

FUTURE CANCER CRISIS: CAUSES, HEALTH CHALLENGES, PREVENTION AND CONTROL STRATEGIES

Shoba S.^{*1}, Rukshana I.², Jeeva K.², Jalakandeswari K.², Uvasri D.², Hemashri M.²

¹*Professor and Head, Department of Pharmacology, Adhiparasakthi College of Pharmacy, Melmaruvathur.

²UG Scholar, Adhiparasakthi College of Pharmacy, Melmaruvathur-603319.

Article Info:

Received: 18 July 2026,

Revised: 08 August 2026,

Accepted: 28 August 2026

***Corresponding Author: Shoba S.**

Professor and Head, Department of Pharmacology, Adhiparasakthi College of Pharmacy, Melmaruvathur.

DOI: <https://doi.org/10.5281/zenodo.22211708>



Citation:

Shoba S.^{*1}, Rukshana I.², Jeeva K.², Jalakandeswari K.², Uvasri D.², Hemashri M.² (2026). Future Cancer Crisis: Causes, Health Challenges, Prevention And Control Strategies. International Journal of Clinical and Pharmaceutical Innovations, 1(6), 94-100.

ABSTRACT

Cancer is expected to become an increasingly significant global health challenge, raising concerns about how future cancer burden can be prevented and effectively controlled. Population aging, rapid urbanization, unhealthy lifestyles, environmental pollution, and persistent exposure to carcinogenic agents are major factors contributing to the anticipated increase in cancer incidence and mortality. The growing cancer burden places substantial physical, psychological, social, and economic pressures on individuals, families, and healthcare systems, while disparities in access to early diagnosis, advanced treatment, and palliative care further intensify these challenges, particularly in low- and middle-income countries. This review examines the major determinants of the future cancer crisis, including genetic susceptibility, tobacco and alcohol consumption, obesity, unhealthy dietary patterns, physical inactivity, infections, occupational hazards, and environmental exposures. It further highlights evidence-based strategies for cancer prevention and control, including lifestyle modification, vaccination against oncogenic infections, population-based screening, early detection, precision medicine, equitable access to quality treatment, cancer surveillance, public awareness, and strengthened national cancer control programs. Overall, the evidence indicates that reducing the future cancer burden requires a comprehensive and multidisciplinary approach involving governments, healthcare professionals, researchers, and communities. Strengthening prevention, promoting early diagnosis, ensuring equitable access to effective treatment, and integrating cancer care and surveillance will be essential to achieving sustainable reductions in cancer incidence and mortality worldwide.

KEYWORDS: Cancer, Future Cancer Crisis, Cancer Prevention, Early Detection, Cancer control.

INTRODUCTION

Cancer is a major global health challenge caused by genetic and epigenetic alterations leading to uncontrolled cell growth, invasion, and metastasis.^[1] The global cancer burden is projected to rise due to population aging, lifestyle changes, environmental exposures, and increasing prevalence of risk factors.^[2] Future cancer

control faces challenges including healthcare inequalities, rising treatment costs, late diagnosis, and treatment.^[3] Integrated strategies involving prevention, early detection, precision medicine, and equitable care are essential to reduce the future cancer crisis.^[4]

GLOBAL BURDEN OF CANCER

Cancer is one of the leading causes of death worldwide, accounting for nearly 10 million deaths in 2020, representing almost one in six deaths globally.^[5] In 2022, an estimated 20 million new cancer cases and 9.7 million cancer-related deaths occurred worldwide, demonstrating the increasing global impact of cancer. The global cancer burden is expected to increase substantially, with approximately 35 million new cancer cases projected annually by 2050 due to population growth, aging, and changes in risk factors.^[2] Low- and middle-income countries experience a disproportionate share of cancer

deaths because of limited access to early detection, diagnosis, treatment, and supportive care services.^[5] The most commonly diagnosed cancers worldwide include breast cancer, lung cancer, colorectal cancer, prostate cancer, and stomach cancer. Lung cancer remains the leading cause of cancer death globally, responsible for the highest number of cancer-related deaths each year.^[6] One-third of cancer cases can be prevented through reducing exposure to risk factors such as tobacco use, alcohol consumption, unhealthy diet, obesity, and infections.^[5]

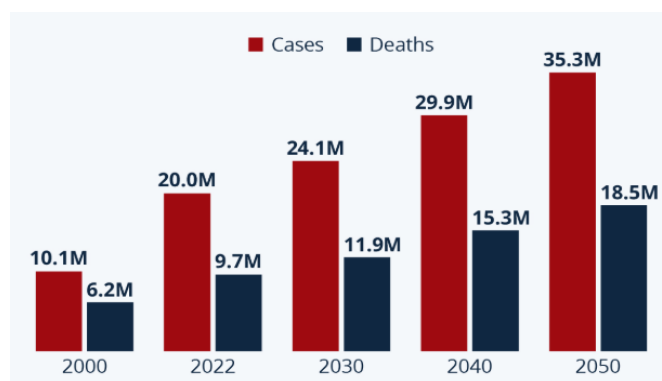


Figure 1: Estimated number of new cancer cases and death worldwide per year.^[6]

DEMOGRAPHIC AND LIFESTYLE FACTORS CONTRIBUTING TO FUTURE CANCER CRISIS

- Increasing life expectancy and growth of the elderly population are major contributors to rising cancer incidence because cancer risk increases with age due to accumulated genetic mutations and cellular damage.^[7]
- The global increase in the population aged 65 years and above is expected to significantly contribute to future cancer cases and mortality worldwide.^[8]
- Urbanization and sedentary lifestyle: Rapid urbanization has promoted physical inactivity, unhealthy dietary patterns, and increased exposure to environmental risk factors, contributing to higher cancer risk.^[9]

- Sedentary behaviour and reduced physical activity are associated with increased risks of several cancers, including breast, colorectal, and endometrial cancers.^[10]
- Obesity and metabolic disorders: Rising rates of obesity and metabolic syndrome are important drivers of cancer development through chronic inflammation, hormonal imbalance, and insulin resistance.^[11]
- Obesity is linked with increased risk of multiple cancers, including colorectal, breast (postmenopausal), kidney, liver, and pancreatic cancers.^[12]
- The increasing prevalence of obesity, unhealthy diet, and metabolic disorders worldwide may accelerate the future global cancer burden if preventive measures are not implemented.^[13]

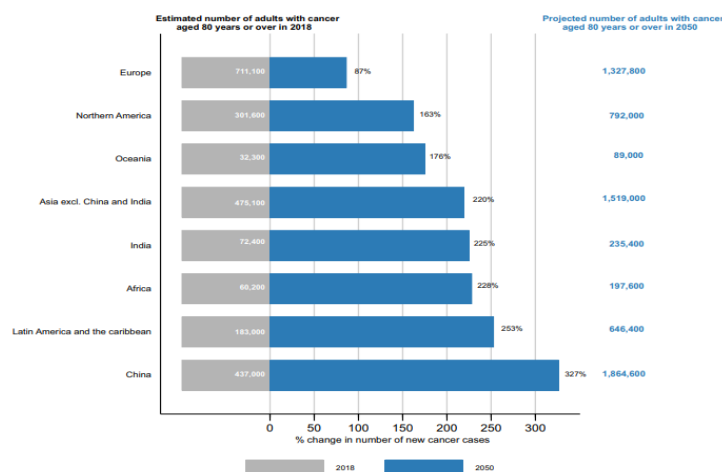


Figure 2: Percentage change in the number of new cancer cases among adults aged 80 years or older by 2050 by world region plus China.^[14]

MAJOR CANCER BURDEN IN FUTURE

Breast Cancer

Breast cancer is the most frequently diagnosed cancer worldwide, accounting for a major proportion of global cancer incidence. Its increasing incidence is associated with population aging, obesity, alcohol consumption, delayed childbearing, hormonal factors, and changes in reproductive patterns.^[13]

The future breast cancer burden is expected to increase due to demographic changes and continued exposure to lifestyle-related risk factors.^[15]

Lung Cancer

Lung cancer remains one of the leading causes of cancer-related mortality worldwide. Tobacco smoking continues to be the major risk factor, while air pollution, occupational exposure, and increasing incidence among never-smokers contribute to future disease burden.^[16]

The global lung cancer burden is expected to remain high due to persistent tobacco exposure and increasing environmental pollution.^[17]

Colorectal Cancer

Colorectal cancer incidence is increasing globally, particularly among younger adults, due to rising obesity rates, sedentary lifestyle, unhealthy diet, alcohol consumption, and metabolic abnormalities.^[18]

Early-onset colorectal cancer has emerged as a significant public health concern, requiring improved prevention and early detection strategies.^[19]

Prostate Cancer

Prostate cancer incidence is expected to increase with global population aging and improved detection

practices. Older age remains the strongest risk factor for prostate cancer development.^[20]

The future prostate cancer burden will be influenced by increasing life expectancy and growth of the elderly male population worldwide.^[21]

Liver Cancer

Liver cancer incidence continues to rise in several regions due to chronic hepatitis B and hepatitis C infection, alcohol consumption, obesity, diabetes, and metabolic dysfunction-associated liver disease.^[22]

The increasing prevalence of metabolic syndrome and fatty liver disease is expected to contribute significantly to future liver cancer cases.^[23]

Pancreatic Cancer

Pancreatic cancer incidence and mortality are projected to increase globally due to aging, smoking, obesity, diabetes, chronic pancreatitis, and genetic susceptibility.^[24]

The poor survival rate of pancreatic cancer is mainly due to late diagnosis, aggressive tumour biology, and limited effective treatment options.^[25]

Endometrial Cancer

Endometrial cancer incidence is increasing worldwide, mainly driven by obesity, diabetes, metabolic syndrome, and hormonal disturbances.^[26] Obesity is considered one of the strongest modifiable risk factors contributing to the rising incidence of endometrial cancer.^[12]

Kidney Cancer

Kidney cancer incidence has increased in many countries due to obesity, hypertension, smoking, and improved diagnostic imaging practices.^[27]

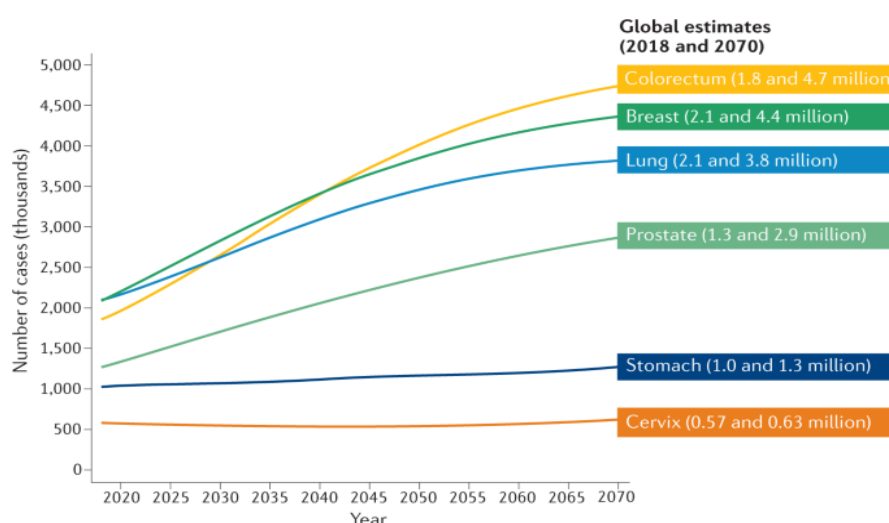


Figure 3: Projected global incidence of the six most common cancers from 2018 to 2070, showing increasing trends in annual new cases. Colorectal cancer is expected to become the most common by 2070 (4.7 million cases), followed by breast, lung, prostate, stomach, and cervical cancers.^[4]

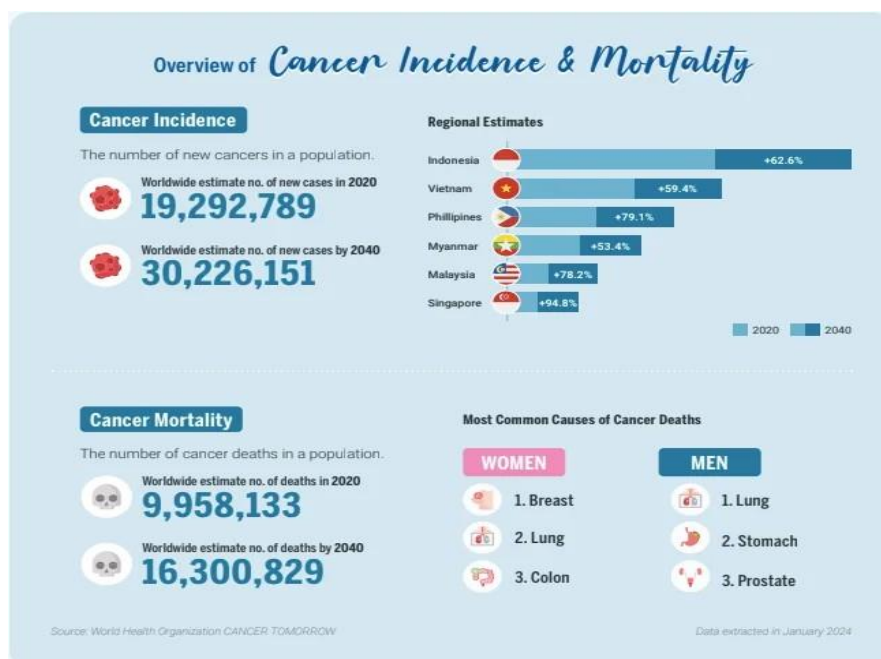


Figure 4: Global cancer incidence and mortality trends, showing projected increases in cases and deaths (2020–2040), regional variations, and major cancer causes by sex.^[2]

MAJOR CAUSES AND RISK FACTORS ASSOCIATED WITH CANCER DEVELOPMENT

➤ Age

Age is the strongest non-modifiable risk factor for cancer. The risk of cancer increases with advancing age due to the gradual accumulation of DNA mutations, genomic instability, reduced DNA repair capacity, cellular senescence, and decline in immune surveillance. The majority of cancers occur in older adults, making population aging a major contributor to the future global cancer burden.^[14]

➤ Genetics and Family History

Inherited genetic mutations and family history contribute significantly to cancer susceptibility. Germline mutations in genes such as BRCA1, BRCA2, TP53, APC, and mismatch repair genes increase the risk of breast, ovarian, colorectal, and other cancers. Although hereditary cancers represent a minority of total cancer cases, genetic predisposition plays an important role in high-risk populations.^[28]

➤ Sex

Sex influences cancer risk due to differences in hormonal regulation, anatomy, genetic factors, and exposure patterns. Certain cancers are sex-specific, such as prostate cancer in males and ovarian cancer in females, while cancers such as breast, liver, and colorectal cancers show differences in incidence and outcomes.^[13]

➤ Tobacco Use

Tobacco use is the leading preventable cause of cancer worldwide. Tobacco smoke contains numerous carcinogenic compounds that induce DNA damage, mutations, and malignant transformation. Smoking is

strongly associated with lung, oral cavity, stomach, pancreatic, kidney, bladder, and cervical cancers.^[29]

➤ Alcohol Consumption

Alcohol consumption increases cancer risk through acetaldehyde formation, oxidative stress, inflammation, and hormonal changes. Alcohol intake is associated with cancers of the breast, liver, colorectum, oral cavity, pharynx, and larynx.^[30]

➤ Unhealthy Diet

Poor dietary patterns, including high consumption of processed meat, red meat, refined carbohydrates, and low intake of fruits, vegetables, and dietary fibers, contribute to cancer development. Diet-related factors influence cancer risk through inflammation, oxidative stress, obesity, and metabolic alterations.^[31]

➤ Physical Inactivity

Physical inactivity increases cancer risk by promoting obesity, insulin resistance, chronic inflammation, and hormonal imbalance. Regular physical activity has been associated with reduced risks of colorectal, breast, and endometrial cancers.^[10]

➤ Obesity

Obesity is an established risk factor for multiple cancers. Excess adipose tissue promotes chronic inflammation, insulin resistance, metabolic dysfunction, contributing to colorectal, breast, endometrial, pancreatic, liver, and kidney cancers.^[12]

➤ Environmental Pollution

Exposure to air pollution, particulate matter, heavy metals, pesticides, and industrial chemicals contributes to

cancer development through oxidative stress, inflammation, and DNA damage. Air pollution is particularly associated with lung cancer risk.^[32]

➤ Occupational Carcinogens

Occupational exposure to carcinogenic substances such as asbestos, benzene, silica, and diesel exhaust increases the risk of cancers including lung cancer, mesothelioma and bladder cancer. Workplace exposure remains an important preventable cause of cancer.^[33]

➤ Infectious Agents (HPV, HBV, HCV, Helicobacter pylori, EBV)

Several infectious agents contribute significantly to global cancer burden. HPV causes cervical and other anogenital cancers; HBV and HCV contribute to liver cancer; Helicobacter pylori is associated with gastric cancer; and EBV contributes to nasopharyngeal carcinoma and lymphomas. These infections promote cancer through chronic inflammation, immune dysregulation, and genetic alterations.^[34]

HEALTH CHALLENGES ASSOCIATED WITH THE RISING BURDEN OF CANCER

➤ Increasing Cancer Incidence and Healthcare Burden

The continuous rise in cancer cases due to population aging, population growth, and lifestyle changes will place significant pressure on healthcare systems worldwide. Increasing numbers of patients will require cancer screening, diagnosis, treatment, rehabilitation, and long-term follow-up care, particularly in low- and middle-income countries where healthcare infrastructure is limited.^[2]

➤ Limited Access to Early Detection and Screening

Early diagnosis and population-based screening significantly improve cancer survival; however, many low- and middle-income countries face challenges such as limited screening programs, inadequate diagnostic facilities, and shortage of trained healthcare professionals. Delayed diagnosis often results in advanced-stage disease and reduced treatment success.^[35]

➤ Rising Treatment Costs and Economic Burden

The increasing use of advanced cancer therapies, including immunotherapy, targeted therapy, precision medicine, and molecular diagnostics, has improved outcomes but has also increased treatment costs. The growing financial burden affects healthcare systems, patients, and families, especially in countries with limited health insurance coverage.^[36]

➤ Shortage of Oncology Workforce and Healthcare Infrastructure

The future increase in cancer patients will require more oncologists, nurses, radiologists, pathologists, and supportive healthcare workers. Many regions already experience shortages of trained cancer specialists and

inadequate diagnostic and treatment facilities, limiting their ability to provide effective cancer care.^[37]

➤ Cancer Survivorship and Long-Term Care Challenges

Advances in treatment have increased the number of cancer survivors; however, survivors may experience long-term complications, treatment-related toxicity, secondary cancers, and psychosocial difficulties. Healthcare systems must develop comprehensive survivorship programs to address these needs.^[38]

PREVENTION AND CONTROL STRATEGIES FOR THE FUTURE CANCER CRISIS

➤ PRIMARY PREVENTION

Lifestyle modification, including tobacco cessation, healthy diet, regular physical activity, weight management, and reduced alcohol consumption, remains the most effective strategy for lowering future cancer incidence.^[4]

➤ VACCINATION

Widespread HPV and HBV vaccination can substantially reduce the incidence of cervical, liver, and other infection-related cancers.^[39]

➤ EARLY DETECTION AND SCREENING

Population-based screening for breast, cervical, colorectal, and lung cancers enables earlier diagnosis and improves survival outcomes.^[40]

➤ PRECISION PREVENTION

Integrating genetic profiling, biomarkers, and individual risk assessment supports personalized cancer prevention and early intervention.^[41]

➤ ARTIFICIAL INTELLIGENCE AND DIGITAL HEALTH

Artificial intelligence and liquid biopsy technologies can enhance early cancer detection, diagnostic accuracy, and clinical decision-making.^[40]

➤ EQUITABLE CANCER CARE

Improving access to prevention, diagnosis, treatment, and survivorship services is essential to reduce disparities in cancer outcomes.^[3]

➤ **RESEARCH AND INNOVATION:** Continued investment in cancer research, precision oncology, immunotherapy, and novel therapeutics is essential to address the future cancer burden.^[1]

➤ NATIONAL CANCER CONTROL PROGRAMS

Integrated national cancer control programs that emphasize prevention, screening, treatment, palliative care, and surveillance are critical for reducing future cancer burden.^[4]

CONCLUSION

The global cancer burden is projected to increase substantially in the coming decades, with new cancer cases expected to rise due to population growth, aging, and changing patterns of exposure to cancer risk factors. The increasing prevalence of tobacco use, obesity, unhealthy diet, alcohol consumption, physical inactivity, and environmental exposures will continue to contribute significantly to future cancer incidence. The growing cancer burden will create major health challenges, including increased healthcare costs, demand for oncology services, treatment accessibility issues, and disparities in cancer outcomes. Prevention strategies, including tobacco control, vaccination, lifestyle modification, and reduction of environmental risk factors, have the potential to prevent a substantial proportion of future cancers.

Emerging technologies, including artificial intelligence, liquid biopsy, genomic profiling, and precision oncology, are expected to transform future cancer prevention, diagnosis, targeted therapies, and personalized treatment approaches provide promising opportunities to improve survival and quality of life for cancer patients. Reducing future cancer inequalities requires equitable access to prevention, screening, diagnosis, treatment, and survivorship care, particularly in low- and middle-income countries. A coordinated global approach integrating prevention, innovation, research investment, and sustainable healthcare policies is essential to mitigate the future cancer crisis.^[2]

REFERENCES

1. Hanahan D. Hallmarks of cancer: new dimensions. *Cancer Discovery*, 2022; 12(1): 31-46. doi:10.1158/2159-8290.CD-21-1059.
2. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.*, 2024; 74(3): 229-263. doi:10.3322/caac.21834.
3. Jaffee EM, Dang CV, Agus DB, Alexander BM, Anderson KC, Ashworth A, et al. Future cancer research priorities in the USA: a Lancet Oncology Commission. *Lancet Oncol*, 2017; 18(11): e653-e706. doi:10.1016/S1470-2045(17)30698-8.
4. Vaccarella S, Georges D, Bray F, et al. Planning for tomorrow: global cancer incidence and the role of prevention 2020-2070. *Nat Rev Clin Oncol.*, 2021; 18(10): 663-672.
5. World Health Organization. Cancer [Internet]. Geneva: World Health Organization; 2022 [cited 2026 Aug 20]. Available from: <https://www.who.int/news-room/facts-in-pictures/detail/cancer>
6. Richter F. The global cancer burden keeps growing [Infographic] [Internet]. Statista; 2025 Feb 4 [cited 2026 Aug 20]. Available from: <https://www.statista.com/chart/20706/new-cancer-cases-per-year/>
7. White MC, Holman DM, Boehm JE, Peipins LA, Grossman M, Henley SJ. Age and cancer risk: a potentially modifiable relationship. *Am J Prev Med.*, 2014; 46(3 Suppl 1): S7-S15.
8. International Agency for Research on Cancer. Global cancer burden growing, amidst mounting need for services [Internet]. Lyon: International Agency for Research on Cancer; 2024 [cited 2026 Aug 20]. Available from: <https://www.iarc.who.int/news-events/global-cancer-burden-growing-amidst-mounting-need-for-services/>
9. Wild CP, Weiderpass E, Stewart BW, editors. World cancer report: cancer research for cancer prevention. Lyon: International Agency for Research on Cancer; 2020.
10. Moore SC, Lee IM, Weiderpass E, Campbell PT, Sampson JN, Kitahara CM, et al. Association of leisure-time physical activity with risk of 26 types of cancer in 1.44 million adults. *JAMA Intern Med.*, 2016; 176(6): 816-825.
11. Khandekar MJ, Cohen P, Spiegelman BM. Molecular mechanisms of cancer development in obesity. *Nat Rev Cancer*, 2011; 11(12): 886-895.
12. Lauby-Secretan B, Scoccianti C, Loomis D, Grosse Y, Bianchini F, Straif K. Body fatness and cancer—viewpoint of the IARC Working Group. *N Engl J Med.*, 2016; 375(8): 794-798.
13. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.*, 2021; 71(3): 209-249.
14. Pilleron S, Sarfati D, Janssen-Heijnen MLG, Vignat J, Ferlay J, Bray F, et al. Estimated global cancer incidence in the oldest adults in 2018 and projections to 2050. *Int J Cancer*, 2021; 148(3): 601-608.
15. Arnold M, Morgan E, Rumgay H, Mafra A, Singh D, Laversanne M, et al. Current and future burden of breast cancer: global statistics for 2020 and 2040. *Breast*, 2022; 66: 15-23. doi:10.1016/j.breast.2022.08.010.
16. Bade BC, Dela Cruz CS. Lung cancer 2020: epidemiology, etiology, and prevention. *Clin Chest Med.*, 2020; 41(1): 1-24.
17. 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.
18. Siegel RL, Wagle NS, Cercek A, Smith RA, Jemal A. Colorectal cancer statistics, 2023. *CA Cancer J Clin.*, 2023; 73(3): 233-254.
19. Patel SG, Karlitz JJ, Yen T, Lieu CH, Boland CR. The rising tide of early-onset colorectal cancer: a comprehensive review. *Cancer*, 2022; 128(8): 1687-1700.

20. Rawla P. Epidemiology of prostate cancer. *World J Oncol*, 2019; 10(2): 63-89.
21. Culp MB, Soerjomataram I, Efstathiou JA, Bray F, Jemal A. Recent global patterns in prostate cancer incidence and mortality rates. *Eur Urol.*, 2020; 77(1): 38-52.
22. Rungay H, Ferlay J, de Martel C, et al. Global burden of primary liver cancer in 2020 attributable to risk factors. *J Hepatol*, 2022; 77(4): 1044-1060.
23. Anstee QM, Reeves HL, Kotsiliti E, Govaere O, Heikenwalder M. From NASH to HCC: current concepts and future challenges. *Nat Rev Gastroenterol Hepatol*, 2019; 16: 411-428.
24. Mizrahi JD, Surana R, Valle JW, Shroff RT. Pancreatic cancer. *Lancet*, 2020; 395(10242): 2008-2020.
25. Kleeff J, Korc M, Apte M, et al. Pancreatic cancer. *Nat Rev Dis Primers*, 2016; 2: 16022.
26. Crosbie EJ, Kitson SJ, McAlpine JN, et al. Endometrial cancer. *Lancet*, 2022; 399(10333): 1412-1428.
27. Padala SA, Barsouk A, Thandra KC, et al. Epidemiology of renal cell carcinoma. *World J Oncol*, 2020; 11(3): 79-87.
28. Vogelstein B, Papadopoulos N, Velculescu VE, Zhou S, Diaz LA Jr, Kinzler KW. Cancer genome landscapes. *Science*, 2013; 339(6127): 1546-1558.
29. World Health Organization. Tobacco [Internet]. Geneva: World Health Organization; 2024 [cited 2026 Aug 20]. Available from: <https://www.who.int/health-topics/tobacco>
30. Rungay H, Murphy N, Ferrari P, Soerjomataram I. Alcohol and cancer: epidemiological and biological perspectives. *Lancet Oncol*, 2021; 22(8): 1071-1080.
31. World Cancer Research Fund, American Institute for Cancer Research. Diet, nutrition, physical activity and cancer: a global perspective. London: World Cancer Research Fund International, 2018.
32. International Agency for Research on Cancer. Outdoor air pollution. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Vol. 109. Lyon: International Agency for Research on Cancer, 2016.
33. International Agency for Research on Cancer. Chemical agents and related occupations. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Vol. 100F. Lyon: International Agency for Research on Cancer, 2012.
34. de Martel C, Georges D, Bray F, Ferlay J, Clifford GM. Global burden of cancer attributable to infections in 2018: a worldwide incidence analysis. *Lancet Glob Health*, 2020; 8(2): e180-e190.
35. World Health Organization. Guide to cancer early diagnosis. Geneva: World Health Organization, 2017.
36. Sullivan R, Peppercorn J, Sikora K, et al. Delivering affordable cancer care in high-income countries. *Lancet Oncol*, 2011; 12(10): 933-980.
37. Atun R, Jaffray DA, Barton MB, et al. Expanding global access to radiotherapy. *Lancet Oncol*, 2015; 16(10): 1153-1186.
38. Miller KD, Nogueira L, Mariotto AB, et al. Cancer treatment and survivorship statistics, 2019. *CA Cancer J Clin.*, 2019; 69(5): 363-385.
39. Plummer M, de Martel C, Vignat J, Ferlay J, Bray F, Franceschi S. Global burden of cancers attributable to infections in 2012: a synthetic analysis. *Lancet Glob Health*, 2016; 4(9): e609-e616. doi:10.1016/S2214-109X(16)30143-7.
40. Rubinstein WS, Patriotis C, Dickherber A, et al. Cancer screening with multicancer detection tests: a translational science review. *CA Cancer J Clin.*, 2024; 74(4): 368-382. doi:10.3322/caac.21850.
41. Loomans-Kropp HA, Umar A. Cancer prevention and screening: the next step in the era of precision medicine. *NPJ Precis Oncol*, 2019; 3: 3.