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ORIGINAL ARTICLE

Projected economic burden of pancreatic cancer in Sweden in 2030

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ABSTRACT

Background: Pancreatic cancer is predicted to become the second most common cause of cancer-related death by 2030. The objective of this study was to estimate the economic burden of pancreatic cancer for the years 2018 and 2030 based on changing demographics and incidence rates in Sweden.

Method: The incidence of pancreatic cancer in Sweden and additional relevant data were obtained from official statistics. A linear regression model and the mean incidence rates 2008–2018 were applied to calculate the incidence in 2030. An economic model based on the human capital method was created to calculate the indirect cost of pancreatic cancer in 2018 and 2030. Costs associated with surgery, radiology, oncology, and palliative care constituted the direct costs. A sensitivity analysis was performed.

Results: The incidence of pancreatic cancer in Sweden in the year 2018 was 1352 patients and projected to between 1554 (+15%) and 1736 (+28%) in 2030. The total cost was calculated to €125 million in 2018 and between €210 million (+68%) and €225 million (+80%) in 2030. The indirect cost in the ≤65-year-old group was €328,344 in 2018 and between €380,738 and €382,109 per individual in 2030.

Conclusions: The economic burden of pancreatic cancer is expected to increase in Sweden by 2030 due to the increasing incidence of the disease and changing demographics. Pancreatic cancer is a growing health care problem in urgent need of advancements in prevention, early detection, treatment, and control of the disease.

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Pancreatic cancer; economic burden; projections; Sweden; 2030

Introduction

Pancreatic cancer (PC) is a highly lethal malignancy with an overall five-year survival rate of 3%, ranging from 0.5% to 9% in Europe [1]. This is comparable to previously reported survival rates during the 1980s in Europe and indicates no significant improvement in long-term survival despite advancements in surgical and oncological management [2,3]. PC is a disease of the elderly with the highest incidence in the 60- to 80-year-old group [3]. PC is the eleventh most common cancer and the third and fourth most common cause of cancer-related death in the USA and European Union, respectively [4,5]. It is projected that PC will surpass colorectal and breast cancer to become the second most frequent cause of cancer-related death in 2030, preceded only by lung cancer [5,6]. The incidence of PC is expected to increase in the coming years.

PC also bears high economic costs for the society. The treatment cost of PC was calculated to €16,066 (€17,459 in 2018 level of prices and exchange rates) per patient and the cost due to production loss was €287,420 (€312,184) per working PC patient in Sweden. The total sum was between €86 million (€96 million) and €93 million (€104 million), including palliative care [7].

Sweden has an aging population with a forecast that the average life expectancy will increase by one year for each decade until 2070 [8]. We speculate that the costs of PC will rise, considering the projected increased incidence of the disease and lack of improvement in survival rates. The aim of this study was to assess the health care costs and loss of production caused by PC in 2018 and make projections for 2030.

Method

Incidence calculation

The incidence of PC from 2008 to 2018 was obtained from the Swedish National Board of Health and Welfare Cancer Register split into sex- and age-groups [9]. The population of Sweden from 2008 to 2018 and the projection for 2030 were obtained from official Swedish Statistics, split into sex- and age-groups [10,11]. The incidence rate of PC in 2030 was calculated by applying linear regression models (LRM) to the

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Supplemental data for this article can be accessed here.

natural logarithm of each sex- and age-stratified incidence rate of patient groups from 2008 to 2018. This age span is assumed to hold similar risk factors for PC as the span from 2018 to 2030. Whole calendar years were used in the model. Linear regression is a noticeably simple model, making the outcomes easier to interpret than the outcomes of more complex models. The outcomes of the LRMs were natural logarithms of incidence rates of each sex- and age-group in 2030, which were then inverted and multiplied by the projected number of people in each sex- and age-group in 2030. The age groups used were 50–64, 65–69, 70–74, 75–79, and ≥80 years due to otherwise small and uneven groups. An ANOVA test was performed to determine if the models were applicable. A value of $p < 0.05$ was assumed to be statistically significant. For groups whose model F-value was not significant and for groups not used in the model, the mean incidence rates (MIR) 2008–2018 were applied. The incidence of PC in 2030 was also calculated with the MIR for each sex- and the age-stratified group as a comparison to LRM, due to the difficulties of making predictions based on present trends. The incidence rates predicted by both of these models are more accurate than predictions made only on a single model. The incidence rates were multiplied by the estimated population in each sex- and age-stratified group in 2030. The statistical analyses were performed in IBM SPSS Statistics 26.0.0.1.

Cost estimation

A retrospective, bottom-up, incidence-based approach was applied and the human-capital-method was used to calculate the burden of PC. Direct costs encompass costs that are directly measurable such as money spent on materials, personnel time, and items of use. The model of the direct costs was based on the mean amount of utilized resources and consists of items from radiology, surgery, and oncology (Table S1). The amount of resource utilization was obtained from relevant literature and the cost of each resource was assessed according to Skåne University Hospital's internal price list and Alexandersson et al. [7,12–16]. These costs include personnel costs. The cost of palliative care was approximated based on data from Ljungman et al. [17]. Indirect costs incorporate hidden costs such as lost work hours due to hospitalization or premature mortality. As a person dies prematurely or is hospitalized for longer periods of time, production is lost either in the household work and/or professional carrier. The model of the indirect costs include loss of household production and production loss due to hospitalization and premature mortality [18,19] and were calculated based on relevant literature [7,12,20–27] according to the following formula:

$$\mathrm{ICPC} = P_{k,a} + H_{k,a}$$

$$P_{k,a} = \sum_{n-a}^{R} E_{k,a} \times (B_{k,a} + F) \times S_{k,a}^{n} \times L_{k,a} \times \frac{(1+g)^{n-a}}{(1+r)^{n-a}}$$

$$H_{k,a} = \sum_{n=a}^{R} d_{k,a} \times \frac{B_{k,a}}{(W \times h_{k,a})} \times (1 - t_{k,a}) \times l_{k,a} \times S_{k,a}^{n}$$

ICPC = Indirect cost of pancreatic cancer; P = value of lost production for persons of sex k and age a; k = sex; a=age; R=retirement age; E=employment to population ratio for persons of sex k and age a; B=mean gross yearly wage for persons of sex k and age a; F=social fees; S=survival rate for persons of sex k and age a to live to n years; L=lost production years for persons of sex k and age a; g=growth rate; r=discount rate; H=value of lost household production for persons of sex k and age a; d=lost hours for persons of sex k and age a; W=number of weeks in a year; h=mean number of hours worked in a week for persons of sex k and age a; t=mean final tax for persons of sex k and age a; l=mean disability grade for persons of sex k and age a

The formula may also be explained as follows: The loss of household production was calculated based on the opportunity cost principle, which assumes that time spent on household work holds equal value as the same amount of time spent at a professional career. It is based on the mean net hourly wage specific for different sex and age groups and adjusted by the mean disability grade and survival rate for these groups. The labor loss of production is calculated based on the mean gross wages and social fees, and adjusted by the survival rate, and multiplied by the calculated lost years of production. Lost years of production are defined as the difference between age at PC diagnosis and retirement age for persons not yet retired.

The growth rate was 2.4% in 2018 and 1.9% in 2030 [28]. The used retirement age in 2018 was 65 years. In 2030 a higher age of retirement (70 years) was assumed as the age of retirement is planned to be increased in Sweden (to 67 years in 2026). All costs were calculated in SEK and converted to €following the yearly average exchange rate of 2018 (€1 = SEK 10.2567). Future assets are considered less valuable to society than present assets. The discount rate allows comparing future costs to the value of today. The value of lost production was discounted at 3%, a commonly used discount rate in Sweden (Table S2).

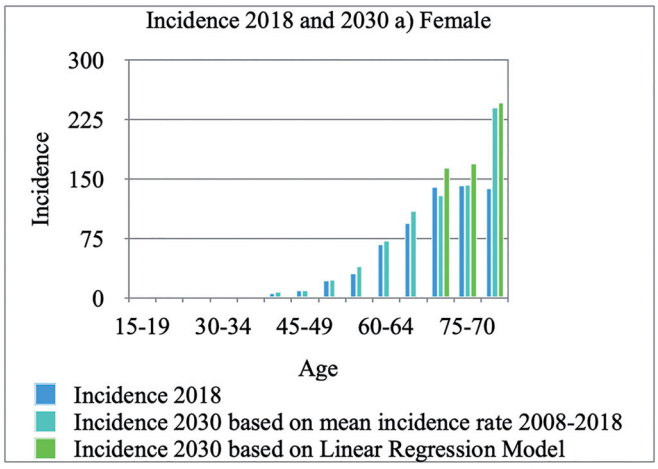
Sensitivity analysis

A sensitivity analysis was performed by variating one factor at a time and calculating the resulting percentage change in the total cost. The tested factors were the growth rate and the sex- and age-specific wages. The growth rate was varied between 1.9%, 0%, and −1.9% in 2030. The variation in wages was based on the sex- and age-specific percentage increase in wages from 2008 to 2018 (in 2018 level of prices) [22,29].

Results

Incidence in 2018

The incidence of PC in 2018 was 1352 patients (Figure 1) and was distributed equally between the sexes (51% male).



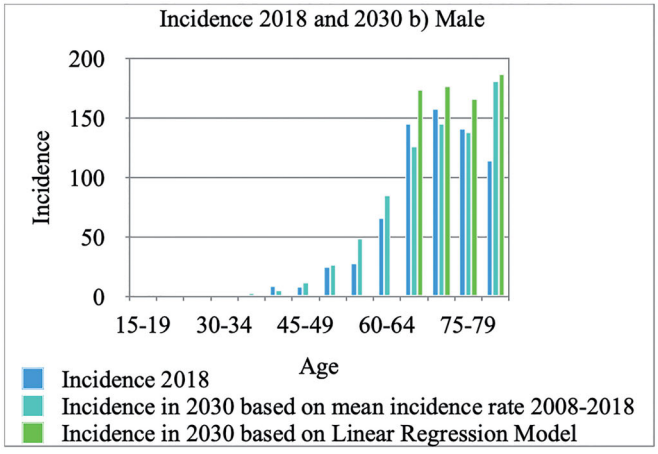


Figure 1. Pancreatic cancer incidence in (a) females and (b) males in Sweden in 2018, in 2030 based on the linear regression model and in 2030 based on the mean incidence rate in 2008–2018, stratified by five year age intervals. No linear regression was performed for age-stratified groups between 15 and 49 years old due to small incidence numbers. For female groups between the age of 50–64 and 65–69 the linear regression models were not statistically significant and therefore the results from these models are not presented here. For male groups between the ages of 50 and 64 the linear regression models were not statistically significant and therefore the results from these models are not presented here.

Cost in 2018

The total cost of PC in 2018 was calculated to €125 million. The direct costs were calculated to €26 million, 21% of the total. The indirect costs equaled €99 million, 79% of the total (Tables 1 and 2 and Figure S1). Patients of 15–49 years group generated 27% of all costs, 50–64 years generated 51%, and ≥65 years generated 22% of all costs. The indirect cost for <65 years was calculated to €328,344 per individual.

Incidence in 2030

The LRMs were not significant ($p \geq 0.05$) for some groups (Table 3). Therefore the MIR were calculated and used for these groups. The incidence of PC in 2030 will be 1736 (+28% since 2018) (Figure 1). Some 1111 (64%) patients will be over the assumed age of retirement of 70 years and 50% will be men in 2030.

The PC incidence in 2030 according to the MIR will be 1554 patients (+15% since 2018) (Figure 1). Some 978 (63%) patients will be over the assumed age of retirement of 70 years. 48% of all the patients will be male.

Cost in 2030

The total cost of PC, based on LRM, in 2030 was estimated to €225 million (+80%). The direct costs were estimated to €35 million, 16% of the total, and the indirect costs were estimated to €190 million, 84% (Tables 1 and 2 and Figure S1). The indirect cost for ≤65 years was calculated to €380,738 per individual and ≤70 years to €254,826 per individual.

The total cost of PC, based on MIR, in 2030 was estimated to €210 million (+68%). The direct costs were estimated to €31 million, 15% of the total, and the indirect costs were estimated to €179 million, 85% (Tables 1 and 2 and Figure

Table 1. Costs of pancreatic cancer in 2018 and 2030 expressed in €at the level of 2018 prices and exchange rates.

	2018	2030, based on mean incidence rate 2008–2018	2030, based on linear regression
Direct costs	26,920,000	31,350,000	35,016,000
Surgery	9,074,000	10,431,000	11,651,000
Radiology	2,857,000	3,285,000	3,669,000
Oncology	10,431,000	11,991,000	13,393,000
Palliative care	4,087,000	5,102,000	5,699,000
Indirect costs	98,556,000	178,721,000	189,746,000
Loss of household production	1,843,000	2,264,000	2,529,000
Loss of production	96,713,000	176,457,000	187,218,000

Table 2. Indirect costs of pancreatic cancer in 2018 and 2030 expressed in € at the level of 2018 prices and exchange rates stratified by age and gender.

Age	15–49		50–64		≥65	
Type of production	Household	Labor	Household	Labor	Household	Labor
			2018			
Female	30,000	15,566,000	190,000	24,871,000	696,000	1,631,000
Male	24,000	17,338,000	145,000	33,445,000	758,000	3,863,000
			2030, linear regression model			
Female	32,000	16,389,000	213,000	36,570,000	1,035,000	18,939,000
Male	31,000	19,263,000	197,000	57,035,000	1,021,000	38,021,000
			2030, mean incidence rate			
Female	32,000	16,389,000	213,000	36,570,000	937,000	16,731,000
Male	31,000	19,730,000	197,000	57,035,000	853,000	30,003,000

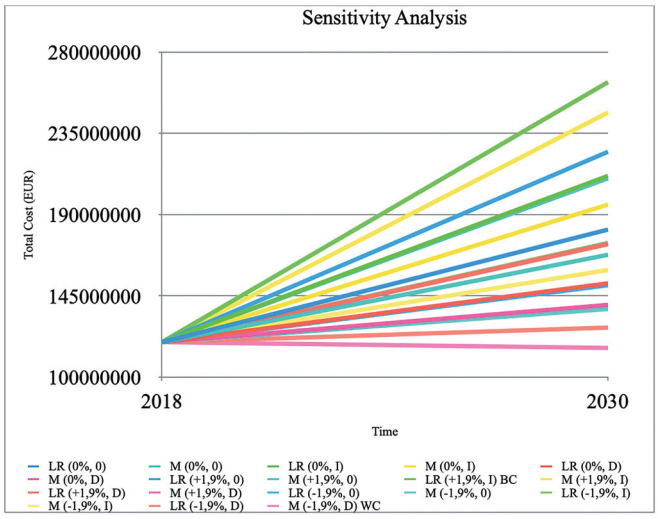


Figure 2. The results of sensitivity analysis. The total cost of pancreatic cancer in 2018 and 2030. The total cost in 2030 was calculated with variations in growth factor and sex- and age-specific wages. The labels inform on the basis of incidence calculation. LR = linear regression model, M = mean incidence rate 2008–2018. Growth Rate: +1.9%; 0%; −1.9% and Wages: I = increase in wages since 2018, 0 = constant wages since 2018 and D = decrease in wages since 2018. BC = best case scenario. WC = worst case scenario. Note that the cost scale starts at €100 million.

S1). The indirect cost for ≤65 years was calculated to €382,109 per individual and ≤70 years to €267,011 per individual.

The distribution of the direct costs was the same in 2018 and 2030. Some 39% of the direct costs were due to oncological treatment, 34% due to surgery, 11% due to radiology, and 15% due to palliative treatment. Some 27% of the direct costs were due to hospitalization in the surgery ward, the oncology ward, and the intensive care unit. The direct costs per patient equaled €19,911.

Sensitivity analysis

The sensitivity analysis provided that the growth rate had the most impact on the economic model (MIR: −18% to +25% and LRM: −17% to +24%) versus the wages (MIR: −17% to +17% and LRM: −16% to +16%) (Figure 2, Figures S2 and S3).

Discussion

The incidence in 2030 was calculated to between 1554 (+14.9%) and 1736 (+28%) indicating an increase in PC incidence in the future. This is in agreement with the study by Maisonneuve [30] which reported the increase in Sweden to +21.9%, from 2018 to 2030. Other studies also indicate an increase in PC incidence worldwide, although calculated with different methods [5,6]. The LRM predicts a much higher incidence in 2030 compared to MIR for applicable groups. It is possible that the LRM results are overestimated and that the MIR results may be closer to the true incidence. Aging of the population remains the most important factor contributing to the increase in new PC cases. PC is associated with a multitude of risk factors. Hereditary and genetic factors are

Table 3. The results and values retrieved from linear regression models applied to the calculation of the incidence rate of pancreatic cancer in 2030.

ANOVA				Coefficients			
	Age	*F*	Sig	Model	B log	B Inv	Sig
Male	50-64	0.16	0.7[a]	Constant	2.750008	15.642757	<0.01
				Year	0.005009	1.005022	0.696180[a]
	65-69	12.44	<0.01	Constant	3.543275	34.579983	<0.01
				Year	0.034120	1.034709	<0.01
	70-74	8.45	<0.05	Constant	3.834733	46.281069	<0.01
				Year	0.037812	1.038536	<0.05
	75-79	18.81	<0.01	Constant	3.949989	51.934796	<0.01
				Year	3.949989	1.035596	<0.01
	≥80	30.97	<0.01	Constant	3.360052	28.790688	<0.01
				Year	0.081834	1.085276	<0.01
Female	50-64	1.48	0.26[a]	Constant	2.578074	13.171745	<0.01
				Year	0.010686	1.010743	0.255326[a]
	65-69	1.89	0.20[a]	Constant	3.508159	33.386746	<0.01
				Year	0.015577	1.015699	0.202782[a]
	70-74	18.30	<0.01	Constant	3.685824	39.877968	<0.01
				Year	0.040619	1.041455	<0.01
	75-79	27.51	<0.01	Constant	3.888553	48.840164	<0.01
				Year	0.040378	1.041204	<0.01
	≥80	6.37	<0.05	Constant	3.450469	31.515169	<0.01
				Year	0.054080	1.055569	<0.05

Note. The left column presents the ANOVA test which tests the significance level of the whole model. The right column presents the results. 'Constant' is the computed value of the natural logarithm of the incidence rate year 2008 based on LRM. 'Years' is the value of the change in the natural logarithm of the incidence rate for every year since 2008. 'Sig' indicates the statistical significance level of the variable. 'B log' stands for the computed value of either 'Constant' or 'Years'. 'B inv' stands for the inversed value of 'B log' for either 'Constant' or 'Years'. '*F*' is the *F*-value computed by the *F*-test of the ANOVA-analysis. The significance of the *F*-value determines if the tested model fits significantly better to the dataset than the model compared to. In this case the linear regression was tested versus the mean incidence rates from 2008 to 2018. The value of $p < 0.05$ was assumed as statistically significant.
[a]Nonsignificant results.
The incidence rate of pancreatic cancer was calculated with the following formula: incidence rate $= C + Y \times n$ where C = the B inv of Constant, Y = the B inv of Year, and n = the difference in years between 2030 and 2008 ($n = 22$).

responsible for less than 10% of all PC cases. The two most important potentially modifiable risk factors are tobacco smoking and excess body weight, which are responsible for 10% to 30% of the cases [30,31]. Obesity prevalence is expected to increase in Europe and the USA in the coming years [32], while tobacco use is expected to decline [33,34].

The cost of PC calculated here is estimated to increase from 2018 to 2030. The major part of the total cost is accredited to indirect costs, 79% in 2018, and between 84% and 85% in 2030. The difference in the percentage of the indirect costs should be explained by the change of age distribution provided by the incidence calculation. In the economic model, the labor loss of production of the non-retired group of patients contribute the most to the total and indirect costs. A change in the incidence of PC within this group has a larger effect on the economic outcome than a change in incidence in the retired group. The total cost calculated by Tingstedt et al. [7], excluding palliative care, added up to between €93 million and €100 million (in 2018 prices), whereof 84% of these costs were due to indirect costs. This displays that the majority of the costs are due to loss of production, that is, morbidity and premature mortality. Resources used on diagnostics and treatment (direct costs) correspond to less than one-fifth of the total cost. Because

symptomatic PC is often detected at an advanced stage, screening methods that enable diagnosis of early cancer or precancerous lesions are highly desirable [35]. US Preventive Services Task Force [36] recently recommended against the screening of PC in the general population due to the low incidence of the disease. An alternative would be to apply secondary screening in high-risk groups, such as individuals with heredity or genetic risk factors, or individuals with new-onset diabetes >50 years [3]. A screening program or biomarker implemented in the future will still carry costs. Lowering the morbidity and mortality in PC, despite expensive diagnostics, management, and treatment, may result in lower indirect costs and therefore lower total cost for the society.

It is problematic to make predictions about the market and economy. Different demographics and consequences such as higher retirement age may equal higher wages and employment rates for the older population, and therefore an even higher value of the lost production in the future. The costs calculated in this study are adjusted with the growth rate proposed by Almerud et al. [28]. The global economic crisis caused by the emergent sars-cov-2 virus will probably make the estimated growth rate for 2030 obsolete. The sensitivity analysis demonstrated that the growth rate had the biggest impact on the total cost of the tested variables. Despite the variations, the total cost of PC increased in 2030 in comparison with 2018. Based on these variations, the best-case scenario produced a cost of more than double the cost in 2018. The worst-case scenario produced a cost slightly smaller than the cost in 2018 (€116 million versus €125 million in 2018). With the uncertainty of the economic outcome of the sars-cov-2 pandemic, this sensitivity analysis concludes that there is a high possibility of an increased cost of PC in 2030 despite potential economic disturbances.

The cost in 2018 is higher than calculated by Tingstedt et al. [7] and the cost in 2030 increases even more. The methods used in both studies are quite similar. However, here, newer chemotherapy (mFOLFIRINOX) was taken into account and the data were taken from other sources, for example, the National Quality Registry for Pancreatic and Periampullary Cancer Report [15]. The indirect cost models in these studies are both based on the human-capital-method although newer data from official statistics were used here. Changes in demographics and social policies in the period between these two studies have influenced the input variables. Due to this, discrepancies are to be expected between the results of these studies. Lastly, different incidences of PC in 2011 and 2018 influence the cost.

Tittelbach-Helmrich et al. [37] calculated the direct costs of surgery and hospitalization of patients with PC in Germany to €16,662 and €10,878 (in 2018 prices) per patient, depending on surgical complications. Excluding costs not included in this study (such as costs of nutrition, management, and laundry), the costs add up to €12,996 and €8,485. Comparable items in this study correspond to €9173 per patient. Müller-Norhorn et al. [38] estimated the direct costs to €32,875 (in 2018 prices). Hospitalization stands for 84% of the costs in Müller-Nordhorn et al. [38] and 34% versus 46% in Tittelbach-Helmrich et al. [37], compared to 27% in this study. Longer hospitalization times may explain the higher costs per patient in the German studies. Müller-Nordhorn et al. [38] estimated the indirect costs to €52,058 (in 2018 prices) per patient. In this study, the indirect costs were estimated to €328,344 per patient ≤65 years in 2018. Differences in wages, occupation, and age distribution may explain these differences. The discount rate used is unclear and may influence the costs.

Conclusion

We here predict an increased incidence of PC in the future. No other studies have calculated the total PC cost in recent years or tried to estimate this cost in 2030. Higher costs of illness are to be expected given the lack of improvement in morbidity and survival. Due to the insidious character of PC, preventive measures and early detection programs should be encouraged, coupled with further refinement of treatment strategies.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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References

[1] Carrato A, Falcone A, Ducreux M, et al. A systematic review of the burden of pancreatic cancer in Europe: real-world impact on survival, quality of life and costs. J Gastrointest Cancer. 2015; 46(3):201–211.

[2] Faivre J, Forman D, Esteve J, et al. Survival of patients with primary liver cancer, pancreatic cancer and biliary tract cancer in Europe. EUROCARE Working Group. Eur J Cancer. 1998;34(14): 2184–2190.

[3] Ansari D, Tingstedt B, Andersson B, et al. Pancreatic cancer: yesterday, today and tomorrow. Future Oncol. 2016;12(16): 1929–1946.

[4] Maisonneuve P, Lowenfels AB. Epidemiology of pancreatic cancer: an update. Dig Dis. 2010;28(4–5):645–656.

[5] Rahib L, Smith BD, Aizenberg R, et al. Projecting cancer incidence and deaths to 2030: the unexpected burden of thyroid, liver, and pancreas cancers in the United States. Cancer Res. 2014;74(11): 2913–2921.

[6] Quante AS, Ming C, Rottmann M, et al. Projections of cancer incidence and cancer-related deaths in Germany by 2020 and 2030. Cancer Med. 2016;5(9):2649–2656.

[7] Tingstedt B, Andersson E, Flink A, et al. Pancreatic cancer, healthcare cost, and loss of productivity: a register-based approach. World J Surg. 2011;35(10):2298–2305.

[8] Statistics Sweden [Internet]. The future population of Sweden 2019–2070. Stockholm (Sweden): Statistics Sweden, Department of Population and Welfare. 2019 [cited 2020 Jan 29]. Available from: https://www.scb.se

[9] The National Board of Health and Welfare [Internet]. Statistical Database, Cancer. Stockholm (Sweden): Socialstyrelsen Statistical Database. 2020 [cited 2020 Mar 12]. Available from: https://sdb.socialstyrelsen.se/if_can/val_eng.aspx

[10] Statistics Sweden [Internet]. Population by region, marital status, age and sex. Stockholm (Sweden): Statistics Sweden; 2020 [cited 2020 Mar 17]. Available from: https://www.scb.se
[11] Statistics Sweden [Internet]. Population by region of birth, age and sex. Year 2020–2120. Stockholm (Sweden): Statistics Sweden. 2020 [cited 2020 Mar 17]. Available from: https://www.scb.se
[12] Ansari D, Tingstedt B, Andersson R. Pancreatic cancer - cost for overtreatment with gemcitabine. Acta Oncol. 2013;52(6): 1146–1151.
[13] Regionala cancercentrum i samverkan. Nationellt vårdprogram Bukspottkörtelcancer. Version 2.0. Regionalt cancercentrum Sydöst Linköping. 2017. Available from: https://cancercentrum.se/samverkan/
[14] Alexandersson N, Rosell L, Wihl J, et al. Determinants of variable resource use for multidisciplinary team meetings in cancer care. Acta Oncol. 2018;57(5):675–680.
[15] Regionala cancercentrum i samverkan. Kvalitetsregister för tumörer i pankreas och periampullärt. Årsrapport. Sveriges Kommuner och Regioner Stockholm 2018. Available from: https://cancercentrum.se/samverkan/
[16] Södra Regionvårdsnämnden. Regionala priser och ersättningar för södra sjukvårdsregionen 2019. Södra Regionvårdsnämnden Lund 2018. Available from: https://sodrasjukvardsregionen.se
[17] Ljungman D, Hyltander A, Lundholm K. Cost-utility estimations of palliative care in patients with pancreatic adenocarcinoma: a retrospective analysis. World J Surg. 2013;37(8):1883–1891.
[18] Hodgson TA, Meiners MR. Cost-of-illness methodology: a guide to current practices and procedures. Milbank Mem Fund Q Health Soc. 1982;60(3):429–462.
[19] Rice DP. Cost-of-illness studies: fact or fiction? Lancet. 1994; 344(8936):1519–1520.
[20] Statistics Sweden [Internet]. Living conditions. Report 123, Swedish Time Use Survey 2010/11. Stockholm (Sweden): Statistics Sweden; 2012 [cited 2020 Feb 7]. Available from: https://www.scb.se
[21] Statistics Sweden [Internet]. Final tax 2018. Stockholm (Sweden): Statistics Sweden; 2019 [cited 2020 Feb 12]. Available from: https://www.scb.se
[22] Statistics Sweden [Internet]. Total earned income for persons registered in the national population register during the whole year by region, sex, age and income bracket. The years 1999–2018. Stockholm (Sweden): Statistics Sweden. 2020 [cited 2020 May 13]. Available from: http://www.scb.se
[23] Swedish Pensions Agency [Internet]. Allmän pension – utbetalningar. Stockholm (Sweden): Swedish Pensions Agency. Available from: https://www.pensionsmyndigheten.se
[24] Försäkringskassan [Internet]. Additional cost allowance for adults. Stockholm (Sweden): Försäkringskassan; 2019 [cited 2020 Apr 20]. Available from: https://www.forsakringskassan.se
[25] Statistics Sweden [Internet]. Labour force survey. Stockholm (Sweden): Statistics Sweden, Department of Population and Welfare; 2019 [cited 2020 Feb 12]. Available from: https://www.scb.se
[26] Carlgren, F. Ekonomifakta. 2020 [cited 2020 Feb 11]. Available from: https://www.ekonomifakta.se
[27] Statistics Sweden [Internet]. Ettårig livslängdstabell, kvarlevande per 100,000 levande födda efter kön, ålder och år. Stockholm (Sweden): Statistics Sweden. 2020 [cited 2020 Apr 17]. Available from: http://www.statistikdatabasen.scb.se
[28] Almerud JE, Forsfält T, Glans E. Sveriges ekonomi – scenarier fram till a˚r 2060. Stockholm (Sweden): Elanders Sverige AB.; 2015.
[29] Statistics Sweden [Internet]. CPI, fixed index numbers (1980 = 100). Stockholm (Sweden): Statistics Sweden; 2020. [cited 2020 Apr 29]. Available from: https://www.scb.se
[30] Maisonneuve P. Epidemiology and burden of pancreatic cancer. Presse Med. 2019;48(3):e113–e123.
[31] Islami F, Goding Sauer A, Miller KD, et al. Proportion and number of cancer cases and deaths attributable to potentially modifiable risk factors in the United States. CA Cancer J Clin. 2018;68(1): 31–54.
[32] Janssen F, Bardoutsos A, Vidra N. Obesity prevalence in the long-term future in 18 European countries and in the USA. Obes Facts. 2020;13(5):514–527.
[33] World Health Organization. WHO global report on trends in prevalence of tobacco use 2000–2025. 3rd ed. Geneva (Switzerland): World Health Organization; 2019.
[34] European tobacco use: trends report 2019. Geneva (Switzerland): World Health Organization; 2019.
[35] Rawla P, Sunkara T, Gaduputi V. Epidemiology of pancreatic cancer: global trends, etiology and risk factors. World J Oncol. 2019; 10(1):10–27.
[36] Owens DK, Davidson KW, Krist AH, et al. Screening for pancreatic cancer: US preventive services task force reaffirmation recommendation statement. JAMA. 2019;322(5):438–444.
[37] Tittelbach-Helmrich D, Abegg L, Wellner U, et al. Insurance costs in pancreatic surgery: does the pecuniary aspect indicate formation of centers? Chirurg. 2011;82(2):154–159.
[38] Muller-Nordhorn J, Bruggenjurgen B, Bohmig M, et al. Direct and indirect costs in a prospective cohort of patients with pancreatic cancer. Aliment Pharmacol Ther. 2005;22(5):405–415.