Supplemental Material, Table 1. Definitions of the environment and environmentally attributable risk estimates for cancer

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Higginson & Oettlé (1)	1960	All exogenous factors that impinge on human health - physical, biological, cultural or chemical.	Broad	70-80%
World Health Organization *(WHO) Technical Report* (2)	1964	All extrinsic factors – including all environmental carcinogens (whether identified or not) as well as "modifying factors" that favor neoplasia of apparently intrinsic origin (e.g., hormonal imbalances, dietary deficiencies, and metabolic defects).	Broad	>75% of human cancers are influenced by environmental factors
WHO (3)	1965	Chemicals	Narrow	>50% of human cancers are due to environmental factors
John Higginson (4) *International Agency for Research on Cancer (IARC)*	1967	Total environment – cultural as well as chemical.	Broad	90% of cancers are due to environmental factors
David B. Clayson (5)	1967	Strictly chemicals.	Narrow	4 out of 5 cancers in man have their origins in the environment
John Higginson (6)	1968	Total environment.	Broad	90% of cancers are due to environmental factors
E. Boyland (7)	1969	Includes only chemical agents.	Narrow	90% of cancers due to chemical agents – "but we do not know how much is due to endogenous carcinogens and how much to environmental factors." 10% due to viruses, genetics, and radiation
S.S. Epstein (8)	1969	Chemical pollutants, including pollutants of air (fuel combustion, tobacco smoke), water (agricultural or industrial effluents), and food (additives, pesticides, and naturally-occurring plant or fungal poisons).	Narrow	The majority of human cancers are probably due to chemical carcinogens in the environment.
Robert J. C. Harris (9)	1970	Includes the "*natural* external environment – sunlight, air, food and water, and to the cancers which are the result of known pollutants, whether these be general or occupational. There are other aspects of the external environment which are under individual control. 'Cultural' cancers, such as lung cancer from cigarette smoking, can be completely abolished. 'Therapeutic' cancers from diagnostic and remedial medicine are under surveillance." Also includes the internal environment.	Broad	80-90% of cancers are due to the environment
John Higginson (10)	1970	Exogenous factors	Broad	80-90%
Fox et al. (11)	1970	Breaks environment into three categories: Biological, physical, and social. *Biological:* Compromises all the flora and fauna, including pathogenic parasites and many other disease agents *Physical*: Includes geology, geographic, and climatic and meteorological features. *Socioeconomic*: Includes man's relation to his fellow man.	Broad	---
S. S. Epstein (12)	1970	Chemicals in the air, water, and soil.	Narrow	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Denis P. Burkitt (13)	1971	Atmosphere, radiation, infection, injury and contact with any substance either externally or through food or drink.	Broad	>80% of cancers are due to the environment
Dr. Benedetto Terracini (14)	1972	Air, the atmosphere in working and living surroundings, medicines and cosmetics, food, drink, consumer products, every substance that involves professional contact with it, tobacco smoke, and other substances consumed for pleasure, etc.	Broad	>50% of tumors have exogenous causes and many of these are chemical in nature
W.C. Hueper (15)	1972	Environmental carcinogens include "all animate and inanimate, natural and man-made agents having displayed carcinogenic properties when introduced into either man or animal by any route, and in any dose or form." Includes certain parasites and viruses, numerous macromolecular carbon and silicon polymers, a few minerals and metals, aliphatic and aromatic chemicals, and several non-ionizing and ionizing radiations (ultra-violet radiation, x radiation, alpha-beta, and gamma radiation, etc.)	Broad	---
IARC (16)	1972	Did not report.	---	80% of cancers have environmental causes
IARC (17)	1972	Did not report.	---	80% of cancers are related to the environment
Selikoff & Hammond (18)	1972	Extrinsic factors – gives examples of tobacco smoking and occupational exposures.	Broad	75 to 85% of all human cancers are derived from environmental causes
R.C. Harris (19)	1973	Environment may be categorized, for these purposes, as natural, cultural, occupational or therapeutic. *Cultural:* Under the control of the individual (i.e. smoking).	Broad	80-90% of cancers in man are directly caused by agents in his environment – both external and internal."
C. Heidelberger (20)	1973	Chemicals in the air, water, food, and soil.	Narrow	80-90% of all human cancers caused by chemicals
Robert Gillette (21)	1974	Defines "environmental factors" ranging from radiation to synthetic chemicals.	Narrow	60-90% cancers are believed to be caused by environmental factors
S.S. Epstein (22)	1974	Chemical, physical, or biological agents.	Broad	70-90% of all human cancers are environmentally caused
C. Heidelberger (23)	1975	Including strictly chemicals.	Narrow	70-90% of all human cancers are environmentally caused
E.C. Hammond (24)	1975	Cigarette smoking, occupational exposures, and various other chemicals and physical agents.	Broad	85% or more of all human cancers are due to environmental factors
A.L. Brown (25)	1976	"That portion of the biosphere that makes up the air we breathe, the water we drink and the food we eat. I shall not be concerned with the broader aspects of 'environmental pollution' or the 'environs' in the general sense. Nor shall I consider occupational exposure."	Narrow	---
Richard Doll (26)	1976	Includes radiation, chemical exposures, tobacco, alcohol, viruses and infections.	Broad	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
UK Department of Health & Social Security (27)	1976	Chemical pollution	Narrow	85% of all cancers have environmental causes
Higginson & Muir (28)	1976	"In its widest sense, embracing not only carcinogens per se but also any exogenous stimulus. It therefore includes not only widespread exposures of a general nature, e.g., air, water and food pollutants, as well as more limited exposures resulting from the work environment, or habits of personal choice, e.g., smoking and drinking, but also general dietary patterns and lifestyle."	Broad	60-90% of human cancers are of environmental origin.
J.H. Weisburger (29)	1976	Describes environmental factors as chemicals, radiation, tobacco, and personal dietary habits.	Broad	80-90% of human cancers are due to environmental factors
John Higginson (30)	1976	Used in the wide sense to include not only obvious air, water, food and other pollutants, but also general dietary patterns and personal habits.	Broad	Exogenous and environmental stimuli causing between 30-40% of human cancers have been identified in European and American industrial societies… there is evidence that between one-half to two-thirds of those cancers for which the etiology has not been yet established are directly or indirectly due to exogenous environmental factors.
R. Preussman (31)	1976	Environmental chemicals.	Narrow	60-99.9% of cancers are environmentally related
John Higginson (32)	1976	Categorizes the environment into the macro-environment and micro-environment. *Macro-environment: "*The individual's total general environment, e.g. air and water pollution, general food supplies, etc. The individual cannot significantly modify the macro-environment, which is largely the responsibility of the appropriate governmental authorities." *Micro-environment: "*The personal environment created by the individual. Includes cultural habits, e.g. cigarette smoking and individual drinking and eating habits. It may also include occupation where, however, the degree of individual control varies according to local political and socio-economic conditions."	Broad	85% of cancers are dependent directly or indirectly on environmental factors.
Higginson & Muir (33)	1977	Widespread general exposures of air and water pollution, the work environment, exposures resulting from personal choice such as smoking and drinking, and the diet.	Broad	80% (70-90%) of all cancers are of environmental origin
R. Train (34)	1977	Some natural, such as sunlight or molds; some due to personal habits, such as cigarette smoking; and some due to carcinogens in air, water, and diet.	Broad	---
Wynder & Gori (35) *National Cancer Institute (NCI)*	1977	Environmental carcinogens either relate to lifestyle (tobacco, alcohol, sunlight, occupational exposure, nutrition) or general environmental factors (air and water pollution, drugs and food additives.) *Environmental carcinogens:* arising wholly or largely outside the host's body.	Broad	---
Sir Richard Doll (36)	1977	Examples of environmental agents include sunlight, 'Kangri', reverse smoking, tobacco, aflatoxin, schistosomiasis, viruses, radiation and pollutants.	Broad	Can reduce age-specific incidence rates by at least 80 to 90%

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
C. Heidelberger (37)	1977	Chemicals, dietary factors, and ultraviolet radiation.	Broad	70-90% of all human cancers are environmentally caused
National Center for Health Statistics (38)	1977	Includes occupational exposures, pollution of water and air, certain chemicals, trace substances, cadmium, asbestos, diet, alcohol, radiation, etc. as environmental agents.	Broad	---
Nordisk Medicin (39)	1977	Includes cultural/ personal environments.	Broad	"Exogenous, environmental stimuli are responsible directly or indirectly for 30-50 per cent of cancers in males in industrialized societies in Europe, North America and Asia."
Dr. Mostafa Kamal Tolba (40) *United Nations Environment Programme (UNEP)*	1978	"Factors in air, water, solar radiation, living and working environments, and personal choices of diet and ways of life – such as tobacco smoking and alcohol consumption."	Broad	60-90% of all cancers are directly or indirectly related to the environment
Robert Hoover (41)	1978	Anything other than a person's genetic makeup. This includes exposure to occupational factors, toxic chemicals in the general environment, natural and artificial constituents in the diet, drugs and cigarette smoking and to other exposures related to human habits.	Broad	The majority of human cancers are environmentally caused
Tomatis et al. (42)	1978	Chemicals, lifestyle exposures including smoking, alcohol drinking, or certain dietary habits.	Broad	70-90% of human cancers are environmentally caused
Vincent F. Garry (43)	1978	Describes carcinogens as environmental chemicals.	Narrow	Estimates that 60% of all human cancers are due to environmental agents.
Dr. Peter Brookes (44)	1978	"Everything to which man is exposed arising outside the body, i.e. via the air he breathes, the food and drink he consumes as well as any specific exposure he might have due to the nature of his occupation or personal habits."	Broad	---
Schneiderman MA (45)	1978	*Personal environment*: cigarette smoking, alcohol, sexual habits, and diet. *Impersonal environment*: industrial and occupational pollutants, water and air contaminants, pesticides, flame-retardants, diet additives, and drugs.	Broad	80% of all cancers attributable to the environment
Patricia A. Buffler (46)	1978	"Everything in the environment – water, diet, personal habits such as drinking and smoking, urban residence, physical, geological features, use of prescription or non-prescription drugs, as well as unique occupational exposures… the combination of all factors in the human environment."	Broad	"It is widely quoted that 75-80 percent, perhaps as high as 90 percent of all cancer is 'caused by', 'due to' or 'associated with' environmental factors."
Merril Eisenbud (47)	1978	"Using the term 'environment' in its broadest sense – which includes substances naturally present in foods, sunlight, cigarette smoking, excessive use of alcoholic beverages, and chemicals or radiations to which individuals are exposed in the course of their occupations."	Broad	60-90% of all deaths from cancer can be attributed to environmental factors.[a]
Joseph C. Arcos (48)	1978	Chemicals in the air, water, food, medications, and work.	Narrow	80-90% of all human malignancies can be traced to the effects of environmental agents.

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Gertrude Barna-Lloyd (49)	1978	Argues that the environment should not be used just to refer to the pollutants found in air, water, and food, but should also include all extrinsic or exogenous factors such as lifestyle factors – sunshine, diet, and smoking.	Broad	---
Barbara J. Culliton (50)	1978	Environmental chemicals, smoking, dietary factors, alcohol consumption, radiation – not strictly industry.	Broad	60-90% of cancers are environmentally caused
M.R.V. Sahyun (51)	1978	Substances introduced by human activity.	Narrow	13-21% of cancers due to substances introduced into the environment by human activity.
Trosko & Chang (52)	1978	*Environmental factors:* Kinds and amounts of physical, chemical and biological initiators, physical and chemical promoters, repair inhibitors, gene derepressors, cell division stimulators and immunological suppressors.	Broad	---
H.F. Thomas (53)	1978	*Environmental pollutants:* air, water, solid wastes and food contaminants; occupational environment; *cultural environment:* smoking, alcohol, and diet.	Broad	---
Clark W. Heath (54)	1978	Chemical pollutants in air and water, radiation, diet, and personal habits such as smoking.	Broad	80-90% of cancers are caused by environmental exposures
L. Fishbein (55)	1979	Cultural environment, cigarette smoking, drinking and eating habits, occupational environment, iatrogenic factors.	Broad	60-90% of all human cancers have their etiology in environmental factors
Robert M. Albrecht (56) *Food and Drug Administration (FDA)*	1979	"I think of environmental agents according to whether individuals can protect themselves or whether government must intervene…an environmental agent is a toxic substance which is imposed on the public, often willy-nilly, and often without the public's knowledge that it is being exposed to a hazardous substance….to maintain the distinction between adverse effects which can be prevented by government, and those against which responsible persons can protect themselves *if they so choose.*"	Narrow	---
W.K. Morgan (57)	1979	Chemicals, cigarette smoking, exposure to ionising radiation, sunlight, and family size.	Broad	80% of cancer can be attributed to environmental factors
John Higginson (58) *IARC*	1979	*Total* environment, cultural as well as chemical. By cultural, I meant mode of life… looking at diets, how they lived, the number of children they had, the age of menopause, the age of menarche – environment is what surrounds people and impinges on them. The air you breathe, the culture you live in, the agricultural habits of your community, the social cultural habits, the social pressures, the physical chemicals with which you come in contact, the diet, and so on…confusion because people have used the word environment purely to mean chemicals.	Broad	>90% attributable to environmental factors Men: 63% lifestyle (20% cultural patterns & 43% diet) Women: 30% lifestyle (5% cultural patterns & 25% diet)
G. Cavallo (59)	1979	Man's external environment, then, is like the larger box that holds the body, which, in its turn, houses the tumour.	Broad	---
G. Gori (60)	1979	Diet, tobacco, radiation (UV & X-ray), occupation, alcohol, and exogenous hormones	Broad	80-90% of cancer rates in the US can be attributed to environmental factors

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Higginson & Muir (61)	1979	Cultural habits, diet, exposure to various infectious agents, average age of menarche, number of children a woman bears, age of menopause - cultural as well as the chemical environment.	Broad	90% of cancers are attributable to environmental factors.
Robert Hoover (62)	1979	Environmental agents include exposure to toxic chemicals on the job and in the general environment, exposure to ionizing and other forms of radiation, ingesting natural and artificial constituents of the diet, ingesting of therapeutic drugs, and exposures related to personal habits.	Broad	60-90% of cancers are environmental in origin
John Higginson (63)	1979	The total milieu in which people live, including cultural habits, diet, exposure to various infectious agents, average age of menarche, number of children a woman bears, age of menopause - cultural as well as the chemical environment.	Broad	90% of cancers are due to the environment
NCI (64)	1979	Not only the quality of the air in the workplace but also such things as dietary habits, smoking, drinking, etc.	Broad	60-90% of cancers are environmentally caused
WC Morgan (65)	1979	Cigarette smoking, exposure to ionising radiation, sunlight, family size, as well as chemicals.	Broad	Around 80% of human cancer can be attributed to environmental factors
Cimino & Demopoulos (66)	1980	Quotes Higginson's definition "'*total* environment, cultural as well as chemical.'"	Broad	Around 85% of cancers are due to environmental factors
Thomas J. Slaga (67)	1980	Chemicals in the air, water, and food, sunlight, occupational exposures, smoking, alcohol, diet, direct and indirect food additives, prescription drugs, radiation, social habits.	Broad	---
John Higginson (68)	1980	Includes tobacco, alcohol, sunlight, occupation, radiation, iatrogenic causes, and lifestyle.	Broad	Between 83-87% of cancer deaths in Birmingham (UK) residents are due to environmental factors
Harris et al. (69)	1980	Chemicals, radiation, diet, smoking, viruses.	Broad	80-90% of cancers are due to the environment
E.M. Whelan (70)	1980	Used broadly, includes all extrinsic stimuli. These include not only commonly recognized environmental pollutants or industrial chemicals but lifestyle habits such smoking, drinking, dietary practices, sunbathing and the like.	Broad	80-90% of cancers caused by environmental factors
John Higginson (71)	1980	The term 'environment' is used to include not only defined chemical or physical carcinogenic stimuli, including chemical mixtures, e.g. cigarette smoking, but all exogenous influences or patterns of life style (dietary, cultural or behavioural) that are associated with cancer incidence.	Broad	80% of cancers are environmental in origin
E.L. Wynder (72)	1980	Environmental factors include diet, tobacco, radiation (UV & X-ray), drugs, occupation, alcohol, and exogenous hormones.	Broad	---
John Higginson (73)	1980	Total cultural, behavioral, and dietary.	Broad	---
Doll & Peto (74)	1981	Air, water, soil and food pollutants.	Narrow	2% (1-5) of cancer deaths due to pollution[a] ; 3% due to pollution, food additives, and industrial products; 4% due to occupational causes

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Sir Geoffrey Badger (75)	1981	Describes environmental factors as naturally occurring carcinogens, tobacco smoking, alcohol, diet, chemical carcinogens produced by man, ultraviolet radiation, and ionizing radiation.	Broad	About 75% of all human cancers are caused by environmental factors
M. Bundy (76)	1981	Lifestyle, cultural patterns, diet, tobacco/alcohol, sunlight, occupation, radiation.	Broad	80-90% of all cancer is of environmental origin.
J. Higginson (77)	1981	All exogenous factors which impinge on man, i.e. the dietary, social and cultural environment as well as discrete chemical carcinogens.	Broad	---
US Congress (78)	1981	Encompasses anything that interacts with humans, including substances eaten, drunk, and smoke, natural and medical radiation, workplace exposures, drugs, aspects of sexual behavior, and substances present in the air, water, and soil. Unfortunately, the statements were sometimes repeated with 'environment' used to mean only air, water, and soil pollution.	Broad	60 to 90% of cancer is associated with the environment
I. Crombie (79)	1981	Factors such as tobacco smoke, ionizing radiation, asbestos, occupation, chemicals, food, etc.	Broad	Environmental factors are responsible for up to 90% of human cancer
S. Langard (80)	1981	Including factors such as smoking, alcohol, and occupational exposures.	Broad	80-90% of all human cancer causes are primarily caused by environmental factors.
Donald F. Austin (81)	1981	Everything that is not genetic.	Broad	Between 60-90% of all cancer is environmentally caused
Greenberg & Meier (82)	1982	Encompasses all factors other than heredity – diet, personal habits, and reproductive behavior.	Broad	80% of cancers are environmentally caused
A. Lilienfeld (83)	1982	*Macro-environment*: general communal environment to which groups of people are exposed. *Micro-environment*: individual exposures such as cigarette smoking, dietary habits, medical radiation exposure, etc. Environmental agents can be classified into three categories: radiation, chemical, and biological.	Broad	80-90% of cancers are caused by environmental agents
R. McKenna (84)	1982	Diet, life style, synthetic chemical contaminants.	Broad	80 to 90% of cancers are environmentally caused
Committee on Diet, Nutrition, and Cancer (85)	1982	Anything external to humans, i.e., lifestyle factors and anything to which humans are exposed, including all forms of radiation and substances eaten, drunk, and inhaled.	Broad	---
H.F. Kraybill (86)	1983	Atmospheric and aquatic pollutants which have additive or promotional effects on other causative agents such as contaminants in food, smoking, alcohol, and workplace exposures.	Narrow	---
Weisburger & Horn (87)	1982	Not just chemicals – including dietary factors, etc. as well.	Broad	70-90% of cancers have been associated with environmental causes.
John Higginson (88)	1983	Lifestyle – including cultural habits, e.g., cigarettes, diet, behavioral and cultural patterns.	Broad	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Virginia L. Ernster (89)	1983	"I use the term environment in the broadest sense, not confined to ambient or air or occupational exposures but encompassing all aspects of lifestyle – diet, smoking, sexual behavior, drugs, and so on."	Broad	80-90% of cancers are associated with environmental factors
I. Hirono (90)	1983	Carcinogens closely related to the daily life of humans.	Broad	80 to 90% of human cancer are caused by environmental carcinogens which are closely related to daily life of humans
John Higginson (91)	1983	All exogenous influences which impinged on man, ie, dietary, social, and cultural environments, as well as exposure to synthetic discrete chemical carcinogens.	Broad	80% of cancers
James D. Hardy (92)	1983	Almost everything that the human being can consciously control or modify by himself or herself.	Broad	50-95% of all cancer is caused by the environment
William J. Nicholson (93)	1984	"'Environmental factors' are taken to mean the totality of the effects of that which we eat, breathe, or are otherwise exposed to."	Broad	Environmental factors contribute to at least 80% of United States cancer
J. Neuberger (94)	1984	Encompasses everything outside of man (i.e., air and water pollution, occupation, diet, smoking, and drinking).	Broad	---
C. Ramel (95)	1984	Exogenous and endogenous factors.	Broad	The vast majority of cancer (close to 90%) is caused by exogenous and endogenous environmental factors.
Muir & Parkin (96)	1985	Embraces all elements of lifestyle – dietary, social, and cultural habits (in which the specific carcinogenic factors may be ill understood)- as well as exposure to carcinogens at work, radiation, and drugs.	Broad	80-90% of human cancer is determined environmentally
Alfred G. Knudson (97)	1985	Chemicals, radiation, viruses, cigarette smoking, and dietary factors.	Broad	80% of cancer is environmentally induced
L. Garfinkel (98)	1986	Includes cigarette smoking, dietary constituents, workplace hazards, reproductive and sexual behavior, certain infections, drugs, ionizing radiation, air and water pollution, and consumer products.	Broad	50-90% of all cancers are promoted or caused by various personal and environmental factors.
Charles E. Kupchella (99)	1986	"The human environment can be defined in terms of habit or lifestyle as well as in terms of geography." "The environment includes *everything* from the skin out and everything from the lining of body cavities open to the outside, in. Also, environmental 'factors' are not restricted to direct-acting carcinogens, promoters, immune system suppressors, and other host-modifying agents, as well as carcinogens and chemicals that can be converted into carcinogens in the body." Includes "cancer-associated environmental factors" – tobacco, alcohol, natural radiation, medical drugs and radiation, occupational exposures, diet, sexual development, pollution, consumer products, and infection.	Broad	90% of all human cancer is caused by factors in the environment
D. Schottenfeld (100)	1986	Tobacco, alcohol, ionizing radiation, solar radiation, medications, estrogens, viruses and parasites, dietary deficiencies and excesses, and pollution.	Broad	Most human cancers are triggered or propagated by exposure to environmental agents.

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
O'Neill & Fishbein (101)	1986	Factors such as tobacco, alcohol, asbestos, diet, and occupation.	Broad	85% of cancers might arise from environmental causes
John Higginson (102)	1987	Any agent, chemical, virus, or life-style risk factor that is associated with an increase in cancer in animals or humans.	Broad	---
Mulvihill & Tulinius (103)	1987	Including behavioral factors.	Broad	80-90% of cancers due to environmental factors
B. Weinstein (104)	1988	External agents such as chemicals, radiation, and viruses. Lists exogenous as environmental and exogenous as genetic or hormonal.	Broad	---
T. Sugimura (105)	1988	Diet, smoking, occupation, ionizing radiation, viruses, etc.	Broad	---
John Higginson (106)	1988	All conditions that impinge on human cancer (e.g., poverty, life style, diet, viruses).	Broad	---
Marie Swanson (107)	1988	For the purpose of their discussion *environmental* refers to "specific sources of carcinogens: outdoor and indoor air contamination, drinking water and natural waterway contamination, and contamination resulting from hazardous waste disposal."	Narrow	---
L. Tomatis (108)	1988	Chemicals, viruses and infectious agents, radiation, diet, culturally determined habits, and socio-economic conditions.	Broad	---
Michael Gough (109)	1989	*Broad* : "Everything that humans encounter: everything that is eaten, drunk, and smoked; drugs, medicines, and occupational exposures; and air, water, and soil… everything outside the body as distinct from a person's genetics." *Narrow:* more commonly used to mean air, water, and soil.	Narrow	*Broad:* 80-90% *Narrow:* 1-3%
Perera et al. (110)	1989	Occupational exposures, air pollutants, drinking water, pesticides, toxic chemicals, additives in the diet, natural constituents in the diet, and lifestyle choices (including smoking and diet).	Broad	The vast majority of cancer can be attributed to a broad category of environmental factors
Krishna Murti (111)	1989	Contamination by chemicals or radiation.	Narrow	60% of cancer is attributable to environmental causes
J. Neuberger (112)	1990	Including individual lifestyle or personal factors.	Broad	About 80% of cancers are attributable to the environment
Tran Ba Loc P. (113)	1990	Physical, chemical, and biological factors.	Broad	State that 50-60% of cancer cases are believed to be caused by the environment
Shields & Harris (114)	1990	Chemicals, radiation, and biological agents.	Broad	---
Chu & Chu (115)	1990	Diet, environmental pollutants, occupation, and life-style factors such as smoking.	Broad	---
Augustin et al. (116)	1991	*Environmental pollutants* – carcinogenic elements in water, air and aerosols.	Narrow	Environmental factors & life-style contribute to 70-90% of cancer cases; Environmental pollution: 1-3%

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
A. Knudson (117)	1992	Viruses, smoking, and dietary factors.	Broad	80% of common cancers of adults are largely induced by environmental agents
Richard Doll (118)	1992	The conditions under which any person lives. "We can, however, limit the conditions to those whose effects people are individually unable to control, and so exclude such conditions as the availability of tobacco and, in high-income societies, of a high-fat diet, as people exposed to them can choose alternative diets and whether or not to smoke."	Narrow	---
M. Kreuter (119)	1992	*Environmental factors:* not only the physical aspects of the environment implied in the traditional public-health sense, such as air and water quality and carcinogenic agents in the environment, but also social and economic factors, such as educational level, participation in health insurance plans and access to health services.	Broad	---
Higginson et al. (120)	1992	All exogenous factors that impinge on human health, whether they be physical, biological, cultural or chemical.	Broad	There is an exogenous component in about 70-80% of cancers.
S.C. McMillan (121)	1992	Chemicals, tobacco, alcohol, dietary fat, radiation, and viruses.	Broad	Between 40-90% of cancers caused by environmental agents can be prevented.
H. Moller (122)	1993	Environmental pollutants and factors relating to living conditions and lifestyle.	Broad	At least 50% of the cancer incidence in Denmark may be attributable to environmental factors [c]
John Higginson (123)	1993	All conditions that impinge on human cancer (e.g., poverty, life style, diet, viruses).	Broad	80% of all cancers have an environmental component.
S.S. Epstein (124)	1993	Diet, tobacco, reproductive/sexual behavior, occupation, alcohol, geophysical factors, pollution, industrial products, and medicine and medical procedures.	Broad	Environmental factors contribute to 86% of cancer mortality.[a]
Cohen et al. (125)	1994	"Using the term, environment, to include specific external entities and such nonspecific things as lifestyle, emotions, and psychosocial experiences, one might say that all human pathology is associated with an external factor… it should be noted that when we speak of the environment, we include a broad range of human experience, including lifestyle as well as exposure to specific agents." Environmental causes of cancer: tobacco, alcohol, diet, occupation, viruses, bacteria, parasites, ultraviolet light, ionizing radiation, hormones, medications, pollution and lifestyle.	Broad	---
Hazel Inskip (126)	1994	Including geophysical (naturally occurring) factors and pollution.	Narrow	5% of all cancers due to the environment 3% (2-4%) due to naturally occurring factors 2% (<1-5%) due to pollution
S. Venitt (127)	1994	Describes environmental carcinogens as chemicals, radiation, or combinations of these.	Narrow	"It is therefore impossible, at present, to determine the precise contribution that individual susceptibility makes to risk of cancer in a given population."
Davis & Muir (128)	1995	Environmental factors broadly defined – tobacco, diet, infectious agents, radiation, occupational exposures, and environmental contaminants.	Broad	75-80% of all cancers attributable to the environment

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Health Canada (129)	1995	Pollution, UV radiation, and occupational exposures.	Narrow	10-15% of all cancers linked to the environment
Carl G. Kardinal (130)	1995	"Defined in the broadest sense, environment includes the total exposure of the individual to the external world, and includes those lifestyle and cultural factors such as diet, cigarette smoking, industrial chemicals, pollution, infectious agents, and ionizing radiation."	Broad	As many as 90% of human cancers are caused by environmental factors
A. Olshan (131)	1995	*Environmental exposure*: includes all exogenous sources, including the *general environment* (air and water pollution), occupational setting, lifestyle (smoking, alcohol, drugs), and medical treatment.	Broad	---
Vainio & Husgafvel-Pursiainen (132)	1996	All exogenous factors – exposures from smoking, diet, and work; internal dose: metabolite level in body fluids; biologically effective dose; early biological responses. *Endogenous:* host-related, such as genetic, hormonal or immunological factors.	Broad	---
Sir Richard Doll (133)	1996	Tobacco smoke, alcohol, infection, diet, physical activity, occupational exposures, and pollution.	Broad	Age-specific incidence rates could be reduced by 80-90%
J.S. Malpas (134)	1996	Chemicals, drugs, tobacco, alcohol, viruses, and dietary factors.	Broad	---
National Institutes of Health (135)	1996	Food and nutrients, synthetic and naturally-occurring chemicals, and physical agents such as heat and ionizing radiation… the scope of what comprises the environment has been extended beyond the historical preoccupation with industrial products and byproducts.	Broad	Nearly all diseases are thought to arise from the interplay between inherited genetic alterations and the environment
Bartsch & Hietanen (136)	1996	Chemical exposures.	Narrow	80-90% of all cancers are related to environmental factors, tobacco smoke, and diet.
Harvard Center for Cancer Prevention (137)	1996	Air, water and soil pollutants.	Narrow	2% cancer incidence due to environmental pollution 2% due to ionizing radiation 5% due to occupational exposures 1% due to food additives
Trichopoulos et al. (138)	1996	Noninherited – including lifestyle factors. Tobacco smoke, diet, alcohol, radiation, occupational exposures, viruses, and pollutants in the air, water, and soil.	Broad	About 75-80% of cancer deaths can be attributed to environmental factors. [a]
F. Karaer (139)	1996	*Environmental pollution:* All the waste and toxic chemicals released into the ecosphere by man – liquid, gaseous, and solid waste.	Narrow	Environmental carcinogens account for 75% of all cancer cases.
Woodward & Boffetta (140)	1997	"The concept of environment is often used in a broad sense, to comprise all factors unrelated to the genetic make-up of an individual, such as occupation, nutrition, lifestyle and reproductive habits, infections and so on…Most commonly, however, the concept of the environment is used in a narrower sense, to cover only factors related to the place where people live, and over which each individual has little control.	Narrow	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Ahlbom et al. (141)	1997	Includes lifestyle factors as environmental.	Broad	Genetic effects can explain more than 10% of the studied cancers.
Thomas & Hrudey (142)	1997	Pollution, UV radiation, occupational exposures, and consumer products.	Narrow	2-10% of cancer deaths
John Higginson (143)	1997	Any influence which impinged on humans should be considered, whether cultural, biological, nutritional, or physical.	Broad	70-80% of cancers have an environmental component.
F.P. Perera (144)	1997	Tobacco smoke, dietary constituents, pollutants (in the workplace, air, water, and food supply), drugs, radiation, and infectious agents.	Broad	Environmental factors explain about 95% of all cancer
WHO (145)	1997	Occupational exposures, viruses and other infectious agents, air pollution, chemical exposures, food additives, radon gas, other types of radiation and solar UVR. Does not include tobacco smoking, diet, or alcohol consumption.	Broad	25% of cancer DALYs attributed to the environment[b]
Sir Richard Doll (146)	1998	Air, water and food pollutants.	Narrow	1-5%
John Higginson (147)	1998	Any factor whether cultural, dietary, biological, etc., which influenced human cancer incidence should be considered as part of the environment and not only chemicals.	Broad	70-80% of all human cancers have an environmental component.
F.P. Perera (148)	1998	Smoking, diet, workplace and ambient pollutants.	Broad	80% of cancer is related to environmental factors
Ames & Gold (149)	1998	Air, water and soil pollutants.	Narrow	<1% due to environmental pollutants
Armstrong & Boffetta (150)	1998	Non-genetic factors, including human behavior, habits, lifestyle and external factors over which the individual has no control.	Broad	80-90% of all human cancers are environmentally determined
Smith et al. (151)	1999	Measurable stressors that penetrate from the outer environment across the body barriers to affect bodily health. Includes occupational exposures, food preservatives and chemicals. Nutrition, active smoking and alcohol not included.	Broad	20-25% of all cancers attributable to the environment
Minamoto et al. (152)	1999	Chemical carcinogens, such as those found in cigarette smoke, dietary contaminants, such as the mycotoxin aflatoxin B1, and physical carcinogens, such as UV irradiation, asbestos and radon. Other environmental factors include pathogenic bacteria and viruses, such as *Helicobacter pylori*, human papilloma virus (HPV), and human hepatitis B and C virus (HBV/HCV). Life-styles that ignore known risk factors, such as smoking, excess exposure to sunlight, fat consumption and stress are themselves integral environmental factors.	Broad	---
S. Tominaga (153)	1999	Includes tobacco, diet, infection, parasites, bacteria, reproductive factors, occupation, alcohol, sunlight/radiation, pollution, medical procedures, sexual behavior, industrial products, food additives, obesity, exercise and stress as environmental factors.	Broad	70-90% of cancer in Japan can be attributed to environmental risk factors[c]
Verkasalo et al. (154)	1999	Non-genetic effects, thus denoting both physical environment and life-style, regardless of whether they aggregate in families.	Broad	Unique environmental factors accounted for 75% (65-85%) of the inter-individual variation in cancer risk.

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Lichter & Rothman (155)	1999	A wide array of causes, including natural as well as man-made agents. Anything that interacts with humans, including substances eaten, drunk, and smoked, natural and medical radiation, workplace exposures drugs, aspects of sexual behavior, and substances present in the air, water and soil.	Broad	90% of all cancers are caused by contaminants placed in the environment by man.
Lichtenstein et al. (156)	2000	Non-genetic factors	Broad	Contribution of environmental factors ranged from 58-82%
J. Carl Barrett (157)	2000	Describes *environmental factors* as natural and synthetic chemicals, radiation, viruses, diet, and ill-informed lifestyle factors.	Broad	---
F.P. Perera (158)	2000	Exposures related to lifestyle and occupation and pollutants in air, water, and the food supply.	Broad	"The great majority of cancers are, in principle, preventable because the factors that determine their incidence are largely exogenous or environmental."
American Cancer Society (ACS) (159)	2000	Environmental factors include smoking, diet, and infectious diseases as well as chemicals and radiation in our homes and workplaces.	Broad	Estimates that environmental factors cause 75% of all cancer cases in the US[c]
Perera & Weinstein (160)	2000	Cigarette smoking, occupational and environmental chemicals, radiation, dietary factors and viruses.	Broad	---
S.S. Epstein (161)	2001	"There are chemicals in the environment, there is air pollution, and there are also consumer products with undisclosed cancer risks – pharmaceutical and body-care products, household products, and food contaminated with pesticides; there is also indoor pollution and occupational exposure."	Narrow	---
R.B. Hayes (162)	2001	Non-genetic factors.	Broad	85% of cancer can be attributed to environmental causes
Adami et al. (163)	2001	Air, water and soil pollutants	Narrow	2% mortality due to environmental pollution[a] <5% due to occupational factors 2% due to Ionizing & UV radiation 1% due to food additives
Tomatis et al. (164)	2001	Synthetic and natural chemicals.	Narrow	"Cancer is thought to be a consequence of genetic and environmental factors, and there are no accurate estimates of the percentage of cancers directly attributable to exposure to occupational or environmental carcinogens."
Dreyer et al. (165)	2001	Tobacco, alcohol, occupation, radon, radiation, infections.	Broad	23% (women) and 42% (men) cancer deaths attributable to the environment [c]
Melse & de Hollander (166) *OECD*	2001	Include physical, chemical and biological human-made or influenced exposures, but exclude occupational health and safety, traffic, war, and life-style factors.	Broad	1-5%

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Wang & Chen (167)	2001	External factors	Broad	Genetic factors are thought to explain only about 5% of all cancer – the remainder can be attributed to external, 'environment' factors that act in conjunction with both genetic and acquired susceptibility.
Hemminki et al. (168)	2001	Includes smoking, diet, and lifestyle factors.	Broad	Environmental effect: 67-68% for colorectal cancer and melanoma 71% for lung cancer
Montesano & Hall (169)	2001	"We use the term 'environmental causes' with reference to different types of human exposures that include exogenous risk factors (chemical, physical and biological agents) and endogenous risk factors (e.g. oxidative DNA damage resulting from infections, gastric reflux in adenocarcinoma of the oesophagus, etc.)."	Broad	---
Landrigan et al. (170)	2002	Toxic chemicals of human origin in air, food, water and communities. Excludes outcomes of personal choice such as tobacco, alcohol, or drug use.	Narrow	At least 5%-10% and less than 80%-90%[d] of all childhood cancers attributed to the environment (5-90%)
W. Willett (171)	2002	The broadest sense (non-genetic factors).	Broad	At least 80 or 90%
Davis & Webster (172)	2002	Encompasses the full array of exogenous factors and impacts on natural resources.	Broad	
Carpenter et al. (173)	2002	Smoking, diet, pollutants, radiation, infectious agents, and drugs.	Broad	Genetics alone account for no more than 5% of cancers
L. Migliore (174)	2002	Lists examples of environmental factors as tobacco smoke, sunlight exposure, aflatoxin, ionizing radiation, heterocyclic amines, aromatic amines, viral infections, inflammation, asbestos, arsenic, nickel, cadmium, cobalt, and vinyl chloride.	Broad	---
Institute of Medicine (175)	2002	The sum total of all the conditions and elements that make up the surroundings and influence the development and actions of an individual.	Broad	80% of cancers are related to environmental factors
B. Stewart (176)	2002	*Environmental factors:* include not only a number of specific chemicals encountered in an occupational, medicinal or dietary context, but also complex mixtures encountered in foodstuffs, tobacco smoke, pollutants and workplace conditions. Ionising and non-ionising radiation, certain infections, chronic inflammatory states, some behaviors, reproductive status, and the competence of the immune system.	Broad	60-90% cancer caused by environmental factors
Czene et al. (177)	2002	Tobacco smoking, infections, ultraviolet and ionizing radiation, alcohol and occupational exposures, and dietary factors.	Broad	58-88% of cancers were attributed to non-shared environmental factors
Linet et al. (178)	2003	Radiation (including ionizing and non-ionizing forms), metals, fibers (eg, asbestos), individual chemicals, mixtures (eg, paints, cigarette smoke, pharmaceutical agents containing several chemicals), dietary constituents (including mixtures such as food groups, macronutrients such as specific types of fat, and micronutrients) and physical activity.	Broad	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Vermont Department of Health (179)	2003	Differentiates between lifestyle factors (tobacco use, alcohol, poor diet, and overexposure to sunlight) and environmental pollutants and radiation.	Narrow	4% of cancer deaths can be attributed to environmental pollution or radiation
D. Briggs (180)	2003	*Environmental pollution:* the presence in the environment of an agent, which is potentially damaging to either the environment or human health.	Narrow	---
D. Dix (181)	2003	Chemical, physical, and biological agents.	Broad	States that the 80% estimate is exaggerated
Kreiger et al. (182)	2003	Defines "*environmental exposures"* as natural and anthropogenic chemical and physical hazards in air, water, soil, foods, consumer products, and our climate to which people may be exposed, usually involuntarily because of the need to eat, drink, and breathe in order to live.	Narrow	---
Boffetta & Nyberg (183)	2003	*Broad:* All non-genetic factors such as diet, lifestyle and infectious agents. *Narrow:* Only the (natural or man-made) agents encountered by humans in their daily life, upon which they have no or limited personal control. Most important environmental exposures: outdoor/indoor air pollution and soil and drinking water contamination.	Narrow	---
Lesley Rushton (184)	2003	*Broad:* External conditions influencing the development of people, animals, or plants; *Voluntary:* lifestyle factors including smoking, diet and alcohol; *Involuntary:* Occupation, air and water pollutants.	Broad	---
Massey & Ackerman (185)	2003	Chemical pollutants in the ambient environment. Excludes tobacco, alcohol, drug use, and any factors related to personal or familial choice.	Narrow	5-90%[d] - only includes childhood cancers
World Cancer Report 2003 *IARC* (186)	2003	Differentiates between broad *environmental factors* – including active smoking, alcohol intake, sun exposure and dietary makeup (where individuals have control over their actions) and *environmental pollutants* – contaminants in air, water and soil (where individuals lack control over their level of exposure).	Narrow	1-4% of cancers attributable to environmental pollutants
P. Boffetta (187)	2004	*Broad:* All nongenetic factors such as diet, lifestyle and infectious agents. *Narrow:* Only the (natural or man-made) agents encountered by humans in their daily life, upon which they have no or limited personal control. Outdoor and indoor air pollution and soil and drinking water contamination.	Narrow	0.5-1% of all cancers are environmental in cause
Wogan et al. (188)	2004	Diet, smoking, alcohol ingestion, drug administration, ingestion of herbal remedies, exposure to environmental pollutants	Broad	---
Kolonel et al. (189)	2004	Tobacco use, reproductive and menstrual traits, exogenous hormones, obesity, certain dietary items, sun exposure, viruses, and other chronic infections, and some occupational exposures.	Broad	---
Parkin (190)	2004	External environment (air pollution, water contaminants, radiation, etc.) and lifestyle (reproduction, diet, tobacco use, etc.).	Broad	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Benedetto Terracini (191)	2004	Including cultural and behavioral factors, tobacco, diet, alcohol, and radiation.	Broad	At least 75% of cancers are attributable to exogenous factors.
Aaron Blair (192) *NCI*	2004	In the broad sense to include both lifestyle factors such as diet, tobacco, and alcohol, as well as radiation, infectious agents, and substances in the air, water, and soil.	Broad	The relative contribution from the environment toward cancer risk is about 80-90%
Clapp & Ozonoff (193)	2004	"Environmental exposure, broadly defined as any exposure from outside the body."	Broad	---
Danaei et al. (194)	2005	Included urban air pollution and indoor smoke as environmental risks.	Narrow	35% of cancer deaths worldwide and 37% of the cancer deaths in high-income countries could be attributed to potentially modifiable lifestyle and environmental risk factors.
L. Le Marchand (195)	2005	Including lifestyle, medications, environmental pollutants, radiation, and infectious agents.	Broad	50-90% of the variation in risk across individuals can be explained by known environmental risk factors
Khoury et al. (196)	2005	Modifiable, nongenetic factors.	Broad	80-90%
Christopher P. Wild (197)	2005	Lifestyle (including diet), infections, radiation, natural and man-made chemicals and occupational exposures. *Exposome:* Air, water, diet, lifestyle, behavior, metabolism, inflammation and oxidative processes.	Broad	---
Newby & Howard (198)	2005	Involuntary exposure to carcinogens. Involuntary exposure implies that the individual has no control over the level of exposure, for example, exposure by means of the diet or through soil, air and water pollution.	Narrow	Between 1 and 5% of all cancers are attributable to environmental factors – though states that this may be an underestimate.
Marahatta et al. (199)	2005	All non-genetic factors.	Broad	95% of cancers are attributable to external, environmental factors that act in conjunction with both genetic and acquired susceptibility.
Medical dictionary (200)	2005	The complex of physical, chemical, and biotic factors (as climate, soil, and living things) that act upon an organism or an ecological community and ultimately determine its form and survival. Also, the aggregate of social and cultural conditions that influence the life of an individual or community.	Broad	---
Giarelli & Jacobs (201)	2005	Either all that is external to the nuclear membrane, external to the cellular membrane, or external to the organism.	Broad	---
Lagiou et al. (202)	2005	Air, water and soil pollutants.	Narrow	3% Environmental pollution[a] 5% Occupational factors 2% Ionizing & food radiation 1% Food additives

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Andreas Luch (203)	2005	Tobacco, alcohol, diet, infections and occupational exposures.	Broad	Over 80% of cancer deaths in Western industrial countries can be attributed to environmental exposures.
Mathews & Parry (204)	2005	Environmental pollutants may be defined as chemical substances of human origin in air, water, soil, food or the home environment.	Narrow	5% (5-90%)[d] – only includes childhood cancers
Rothman & Greenland (205)	2005	An all-embracing category that represents nongenetic causes.	Broad	"It is clear on a priori grounds that 100% of any disease is environmentally caused. Thus, Higginson's estimate of 90% was an underestimate. Similarly, one can show that 100% of any disease is inherited."
AFSSE; the French Agency for Environmental Safety and Health (206)	2005	Chemical environment (e.g. pesticides, dioxin); physical environment (e.g. ionizing radiation, UV radiation, radon); viral and bacterial infections.	Broad	Some believe that half of cancer cases could be avoided by applying existing etiological knowledge. However, this estimate is widely debated for lack of consensus criteria among the scientific community.
Davies & Hauge (207)	2006	Chemical pollutants in air, water, and food.	Narrow	5% (2-10%) [d]
Environmental Protection Agency (208)	2006	The sum of all external conditions affecting the life, development and survival of an organism.	Broad	---
Vineis & Berwick (209)	2006	*Environmental exposures*: All changes that occur in the external environment that have the capability of modifying also the internal environment of the cell.	Broad	---
P. Boffetta (210)	2006	*Broad:* All non-genetic factors such as diet, lifestyle and infectious agents. *Narrow:* Only the (natural or man-made) agents encountered by humans in their daily life, upon which they have no or limited personal control. Only air, water, soil and food pollutants.	Narrow	---
Hemminki et al. (211)	2006	Any influencing factor that is not inherited, including sporadic, random causation of disease.	Broad	75-90% of cancer has thought to be environmental.
Ezzati et al. (212)	2006	Includes indoor/outdoor air pollution as environmental.	Narrow	35% of cancer deaths worldwide attributable to modifiable and environmental risk factors.
National Cancer Institute (NCI) (213)	2006	Everything outside the body that enters and interacts with it – sunshine, radiation, hormones, viruses, bacteria, chemicals in air, water, food, and workplace, lifestyle choices (including smoking and excessive alcohol consumption), an unhealthful diet, or lack of exercise.	Broad	67% of all cancers attributable to the environment
National Institute of Environmental Health Sciences (NIEHS) (214)	2006	"In the broadest sense, the environment is what is all around you; it consists of the chemicals, foods, drugs, and natural products that you touch, eat, and breathe in everyday life."	Broad	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
ACS (215)	2006	*Environmental factors:* tobacco use, poor nutrition, inactivity, obesity, certain infectious agents, certain medical treatments, sunlight, cancer- causing agents that occur naturally in food, cancer-causing agents in the workplace, and cancer-causing agents that exist as pollutants in our air, water, and soil.	Broad	75-80% of cancer cases and deaths are due to environmental factors in the broad sense 4% occupational exposures 2% environmental pollutants
Enrique Garcia Jorda (216)	2006	"We understand the word environment as our surround or envelope; just like the scene or sum of the things around us. This envelope affects and determines our lives, and specially the life circumstances of people, or the society as a whole; it contains the sum of natural, social and cultural values of a place in a certain moment, and has an influence on the life of men and the generations to come. It comprises not only the space where life develops but also all living beings, objects, water, ground, air, as well as all relations among them; and also intangible elements, such as cultural aspects." Breaks up the environment into physical, biological and socioeconomic.	Broad	80% of cancers caused by exogenous and environmental factors
Pruss-Ustan & Corvalan (217) *WHO*	2006	All the physical, chemical and biological factors external to the human host, and all related behaviors, but not excluding those natural environments that cannot be modified.	Broad	19% (12-29%)
Ma & Yu (218)	2006	Contaminants in the environment, such as indoor air pollution and pesticides.	Narrow	"It is believed that the majority of cancer cases (over 90 percent) are due to the joint effect of genetic variations, environmental factors, and lifestyle choices."
Shuler et al. (219)	2006	Air, water, soil, and food pollutants.	Narrow	5% (2-10%) [d]
Soterios A. Kyrtopoulos (220)	2006	All exogenous factors.	Broad	Environmental factors determine more than 50% of the cancer risk
Boyd & Genuis (221)	2007	Refers specifically to various forms of adverse environmental exposures such as chemical exposure and pollution, not the broader meaning sometimes used in the medical community to refer to all factors outside of an individual's genetic makeup.	Narrow	---
Boffetta et al. (222) *IARC*	2007	*Broad*: all non-genetic factors such as diet, lifestyle and infectious agents. *Narrow:* Only the natural or man-made agents encountered by humans in their daily life, upon which they have no or limited personal control. Air, water, soil and food pollutants.	Narrow	1-3% of all cancers attributable to the environment (using narrow definition).
Saracci & Vineis (223)	2007	Outdoor air pollution, indoor air pollution from solid fuel-use, lead, water and sanitation/hygiene.	Narrow	5.1% of all cancers attributable to just pollutants 5.3% due to pollutants and occupational causes
Anthony B. Miller (224)	2007	Attribution to manmade factors in "the environment", that is carcinogenic contaminants in air, water, and soil, that may either affect us directly, or through our food supply.	Narrow	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
D. Belpomme (225)	2007	*Standard definition*: physical, chemical and biotic factors that act on individuals; *Geneticists:* consider all acquired factors and therefore include lifestyle-related factors among environmental factors; *Oncologists:* distinguish lifestyle-related factors such as smoking, alcohol consumption and diets, from physical, chemical and biological cancer-causing agents, which may be present in the surroundings of individuals and thus can contribute to carcinogenesis.	Broad	---
Z. Herceg (226)	2007	Chemical carcinogens, dietary contaminants, and physical carcinogens – tobacco smoke, nickel, aflatoxin B1 (AFB1), arsenic, ionizing radiation, UV radiation, bacteria, and viruses. Distinguishes environmental factors from dietary and lifestyle.	Broad	---
D. Belpomme et al. (227)	2007	Physical, chemical and biological agents present in the surroundings of individuals.	Broad	---
IARC (228)	2007	Water, air, soil and food pollutants.	Narrow	0.1% of all cancers in *France* attributed to pollutants of the environment [c]
Pruss-Ustan & Corvalan (229)	2007	The physical, chemical and biologic environment to the human host and related behavior, but only those parts that could be reasonably modified. Includes pollution, radiation, noise, occupational risks, the built environment, land use patterns, agricultural methods and irrigation schemes, and manmade changes to the climate and ecosystems.	Broad	19% (12-29%)
Irigaray et al. (230)	2007	Alcohol consumption, smoking, microorganisms (viruses, bacteria and parasites), radiations (radioactivity, UV and pulsed electromagnetic fields), xenochemicals, outdoor air pollution (carbon particles associated with polycyclic aromatic hydrocarbons), indoor air pollution (environmental tobacco smoke, formaldehyde and volatile organic compounds such as benzene and 1,3 butadiene), food additives, carcinogenic contaminants such as nitrates, pesticides, dioxins and other organochlorines, carcinogenic metals and metalloids, pharmaceutical medicines and some ingredients and contaminants in cosmetics.	Broad	Although the risk fraction attributable to environmental factors is still unknown, this long list of carcinogenic and especially mutagenic factors supports our working hypothesis according to which numerous cancers may in fact be caused by the recent modification of our environment
R.W. Ruddon (231)	2007	Cigarette smoking, diet, ultraviolet radiation, sexual practices, parasitic and viral infections, industrial pollution, and pesticides.	Broad	60 to 90% of human cancers are attributable to environmental and lifestyle factors.
Jirtle & Skinner (232)	2007	The word 'environment' means vastly different things to different people. For sociologists and psychologists, it conjures up visions of social group interactions, family dynamics and maternal nurturing. Nutritionists might envision food pyramids and dietary supplements, whereas toxicologists think of water, soil and air pollutants.	Broad	---
Bert Brunekreef (233)	2008	All that surrounds us. This includes the water we drink, the air we inhale, the food we eat, the soil we live on, the buildings we dwell in, the work we do, and the society we are part of. Excluding occupational exposures and the social environment.	Broad	---
Angela Logomasini (234)	2008	Everything other than genetics. Smoking, diet, occupational exposure to chemicals, and geophysical factors (naturally occurring radiation, man-made radiation, medical drugs and medical radiation, and pollution).	Broad	80-90% of cancers are caused by environmental factors

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Anand et al. (235)	2008	Includes diet, alcohol, tobacco, obesity, infectious agents, environmental pollutants, and radiation.	Broad	90-95% of cancer can be attributed to environmental factors
R.M. Merrill (236)	2008	Inner vs. outer environment; Personal vs. ambient environment: where a person has control or not; Solid, liquid, and gaseous environments: solid, food, water, and air contaminants; Physical, chemical, biological, and psychosocial environments.	Broad	---
I. Hertz-Picciotto (237)	2008	Factors that are exogenous to and nonessential for the normal functioning of human beings and that alter patterns of disease and health. It therefore includes physical, chemical, and biological agents, as well as social, political, cultural, and engineering or architectural factors affecting human contact with such agents.	Broad	90-100%
Martin-Moreno et al. (238)	2008	Pollutants in the air, water, and soil, as well as radiation.	Narrow	5% of cancer incidence in men is attributable to environmental and occupational exposures.
Oregon Environmental Council (239)	2008	Air, water and soil pollutants, both naturally occurring and anthropogenic. Exposures included within this definition are potentially preventable through application of pollution prevention and public health approaches. This definition of environmental factors does not include diet, smoking, alcohol, sexual behavior, infectious disease, accidents or injuries.	Narrow	5% (2-10%) [d]
Miquel Porta (240) *International Epidemiological Association (IEA)*	2008	All that which is external to the individual human host. Can be divided into physical, biological, social, cultural, etc., any or all of which can influence the health status of populations.	Broad	---
D.G. Zaridze (241)	2008	Environmental factors include occupation and exposure to carcinogens at the workplace, exogenous hormones, ultraviolet and ionizing radiation.	Broad	90-95% of cancers are due to environment and lifestyle factors
National Center for Environmental Health (NCEH) (242)	2009	Everything around us – the air we breathe, the water we drink and use, and the food we consume. It's also the chemicals, radiation, microbes, and physical forces with which we come into contact.	Broad	---
Cancer Research UK (243)	2009	Pollutants and chemicals in air, water, food, and soil.	Narrow	3% of all cancers
Kumar & Das (244)	2009	Microorganisms (viruses, bacteria and parasites), radiation (radioactivity, UV and pulsed electromagnetic fields), occupational exposures, tobacco smoke, sexual behavior, alcohol, diet, pollutants (in the workplace, air, water, and food supply), formaldehyde, volatile organic compounds such as benzene and 1,3 butadiene and many xenochemicals, carcinogenic metals and metalloids, pharmaceutical medicines, food additives, and cosmetics.	Broad	90-95% of all cancers can be attributed to environmental carcinogens.
Cancer Care Ontario (245)	2009	Environmental contaminants such as arsenic, radon, chromium, nitrates, solar radiation, and environmental tobacco smoke.	Narrow	It is unknown to what degree environmental carcinogens contribute to the cancer burden.
Vineis & Xun (246)	2009	Pollutants of air, food, water and soil. Excluding tobacco smoking, alcohol, dietary habits, occupational exposures, and infectious or parasitic causes of cancer.	Narrow	---

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Mary E. Davis (247)	2009	Air, water, soil, and food pollutants.	Narrow	5 % (2-10%) [d]
G. Colditz (248)	2009	Smoking, diet, reproductive behavior, sexual behavior, infection, and occupational exposures.	Broad	Cites Doll & Peto's estimates: smoking (30%), diet and lack of physical activity (35%) infections (17%) – 75-80% of cancers.
J. Shen (249)	2009	Endogenous and exogenous exposures. Personal lifestyle and behavioral factors.	Broad	75-90% of sporadic cancer is environmentally determined. Up to 90% for all types of cancer
Fontham et al. (250)	2009	Tobacco use, poor nutrition, physical activity and obesity, alcohol consumption, excessive sun exposure, certain chronic infections, and exposures to other known carcinogens in various settings…'environmental' in the sense that they are acquired, and potentially controllable, rather than being inherited genetic traits."	Broad	---
The Lancet (251)	2010	Toxic chemicals and environmental pollutants found in the air, water, home, and workplace.	Narrow	6% of US cancer deaths are attributable to occupational and environmental risk factors. [a]
New Hampshire Department of Environmental Services (252)	2010	Chemicals and pollutants.	Narrow	75% of cancer mortality can be attributed to behavioral risk factors such as smoking, drinking, and diet. A much smaller proportion of cancer mortality has been linked to environmental factors and pollution.[a]
J. Argo (253)	2010	Factors closely related to the daily life of humans.	Broad	80-90% of cancers are caused by environmental carcinogens
Paolo Boffetta (254)	2010	"The term 'environmental factors', with regard to disease causation, is often used in the medical literature to include all non-genetic factors, such as diet, lifestyle and infectious agents. In this broad sense, the environment has been implicated in the causation of the majority of human cancers. But in a more specific sense, environmental factors should include only the natural or man-made agents encountered by humans in their daily life, upon which they have no or limited personal control, including air, water, soil and food pollutants."	Narrow	---
Huchcroft et al. (255)	2010	Defined broadly as those that are not a lifestyle choice (such as diet and smoking), are ubiquitous (e.g., ultraviolet radiation and air pollution) and/or involve involuntary exposure (e.g., occupational exposures, industrial pollution and environmental tobacco smoke). Although biological agents are a class of environmental exposures/ hazards, they are not dealt with here.	Broad	---
Ziech et al. (256)	2010	Air, water, soil, and food pollutants.	Narrow	---
Glaser et al. (257)	2010	Chemical pollutants in air, water, and food.	Narrow	5% (2 -10%) [d]

Reference	Year	Definition of environment	Narrow/ broad def.	Environmentally attributable risk estimate for cancer
Maryland Department of Health (258)	2010	Many cancer researchers consider things such as tobacco use, diet, alcohol, a woman's age when she has her first child, lifestyle factors, infections and exposure to sunlight. In this very broad sense, it is likely that a large percentage of cancers are environmental in their origin. However, if environment is defined more narrowly as one's surroundings, then the percentage of cancers that can be attributed to the environment is probably small.	Broad	---
Rappaport & Smith (259)	2010	Differentiates between internal chemical environment and "external environment" which includes radiation, stress, lifestyle, infections, drugs, diet and pollution	Broad	---
Cancer Research UK (260)	2010	What is around you each day that may help to cause cancer. This could include: tobacco smoke, the sun, natural and manmade radiation, work place hazards, asbestos.	Broad	---
Agency for Toxic Substances & Disease Registry (261)	2010	Everything outside the body that interacts with humans. Lifestyle choices such as cigarette smoking, excessive alcohol consumption, poor diet, lack of exercise, excessive sunlight exposure, and sexual behavior, that increases exposure to certain viruses. Other factors include exposure to certain medical drugs, hormones, radiation, viruses, bacteria, and environmental chemicals possibly present in the air, water, food, and workplace.	Broad	Natural and manufactured substances in the environment accounts for at least two-thirds of all cancer cases.

[a] Represents mortality not incidence
[b] Represents DALYs not incidence
[c] Estimate only applies to one country (not a global estimate)
[d] Estimate includes only childhood cancers

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