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Cancer in Estonia 2018

Tallinn 2021

National Institute for Health Development

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Definitions

Age-standardized rate	a summary measure of the rate a population would have if it had a standard age structure. Standardization is necessary when comparing several populations that differ with respect to age. It is a weighted mean of age-specific rates; the weights are taken from the population distribution of the standard population
Cancer screening	checking for disease when there are no symptoms. Since screening may find diseases at an early stage, there may be a better chance of curing the disease
Distant metastasis	cancer which has spread from the primary tumour to distant organs or distant lymph nodes
Local cancer	an invasive malignant cancer confined entirely to the organ where the cancer began
Regional cancer	cancer which has grown beyond the primary tumour to nearby lymph nodes or organs and tissues
Solid tumours	an abnormal mass of tissue that usually does not contain cysts or liquid areas. Solid tumours may be benign (non-cancerous), or malignant (cancerous). Types of solid tumours are named for the type of cells that form them
TNM staging	a system for describing the amount and spread of cancer in a patient's body, using TNM where T describes the size of the tumour and any spread of cancer to nearby tissue, N describes the spread of cancer to nearby lymph nodes and M describes metastasis (spread of cancer to other parts of the body)

Abbreviations

ICCC	International Classification of Childhood Cancer
ICD-10	International Classification of Diseases, 10th version

Summary

Estonian cancer incidence data are available for as far back as 1968; over the past 50 years, the annual number of new cancer cases has increased significantly. In 2018, 8783 new cancer cases were registered in Estonia, of which 4462 were diagnosed in men and 4321 in women. Leading cancer sites in men were the prostate (26% of all cancers in men) and lung (14%). Among women, the leading sites were the breast and non-melanoma skin (both 19% of all cancers in women).

The number of new cases as well as the crude and age-standardized incidence rates per 100,000 persons in men and women for tumours reportable to the Estonian Cancer Registry are presented in the Tables of this report.

Around 65% of all malignant tumours were diagnosed in patients older than 65 years. The most frequent cancer sites vary across age groups. In the age group 15-34, the leading cancer sites were the testis and Hodgkin's lymphoma in men and the cervix and breast in women. In age group 35-54, the most common cancer site was the prostate in men and the breast in women. Among patients aged 55-74 years, as well as those aged 75 or older, the leading sites were the same as in the general population, i.e. prostate and lung in men and breast and non-melanoma skin in women.

In 2018, 40 new cancer cases were diagnosed in the age group 0-14, of which 22 were among boys and 18 among girls. This report gives an overview of childhood cancer incidence during the period 2009-2018.

The proportion of microscopically verified cases in 2018 was 90%, while *ca* 1% of cases were registered on the basis of death certificates only (DCO cases). Half of the new cancer cases diagnosed in 2018 were localized at the time of diagnosis, but *ca* 20% of patients already had distant metastasis. Specifically, 40% of lung cancer cases and 25% of colorectal cancer cases were diagnosed at stage IV, among both men and women.

From 1968 to 2018, total cancer incidence more than doubled in both men and women. The rate of stomach cancer in both sexes as well as lung cancer in men is decreasing, but the incidence of colon and rectum cancer, skin melanoma and non-Hodgkin's lymphoma is increasing in both men and women. The previously increasing rates of prostate cancer have recently stabilized. Cervical cancer, which affects younger women in particular, remains an important public health issue in Estonia.

On 31 December 2018, there were 63,939 persons (25,856 men and 38,083 women) in the population of Estonia with a history of cancer.

Introduction

The Estonian Cancer Registry (ECR) was founded in 1978, while reliable incidence data are available for as far back as 1968. The ECR is a population-based registry that collects data on all cancer cases diagnosed in Estonia. The main task of the ECR is to ensure the complete and reliable registration of incident cancer cases which forms the basis for national cancer statistics, survival analysis and other epidemiological research.

In this report, incidence and prevalence data were updated on 10th December 2020.

For coding the topography and morphology of the tumour, the ECR uses the Third Edition of the International Classification of Diseases for Oncology (ICD-O-3). For this report, the Tenth Revision of the International Classification of Diseases (ICD-10) was used by converting the ICD-O-3 codes into ICD-10 codes (1). The calculation of age-standardized incidence rates is based on the World Standard Population (2).

In Estonia, it is mandatory to report the following tumours to the cancer registry: all malignant tumours (C00-C97), in situ tumours (D00-D09), benign tumours and tumours of uncertain or unknown behaviour of the brain and central nervous system as well as of the endocrine organs that are located in the area of the brain (D32.0-D33.9, D35.2-D35.4, D42.0-D43.9, D44.3-D44.5) and other tumours of lymphoid, haematopoietic and related tissue (D45-D47).

1. Cancer incidence

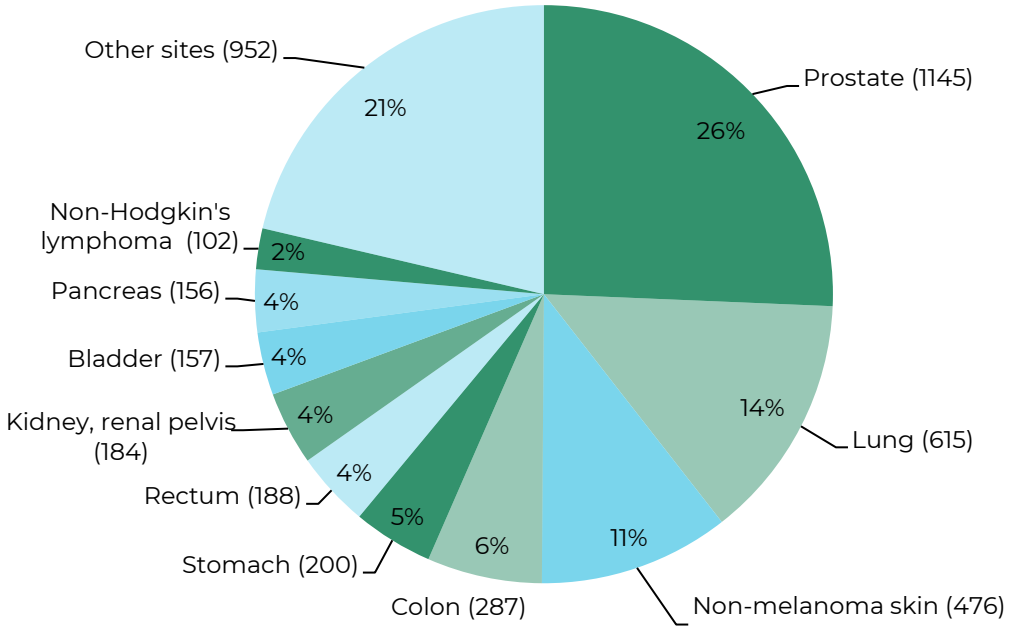
1.1. Leading cancer sites

In 2018, 8783 new cancer cases were registered in Estonia – 4462 among men and 4321 among women. The most common cancer sites are shown in Figure 1.

The leading cancer site in men was the prostate (26% of all cancers in men), followed by lung (14%), non-melanoma skin (11%), colon (6%), stomach (4%), rectum (4%) and kidney (4%). The ten most common sites also included bladder, pancreas, and non-Hodgkin's lymphoma.

In women, the most common sites were the breast and non-melanoma skin (19% of all cancer cases), followed by colon (8%), lung (6%) and corpus uteri (5%). Pancreas, rectum, stomach, kidney and skin melanoma were also among the ten leading sites in women.

Men



Women

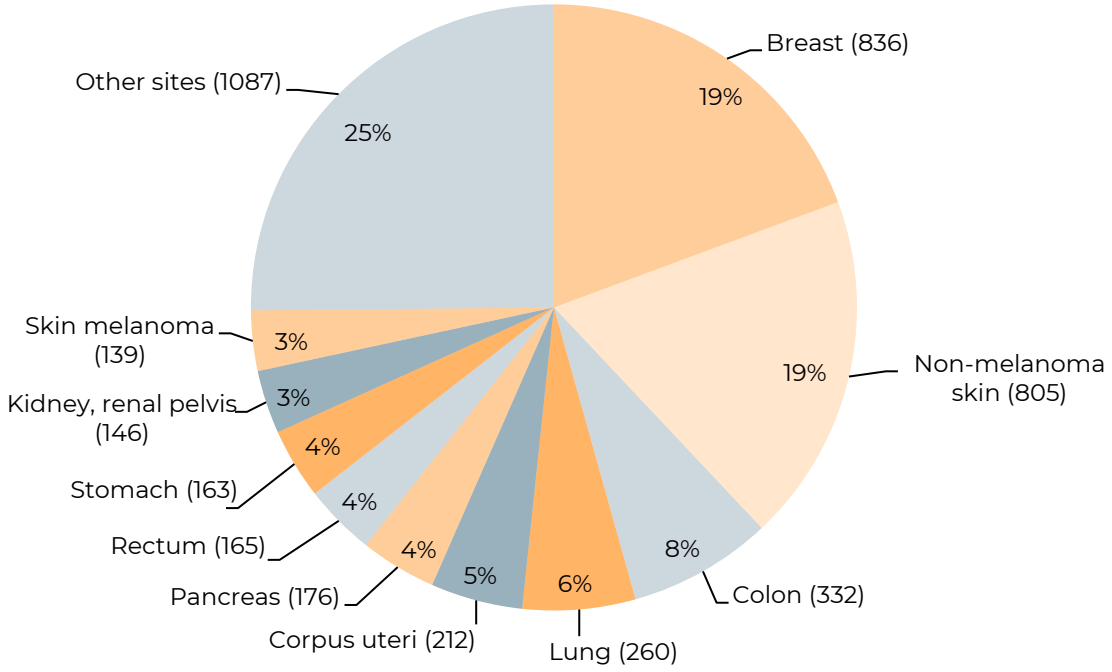


Figure 1. Leading cancer sites in Estonia, 2018 (n, %)

Tables 1a and 1b show the number of new cancer cases in 2018 and the crude and age-standardized incidence rates per 100,000 persons in men and women for the ten most frequent cancer sites.

According to GLOBOCAN 2018, total cancer incidence in men in Estonia was *ca* 20% higher than the average in Europe. Among women, overall cancer incidence in Estonia was remarkably lower than in women in Western and Northern Europe and the same pattern was seen for breast cancer. Lung cancer incidence in men was slightly higher in Estonia than in Eastern and Western European countries, whereas lung cancer incidence in women was almost two times lower in Estonia compared with Western and Northern Europe. Incidence of colon and rectal cancer among both sexes was similar to other European countries, but stomach cancer was remarkably more common in both men and women in Estonia than in Western and Northern Europe. Additionally, cancers of the kidney, pancreas and prostate were diagnosed more frequently than average in Europe (3).

Table 1a. Leading cancer sites in Estonia in men, 2018

Cancer site	ICD-10	New cases		Incidence rate per 100,000	
		Number	%	Crude	Standardized*
Prostate	C61	1 145	25.7	183.7	100.1
Trachea, bronchus, lung	C33-C34	615	13.8	98.7	52.2
Non-melanoma skin	C44	476	10.7	76.4	40.3
Colon	C18	287	6.4	46.0	23.7
Stomach	C16	200	4.5	32.1	17.5
Rectum	C19-21	188	4.2	30.2	16.5
Kidney, renal pelvis	C64-65	184	4.1	29.5	16.2
Bladder	C67	157	3.5	25.2	12.8
Pancreas	C25	156	3.5	25.0	13.3
Non-Hodgkin's lymphoma	C82-C86/C96	102	2.3	16.4	9.7
All sites	C00-C97	4462	100	715.8	397.3

* Age-standardized (world standard population).

Table 1b. Leading cancer sits in Estonia in women, 2018

Cancer site	ICD-10	New cases		Incidence rate per 100,000	
		Number	%	Crude	Standardized*
Breast	C50	836	19.3	119.7	61.4
Non-melanoma skin	C44	805	18.6	115.2	45.8
Colon	C18	332	7.7	47.5	16.0
Trachea, bronchus, lung	C33-C34	260	6.0	37.2	14.3
Corpus uteri	C54	212	4.9	30.3	14.7
Pancreas	C25	176	4.1	25.2	8.5
Rectum	C19-C21	165	3.8	23.6	9.7
Stomach	C16	163	3.8	23.3	8.0
Kidney, renal pelvis	C64-C65	146	3.4	20.9	7.4
Skin melanoma	C43	139	3.2	19.9	10.1
All sites	C00-C97	4321	100	618.5	270.9

* Age-standardized (world standard population).

1.2. All cancer sites

Tables 2a and 2b show the number of new cancer cases and the crude and age-standardized incidence rates per 100,000 persons by cancer site in men and women. The number of new cancer cases by age group and the age-specific incidence rates by cancer site are available in the Health Statistics and Health Research Database (https://statistika.tai.ee/index_en.html).

In Tables 3a and 3b, the corresponding data are presented for malignant neoplasms of lymphoid, haematopoietic and related tissues, which also include polycythaemia vera, myelodysplastic syndromes and other neoplasms of uncertain behaviour of lymphoid, hematopoietic and related tissue coded as D45-D47 in ICD-10.

In addition to all malignant neoplasms, in situ neoplasms, benign neoplasms and neoplasms of uncertain or unknown behaviour of the brain and central nervous system as well as of the endocrine organs that are located in the area of the brain are reported to the registry. The number of new cases of these neoplasms as well as the crude and age-standardized incidence rates in 2018 in men and women are presented in tables 4a and 4b.

Table 2a. The number of new cases, the crude and age-standardized incidence rates by cancer site in Estonia in men, 2018

Cancer site	ICD-10	Number of new cases	Incidence rate per 100,000	
			Crude	Standardized*
All sites	C00-C97	4462	715.8	397.3
All sites but non-melanoma skin	C00-C97 but C44	3986	639.4	357.0
Lip, oral cavity, pharynx	C00-C14	152	24.4	14.9
Lip	C00	5	0.8	0.4
Tongue	C01-C02	29	4.7	2.9
Gum, floor of mouth etc.	C03-C06	41	6.6	4.4
Major salivary glands	C07-C08	5	0.8	0.4
Tonsil, oropharynx	C09-C10	40	6.4	3.9
Nasopharynx	C11	2	0.3	0.2
Pyriform sinus, hypopharynx	C12-C13	30	4.8	2.7
Other lip, oral cavity, pharynx	C14	—	—	—
Digestive organs	C15-C26	1033	165.7	89.2
Oesophagus	C15	65	10.4	6.1
Stomach	C16	200	32.1	17.5
Small intestine	C17	18	2.9	1.7
Colon	C18	287	46.0	23.7
Rectum etc.	C19-C21	188	30.2	16.5
Liver etc.	C22	93	14.9	8.5
Gallbladder etc.	C23-C24	23	3.7	1.7
Pancreas	C25	156	25.0	13.3
Other digestive organs	C26	3	0.5	0.3

* Standardized to the world standard population.

Table 2a. (cont.)

Cancer site	ICD-10	Number of new cases	Incidence rate per 100,000	
			Crude	Standardized*
Respiratory, intrathoracic organs	C30-C39	691	110.9	59.5
Nasal cavities, ear, sinuses	C30-C31	5	0.8	0.5
Larynx	C32	65	10.4	6.2
Trachea, bronchus, lung	C33-C34	615	98.7	52.2
Thymus, heart, mediastinum, pleura	C37-C38	6	1.0	0.6
Respiratory organs etc.	C39	—	—	—
Bone, articular cartilage	C40-C41	6	1.0	1.0
Melanoma of skin	C43	84	13.5	8.0
Non-melanoma skin	C44	476	76.4	40.3
Mesothelial and soft tissues	C45-C49	29	4.7	2.9
Breast	C50	4	0.6	0.3
Male genital organs	C60-C63	1183	189.8	105.5
Penis	C60	12	1.9	1.0
Prostate	C61	1145	183.7	100.1
Testis	C62	25	4.0	4.3
Other male genital organs	C63	1	0.2	0.1
Urinary organs	C64-C68	350	56.1	29.8
Kidney, renal pelvis	C64-C65	184	29.5	16.2
Ureter	C66	7	1.1	0.6
Bladder	C67	157	25.2	12.8
Other urinary organs	C68	2	0.3	0.2
Eye	C69	7	1.1	1.2
Brain, central nervous system	C70-C72	71	11.4	7.6
Meninges	C70	1	0.2	0.1
Brain	C71	70	11.2	7.5
Other central nervous system	C72	—	—	—
Thyroid gland	C73	23	3.7	2.8
Other endocrine	C74-C75	2	0.3	0.2
Site unknown or uncertain	C76-C80	57	9.1	5.0
Hodgkin's disease	C81	18	2.9	2.7
Non-Hodgkin's lymphoma	C82-C85/96	102	16.4	9.7
Immunoproliferative diseases	C88	7	1.1	0.8
Multiple myeloma	C90	57	9.1	4.9
Leukaemia	C91-C95	110	17.6	11.0
Independent multiple sites	C97	—	—	—

* Standardized to the world standard population.

Table 2b. The number of new cases, the crude and age-standardized incidence rates by cancer site in Estonia in women, 2018

Cancer site	ICD-10	Number of new cases	Incidence rate per 100,000	
			Crude	Standardized*
All sites	C00-C97	4321	618.5	270.9
All sites but non-melanoma skin	C00-C97 but C44	3516	503.3	225.1
Lip, oral cavity, pharynx	C00-C14	57	8.2	4.2
Lip	C00	2	0.3	0.1
Tongue	C01-C02	12	1.7	0.8
Gum, floor of mouth etc.	C03-C06	11	1.6	0.9
Major salivary glands	C07-C08	11	1.6	0.7
Tonsil, oropharynx	C09-C10	16	2.3	1.3
Nasopharynx	C11	2	0.3	0.1
Pyriform sinus, hypopharynx	C12-C13	3	0.4	0.3
Other lip, oral cavity, pharynx	C14	—	—	—
Digestive organs	C15-C26	956	136.8	48.1
Oesophagus	C15	17	2.4	1.1
Stomach	C16	163	23.3	8.0
Small intestine	C17	15	2.1	1.0
Colon	C18	332	47.5	16.0
Rectum etc.	C19-C21	165	23.6	9.7
Liver etc.	C22	45	6.4	2.1
Gallbladder etc.	C23-C24	40	5.7	1.8
Pancreas	C25	176	25.2	8.5
Other digestive organs	C26	3	0.4	0.1
Respiratory, intrathoracic organs	C30-C39	277	39.6	15.3
Nasal cavities, ear, sinuses	C30-C31	6	0.9	0.4
Larynx	C32	6	0.9	0.3
Trachea, bronchus, lung	C33-C34	260	37.2	14.3
Thymus, heart, mediastinum, pleura	C37-C38	5	0.7	0.3
Respiratory organs etc.	C39	—	—	—
Bone, articular cartilage	C40-C41	4	0.6	0.7
Melanoma of skin	C43	139	19.9	10.1
Non-melanoma skin	C44	805	115.2	45.8
Mesothelial and soft tissues	C45-C49	29	4.2	2.6

* Standardized to the world standard population.

Table 2b. (cont.)

Cancer site	ICD-10	Number of new cases	Incidence rate per 100,000	
			Crude	Standardized*
Breast	C50	836	119.7	61.4
Female genital organs	C51-C58	527	75.4	39.1
Vulva, vagina	C51-C52	47	6.7	2.3
Cervix uteri	C53	127	18.2	12.0
Corpus uteri	C54	212	30.3	14.7
Uterus unspecified	C55	3	0.4	0.2
Ovary	C56	122	17.5	8.8
Other female genital organs	C57	16	2.3	1.1
Placenta	C58	—	—	—
Urinary organs	C64-C68	188	26.9	9.3
Kidney, renal pelvis	C64-C65	146	20.9	7.4
Ureter	C66	2	0.3	0.0
Bladder	C67	39	5.6	1.8
Other urinary organs	C68	1	0.1	0.0
Eye	C69	14	2.0	1.8
Brain, central nervous system	C70-C72	64	9.2	5.1
Meninges	C70	—	—	—
Brain	C71	63	9.0	5.1
Other central nervous system	C72	1	0.1	0.0
Thyroid gland	C73	64	9.2	4.9
Other endocrine	C74-C75	8	1.1	0.7
Site unknown or uncertain	C76-C80	67	9.6	3.1
Hodgkin's disease	C81	15	2.1	2.5
Non-Hodgkin's lymphoma	C82-C85/96	125	17.9	7.4
Immunoproliferative diseases	C88	5	0.7	0.1
Multiple myeloma	C90	51	7.3	2.4
Leukaemia	C91-C95	90	12.9	6.5
Independent multiple sites	C97	—	—	—

* Standardized to the world standard population.

Table 3a. The number of new cases of malignant neoplasms of lymphoid, haematopoietic and related tissues, the crude and age-standardized incidence rates in Estonia in men, 2018

Cancer site	ICD-10	Number of new cases	Incidence rate per 100,000	
			Crude	Standardized*
Hodgkin's disease	C81	18	2.9	2.7
Non-Hodgkin's lymphoma	C82-C85/96	102	16.4	9.7
Immunoproliferative diseases	C88	7	1.1	0.8
Multiple myeloma	C90	57	9.1	4.9
Leukaemia	C91-C95	110	17.6	11.0
Lymphoid leukaemia	C91	64	10.3	6.6
Acute lymphoid leukaemia	C91.0	8	1.3	2.0
Chronic lymphoid leukaemia	C91.1	53	8.5	4.3
Other lymphoid leukaemia	C91.2-C91.9	3	0.5	0.3
Myeloid leukaemia	C92	42	6.7	3.9
Acute myeloid leukaemia	C92.0	17	2.7	1.4
Chronic myeloid leukaemia	C92.1	21	3.4	1.9
Other myeloid leukaemia	C92.2-C92.9	4	0.6	0.6
Other leukaemia	C93-C95	4	0.6	0.5
Polycythaemia vera	D45	10	1.6	0.9
Myelodysplastic syndromes	D46	10	1.6	0.6
Other neoplasms of lymphoid, haematopoietic and related tissue	D47	24	3.9	2.0

* Standardized to the world standard population.

Table 3b. The number of new cases of malignant neoplasms of lymphoid, haematopoietic and related tissues, the crude and age-standardized incidence rates in Estonia in women, 2018

Cancer site	ICD-10	Number of new cases	Incidence rate per 100,000	
			Crude	Standardized*
Hodgkin's disease	C81	15	2.1	2.5
Non-Hodgkin's lymphoma	C82-C85/96	125	17.9	7.4
Immunoproliferative diseases	C88	5	0.7	0.1
Multiple myeloma	C90	51	7.3	2.4
Leukaemia	C91-C95	90	12.9	6.5
Lymphoid leukaemia	C91	60	8.6	4.1
Acute lymphoid leukaemia	C91.0	5	0.7	1.3
Chronic lymphoid leukaemia	C91.1	49	7.0	2.4
Other lymphoid leukaemia	C91.2-C91.9	6	0.9	0.4
Myeloid leukaemia	C92	24	3.4	1.6
Acute myeloid leukaemia	C92.0	9	1.3	0.6
Chronic myeloid leukaemia	C92.1	13	1.9	0.9
Other myeloid leukaemia	C92.2-C92.9	2	0.3	0.1
Other leukaemia	C93-C95	6	0.9	0.7
Polycythaemia vera	D45	14	2.0	0.8
Myelodysplastic syndromes	D46	21	3.0	0.9
Other neoplasms of lymphoid, haematopoietic and related tissue	D47	39	5.6	2.0

*Standardized to the world standard population.

Table 4a. The number of new cases of neoplasms *in situ*, benign and uncertain or unknown behaviour* and the crude and age-standardized incidence rates by cancer site in Estonia in men, 2018

Cancer site	ICD-10	Number of new cases	Incidence rate per 100,000	
			Crude	Standardized**
In situ neoplasms	D00–D09	147	23,6	12,1
Neoplasms of benign and uncertain or unknown behaviour of brain and central nervous system	D32, D33, D42, D43	34	5,5	3,5
Meninges	D32, D42	22	3,5	2,2
Brain, central nervous system	D33, D43	12	1,9	1,4
Neoplasms of benign and uncertain or unknown behaviour of intracranial endocrine glands	D35.2–D35.4, D44.3–D44.5	9	1,4	0,7

* Neoplasms reportable to the Estonian Cancer Registry.

** Standardized to the world standard population.

Table 4b. The number of new cases of neoplasms *in situ*, benign and uncertain or unknown behaviour* and the crude and age-standardized incidence rates by cancer site in Estonia in women, 2018

Cancer site	ICD-10	Number of new cases	Incidence rate per 100,000	
			Crude	Standardized**
In situ neoplasms	D00-D09	208	29.8	13.6
Cervix uteri	D06	16	2.3	2.2
Neoplasms of benign and uncertain or unknown behaviour of brain and central nervous system	D32, D33, D42, D43	84	12.0	6.2
Meninges	D32, D42	54	7.7	4.0
Brain, central nervous system	D33, D43	30	4.3	2.3
Neoplasms of benign and uncertain or unknown behaviour of intracranial endocrine glands	D35.2 D35.4, D44.3-D44.5	8	1.1	0.8

* Neoplasms reportable to the Estonian Cancer Registry.

** Standardized to the world standard population.

2. Cancer incidence by age

Age-specific cancer incidence rates are presented in Figure 2. Around 65% of all new cancer cases were diagnosed at the age of 65 or older. Women had slightly higher incidence rates than men up to the age of 54 years, whereas in older age groups, the rates in men were significantly higher than those in women.

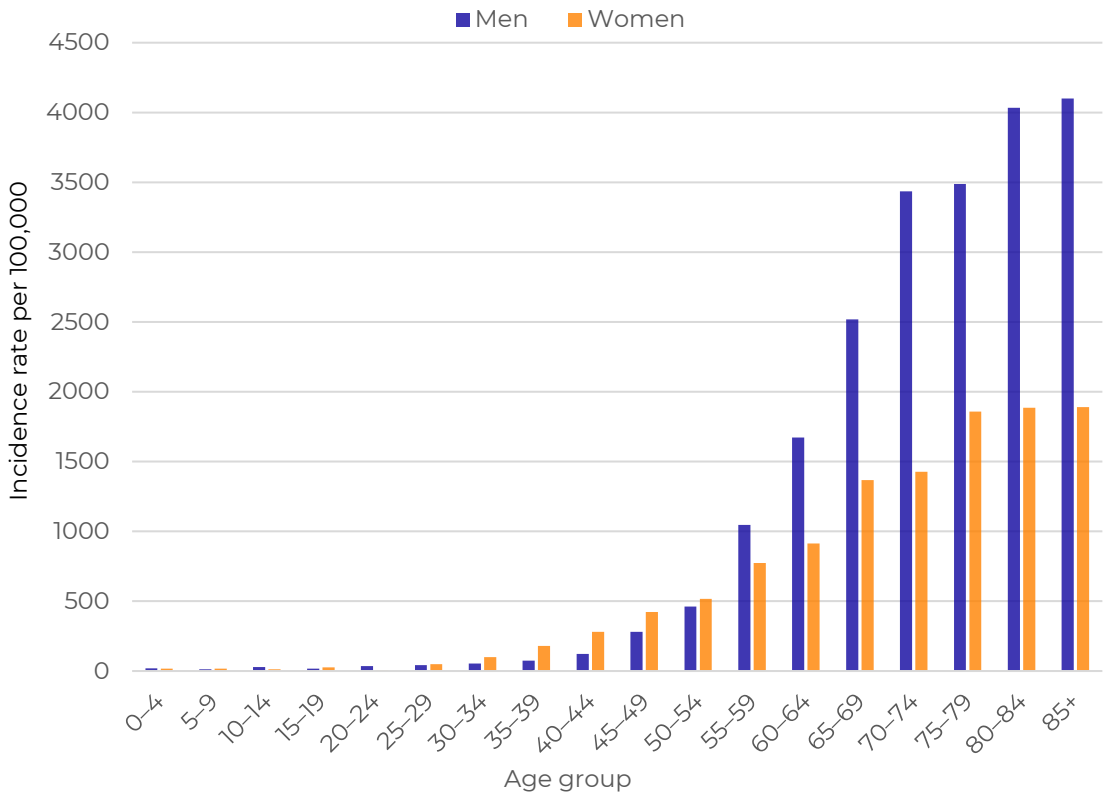


Figure 2. Age-specific cancer incidence in Estonia, 2018

Tables 5a and 5b show the variation in the most common cancer sites across age groups.

In the age group 15-34, the most frequent cancer sites were the testis, Hodgkin's lymphoma and melanoma of skin in men and the cervix, breast and Hodgkin's lymphoma in women.

In the age group 35-54, the most frequently diagnosed cancers were prostate cancer, non-melanoma skin and lung cancer in men and breast cancer, non-melanoma skin and cervical cancer in women.

In the age group 55-74, the most common cancer sites were the same as in the general population, i.e. prostate and lung cancer, non-melanoma skin cancer and colon cancer in men and breast, non-melanoma skin, lung, and colon cancer in women.

In the age group 75+, the most common cancer site in men was also the prostate, whereas lung cancer and non-melanoma skin cancer were diagnosed slightly less frequently. Among women, the most frequently diagnosed cancers were non-melanoma skin, breast and colon cancer.

Table 5a. Eight leading cancer sites by age groups in Estonia in men, 2018

Age group / Cancer site	ICD-10	New cases	
		Number	%
Age group 15-34			
Testis	C62	17	26.2
Hodgkin's lymphoma	C81	7	10.8
Melanoma of skin	C43	6	9.2
Non-melanoma skin	C44	5	7.7
Non-Hodgkin's lymphoma	C82-C85/C96	5	7.7
Colon	C18	3	4.6
Bladder	C67	3	4.6
Brain	C71	3	4.6
All sites	C00-C97	65	100
Age group 35-54			
Prostate	C61	53	13.0
Non-melanoma skin	C44	49	12.0
Trachea, bronchus, lung	C33-C34	33	8.1
Lip, oral cavity, pharynx	C00-C14	31	7.6
Kidney, renal pelvis	C64-C65	23	5.7
Non-Hodgkin's lymphoma	C82-C85/C96	20	4.9
Colon	C18	19	4.7
Stomach	C16	18	4.4
All sites	C00-C97	407	100
Age group 55-74			
Prostate	C61	788	30.4
Trachea, bronchus, lung	C33-C34	375	14.5
Non-melanoma skin	C44	234	9.0
Colon	C18	142	5.5
Stomach	C16	119	4.6
Rectum etc.	C19-C21	113	4.4
Lip, oral cavity, pharynx	C00-C14	101	3.9
Kidney, renal pelvis	C64-C65	100	3.9
All sites	C00-C97	2590	100
Age group 75+			
Prostate	C61	304	22.1
Trachea, bronchus, lung	C33-C34	206	14.9
Non-melanoma skin	C44	188	13.6
Colon	C18	123	8.9
Bladder	C67	68	4.9
Stomach	C16	62	4.5
Kidney, renal pelvis	C64-C65	60	4.5
Rectum etc.	C19-C21	58	4.2
All sites	C00-C97	1378	100

Table 5b. Eight leading cancer sites by age groups in Estonia in women, 2018

Age group / Cancer site	ICD-10	New cases	
		Number	%
Age group 15-34			
Cervix uteri	C53	16	20.5
Breast	C50	9	11.5
Hodgkin's lymphoma	C81	7	9.0
Melanoma of skin	C43	6	7.7
Non-melanoma skin	C44	6	7.7
Ovary	C56	6	7.7
Brain	C71	6	7.7
Non-Hodgkin's lymphoma	C82-C85/C96	5	6.4
All sites	C00-C97	78	100
Age group 35-54			
Breast	C50	194	31.5
Non-melanoma skin	C44	111	18.0
Cervix uteri	C53	41	6.7
Corpus uteri	C54	36	5.9
Melanoma of skin	C43	31	5.0
Colon	C18	25	4.1
Trachea, bronchus, lung	C33-C34	22	3.6
Ovary	C56	18	2.9
All sites	C00-C97	615	100
Age group 55-74			
Breast	C50	425	22.2
Non-melanoma skin	C44	313	16.3
Trachea, bronchus, lung	C33-C34	129	6.7
Colon	C18	118	6.2
Corpus uteri	C54	116	6.1
Rectum etc.	C19-C21	79	4.1
Pancreas	C25	79	4.1
Kidney, renal pelvis	C64-C65	71	3.7
All sites	C00-C97	1917	100
Age group 75+			
Non-melanoma skin	C44	375	22.1
Breast	C50	208	12.3
Colon	C18	188	11.1
Trachea, bronchus, lung	C33-C34	108	6.4
Pancreas	C25	88	5.2
Stomach	C16	87	5.1
Rectum etc.	C19-C21	67	4.0
Kidney, renal pelvis	C64-C65	67	4.0
All sites	C00-C97	1695	100

3. Cancer cases by basis of diagnosis

The distribution of new cancer cases by cancer site and the most valid basis of diagnosis are presented in Tables 6a and 6b.

One of the most important data quality indicators of a cancer registry is the percentage of microscopically verified (histologically, cytologically or haematologically confirmed) cancer cases. In 2018, 90% of new cases were microscopically verified, indicating good quality (4). Nevertheless, a low proportion of microscopically verified tumours was seen for pancreatic cancer (64% in men and 55% in women), tumours of the brain and central nervous system (78% in men and 64% in women) and lung cancer (80% for both sexes).

Another important data quality indicator of a cancer registry is the percentage of death certificates only (DCO) cases (cases registered solely based on death certificates after conducting the trace back of death certificate notifications), which was 1% in 2018. Compared with other cancer sites, lung and brain cancer were more frequently diagnosed based on a death certificate only.

Table 6a. The distribution of new cancer cases by cancer site and the most valid basis of diagnosis in Estonia in men, 2018 (n, %)

Cancer site	ICD-10	Number of new cases	Microscopic (%)**	Non-microscopic (%)**	Death certificate only (%)***
All sites	C00-C97	4462	89.8	9.0	1.3
All sites but non-melanoma skin	C00-C97 but C44	3986	88.7	9.9	1.4
Lip, oral cavity, pharynx	C00-C14	152	92.1	7.2	0.7
Lip	C00	5	100	—	—
Tongue	C01-C02	29	82.8	17.2	—
Gum, floor of mouth etc.	C03-C06	41	95.1	2.4	2.4
Major salivary glands	C07-C08	5	80.0	20.0	—
Tonsil, oropharynx	C09-C10	40	100	—	—
Nasopharynx	C11	2	100	—	—
Pyriform sinus, hypopharynx	C12-C13	30	86.7	13.3	—
Other lip, oral cavity, pharynx	C14	—	—	—	—
Digestive organs	C15-C26	1033	85.9	13.3	0.9
Oesophagus	C15	65	89.2	10.8	—
Stomach	C16	200	91.0	8.0	1.0
Small intestine	C17	18	100	—	—
Colon	C18	287	91.6	7.3	1.0
Rectum etc.	C19-C21	188	92.0	8.0	—
Liver etc.	C22	93	78.5	20.4	1.1
Gallbladder etc.	C23-C24	23	82.6	17.4	—
Pancreas	C25	156	64.1	34.6	1.3
Other digestive organs	C26	3	33.3	33.3	33.3

* Histology, autopsy with histology, cytology, haematology.

** Clinical only, instrumental clinical, biochemical/immunological, surgery/autopsy without histology.

*** The only information about the cancer case in the Cancer Registry comes from the Causes of Death Registry.

Table 6a. (cont.)

Cancer site	ICD-10	Number of new cases	Microscopic (%)**	Non-microscopic (%)**	Death certificate only (%)***
Respiratory, intrathoracic organs	C30-C39	691	80.8	17.2	2.0
Nasal cavities, ear, sinuses	C30-C31	5	100	—	—
Larynx	C32	65	96.9	3.1	—
Trachea, bronchus, lung	C33-C34	615	78.7	19.0	2.3
Thymus, heart, mediastinum, pleura	C37-C38	6	100	—	—
Respiratory organs etc.	C39	—	—	—	—
Bone, articular cartilage	C40-C41	6	100	—	—
Melanoma of skin	C43	84	100	—	—
Non-melanoma skin	C44	476	98.7	1.3	—
Mesothelial and soft tissues	C45-C49	29	100	—	—
Breast	C50	4	100	—	—
Male genital organs	C60-C63	1183	95.8	2.9	1.4
Penis	C60	12	100	—	—
Prostate	C61	1145	95.7	2.9	1.4
Testis	C62	25	96.0	4.0	—
Other male genital organs	C63	1	100	—	—
Urinary organs	C64-C68	350	86.0	12.0	2.0
Kidney, renal pelvis	C64-C65	184	81.5	16.3	2.2
Ureter	C66	7	100	—	—
Bladder	C67	157	91.1	7.0	1.9
Other urinary organs	C68	2	50.0	50.0	—

* Histology, autopsy with histology, cytology, haematology.

** Clinical only, instrumental clinical, biochemical/immunological, surgery/autopsy without histology.

*** The only information about the cancer case in the Cancer Registry comes from the Causes of Death Registry.

Table 6a. (cont.)

Cancer site	ICD-10	Number of new cases	Microscopic (%)**	Non-microscopic (%)**	Death certificate only (%)***
Eye	C69	7	28.6	71.4	—
Brain, central nervous system	C70-C72	71	77.5	16.9	5.6
Meninges	C70	1	100	—	—
Brain	C71	70	77.1	17.1	5.7
Other central nervous system	C72	—	—	—	—
Thyroid gland	C73	23	100	—	—
Other endocrine	C74-C75	2	100	—	—
Site unknown or uncertain	C76-C80	57	42.1	54.4	3.5
Hodgkin's disease	C81	18	100	—	—
Non-Hodgkin's lymphoma	C82-C85/96	102	97.1	2.9	—
Immunoproliferative diseases	C88	7	100	—	—
Multiple myeloma	C90	57	100	—	—
Leukaemia	C91-C95	110	96.4	—	3.6
Independent multiple sites	C97	—	—	—	—

* Histology, autopsy with histology, cytology, haematology.

** Clinical only, instrumental clinical, biochemical/immunological, surgery/autopsy without histology.

*** The only information about the cancer case in the Cancer Registry comes from the Causes of Death Registry.

Table 6b. The distribution of new cancer cases by cancer site and the most valid basis of diagnosis in Estonia in women, 2018 (n, %)

Cancer site	ICD-10	Number of new cases	Microscopic**	Non-microscopic **	Death certificate only ***
All sites	C00-C97	4 321	90.6	8.1	1.3
All sites but non-melanoma skin	C00-C97 but C44	3 516	88.7	9.7	1.6
Lip, oral cavity, pharynx	C00-C14	57	93.0	5.3	1.8
Lip	C00	2	100	—	—
Tongue	C01-C02	12	100	—	—
Gum, floor of mouth etc.	C03-C06	11	100	—	—
Major salivary glands	C07-C08	11	100	—	—
Tonsil, oropharynx	C09-C10	16	81.3	18.8	—
Nasopharynx	C11	2	50.0	—	50.0
Pyriform sinus, hypopharynx	C12-C13	3	100	—	—
Other lip, oral cavity, pharynx	C14	—	—	—	—
Digestive organs	C15-C26	956	81.4	16.7	1.9
Oesophagus	C15	17	88.2	11.8	—
Stomach	C16	163	87.7	10.4	1.8
Small intestine	C17	15	100	—	—
Colon	C18	332	87.3	11.7	0.9
Rectum etc.	C19-C21	165	92.7	5.5	1.8
Liver etc.	C22	45	80.0	15.6	4.4
Gallbladder etc.	C23-C24	40	75.0	25.0	—
Pancreas	C25	176	54.5	41.5	4.0
Other digestive organs	C26	3	—	100	—

* Histology, autopsy with histology, cytology, haematology.

** Clinical only, instrumental clinical, biochemical/immunological, surgery/autopsy without histology.

*** The only information about the cancer case in the Cancer Registry comes from the Causes of Death Registry.

Table 6b. (cont.)

Cancer site	ICD-10	Number of new cases	Microscopic (%)**	Non-microscopic (%)**	Death certificate only (%)***
Respiratory, intrathoracic organs	C30-C39	277	80.5	16.2	3.2
Nasal cavities, ear, sinuses	C30-C31	6	100	—	—
Larynx	C32	6	83.3	—	16.7
Trachea, bronchus, lung	C33-C34	260	80.4	16.9	2.7
Thymus, heart, mediastinum, pleura	C37-C38	5	60.0	20.0	20.0
Respiratory organs etc.	C39	—	—	—	—
Bone, articular cartilage	C40-C41	4	100	—	—
Melanoma of skin	C43	139	100	—	—
Non-melanoma skin	C44	805	98.9	1.0	0.1
Mesothelial and soft tissues	C45-C49	29	96.6	3.4	—
Breast	C50	836	97.2	2.2	0.6
Female genital organs	C51-C58	527	94.3	5.1	0.6
Vulva, vagina	C51-C52	47	91.5	8.5	—
Cervix uteri	C53	127	92.9	6.3	0.8
Corpus uteri	C54	212	96.2	3.8	—
Uterus unspecified	C55	3	100	—	—
Ovary	C56	122	93.4	5.7	0.8
Other female genital organs	C57	16	93.8	—	6.3
Placenta	C58	—	—	—	—

* Histology, autopsy with histology, cytology, haematology.

** Clinical only, instrumental clinical, biochemical/immunological, surgery/autopsy without histology.

*** The only information about the cancer case in the Cancer Registry comes from the Causes of Death Registry.

Table 6b. (cont.)

Cancer site	ICD-10	Number of new cases	Microscopic (%)**	Non-microscopic (%)**	Death certificate only (%)***
Urinary organs	C64-C68	188	86.7	11.2	2.1
Kidney, renal pelvis	C64-C65	146	84.9	12.3	2.7
Ureter	C66	2	50.0	50.0	—
Bladder	C67	39	94.9	5.1	—
Other urinary organs	C68	1	100	—	—
Eye	C69	14	21.4	78.6	—
Brain, central nervous system	C70-C72	64	64.1	28.1	7.8
Meninges	C70	—	—	—	—
Brain	C71	63	65.1	27.0	7.9
Other central nervous system	C72	1	—	100	—
Thyroid gland	C73	64	95.3	4.7	—
Other endocrine	C74-C75	8	87.5	12.5	—
Site unknown or uncertain	C76-C80	67	46.3	44.8	9.0
Hodgkin's disease	C81	15	100	—	—
Non-Hodgkin's lymphoma	C82-C85/96	125	97.6	1.6	0.8
Immunoproliferative diseases	C88	5	100	—	—
Multiple myeloma	C90	51	96.1	—	3.9
Leukaemia	C91-C95	90	96.7	—	3.3
Independent multiple sites	C97	—	—	—	—

* Histology, autopsy with histology, cytology, haematology.

** Clinical only, instrumental clinical, biochemical/immunological, surgery/autopsy without histology.

*** The only information about the cancer case in the Cancer Registry comes from the Causes of Death Registry.

4. Stage at diagnosis

4.1. Extent of solid tumours

Cancer development is usually a slow process. Diagnosing cancer as early as possible is crucial for the cancer patient's prognosis. Unfortunately, a significant proportion of new cancer cases in Estonia are diagnosed when the disease has already spread beyond the primary tumour – in 2018, around half of new cancers in men and women were localized at the time of diagnosis, whereas *ca* 19% of the patients had distant metastasis.

The distribution of incident cancer cases by the extent of disease at the time of diagnosis for solid cancers in men and women is presented in Tables 7a and 7b.

Nearly half of patients diagnosed with pancreatic and stomach cancer had distant metastasis at the time of diagnosis. In lung cancer, the respective proportion exceeded one-third. A likely explanation is that for these sites, symptoms tend to emerge rather late, when the disease has had time to develop and spread. Therefore, it is vital that people are able to recognize the early symptoms of cancer and turn to their doctor for a check-up – the longer the time gap between the development of early symptoms and starting treatment, the lower the patient's chance for survival (5).

Table 7a. The distribution of new cancer cases by site and extent of disease in Estonia in men, 2018 (n, %)

Cancer site	ICD-10	Number of new cases	Localized (%)	Regional, lymph nodes only (%)	Regional, adjacent tissues (%)	Distant metastasis (%)	Unknown (%)
All sites	C00-C80	4168	48.1	9.4	13.1	21.4	8.1
All sites but non-melanoma skin	C00-C80 but C44	3692	41.9	10.6	14.8	24.1	8.6
Lip, oral cavity, pharynx	C00-C14	152	25.0	38.2	25.0	5.3	6.6
Lip	C00	5	80.0	20.0	—	—	—
Tongue	C01-C02	29	31.0	31.0	27.6	3.4	6.9
Gum, floor of mouth etc.	C03-C06	41	26.8	31.7	29.3	4.9	7.3
Major salivary glands	C07-C08	5	40.0	40.0	—	20.0	—
Tonsil, oropharynx	C09-C10	40	20.0	50.0	22.5	2.5	5.0
Nasopharynx	C11	2	50.0	—	—	50.0	—
Pyriform sinus, hypopharynx	C12-C13	30	10.0	43.3	30.0	6.7	10.0
Other lip, oral cavity, pharynx	C14	—	—	—	—	—	—
Digestive organs	C15-C26	1033	28.2	18.4	11.0	33.6	8.8
Oesophagus	C15	65	18.5	26.2	18.5	24.6	12.3
Stomach	C16	200	25.5	14.5	13.0	36.5	10.5
Small intestine	C17	18	5.6	5.6	44.4	38.9	5.6
Colon	C18	287	39.7	18.1	8.4	27.5	6.3
Rectum etc.	C19-C21	188	29.8	33.5	6.4	22.9	7.4
Liver etc.	C22	93	32.3	8.6	9.7	35.5	14.0
Gallbladder etc.	C23-C24	23	21.7	13.0	21.7	21.7	21.7
Pancreas	C25	156	14.1	10.9	11.5	57.7	5.8
Other digestive organs	C26	3	—	—	—	33.3	66.7

Table 7a. (cont.)

Cancer site	ICD-10	Number of new cases	Localized (%)	Regional, lymph nodes only (%)	Regional, adjacent tissues (%)	Distant metastasis (%)	Unknown (%)
Respiratory, intrathoracic organs	C30-C39	691	22.3	14.5	14.8	39.5	9.0
Nasal cavities, ear, sinuses	C30-C31	5	—	—	60.0	40.0	—
Larynx	C32	65	52.3	6.2	23.1	6.2	12.3
Trachea, bronchus, lung	C33-C34	615	19.3	15.6	13.5	42.8	8.8
Thymus, heart, mediastinum, pleura	C37-C38	6	16.7	—	16.7	66.7	—
Respiratory organs etc.	C39	—	—	—	—	—	—
Bone, articular cartilage	C40-C41	6	66.7	—	33.3	—	—
Melanoma of skin	C43	84	70.2	13.1	9.5	2.4	4.8
Non-melanoma skin	C44	476	96.0	—	—	—	4.0
Mesothelial and soft tissues	C45-C49	29	48.3	6.9	17.2	20.7	6.9
Breast	C50	4	25.0	25.0	25.0	—	25.0
Male genital organs	C60-C63	1 183	59.8	1.4	18.3	12.2	8.3
Penis	C60	12	50.0	33.3	—	16.7	—
Prostate	C61	1 145	59.7	0.8	19.0	12.2	8.4
Testis	C62	25	76.0	12.0	—	8.0	4.0
Other male genital organs	C63	1	—	—	—	—	100.0
Urinary organs	C64-C68	350	57.1	1.4	15.7	19.4	6.3
Kidney, renal pelvis	C64-C65	184	52.2	1.1	14.1	26.1	6.5
Ureter	C66	7	28.6	—	42.9	28.6	—
Bladder	C67	157	64.3	1.9	16.6	10.8	6.4
Other urinary organs	C68	2	50.0	—	—	50.0	—
Eye	C69	7	100	—	—	—	—

Table 7a. (cont.)

Cancer site	ICD-10	Number of new cases	Localized (%)	Regional, lymph nodes only (%)	Regional, adjacent tissues (%)	Distant metastasis (%)	Unknown (%)
Brain, central nervous system	C70-C72	71	81.7	—	—	—	18.3
Meninges	C70	1	100	—	—	—	—
Brain	C71	70	81.4	—	—	—	18.6
Other central nervous system	C72	—	—	—	—	—	—
Thyroid gland	C73	23	47.8	26.1	17.4	8.7	—
Other endocrine	C74-C75	2	50.0	—	—	50.0	—
Site unknown or uncertain	C76-C80	57	—	3.5	—	70.2	26.3

Table 7b. The distribution of new cancer cases by site and extent of disease in Estonia in women, 2018 (n, %)

Cancer site	ICD-10	Number of new cases	Localized (%)	Regional, lymph nodes only (%)	Regional, adjacent tissues (%)	Distant metastasis (%)	Unknown (%)
All sites	C00-C80	4035	52.4	12.8	9.7	17.1	8.1
All sites but non-melanoma skin	C00-C80 but C44	3230	41.7	15.9	12.0	21.3	9.1
Lip, oral cavity, pharynx	C00-C14	57	47.4	29.8	14.0	5.3	3.5
Lip	C00	2	100	—	—	—	—
Tongue	C01-C02	12	58.3	33.3	8.3	—	—
Gum, floor of mouth etc.	C03-C06	11	27.3	36.4	27.3	—	9.1
Major salivary glands	C07-C08	11	81.8	—	—	18.2	—
Tonsil, oropharynx	C09-C10	16	37.5	50.0	12.5	—	—
Nasopharynx	C11	2	—	50.0	—	—	50.0
Pyriform sinus, hypopharynx	C12-C13	3	—	—	66.7	33.3	—
Other lip, oral cavity, pharynx	C14	—	—	—	—	—	—
Digestive organs	C15-C26	956	26.2	16.1	11.8	34.7	11.2
Oesophagus	C15	17	52.9	17.6	5.9	17.6	5.9
Stomach	C16	163	17.2	12.3	12.3	47.9	10.4
Small intestine	C17	15	26.7	6.7	6.7	60.0	—
Colon	C18	332	38.3	19.9	8.7	26.2	6.9
Rectum etc.	C19-C21	165	25.5	27.9	10.9	23.6	12.1
Liver etc.	C22	45	31.1	4.4	6.7	28.9	28.9
Gallbladder etc.	C23-C24	40	7.5	12.5	27.5	30.0	22.5
Pancreas	C25	176	13.1	6.3	17.0	51.1	12.5
Other digestive organs	C26	3	—	—	—	33.3	66.7

Table 7b. (cont.)

Cancer site	ICD-10	Number of new cases	Localized (%)	Regional, lymph nodes only (%)	Regional, adjacent tissues (%)	Distant metastasis (%)	Unknown (%)
Respiratory, intrathoracic organs	C30-C39	277	30.0	13.0	9.4	36.1	11.6
Nasal cavities, ear, sinuses	C30-C31	6	16.7	—	66.7	16.7	—
Larynx	C32	6	33.3	16.7	16.7	—	33.3
Trachea, bronchus, lung	C33-C34	260	29.6	13.5	7.7	38.1	11.2
Thymus, heart, mediastinum, pleura	C37-C38	5	60.0	—	20.0	—	20.0
Respiratory organs etc.	C39	—	—	—	—	—	—
Bone, articular cartilage	C40-C41	4	50.0	—	25.0	—	25.0
Melanoma of skin	C43	139	64.7	11.5	13.7	5.8	4.3
Non-melanoma skin	C44	805	95.3	0.1	0.7	0.1	3.7
Mesothelial and soft tissues	C45-C49	29	41.4	—	13.8	27.6	17.2
Breast	C50	836	49.4	30.6	3.2	9.4	7.3
Female genital organs	C51-C58	527	45.5	5.5	29.2	13.5	6.3
Vulva, vagina	C51-C52	47	63.8	12.8	10.6	4.3	8.5
Cervix uteri	C53	127	29.1	6.3	44.9	8.7	11.0
Corpus uteri	C54	212	71.7	6.6	8.0	10.8	2.8
Uterus unspecified	C55	3	33.3	—	33.3	—	33.3
Ovary	C56	122	13.9	0.8	51.6	27.9	5.7
Other female genital organs	C57	16	18.8	—	68.8	6.3	6.3
Placenta	C58	—	—	—	—	—	—

Table 7b. (cont.)

Cancer site	ICD-10	Number of new cases	Localized (%)	Regional, lymph nodes only (%)	Regional, adjacent tissues (%)	Distant metastasis (%)	Unknown (%)
Urinary organs	C64-C68	188	58.5	0.5	17.6	16.5	6.9
Kidney, renal pelvis	C64-C65	146	57.5	0.7	16.4	17.8	7.5
Ureter	C66	2	50.0	—	—	50.0	—
Bladder	C67	39	61.5	—	23.1	10.3	5.1
Other urinary organs	C68	1	100	—	—	—	—
Eye	C69	14	85.7	—	—	7.1	7.1
Brain, central nervous system	C70-C72	64	85.9	—	—	—	14.1
Meninges	C70	—	—	—	—	—	—
Brain	C71	63	85.7	—	—	—	14.3
Other central nervous system	C72	1	100	—	—	—	—
Thyroid gland	C73	64	73.4	9.4	1.6	12.5	3.1
Other endocrine	C74-C75	8	62.5	—	—	37.5	—
Site unknown or uncertain	C76-C80	67	1.5	—	—	64.2	34.3

4.2. TNM stage of selected sites

The TNM staging system is used to describe the amount and spread of cancer in a patient's body. At stages I and II, the tumour is usually local and rather small. At stage III, the cancer has grown beyond the primary tumour site to nearby lymph nodes or organs and tissues. At stage IV, the cancer has spread from the primary tumour site to distant organs or distant lymph nodes. TNM staging depends on the cancer site and, in some cases, on tumour morphology.

The ECR collects data on TNM and stage of disease at the time of diagnosis. The 8th version of TNM Classification has been in use since 2018 (6).

The distribution of incident cases in 2018 by stage at diagnosis for selected sites is illustrated in Figure 3.

In 2018, a quarter of both male and female patients were diagnosed with stage IV colon and rectum cancer. Compared with the second half of 1990s, the proportion of stage IV colon cancers has somewhat decreased (7). The national screening programme for colorectal cancer in Estonia started in 2016 and therefore its impact is yet to be seen – in the long term, it is expected to lower incidence and mortality due to the detection and treatment of precancerous lesions as well as early diagnosis of cancer (8).

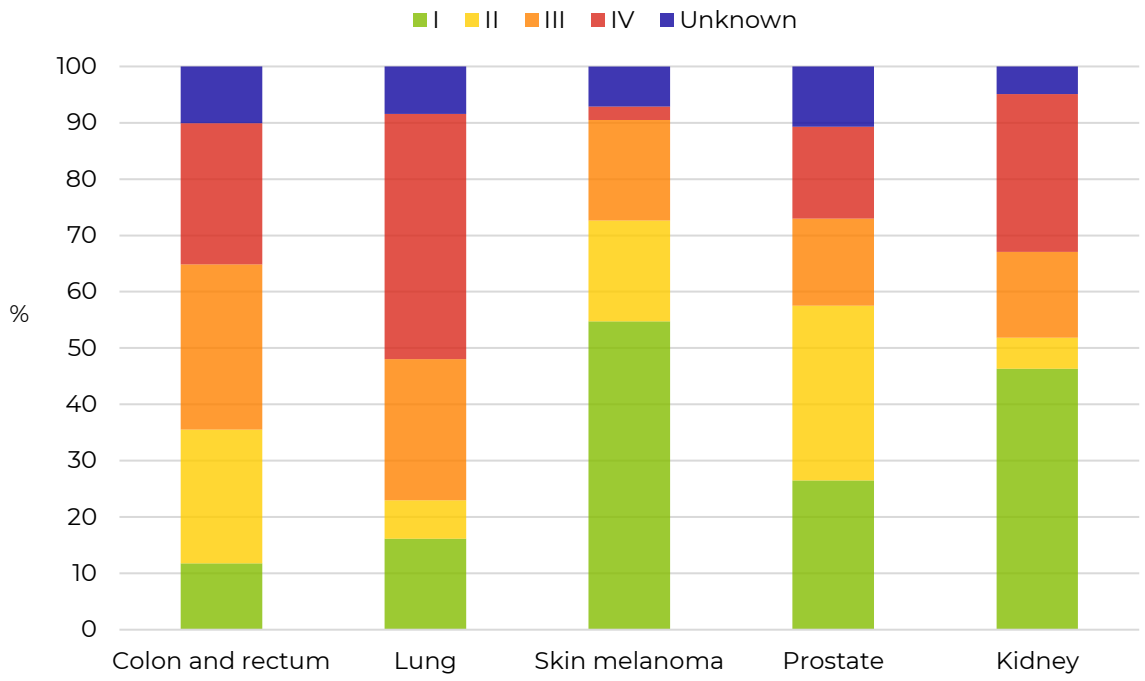
The proportion of stage I lung cancer was 16% in men and 25% in women, while 44% and 39% of patients, respectively, already had stage IV cancer. Among new cases of cervical cancer, 12% were diagnosed at stage IV in 2018. Compared with 2010-2014, the proportion of cases diagnosed at stage IV decreased, but at the same time less cases were diagnosed at stage I (9).

A noticeable change in early detection has occurred in melanoma of skin – while only 15% of men and 29% of women were diagnosed with stage I melanoma in the early 2000s (10), more than half of male and female patients had stage I melanoma in 2018 and less than 6% had stage IV.

In breast cancer, the proportion of cases diagnosed at stage I is slowly increasing, reaching 32% in 2018, whereas the proportion of stage IV cases remains at around 10%. The age group of organized mammography screening was extended in 2018 to include women aged 50-69 years (previously 50-62). This change is expected to facilitate early diagnosis.

In prostate cancer, 27% of new cases were diagnosed at stage I and 16% at stage IV. Compared with 2010-2014, the proportion of stage I has increased (11). The stage distribution of prostate cancer at diagnosis is affected by the intensity of prostate-specific antigen (PSA) testing in middle-aged and older men. Stage data quality has improved as the proportion of new prostate cancer cases with an unknown stage has decreased.

Men



Women

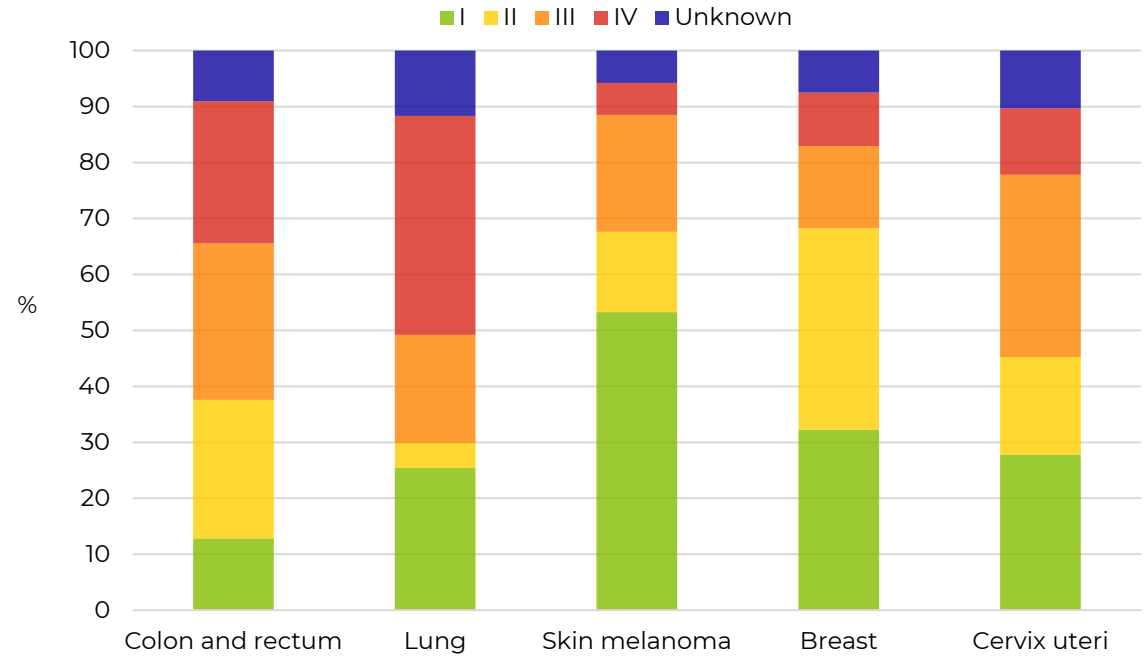


Figure 3. The distribution (%) of new cases by stage at diagnosis among persons alive at the time of diagnosis (selected sites), 2018

5. Cancer incidence trends from 1968-2018

5.1. Number of new cancer cases

In Estonia, cancer incidence data are available for as far back as 1968. Due to an ageing population, an improvement in diagnostic methods and an increase in lifestyle-related cancers, the number of new cancer cases has continuously risen, reaching almost 8800 in 2018 (Figure 4). During the period 1968-2018, the number of new cancer cases has more than doubled in both men and women.

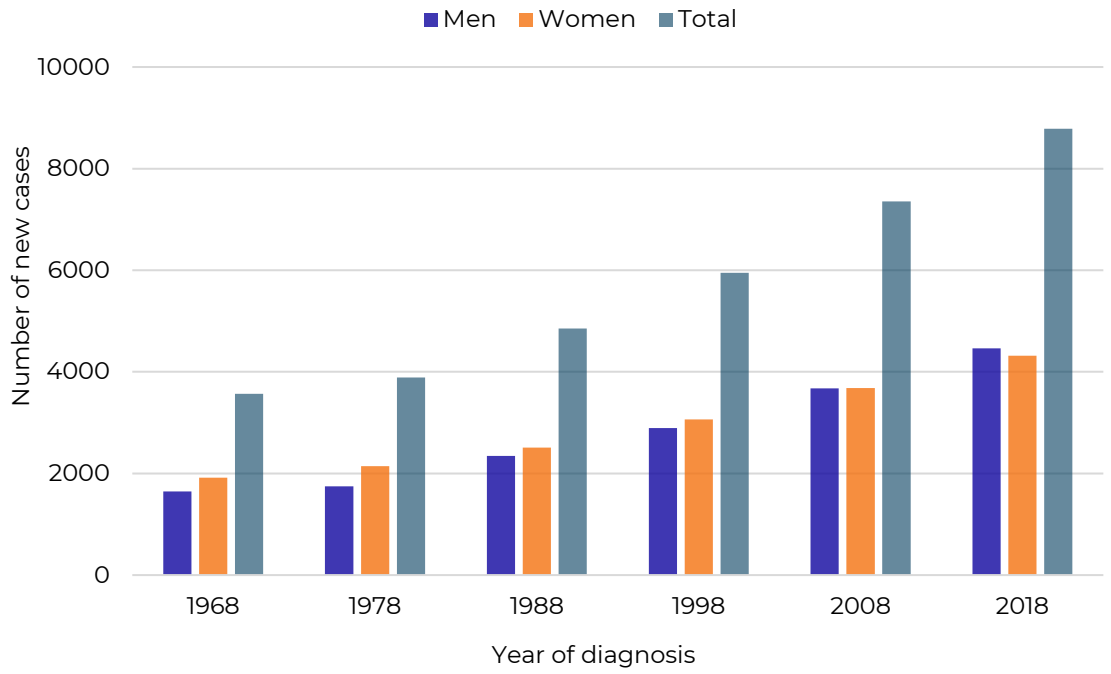


Figure 4. Number of cancer cases in Estonia, 1968-2018

5.2. Incidence trends of selected sites

Time trends for selected sites in the period 1968-2018 are presented in Figure 5, showing a variation of incidence trends across cancer sites.

Lung cancer incidence has decreased in men since 1996, but a continuous increase has been evident in women. Since one of the main risk factors for lung cancer is smoking, the incidence trends are related to changes in smoking prevalence in the population (12). While the daily smoking prevalence of men aged 15-64 years has decreased significantly since the early 1990s reaching 23% in 2018, the prevalence of daily smoking among women has decreased only slightly (13). Education level is also an important predictor of smoking behaviour (14, 15). During the period 1990-2010, smoking among women with basic education doubled, whereas the same indicator among men did not change noticeably (16); this difference likely explains some of the lung cancer trends seen at present.

Breast cancer incidence has slowly increased over five decades and the introduction of screening in 2004 have not caused any rapid changes in incidence.

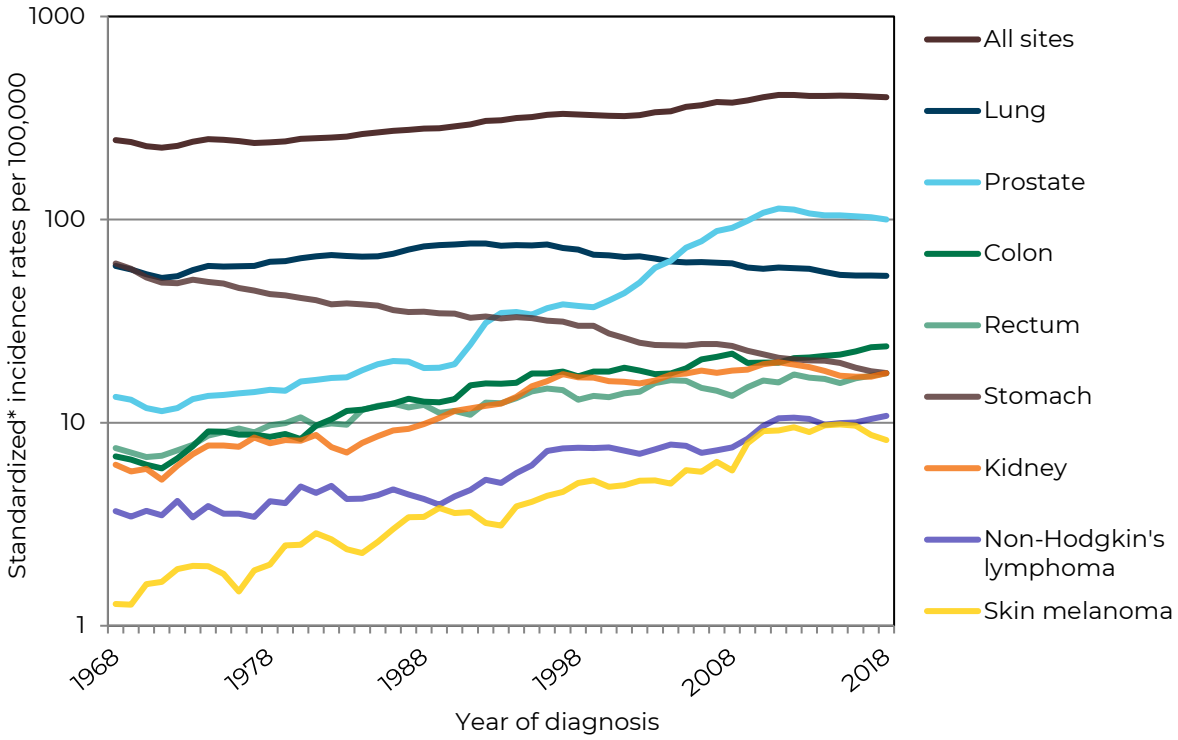
The rates of prostate cancer increased rapidly in the 2000s but have recently stabilized. The rapid increase in prostate cancer incidence likely resulted from intense PSA-testing in middle-aged and elderly men as the incidence rise was limited to early-stage prostate cancer and there was no change in the incidence of advanced cancers (11).

The increasing incidence of colon and rectum cancer and skin melanoma among both men and women as well as kidney cancer in men have a common feature – their association with people's lifestyle. The main risk factors for these cancers include obesity, low physical activity, smoking and excessive UV radiation. The incidence of non-Hodgkin's lymphoma is also increasing among both sexes, but a connection with any specific risk factor is not clear.

The rate of stomach cancer is decreasing in both sexes due to the decreasing prevalence of *Helicobacter pylori* infections and smoking which are both known risk factors of stomach cancer (17).

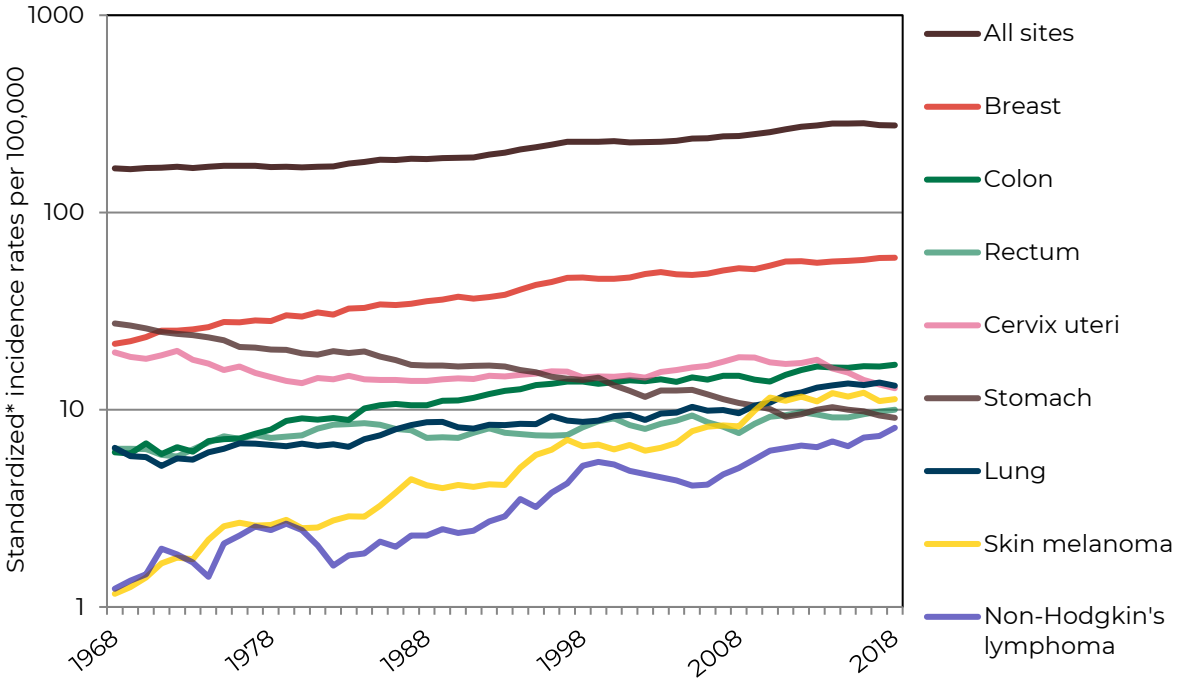
Cervical cancer, which especially affects younger women and is largely preventable with a population-based screening programme, is still an important public health issue in Estonia. A significant decrease in cervical cancer incidence has been seen in many countries after the introduction of screening (18, 19). Unfortunately, in Estonia the increase in cervical cancer incidence that started in the 1980s continued even after screening was initiated in 2006 (9) and a slight decrease has only appeared in recent years. Since 2018 the national immunisation schedule of Estonia includes the vaccination of 12-year-old girls against human papillomavirus infection, which is known to be an effective measure in decreasing cervical cancer incidence (20), but its impact in Estonia will be seen in the future.

Men



* Standardized to the world standard population; calculated as the three-year running average.

Women



* Standardized to the world standard population; calculated as the three-year running average.

Figure 5. Trends in age-standardized cancer incidence in Estonia, 1968-2018 (selected sites)

6. Cancer prevalence

On 31 December 2018, there were 63,939 persons (25,856 men and 38.083 women) in the population of Estonia with a life-time history of cancer and the number of prevalent cases was 70,694 (29,010 in men and 41,684 in women).

The number of persons with a history of cancer has constantly increased (Figure 6) over time as a result of rising cancer incidence and improving survival.

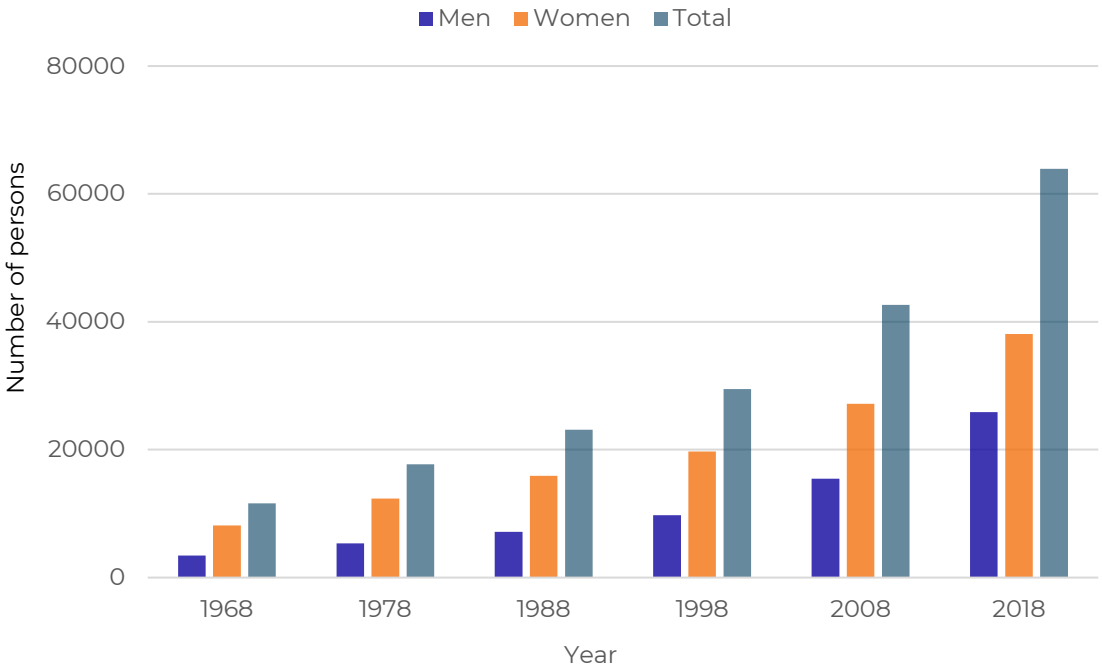


Figure 6. Number of persons with a life-time history of cancer in Estonia at the end of corresponding year, 1968-2018

7. Childhood cancer incidence from 2009-2018

The widely used International Classification of Childhood Cancer (ICCC) is based on tumour morphology and primary site with an emphasis on morphology. According to the third version of ICCC (ICCC-3), childhood cancers were divided into 12 groups. ICCC-3 codes were derived by recoding ICD-0-3 codes using an internationally agreed correspondence table (21).

The criteria for defining the age range of childhood cancer may depend on the legislation or health care system of a country, i.e. the upper age limit of children being treated by paediatric oncologists. Although all tumours diagnosed in patients up to the age of 18 are treated by paediatric oncologists in Estonia, incidence data in this report are presented for the age group 0-14 for better international comparison.

Childhood cancers are rare; in 2018, *ca* 0.5% of all cancer cases in Estonia were diagnosed in children younger than 15 years. Although the increasing incidence in some cancer sites may at least partly be due to improvements in diagnostic procedures and the corresponding decreases in the incidence of unspecified neoplasms, overall cancer incidence in children is still increasing (22).

In 2018, 22 boys and 18 girls aged 0-14 were diagnosed with cancer. Due to the small numbers, site-specific data in this report are presented for a longer period. The average annual numbers of new cancer cases in children aged 0-14 for 2009-2013 and 2014-2018 are presented in Tables 8a and 8b. Cancer incidence varies significantly across age groups – during the first five years of life, the number of new cases was almost twice as high as that of the age group of 5-14.

Similarly to adults, the most common cancer sites varied across age groups. In the age group 0-4, lymphoid leukaemia, central nervous system (CNS) and miscellaneous intracranial and intraspinal neoplasms as well as neuroblastomas were diagnosed most frequently. In age groups 5-9 and 10-14, the most common sites included CNS tumours along with lymphomas and bone tumours, which were very rare in the youngest age group, whereas the number of neuroblastomas decreased remarkably among 5-14-year-old children.

Table 8a. Average annual number of new cancer cases in children aged 0-14 years, 2009-2013

Site group by ICCC-3	Age group							
	0-4		5-9		10-14		0-14	
	Number	%	Number	%	Number	%	Number	%
I. Leukaemias, myeloproliferative diseases and myelodysplastic diseases	5	34.2	3.2	44.4	1.8	20.0	10	32.4
Ia. Lymphoid leukaemias	3.8	26.0	2.4	33.3	1.2	13.3	7.4	24.0
Ib, Acute myeloid leukaemias	0.8	5.5	0.8	11.1	0.4	4.4	2	6.5
Ic, Id, Ie. Chronic myeloproliferative diseases; myelodysplastic syndrome and other myeloproliferative diseases; unspecified and other specified leukaemias	0.4	2.7	—	—	0.2	2.2	0.6	1.9
II. Lymphomas and reticuloendothelial neoplasms	0.6	4.2	1.6	22.2	2.4	26.7	4.6	14.9
IIa. Hodgkin lymphomas	0.2	1.4	0.2	2.8	0.6	6.7	1	3.2
IIb. Non-Hodgkin lymphomas (except Burkitt lymphoma)	0.2	1.4	—	—	1	11.1	1.2	3.9
IIc, IId, IIe. Burkitt lymphoma; miscellaneous lymphoreticular neoplasms; unspecified lymphomas	0.2	1.4	1.4	19.4	0.8	8.9	2.4	7.8
III. CNS and miscellaneous intracranial and intraspinal neoplasms	2.8	19.2	1.8	25.0	3	33.3	7.6	24.7
IV. Neuroblastoma and other peripheral nervous cell tumours	2	13.7	—	—	—	—	2	6.5
V. Retinoblastoma	0.6	4.1	—	—	—	—	0.6	1.9
VI. Renal tumours	1	6.8	0.2	2.8	—	—	1.2	3.9
VII. Hepatic tumours	0.2	1.4	—	—	—	—	0.2	0.6
VIII. Malignant bone tumours	0.4	2.7	—	—	0.8	8.9	1.2	3.9
IX. Soft tissue and other extraosseous sarcomas	1.4	9.6	—	—	0.4	4.4	1.8	5.8
X. Germ cell tumours, trophoblastic tumours, and neoplasms of gonads	0.6	4.1	0.2	2.8	0.2	2.2	1	3.2
XI. Other malignant epithelial neoplasms and malignant melanomas	—	—	0.2	2.8	0.4	4.4	0.6	1.9
XII. Other and unspecified malignant neoplasms	—	—	—	—	—	—	—	—
Total	14.6	100	7.2	100	9	100	30.8	100

Table 8b. Average annual number of new cancer cases in children aged 0-14 years, 2014-2018

Site group by ICCC-3	Age group							
	0-4		5-9		10-14		0-14	
	Number	%	Number	%	Number	%	Number	%
I. Leukaemias, myeloproliferative diseases and myelodysplastic diseases	4.8	25.0	3.2	34.7	1.4	15.2	9.4	25.0
Ia. Lymphoid leukaemias	3.6	18.8	2.4	26.1	0.8	8.7	6.8	18.1
Ib, Acute myeloid leukaemias	0.6	3.1	0.4	4.3	0.4	4.3	1.4	3.7
Ic, Id, Ie. Chronic myeloproliferative diseases; myelodysplastic syndrome and other myeloproliferative diseases; unspecified and other specified leukaemias	0.6	3.1	0.4	4.3	0.2	2.2	1.2	3.2
II. Lymphomas and reticuloendothelial neoplasms	1.2	6.2	0.6	6.5	2.4	26.1	4.2	11.2
IIa. Hodgkin lymphomas	—	—	0.2	2.2	1	10.9	1.2	3.2
IIb. Non-Hodgkin lymphomas (except Burkitt lymphoma)	0.6	3.1	0.4	4.3	1.4	15.2	2.4	6.4
IIc, IId, IIe. Burkitt lymphoma; miscellaneous lymphoreticular neoplasms; unspecified lymphomas	0.6	3.1	—	—	—	—	0.6	1.6
III. CNS and miscellaneous intracranial and intraspinal neoplasms	5.2	27.1	2.8	30.4	2.4	26.1	10.4	27.7
IV. Neuroblastoma and other peripheral nervous cell tumours	1.8	9.4	0.2	2.2	—	—	2	5.3
V. Retinoblastoma	1.6	8.3	—	—	—	—	1.6	4.3
VI. Renal tumours	1.2	6.3	0.4	4.3	—	—	1.6	4.3
VII. Hepatic tumours	0.4	2.1	—	—	—	—	0.4	1.1
VIII. Malignant bone tumours	—	—	0.6	6.5	0.2	2.2	0.8	2.1
IX. Soft tissue and other extraosseous sarcomas	1.2	6.3	0.8	8.7	0.6	6.5	2.6	6.9
X. Germ cell tumours, trophoblastic tumours, and neoplasms of gonads	1.8	9.4	—	—	0.6	6.5	2.4	6.4
XI. Other malignant epithelial neoplasms and malignant melanomas	—	—	0.6	6.5	1.4	15.2	2	5.3
XII. Other and unspecified malignant neoplasms	—	—	—	—	0.2	2.2	0.2	0.5
Total	19.2	100	9.2	100	9.2	100	37.6	100

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