Ethylbenzene
Environmental estimates (circa 2011): Supplemental data

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1. Data for lifetime excess cancer risk estimates

Overview

The summary data used to calculate lifetime excess cancer risk and the results for ethylbenzene are provided in the tables below. For more detailed information on supporting data and sources, see below for each exposure pathway.

i. Environmental Concentrations

Exposure pathway	Units	Average	Maximum	Notes
Outdoor air	µg/m³	0.55	8.9	
Indoor air	µg/m³	2.16	200	
Drinking water	µg/L	0.052	0.3	
Foods and beverages		See detailed data	Not estimated	

ii. Calculated Lifetime Daily Intake

Exposure pathway	Average intake (mg/kg bodyweight per day)	Maximum intake (mg/kg bodyweight per day)
Outdoor air	0.000013	0.00021
Indoor air	0.00070	0.065
Drinking water	0.0000014	0.000008
Foods and beverages	0.0000028	Not estimated

iii. Cancer Potency Factors

Exposure route	Health Canada	US EPA	CA OEHHA
Inhalation	--	--	0.0087
Ingestion	--	--	0.011

Sources for Cancer Potency Factors:

- Health Canada, 2010. Federal Contaminated Site Risk Assessment in Canada, Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment. Version 2.0.
- Health Canada, 2010. Federal Contaminated Site Risk Assessment in Canada, Part II: Health Canada Toxicological Reference Values (TRVs) and Chemical-Specific Factors. Version 2.0.
- United States Environmental Protection Agency Integrated Risk Information System
- California Office of Environmental Health Hazard Assessment, 2009. Air Toxics Hot Spots Risk Assessment Guidelines Part II: Technical Support Document for Cancer Potency Factors, Appendix A. (Updated 2011)

iv. Lifetime Excess Cancer Risk (per million people)

	Average[1]			Maximum[2]
Exposure pathway	Health Canada	US EPA	CA OEHHA[3]	
Outdoor air	--	--	0.111	1.79
Indoor air	--	--	6.10	565.27
Drinking water	--	--	0.015	0.086
Foods and beverages	--	--	0.0304	Not estimated

[1]Lifetime excess cancer risk based on average intake x cancer potency factor from each agency
[2]Lifetime excess cancer risk based on maximum intake x highest cancer potency factor
[3]California Office of Environmental Health Hazard Assessment

Supporting data by exposure pathway

i. Outdoor air

Outdoor air concentrations are from the National Air Pollution Surveillance monitoring network operated by Environment Canada, for the year 2010.

Source	Stations (n)	Min	Max	Mean	DF
NAPS 2010 (µg/m³)	53	0.007	8.9	0.55	1.0

DF = Detection frequency

We assume ethylbenzene is present at these levels in all outdoor air, although concentrations may vary from one location to another.

ii. Indoor air

Indoor air concentrations are based on data published in peer-reviewed literature since 2000. A ranking system was used to select data most representative of Canadian conditions circa 2011:

1. Canadian data collected in 2000 or more recently, sample duration of 24 hours or longer;
2. US studies of similar currency and sample duration;
3. Studies from northern European countries of similar currency and sample duration;
4. Canadian, US or European studies with data collected prior to 2000 and similar sample duration; and
5. Studies with sample duration of less than 24 hours regardless of country or collection date, or studies from countries not comparable to Canada.

Rank: 1	Author:	Wheeler (2013)						Location:	Canada National		
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
3857	0.996	0.35	2009-2011	µg/m³	7 days			4.09	1.24	1.44	25th 0.60 75th 2.78 90th 7.28 95th 15.07

*DF = Detection frequency
**DL = Detection limit

Rank: 1	Author:	Health Canada (2012)						Location:	Halifax, NS		
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
331	1.0	0.002	2009 summer	µg/m³	24hr	0.068	210.40	6.917	1.108	1.554	25th 0.588 75th 3.948 90th 10.59 95th 23.05
312	1.0		winter			0.137	107.10	4.160	1.073	1.215	25th 0.495 75th 2.163 90th 4.583 95th 11.04

*DF = Detection frequency
**DL = Detection limit

Rank: 1	Author:	Health Canada (2010)						Location:	Regina, SK		
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
105	1.0	0.029	2007 Summer	µg/m³	24hr	0.103	33.595	3.637	1.535	1.771	25th 0.803 75th 3.730 90th 7.165 95th 15.440
101	1.0				5 day	0.270	216.500	6.160	2.010	2.244	25th 1.000 75th 4.370 90th 8.285 95th 15.880
105	1.0		winter		24hr	0.227	14.270	1.902	1.083	1.172	25th 0.630 75th 1.937 90th 3.973 95th 5.770
89	1.0				5 day	0.133	41.943	1.945	0.970	1.055	25th 0.577 75th 1.923 90th 3.017 95th 5.110

*DF = Detection frequency
**DL = Detection limit

Rank: 1 Author: Health Canada (2010) Location: Windsor, ON

Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
217	1.0	0.046	2005 summer	$\mu g/m^3$	24hr	0.410	912.780	15.331	4.092	1.630	25th 1.745 75th 7.085 90th 23.883 95th 39.665
232	1.0		winter			0.224	609.930	7.668	1.123	1.587	25th 0.672 75th 2.469 90th 5.580 95th 11.300
211	0.995	0.038	2006 summer		24hr	0.287	308.390	10.338	2.537	3.773	25th 1.597 75th 7.007 90th 26.400 95th 54.280
224	1.0		winter			0.267	1198.500	10.686	1.177	1.378	25th 0.723 75th 2.005 90th 5.013 95th 10.175

*DF = Detection frequency
**DL = Detection limit

Rank: 1 Author: Héroux (2008) Location: Québec, Canada

Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
96	0.96	0.2	2005 (winter)	$\mu g/m^3$	7 days	0.4	19.5		2.45	2.69	

*DF = Detection frequency
**DL = Detection limit

Rank: 1 Author: WBEA (2008) Location: Alberta, Canada

Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
35	1.0	0.55	2006	$\mu g/m^3$	4 weeks				1.8		95th 26.4
24									2.1		95th 18.5

Notes: Values listed in following order: Fort MacKay, Fort McMurray
*DF = Detection frequency
**DL = Detection limit

Rank: 2 Author: Adgate (2004) Location: USA, Minnesota

Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
113	1.0		2000	$\mu g/m^3$	48 hrs				1.0		10th 0.6 90th 2.8
	1.0								1.0		10th 0.5 90th 3.8

Notes: Values listed in following order: Winter, Spring
*DF = Detection frequency
**DL = Detection limit

Rank: 2	Author:	Batterman (2007)					Location:	USA, Michigan			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
15	1.0	0.021	2005	µg/m³	4 days		5.2	2.3			

Notes: Single family dwelling with attached garages
*DF = Detection frequency
**DL = Detection limit

Rank: 2	Author:	Jia (2008)					Location:	USA, Michigan (Ann Arbor, Ypsilanti, Dearborn)			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
252	1.0		2004-	µg/m3	3-4 days		79.87	2.84	1.17		
46			2005					3.15	0.94		
50								2.77	1.06		
30								4.06	1.06		
29								1.98	1.12		
45								2.05	1.25		
52								3.09	1.83		

Notes: Values listed in following order: ALL, Suburban Summer '04, Suburban Winter '05, Urban Summer '04, Urban Winter '05, Industrial Spring '05 Industrial Fall '04
*DF = Detection frequency
**DL = Detection limit

Rank: 2	Author:	Johnson (2010)					Location:	USA, Michigan			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
41	1.0	0.1	2006	µg/m³	7day or 24/48 hr	0.4	20.8	2.3			25th 0.8 50th 1.3 75th 2.1 95th 9.0

*DF = Detection frequency
**DL = Detection limit

Rank: 2	Author:	Payne-Sturges (2004)					Location:	USA, Baltimore			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
33			2000-2001	µg/m³	3 day			3.22	1.95		10th 0.90 90th 7.33

*DF = Detection frequency
**DL = Detection limit

Rank: 2	Author:	Schlink (2010)					Location:	Germany, Leipzig			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
601			2004-2005	$\mu g/m^3$	4 weeks		29	2.23			50th 1.40 95th 7.57 98th 10.93

*DF = Detection frequency
**DL = Detection limit

Rank: 2	Author:	Weisel (2008)					Location:	USA, New Jersey			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
100	0.56	2.2 or 0.87	2003-2006	$\mu g/m^3$	24 hr	Bdl <0.87	39	3.72			25th <1.2 50th 2.20 75th 2.75 90th 9.64 95th 12.0

*DF = Detection frequency
**DL = Detection limit

Rank: 3	Author:	Ohura (2006)					Location:	Japan, Shimizu			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
25	1.0	0.55	2000-2001	$\mu g/m^3$	24 hr					2.47	10th 1.38 90th 4.45
21										5.26	10th 2.09 90th 18.4

Notes: Values listed in following order: Summer, Winter
*DF = Detection frequency
**DL = Detection limit

Rank: 4	Author:	Kim (2001)					Location:	England, Birmingham			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
128		<0.32	1999-2000	$\mu g/m^3$	48 hrs	0.6	6.5	2.3	2.0		
32						0.6	5.9	1.9	1.5		
32						1.1	6.5	2.7	2.4		
2								1.2			
2								4.2			
2								3.2			
2								2.5			

Notes: Values listed in following order: ALL, Smoking (6), Non-smoking (6), Before Solvent Cleaning, After Solvent Cleaning, Before Painting, After Painting
*DF = Detection frequency
**DL = Detection limit

Rank: 4	Author:	Kinney (2002)					Location:	New York City, Los Angeles			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
36		0.22	1999	µg/m³	48 hrs			0.00127			
36		0.17						0.00199			

Notes: Values listed in following order: Winter, Summer
*DF = Detection frequency
**DL = Detection limit

Rank: 4	Author:	Sax (2006)					Location:	New York City, Los Angeles			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
79	1.0		1999-	µg/m³	48 hr		17.9	2.48	1.65		
75	1.0		2000				8.55	2.75	2.35		

Notes: Values listed in following order: New York City, Los Angeles.
*DF = Detection frequency
**DL = Detection limit

Rank: 4	Author:	Schlink (2004)					Location:	Germany			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
2103			1994- 2001	µg/m³	4 weeks		11.3	3.6	1.9		95th 10.2 98th 19.1

Notes: Leipzig, München, Köln
*DF = Detection frequency
**DL = Detection limit

Rank: 4	Author:	Sexton (2004)					Location:	USA, Minnesota			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
292	0.99		1999	µg/m³	2 day			3.9	1.4		10th 0.5 90th 8.9

Notes: Spring, Summer, Fall Non-Smoking
*DF = Detection frequency
**DL = Detection limit

Rank: 5	Author:	Esplugues (2010)					Location:	Spain, Valencia			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
352	0.97	0.06	2006- 2007	µg/m³	15 days	0.03	40.9	2.3		1.3	25th 0.7 50th 1.3 75th 2.1

Notes: Living Rooms
*DF = Detection frequency
**DL = Detection limit

Rank: 5	Author:	Hinwood (2006)					Location:	W Australia, Perth			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
27		<.01	2000	ppb	12 hrs		0.6				
							0.5				
							0.4				
							0.1				
							0.1				
							< DL				

Notes: Values listed in following order: Open Fireplace Heating, Pot-bellied Stove Heating, With Garage, Indoor (daytime), New Furnishings, Gas Heater
*DF = Detection frequency
**DL = Detection limit

Rank: 5	Author:	Hippelein (2004)					Location:	Germany			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
76		0.07	2000-2001	µg/m³	2 L sample		5.7	1.6	1.4	1.1	90th 2.7

*DF = Detection frequency
**DL = Detection limit

Rank: 5	Author:	Massolo (2009)					Location:	Argentina, La Plata			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
		.01-.05	2000-	µg/m³	4 weeks						
26			2002				18.79	4.21	2.13		
24							2.85	1.35	1.27		
23							25.26	2.57	0.97		
14							23.99	3.60	1.66		

Notes: Values listed in following order: Industry, Urban, Semi-Rural, Residential
*DF = Detection frequency
**DL = Detection limit

Rank: 5	Author:	Zhu (2005)					Location:	Canada, Ottawa			
Samples (n)	DF*	DL**	Sample Date	Units	Sample Duration	Min	Max	Mean (AM)	Med	Geomean (GM)	Percentile
75	0.83	0.01	2002-2003	µg/m³	100 min	0.005	201.41	4.71			50th 1.05 75th 1.98 90th 4.76

*DF = Detection frequency
**DL = Detection limit

Sources for indoor air data:

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- Health Canada. 2012. Halifax Indoor Air Quality Study (2009) – Volitile Organic Compounds (VOC) Data Summary. Available online at http://www.healthcanada.gc.ca.
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- Hinwood AL, Berko HN, Farrar D, Galbally IE, Weeks IA. 2006. Volatile organic compounds in selected micro-environments. Chemosphere 63: 421-429.
- Hippelein M. 2004. Background concentrations of individual and total volatile organic compounds in residential indoor air of Schleswig-Holstein, Germany. Journal of Environmental Monitoring 6: 745-752.
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- Massolo L, Rehwagen M, Porta A, Ronco A, Herbarth O, Mueller A. 2009. Indoor-outdoor distribution and risk assessment of volatile organic compounds in the atmosphere of industrial and urban areas. Environmental Toxicology.
- Ohura T, Amagai T, Senga Y, Fusaya M. 2006. Organic air pollutants inside and outside residences in Shimizu, Japan: Levels, sources and risks. Science of the Total Environment 366: 485-499.
- Payne-Sturges DC, Burke TA, Breyesse P, Diener-West M, Campbell S. 2004. Personal exposure meets risk assessment: a comparison of measured and modeled exposures and risks in an urban community. Environmental Health Perspectives 112: 589-598.
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- Schlink U, Rehwagen M, Damm M, Richter M, Borte M, Herbarth O. 2004. Seasonal cycle of indoor-VOCs: comparison of apartments and cities. Atmospheric Environment 38: 1181-1190.
- Schlink U, Thiem A, Kohajda T, Richter M, Strebel K. 2010. Quantile regression of indoor air concentrations of volatile organic compounds (VOC). Science of the Total Environment 408: 3840-3851.
- Sexton K, Adgate JL, Ramachandran G, Pratt GC, Mongin SJ, Stock TH, et al. 2004. Comparison of personal, indoor, and outdoor exposures to hazardous air pollutants in three urban communities. Environmental Science and Technology 38: 423-430.

- Weisel CP, Alimokhtari S, Sanders PF. 2008. Indoor Air VOC Concentrations in Suburban and Rural New Jersey. Environmental Science & Technology 42: 8231-8238.
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iii. Dust

Ethylbenzene is not expected to be present in indoor dust in significant amounts.

iv. Drinking water

Drinking water data are from the Ontario Drinking Water Surveillance Program (DWSP) for 2011. A review of published reports was also conducted in order to compare how well the Ontario data represented other regions in Canada.

Source	Units	DL
Ontario DWSP 2011	(µg/L)	0.05

Sample Type	Parameter	Mean	SD	Min	25th	50th	75th	Max	N
Distribution		0.052	0.016	0.05	0.05	0.05	0.05	0.3	342

DL = Detection limit
SD = Standard Deviation

v. Food and Beverages

Food consumption data are from the Statistics Canada Food Survey (2006) - Food available, adjusted for losses tables, and from the Nutrition Canada Survey (1970-1972).

Food concentration data are primarily from the US-FDA Total Diet Study (2003-2004), with additional data on metals and several PAHs from the Canadian Food Inspection Agency (CFIA) - National Chemical Residue Monitoring Program: 2009-2010 Annual Report and the US-FDA (TDS Statistics on Element Results - 2008).

In order to better represent actual intake, we incorporated data for cooked and/or processed foods, as in some cases, this can either add to or diminish the amount measured in raw food.

Concentration data were obtained for 21% of total meat consumed, 46% of total seafood consumed, 22% of total fruit consumed, 8% of total vegetables consumed, 18% of total dairy and eggs consumed, 1% of total grains consumed, and 46% of total beverages consumed.

Food or Beverage	Concentration (µg/g)	DF
Beef	0.00036	0.13636
Chicken		
Mutton and lamb		
Offal	0.02100	0.02273
Oils and fats		
Pork		
Salad oils		
Shortening and shortening oils		
Stewing hen		
Turkey		
Veal		
Fish fresh and frozen seafish		
Fish freshwater		
Fish processed seafish	0.00125	0.50000
Apple pie filling		
Apple sauce		
Apples canned		
Apples dried		
Apples fresh	0.00123	0.09091
Apples frozen		
Apricots canned		
Apricots fresh		
Bananas fresh	0.00200	0.02273
Berries other fresh		
Blueberries canned		
Blueberries fresh		
Blueberries frozen		
Cherries fresh		
Cherries frozen		
Citrus other fresh		
Coconut fresh		
Cranberries fresh		
Dates fresh		
Figs fresh		
Fruit dried		
Grapefruit fresh		
Grapes fresh		
Guava and mangoes fresh		
Kiwi fresh		
Lemons fresh		
Limes fresh		
Mandarins fresh		
Melons musk, cantaloupe fresh		
Melons other fresh		
Melons watermelons fresh		
Melons, winter melons fresh		
Nectarines fresh		
Oranges fresh		
Papayas fresh		
Peaches canned		

Food or Beverage	Concentration (µg/g)	DF
Peaches fresh		
Pears canned		
Pears fresh		
Pineapples canned		
Pineapples fresh		
Plums total fresh		
Quinces fresh		
Raspberries frozen		
Strawberries canned		
Strawberries fresh	0.00051	0.04651
Strawberries frozen		
Sugar maple		
Sugar refined		
Honey		
Artichokes fresh		
Asparagus canned		
Asparagus fresh		
Avocados fresh	0.00020	0.06818
Beans baked and canned		
Beans dry		
Beans green and wax canned		
Beans green and wax fresh		
Beans green and wax frozen		
Beets canned		
Beets fresh		
Broccoli fresh		
Broccoli frozen		
Brussels sprouts fresh		
Brussels sprouts frozen		
Cabbage Chinese fresh		
Cabbage fresh		
Carrots canned		
Carrots fresh		
Carrots frozen		
Cauliflower fresh		
Cauliflower frozen		
Celery fresh		
Corn canned		
Corn flour and meal		
Corn fresh		
Corn frozen		
Cucumbers fresh		
Eggplant fresh		
Garlic fresh		
Kohlrabi fresh		
Leeks fresh		
Lettuce fresh		
Lima beans frozen		
Manioc fresh		
Mushrooms canned		

Food or Beverage	Concentration (µg/g)	DF
Mushrooms fresh		
Okra fresh		
Olives fresh		
Onions and shallots fresh		
Parsley fresh		
Parsnips fresh		
Peas canned		
Peas dry		
Peas fresh		
Peas frozen		
Peppers fresh		
Potatoes chips	0.00227	0.27273
Potatoes frozen		
Potatoes other processed		
Potatoes sweet fresh		
Potatoes white fresh		
Potatoes white fresh and processed		
Pumpkins and squash fresh		
Radishes fresh		
Rappini fresh		
Rutabagas and turnip fresh		
Spinach fresh		
Spinach frozen		
Tomatoes canned		
Tomatoes fresh	0.00091	0.09091
Tomatoes pulp, paste and puree		
Vegetables other edible root fresh		
Vegetables other leguminous fresh		
Vegetables unspecified canned		
Vegetables unspecified fresh		
Vegetables unspecified frozen		
Butter	0.00445	0.25000
Cheese cheddar	0.00073	0.09091
Cheese cottage		
Cheese processed	0.00064	0.13636
Cheese variety	0.00023	0.09091
Cream cereal 10%		
Cream sour	0.00005	0.02273
Cream table 18%		
Cream whipping 32% or 35%		
Eggs	0.00039	0.13636
Ice cream	0.00009	0.04545
Ice milk		
Margarine	0.00239	0.29546

Food or Beverage	Concentration (µg/g)	DF
Milk buttermilk		
Milk chocolate drink		
Milk concentrated skim		
Milk concentrated whole		
Milk other whole milk products		
Milk partly skimmed 2%		
Milk skim		
Milk standard		
Milk sweetened concentrated skim		
Milkshake		
Powder buttermilk		
Powder skim milk		
Powder whey		
Sherbet		
Yogurt		
Cereal products		
Oatmeal and rolled oats		
Peanuts	0.00261	0.40909
Pot and pearl barley		
Pulses and nuts		
Rice		
Rye flour		
Tree nuts		
Wheat flour		
Ale, beer, stout and porter		
Beverages alcoholic		
Coffee	0.01700	0.02273
Distilled spirits		
Juice apple		
Juice grape		
Juice tomato		
Juice fruit		
Juice grapefruit		
Juice lemon		
Juice orange	0.00055	0.09091
Juice pineapple		
Juice vegetable		
Soft drinks	0.00027	0.04546
Tea		
Water bottled	0.00200	0.25000
Wines		
Cocoa		

2. Data quality for lifetime excess cancer risk estimates

Only publicly available data were used to calculate these indicators. Data that are not publicly available may produce different results.

No systematic method for measuring data quality was possible, so we provide the following assessments of how well the data used may represent the actual Canadian average levels. Quality is rated higher when there are data from a number of Canadian monitors, or from Canadian studies that show results similar to other comparable studies. Quality is rated lower when data from few monitors or studies were available and lowest when estimates are based on non-Canadian data. Others may rate data quality differently.

Exposure Pathway	Data Quality	Notes
Outdoor air	High	• Ethylbenzene is regularly measured in outdoor air at 53 monitoring stations across Canada using accepted protocols.
Indoor air	High	• The 2009-2011 Canadian Health Measures Survey provides a nationally representative sample of ethylbenzene in indoor air across Canada. Three recent studies in Halifax NS, Regina SK, and Windsor ON were also identified. The national mean concentration is similar to that measured in Halifax NS and Regina SK, although mean and maximum concentrations measured in Windsor ON are higher.
Drinking water	Moderate	• Trace levels of ethylbenzene were detected in 15 percent of samples (n=342) from the Ontario Drinking Water Surveillance Program in 2011.
Foods and beverages	Very Low	• No Canadian data on concentrations of ethylbenzene in foods and beverages were identified. Data from the US-FDA (TDS-2003-2004) were used for this estimate.

3. Data for mapping concentrations

The maps use geographic coordinates at the census block level to represent residential locations. Concentration estimates are mapped at the health region level, which are created with aggregated census block data.

We used a model to predict annual average concentrations of ethylbenzene in outdoor air at residential locations for 2011. These are predicted using levels measured from the National Air Pollution Surveillance (NAPS) monitors and estimated concentrations from known emitters. For more information on how these estimates were created, please see the Mapping Methods document on the Environmental Approach section of our website.

Estimates by health region

The table below shows predicted ethylbenzene concentrations by province based on data at the health region level. The median concentration of ethylbenzene measured in outdoor air in 2011 at the health region level was 0.864 µg/m^3, while the mean concentration was 0.871 µg/m^3. Concentrations of ethylbenzene can be higher or lower than average in many locations.

i. Provincial averages of predicted ethylbenzene concentrations (µg/m^3) in outdoor air in 2011 based on health regions

Province	Median	Mean
BC	0.887	0.927
AB	0.850	0.844
SK	0.816	0.804
MB	0.767	0.772
ON	0.875	0.812
QC	0.931	0.977
NB	0.957	0.950
PE	0.904	0.904
NS	0.835	0.809
NL	0.786	0.802
YK	0.876	0.876
NT	0.730	0.730
NU	1.754	1.754
Canada	**0.864**	**0.871**

Estimates by census block

The table below shows provincial populations by concentration levels (either annual average or number of times above/below the national average) based on the census block data and the associated potential lifetime excess risk given different cancer potency factors.

i. Provincial population distribution by estimated average concentration (µg/m³) of ethylbenzene in outdoor air in 2011 based on NAPS data at the census block

Estimated annual average concentration (µg/m³)	Less than 0.18	0.18 to 0.22	0.22 to 0.28	0.28 to 0.37	0.37 to 0.55	0.55 to 0.83	0.83 to 1.10	1.10 to 1.38	1.38 to 1.65	More than 1.65
Compared to national average (0.55 µg/m³)*	> 3x lower	2.5 to 3x lower	2 to 2.5x lower	1.5 to 2x lower	1 to 1.5x lower	1 to 1.5x higher	1.5 to 2x higher	2 to 2.5x higher	2.5 to 3x higher	> 3.0x higher
	← Below Average					Above Average →				
BC	663,133 (15.1%)	248,757 (5.7%)	101,587 (2.3%)	262,599 (6.0%)	316,420 (7.2%)	508,119 (11.5%)	1,057,017 (24.0%)	413,363 (9.4%)	303,378 (6.9%)	525,684 (11.9%)
AB	269,365 (7.4%)	237,841 (6.5%)	47,822 (1.3%)	98,985 (2.7%)	987,297 (27.1%)	1,072,444 (29.4%)	595,209 (16.3%)	148,217 (4.1%)	91,461 (2.5%)	96,616 (2.7%)
SK	147,935 (14.3%)	141,154 (13.7%)	116,448 (11.3%)	70,664 (6.8%)	94,579 (9.2%)	66,833 (6.5%)	203,632 (19.7%)	50,592 (4.9%)	54,775 (5.3%)	86,769 (8.4%)
MB	145,511 (12.0%)	96,370 (8.0%)	78,328 (6.5%)	317,928 (26.3%)	276,128 (22.9%)	169,587 (14.0%)	76,995 (6.4%)	15,994 (1.3%)	11,045 (0.1%)	20,382 (1.7%)
ON	1,282,109 (10.0%)	630,613 (4.9%)	629,564 (4.9%)	1,650,813 (12.8%)	2,937,911 (22.9%)	2,772,707 (21.6%)	1,074,393 (8.4%)	353,955 (2.8%)	319,032 (2.5%)	1,200,724 (9.3%)
QC	1,076,995 (13.6%)	301,424 (3.8%)	61,399 (0.8%)	162,057 (2.1%)	812,968 (10.3%)	1,366,189 (17.3%)	1,347,146 (17.0%)	695,468 (8.8%)	492,412 (6.2%)	1,586,943 (20.1%)
NB	146,653 (19.5%)	66,800 (8.9%)	13,681 (1.8%)	38,570 (5.1%)	76,028 (10.1%)	93,785 (12.5%)	137,926 (18.4%)	39,960 (5.3%)	30,143 (4.0%)	107,625 (14.3%)
NS	192,780 (20.9%)	88,121 (9.6%)	46,894 (5.1%)	142,507 (15.5%)	143,693 (15.6%)	138,174 (15.0%)	110,722 (12.0%)	15,166 (1.6%)	11,157 (1.2%)	32,513 (3.5%)
PE	36,690 (26.2%)	8,558 (6.1%)	2,090 (1.5%)	3,294 (2.3%)	6,947 (5.0%)	18,568 (13.2%)	32,490 (23.2%)	4,598 (3.3%)	5,900 (4.2%)	21,069 (15.0%)
NL	83,858 (18.4%)	93,550 (18.2%)	46,468 (9.0%)	105,322 (20.5%)	97,438 (18.9%)	47,199 (9.2%)	22,236 (4.3%)	3,192 (0.6%)	7,519 (1.5%)	7,754 (1.5%)
NU	6,142 (19.3%)	19,294 (60.5%)	6,430 (20.2%)	40 (0.1%)	--	--	--	--	--	--
NT	3,633 (8.8%)	11,709 (28.2%)	4,307 (10.4%)	484 (1.2%)	1,504 (3.6%)	1,398 (3.4%)	13,836 (33.4%)	1,585 (3.8%)	2,403 (5.8%)	603 (1.5%)
YT	2,830 (8.3%)	3,271 (9.6%)	399 (1.2%)	385 (1.1%)	769 (2.3%)	5,263 (15.5%)	9,702 (28.6%)	2,339 (6.9%)	4,552 (13.4%)	4,387 (12.9%)
CANADA	4,057,634	1,947,462	1,155,417	2,853,648	5,751,682	6,260,266	4,681,304	1,744,429	1,333,777	3,691,069
% of pop.	(12.1%)	(5.8%)	(3.5%)	(8.5%)	(17.2%)	(18.7%)	(14.0%)	(5.2%)	(4.0%)	(11.0%)

ASSOCIATED LIFETIME EXCESS CANCER RISK (per million people):
RED=POTENTIAL LIFETIME EXCESS RISK IS GREATER THAN 1 PER MILLION PEOPLE

Health Canada CPF: No CPF										
California OEHHA CPF: 0.0087	< 0.037	0.037 to < 0.044	0.044 to < 0.056	0.056 to < 0.074	0.074 to < 0.111	0.111 to < 0.167	0.167 to < 0.222	0.222 to < 0.278	0.278 to < 0.333	> 0.333
US EPA CPF: No CPF										

*measured at National Air Pollution Surveillance (NAPS) monitors in 2011
CPF: Cancer Potency Factor