Epidemiological characteristics and public health importance of malignant diseases

- Cancer is a generic term for a large group of diseases that can affect any part of the body. Other terms used are malignant tumours and neoplasms.
- One defining feature of cancer is the rapid creation of abnormal cells that grow beyond their usual boundaries, and which can then invade adjoining parts of the body and spread to other organs; the latter process is referred to as metastasis.
- Cancer arises from the transformation of normal cells into tumour cells in a multi-stage process that generally progresses from a pre-cancerous lesion to a malignant tumour. These changes are the result of the interaction between a person's genetic factors and three categories of external agents, including:

physical carcinogens, such as ultraviolet and ionizing radiation;

chemical carcinogens, such as asbestos, components of tobacco smoke, alcohol, aflatoxin (a food contaminant), and arsenic (a drinking water contaminant); and

biological carcinogens, such as infections from certain viruses, bacteria, or parasites.

- Cancer poses the highest clinical, social, and economic burden in terms of cause-specific Disability-Adjusted Life Years (DALYs) among all human diseases. The overall 0–74 years risk of developing cancer is 20.2% (22.4% in men and 18.2% in women, respectively).
- Each year, approximately 400 000 children develop cancer.

- The International Agency for Research on Cancer (IARC) estimates that globally, 1 in 5 people develop cancer during their lifetime, and 1 in 8 men and 1 in 11 women die from the disease. These new estimates suggest that more than 50 million people are living within five years of a past cancer diagnosis. Ageing populations globally and socio-economic risk factors remain among the primary factors driving this increase.

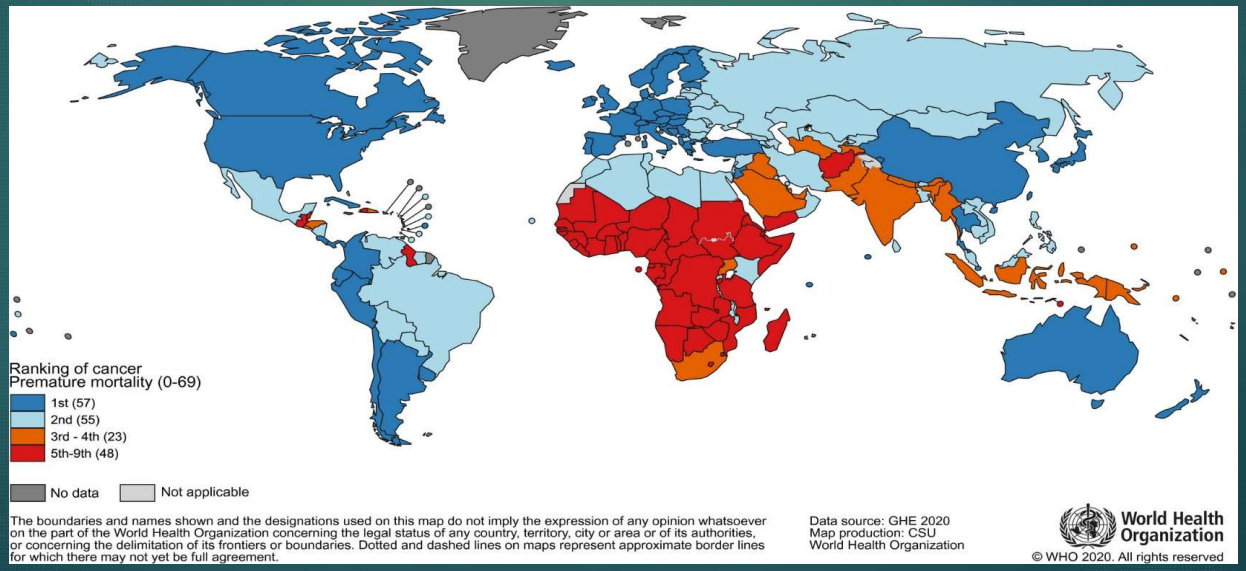
Risk factors

- Tobacco use, alcohol consumption, unhealthy diet, physical inactivity and air pollution are risk factors for cancer and other noncommunicable diseases.

- Some chronic infections are risk factors for cancer; this is a particular issue in low- and middle-income countries. Approximately 13% of cancers diagnosed in 2018 globally were attributed to carcinogenic infections, including Helicobacter pylori, human papillomavirus (HPV), hepatitis B virus, hepatitis C virus, and Epstein-Barr virus .

- Hepatitis B and C viruses and some types of HPV increase the risk for liver and cervical cancer, respectively. Infection with HIV increases the risk of developing cervical cancer six-fold and substantially increases the risk of developing select other cancers such as Kaposi sarcoma.

- Cancer ranks as a leading cause of death and an important barrier to increasing life expectancy in every country of the world.[1] According to estimates from the World Health Organization (WHO) in 2019, cancer is the first or second leading cause of death before the age of 70 years in 112 of 183 countries and ranks third or fourth in a further 23 countries. Cancer's rising prominence as a leading cause of death partly reflects marked declines in mortality rates of stroke and coronary heart disease, relative to cancer, in many countries.



Cancer is a leading cause of death worldwide, accounting for nearly 10 million deaths in 2020 .

The most common in 2020 (in terms of new cases of cancer) were:

- breast (2.26 million cases);
- lung (2.21 million cases);
- colon and rectum (1.93 million cases);
- prostate (1.41 million cases);
- skin (non-melanoma) (1.20 million cases); and
- stomach (1.09 million cases).

The most common causes of cancer death in 2020 were:

- lung (1.80 million deaths);
- colon and rectum (916 000 deaths);
- liver (830 000 deaths);
- stomach (769 000 deaths); and
- breast (685 000 deaths).

Global cancer incidence: both sexes

Rank	Cancer	New cases in 2020	% of all cancers
	All cancers*	18,094,716	
1	Breast	2,261,419	12.5
2	Lung	2,206,771	12.2
3	Colorectal**	1,931,590	10.7
4	Prostate	1,414,259	7.8
5	Stomach	1,089,103	6.0
6	Liver	905,677	5.0
7	Cervix uteri	604,127	3.3
8	Oesophagus	604,100	3.3
9	Thyroid	586,202	3.2
10	Bladder	573,278	3.2
11	Non-Hodgkin lymphoma	544,352	3.0
12	Pancreas	495,773	2.7
13	Leukaemia	474,519	2.6
14	Kidney	431,288	2.4
15	Corpus uteri	417,367	2.3
16	Lip, oral cavity	377,713	2.1
17	Melanoma of skin	324,635	1.8
18	Ovary	313,959	1.7
19	Brain, central nervous system	308,102	1.7
20	Larynx	184,615	1.0
21	Multiple myeloma	176,404	1.0
22	Nasopharynx	133,354	0.7
23	Gallbladder	115,949	0.6
24	Oropharynx	98,412	0.5
25	Hypopharynx	84,254	0.5
26	Hodgkin lymphoma	83,087	0.5
27	Testis	74,458	0.4
28	Salivary glands	53,583	0.3
29	Vulva	45,240	0.3
30	Penis	36,068	0.2
31	Kaposi sarcoma	34,270	0.2
32	Mesothelioma	30,870	0.2

Global cancer incidence in men

- Lung cancer was the most common cancer in men worldwide, contributing 15.4% of the total number of new cases diagnosed in 2020.
- The top three – lung, prostate and colorectal cancers – contributed 41.9% of all cancers (excluding non-melanoma skin cancer).
- Other common cancers contributing more than 5% were stomach and liver.

Global cancer incidence in men

Rank	Cancer	New cases in 2020	% of all cancers
	All cancers*	9,342,957	
1	Lung	1,435,943	15.4
2	Prostate	1,414,259	15.1
3	Colorectal**	1,065,960	11.4
4	Stomach	719,523	7.7
5	Liver	632,320	6.8
6	Bladder	440,864	4.7
7	Oesophagus	418,350	4.5
8	Non-Hodgkin lymphoma	304,151	3.3
9	Kidney	271,249	2.9
10	Leukaemia	269,503	2.9
11	Lip, oral cavity	264,211	2.8
12	Pancreas	262,865	2.8
13	Melanoma of skin	173,844	1.9
14	Brain, central nervous system	168,346	1.8
15	Larynx	160,265	1.7
16	Thyroid	137,287	1.5
17	Multiple melanoma	98,613	1.1
18	Nasopharynx	96,371	1.0
19	Oropharynx	79,045	0.8
20	Testis	74,458	0.8
21	Hypopharynx	70,254	0.8
22	Hodgkin lymphoma	48,981	0.5
23	Gallbladder	41,062	0.4
24	Penis	36,068	0.4
25	Salivary glands	29,694	0.3
26	Kaposi sarcoma	23,413	0.3

Global cancer incidence in women

- Breast cancer was the most common cancer in women worldwide, contributing 25.8% of the total number of new cases diagnosed in 2020.
- The top three – breast, colorectal and lung cancers – contributed 44.5% of all cancers (excluding non-melanoma skin cancer).
- Cervical cancer was the fourth most common cancer in women, contributing 6.9% of the total number of new cases diagnosed in 2020.

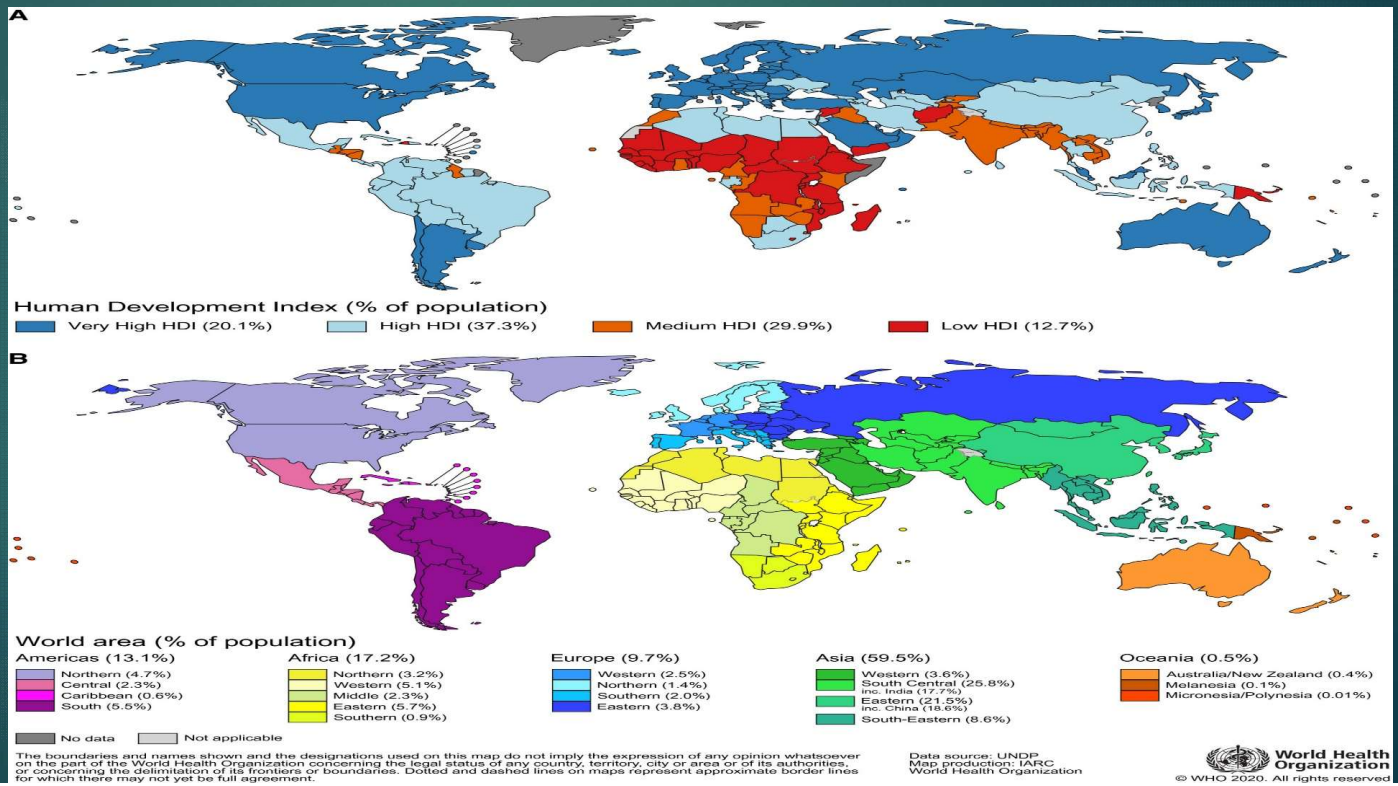
Global cancer incidence in women

Rank	Cancer	New cases in 2020	% of all cancers
	All cancers*	8,751,759	
1	Breast	2,261,419	25.8
2	Colorectal **	865,630	9.9
3	Lung	770,828	8.8
4	Cervix uteri	604,127	6.9
5	Thyroid	448,915	5.1
6	Corpus uteri	417,367	4.8
7	Stomach	369,580	4.2
8	Ovary	313,959	3.6
9	Liver	273,357	3.1
10	Non-Hodgkin lymphoma	240,201	2.7
11	Pancreas	232,908	2.7
12	Leukaemia	205,016	2.3
13	Oesophagus	185,750	2.1
14	Kidney	160,039	1.8
15	Melanoma of skin	150,791	1.7
16	Brain, central nervous system	139,756	1.6
17	Bladder	132,414	1.5
18	Lip, oral cavity	113,502	1.3
19	Multiple myeloma	77,791	0.9
20	Gallbladder	74,887	0.9
21	Vulva	45,240	0.5
22	Nasopharynx	36,983	0.4
23	Hodgkin lymphoma	34,106	0.4
24	Larynx	24,350	0.3
25	Salivary glands	23,889	0.3
26	Oropharynx	19,367	0.2
27	Vagina	17,908	0.2
28	Hypopharynx	14,000	0.2
29	Kaposi sarcoma	10,857	0.1
30	Mesothelioma	9,310	0.1

Cancer rates by Human Development Index

- Overall, cancer incidence is higher in more developed countries, but rates of cancer are rising in many lower income countries.
- About differences in cancer incidence and mortality between more and less developed regions, we are using the United Nations Human Development Index to make these comparisons.
- The Human Development Index measures average achievement in three key dimensions of human development: a long and healthy life, knowledge, and a decent standard of living.
- The health dimension is assessed by life expectancy at birth. The education dimension is measured by mean years of schooling for adults aged 25 years and more, and expected years of schooling for children. The standard of living dimension is measured by gross national income per capita
- The scores for the three indices are then aggregated into a composite index. The Human Development Index captures only part of what human development entails. It does not reflect on inequalities, poverty, human security, empowerment or many other factors.

- Overall, the burden of cancer incidence and mortality is rapidly growing worldwide; this reflects both aging and growth of the population as well as changes in the prevalence and distribution of the main risk factors for cancer, several of which are associated with socioeconomic development. The extent to which the position of cancer as a cause of premature death reflects national levels of social and economic development can be seen by comparing the maps in Figure 1 and Figure 2A, the latter depicting the 4-tier Human Development Index (HDI) based on the United Nation's 2019 Human Development Report.



- The number of cancer cases and the age-standardised cancer rate (including non-melanoma skin cancer) is higher in more developed countries.
- There were an estimated 295.3 cases of cancer per 100,000 people in areas with very high human development, compared with 115.7 in areas with low human development in 2020.
- There are also more deaths from cancer in more developed areas. There were an estimated 98.7 deaths from cancer per 100,000 people in areas with very high human development, compared with 82.7 in areas with low human development in 2020.
- ASR = age-standardised rates. These are a summary measure of the rate of disease that a population would have if it had a standard age structure. Standardisation is necessary when comparing populations that differ with respect to age because age has a powerful influence on the risk of dying from cancer.

Estimated cancer incidence, all cancers, both sexes

Population	Number	ASR/100,000
Very high HDI	8,934,818	295.3
High HDI	7,371,321	190.5
Medium HDI	2,326,749	108.5
Low HDI	650,423	115.7

Estimated cancer mortality, all cancers, both

Population	Number	ASR/100,000
Very high HDI	3,478,767	98.7
High HDI	4,521,833	113.7
Medium HDI	1,513,219	71.5
Low HDI	439,852	82.7

Global cancer data by country

- Globally, 18,094,716 million cases of cancer were diagnosed in 2020.
- The age-standardised rate for all cancers (excluding non-melanoma skin cancer) for men and women combined was 190 per 100,000 in 2020.
- The rate was higher for men (206.9 per 100,000) than women (178.1 per 100,000).

Global cancer incidence: both sexes

- The highest cancer rate for men and women combined was in Denmark at 334.9 people per 100,000.
- The age-standardised rate was at least 300 per 100,000 for 10 countries: Denmark, Ireland, Belgium, Hungary, France, The Netherlands, Australia, Norway, France (New Caledonia) and Slovenia.

Both sexes	Number	ASR/100,000
World	18,094,716	190.0
Denmark	39,996	334.9
Ireland	27,067	326.6
Belgium	74,162	322.8
Hungary	62,399	321.6
France	422,828	320.1
The Netherlands	114,601	315.1
Australia	141,182	312.3
Norway	32,655	312.3
France, New Caledonia	1,147	306.4
Slovenia	13,572	300.2
US	1,756,921	297.3
UK	409,228	296.1
Latvia	12,051	296.1
New Zealand	25,663	295.3
Serbia	47,342	291.6
Slovakia	29,480	290.4
Lithuania	16,561	287.5
Canada	212,719	287.4
Croatia	25,001	284.1
Japan	1,017,282	282.9
Germany	538,140	281.9
Czechia	63,365	281.2

Both sexes	Number	ASR/100,000
Estonia	7,706	274.2
Sweden	56,889	271.0
Switzerland	47,711	268.2
Spain	260,455	264.6
Luxembourg	2,957	264.6
Finland	33,607	260.9
Montenegro	2,806	260.6
Poland	196,440	260.4
Greece	62,577	260.4
Uruguay	14,845	257.8
Romania	95,276	255.9
Portugal	57,742	255.0
Iceland	1,577	252.0
France, Guadeloupe	2,043	249.6
Cyprus	4,989	248.0
Belarus	40,531	246.9
Austria	44,294	241.6
French Polynesia	861	240.4
South Korea	226,918	239.9
France, Martinique	2,069	239.6
Israel	28,499	239.4
Bulgaria	34,741	238.5

Cancer incidence in men

- The highest cancer rate was found in Hungary at 371 men per 100,000.
- The age-standardised rate was at least 350 per 100,000 in 8 countries: Hungary, Latvia, France, Lithuania, Slovakia, Slovenia, Estonia and Ireland.

Men	Number	ASR/ 100,000
World	9,342,957	206.9
Hungary	31,496	371.0
Latvia	6,085	370.4
France	233,162	366.5
Lithuania	8,408	356.4
Slovakia	15,971	354.7
Slovenia	7,698	354.3
Estonia	4,074	350.2
Ireland	14,378	350.1
Denmark	20,729	345.9
Belgium	39,496	344.7
France, New Caledonia	620	344.2
France, Guadeloupe	1,288	338.1
Norway	17,693	335.9
Croatia	13,499	334.8
The Netherlands	61,755	332.8
Australia	74,700	330.6
Czechia	34,398	325.4
Japan	592,752	325.1
Belarus	21,257	316.4

Cancer incidence in women

- The highest cancer rate in women was in Denmark at 328.3 women per 100,000.
- The age-standardised rate was at least 300 per 100,000 in 4 countries: Denmark, Belgium, Ireland and the Netherlands.

Women	Number	ASR/100,000
World	8,751,759	178.1
Denmark	19,267	328.3
Belgium	34,666	308.8
Ireland	12,689	306.4
The Netherlands	52,846	302.1
Australia	66,482	297.1
Norway	14,962	293.8
Hungary	30,903	292.6
US	866,471	290.4
UK	195,578	286.3
France	189,666	283.0
Canada	102,899	280.0
New Zealand	12,229	279.5
Serbia	22,907	277.2

Global cancer mortality: both sexes

- The highest rate of cancer deaths for men and women combined was in Mongolia at 175.9 people per 100,000.
- The age-standardised rate was at least 140 per 100,000 for 5 countries: Mongolia, Serbia, Hungary, Montenegro and Slovakia.

	Number	ASR/100,000
World	9,894,402	100.1
Mongolia	4,465	175.9
Serbia	27,820	150.6
Hungary	32,637	148.1
Montenegro	1,752	144.5
Slovakia	16,192	140.7
Samoa	218	139.8
Zimbabwe	10,517	137.1
Poland	118,309	136.8
Croatia	14,216	132.7
French Polynesia	479	131.7
Romania	53,974	130.9
China	2,992,600	129.0
Moldova	8,289	127.8
Bosnia and Herzegovina	9,142	127.3

Cancer mortality in women

- The highest rate of death from cancer in women was in Zimbabwe at 142.9 women per 100,000.

- The age-standardised rate was at least 120 per 100,000 in 6 countries: Zimbabwe, Mongolia, Samoa, Malawi, Serbia and Papua New Guinea.

Women	Number	ASR/100,000
World	4,403,188	83.7
Zimbabwe	6,628	142.9
Mongolia	1,940	138.5
Samoa	107	130.6
Malawi	7,689	128.6
Serbia	12,168	122.8
Papua New Guinea	3,688	121.5
Mali	6,234	119.2
Barbados	369	118.0
Hungary	15,365	117.6
Fiji	513	116.1
Uganda	12,893	113.6
Montenegro	727	113.2

Reducing the burden

- Between 30 and 50% of cancers can currently be prevented by avoiding risk factors and implementing existing evidence-based prevention strategies.
- The cancer burden can also be reduced through early detection of cancer and appropriate treatment and care of patients who develop cancer. Many cancers have a high chance of cure if diagnosed early and treated appropriately.

Prevention

- Cancer risk can be reduced by:
- not using tobacco;
- maintaining a healthy body weight;
- eating a healthy diet, including fruit and vegetables;
- doing physical activity on a regular basis;
- avoiding or reducing consumption of alcohol;
- getting vaccinated against HPV and hepatitis B if you belong to a group for which vaccination is recommended;
- avoiding ultraviolet radiation exposure (which primarily results from exposure to the sun and artificial tanning devices) and/or using sun protection measures;
- ensuring safe and appropriate use of radiation in health care (for diagnostic and therapeutic purposes);
- minimizing occupational exposure to ionizing radiation; and
- reducing exposure to outdoor air pollution and indoor air pollution, including radon (a radioactive gas produced from the natural decay of uranium, which can accumulate in buildings — homes, schools and workplaces).

Early detection

- Cancer mortality is reduced when cases are detected and treated early. There are two components of early detection: ***early diagnosis and screening.***

Early diagnosis

- When identified early, cancer is more likely to respond to treatment and can result in a greater probability of survival with less morbidity, as well as less expensive treatment. Significant improvements can be made in the lives of cancer patients by detecting cancer early and avoiding delays in care.

Early diagnosis consists of three components:

- being aware of the symptoms of different forms of cancer and of the importance of seeking medical advice when abnormal findings are observed;
- access to clinical evaluation and diagnostic services; and
- timely referral to treatment services.
- Early diagnosis of symptomatic cancers is relevant in all settings and the majority of cancers. Cancer programmes should be designed to reduce delays in, and barriers to, diagnosis, treatment and supportive care.

Screening

- Screening aims to identify individuals with findings suggestive of a specific cancer or pre-cancer before they have developed symptoms. When abnormalities are identified during screening, further tests to establish a definitive diagnosis should follow, as should referral for treatment if cancer is proven to be present.
- Screening programmes are effective for some but not all cancer types and in general are far more complex and resource-intensive than early diagnosis as they require special equipment and dedicated personnel. Even when screening programmes are established, early diagnosis programmes are still necessary to identify those cancer cases occurring in people who do not meet the age or risk factor criteria for screening.
- Patient selection for screening programmes is based on age and risk factors to avoid excessive false positive studies. Examples of screening methods are:
  - HPV test (including HPV DNA and mRNA test), as preferred modality for cervical cancer screening; and
  - mammography screening for breast cancer for women aged 50–69 residing in settings with strong or relatively strong health systems.
- Quality assurance is required for both screening and early diagnosis programmes.

Treatment

- A correct cancer diagnosis is essential for appropriate and effective treatment because every cancer type requires a specific treatment regimen. Treatment usually includes surgery, radiotherapy, and/or systemic therapy (chemotherapy, hormonal treatments, targeted biological therapies). Proper selection of a treatment regimen takes into consideration both the cancer and the individual being treated. Completion of the treatment protocol in a defined period of time is important to achieve the predicted therapeutic result.
- Determining the goals of treatment is an important first step. The primary goal is generally to cure cancer or to considerably prolong life. Improving the patient's quality of life is also an important goal. This can be achieved by support for the patient's physical, psychosocial and spiritual well-being and palliative care in terminal stages of cancer.
- Some of the most common cancer types, such as breast cancer, cervical cancer, oral cancer, and colorectal cancer, have high cure probabilities when detected early and treated according to best practices.
- Some cancer types, such as testicular seminoma and different types of leukaemia and lymphoma in children, also have high cure rates if appropriate treatment is provided, even when cancerous cells are present in other areas of the body.
- There is, however, a significant variation in treatment availability between countries of different income levels; comprehensive treatment is reportedly available in more than 90% of high-income countries but less than 15% of low-income countries

Palliative care

- Palliative care is treatment to relieve, rather than cure, symptoms and suffering caused by cancer and to improve the quality of life of patients and their families. Palliative care can help people live more comfortably. It is particularly needed in places with a high proportion of patients in advanced stages of cancer where there is little chance of cure.
- Relief from physical, psychosocial, and spiritual problems through palliative care is possible for more than 90% of patients with advanced stages of cancer.
- Effective public health strategies, comprising community- and home-based care, are essential to provide pain relief and palliative care for patients and their families.
- Improved access to oral morphine is strongly recommended for the treatment of moderate to severe cancer pain, suffered by over 80% of people with cancer in the terminal phase.

- With the burden growing in almost every country, preventing cancer is a significant public health challenge. Around 40% of cancer cases could be prevented by tackling risk factors relating to diet, nutrition and physical activity

- With this growing global burden, prevention of cancer is one of the most significant public health challenges of the 21st century. Our Cancer Prevention Recommendations work together as an overall way of living healthily to prevent cancer through changing dietary patterns, reducing alcohol consumption, increasing physical activity, and achieving and maintaining a healthy body weight.

- As well as action by individuals, achieving healthy patterns of diet and sustained physical activity over the life course requires concerted and integrated action from all sectors of society, including civil society, private sector, and health and other professions.

- The Assembly of the World Health Organization adopted at its 58th session in Geneva in 2005 the Resolution on the prevention and control of cancer (WHA 58.22 Cancer prevention and control).

- The resolution indicates the need to develop and implement comprehensive national programs for the prevention and control of malignant diseases.

National politics

In Serbia, several acts have been adopted in terms of society's involvement in the prevention and early detection of cancer:

2005 Law on Health Care,

2008. Strategy for the prevention and control of chronic non-communicable diseases,

2009. National program to fight cancer

National breast cancer early detection program
National Colorectal Cancer Early Detection Program
National program of Serbia against cancer
National Colorectal Cancer Prevention Program
National Breast Cancer Prevention Program
National Cervical Cancer Prevention Program

World Health Organization

TOGETHER LET'S BEAT CANCERS

#beatNCDs

Smanjite rizik od raka

Prestanite da pušite.

Neka Vaš dom bude bez dima.

Budite fizički aktivni.

Hranite se zdravo i raznovrsno.

Smanjite unos alkoholnih pića.

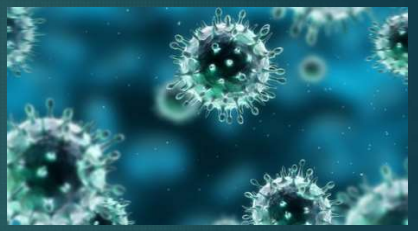
Izbegavajte neumereno izlaganje suncu i koristite zaštitne kreme.

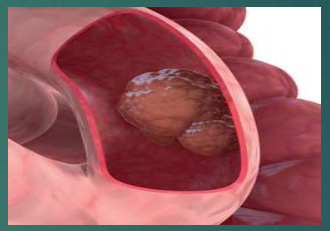
Dojenjem smanjite rizik od raka.

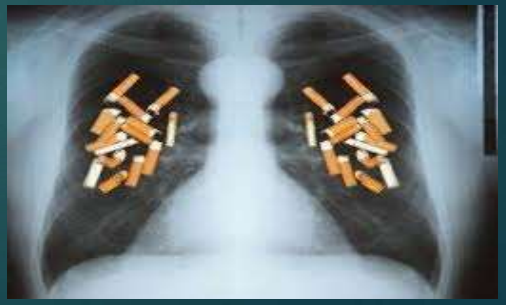
Smanjite zagađenje vazduha na otvorenom i u zatvorenom prostoru.

Vakcinišite decu protiv hepatitisa B i HPV.

Odazovite se na preglede u okviru programa za rano otkrivanje raka.







THANK YOU!