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Cancer Hazards in Colombia: Epidemiology, Environmental and Behavioural Risks, Infections, Occupational Exposures and Prevention

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Abstract

Cancer represents a major and increasingly complex public-health challenge in Colombia. The country's cancer profile combines malignancies associated with tobacco, alcohol, obesity and metabolic risk with cancers strongly influenced by infectious agents, occupational exposures, environmental conditions, socioeconomic inequalities and access to prevention and early diagnosis. GLOBOCAN 2022 estimated 117,620 new cancer cases and 56,719 cancer deaths in Colombia, with breast, prostate, colorectal, stomach and lung cancers accounting for a substantial proportion of incident disease (IARC, 2024). Colombia's cancer burden therefore cannot be explained by a single hazard. Instead, cancer risk emerges from interacting behavioural, infectious, environmental, occupational, genetic, demographic and health-system determinants. This narrative review examines the major cancer hazards relevant to Colombia, including tobacco smoking and second-hand smoke, alcohol consumption, excess body weight and physical inactivity, dietary patterns, human papillomavirus (HPV), Helicobacter pylori, hepatitis B and C viruses, occupational carcinogens, air pollution, ultraviolet radiation, environmental contamination, and social inequalities affecting exposure and access to prevention. Particular attention is given to cervical and gastric cancers, which retain important links to infectious exposures, and to breast, prostate, colorectal and lung cancers, which reflect combinations of age, lifestyle, tobacco exposure, metabolic risk and health-system factors. The review also considers Colombia's changing demographic structure, regional heterogeneity, urbanization and unequal distribution of health resources. Evidence indicates substantial opportunities for prevention through tobacco control, vaccination, infection control, healthy-weight strategies, occupational protection, reduction of hazardous environmental exposures, cancer screening and timely diagnosis. A coordinated national approach should integrate population prevention with risk-based interventions, strengthen surveillance and registries, reduce regional inequalities, and improve access to evidence-based screening and treatment. The article concludes that Colombia's cancer hazards are multidimensional and require an integrated prevention framework linking health policy, environmental regulation, occupational safety, primary care and cancer control.

Keywords: cancer hazards; Colombia; cancer prevention; risk factors; environmental exposure; occupational exposure; tobacco; HPV; Helicobacter pylori; obesity; air pollution; cancer epidemiology; screening

1. Introduction

Cancer is a heterogeneous group of diseases arising from accumulated genetic and epigenetic alterations that affect cellular growth, differentiation and survival. Although inherited susceptibility contributes to risk for some individuals, the majority of cancer burden is associated with a combination of age, infections, tobacco, alcohol, excess body weight, diet, physical inactivity, environmental exposures, occupational hazards and other modifiable or partly modifiable determinants (WHO, 2024; IARC, 2026). Cancer prevention therefore requires attention not only to clinical care but also to the social and environmental conditions in which people live and work.

Colombia illustrates the complexity of contemporary cancer epidemiology in Latin America. According to the International Agency for Research on Cancer (IARC), GLOBOCAN 2022 estimated 117,620 new cancer cases and 56,719 cancer deaths in the country. The age-standardized incidence rate was 177.6 per 100,000 population and the age-standardized mortality rate was 81.4 per 100,000. Breast cancer was the most frequently diagnosed cancer overall, followed by prostate, colorectal, stomach and lung cancers (IARC, 2024).

Colombia's national cancer-control agenda has increasingly emphasized prevention, early detection, treatment and surveillance. Recent Ministry of Health planning documents indicate that, although age-adjusted cancer mortality has shown a long-term decline, the absolute number of deaths has increased with population growth and ageing. The same planning evidence projects a substantial increase in new cases by 2040 and 2050 if demographic and epidemiological trends continue (Ministerio de Salud y Protección Social, 2026).

The term 'cancer hazard' is used in this review to refer broadly to an exposure, behaviour, biological agent, occupational condition or environmental circumstance that can increase the probability of cancer. The concept is deliberately wider than a single chemical hazard because cancer risk in Colombia is produced by multiple interacting pathways. The review therefore addresses hazards that are established or strongly supported by international evidence and that have particular relevance to the Colombian population.

The purpose of this manuscript is to synthesize the evidence on major cancer hazards in Colombia, describe the cancers with the greatest current burden, identify populations and settings in which exposure may be concentrated, and outline prevention priorities. The article is a narrative review based on secondary sources and does not report original human-subject research, interviews, surveys or clinical data.

2. Methodology

A narrative literature and policy review approach was used. Sources included the International Agency for Research on Cancer (IARC), the World Health Organization (WHO), the Colombian Ministry of Health and Social Protection, national cancer-control planning documents, and peer-reviewed scientific literature addressing cancer epidemiology, risk factors and prevention in Colombia and Latin America. Priority was given to official cancer statistics, authoritative hazard classifications and systematic or high-quality epidemiological evidence.

The review focused on: (1) the national cancer burden; (2) behavioural and metabolic hazards; (3) infectious carcinogens; (4) occupational and environmental exposures; (5) regional and socioeconomic inequalities; (6) screening and early detection; and (7) policy and prevention implications. GLOBOCAN 2022 is used as the principal internationally comparable cancer-burden dataset, while newer Colombian policy evidence is used to describe recent trends and planning projections. Because cancer statistics and policy documents are periodically updated, numerical estimates should be interpreted according to their stated year.

3. Cancer Burden in Colombia

The GLOBOCAN 2022 profile demonstrates a substantial cancer burden in Colombia. An estimated 117,620 new cases occurred in 2022, including 56,224 among males and 61,396 among females. There were an estimated 56,719 cancer deaths, with 27,816 in males and 28,903 in females (IARC, 2024). The cumulative risk of developing cancer before age 75 was estimated at 17.9% for both sexes, while the cumulative risk of dying from cancer before age 75 was 8.3%.

Table 1. Selected GLOBOCAN 2022 cancer indicators for Colombia

Indicator	Males	Females	Both sexes
New cancer cases	56,224	61,396	117,620
Cancer deaths	27,816	28,903	56,719
Age-standardized incidence rate	183.3/100,000	175.3/100,000	177.6/100,000
Age-standardized mortality rate	87.6/100,000	76.9/100,000	81.4/100,000
Cumulative risk of developing cancer before 75	18.9%	17.2%	17.9%
Cumulative risk of dying from cancer before 75	8.8%	7.9%	8.3%

The distribution by cancer site reveals a mixed epidemiological profile. Among men, prostate cancer was the leading cancer, followed by colorectal and stomach cancers. Among women, breast cancer was dominant, followed by colorectal and cervical cancers. For both sexes combined, breast, prostate, colorectal, stomach and lung cancers were the five most frequent cancers in 2022 (IARC, 2024).

Table 2. Leading incident cancers in Colombia, GLOBOCAN 2022

Population	Cancer	Estimated new cases	Share of cases
Males	Prostate	16,479	29.3%
Males	Colorectum	5,455	9.7%
Males	Stomach	5,437	9.7%
Females	Breast	17,018	27.7%
Females	Colorectum	5,708	9.3%
Females	Cervix uteri	4,570	7.4%
Both sexes	Breast	17,018	14.5%
Both sexes	Prostate	16,479	14.0%
Both sexes	Colorectum	11,163	9.5%
Both sexes	Stomach	8,938	7.6%
Both sexes	Lung	7,196	6.1%

The national profile also demonstrates why cancer prevention should not focus exclusively on one risk factor. Lung cancer is strongly linked to tobacco and other inhalational exposures; cervical cancer is primarily driven by persistent oncogenic HPV infection; gastric cancer is strongly associated with H. pylori and dietary and environmental factors; colorectal cancer is associated with age, obesity, diet, physical inactivity, alcohol and

other determinants; and breast and prostate cancers are influenced by age, reproductive, hormonal, genetic and metabolic factors. These pathways overlap within populations and individuals.

4. Major Behavioural and Metabolic Cancer Hazards

4.1 Tobacco Use

Tobacco remains one of the most important preventable causes of cancer globally and is relevant to Colombia because smoking contributes to lung cancer as well as cancers of the upper aerodigestive tract, pancreas, bladder, kidney and several other sites (IARC, 2012; WHO, 2024). Tobacco smoke contains numerous carcinogens capable of producing DNA damage and promoting tumour development.

Colombia has adopted tobacco-control measures within a broader public-health framework, but prevention remains important because even relatively moderate population smoking prevalence can generate a large cancer burden when exposure is sustained over decades. Prevention must include taxation and price policies, smoke-free environments, restrictions on advertising and promotion, cessation support, protection from second-hand smoke and sustained public education.

Second-hand smoke is also a cancer hazard. Children, pregnant women and adults living or working in environments where tobacco is smoked may be exposed despite not smoking themselves. Strong enforcement of smoke-free policies therefore functions as both an individual-protection and population-prevention measure.

4.2 Alcohol Consumption

Alcohol is an established carcinogen and is causally associated with cancers including oral cavity, pharynx, larynx, oesophagus, liver, colorectum and female breast cancer (IARC, 2010; WHO, 2024). Risk generally increases with consumption, and alcohol can interact with tobacco to produce particularly high risks for cancers of the upper aerodigestive tract.

In Colombia, alcohol-related cancer prevention should therefore be integrated into noncommunicable-disease strategies rather than considered solely an issue of addiction. Policies affecting affordability, availability, marketing and drinking in high-risk settings can complement clinical counselling. Public messaging should emphasize that alcohol consumption is not risk-free with respect to cancer.

4.3 Overweight, Obesity and Physical Inactivity

Excess body weight and physical inactivity are increasingly important cancer hazards as populations urbanize and lifestyles change. Obesity is associated with multiple cancers, including colorectal, endometrial, kidney, pancreatic, liver and postmenopausal breast cancers (Lauby-Secretan et al., 2016). Mechanisms include chronic inflammation, insulin resistance, altered sex-hormone metabolism and growth-factor signalling.

Colombia's cancer-control strategy should therefore treat healthy weight as a cancer-prevention issue as well as a cardiovascular and diabetes issue. Population-level measures include healthier food environments, reduction of excessive intake of energy-dense foods, promotion of physical activity and improved access to safe public spaces. Clinical prevention should identify people at elevated metabolic risk and provide sustained support rather than short-term advice alone.

4.4 Diet and Nutrition

Dietary patterns influence cancer risk through several pathways. High consumption of processed meat is associated with colorectal cancer, while diets rich in whole grains, fibre, vegetables and fruits are generally

associated with lower risk of several chronic diseases (IARC, 2015; WHO, 2024). High salt intake and consumption of preserved foods are also relevant to gastric cancer risk, particularly in populations with H. pylori infection.

Colombian prevention strategies should account for regional dietary diversity. Nutrition interventions are more likely to be effective when they recognize local foods, household economics and food availability rather than relying exclusively on generic recommendations.

5. Infectious Causes of Cancer

5.1 Human Papillomavirus and Cervical Cancer

Persistent infection with oncogenic HPV types is the necessary cause of virtually all cervical cancers and contributes to several anogenital and oropharyngeal cancers (IARC, 2012; WHO, 2024). Cervical cancer therefore represents a major example of a cancer that can be prevented through vaccination, screening and treatment of precancerous lesions.

GLOBOCAN 2022 estimated 4,570 new cervical cancer cases among Colombian women, placing cervical cancer among the country's leading cancers in females (IARC, 2024). The continuing burden demonstrates the importance of ensuring high HPV-vaccination coverage, effective screening, follow-up of abnormal results and timely treatment. Prevention must also address barriers related to geography, socioeconomic inequality, misinformation and health-system access.

HPV vaccination is particularly important because it prevents infection before exposure. Screening remains essential because vaccinated populations may not have complete protection against all oncogenic HPV types and because older cohorts may not have benefited from vaccination. A combined prevention strategy is therefore more robust than reliance on a single intervention.

5.2 Helicobacter pylori and Gastric Cancer

H. pylori is a well-established carcinogen and an important risk factor for gastric adenocarcinoma. Colombia's relatively high gastric-cancer burden makes this infection especially relevant. In GLOBOCAN 2022, stomach cancer was the leading cause of cancer death when both sexes were combined, with 8,938 incident cases estimated nationally (IARC, 2024).

The epidemiology of gastric cancer in Colombia is geographically heterogeneous, and high-risk populations may benefit from targeted strategies for H. pylori detection and eradication alongside broader improvements in diet, sanitation and access to medical care. Research should continue to clarify how bacterial strains, host susceptibility, diet and environmental conditions interact in Colombian populations.

5.3 Hepatitis B and C Viruses

Chronic infection with hepatitis B virus (HBV) and hepatitis C virus (HCV) is associated with hepatocellular carcinoma (IARC, 2012). Prevention and control therefore require vaccination against HBV, safe injection and blood practices, prevention of transmission, testing, linkage to treatment and surveillance of people with chronic liver disease.

Viral hepatitis illustrates how infectious-disease control can function as cancer prevention. Strengthening primary-care detection and treatment pathways can reduce future liver-cancer risk while also preventing other complications of chronic infection.

6. Occupational Cancer Hazards

Occupational exposures are important because workers may experience repeated or prolonged contact with carcinogenic substances or processes. Internationally recognized occupational carcinogens include asbestos, certain aromatic amines, benzene, crystalline silica, diesel-engine exhaust and several metals and industrial agents (IARC, 2012–2023). The risk depends on the substance, dose, duration, route of exposure and availability of protective measures.

Colombia's diverse economy creates multiple occupational contexts relevant to cancer prevention, including mining, construction, manufacturing, agriculture, transport and petroleum-related activities. Workers may encounter dusts, fumes, solvents, combustion products, pesticides, ultraviolet radiation and other hazards depending on the occupation.

Occupational cancer prevention requires the hierarchy of controls: eliminate or substitute hazardous agents where possible; use engineering controls and ventilation; implement administrative controls; provide appropriate personal protective equipment; and conduct health surveillance where indicated. Enforcement and worker education are particularly important in informal or small-scale workplaces where occupational-health infrastructure may be limited.

Table 3. Major occupational hazards relevant to cancer prevention

Hazard/exposure	Examples of associated cancers	Prevention priorities
Asbestos	Lung cancer, mesothelioma, laryngeal/ovarian cancer	Elimination, exposure control, safe removal, worker protection
Crystalline silica	Lung cancer	Dust suppression, ventilation, respiratory protection
Benzene	Leukaemia	Substitution, containment, monitoring
Diesel exhaust	Lung cancer	Engine controls, ventilation, exposure reduction
Ultraviolet radiation	Skin cancers	Shade, clothing, sunscreen, work scheduling
Certain pesticides	Several cancers depending on agent	Integrated pest management, substitution, safe handling
Metals/industrial fumes	Site-specific cancers depending on agent	Process controls, monitoring, PPE

7. Environmental Cancer Hazards

7.1 Ambient Air Pollution

Outdoor air pollution and particulate matter are recognized carcinogenic hazards, particularly in relation to lung cancer (IARC, 2013). Traffic emissions, industrial activity, combustion and other sources can contribute to exposure. Urban residents may experience higher exposure depending on traffic density, local topography and industrial patterns.

Colombian cancer prevention should therefore link air-quality policy with noncommunicable-disease prevention. Monitoring networks, emissions standards, clean transport, industrial controls and urban planning

can reduce exposure at population scale. Individual behaviour changes alone cannot fully address ambient air pollution because exposure is partly determined by the environment in which people live and work.

7.2 Household and Indoor Air Pollution

Indoor exposure to combustion products can contribute to respiratory disease and cancer. The magnitude of risk varies with fuel type, ventilation and duration of exposure. Rural and low-income households using polluting fuels can be disproportionately affected. Clean cooking energy, improved ventilation and transition away from high-emission fuels are therefore relevant to cancer prevention as well as broader respiratory health.

7.3 Ultraviolet Radiation

Solar ultraviolet radiation is a major environmental carcinogen for skin cancer. Colombia's geographic location, high-altitude regions and outdoor occupations can produce substantial cumulative UV exposure. Outdoor workers, including agricultural and construction workers, may have particularly high occupational exposure.

Prevention includes shade, protective clothing, hats, sunglasses, sunscreen and work practices that reduce peak exposure. Public education should emphasize that UV protection is relevant even in populations with darker skin because ultraviolet radiation can cause skin cancer across skin types.

7.4 Water, Soil and Industrial Contamination

Environmental contamination can create cancer risks when carcinogenic substances enter air, water or food chains. The specific hazard depends on the contaminant and exposure pathway. Colombia's mining, agricultural and industrial activities make environmental monitoring important, especially in communities located near extraction or industrial sites.

Environmental-health surveillance should integrate cancer registries with exposure data where feasible. When an unusual cancer cluster is suspected, investigation should use rigorous epidemiological methods rather than assuming that geographic clustering proves causation.

8. Genetic Susceptibility and Family History

A small but important proportion of cancers is attributable to inherited pathogenic variants that substantially increase susceptibility. Family history may indicate inherited risk but can also reflect shared environmental and behavioural exposures (WHO, 2024). Examples include hereditary breast and ovarian cancer syndromes associated with BRCA1/BRCA2 variants and hereditary colorectal-cancer syndromes such as Lynch syndrome.

In Colombia, expanding genetic counselling and appropriately targeted testing can improve prevention for high-risk families. However, population-wide genetic testing is not a substitute for established cancer-prevention measures. Genetic services should be accompanied by counselling, informed consent, privacy protections and equitable access.

9. Social Determinants and Health Inequalities

Cancer hazards are not distributed evenly. Income, education, occupation, residence, ethnicity, gender, health literacy, transportation and access to health services can influence both exposure and outcomes. A person living in a polluted urban environment may have different hazards from an agricultural worker, while a person in a remote area may face greater difficulty reaching screening or diagnostic services.

Social inequalities can also affect the consequences of exposure. Smoking cessation resources, healthy foods, safe recreational spaces and preventive healthcare may be less accessible to economically disadvantaged populations. Likewise, a cancer detected at an advanced stage may require more complex treatment and generate greater financial and social costs.

The prevention agenda should therefore address structural determinants alongside individual behaviours. Cancer control is more equitable when preventive services are accessible to rural and underserved communities and when policies reduce exposure at the population level.

10. Regional and Geographic Heterogeneity

Colombia's geography is highly diverse, encompassing large cities, Andean highlands, Caribbean and Pacific coastal areas, Amazonian and Orinoquian territories, and remote rural communities. Exposure profiles and access to care can consequently vary substantially by region.

Cancer epidemiology can also differ geographically because of variation in socioeconomic conditions, dietary practices, infectious exposures, occupational activities and healthcare access. The well-documented geographic variation in gastric cancer within Colombia illustrates the importance of place-specific epidemiology. National averages can conceal high-risk communities that require targeted intervention.

Strengthening cancer surveillance at departmental and municipal levels can help identify regional differences and guide resource allocation. Population-based cancer registries, mortality data and risk-factor surveillance should be integrated wherever possible.

11. Screening and Early Detection

Screening is not a universal solution for all cancers, but it can substantially reduce mortality when applied to diseases for which effective screening tests and treatment pathways exist. In Colombia, cervical-cancer prevention provides a particularly strong example because HPV vaccination and screening can prevent disease before invasive cancer develops.

Breast and colorectal cancer control also depend on timely diagnosis. Screening programs must be evaluated not only by the number of tests performed but by the entire pathway from invitation to diagnostic confirmation and treatment. A screening test without reliable follow-up may produce limited population benefit.

Cancer screening should be organized around evidence-based age groups, risk categories and available diagnostic capacity. Opportunistic testing that is poorly coordinated can increase inequity if people with better resources receive repeated screening while underserved populations remain unscreened.

Table 4. Cancer-hazard prevention priorities for Colombia

Hazard	Relevant cancer(s)	Population-level prevention	Clinical/public-health action
Tobacco	Lung and multiple cancers	Taxation, smoke-free laws, marketing controls	Cessation support and risk assessment
Alcohol	Breast, colorectal, liver, upper aerodigestive cancers	Availability/marketing policies, public education	Brief interventions and treatment for harmful use
HPV	Cervical and other HPV-	Vaccination, sexual-	Screening and treatment

	related cancers	health education	of precancer
H. pylori	Gastric cancer	Risk-based testing and eradication strategies	Diagnosis and eradication of infection
HBV/HCV	Liver cancer	HBV vaccination and infection prevention	Testing, antiviral treatment and liver surveillance
Obesity/inactivity	Colorectal, endometrial, breast and other cancers	Healthy food and active environments	Weight-management and lifestyle services
Occupational carcinogens	Site-specific cancers	Regulation and exposure elimination	Workplace monitoring and health surveillance
Air pollution	Lung cancer	Clean transport and emission controls	High-risk patient counselling and surveillance
UV radiation	Skin cancers	Sun-safety environments and occupational protection	Early assessment of suspicious lesions

12. Cancer Hazards Across the Life Course

Cancer prevention should be considered across the life course. Early-life exposures can influence later risk, while cumulative exposure becomes increasingly important with age. Tobacco prevention is especially effective when initiation is prevented among adolescents. HPV vaccination is similarly most effective when delivered before exposure to the virus.

Adulthood is an important period for reducing tobacco and alcohol use, maintaining healthy body weight, improving physical activity and reducing occupational exposures. Older age groups require appropriate screening and timely diagnostic evaluation because cancer incidence generally rises with age.

A life-course perspective also emphasizes that prevention should begin before symptoms appear. Many cancers develop after years or decades of exposure, so current prevention policies influence future disease burden.

13. Health-System Challenges

Cancer prevention and control depend on the capacity of the health system to convert knowledge into accessible services. Colombia's health system has broad population coverage, but geographic and socioeconomic differences can affect access to prevention, diagnosis and specialized treatment. Delays can occur between initial presentation, diagnostic confirmation and treatment, particularly where specialist services are concentrated in major urban centres.

Strengthening primary care can improve prevention by integrating tobacco cessation, vaccination, obesity management, infection control and cancer-risk assessment. Primary-care professionals can also identify warning symptoms and facilitate referral. At the secondary and tertiary levels, multidisciplinary cancer services and reliable diagnostic pathways are necessary for timely treatment.

Cancer registries are essential for evaluating whether prevention and treatment policies are working. High-quality incidence and mortality data allow identification of emerging patterns, regional inequalities and changes over time.

14. Policy and Prevention Framework

A comprehensive Colombian cancer-hazard strategy should combine population-wide interventions with targeted measures for high-risk groups. Population measures are especially valuable because they can reach people before individual risk is recognized. Examples include tobacco taxation, smoke-free policies, HPV vaccination, air-quality regulation and occupational standards.

Targeted interventions are also necessary. Individuals with strong family histories may require genetic counselling; people with chronic viral hepatitis may need liver surveillance; workers with carcinogenic exposures may need occupational health monitoring; and communities with high gastric-cancer risk may benefit from targeted H. pylori strategies.

Prevention policy should be evaluated using measurable outcomes: tobacco prevalence, HPV vaccination coverage, screening participation, stage at diagnosis, time to treatment, cancer mortality, occupational exposure levels and geographic equity. The emphasis should be on sustained population impact rather than short-term activity counts.

Table 5. Proposed strategic framework for reducing cancer hazards in Colombia

Strategic pillar	Priority actions	Expected contribution
Tobacco control	Taxation, smoke-free environments, cessation services	Lower lung and tobacco-related cancer burden
Infection prevention	HPV and HBV vaccination; H. pylori and viral-hepatitis control	Reduce infection-related cancers
Healthy environments	Air-quality improvement, clean cooking, environmental monitoring	Reduce population exposure to carcinogens
Occupational health	Exposure assessment, substitution, engineering controls	Prevent work-related cancers
Healthy living	Physical activity, healthy diet, alcohol-risk reduction	Reduce metabolic and lifestyle-related cancer risk
Screening	Evidence-based cervical, breast and colorectal pathways	Increase early detection and preventable disease
Primary care	Risk assessment, counselling and referral	Improve continuity of prevention
Cancer surveillance	Registries, mortality data and risk-factor monitoring	Guide policy and evaluate outcomes
Health equity	Rural outreach, transport/access support and targeted services	Reduce regional and socioeconomic disparities

15. Discussion

The Colombian cancer profile demonstrates a transition in which infectious, lifestyle-related, environmental and occupational hazards coexist. This creates a dual prevention challenge. Some cancers remain strongly linked to persistent infections and socioeconomic conditions, while other cancers increasingly reflect ageing, obesity, tobacco exposure, alcohol use and urban lifestyles.

The coexistence of these hazards means that cancer prevention cannot be organized around a single intervention. HPV vaccination may reduce cervical cancer, but it will not prevent lung or colorectal cancer.

Tobacco control can reduce lung cancer, but it will not eliminate gastric cancer associated with H. pylori. Similarly, healthy weight can reduce several cancers but cannot substitute for occupational regulation.

Another important issue is the distinction between hazard and risk. The presence of a carcinogenic agent does not mean that every exposed person will develop cancer. Risk depends on dose, duration, route of exposure, susceptibility and interactions with other determinants. Public communication should therefore avoid both minimizing established hazards and overstating individual risk.

The country's demographic ageing is likely to remain an important driver of absolute cancer burden. Even if age-specific mortality improves, population growth and ageing can increase the number of people requiring cancer prevention, diagnosis and treatment. Planning must therefore combine prevention with health-system capacity building (Ministerio de Salud y Protección Social, 2026).

Colombia also has an opportunity to integrate cancer prevention into existing public-health platforms. Tobacco control, vaccination, primary care, occupational health, environmental regulation and noncommunicable-disease programs can collectively address a large share of preventable cancer risk. Such integration may be more sustainable than creating isolated programs for each hazard.

16. Research Priorities

Future research should strengthen evidence on the distribution and magnitude of cancer hazards within Colombia. Priority areas include longitudinal studies of occupational exposure, air pollution and cancer; regional studies of gastric cancer and H. pylori; evaluation of HPV vaccination and screening; population studies of obesity and cancer; and research on inequalities in cancer stage and survival.

Colombia would also benefit from stronger linkage between cancer registries, mortality data, environmental monitoring and socioeconomic indicators. Such linkage can help identify communities where exposure and poor outcomes overlap.

Research should also evaluate interventions rather than only describing risk. Implementation research can determine which approaches to vaccination, screening, cessation, occupational protection and early diagnosis produce sustainable benefits in rural and urban settings.

17. Limitations

This article is a narrative review and not a systematic review or meta-analysis. The manuscript relies heavily on authoritative secondary sources and internationally standardized estimates, which may differ from national registry or administrative estimates because of differences in methodology. GLOBOCAN figures are estimates and should not be interpreted as a complete census of diagnosed cancers. Evidence on particular environmental and occupational hazards may also be stronger in some settings than in Colombia specifically. Finally, current national cancer policy is evolving, so implementation details should be checked against the latest Colombian regulations and strategic documents before publication or policy use.

18. Conclusion

Cancer hazards in Colombia are diverse, interconnected and unequally distributed. The national burden includes cancers associated with tobacco, alcohol, metabolic risk, infectious agents, environmental exposure and

occupational carcinogens. GLOBOCAN 2022 estimated 117,620 new cases and 56,719 cancer deaths, with breast, prostate, colorectal, stomach and lung cancers among the leading cancers (IARC, 2024).

The most important prevention opportunity is to address hazards before cancer develops. Tobacco control, HPV and hepatitis B vaccination, H. pylori management, healthy-weight strategies, physical activity, alcohol-risk reduction, occupational protection, air-quality improvement and evidence-based screening can collectively reduce preventable cancer burden. These interventions should be accompanied by strong primary care, cancer surveillance and equitable access to diagnostic and treatment services.

Colombia's cancer strategy should therefore adopt an integrated hazard-prevention framework that recognizes the country's epidemiological diversity. Combining population-wide prevention with targeted interventions for high-risk groups, strengthening regional surveillance and reducing inequalities can improve the country's capacity to prevent cancer and reduce avoidable deaths. Continued investment in high-quality epidemiological research will be essential for identifying emerging hazards and evaluating whether prevention policies are reaching the populations that need them most.

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