

Indoor Radon Levels in Windsor-Essex County: 2016/2017 Study Summary Report

Overview

Radon is a naturally occurring odourless and colourless gas that is produced by the radioactive decay of uranium. In outdoor air, radon is not harmful. However, radon can accumulate indoors to high concentrations and pose a health risk (Health Canada, 2012). The Government of Canada Radon Guideline recommends that if the annual average indoor radon concentration in a home's normal occupancy area is greater than 200 Becquerel's per cubic metre (Bq/m³) then steps are necessary to decrease the radon level (Health Canada, 2007).

The Windsor-Essex County Health Unit (WECHU) began a 3-year Radon: Know Your Level study and awareness campaign in 2015. As a part of this campaign, homeowners of detached and semi-detached homes were recruited to determine indoor radon levels in the areas of Windsor-Essex County (WEC). This document is a summary report of data collected from 2016/2017 study.

Percentage of Homes Above the Canadian Guideline (≥ 200 Bq/m³)

Fifteen percent of homes in WEC had radon levels above 200 Bq/m³ (Table 1 and Figure 1). Essex County had a significantly greater proportion of homes with levels above the Canadian guideline (twenty-two percent) than compared to the City of Windsor (eight percent). The lowest and highest radon levels observed were 22 and 610 Bq/m³ (Figure 2 for breakdown of levels).

Average Indoor Radon Levels

The average indoor radon level for WEC from the 2016/2017 study results was 106 Bq/m³ (Table 2). The average levels for both Essex County and City of Windsor were not significantly different than the WEC overall average (Table 2). Amherstburg, Kingsville, Leamington and LaSalle had average concentrations 20 to 33 Bq/m³ higher than WEC; however, the small sample size in these municipalities made it difficult to determine significant differences. Promoting the importance of radon testing may increase participation in future assessments and deliver more accurate results.

Table 1. Percentage of Homes with Indoor Radon Levels ≥ 200 Bq/m³ and 95% Confidence Intervals by Area

Area	% ≥ 200 Bq/m ³	95% Confidence Interval (%)
Essex County	21.6	17.7 to 26.2
Windsor	8.1	6.0 to 10.9
Windsor-Essex County	14.6	12.4 to 17.2
Ontario	8.2*	N/A

*The percentage for Ontario was obtained from the Cross-Canada Survey of Radon Concentrations in Homes – Final Report (Health Canada, 2012).

Figure 1. Percentage of Homes with Indoor Radon Levels ≥ 200 Bq/m³ by Area.

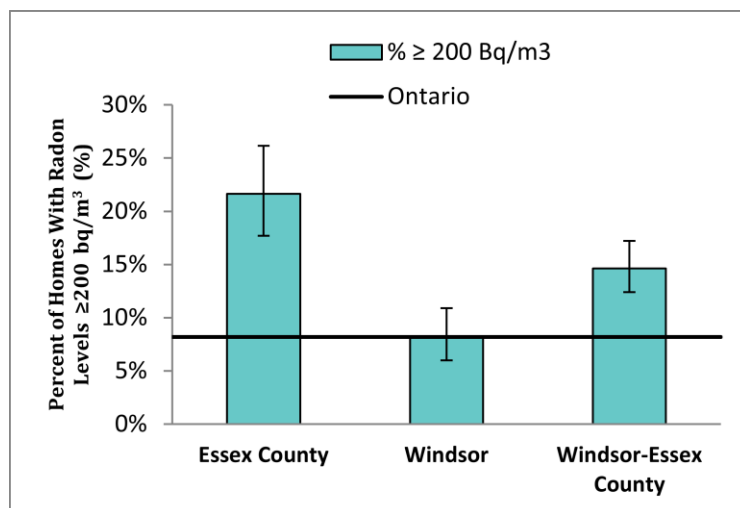


Figure 2. Distribution of Radon Levels in Participating Homes

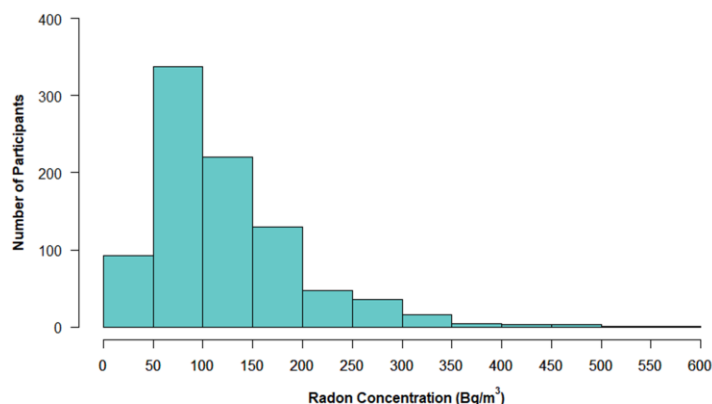


Table 2. Average Indoor Radon Level (Bq/m³) and 95% Confidence Intervals by Area

Area	Average (Bq/m ³)	95% Confidence Interval (Bq/m ³)
Amherstburg	132.5	112.7 to 155.8
Essex	96.6	79.5 to 117.3
Kingsville	127.8	102.3 to 159.7
Lakeshore	101.2	87.7 to 116.8
LaSalle	119.7	107.8 to 132.9
Leamington	119.5	90.0 to 158.7
Tecumseh	110.4	99.1 to 122.9
Essex County	113.8	106.4 to 121.7
Windsor	98.5	94.3 to 103.0
Windsor-Essex County	105.6	101.5 to 109.9

House Construction

House characteristics assessed in the survey identify which participating homes were more susceptible to higher indoor radon concentrations.

Newer builds (2011 or after) had the highest average indoor radon concentrations in this study (Figure 3).

The number of levels in a home, including the basement, was associated with higher average indoor radon concentrations. Homes with two levels (i.e. bungalow style) had 24% higher average radon levels compared to one-level houses with a crawl space partially or completely under the house (Figure 4).

Figure 3. Average Indoor Radon Levels by original year of home construction.

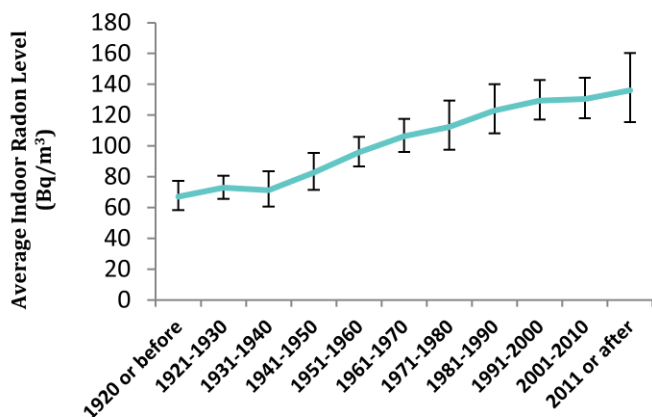
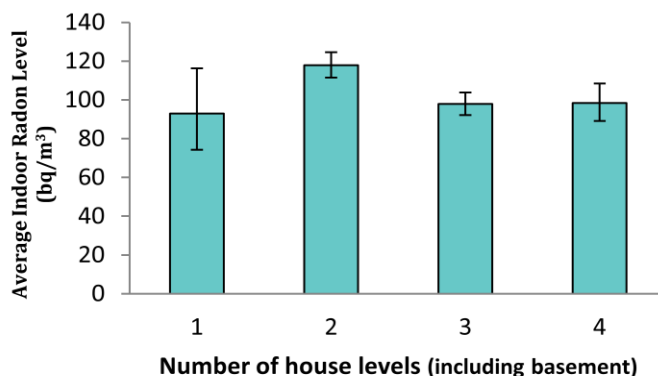


Figure 4. Average Indoor Radon Levels (Bq/m³) by number of house levels



Data Notes

1. The estimates reported are based on radon test kit and geographic data obtained from 886 participants that met the study criteria and provided valid results.
2. An estimate was deemed to be significantly different than another estimate if the 95% Confidence Intervals for the two estimates did not overlap. The 95% Confidence Interval is the range within which we can be 95% certain that the true population estimate falls.
3. Geometric averages were calculated (rather than arithmetic averages) since indoor radon levels follow a lognormal distribution rather than a normal distribution (World Health Organization, 2009).
4. Multiple linear regression model with survey weights and log-transformed outcome was used to associate municipality, adjusted for house traits, to radon levels.

Participants were restricted to owners of detached and semi-detached homes who were 18 years or older and did not plan on moving or undertaking major renovations in the six months after start of testing. Participants were asked to conduct the test in the normal occupancy area of the lowest lived-in level of their home, for at least 91 days.

A stratified sampling strategy with proportionate allocation of test kits was undertaken to ensure regional representation. This was done by ensuring that the proportion of test kits distributed in a municipality was proportional to the number of homes in that municipality to the total number of homes in WEC.

References

1. Health Canada. (2007). *Government of Canada Radon Guideline*. Ottawa. Retrieved from http://www.hc-sc.gc.ca/ewh-semt/radiation/radon/guidelines_lignes_directrice-eng.php
2. Health Canada. (2012). *Cross-Canada Survey of Radon Concentrations in Homes - Final Report*. Ottawa. Retrieved from <http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/survey-sondage/index-eng.php>
3. World Health Organization. (2009). *WHO handbook on indoor radon: a public health perspective*. Geneva. Retrieved from http://apps.who.int/iris/bitstream/10665/44149/1/9789241547673_eng.pdf

More Information

Windsor-Essex County Health Unit

<https://www.wechu.org/healthy-homes/radon>

Radon Hotline:

519-258-2146 ext. 1454 or
radon@wechu.org

Resources

- Canadian National Radon Proficiency Program (C-NRPP):
www.c-nrpp.ca
- Take Action on Radon:
www.takeactiononrado.ca

