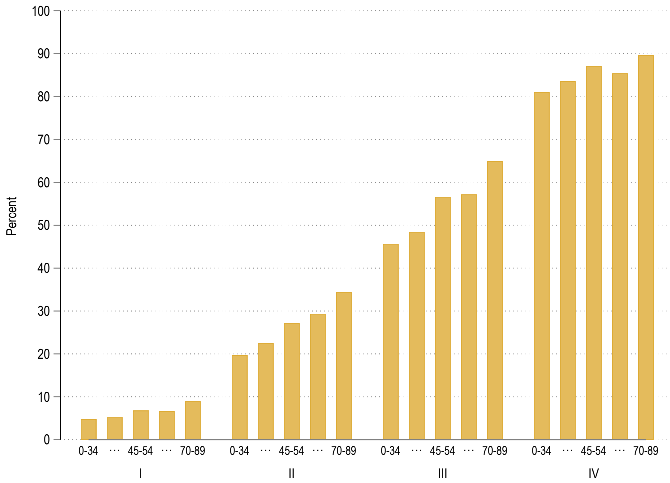
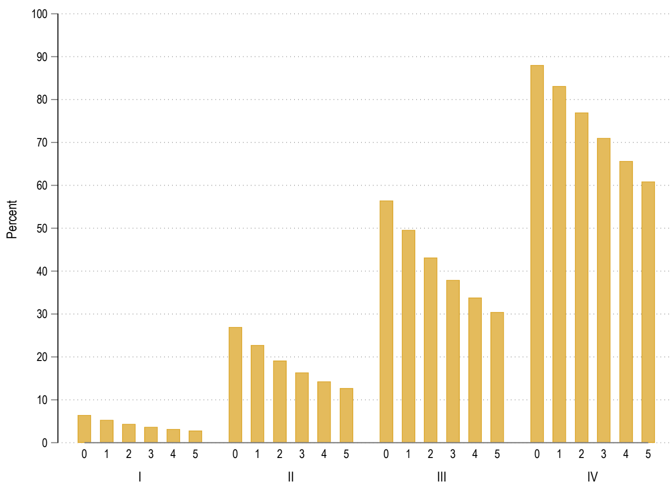


Figure 12.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 46 years at diagnosis (median age). Males

Figure 12.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 46 years at diagnosis (median age). Females



Cervix uteri

Figure 12.3: Cervix uteri: trends

Figure 12.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

Figure 12.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

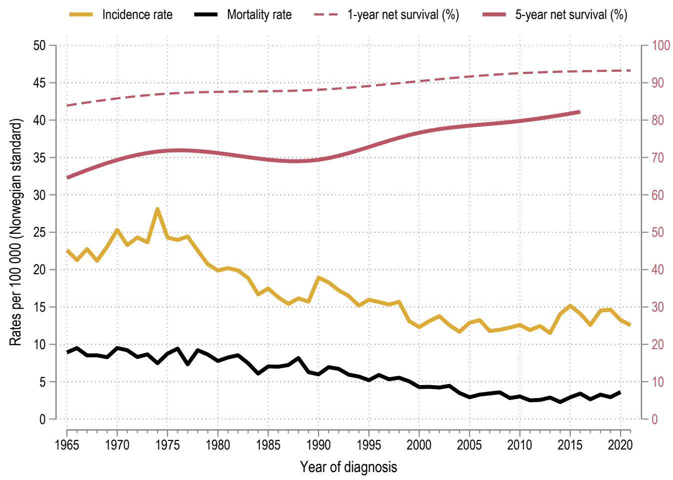


Figure 12.3–C: Trends in reference adjusted all-cause survival

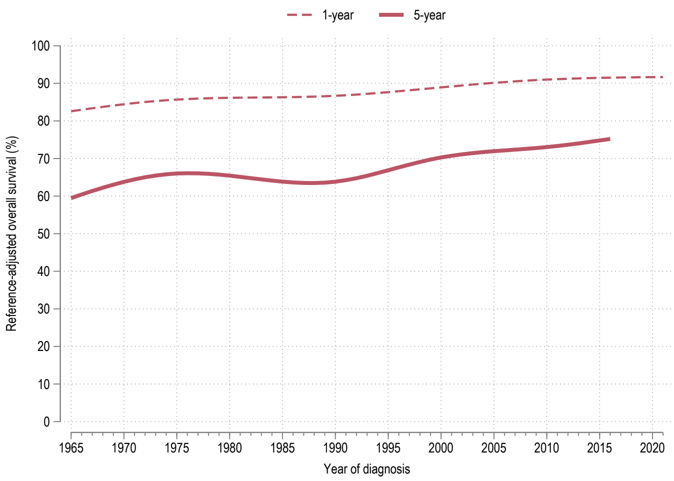


Figure 12.3–D: Trends in reference adjusted crude probability of cancer death

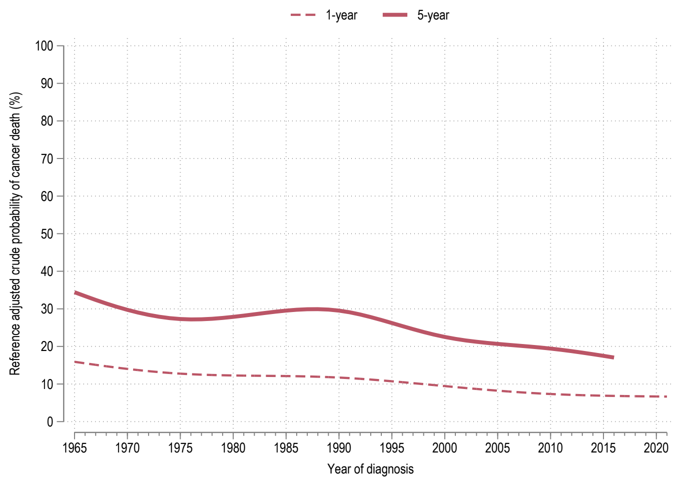


Figure 12.3–E: Trends in reference adjusted life-years lost

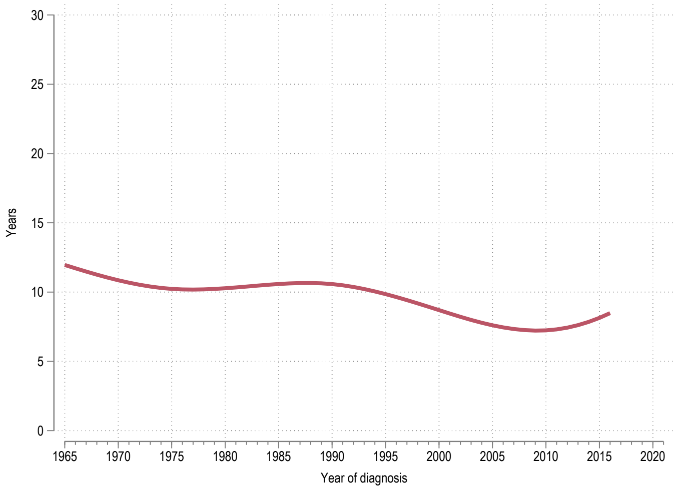
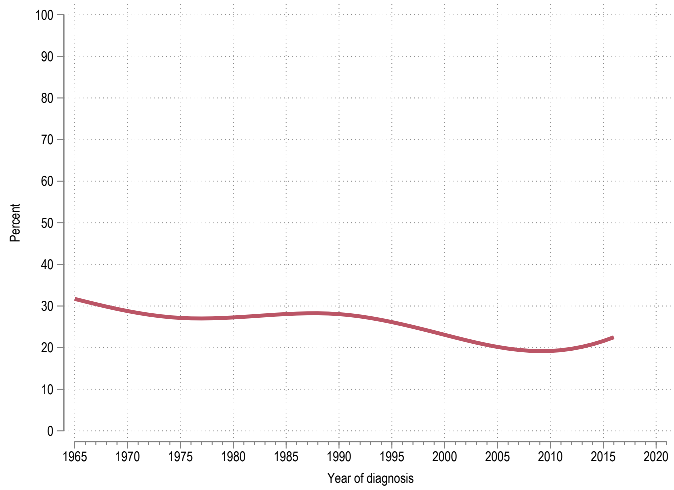


Figure 12.3–F: Trends in reference adjusted life-years lost (%)



Cervix uteri

Corpus uteri

13.1 Net survival and crude probabilities

Net survival among patients with corpus uteri cancer declines somewhat the first years after diagnosis with a five year net survival estimate of 85.7 %. After five years the net survival seems to reach a plateau, with ten year net survival equal to 83.7 % (Figure 13.1–A). This reflect a rather good prognosis for many corpus uteri cancer patients, and also illustrates that many of these patients may be hoping to live a long time after the cancer diagnosis and potentially be cured.

The probability of surviving five years after diagnosis is 78 % (Figure 13.1–B). The probability of dying from corpus uteri cancer within five years is 13.7 % and the additional probability of dying from other causes is 8.3 % In comparison to net survival, the crude probability of surviving after corpus uteri cancer is somewhat lower, reflecting that a substantial proportion of these patients are older and therefore at risk of dying from other causes.

Crude probabilities of corpus uteri cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figure 13.1–D). For localised corpus uteri cancer, the five year crude probability of death due to cancer is 3.7 % at ages 60–69, while the corresponding probability is 54.4 % for distant corpus uteri cancer (Figure 13.1–D). There is also a clear age pattern, where older patients are at a higher risk of dying from breast cancer, especially for more advanced stages.

Having survived a localised corpus uteri cancer for one, two or up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figure 13.1–F). However, if regional or distant metastases were present at time of diagnosis it will strongly influence the future five-year survival conditioning on surviving one, two or up to five years. The longer a patient survives the better future survival and the more similar future survival across stages.

13.2 Life expectancy and life-years lost

The differences in prognosis across stages of corpus uteri cancer leads to differences in life-years lost. Women with localised corpus uteri cancer generally lose few of their remaining life-years, whereas women with distant corpus uteri cancer lose many life-years (Figure 13.2–B). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. However,the proportion of life-years lost are varying across age groups for more advanced stages, with older women losing a larger proportion of their remaining lifetime (Figure 13.2–D). These plots also shows the large difference in prognosis across stages, with women with distant corpus uteri cancer losing a much larger proportion of their remaining lifetime compared to localised stage.

The proportion of life-years lost decreases with the number of years survived, for all stages (Figure 13.2–F).For localised corpus uteri cancer this proportion approaches zero for a median aged patient. For distant corpus uteri cancer the proportion declines substantially, from 62.1 % at diagnosis to 23.7 % having survived five years after diagnosis.

13.3 Time trends

Net survival of corpus uteri cancer has increased over time and been stable at a high level the most recent years (Figure 13.3–B).Correspondingly, all-cause survival has increased and the crude probability of dying from corpus uteri cancer has declined (Figures 13.3–C and 13.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 13.3–E and 13.3–F). As an example, the number of life-years lost, if life expectancy is held constant at 2021-level, was on average 9.3 years in 1965 and expected to be 2.8 years in 2016. Correspondingly, the proportion of life-years lost due to corpus uteri cancer has declined from 44.6 % in 1965 to an expected 13.2 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 13.1: Corpus uteri: net and crude probabilities

Figure 13.1–A: Net survival 0–10 years

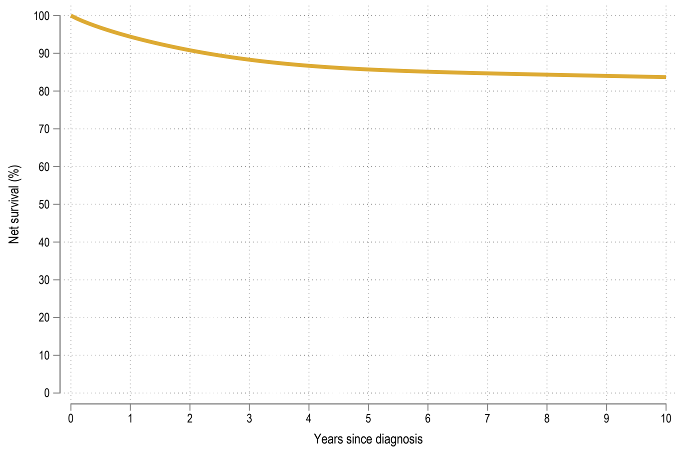


Figure 13.1–B: Crude probabilities 0–10 years

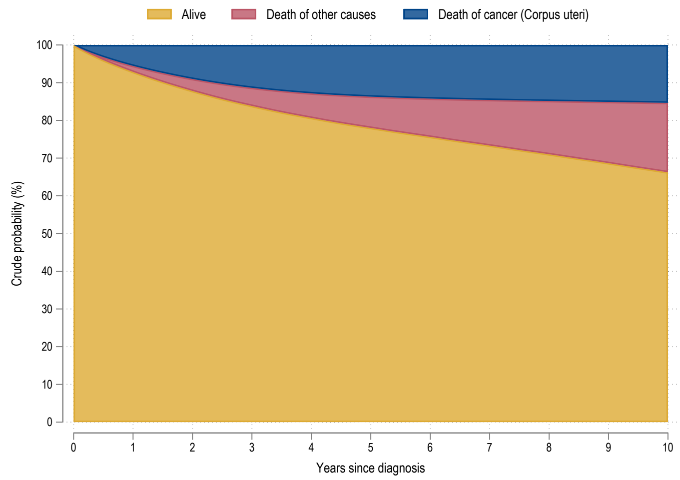


Figure 13.1–C: 5-year crude probabilities by age and stage. Males

Figure 13.1–D: 5-year crude probabilities by age and stage. Females

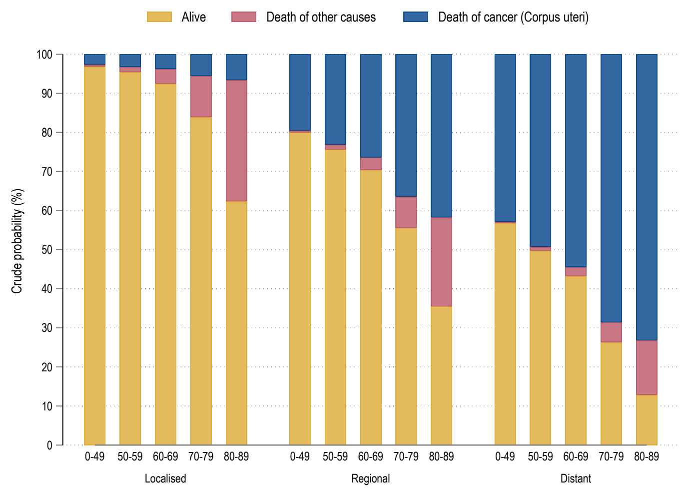
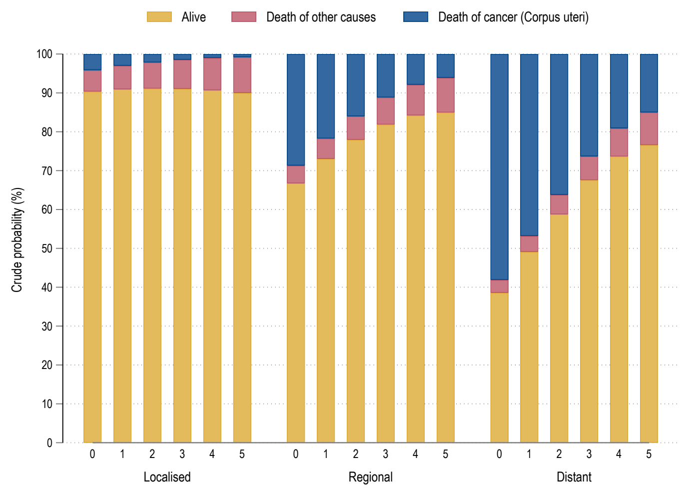


Figure 13.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 68 years at diagnosis (median age). Males

Figure 13.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 68 years at diagnosis (median age). Females



Corpus uteri

Figure 13.2: Corpus uteri: life expectancy and life-years lost

Figure 13.2–A: Life expectancy by age and stage. Males

Figure 13.2–B: Life expectancy by age and stage. Females

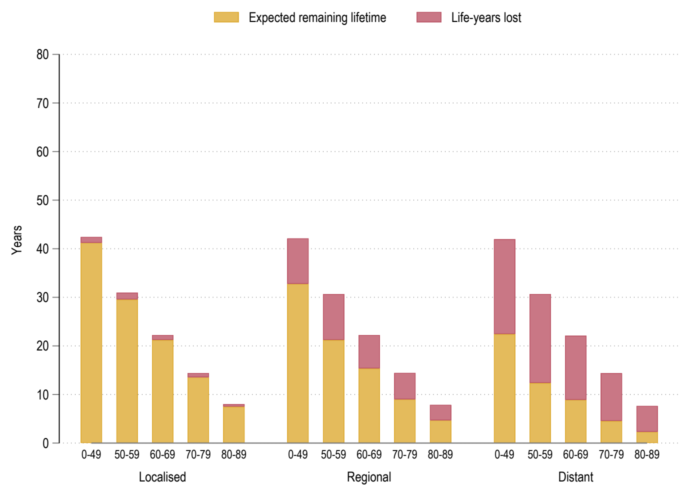


Figure 13.2–C: Proportion of life-years lost. Males

Figure 13.2–D: Proportion of life-years lost. Females

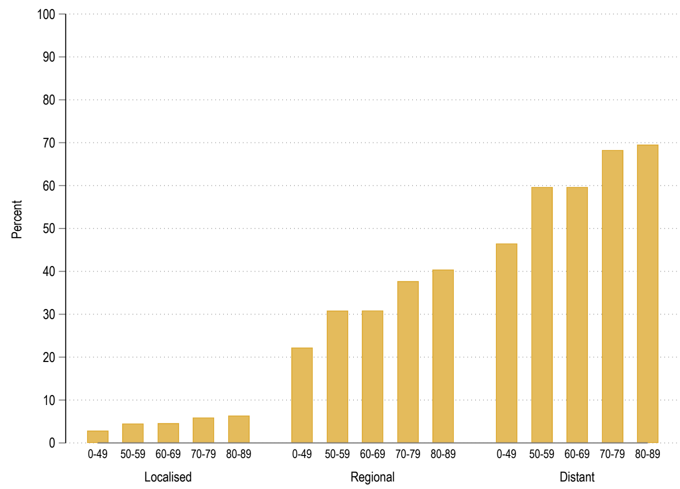
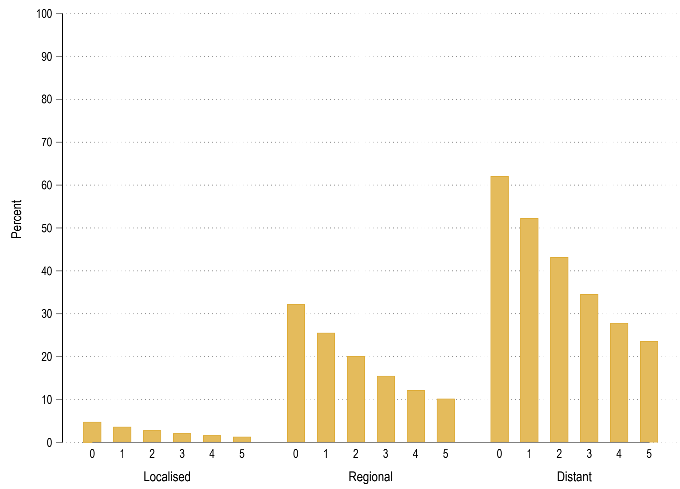


Figure 13.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 68 years at diagnosis (median age). Males

Figure 13.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 68 years at diagnosis (median age). Females



Corpus uteri

Figure 13.3: Corpus uteri: trends

Figure 13.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

Figure 13.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

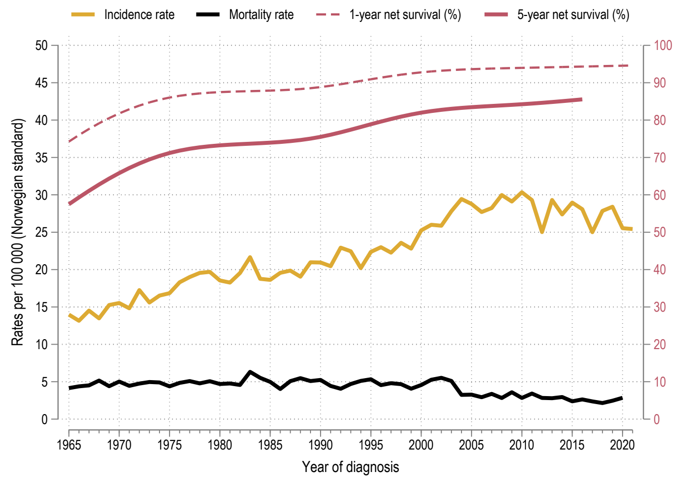


Figure 13.3–C: Trends in reference adjusted all-cause survival

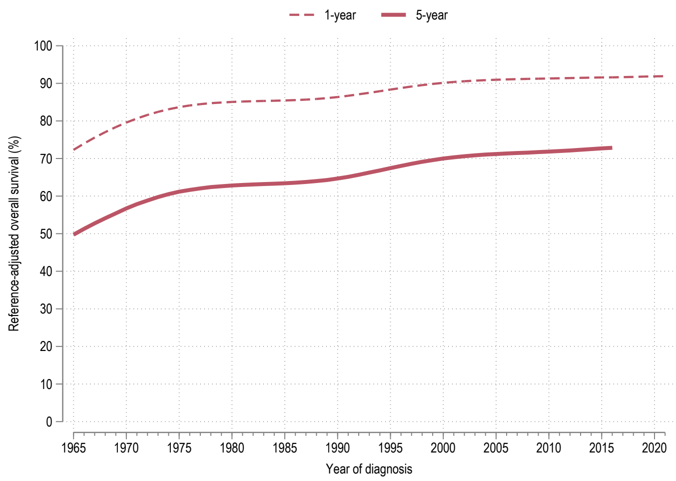


Figure 13.3–D: Trends in reference adjusted crude probability of cancer death

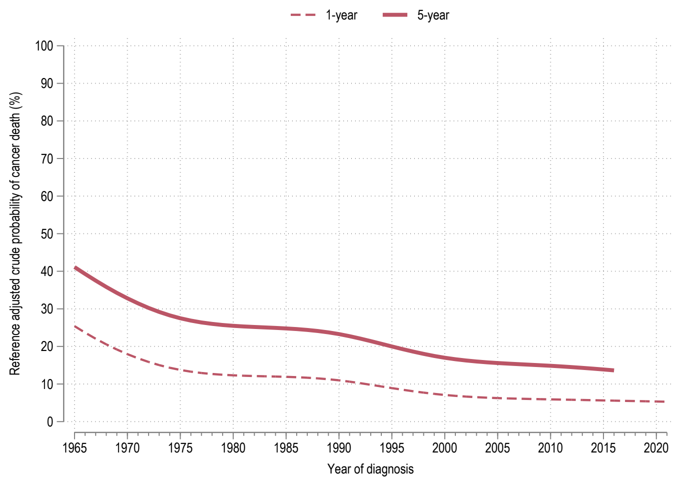


Figure 13.3–E: Trends in reference adjusted life-years lost

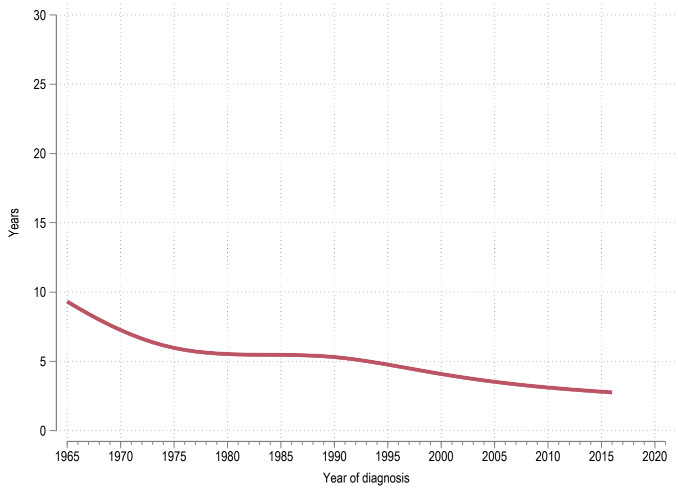
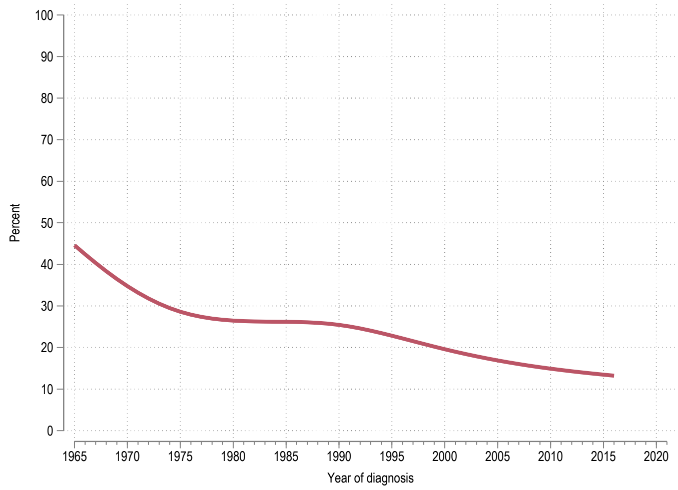


Figure 13.3–F: Trends in reference adjusted life-years lost (%)



Corpus uteri

Ovary

14.1 Net survival and crude probabilities

Net survival among ovarian cancer patients declines quite sharply after diagnosis with a five year net survival estimate of 50.3 %. After five years the net survival levels off with a tendency to reach a plateau, with a ten year net survival equal to 39.9 % (Figure 14.1–A). This reflect a rather poor prognosis for many ovarian cancer patients, with a large proportion of patients being diagnosed with distant metastases at diagnosis.

The probability of surviving five years after diagnosis is 47.2 % (Figure 14.1–B). The probability of dying from ovarian cancer within five years is 48.1 % and the additional probability of dying from other causes is 4.7 % In comparison to net survival, the crude probability of surviving after ovarian cancer is only marginally lower, reflecting both a rather high risk of cancer death and also that a substantial proportion of these patients are younger and therefore at low risk of dying from other causes.

Crude probabilities of ovarian cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figure 14.1–D). For localised ovarian cancer, the five year crude probability of death due to cancer is 5.8 % at ages 60–69, while the corresponding probability is 62 % for distant ovarian cancer (Figure 14.1–D). Except for localised cancer, there is a clear age pattern, where older patients are at a higher risk of dying from their cancer.

The probability of dying from ovarian cancer is only marginally influenced by the number of years survived since diagnosis (Figure 14.1–F). For a median aged patient with localised ovarian cancer, the probability of dying from cancer within five years after diagnosis is 5.6 %, and the same five year risk is 4.3 % if surviving five years after diagnosis. In comparison, the probability of dying from distant ovarian cancer within five years after diagnosis is 61.5 %. If surviving five years from diagnosis the future five year risk of dying from cancer is reduced to 37.9 %.

14.2 Life expectancy and life-years lost

The differences in prognosis across stages of breast cancer leads to differences in life-years lost. Women with localised ovarian cancer generally lose few of their remaining life-years, whereas women distant ovarian cancer lose many life-years (Figure 14.2–B). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. However, When looking at the proportion of life-years lost the effect of age is less clear (Figure 14.2–D). These plots also shows the large difference in prognosis across stages, with women with localised cancer losing a much smaller proportion of their remaining lifetime compared to more advanced stages.

The proportion of life-years lost is slowly declining with the number of years survived for all stages (Figure 14.2–F). A median aged patient with distant ovarian cancer is expected to lose 69 % of her remaining lifetime at the time of diagnosis. If surviving five years after diagnosis this proportion declines to 45.1 %.

14.3 Time trends

Net survival of ovarian cancer has increased over time and in particular over the past two decades (Figure 14.3–B). Correspondingly, all-cause survival has increased and the crude probability of dying from ovarian cancer has declined (Figures 14.3–C and 14.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 14.3–E and 14.3–F). As an example, the number of life-years lost, if life expectancy is held constant at 2021-level, was on average 14.4 years in 1965 and expected to be 14.3 years in 2016. Correspondingly, the proportion of life-years lost due to ovarian cancer has declined from 64.1 % in 1965 to an expected 63.5 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 14.1: Ovary: net and crude probabilities

Figure 14.1–A: Net survival 0–10 years

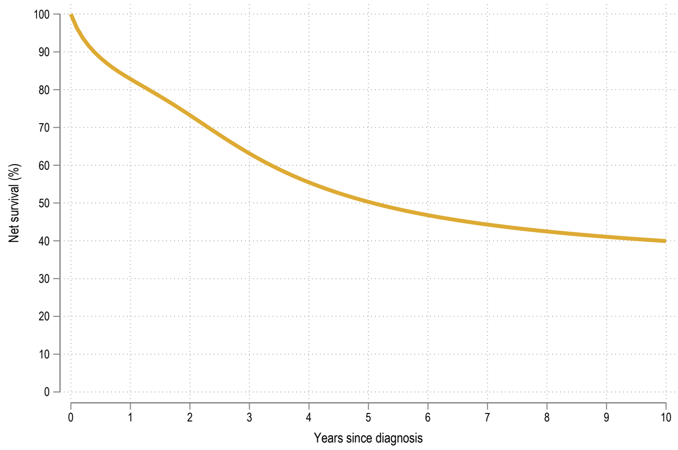


Figure 14.1–B: Crude probabilities 0–10 years

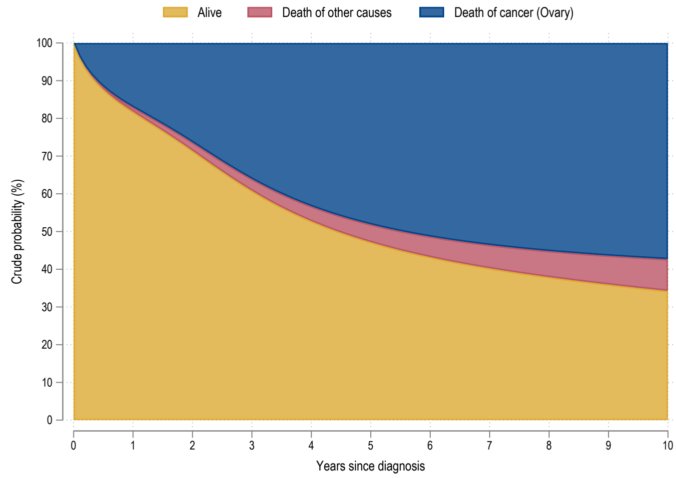


Figure 14.1–C: 5-year crude probabilities by age and stage. Males

Figure 14.1–D: 5-year crude probabilities by age and stage. Females

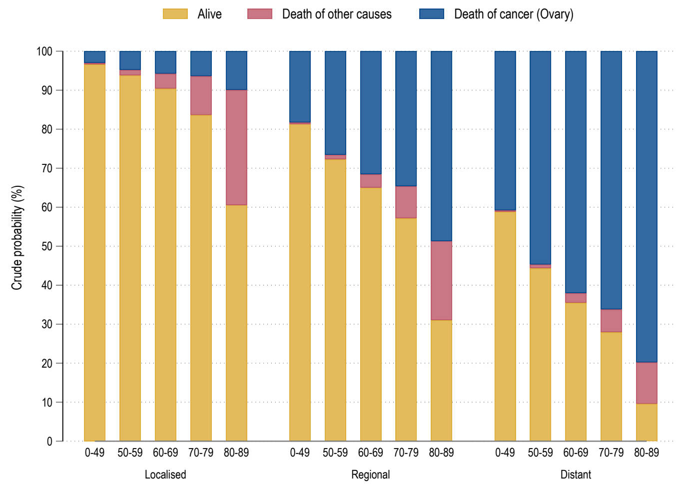


Figure 14.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Males

Figure 14.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Females

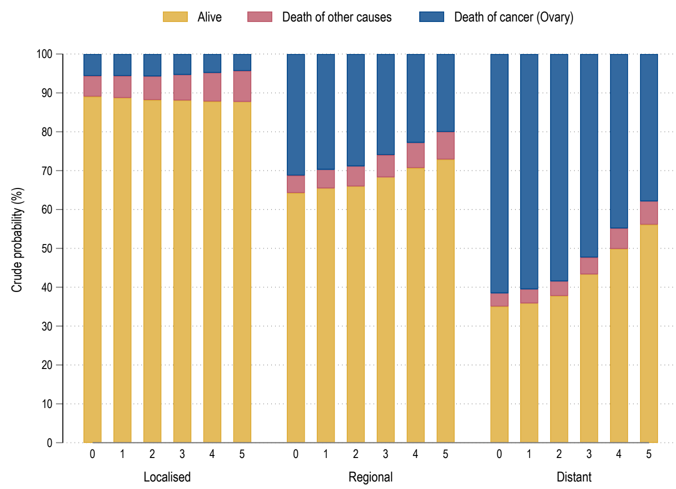


Figure 14.2: Ovary: life expectancy and life-years lost

Figure 14.2–A: Life expectancy by age and stage. Males

Figure 14.2–B: Life expectancy by age and stage. Females

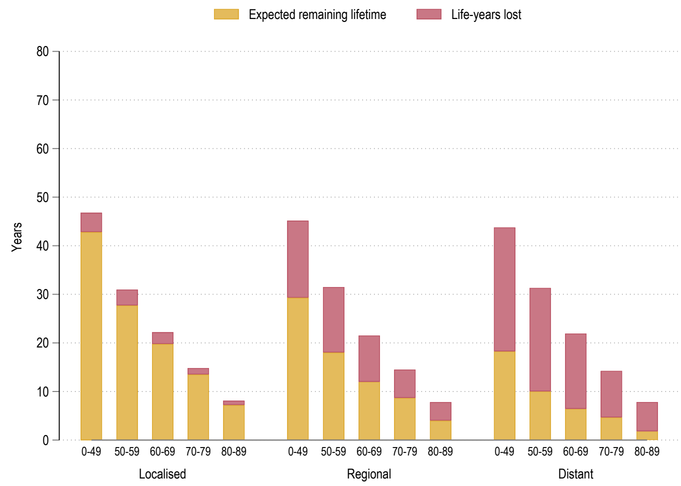


Figure 14.2–C: Proportion of life-years lost. Males

Figure 14.2–D: Proportion of life-years lost. Females

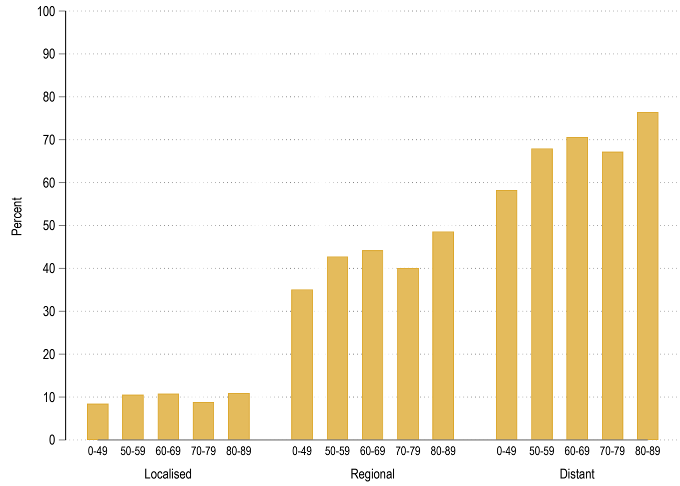
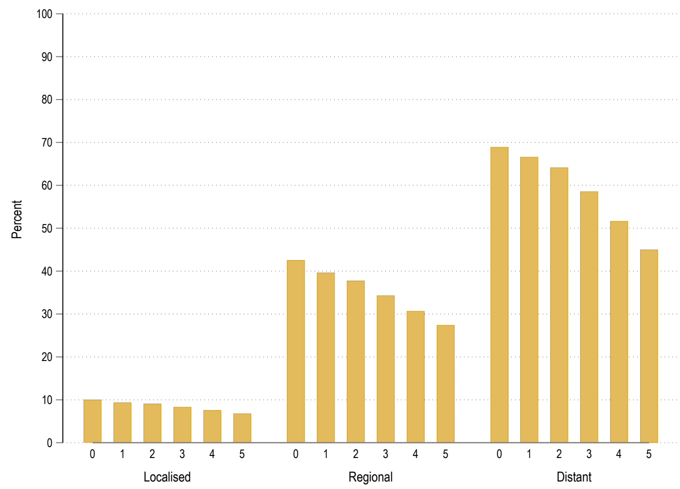


Figure 14.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Males

Figure 14.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Females



Ovary

Figure 14.3: Ovary: trends

Figure 14.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

Figure 14.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

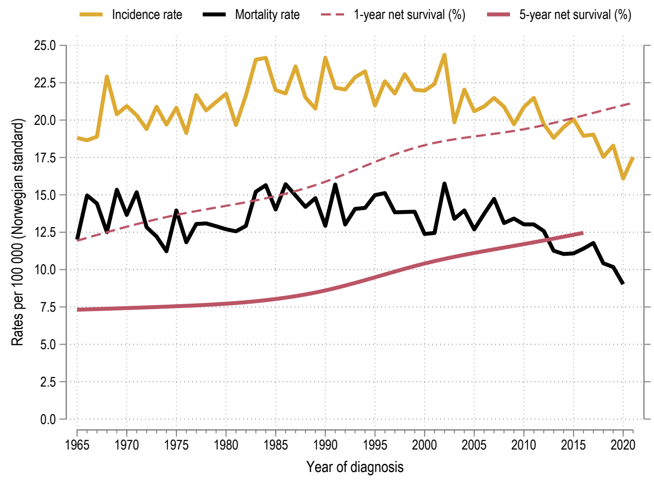


Figure 14.3–C: Trends in reference adjusted all-cause survival

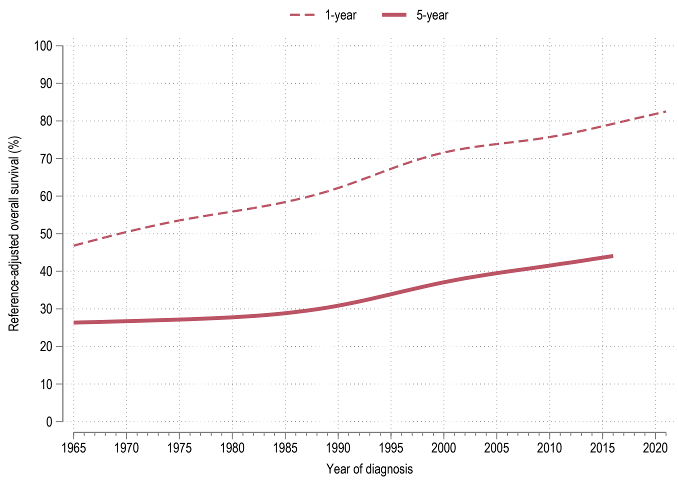


Figure 14.3–D: Trends in reference adjusted crude probability of cancer death

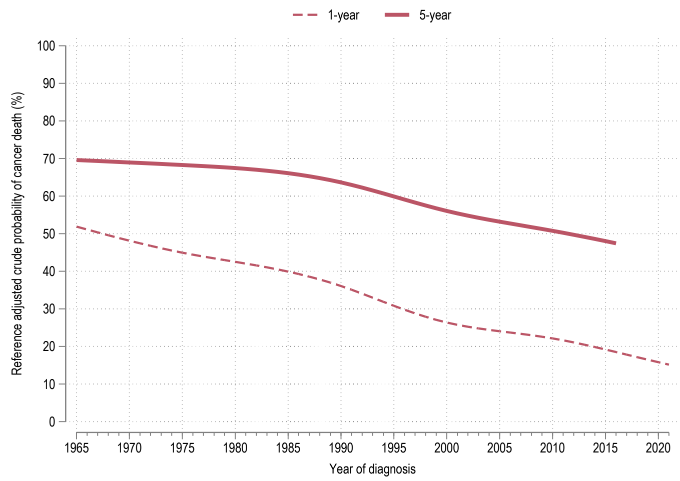


Figure 14.3–E: Trends in reference adjusted life-years lost

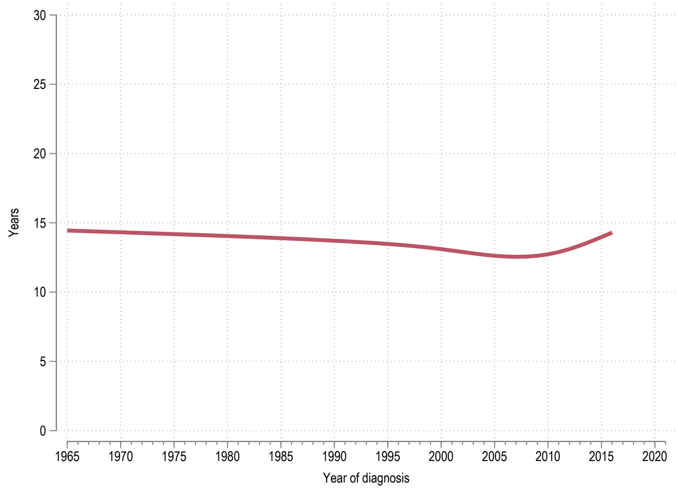
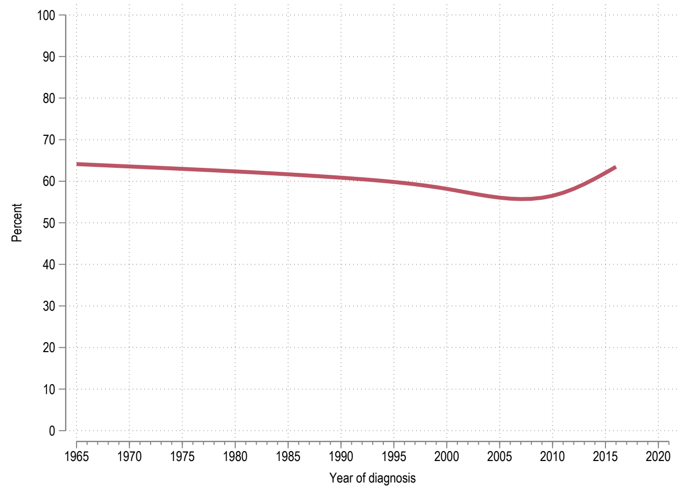


Figure 14.3–F: Trends in reference adjusted life-years lost (%)



Ovary

Prostate

15.1 Net survival and crude probabilities

Net survival among prostate cancer patients slowly declines after diagnosis with a five year net survival estimate of 92.8 %. After five years the net survival continue to decline, without reaching a plateau, with ten year net survival equal to 86.4 % (Figure 15.1–A). This reflect the good prognosis for many prostate cancer patients, but also illustrates that some prostate cancer patients dies from their cancer a long time after diagnosis.

The probability of surviving five years after diagnosis is 82.3 % (Figure 15.1–B). The probability of dying from prostate cancer within five years is 6.4 % and the additional probability of dying from other causes is 11.4 % In comparison to net survival, the crude probability of surviving after prostate cancer is markedly lower, reflecting that a large proportion of these patients are older and therefore at risk of dying from other causes.

Crude probabilities of prostate cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figure 15.1–C). For localised prostate cancer, the five year crude probability of death due to cancer is 0.7 % at ages 60–69, while the corresponding probability is 44.1 % for distant prostate cancer.The differences in all-cause survival within each stage is mostly due to different risks of dying from other causes, increasing strongly with age.

The probability of dying from prostate cancer is only marginally influenced by the number of years survived since diagnosis (Figure 15.1–E). For a median aged prostate cancer patient with localised stage the probability of dying from prostate cancer within five years after diagnosis is 0.3 %, and the same five year risk is 0.4 % if surviving five years after diagnosis. In comparison, the probability of dying from distant prostate cancer within five years after diagnosis is 44.9 %. If surviving five years from diagnosis the future five year risk of dying from prostate cancer is reduced to 52.3 %.

15.2 Life expectancy and life-years lost

The differences in prognosis across stages of prostate cancer leads to differences in life-years lost. Patients with localised prostate cancer lose few of their remaining life-years, whereas patients with distant prostate cancer lose many life-years (Figure 15.2–A). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. However, the proportions of life-years lost are varying across age groups for all stages, with a tendency that younger patients lose a larger proportion of their remaining lifetime, possibly reflecting different patterns in aggressiveness across ages (Figure 15.2–C). These plots also shows the large difference in prognosis across stages, with patients with distant prostate cancer losing a much larger proportion of their remaining lifetime compared to regional and localised prostate cancer.

The proportion of life-years lost only slightly varies with the number of years survived since diagnosis (Figure 15.2–E). For localised prostate cancer the estimates ranges from 1.5 % for newly diagnosed patients to 1.8 % for those surviving five years after diagnosis. The corresponding numbers for distant prostate cancer is 62 % at diagnosis, declining to 61.1 % when surviving five years.

15.3 Time trends

Net survival of prostate cancer has increased over time, and in particular from the 1990s on wards (Figure 15.3–A). These improvements must be seen in light of increased used of PSA testing, leading to a large increase in incidence of localised prostate cancer. In addition, continuous improvement in treatment have occurred, particularly during the last two decades. Correspondingly, all-cause survival has increased and the crude probability of dying from prostate cancer has declined(Figures 15.3–C and 15.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 15.3–E and 15.3–F). As an example, the number of life-years lost, if life expectancy is held constant at 2021-level, was on average 10.5 years in 1965 and expected to be 0.9 years in 2016. Correspondingly, the proportion of life-years lost due to prostate cancer has decreased from 61.8 % in 1965 to an expected 5.6 % in 2016, when averaging across all ages and stage at diagnosis.

Figure 15.1: Prostate: net and crude probabilities

Figure 15.1–A: Net survival 0–10 years

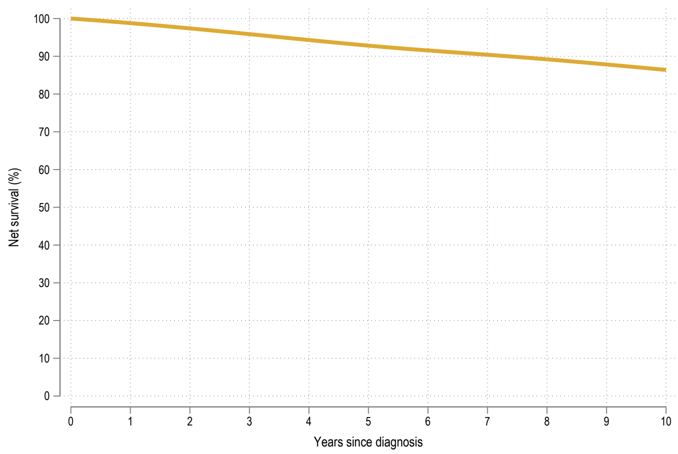


Figure 15.1–B: Crude probabilities 0–10 years

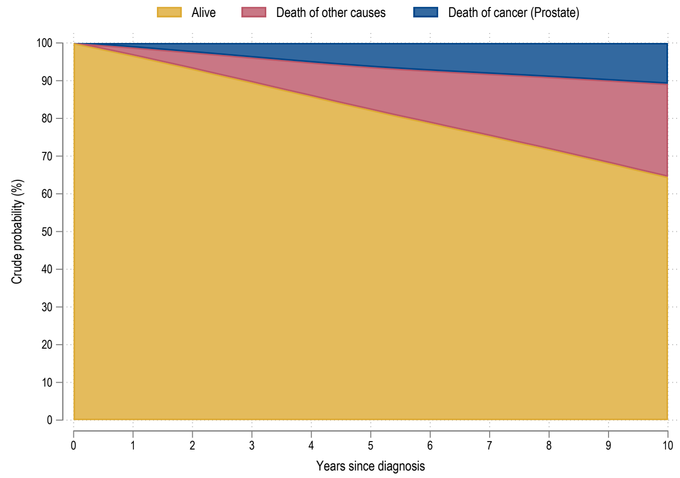


Figure 15.1–C: 5-year crude probabilities by age and stage. Males

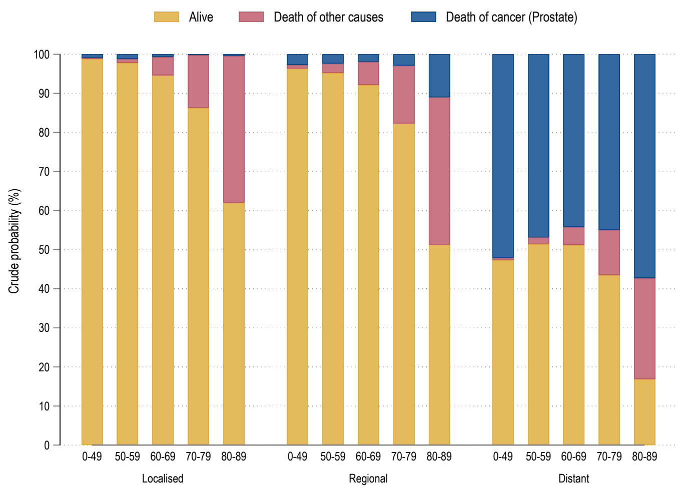


Figure 15.1–D: 5-year crude probabilities by age and stage. Females

Figure 15.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Males

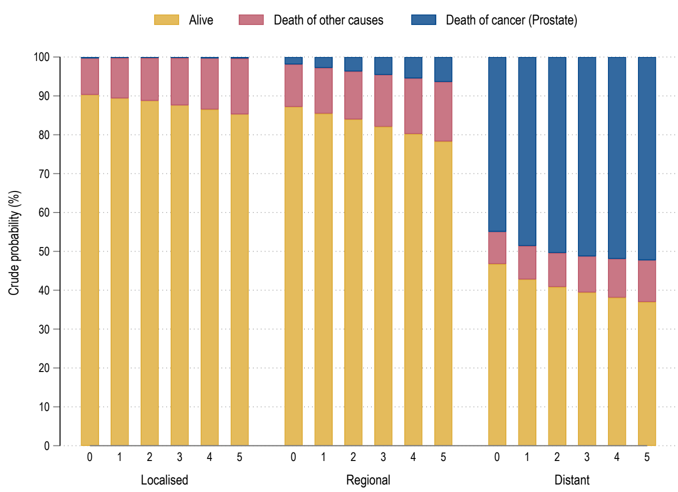


Figure 15.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Females

Prostate

Figure 15.2: Prostate: life expectancy and life-years lost

Figure 15.2–A: Life expectancy by age and stage. Males

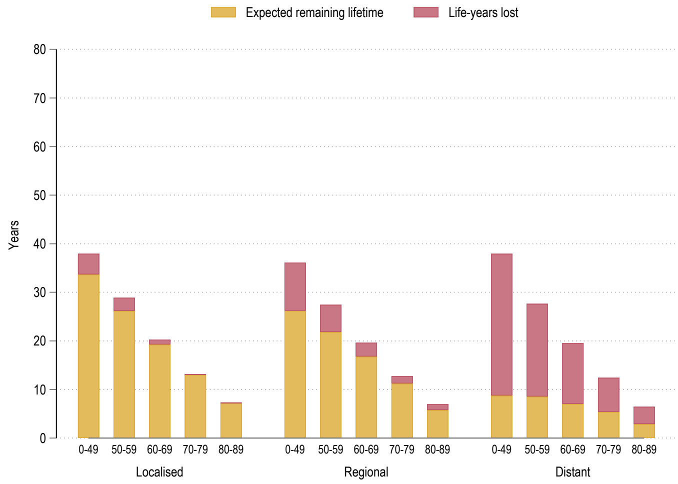


Figure 15.2–B: Life expectancy by age and stage. Females

Figure 15.2–C: Proportion of life-years lost. Males

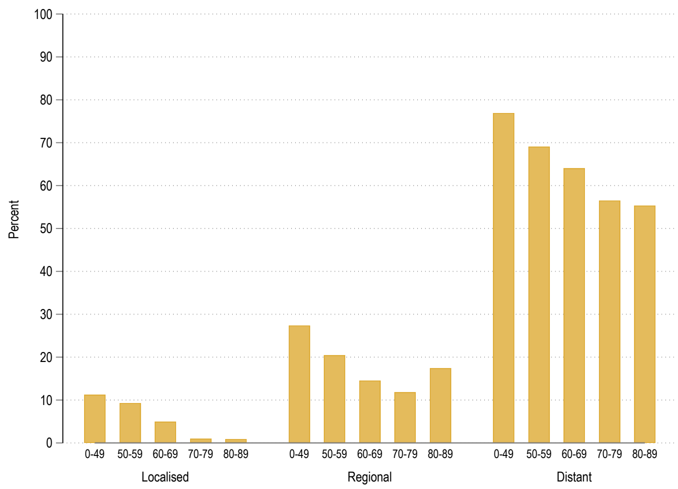


Figure 15.2–D: Proportion of life-years lost. Females

Figure 15.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Males

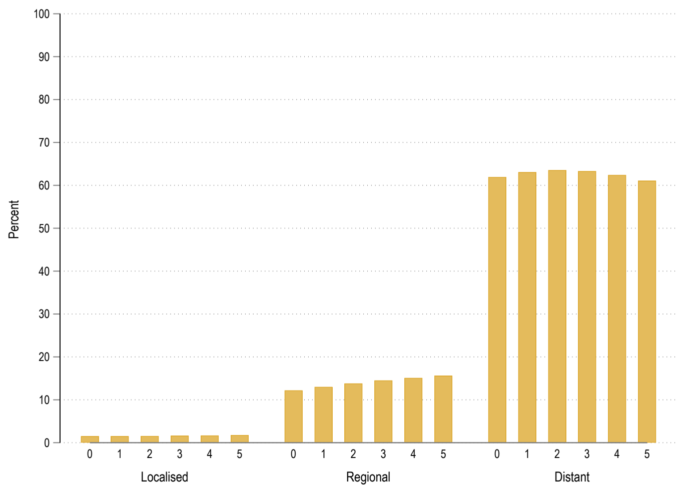


Figure 15.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Females

Figure 15.3: Prostate: trends

Figure 15.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

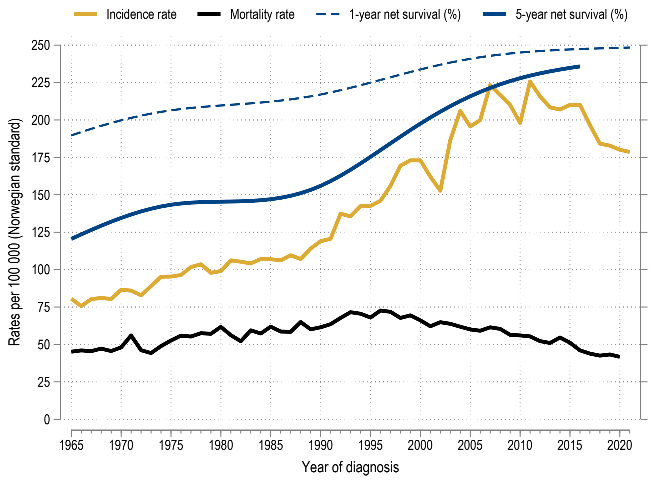


Figure 15.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

Figure 15.3–C: Trends in reference adjusted all-cause survival

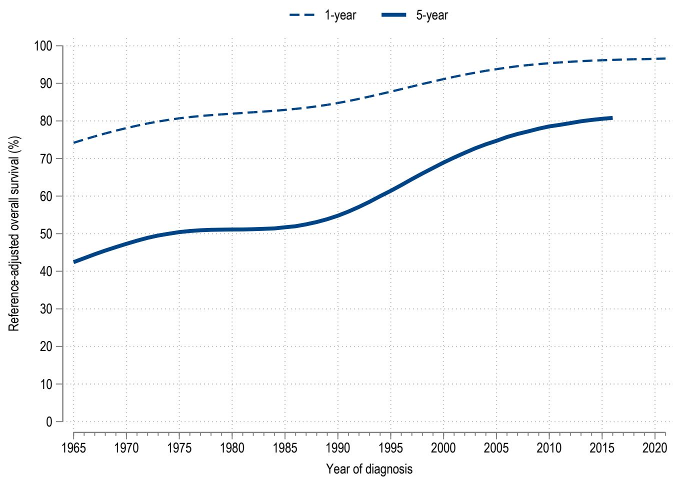


Figure 15.3–D: Trends in reference adjusted crude probability of cancer death

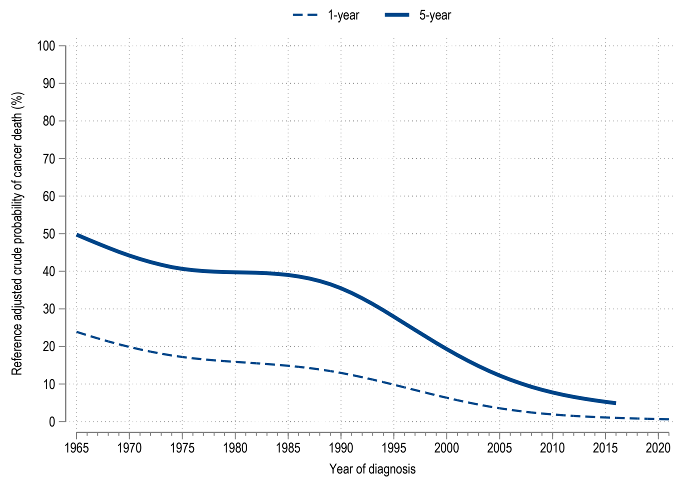


Figure 15.3–E: Trends in reference adjusted life-years lost

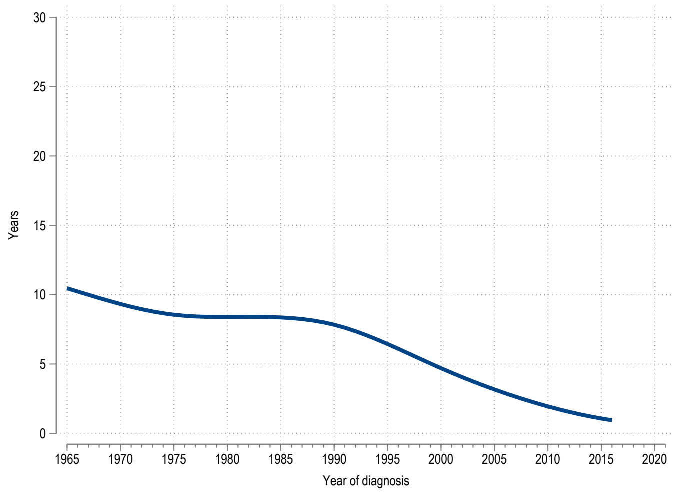
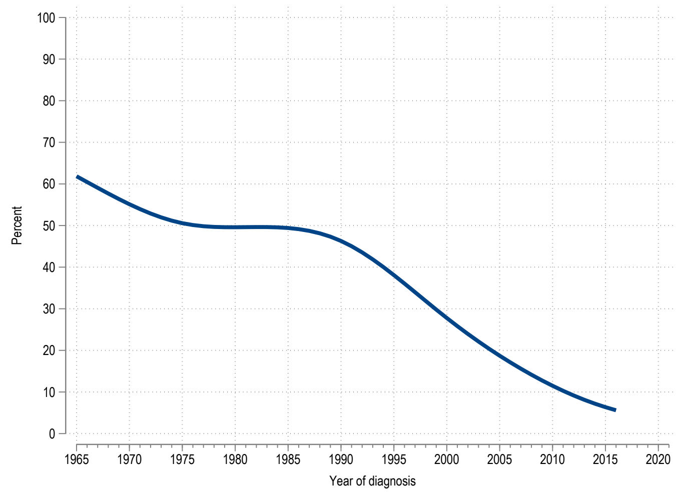


Figure 15.3–F: Trends in reference adjusted life-years lost (%)



Prostate

Testis

16.1 Net survival and crude probabilities

Net survival among testicular cancer patients is very high throughout the first ten years after diagnosis, with a five year net survival estimate of 98.5 % and a ten year estimate of 98.3 % (Figure 16.1–A). Several studies have documented declining net survival for longer term follow-up due to treatment-related late effects. Such an effect would not show up in these result where follow-up is limited to ten years after diagnosis.

The probability of surviving five years after diagnosis is 97.5 % (Figure 16.1–B). The probability of dying from testicular cancer within five years is 1.5 % and the additional probability of dying from other causes is 1 % In comparison to net survival, the crude probability of surviving after testicular cancer is very similar, reflecting that a large proportion of these patients are young at the time of diagnosis and therefore at a low risk of dying from other causes.

Crude probabilities of testicular cancer death depend both on stage and age at diagnosis, while death due to other causes increases with age (Figure 16.1–C). For localised testicular cancer, the five year crude probability of death due to cancer is very low for all ages. For regional and distant cancer the probability of dying from cancer is quite low for younger men, but increasing markedly with age. The risk of dying from testicular cancer, if diagnosed with distant cancer, is 3 % for ages 0–24 and 63.3 % for ages 55–89.

The probability of dying from testicular cancer, when surviving one, two and up to five years after diagnosis is generally low for all stages, but still declining with number of years survived, in particular for distant stage. For a median aged testicular cancer patient diagnosed with distant stage the probability of dying from testicular cancer within five years after diagnosis is 6.3 %, declining to 1 % after surviving five years.

16.2 Life expectancy and life-years lost

The differences in prognosis across age and stages of testicular cancer leads to differences in life-years lost. Patients with localised testicular cancer lose almost none of their remaining life-years, whereas patients with distant testicular cancer lose more life-years. The number of life-years lost varies across age groups, with older men losing more life-years (Figure 16.2–A). Looking at the proportion of life-years lost, the age pattern becomes clearer, with a large increase in proportion of lifetime lost for the oldest men, possibly reflecting different patterns in aggressiveness across ages (Figure 16.2–C).

The proportion of life-years lost is close to zero for a median aged localised testicular cancer patient. For regional and distant testicular cancer, the proportion of life-years lost is declining with the number of years survived (Figure 16.2–E).For regional testicular cancer the estimates ranges from 2.3 % for newly diagnosed patients to 1.3 % for those surviving five years after diagnosis. The corresponding numbers for distant testicular cancer is 12.5 % at diagnosis, declining to 7.2 % when surviving five years.

16.3 Time trends

Net survival of testicular cancer increased dramatically when introducing cisplatin-based chemotherapy as standard treatment towards the end of the 1970s. In fact the increase is steeper than what the results in Figure 16.3–A indicates, since the smoothing of trends imply the increase was over a larger time-span than what is actually true. Correspondingly, all-cause survival has increased and the crude probability of dying from testicular cancer has declined (Figures 16.3–C and 16.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining sharply over time (Figures 16.3–E and 16.3–F). As an example, the number of life-years lost, if life expectancy is held constant at 2021-level, was on average 20.4 years in 1965 and expected to be 0.8 years in 2016. Correspondingly, the proportion of life-years lost due to testicular cancer has decreased from 45.3 % in 1965 to an expected 1.7 % in 2016, when averaging across all ages and stage at diagnosis.

Figure 16.1: Testis: net and crude probabilities

Figure 16.1–A: Net survival 0–10 years

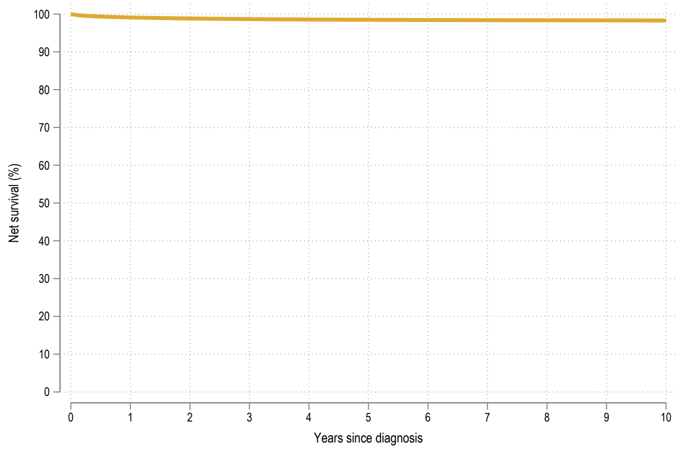


Figure 16.1–B: Crude probabilities 0–10 years

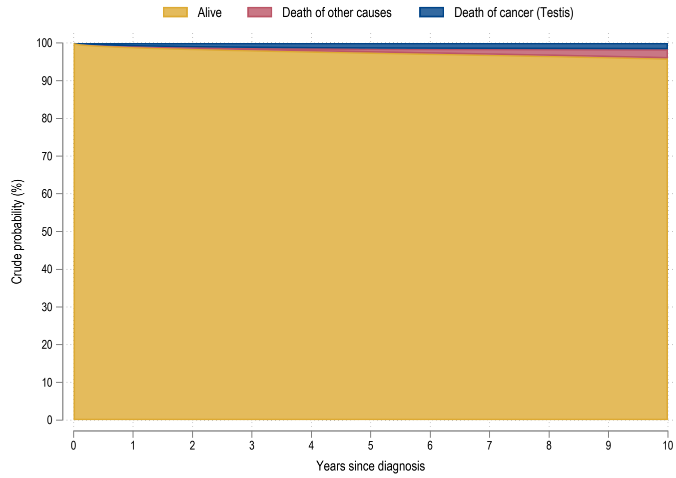


Figure 16.1–C: 5-year crude probabilities by age and stage. Males

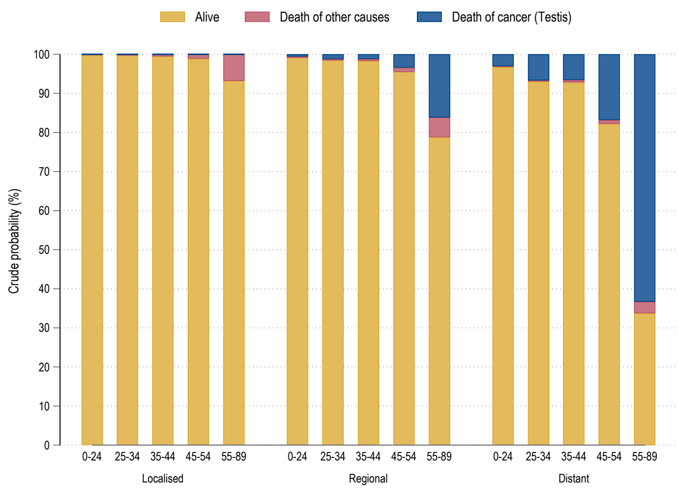


Figure 16.1–D: 5-year crude probabilities by age and stage. Females

Figure 16.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 36 years at diagnosis (median age). Males

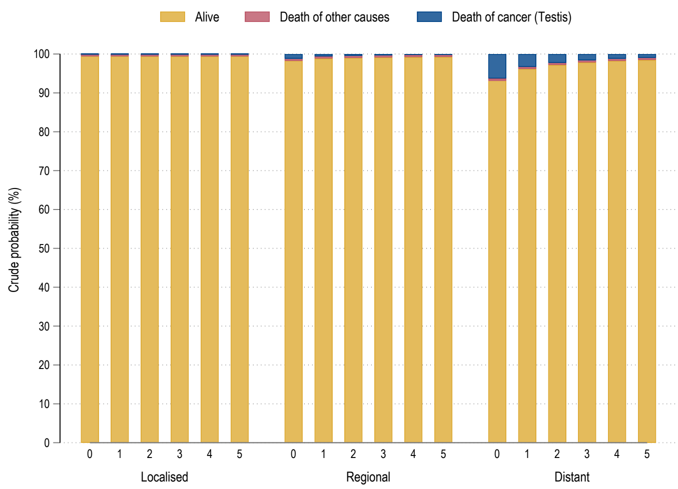


Figure 16.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 36 years at diagnosis (median age). Females

Testis

Figure 16.2: Testis: life expectancy and life-years lost

Figure 16.2–A: Life expectancy by age and stage. Males

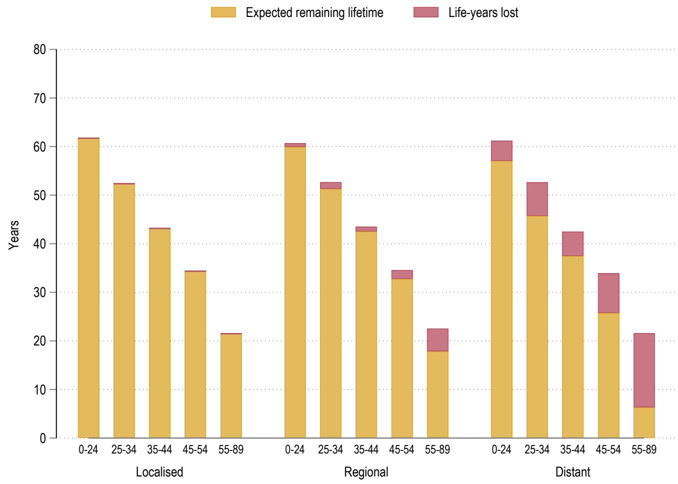


Figure 16.2–B: Life expectancy by age and stage. Females

Figure 16.2–C: Proportion of life-years lost. Males

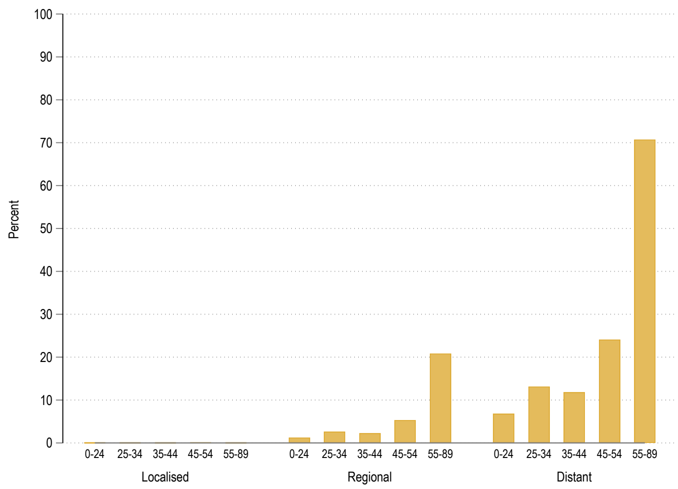


Figure 16.2–D: Proportion of life-years lost. Females

Figure 16.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 36 years at diagnosis (median age). Males

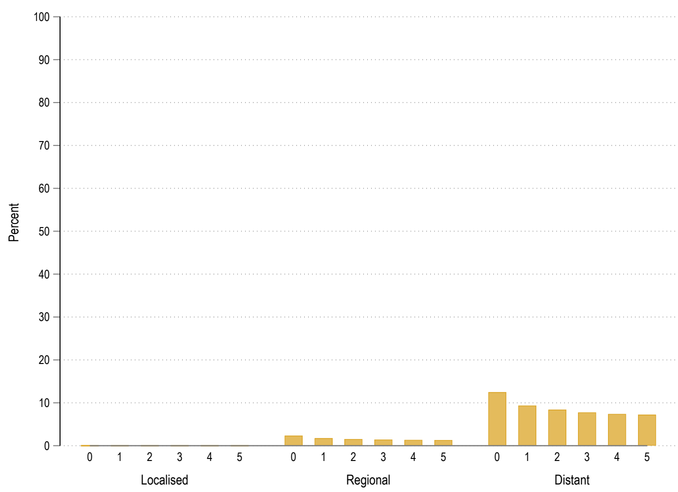


Figure 16.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 36 years at diagnosis (median age). Females

Testis

Figure 16.3: Testis: trends

Figure 16.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

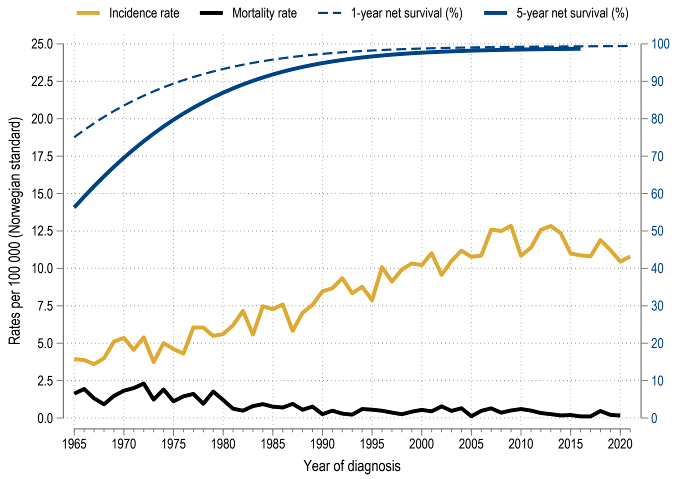


Figure 16.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

Figure 16.3–C: Trends in reference adjusted all-cause survival

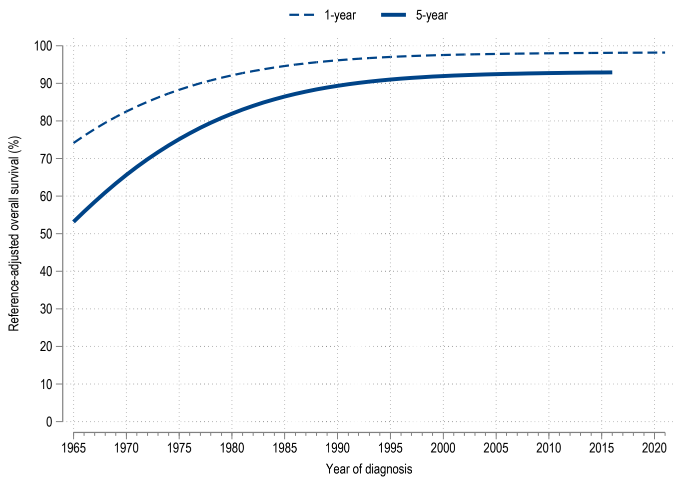


Figure 16.3–D: Trends in reference adjusted crude probability of cancer death

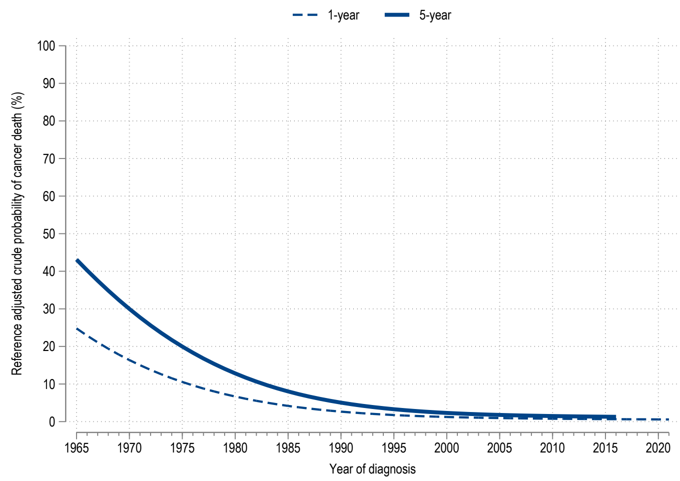


Figure 16.3–E: Trends in reference adjusted life-years lost

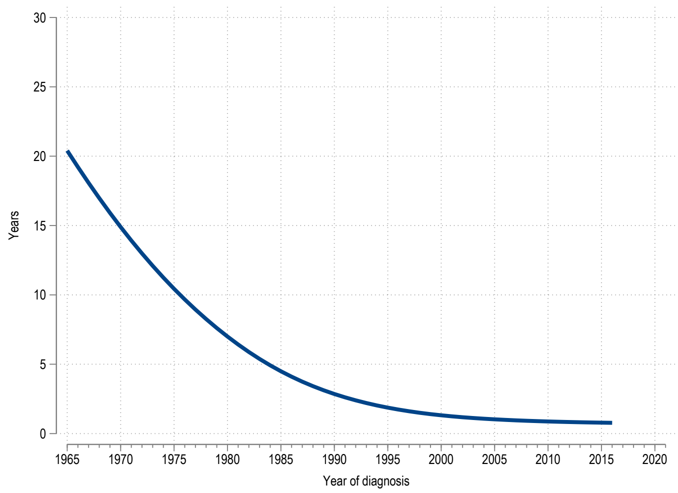
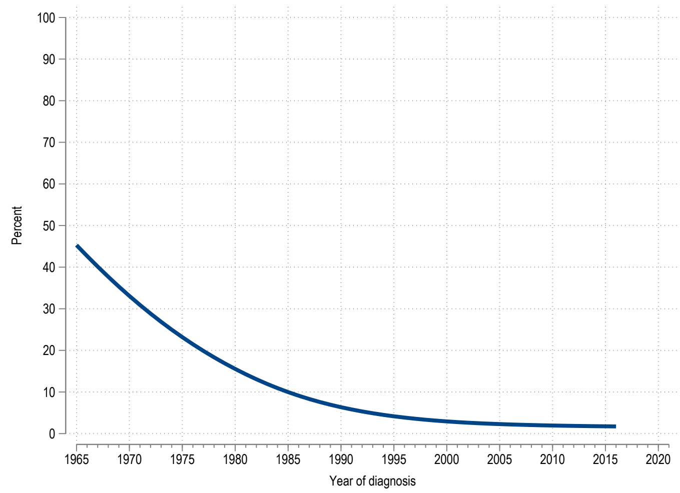


Figure 16.3–F: Trends in reference adjusted life-years lost (%)



Testis

Kidney

17.1 Net survival and crude probabilities

Net survival among kidney cancer patients declines the first years after diagnosis with a five year net survival estimate of 77.8 %. After five years the net survival continues to decline without reaching a plateau, with a ten year net survival equal to 70.6 % for both sexes combined (Figure 17.1–A). Men and women have a very similar net survival.

The probability of surviving five years after diagnosis is 71.1 % (Figure 17.1–B). The probability of dying from kidney cancer within five years is 21.5 % and the additional probability of dying from other causes is 7.4 %. In comparison to net survival, the crude probability of dying from cancer is lower since patients may also die from other causes.

Crude probabilities of kidney cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 17.1–D and 17.1–C). The probability of dying from kidney cancer only slightly varies with age, with better survival in the youngest age groups. In women with localised cancer, the five year crude probability of death due to kidney cancer is 11 % at ages 80–89, while the corresponding probability is 6.1 % at ages 0–49. Among patients with distant metastases at diagnosis, the probability of cancer death is 85.2 % in the ages 80–89 and 68.5 % at ages 0–49.

Having survived kidney cancer for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 17.1–F and 17.1–E). This pattern is the same for all stages. For a median aged kidney cancer patient with distant metastases at the time of diagnosis, the five year risk of dying from the cancer is 79.6 %. If surviving five years from diagnosis the future five year risk of dying from kidney cancer is reduced to 63.9 %. Considerable differences in survival remain across stages even after surviving up to five years after diagnosis.

17.2 Life expectancy and life-years lost

The differences in prognosis across stages of kidney cancer leads to differences in life-years lost. Patients with localised kidney cancer lose relatively few of their remaining life-years, whereas patients with distant kidney cancer lose many life-years (Figures 17.2–B and 17.2–A). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. The proportions of life-years lost are quite similar across ages for all stages of kidney cancer (Figures 17.2–D and 17.2–C). These plots also shows the large difference in prognosis across stages, with patients with regional and distant kidney cancer losing a much larger proportion of their remaining lifetime compared to localised kidney cancer.

The proportion of life-years lost decreases only slightly with the number of years survived for all stages (Figures 17.2–F and 17.2–E). The proportion does not approach zero for any stages, meaning that the cancer diagnosis continues to influence expected remaining lifetime despite surviving several years after diagnosis.

17.3 Time trends

Net survival of kidney cancer has increased steadily over time for both sexes and especially over the past two decades (Figures 17.3–B and 17.3–A). Correspondingly, all-cause survival has increased and the crude probability of dying from kidney cancer has declined (Figures 17.3–C and 17.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 17.3–E and 17.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 15.5 years in 1965 and expected to be 5.3 years in 2016. Correspondingly, the proportion of life-years lost due to kidney cancer has decreased from 68.7 % in 1965 to an expected 23.6 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 17.1: Kidney: net and crude probabilities

Figure 17.1–A: Net survival 0–10 years

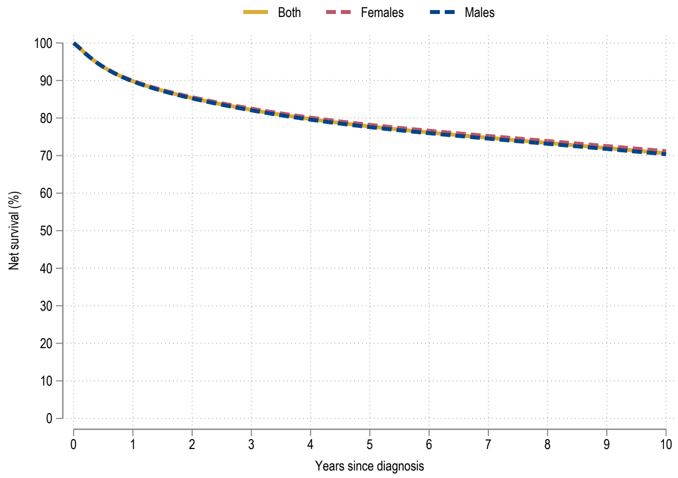


Figure 17.1–B: Crude probabilities 0–10 years

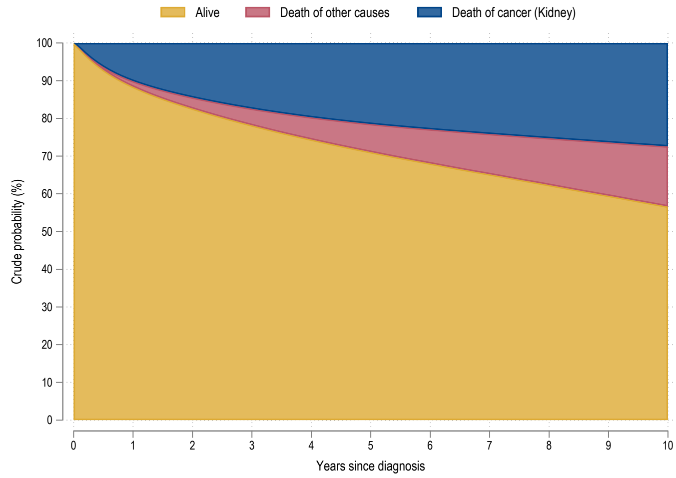


Figure 17.1–C: 5-year crude probabilities by age and stage. Males

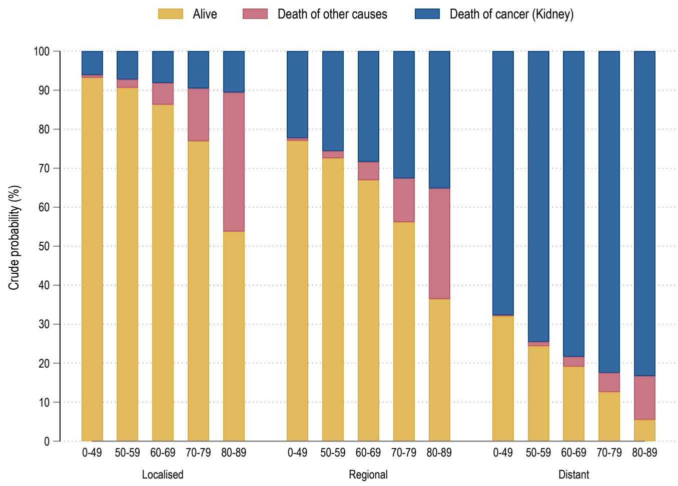


Figure 17.1–D: 5-year crude probabilities by age and stage. Females

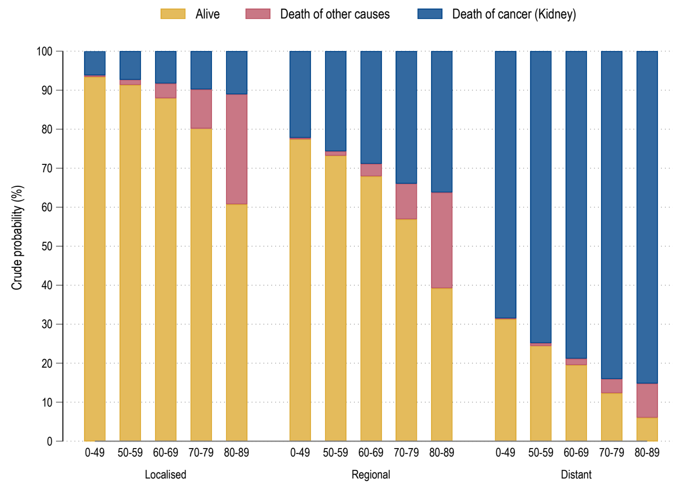


Figure 17.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Males

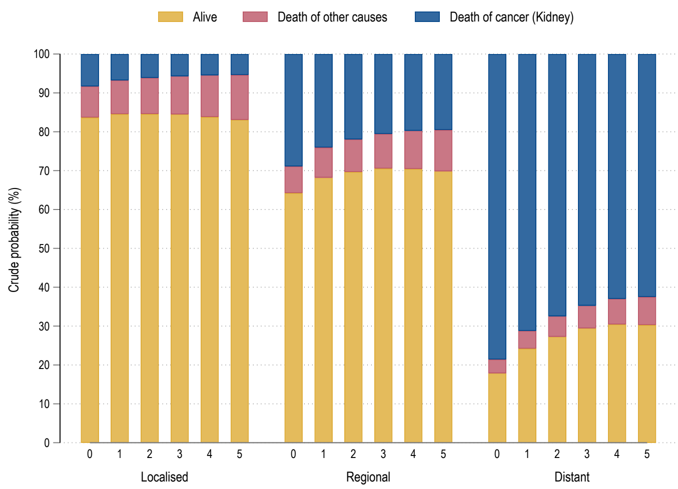
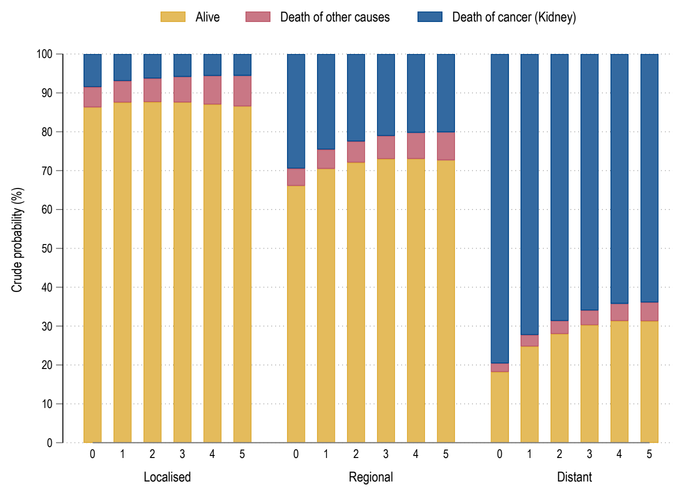


Figure 17.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Females



Kidney

Figure 17.2: Kidney: life expectancy and life-years lost

Figure 17.2–A: Life expectancy by age and stage. Males

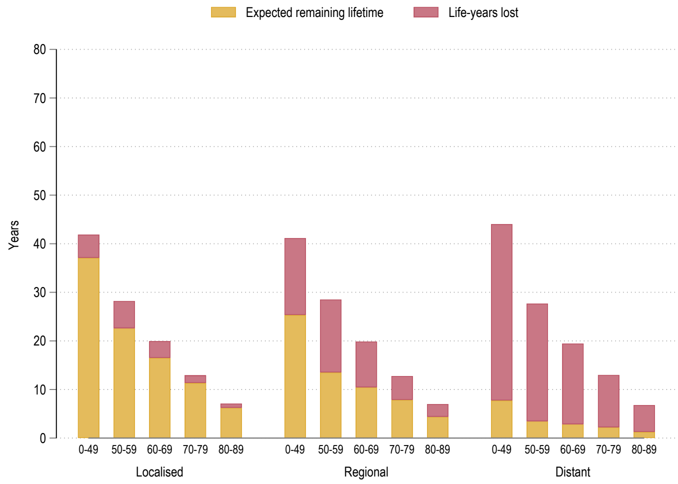


Figure 17.2–B: Life expectancy by age and stage. Females

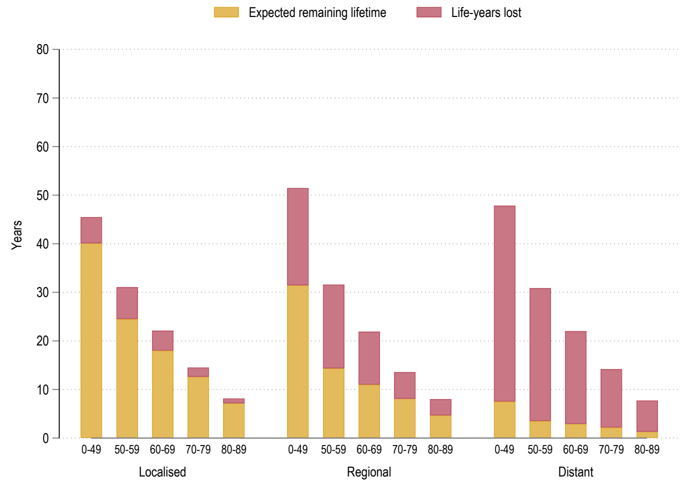


Figure 17.2–C: Proportion of life-years lost. Males

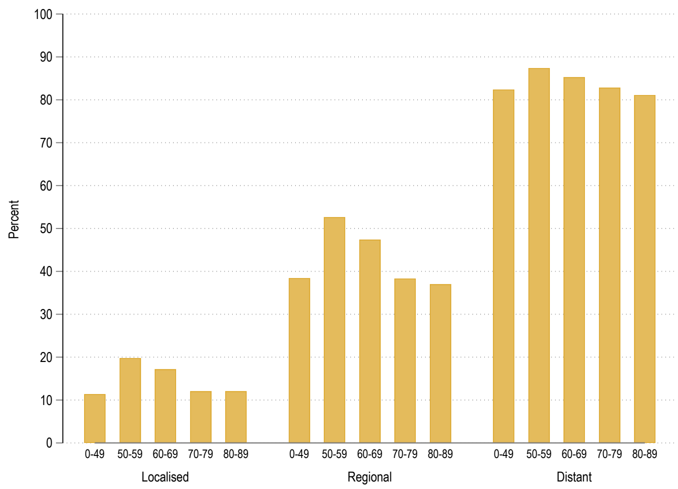


Figure 17.2–D: Proportion of life-years lost. Females

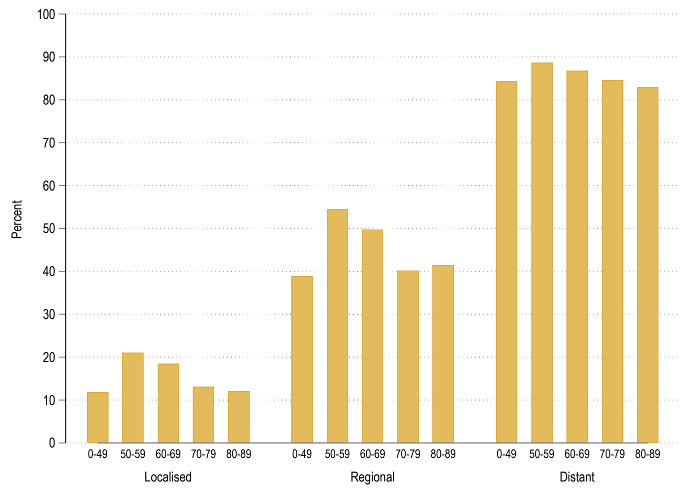


Figure 17.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Males

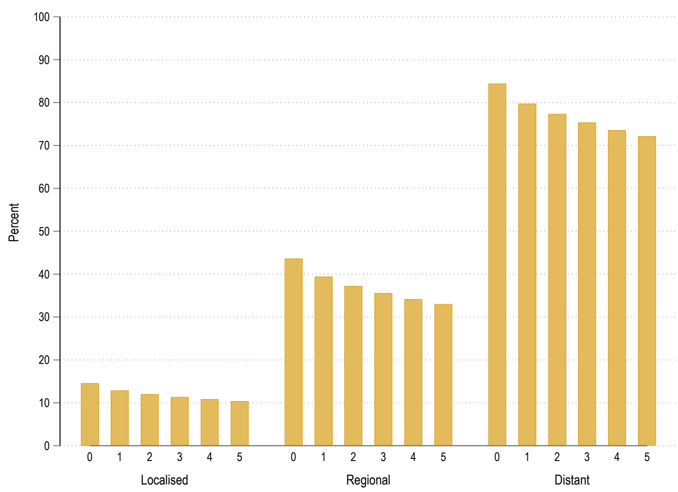
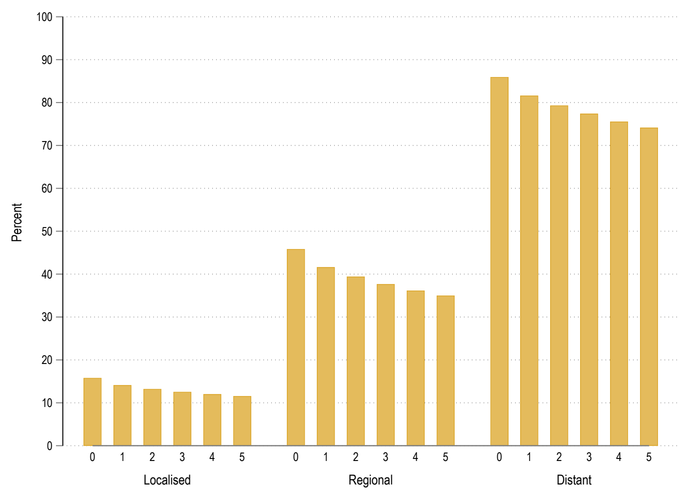


Figure 17.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 67 years at diagnosis (median age). Females



Kidney

Figure 17.3: Kidney: trends

Figure 17.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

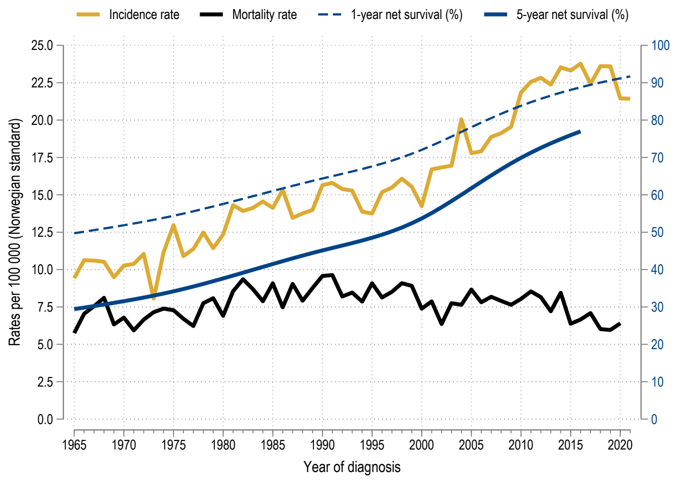


Figure 17.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

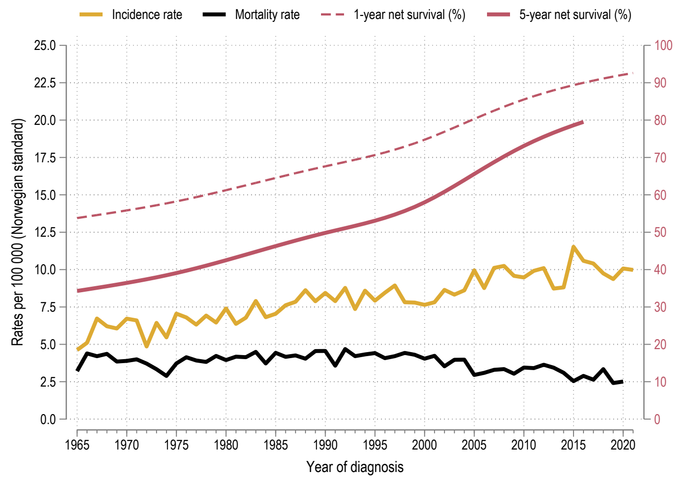


Figure 17.3–C: Trends in reference adjusted all-cause survival

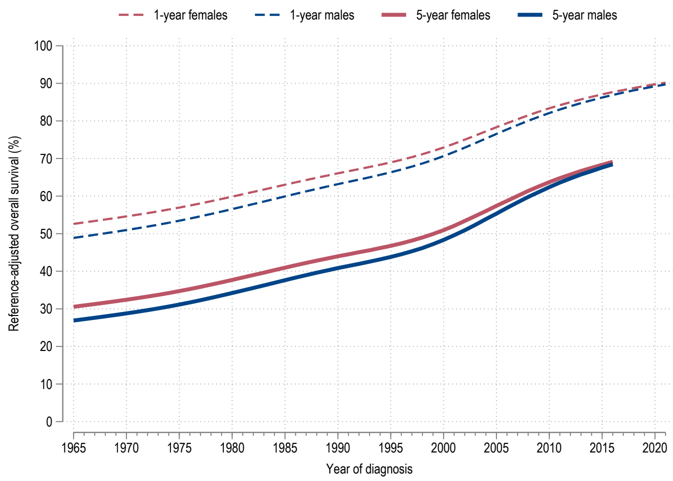


Figure 17.3–D: Trends in reference adjusted crude probability of cancer death

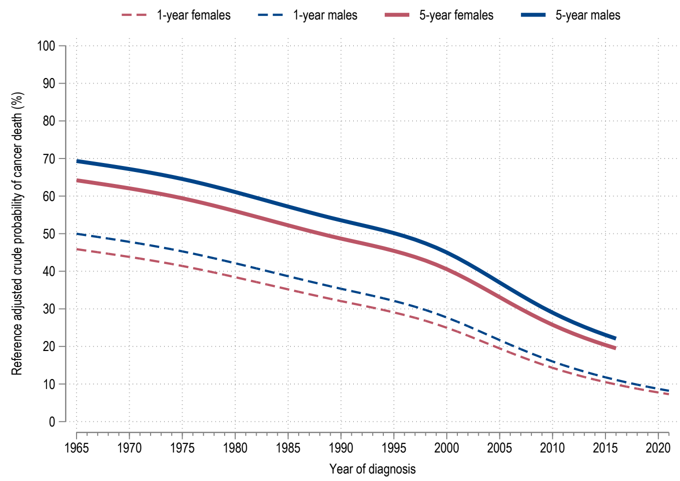


Figure 17.3–E: Trends in reference adjusted life-years lost

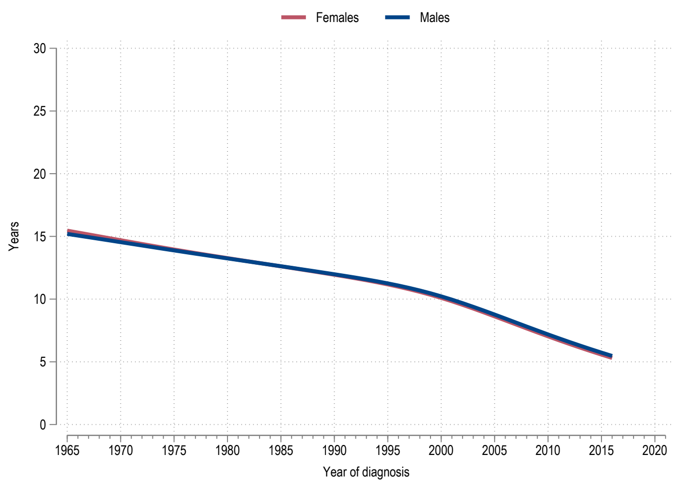
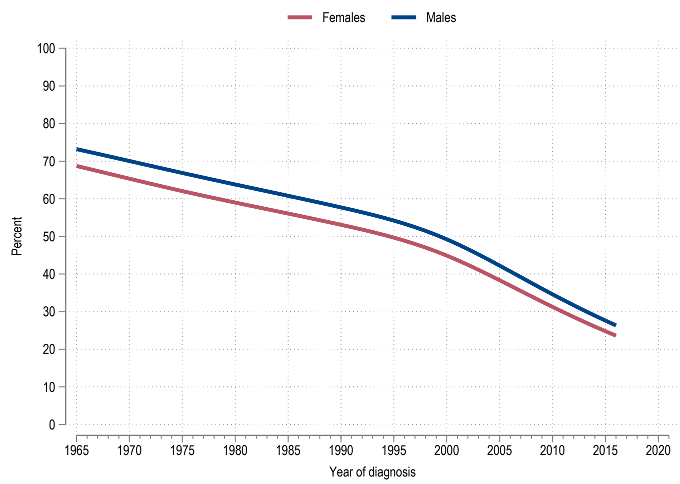


Figure 17.3–F: Trends in reference adjusted life-years lost (%)



Kidney

Urinary tract

18.1 Net survival and crude probabilities

Cancers in the urinary tract includes cancers of the renal pelvis (ICD10-C65), cancers of ureter (ICD10-C66), bladder cancer (ICD10-C67) and cancers of other and unspecified urinary organs (ICD10-C68). Most of the cancers in this group are bladder cancers, with a proportion of approximately 84 % for women and 91 % for men during the last five years. Net survival among urinary tract cancer patients declines the first years after diagnosis with a five year net survival estimate of 77.7 %. After five years the net survival continues to decline without reaching a plateau, with a ten year net survival equal to 69.6 % for both sexes combined (Figure 18.1–A). Men have a somewhat higher net survival compared to women.

The probability of surviving five years after diagnosis is 66 % (Figure 18.1–B). The probability of dying from urinary tract cancer within five years is 20.9 % and the additional probability of dying from other causes is 13.1 %. In comparison to net survival, the crude probability of dying from cancer is lower since patients may also die from other causes.

Crude probabilities of urinary tract cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 18.1–D and 18.1–C). The probability of dying from urinary tract cancer only slightly varies with age with better survival in the youngest age groups. In women with localised cancer, the five year crude probability of death due to urinary tract cancer is 24.2 % at ages 80–89, while the corresponding probability is 3.5 % at ages 0–49. Among patients with distant metastases at diagnosis, where the risk of dying from urinary tract cancer is higher, the age gradient is less clear.

Having survived a localised urinary tract cancer for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 18.1–F and 18.1–E). However, if more advanced cancer were present at the time of diagnosis the prognosis will strongly depend on how long you have survived since diagnosis. For these stages, the crude probability of death from urinary tract cancer declines a lot the first three years after diagnosis. For a median aged urinary tract cancer patient with distant metastases at the time of diagnosis, the five year risk of dying from the cancer is 89.5 %. If surviving three years from diagnosis the future five year risk of dying from urinary tract cancer is reduced to 38 %. Even though survival improves with the number of years survived, considerable differences remain across stages.

18.2 Life expectancy and life-years lost

The differences in prognosis across stages of urinary tract cancer leads to differences in life-years lost. Patients with localised urinary tract cancer lose few of their remaining life-years, whereas patients with distant urinary tract cancer lose many life-years (Figures 18.2–B and 18.2–A). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. The proportion of life-years lost are quite similar across ages for all stages of urinary tract cancer (Figures 18.2–D and 18.2–C). These plots also shows the large difference in prognosis across stages, with patients with regional and distant urinary tract cancer losing a much larger proportion of their remaining lifetime compared to localised urinary tract cancer.

The proportion of life-years lost decreases with the number of years survived, in particular for patients diagnosed with regional or distant urinary tract cancer (Figures 18.2–F and 18.2–E). Still, the proportion does not approach zero for any stages, meaning that the cancer diagnosis continues to influence expected remaining lifetime despite surviving several years after diagnosis.

18.3 Time trends

Net survival of urinary tract cancer has increased steadily over time for both sexes (Figures 18.3–B and 18.3–A). Correspondingly, all-cause survival has increased and the crude probability of dying from urinary tract cancer has declined (Figures 18.3–C and 18.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 18.3–E and 18.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 10.6 years in 1965 and expected to be 4.6 years in 2016. Correspondingly, the proportion of life-years lost due to urinary tract cancer has decreased from 61.1 % in 1965 to an expected 26.7 % in 2021, when averaging across all ages and stage at diagnosis.

Figure 18.1: Urinary tract: net and crude probabilities

Figure 18.1–A: Net survival 0–10 years

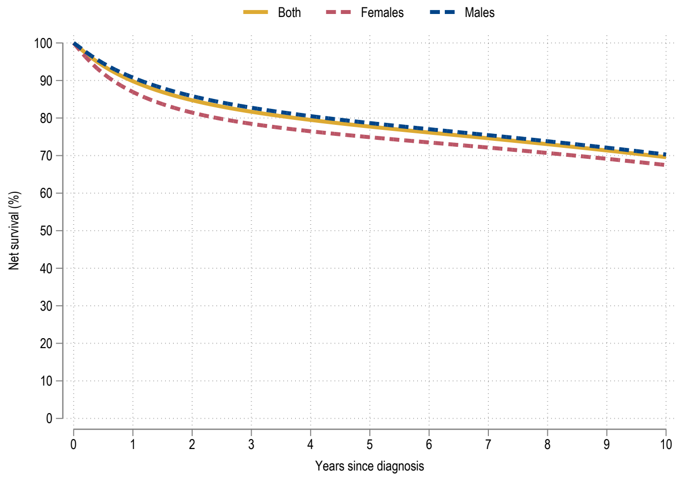


Figure 18.1–B: Crude probabilities 0–10 years

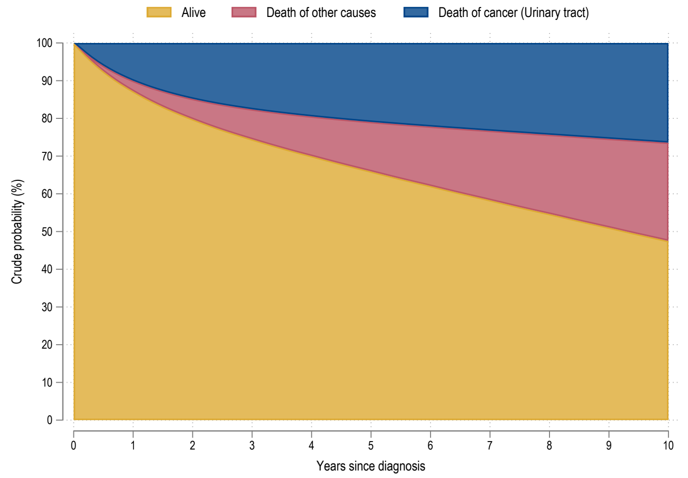


Figure 18.1–C: 5-year crude probabilities by age and stage. Males

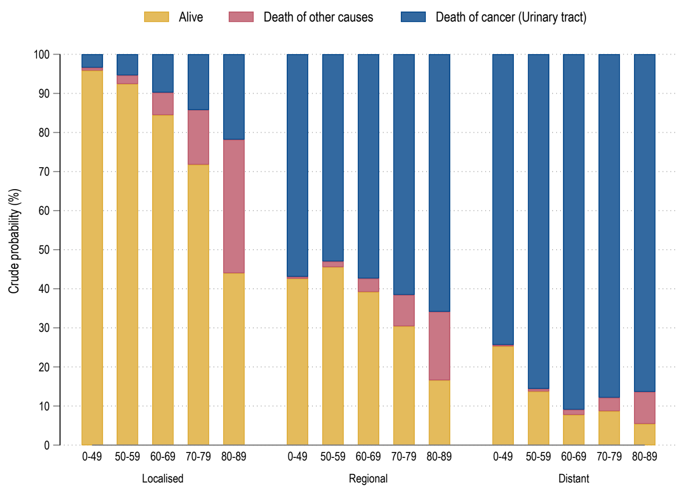


Figure 18.1–D: 5-year crude probabilities by age and stage. Females

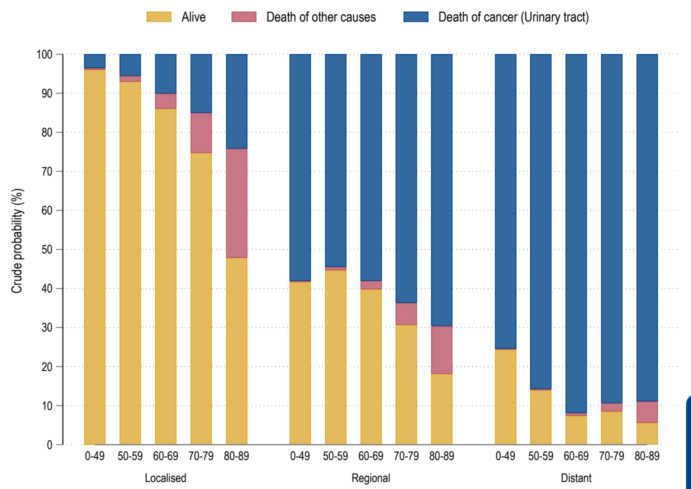


Figure 18.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 73 years at diagnosis (median age). Males

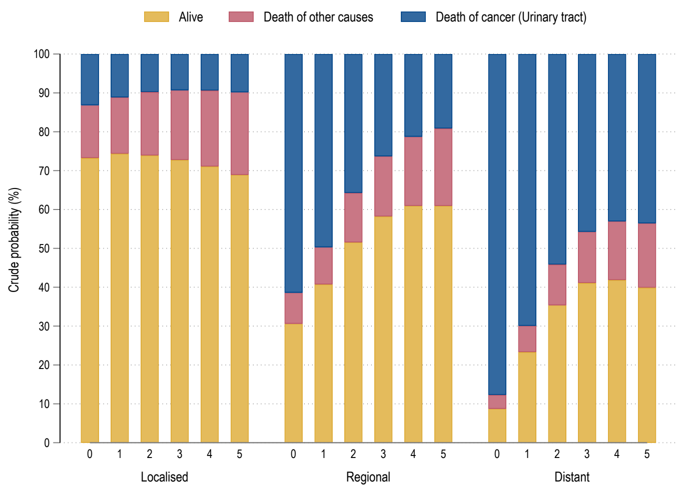


Figure 18.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 73 years at diagnosis (median age). Females

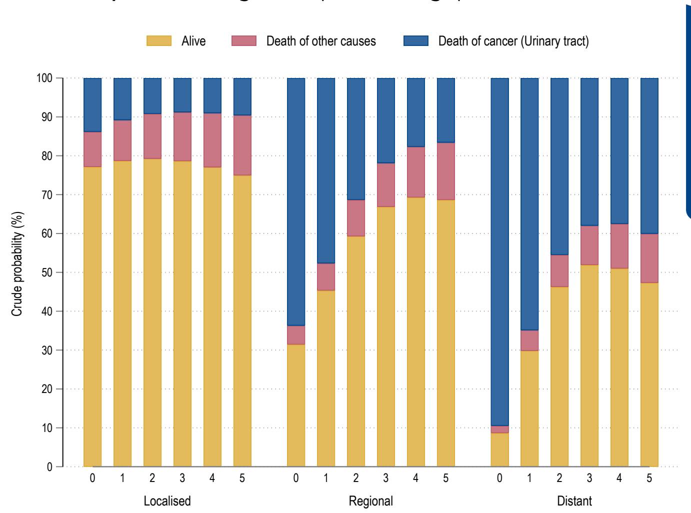


Figure 18.2: Urinary tract: life expectancy and life-years lost

Figure 18.2–A: Life expectancy by age and stage. Males

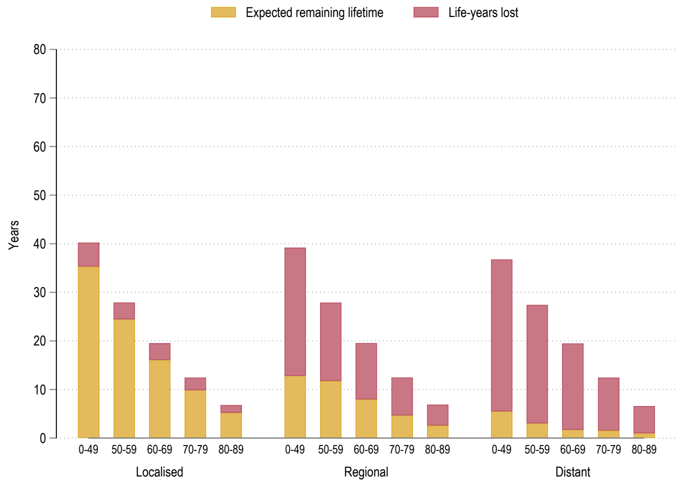


Figure 18.2–B: Life expectancy by age and stage. Females

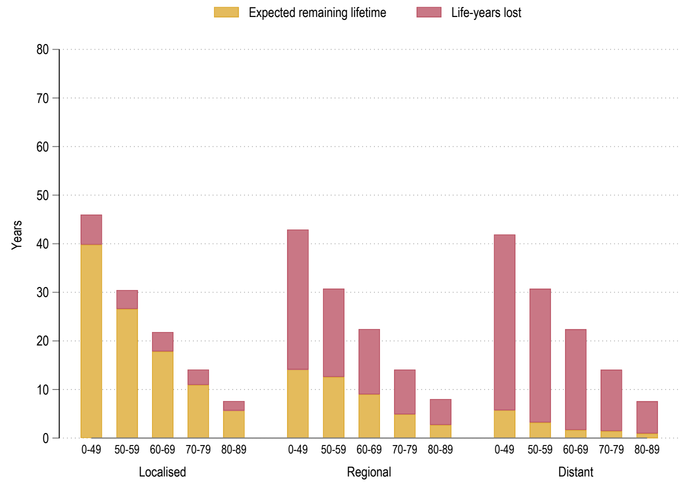


Figure 18.2–C: Proportion of life-years lost. Males

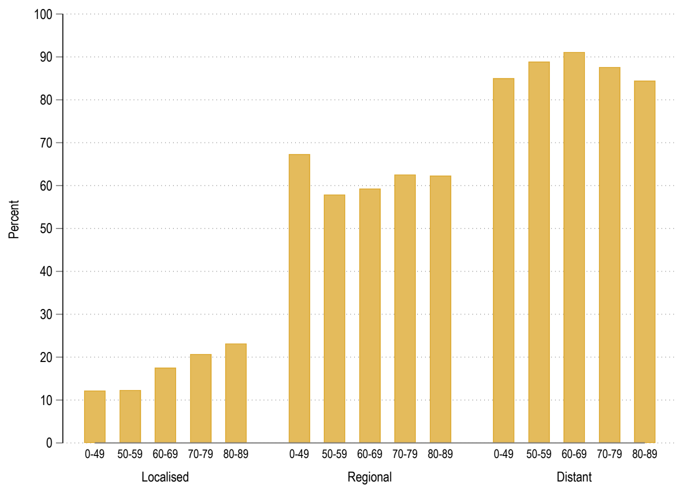


Figure 18.2–D: Proportion of life-years lost. Females

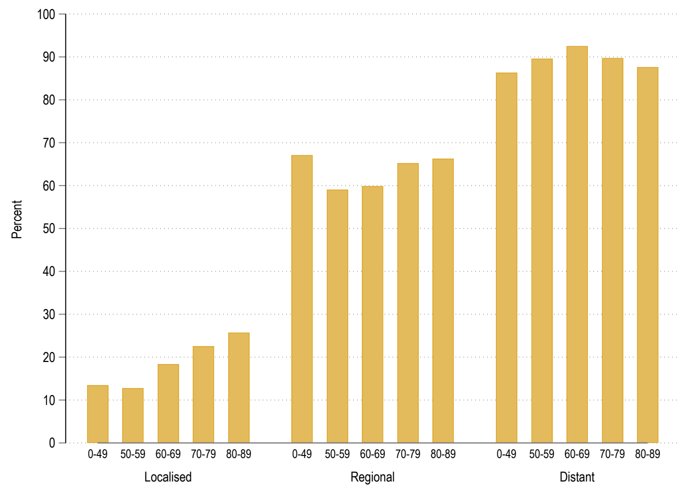


Figure 18.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 73 years at diagnosis (median age). Males

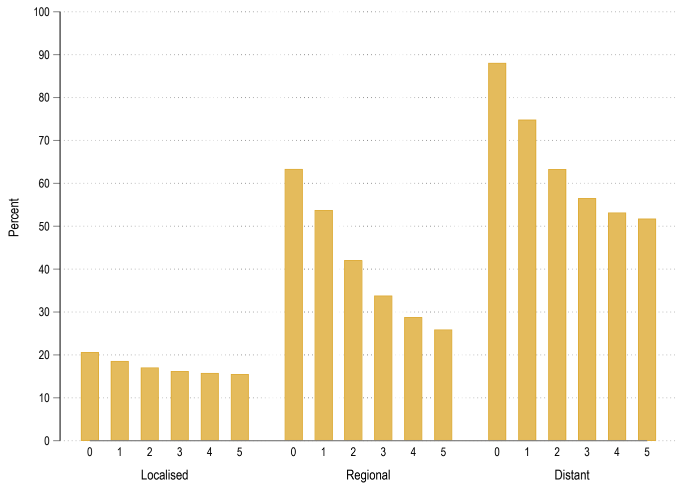
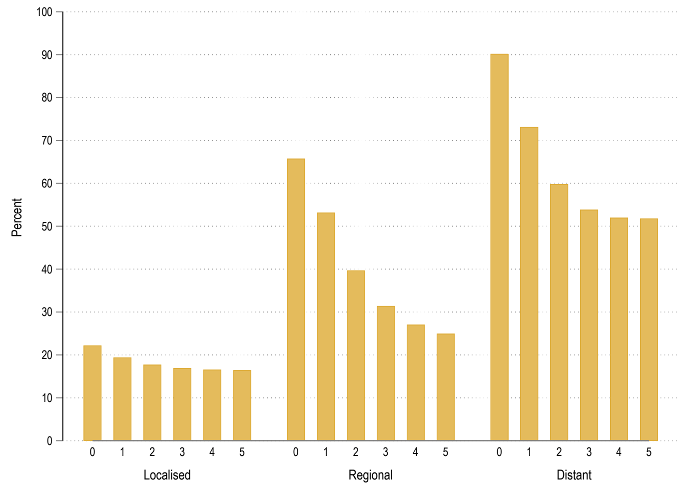


Figure 18.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 73 years at diagnosis (median age). Females



Urinary tract

Figure 18.3: Urinary tract: trends

Figure 18.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

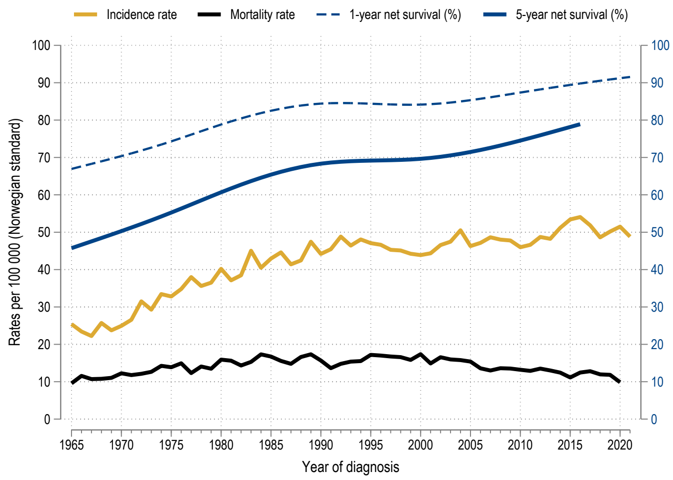


Figure 18.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

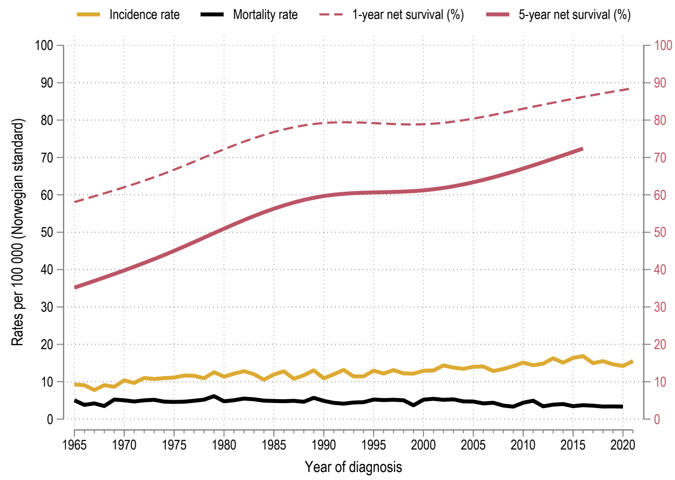


Figure 18.3–C: Trends in reference adjusted all-cause survival

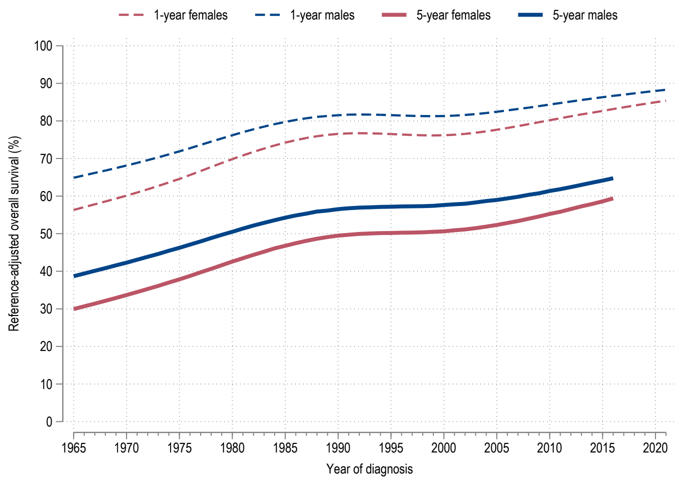


Figure 18.3–D: Trends in reference adjusted crude probability of cancer death

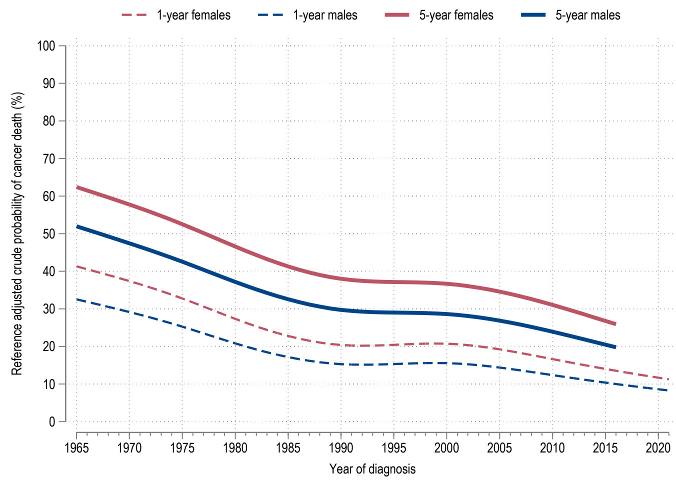


Figure 18.3–E: Trends in reference adjusted life-years lost

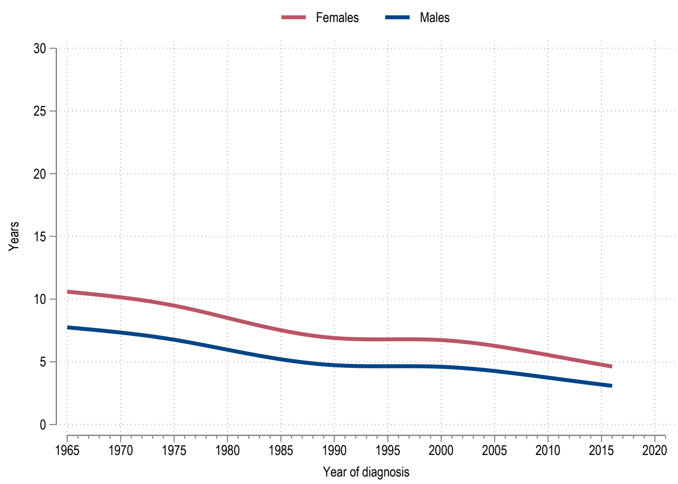
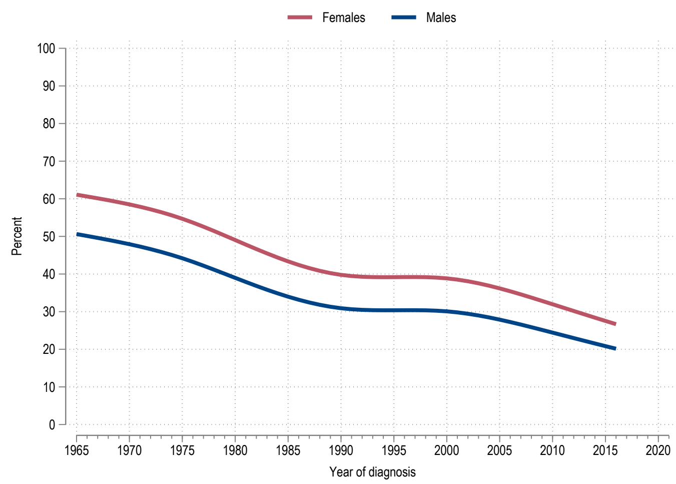


Figure 18.3–F: Trends in reference adjusted life-years lost (%)



Central nervous system

19.1 Net survival and crude probabilities

Cancers in the central nervous system (CNS) includes cancers of the meninges (ICD10-C70), cancers of the brain (ICD10-C71) and cancers of other parts in the CNS (ICD10-C72), with the two former being the dominating groups.

Net survival for patients with CNS cancers declines quite sharply the first two years after diagnosis, with a two year net survival estimate of 72.4 %. After two years the net survival only marginally declines, reaching a plateau, with a ten year net survival equal to 62.7 % for both sexes combined (Figure 19.1–A). Women have a much higher net survival compared to men.

The probability of surviving five years after diagnosis is 62.5 % (Figure 19.1–B). The probability of dying from CNS cancer within five years is 33.7 % and the additional probability of dying from other causes is 3.8 %. In comparison to net survival, the crude probability of dying from cancer is quite similar, despite accounting for deaths from other causes, reflecting the fact that these cancers occur in many younger patients.

Crude probabilities of death from CNS cancer strongly depend on malignancy grade, with non-malignant cancers having a very low risk of cancer death for all age groups. Patients with malignant CNS cancers, on the other hand, have a much larger risk of cancer death. In this group there is also a strong dependency on age, with the risk of cancer death increasing sharply with older age (Figures 19.1–D and 19.1–C). For women with malignant CNS cancer, the five year crude probability of death due to cancer is 93.9 % at ages 80–89, while the corresponding probability is 29.8 % at ages 0–19.

Having survived CNS cancer for one, two and up to five years after diagnosis, does not impact your survival the coming five years for non-malignant cancer, since the prognosis is very good already from the time of diagnosis. For malignant CNS cancer the coming five year survival is strongly affected by the number of years survived since diagnosis (Figures 19.1–F and 19.1–E). For a median aged patient with malignant CNS cancer the five year risk of dying from the cancer is 80 % when seen from diagnosis. If surviving five years from diagnosis the future five year risk of dying cancer is 27.3 %.

19.2 Life expectancy and life-years lost

The differences in prognosis across malignancy grade and age of CNS cancer leads to differences in life-years lost. Looking at the absolute number of life-years lost, the youngest patients lose most, related to the higher expected remaining lifetime for younger ages. In general, the loss in life expectancy is low for non-malignant cancer, but much larger for malignant cancer (Figures 19.2–B and 19.2–A). The proportion of life-years lost increases slightly with age for malignant CNS cancer (Figures 19.2–D and 19.2–C).

The proportion of life-years lost decreases with the number of years survived for malignant CNS cancer. For non-malignant cancer the proportion of loss in life expectancy is stable and low throughout (Figures 19.2–F and 19.2–E).

19.3 Time trends

Keeping the distribution of malignant and non-malignant cancers the same over time, net survival of CNS cancer has increased steadily over time for both sexes (Figures 19.3–B and 19.3–A). Correspondingly, all-cause survival has increased and the crude probability of dying from CNS cancer has declined (Figures 19.3–C and 19.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 19.3–E and 19.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 14.1 years in 1965 and expected to be 8.5 years in 2016. Correspondingly, the proportion of life-years lost due to CNS cancer has decreased from 46.6 % in 1965 to an expected 28.2 % in 2016, when averaging across all ages at diagnosis.

Figure 19.1: Central nervous system: net and crude probabilities

Figure 19.1–A: Net survival 0–10 years

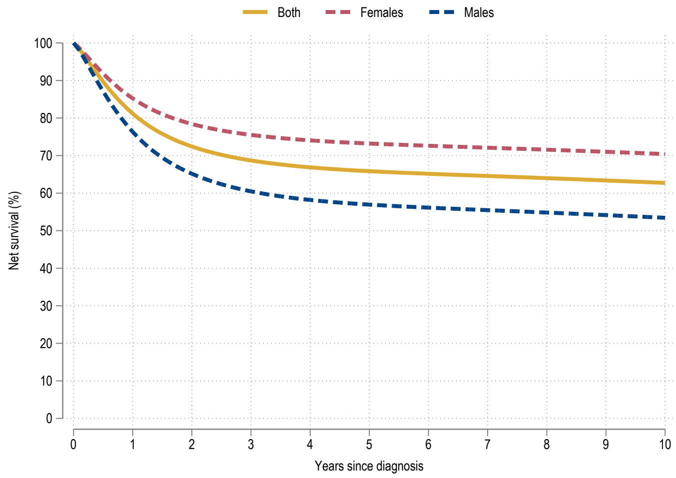


Figure 19.1–B: Crude probabilities 0–10 years

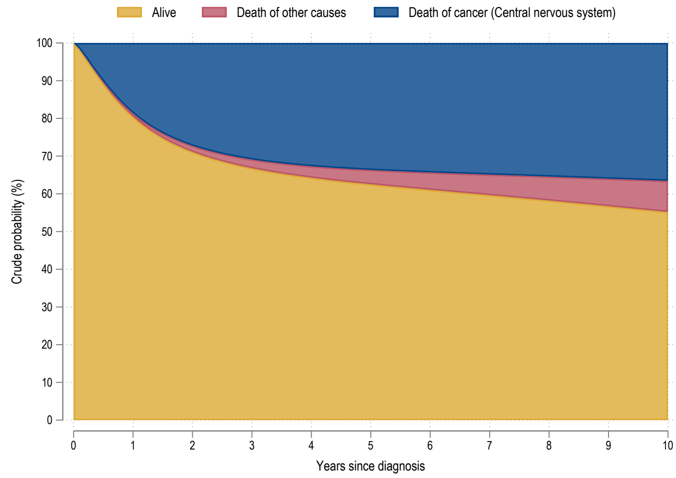


Figure 19.1–C: 5-year crude probabilities by age and stage. Males

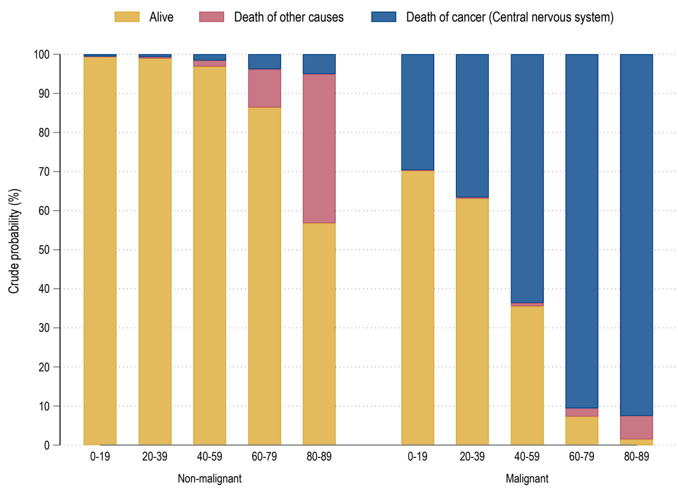


Figure 19.1–D: 5-year crude probabilities by age and stage. Females

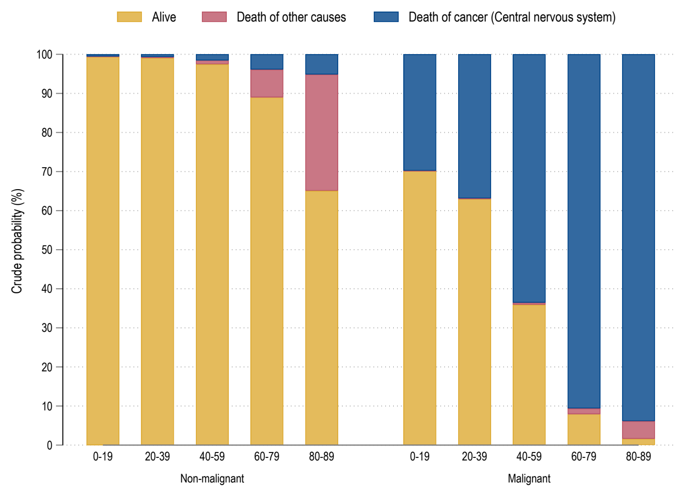


Figure 19.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 59 years at diagnosis (median age). Males

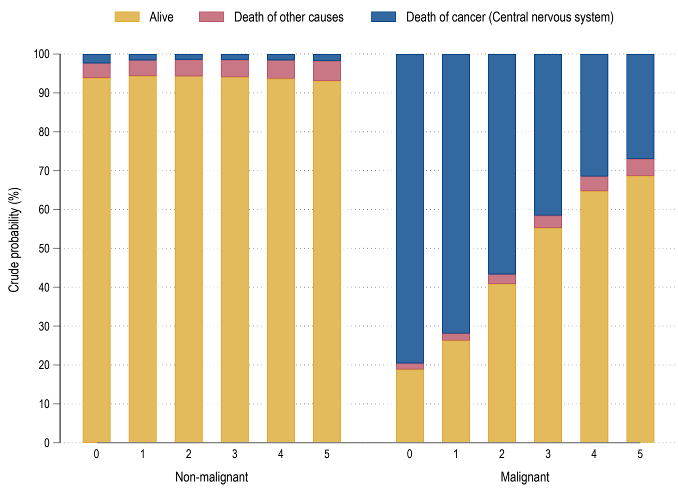


Figure 19.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 59 years at diagnosis (median age). Females

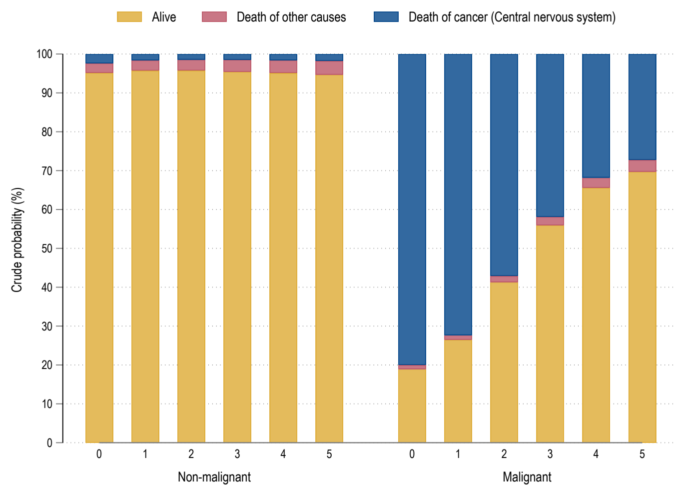


Figure 19.2: Central nervous system: life expectancy and life-years lost

Figure 19.2–A: Life expectancy by age and stage. Males

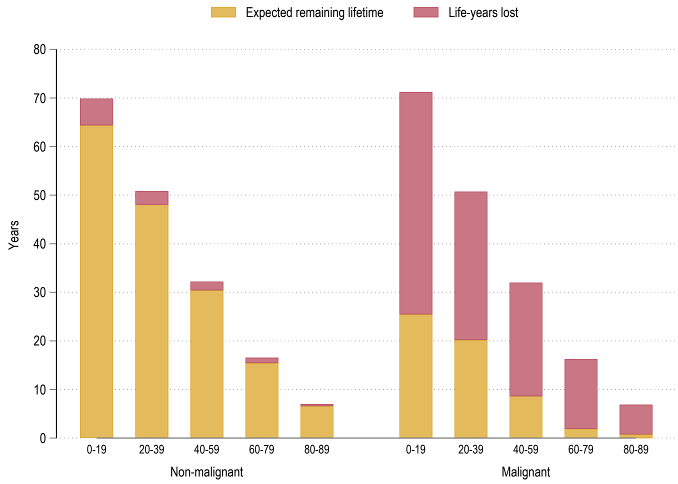


Figure 19.2–B: Life expectancy by age and stage. Females

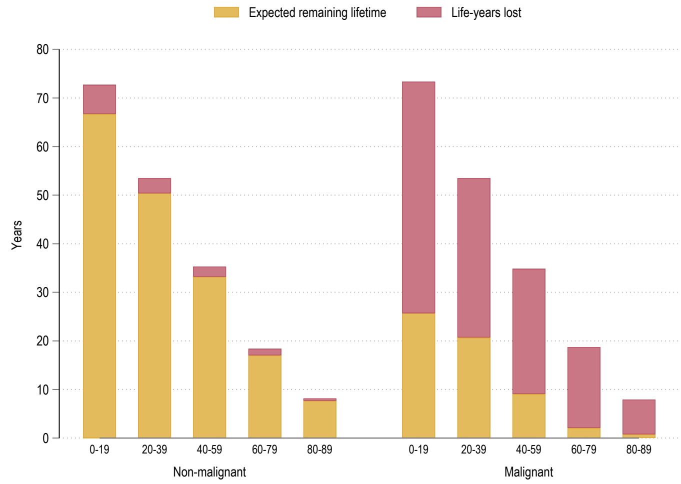


Figure 19.2–C: Proportion of life-years lost. Males

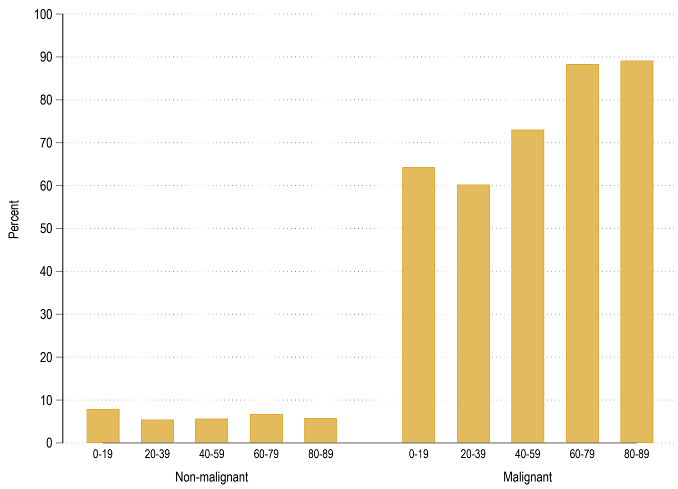


Figure 19.2–D: Proportion of life-years lost. Females

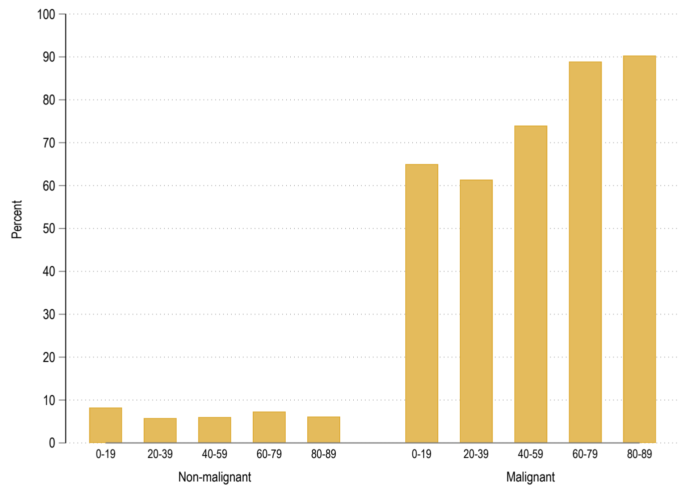


Figure 19.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 59 years at diagnosis (median age). Males

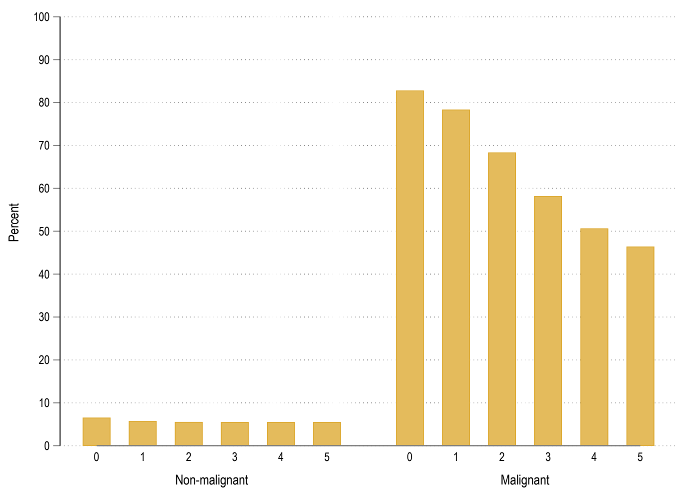
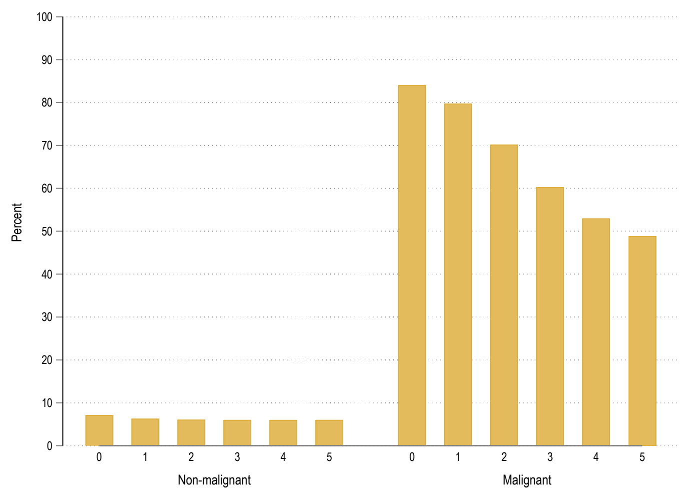


Figure 19.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 59 years at diagnosis (median age). Females



Central nervous system

Figure 19.3: Central nervous system: trends

Figure 19.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

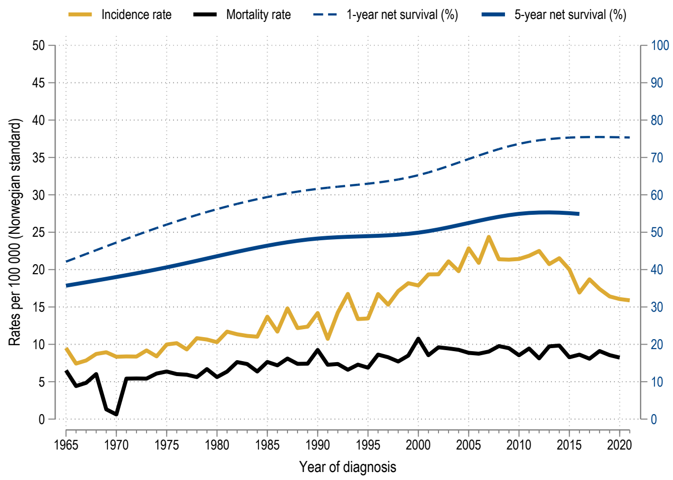


Figure 19.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

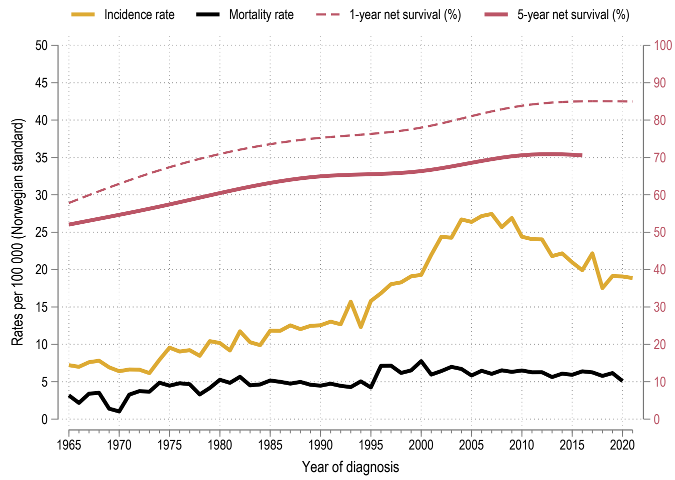


Figure 19.3–C: Trends in reference adjusted all-cause survival

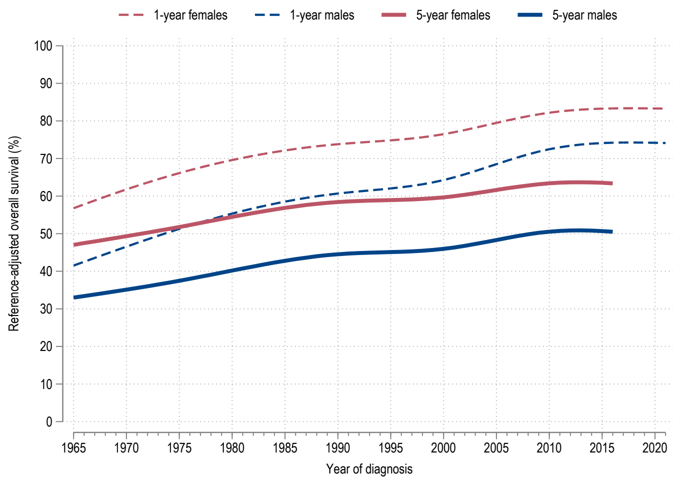


Figure 19.3–D: Trends in reference adjusted crude probability of cancer death

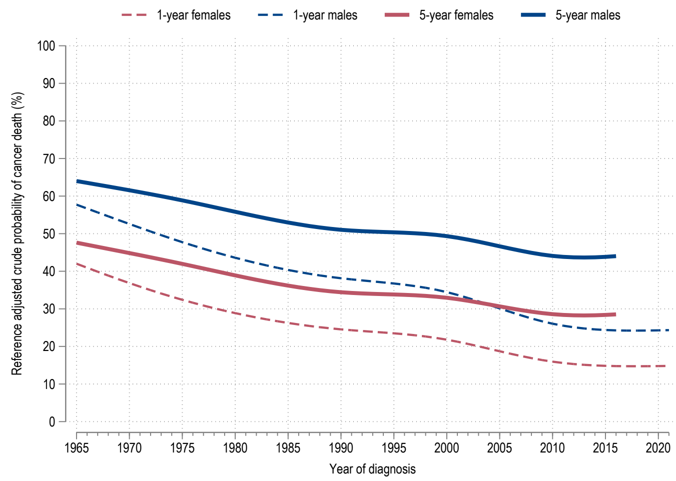


Figure 19.3–E: Trends in reference adjusted life-years lost

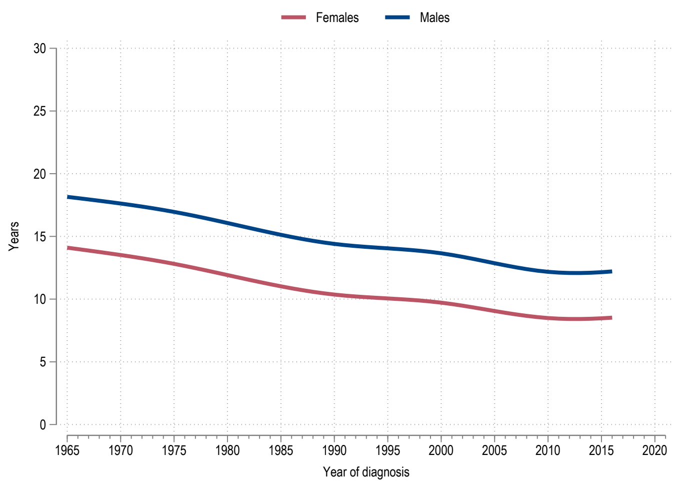
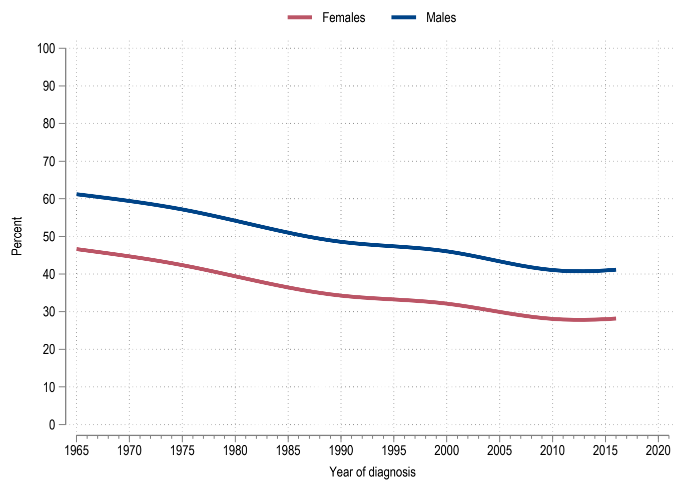


Figure 19.3–F: Trends in reference adjusted life-years lost (%)



Thyroid gland

20.1 Net survival and crude probabilities

Net survival among thyroid cancer patients is steadily at a high level, with a five year net survival estimate of 94.1 %. After five years the net survival does not change much and the ten year net survival is equal to 92 %. There are quite large differences between sexes, with men having a lower net survival. In particular for women, net survival also seem to flatten out at a high level, suggesting that a large proportion of women live for a long time with their cancer, or get cured. Approximately 70 % of all thyroid cancers are diagnosed in women.

The probability of surviving five years after diagnosis is 90 % (Figure 20.1–B). The probability of dying from thyroid cancer within five years is 5.7 % and the additional probability of dying from other causes is 4.3 % In comparison to net survival, the crude probability of surviving after thyroid cancer is only marginally lower, reflecting that a substantial proportion of these patients are younger and therefore at low risk of dying from other causes.

Crude probabilities of thyroid cancer death depend strongly on stage at diagnosis, while death due to other causes increases with age (Figures 20.1–D and 20.1–C). Localised thyroid cancer patients have a very low risk of dying from cancer, with a five year crude probability of death equal to 0.5 % in women aged 45–59. The corresponding probability is 27.3 % for distant thyroid cancer. For more advanced stages there is also a clear age pattern, where older patients are at a higher risk of dying from thyroid cancer.

The probability of dying from thyroid cancer is only marginally influenced by the number of years survived since diagnosis (Figures 20.1–F and 20.1–E). For a median aged, female localised thyroid cancer patient, the probability of dying from cancer within five years after diagnosis is 0.5 %, and the same five year risk is 0.3 % if surviving five years after diagnosis. In comparison, the probability of dying from distant thyroid cancer within five years after diagnosis is 26.6 %. If surviving five years from diagnosis the future five year risk of dying from thyroid cancer is reduced to 15.9 %.

20.2 Life expectancy and life-years lost

The differences in prognosis across stages of thyroid cancer leads to differences in life-years lost. Patients with localised thyroid cancer generally lose very few of their remaining life-years, whereas patients with distant thyroid cancer lose many life-years (Figures 20.2–B and 20.2–A). The number of life-years lost varies across age groups, related to the reduced expected remaining lifetime for older ages. However, the proportions of life-years lost is increasing with age (Figures 20.2–D and 20.2–C). These plots also shows the large difference in prognosis across stages, with women with distant thyroid cancer losing a much larger proportion of their remaining lifetime compared to less advanced stages.

The proportion of life-years lost is quite similar across number of years survived for each stage (Figures 20.2–F and 20.2–E). For localised thyroid cancer this proportion approaches zero. A median aged woman with distant thyroid cancer is expected to lose 46.2 % of her remaining lifetime at the time of diagnosis. If surviving five years after diagnosis this proportion declines to 33.6 %.

20.3 Time trends

Net survival of thyroid cancer has been quite high since 1965, but still has increased over time (Figures 20.3–B and 20.3–A). The high survival is related to most patients being diagnosed with a disease which is at a stage where curative treatment options exist. Correspondingly, all-cause survival has increased and the crude probability of dying from thyroid cancer has declined (Figures 20.3–C and 20.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 20.3–E and 20.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 7.6 years in 1965 and expected to be 1.2 years in 2016. Correspondingly, the proportion of life-years lost due to thyroid cancer has declined from 22.2 % in 1965 to an expected 3.6 % in 2016, when averaging across all ages and stages at diagnosis.

Figure 20.1: Thyroid gland: net and crude probabilities

Figure 20.1–A: Net survival 0–10 years

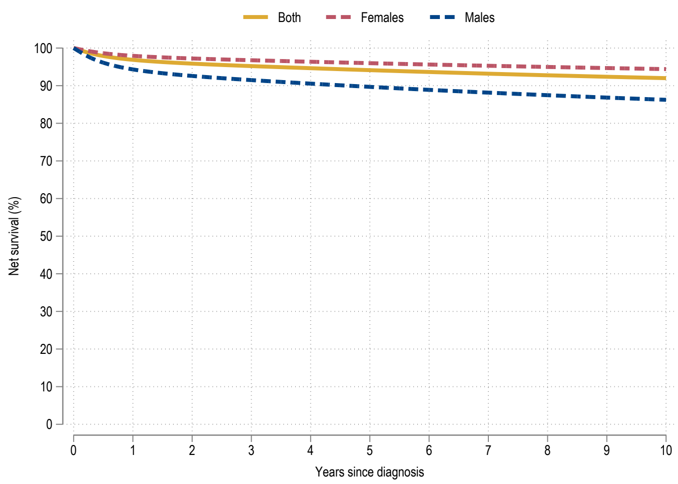


Figure 20.1–B: Crude probabilities 0–10 years

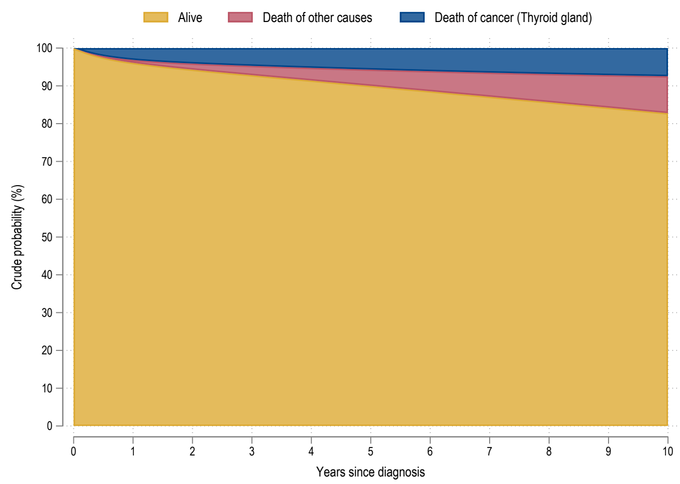


Figure 20.1–C: 5-year crude probabilities by age and stage. Males

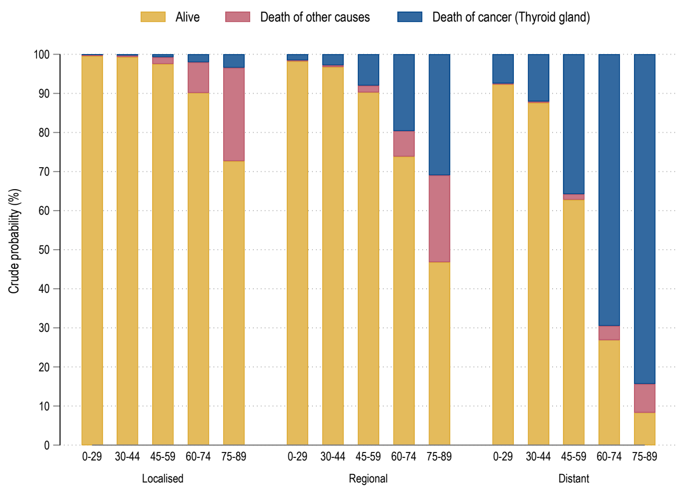


Figure 20.1–D: 5-year crude probabilities by age and stage. Females

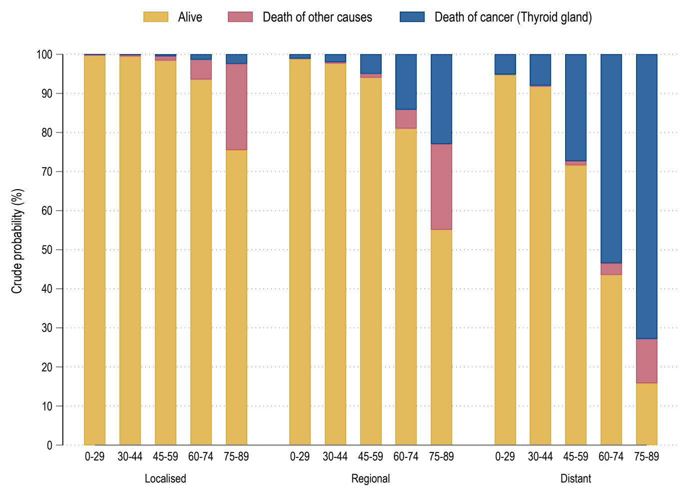


Figure 20.1–E: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 54 years at diagnosis (median age). Males

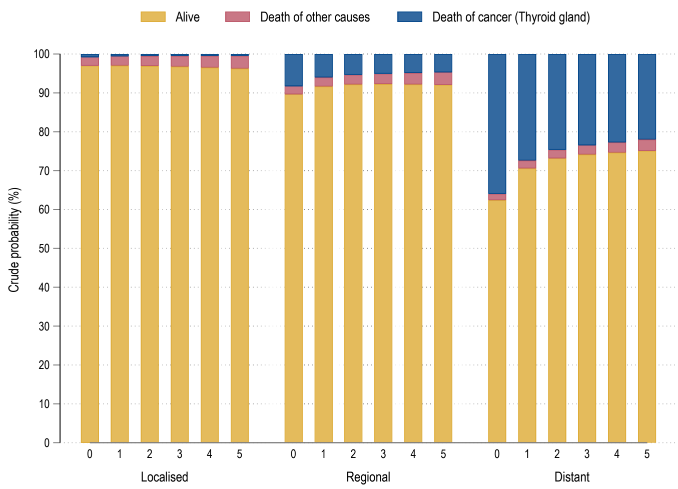
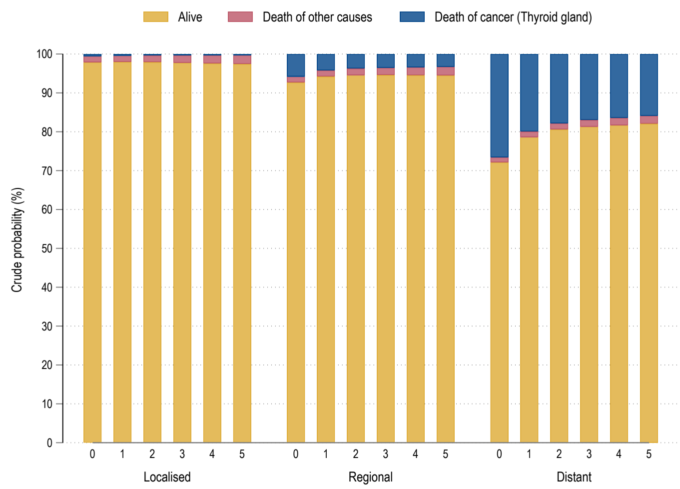


Figure 20.1–F: Conditional 5-year crude probabilities by stage and years (0–5) since diagnosis. Patients aged 54 years at diagnosis (median age). Females



Thyroid gland

Figure 20.2: Thyroid gland: life expectancy and life-years lost

Figure 20.2–A: Life expectancy by age and stage. Males

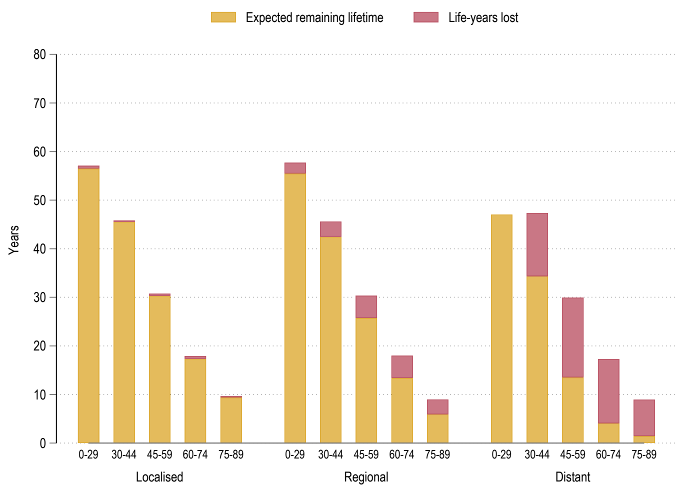


Figure 20.2–B: Life expectancy by age and stage. Females

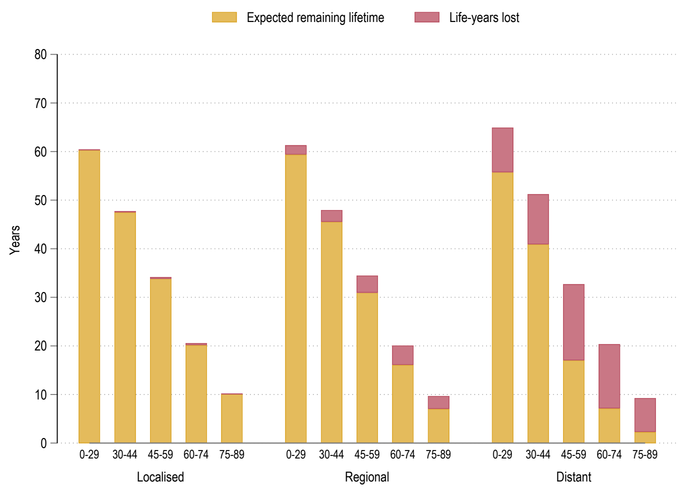


Figure 20.2–C: Proportion of life-years lost. Males

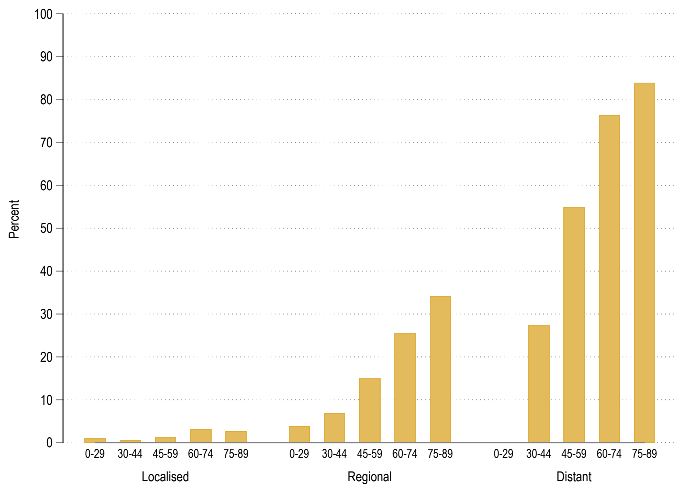


Figure 20.2–D: Proportion of life-years lost. Females

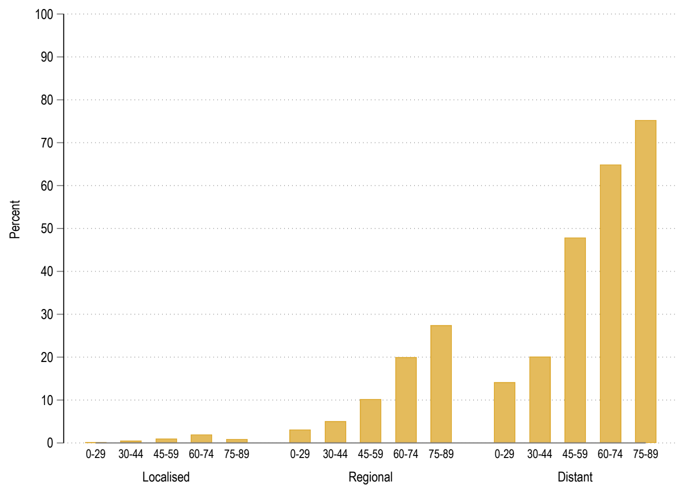


Figure 20.2–E: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 54 years at diagnosis (median age). Males

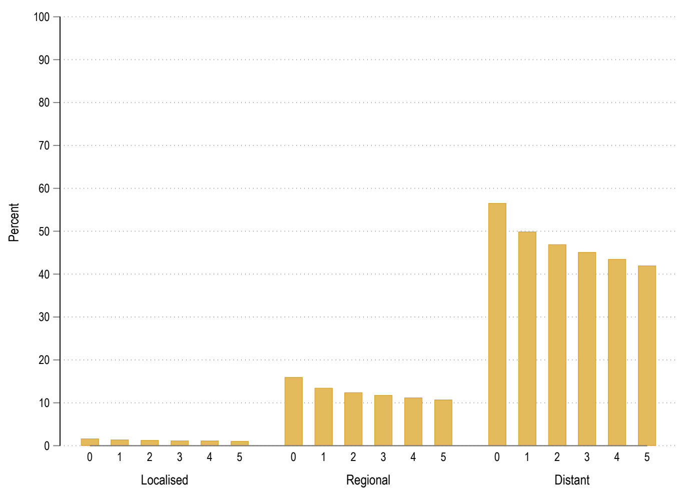


Figure 20.2–F: Conditional proportion of life-years lost by stage and years (0–5) since diagnosis. Patients aged 54 years at diagnosis (median age). Females

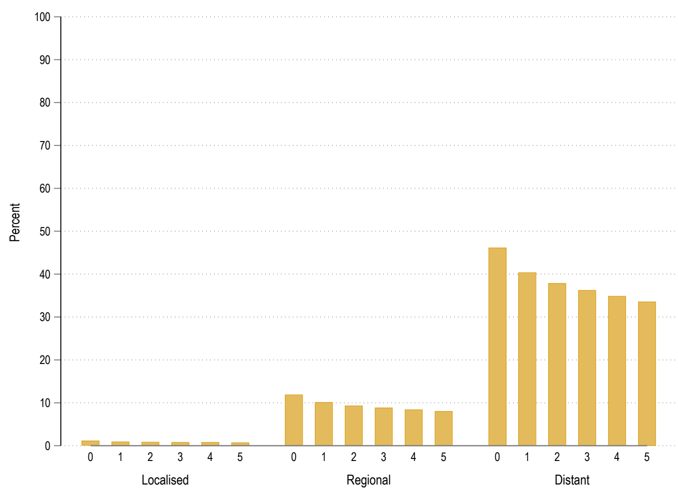


Figure 20.3: Thyroid gland: trends

Figure 20.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

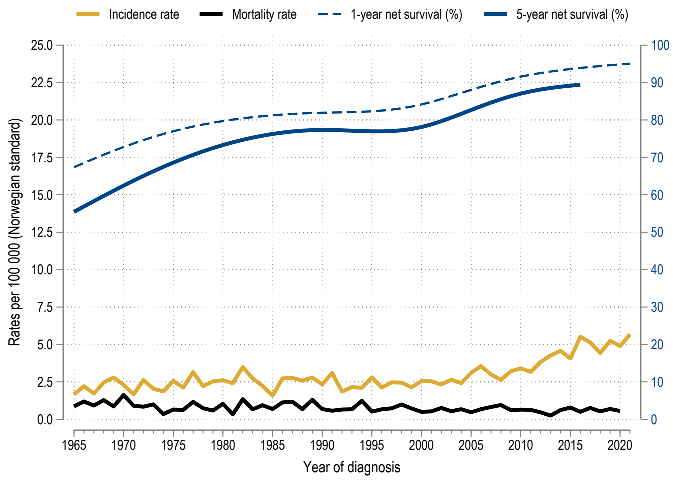


Figure 20.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

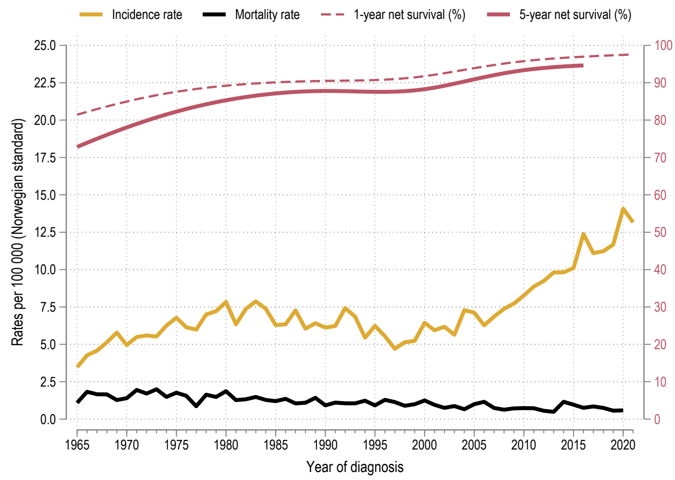


Figure 20.3–C: Trends in reference adjusted all-cause survival

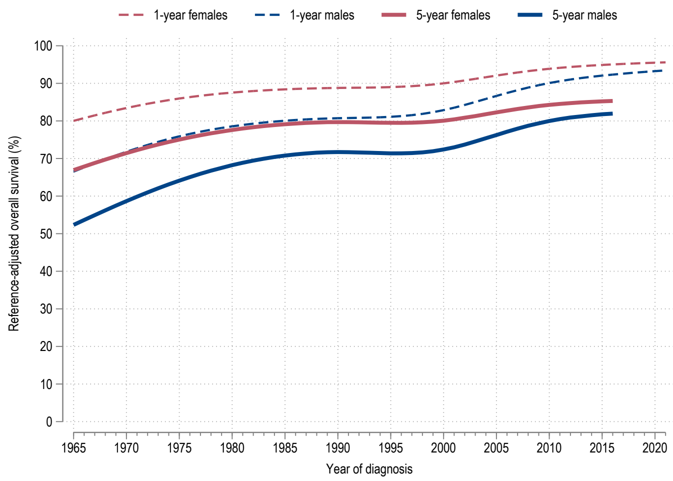


Figure 20.3–D: Trends in reference adjusted crude probability of cancer death

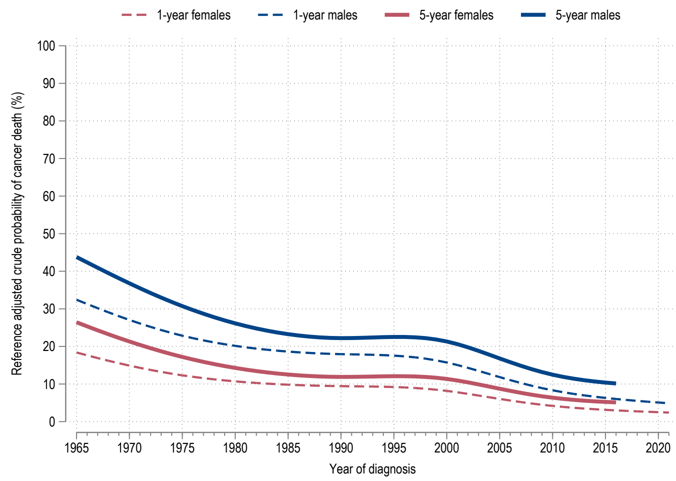


Figure 20.3–E: Trends in reference adjusted life-years lost

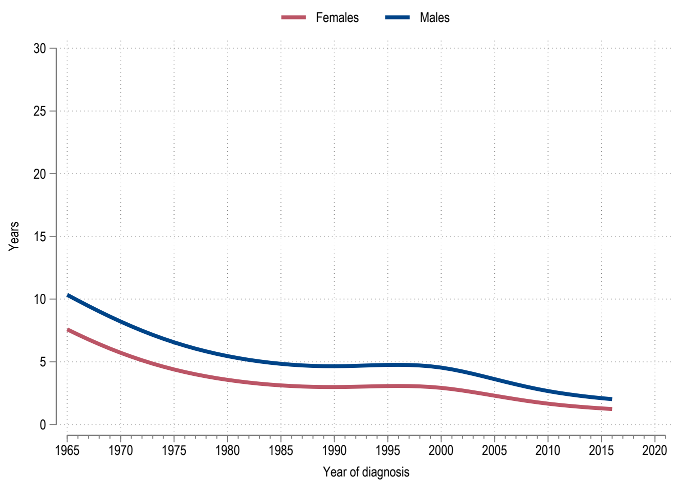
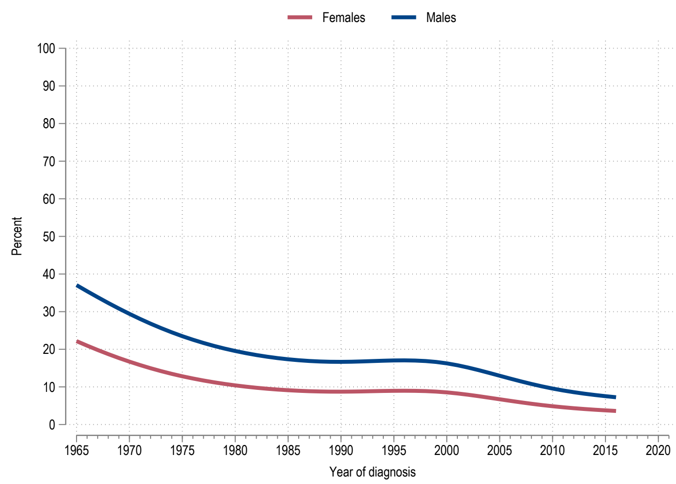


Figure 20.3–F: Trends in reference adjusted life-years lost (%)



Thyroid gland

Hodgkin lymphoma

21.1 Net survival and crude probabilities

Net survival for patients with Hodgkin lymphoma declines somewhat the first years after diagnosis, but with a high five year net survival estimate of 88.9 %. After five years there is a tendency for net survival to decline further and not reaching a plateau, with a ten year net survival equal to 82.9 % for both sexes combined (Figure 21.1–A). There are virtually no differences between men and women.

The probability of surviving five years after diagnosis is 85.9 % (Figure 21.1–B). The probability of dying from Hodgkin lymphoma within five years is 10.7 % and the additional probability of dying from other causes is 3.4 %. In comparison to net survival, the crude probability of dying from cancer is similar, reflecting that a large proportion of these patients are younger, and have a low risk of dying from other causes.

Crude probabilities of death from Hodgkin lymphoma depend on age at diagnosis, with poorer prognosis for the older age groups. Also adding the increased risk of other cause deaths by age, the overall five year survival is much lower for the oldest compared to the youngest patients (Figures 21.1–D and 21.1–C). For women, the five year crude probability of death due to Hodgkin lymphoma is 42.3 % at ages 80–89, while the corresponding probability is 0.7 % at ages 0–19. The five year all-cause survival is 36.3 % at ages 80–89 and 99.3 % at ages 0–19.

Since prognosis for Hodgkin lymphoma patients as a group is very good, having survived for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 21.1–F and 21.1–E). For a median aged woman with Hodgkin lymphoma the five year risk of dying from the cancer is 2.5 % when seen from diagnosis. If surviving five years from diagnosis the future five year risk of dying from Hodgkin lymphoma is 1.2 %.

21.2 Life expectancy and life-years lost

The differences in prognosis across age groups of Hodgkin lymphoma leads to differences in life-years lost. Looking at the absolute number of life-years lost, the oldest patients lose fewer years, related to the shorter expected remaining lifetime for older ages (Figures 21.2–B and 21.2–A). However, when looking at the proportion of life-years lost, the picture is different, with a sharply increasing proportion by age (Figures 21.2–D and 21.2–C). The proportion of life-years lost is only marginally decreasing with the number of years survived (Figures 21.2–F and 22.2–E).

21.3 Time trends

Net survival of Hodgkin lymphomas has increased steadily over time for both sexes (Figures 21.3–B and 21.3–A). Correspondingly, all-cause survival has increased and the crude probability of dying from Hodgkin lymphoma has declined (Figures 21.3–C and 21.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 21.3–E and 21.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 17.2 years in 1965 and expected to be 2.7 years in 2016. Correspondingly, the proportion of life-years lost due to Hodgkin lymphoma has decreased from 40.5 % in 1965 to an expected 6.3 % in 2016, when averaging across all ages at diagnosis.

Figure 21.1: Hodgkin lymphoma: net and crude probabilities

Figure 21.1–A: Net survival 0–10 years

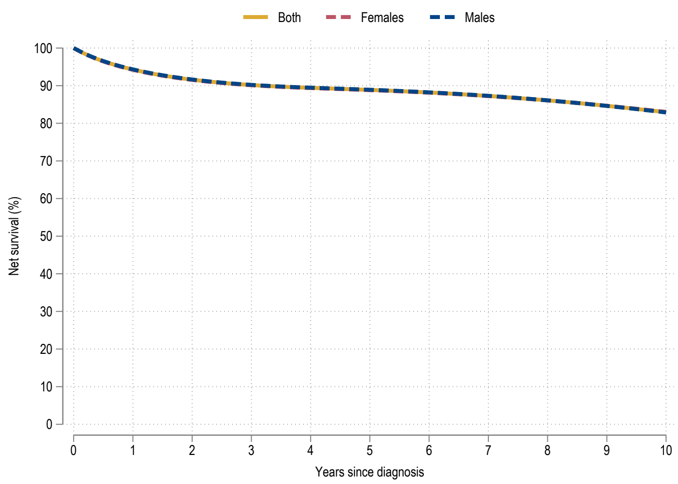


Figure 21.1–B: Crude probabilities 0–10 years

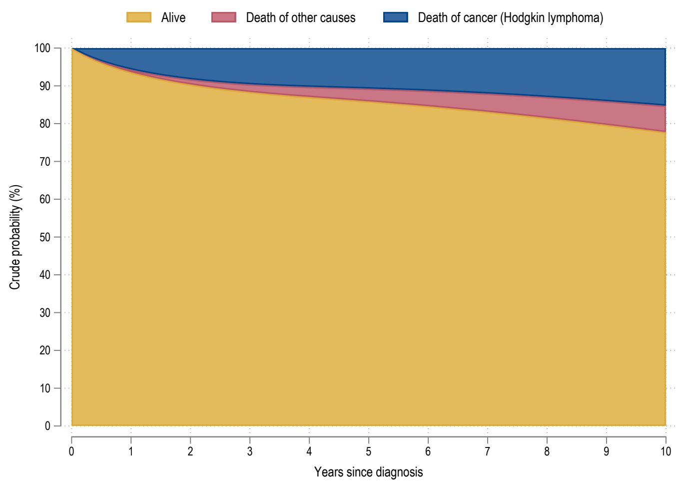


Figure 21.1–C: 5-year crude probabilities by age. Males

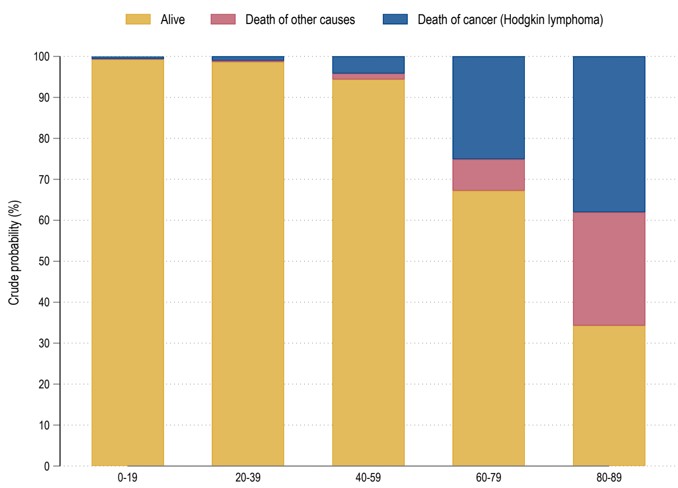


Figure 21.1–D: 5-year crude probabilities by age. Females

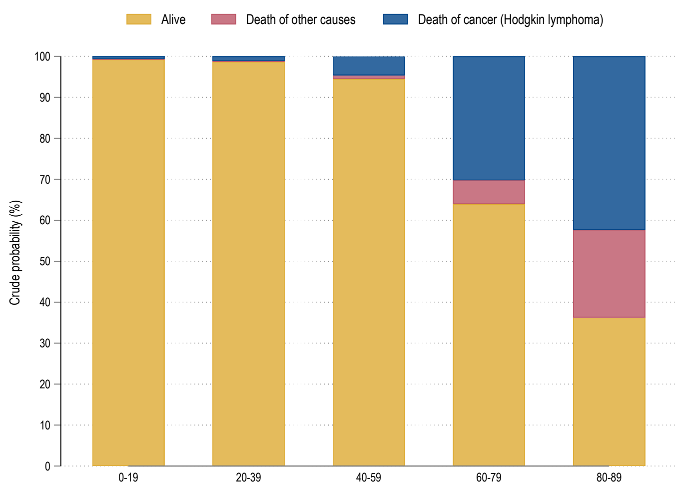


Figure 21.1–E: Conditional 5-year crude probabilities by years (0–5) since diagnosis. Patients aged 44 years at diagnosis (median age). Males

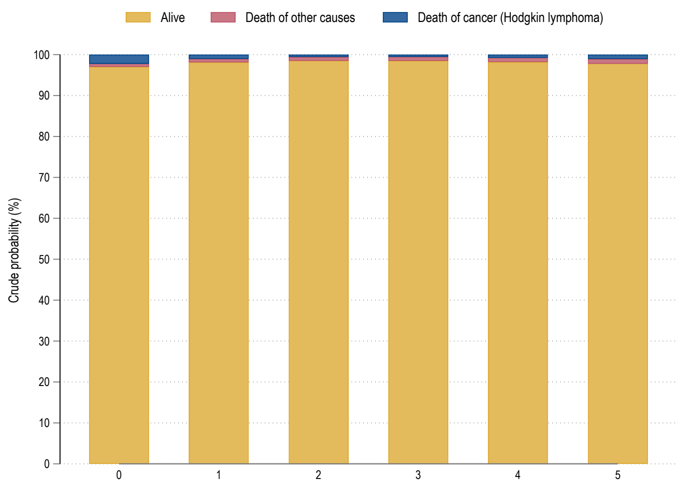
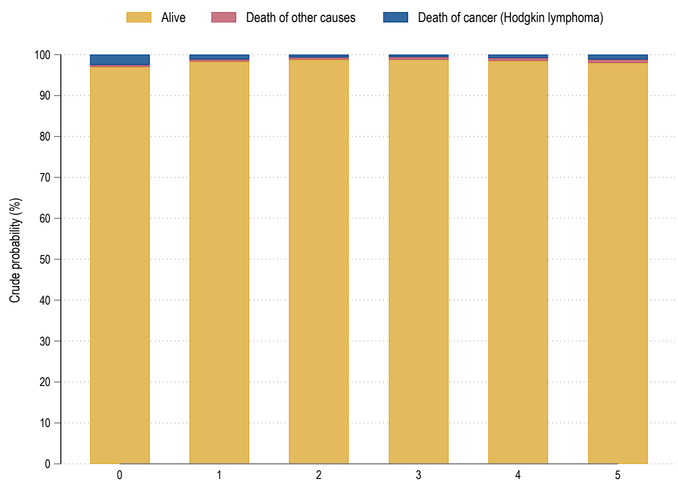


Figure 21.1–F: Conditional 5-year crude probabilities by years (0–5) since diagnosis. Patients aged 44 years at diagnosis (median age). Females



Hodgkin lymphoma

Figure 21.2: Hodgkin lymphoma: life expectancy and life-years lost

Figure 21.2–A: Life expectancy by age. Males

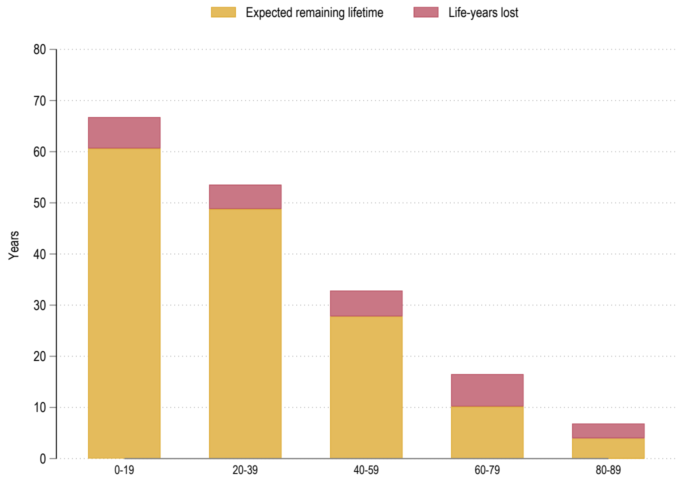


Figure 21.2–B: Life expectancy by age. Females

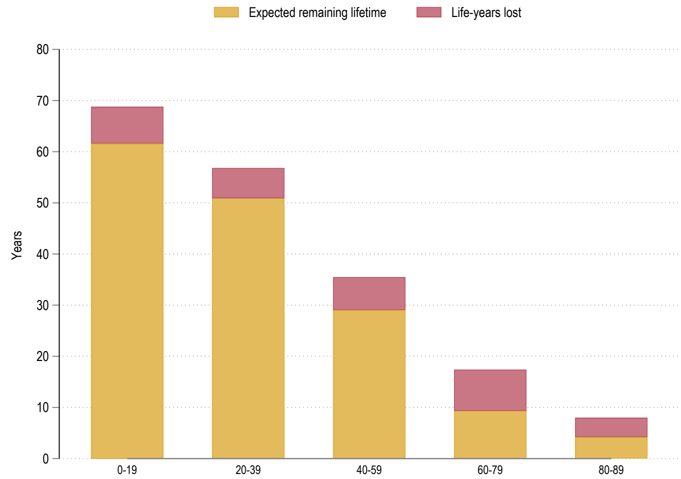


Figure 21.2–C: Proportion of life-years lost. Males

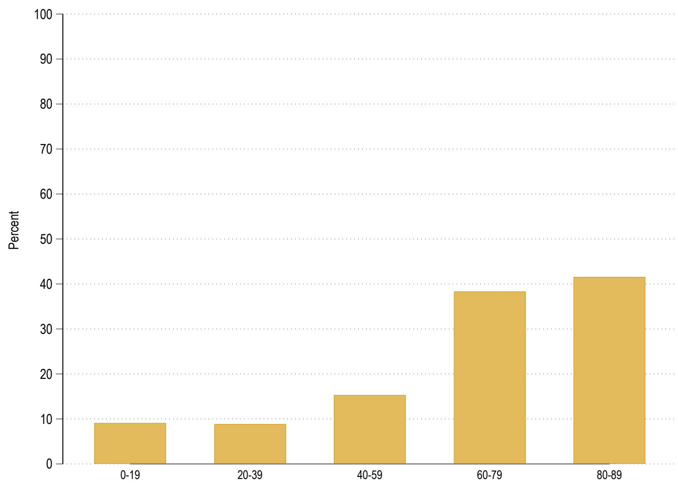


Figure 21.2–D: Proportion of life-years lost. Females

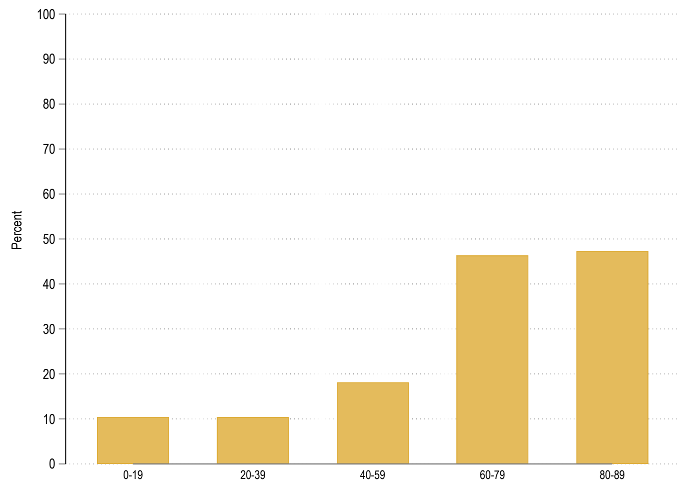


Figure 21.2–E: Conditional proportion of life-years lost by years (0–5) since diagnosis. Patients aged 44 years at diagnosis (median age). Males

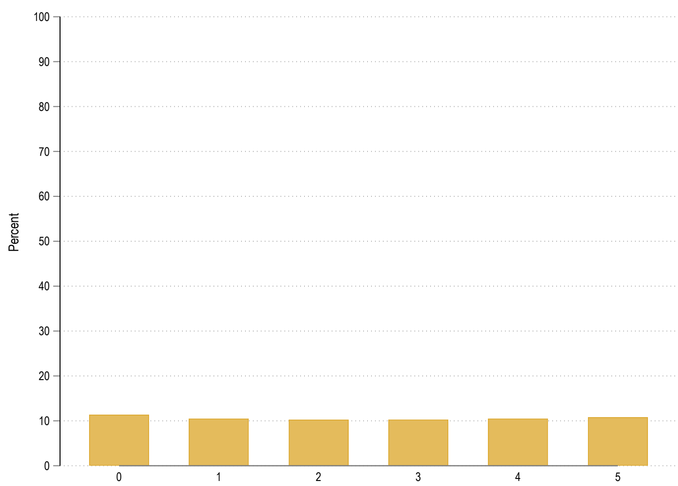
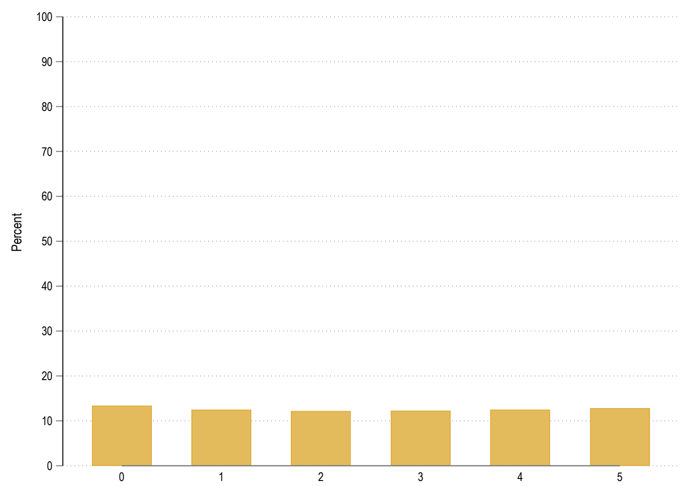


Figure 21.2–F: Conditional proportion of life-years lost by years (0–5) since diagnosis. Patients aged 44 years at diagnosis (median age). Females



Hodgkin lymphoma

Figure 21.3: Hodgkin lymphoma: trends

Figure 21.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

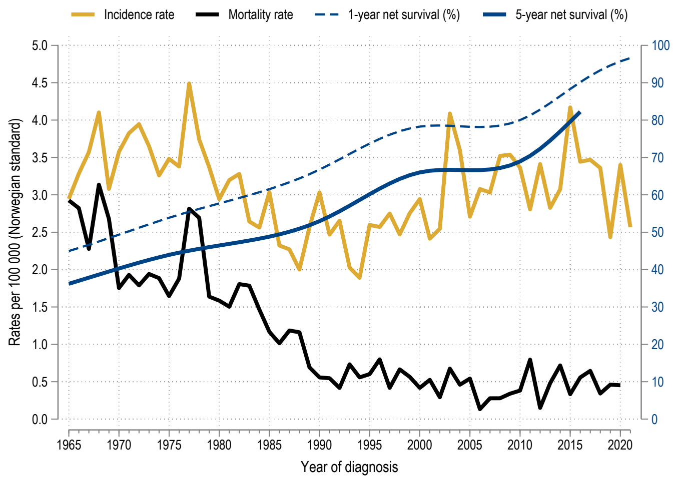


Figure 21.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

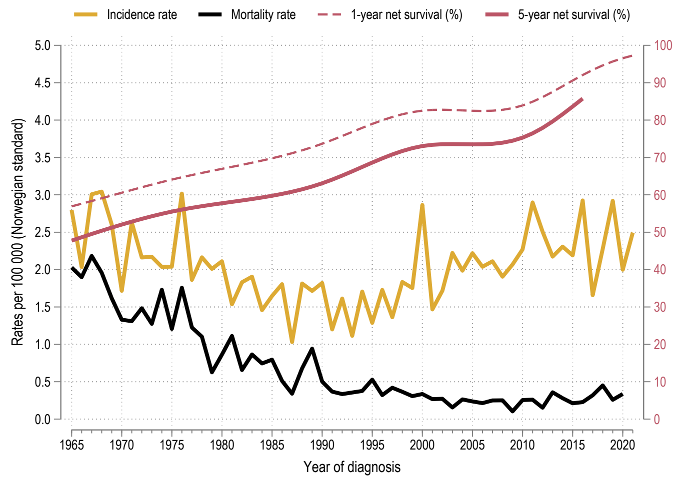


Figure 21.3–C: Trends in reference adjusted all-cause survival

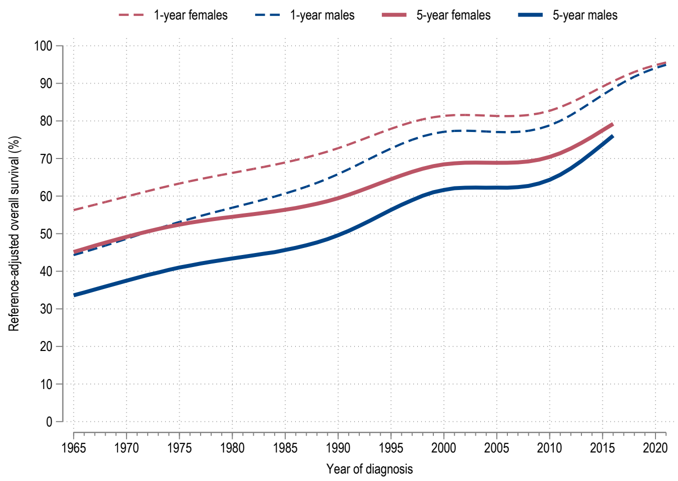


Figure 21.3–D: Trends in reference adjusted crude probability of cancer death

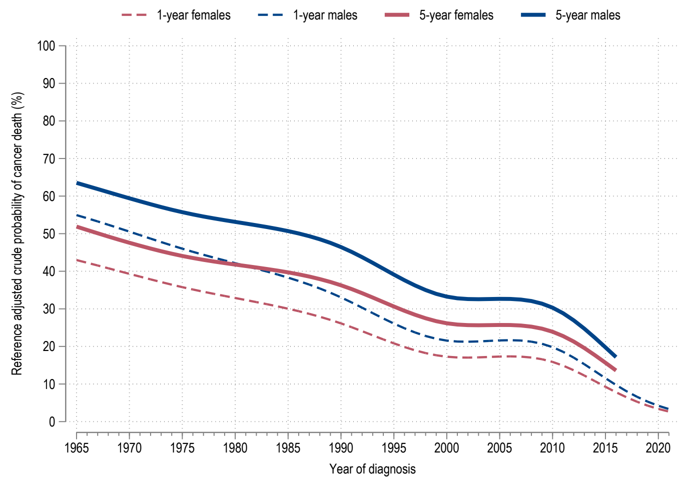


Figure 21.3–E: Trends in reference adjusted life-years lost

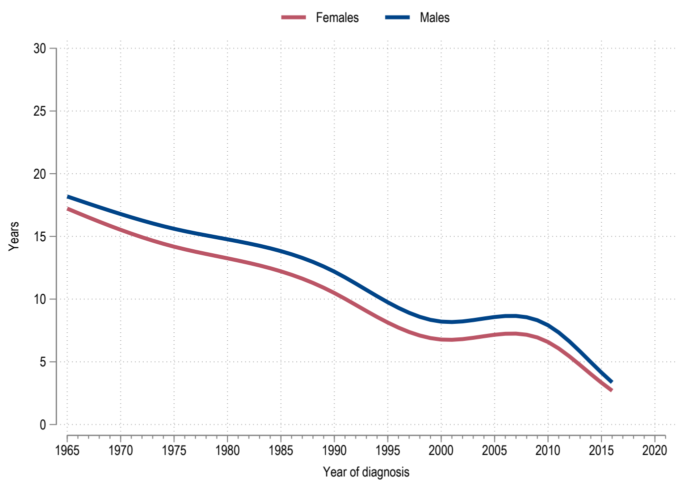
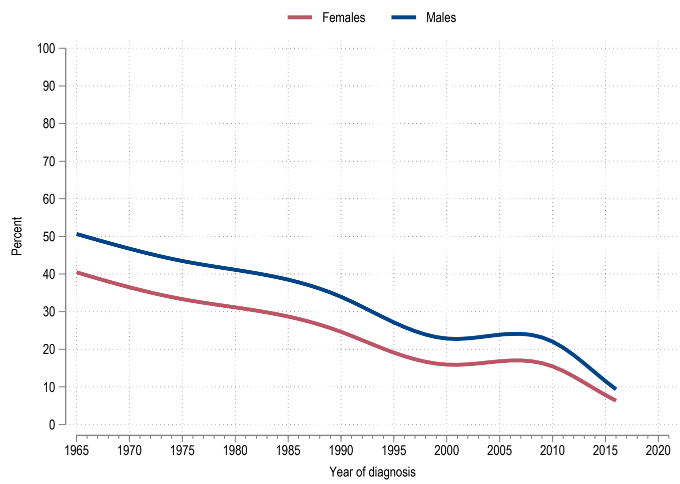


Figure 21.3–F: Trends in reference adjusted life-years lost (%)



Non-Hodgkin lymphoma

22.1 Net survival and crude probabilities

Non-Hodgkin lymphomas includes follicular (ICD10-C82) and non-follicular lymphomas (ICD10-C83) as the two dominating groups. Non-Hodgkin lymphoma are a heterogeneous group of diseases, with great variability in prognosis. In this report we do not separate different histological subgroups, and this is important to remember when interpreting the results.

Net survival for patients with Non-Hodgkin lymphoma declines the first years after diagnosis with a five year net survival estimate of 78 %. After five years the net survival continues to decline without reaching a plateau, with a ten year net survival equal to 66.4 % for both sexes combined (Figure 22.1–A). Women have a higher net survival compared to men.

The probability of surviving five years after diagnosis is 69.8 % (Figure 22.1–B). The probability of dying from Non-Hodgkin lymphoma within five years is 21 % and the additional probability of dying from other causes is 9.2 %. In comparison to net survival, the crude probability of dying from cancer is lower since patients may also die from other causes.

Crude probabilities of death from Non-Hodgkin lymphoma depend on age at diagnosis, with poorer prognosis for the older age groups. Also adding the increased risk of other cause deaths by age, the overall five year survival is much lower for the oldest compared to the youngest patients (Figures 22.1–D and 22.1–C). For women, the five year crude probability of death due to Non-Hodgkin lymphoma is 36.9 % at ages 80–89, while the corresponding probability is 6.5 % at ages 0–19. The five year all-cause survival is 40.1 % at ages 80–89 and 93.5 % at ages 0–19.

Having survived Non-Hodgkin lymphomas for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 22.1–F and 22.1–E). For a median aged woman with Non-Hodgkin lymphoma the five year risk of dying from the cancer is 17 % when seen from diagnosis. If surviving five years from diagnosis the future five year risk of dying from Non-Hodgkin lymphoma is 13.7 %.

22.2 Life expectancy and life-years lost

The differences in prognosis across age groups of Non-Hodgkin lymphoma leads to differences in life-years lost. Looking at the absolute number of life-years lost, the youngest patients lose most, related to the higher expected remaining lifetime for younger ages (Figures 22.2–B and 22.2–A). However, when looking at the proportion of life-years lost, the picture is different, with a sharply increasing proportion by age (Figures 22.2–D and 22.2–C). Men lose more of their remaining lifetime compared to women.

The proportion of life-years lost is only marginally decreasing with the number of years survived, reflecting the continued influence from Non-Hodgkin lymphomas on expected remaining lifetime despite surviving several years after diagnosis (Figures 22.2–F and 22.2–E).

22.3 Time trends

Net survival of Non-Hodgkin lymphomas has increased over time for both sexes, especially over the past two decades (Figures 22.3–B and 22.3–A). Correspondingly, all-cause survival has increased and the crude probability of dying from Non-Hodgkin lymphoma has declined (Figures 22.3–C and 22.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 22.3–E and 22.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 14.1 years in 1965 and expected to be 4.5 years in 2016. Correspondingly, the proportion of life-years lost due to Non-Hodgkin lymphoma has decreased from 67.8 % in 1965 to an expected 21.5 % in 2016, when averaging across all ages at diagnosis.

Figure 22.1: Non-Hodgkin lymphoma: net and crude probabilities

Figure 22.1–A: Net survival 0–10 years

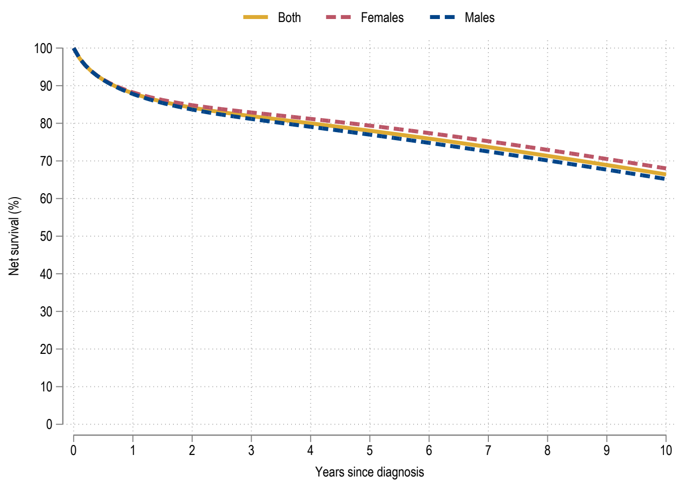


Figure 22.1–B: Crude probabilities 0–10 years

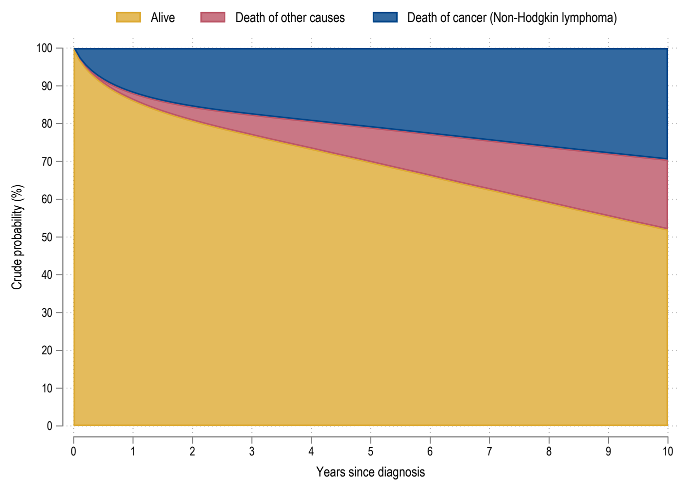


Figure 22.1–C: 5-year crude probabilities by age. Males

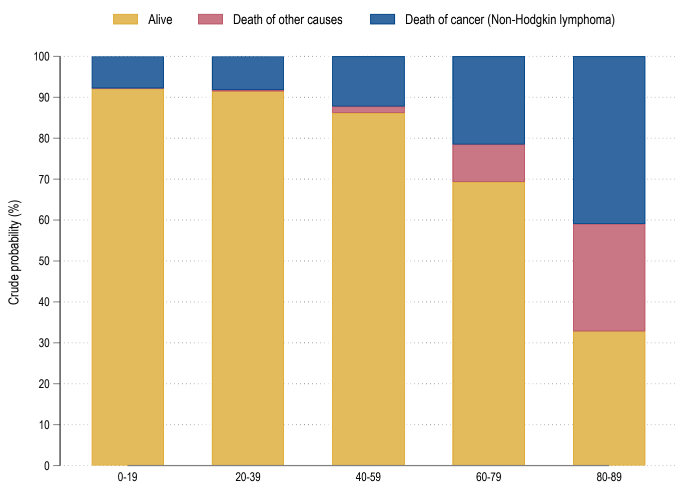


Figure 22.1–D: 5-year crude probabilities by age. Females

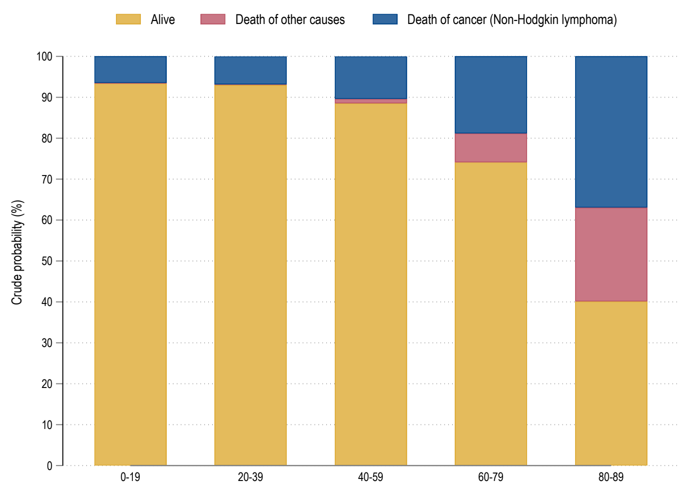


Figure 22.1–E: Conditional 5-year crude probabilities by years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Males

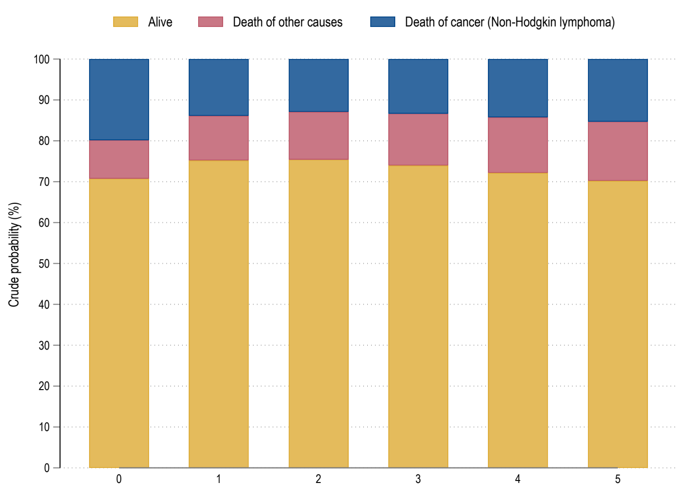


Figure 22.1–F: Conditional 5-year crude probabilities by years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Females

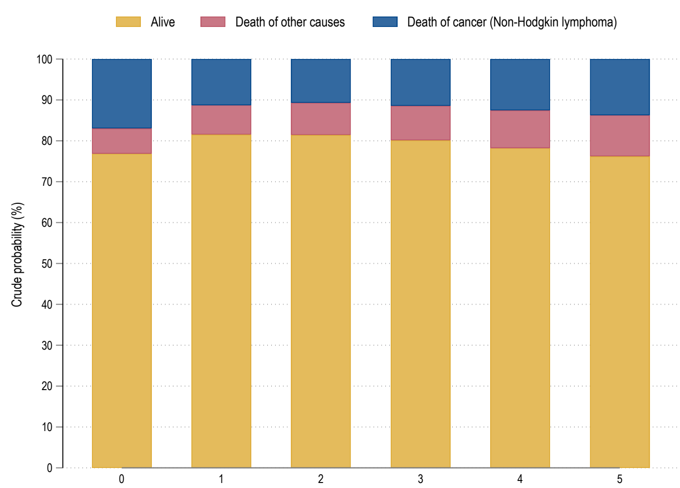


Figure 22.2: Non-Hodgkin lymphoma: life expectancy and life-years lost

Figure 22.2–A: Life expectancy by age. Males

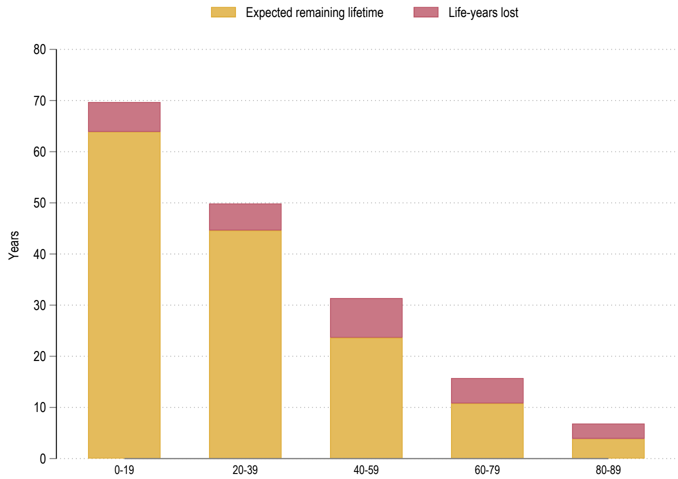


Figure 22.2–B: Life expectancy by age. Females

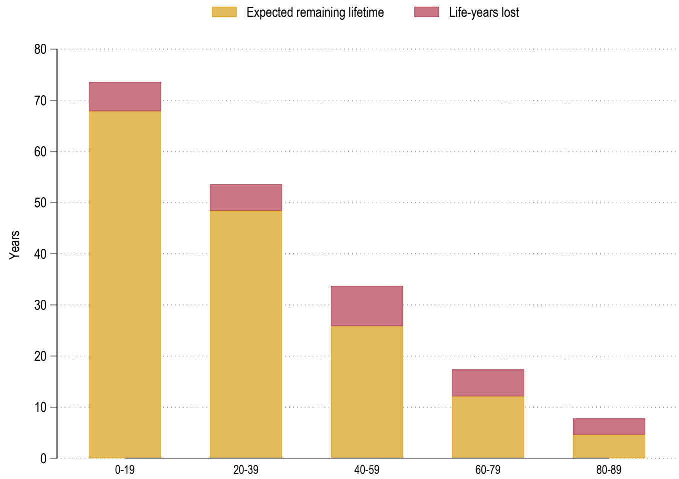


Figure 22.2–C: Proportion of life-years lost. Males

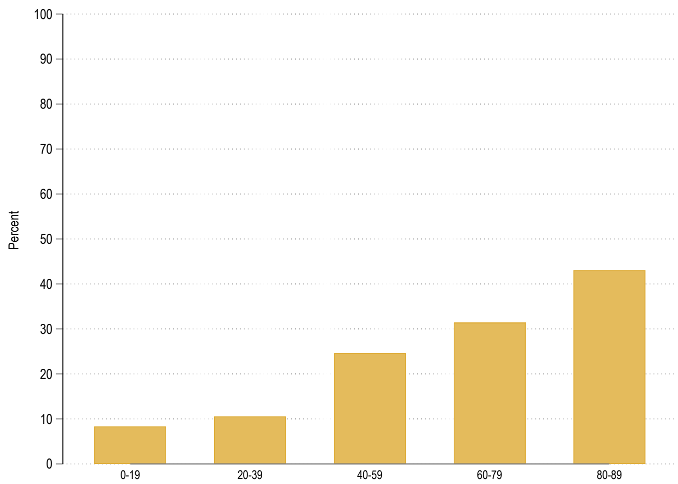


Figure 22.2–D: Proportion of life-years lost. Females

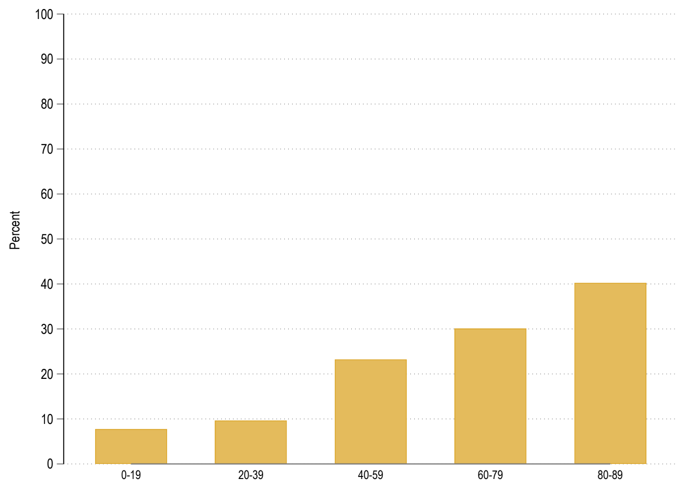


Figure 22.2–E: Conditional proportion of life-years lost by years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Males

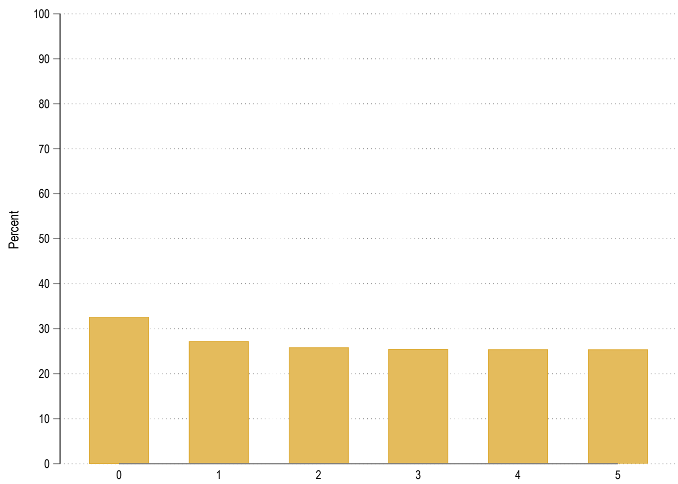


Figure 22.2–F: Conditional proportion of life-years lost by years (0–5) since diagnosis. Patients aged 70 years at diagnosis (median age). Females

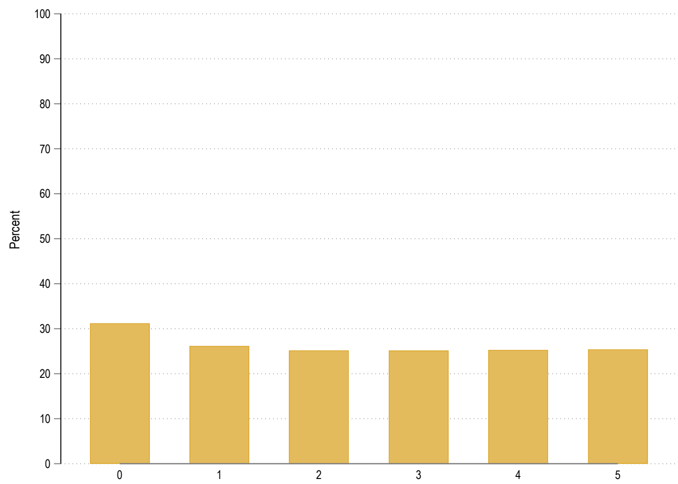


Figure 22.3: Non-Hodgkin lymphoma: trends

Figure 22.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

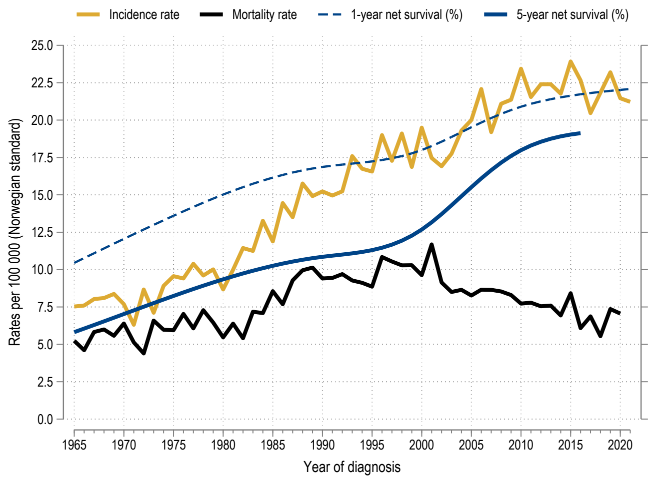


Figure 22.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

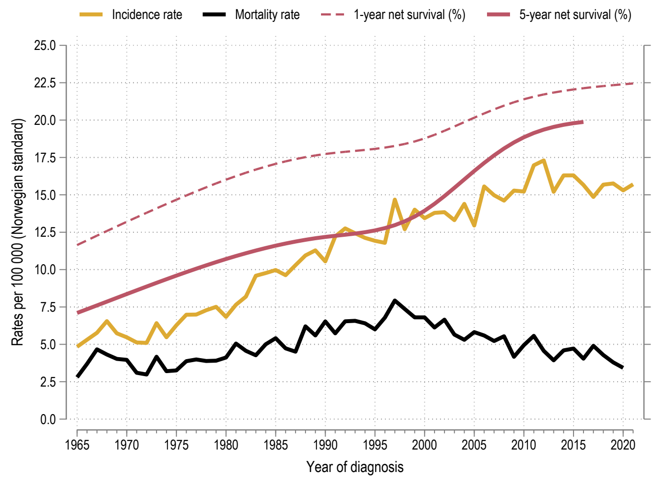


Figure 22.3–C: Trends in reference adjusted all-cause survival

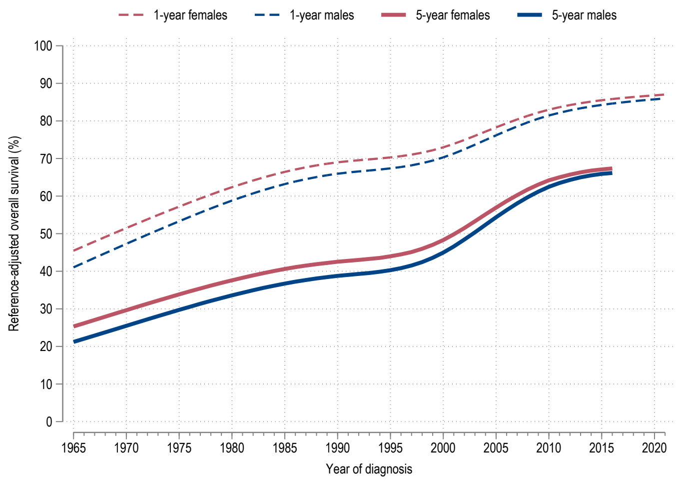


Figure 22.3–D: Trends in reference adjusted crude probability of cancer death

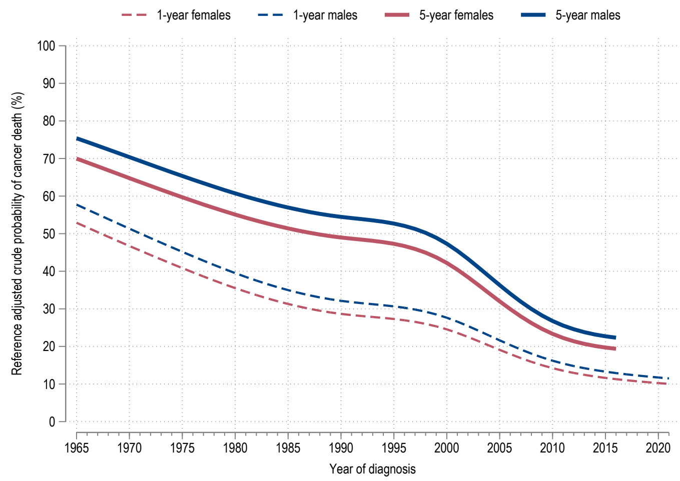


Figure 22.3–E: Trends in reference adjusted life-years lost

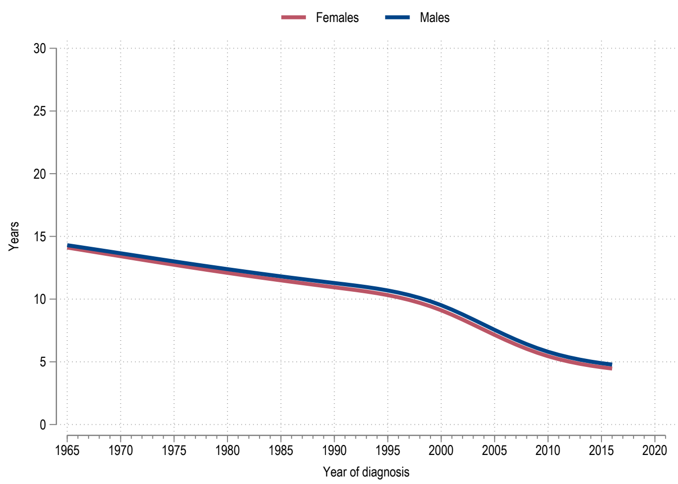
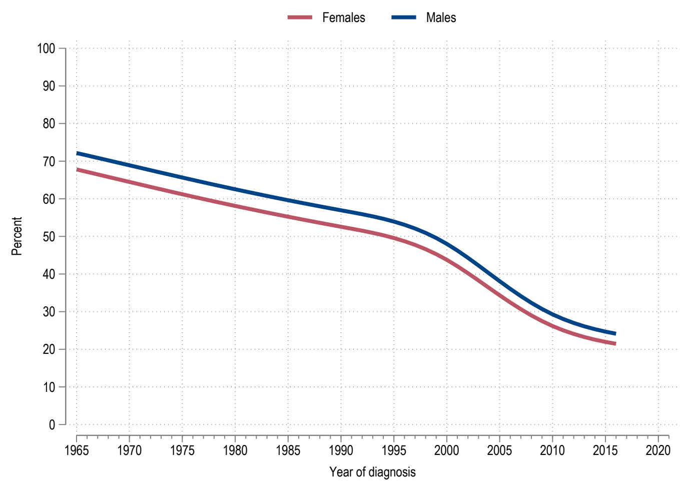


Figure 22.3–F: Trends in reference adjusted life-years lost (%)



Leukaemia

23.1 Net survival and crude probabilities

Net survival for patients with leukaemia declines the first years after diagnosis with a five year net survival estimate of 72.7 %. After five years the net survival continues to decline without reaching a plateau, with a ten year net survival equal to 61.2 % for both sexes combined (Figure 23.1–A). Women have a higher net survival compared to men.

The probability of surviving five years after diagnosis is 65.5 % (Figure 23.1–B). The probability of dying from leukaemia within five years is 25.9 % and the additional probability of dying from other causes is 8.7 %. In comparison to net survival, the crude probability of dying from cancer is lower since patients may also die from other causes.

Crude probabilities of death from leukaemia depend on age at diagnosis, with poorer prognosis for the older age groups. Also adding the increased risk of other cause deaths by age, the overall five year survival is much lower for the oldest compared to the youngest patients (Figures 23.1–D and 23.1–C). For women, the five year crude probability of death due to leukaemia is 37.7 % at ages 75–89, while the corresponding probability is 8.3 % at ages 0–29. The five year all-cause survival is 45.1 % at ages 75–89 and 91.6 % at ages 0–29.

Having survived leukaemia for one, two and up to five years after diagnosis, only has a minor impact on your survival the coming five years (Figures 23.1–F and 23.1–E). For a median aged woman with leukaemia the five year risk of dying from the cancer is 22.4 % when seen from diagnosis. If surviving five years from diagnosis the future five year risk of dying from leukaemia is 13.5 %.

23.2 Life expectancy and life-years lost

The differences in prognosis across age groups of leukaemia leads to differences in life-years lost. Looking at the absolute number of life-years lost, the youngest patients lose most, related to the higher expected remaining lifetime for younger ages (Figures 23.2–B and 23.2–A). However, when looking at the proportion of life-years lost, the picture is different, with a sharply increasing proportion by age (Figures 23.2–D and 23.2–C). Men lose more of their remaining lifetime compared to women.

The proportion of life-years lost is only marginally decreasing with the number of years survived, reflecting the continued influence from leukaemia on expected remaining lifetime despite surviving several years after diagnosis (Figures 23.2–F and 23.2–E).

23.3 Time trends

Net survival of leukaemia has increased steadily over time for both sexes (Figures 23.3–B and 23.3–A). Correspondingly, all-cause survival has increased and the crude probability of dying from leukaemia has declined (Figures 23.3–C and 23.3–D). This has also affected life-years lost, with both the number and proportion of life-years lost declining over time (Figures 23.3–E and 23.3–F). As an example, the number of life-years lost for women, if life expectancy is held constant at 2021-level, was on average 18.8 years in 1965 and expected to be 5.1 years in 2016. Correspondingly, the proportion of life-years lost due to leukaemia has decreased from 79.6 % in 1965 to an expected 21.7 % in 2016, when averaging across all ages at diagnosis.

Figure 23.1: Leukaemia: net and crude probabilities

Figure 23.1–A: Net survival 0–10 years

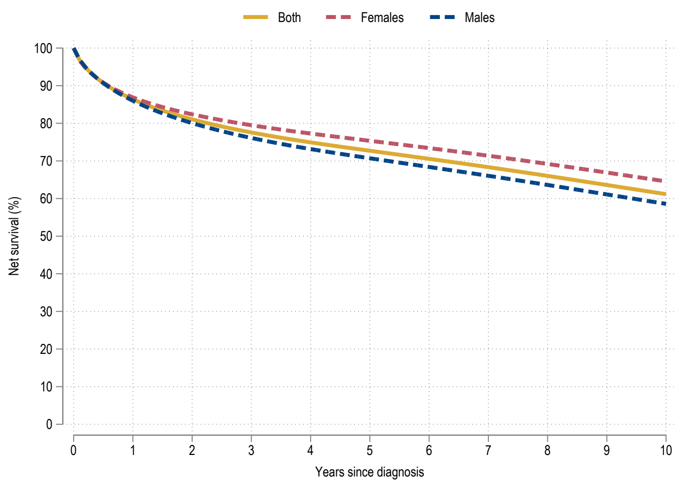


Figure 23.1–B: Crude probabilities 0–10 years

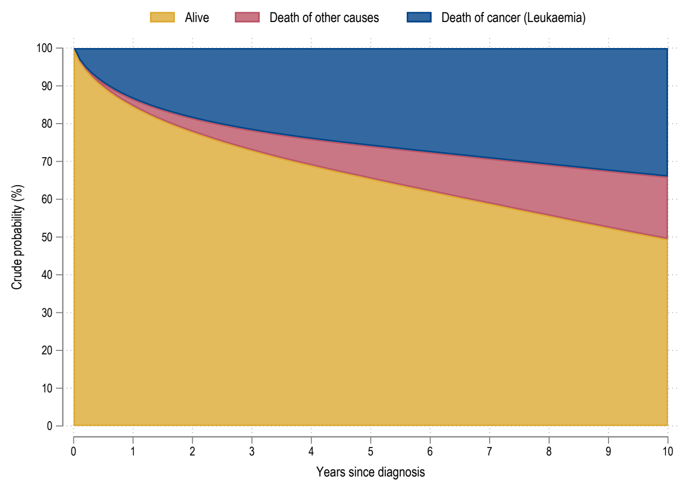


Figure 23.1–C: 5-year crude probabilities by age. Males

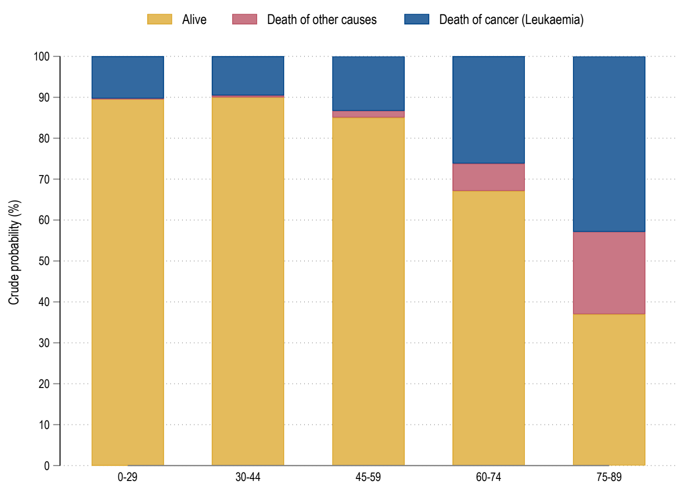


Figure 23.1–D: 5-year crude probabilities by age. Females

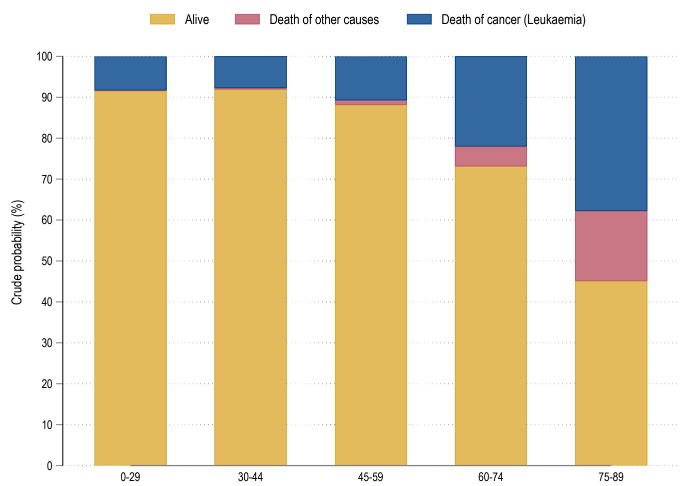


Figure 23.1–E: Conditional 5-year crude probabilities by years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Males

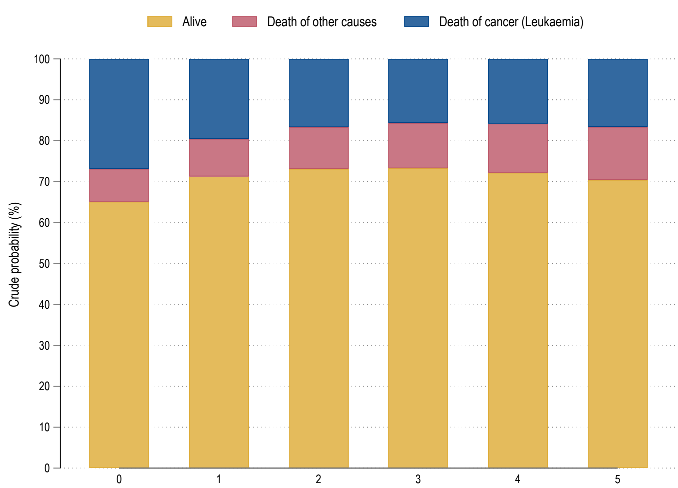
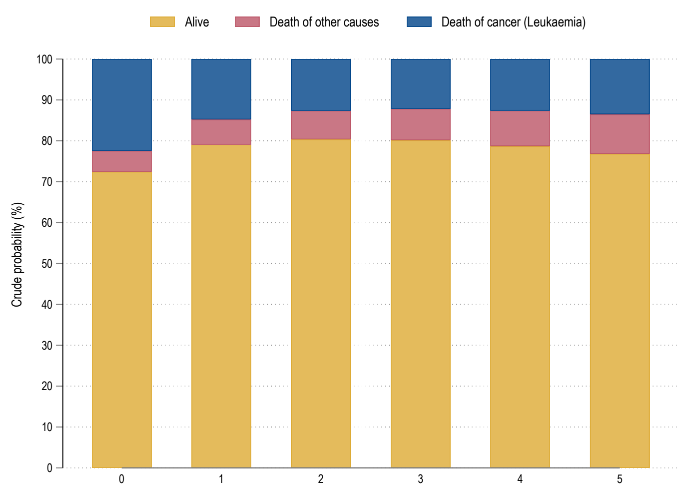


Figure 23.1–F: Conditional 5-year crude probabilities by years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Females



Leukaemia

Figure 23.2: Leukaemia: life expectancy and life-years lost

Figure 23.2–A: Life expectancy by age. Males

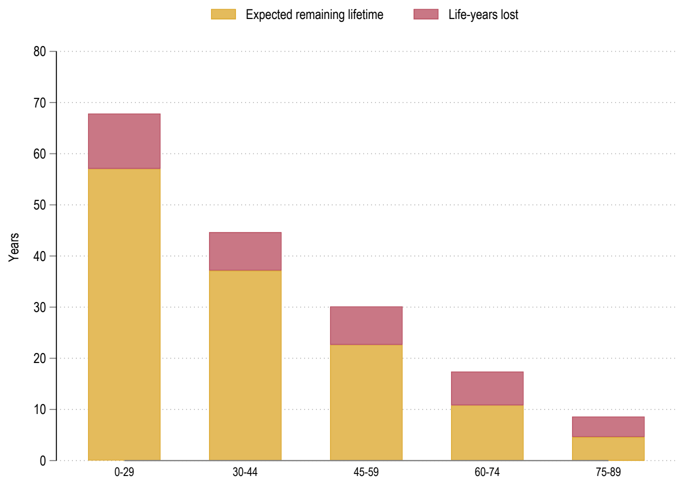


Figure 23.2–B: Life expectancy by age. Females

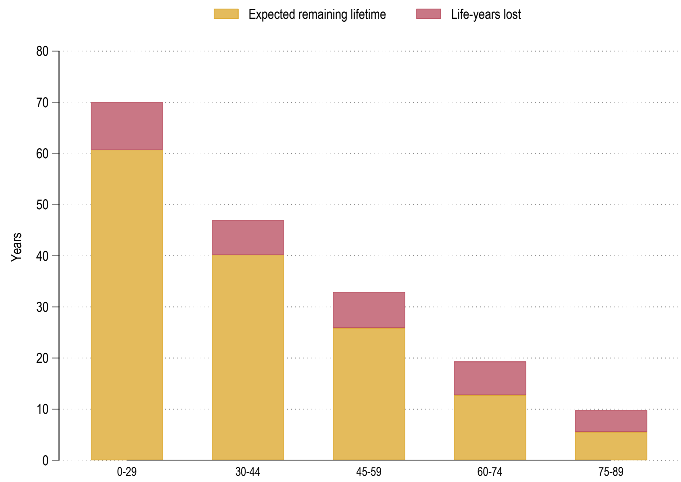


Figure 23.2–C: Proportion of life-years lost. Males

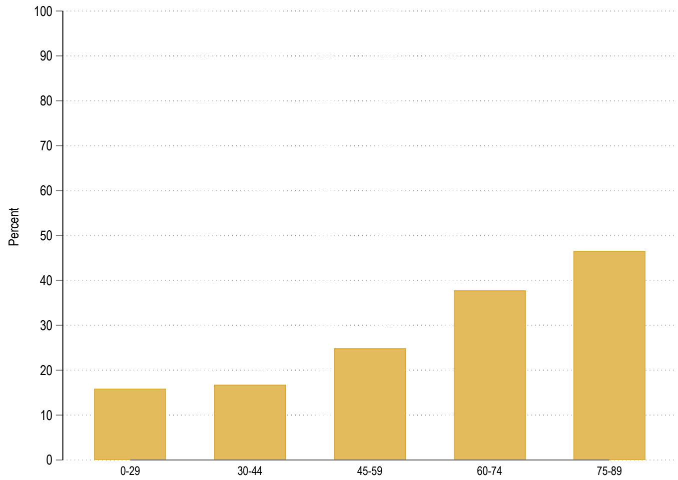


Figure 23.2–D: Proportion of life-years lost. Females

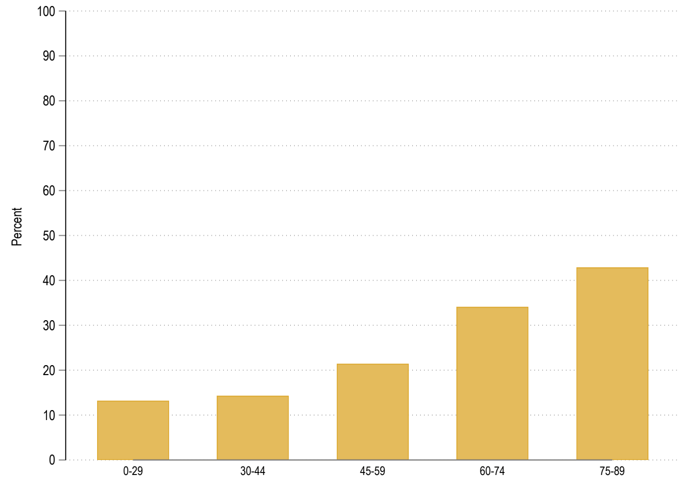


Figure 23.2–E: Conditional proportion of life-years lost by years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Males

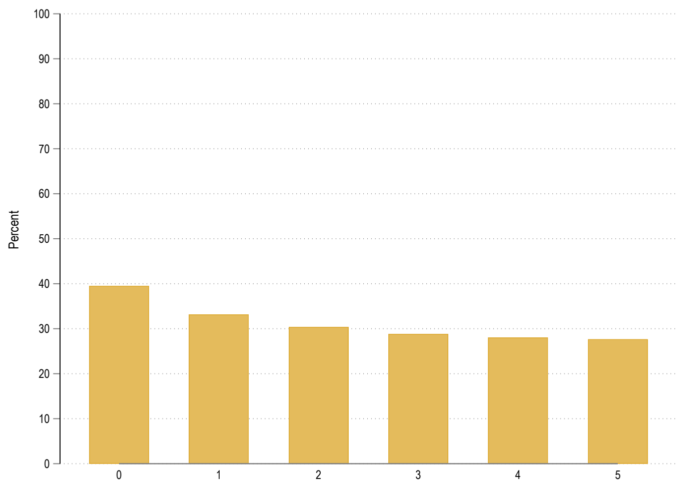
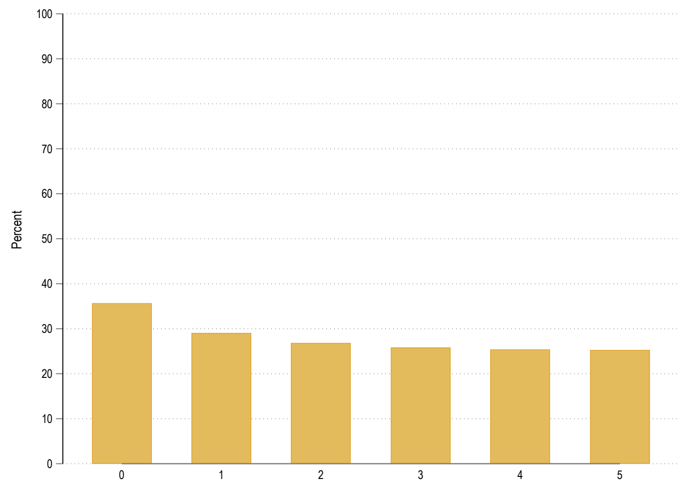


Figure 23.2–F: Conditional proportion of life-years lost by years (0–5) since diagnosis. Patients aged 69 years at diagnosis (median age). Females



Leukaemia

Figure 23.3: Leukaemia: trends

Figure 23.3–A: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Males

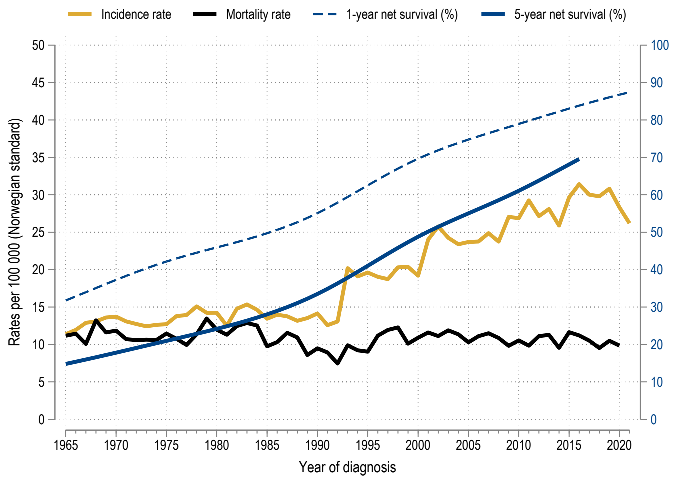


Figure 23.3–B: Trends in incidence and mortality rates and 1- and 5-year net survival (%). Females

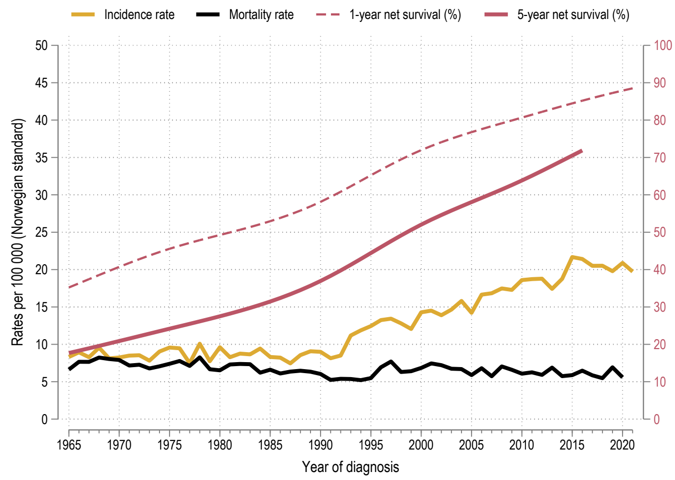


Figure 23.3–C: Trends in reference adjusted all-cause survival

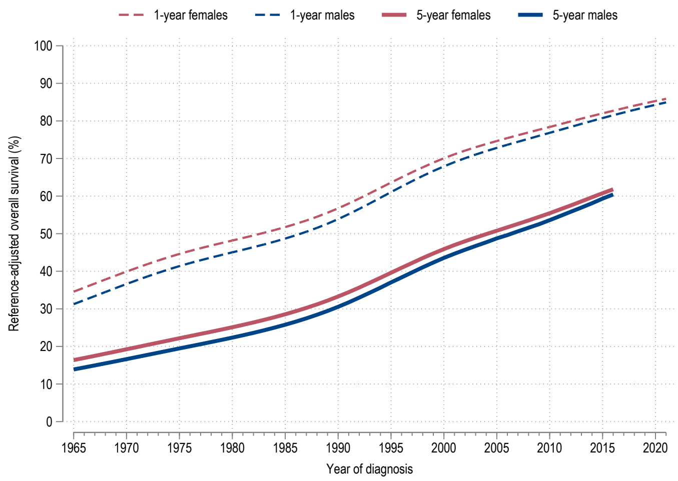


Figure 23.3–D: Trends in reference adjusted crude probability of cancer death

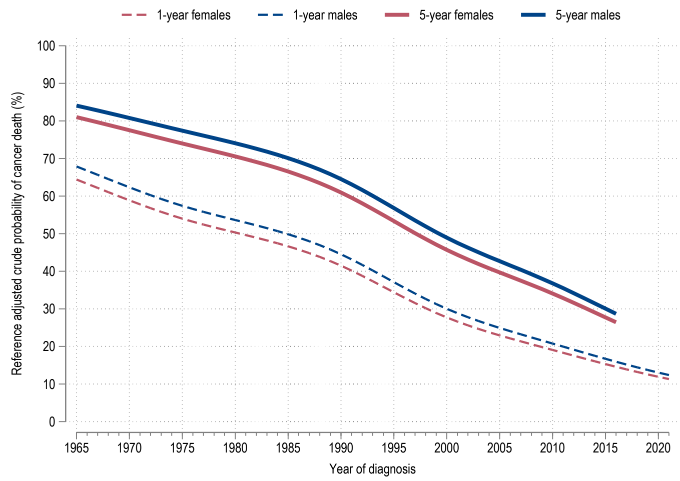


Figure 23.3–E: Trends in reference adjusted life-years lost

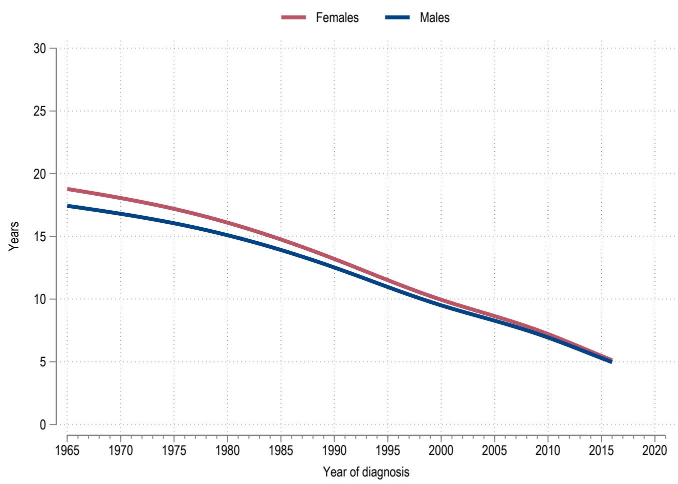
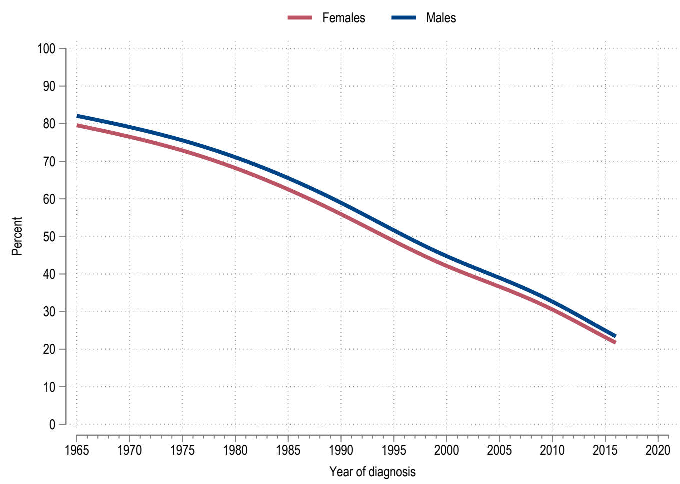


Figure 23.3–F: Trends in reference adjusted life-years lost (%)



Leukaemia

Table 1: Specification of models used when analysing survival for recently diagnosed patients

ICD-10	Site	Covariates	Interactions	DF Age[1]	Tvc[2]	DF Tvc[3]	DF[4]
C00–14	Mouth,pharynx	sex, stage, age	age×stage	4	stage, age	2	5
C15	Oesophagus	sex, stage, age	-	4	age	3	5
C16	Stomach	sex, stage, age	-	4	sex, stage, age	3	5
C18	Colon	sex, stage, age	age×stage	4	stage, age	2	5
C19–20	Rectum	sex, stage, age	age×stage	4	stage, age	2	5
C22	Liver	sex, stage, age	-	4	age	3	5
C23–24	Gallbladder	sex, stage, age	-	3	stage, age	3	5
C25	Pancreas	sex, stage, age	age×stage	4	sex, stage, age	3	5
C33–34	Lung	sex, stage, age	age×stage	4	stage, age	3	5
C43	Melanoma of the skin	sex, stage, age	-	3	stage, age	3	5
C50	Breast	stage, age	age×stage	4	stage, age	2	5
C53	Cervix uteri	stage, age	-	4	age	2	4
C54	Corpus uteri	stage, age	-	4	age	2	4
C56, C57.0–4, C48.2	Ovary	stage, age	-	4	stage, age	3	5
C61	Prostate	stage, age	age×stage	4	sex, stage, age	3	5
C62	Testis	stage, age	-	3	-	-	4
C64	Kidney	sex, stage, age	-	4	age	3	5
C65–68	Urinary tract	sex, stage, age	age×stage	4	sex, stage, age	3	5
C70–72	Central nervous system	sex, stage, age	-	3	stage, age	3	5
C73	Thyroid gland	sex, stage, age	-	3	age	2	4
C81	Hodgkin lymphoma	sex, age	-	3	stage, age	2	4
C82–86, C96	Non-Hodgkin lymphoma	sex, age	age×stage	4	sex, age	3	5
C91–95	Leukaemia	sex, age	age×stage	4	sex, age	3	5

[1] Degrees of freedom used for generating basis functions for restricted cubic splines for age at diagnosis
[2] List of covariates with time-dependent effects
[3] Degrees of freedom used for each time-dependent effect
[4] Degrees of freedom used for baseline excess hazard function

Table 2: Specification of models used when analysing survival trends

ICD-10	Site	Covariates	Interactions	DF Year[1]	DF Age[2]	Tvc[3]	DF Tvc[4]	DF[5]
C00–C14	Mouth, pharynx	sex, age, year	age×year	5	4	age, year	3	5
C15	Oesophagus	sex, age, year	age×year	5	4	age, year	3	5
C16	Stomach	sex, age, year	age×year	5	4	age, year	3	5
C18	Colon	sex, age, year	age×year	5	4	age, year	3	5
C19–20	Rectum	sex, age, year	age×year	5	4	age, year	3	5
C22	Liver	sex, age, year	age×year	5	4	age, year	3	5
C23–24	Gallbladder	sex, age, year	age×year	5	4	age, year	3	5
C25	Pancreas	sex, age, year	age×year	5	4	age, year	3	5
C33–34	Lung	sex, age, year	age×year	5	4	age, year	3	5
C43	Melanoma of the skin	sex, age, year	age×year	5	4	age, year	3	5
C50	Breast	age, year	age×year	5	4	age, year	3	5
C53	Cervix uteri	age, year	age×year	5	4	age, year	3	5
C54	Corpus uteri	age, year	age×year	5	4	age, year	3	5
C56, C57.0–4, C48.2	Ovary	age, year	age×year	5	4	age, year	3	5
C61	Prostate	age, year	age×year	5	4	age, year	3	5
C62	Testis	age, year	-	3	4	year	2	5
C64	Kidney	sex, age, year	age×year	5	4	age, year	3	5
C65–68	Urinary tract	sex, age, year	age×year	5	4	age, year	3	5
C70–72	Central nervous system	sex, stage, age, year	age×year	5	4	age, year	3	5
C73	Thyroid gland	sex, age, year	-	5	4	year	3	5
C81	Hodgkin lymphoma	sex, age, year	age×year	5	4	age, year	3	5
C82–86, C96	Non-Hodgkin lymphoma	sex, age, year	age×year	5	4	age, year	3	5
C91–95	Leukaemia	sex, age, year	age×year	5	4	age, year	3	5

[1] Degrees of freedom used for generating basis functions for restricted cubic splines for year of diagnosis
[2] Degrees of freedom used for generating basis functions for restricted cubic splines for age at diagnosis
[3] List of covariates with time-dependent effects
[4] Degrees of freedom used for each time-dependent effect
[5] Degrees of freedom used for baseline excess hazard function

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Return Address:
Kreftregisteret
P.O. box 5313 Majorstuen
N-0304 Oslo
Norway

Cancer Registry of Norway
Institute of Population-based Cancer Research

Postal Address:
P.O. box 5313 Majorstuen
N-0304 Oslo
Norway

Office Address:
Ullernchausséen 64, Oslo

Telephone: +47 22 45 13 00

E-mail: kreftregisteret@kreftregisteret.no
Internet: www.kreftregisteret.no