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# Canadian Environmental Sustainability Indicators

## Drinking Water Advisories in Canada



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# Drinking Water Advisories in Canada

April 2016

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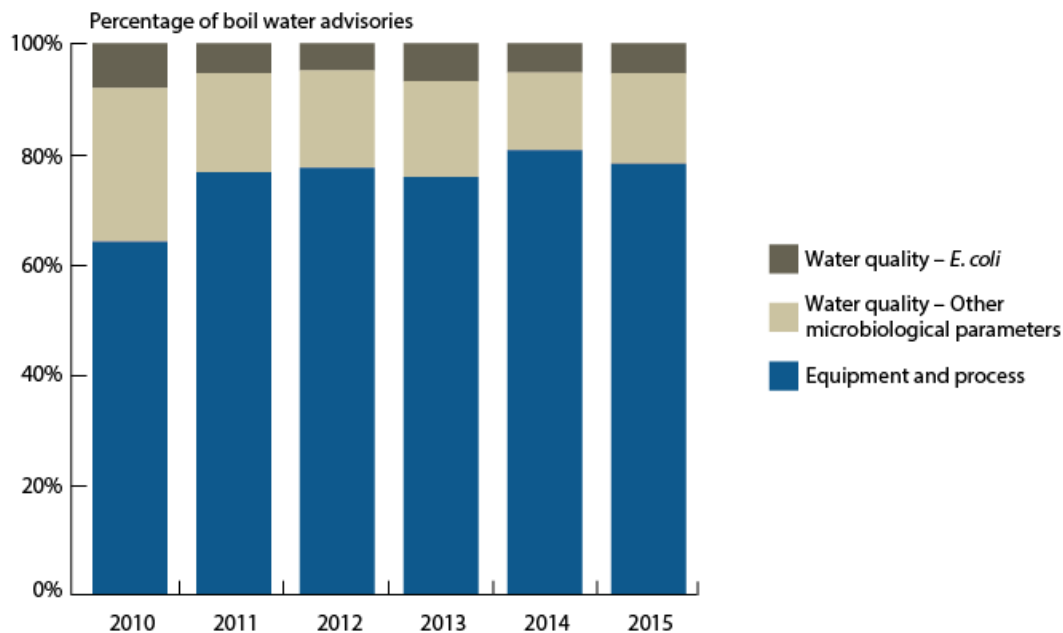
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## Part 1. Drinking Water Advisories in Canada Indicator

In 2015, 78% of boil water advisories<sup>1</sup> in Canada were issued on a precautionary basis due to problems with drinking water equipment or processes. By contrast, boil water advisories issued due to the detection of *Escherichia coli* (*E. coli*) in drinking water samples accounted for 5%. Boil water advisories related to other microbiological water quality parameters, such as the detection of total coliform bacteria or unacceptable turbidity levels, accounted for 17% of total boil water advisories.

**Figure 1. Causes of boil water advisories, Canada, 2010 to 2015**



[Data for Figure 1](#)

**Note:** Data used in this indicator come from a variety of agencies and jurisdictions across Canada and represent a subset of the Canadian population. National use of the Canadian Network for Public Health Intelligence Drinking Water Advisories application has not yet been reached and national totals are not available. See this indicator's [Data Sources and Methods section](#) for more detail. The Water quality - Other microbiological parameters category includes detection of total coliform bacteria, high turbidity levels, and/or exceedances of maximum acceptable concentrations or drinking water standards in drinking water systems. **Source:** Canadian Network for Public Health Intelligence, Drinking Water Advisories Application.

Drinking water advisories are public health protection messages issued by public health or regulatory authorities to inform consumers about actions they should take to protect themselves from real or potential health risks related to their drinking water supply. Advisories are generally precautionary, meaning they are typically issued before drinking water quality problems happen, and can take three forms: Do not consume, Do not use and Boil water.

<sup>1</sup> "Do not consume" and "Do not use" advisories are not included in this indicator.

Boil water advisories are by far the most common type of advisory. They are issued when the microbiological quality of drinking water is suspected or confirmed to be compromised, meaning disease-causing micro-organisms, such as bacteria, viruses or parasites, could be in the drinking water. "Do not consume" and "Do not use" advisories<sup>1</sup> are typically used when a chemical contaminant is suspected or confirmed in a drinking water supply. Both of these types of advisories are rare, representing approximately 2% of all drinking water advisories in Canada annually.

Most boil water advisories are issued because the equipment and processes used to treat, store or distribute drinking water break down, require maintenance, or have been affected by environmental conditions. This broad array of reasons includes issues such as broken water mains, planned system maintenance, power failures or equipment problems. In some cases, extreme weather or heavy rains may cause the quality of surface or ground water sources to temporarily worsen, challenging the drinking water treatment system. Boil water advisories issued for equipment and process related reasons are generally issued before any actual decline in drinking water quality and are in place until conditions return to normal.

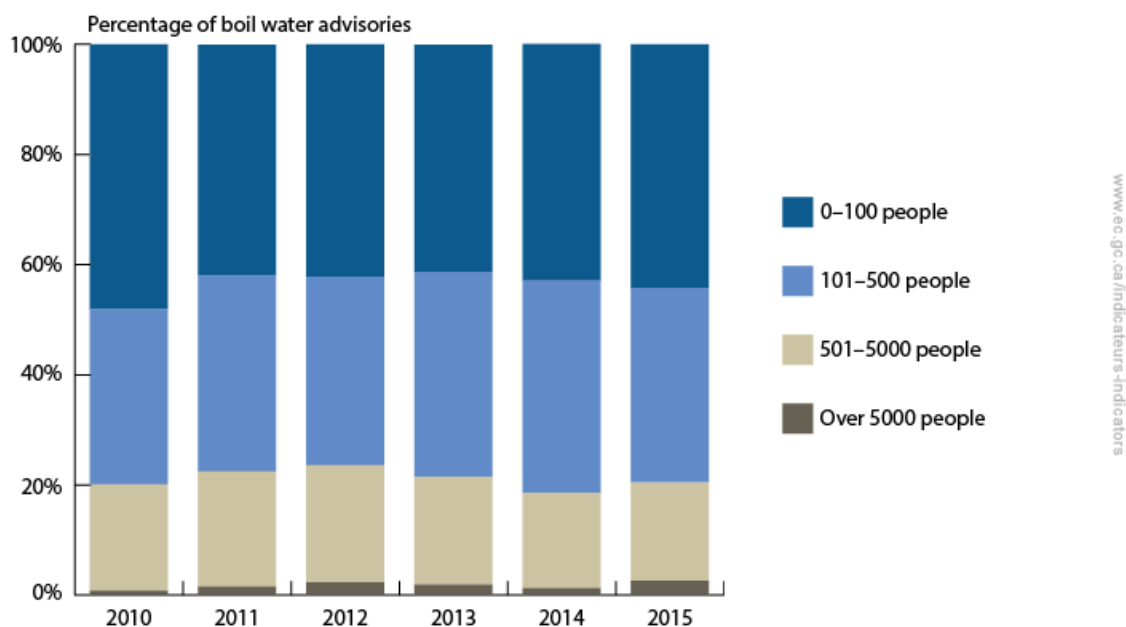
The presence of *E. coli* signals the possible presence of other disease-causing microbes, including bacteria, viruses or parasites. *E. coli* is naturally found in the digestive system of all warm-blooded birds and animals, including humans, and is commonly found in water in the environment. Its presence in treated drinking water indicates recent fecal contamination by, for example, raw sewage or manure. Some strains of *E. coli* can cause stomach illness in humans along with other, more serious health problems.

The category Water quality – Other microbiological parameters identifies advisories issued due to changing conditions inside the drinking water system that typically do not represent a health risk to consumers. Under this category are total coliform bacteria and turbidity. Total coliforms are a broad family of bacteria commonly found in the environment and turbidity is a measure of the cloudiness of water caused by particles. When unusual or elevated levels of these water quality parameters are measured in the drinking water system, the cause is investigated and the findings may contribute to the decision to issue a boil water advisory.

## Community size and drinking water advisories

In 2015, 79% of boil water advisories were issued for drinking water systems serving 500 people or less. This pattern is consistent with that observed from 2010 to 2014.

**Figure 2. Boil water advisories by community size, Canada, 2010 to 2015**



[Data for Figure 2](#)

**Note:** Data used in this indicator come from a variety of agencies and jurisdictions across Canada and represent a subset of the Canadian population. National use of the Canadian Network for Public Health Intelligence Drinking Water Advisories application has not yet been reached and national totals are not available. See this indicator's [Data Sources and Methods section](#) for more detail.

**Source:** Canadian Network for Public Health Intelligence, Drinking Water Advisories Application.

Boil water advisories are issued more commonly in small communities because of the unique challenges they face, including limitations to their operational capacity. For example, a broken water main in a larger city is isolated and repaired quickly by well-equipped staff with no need for a boil water advisory. The same issue in a village may take longer to fix and may result in the need for a boil water advisory to be issued while repairs are arranged and completed.



This indicator is used to measure progress toward [Goal 3: Water Quality and Water Quantity – Protect and enhance water so that it is clean, safe and secure for all Canadians and supports healthy ecosystems](#) of the [Federal Sustainable Development Strategy 2013–2016](#).

# Part 2. Data Sources and Methods for the Drinking Water Advisories in Canada Indicator

## Introduction

The [Drinking Water Advisories in Canada](#) indicator is part of the [Canadian Environmental Sustainability Indicators](#) (CESI) program, which provides data and information to track Canada's performance on key environmental sustainability issues. This indicator is also used to measure progress towards the goals and targets of the [Federal Sustainable Development Strategy 2013–2016](#).

## Description and rationale of the Drinking Water Advisories in Canada indicator

### Description

The Drinking Water Advisories in Canada indicator provides a long-term view of the main reasons why boil water advisories are issued, namely:

- due to the detection of *Escherichia coli* (*E. coli*), which suggests the possible presence of disease-causing organisms in drinking water;
- on a precautionary basis due to elevated levels of other, non-health-related water quality indicators; and
- on a precautionary basis due to equipment and process related issues.

It also reports on how community size influences the percentage of boil water advisories issued in each year. This indicator includes boil water advisories and excludes the rarely used "Do not consume" and "Do not use" advisories.

### Rationale

Although Canada's drinking water is among the safest in the world,<sup>2</sup> improved understanding of key trends related to drinking water advisories helps identify priorities for drinking water infrastructure and operations in Canada. This information helps foster consistency and coordination of efforts to support enhanced drinking water safety and the sustainability of drinking water infrastructure across the country.

The Canadian Network for Public Health Intelligence (CNPHI) provides a suite of secure surveillance and alerting applications for use by federal, provincial and territorial health protection agencies. The CNPHI Drinking Water Advisories application (DWA) has been created to meet the needs of the agencies responsible for overseeing the safety of drinking water. The DWA helps them to manage and share information to coordinate response efforts during a drinking water incident, and helps to capture, analyze and report on the context of drinking water advisories so that lessons can be learned and priorities identified.

In Canada, the lead responsibility for overseeing the safety of drinking water lies with provincial and territorial governments. Drinking water advisory data are generated by regulatory agencies as the advisories are issued. When a drinking water advisory is issued, the DWA application helps the regulatory agency quickly communicate the advisory to personnel at the local and regional level while capturing key information describing the incident. The system can help agencies communicate information to the public quickly and

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<sup>2</sup> World Health Organization (2009) [Country profiles of environmental burden of disease: Canada](#). Quantifying environmental health impacts. Retrieved on December 2, 2015.



allows for analysis of accumulated drinking water advisory data to reveal key trends such as water quality or operational reasons for the advisories and the characteristics of the drinking water systems or communities affected.

#### **Recent changes to the indicator**

Data for 2014 and 2015 have been added to the indicator. As new agencies adopt the DWA, they may add retrospective data to the system; results for 2010–2013 have been revised accordingly.

## **Data**

#### **Data source**

Data for this indicator originate from agencies using the Canadian Network for Public Health Intelligence Drinking Water Advisories application (DWA) and were drawn from the database.

#### **Spatial coverage**

Data used in this indicator originate from a variety of agencies and jurisdictions across Canada. Given this is a relatively new surveillance tool, the data do not yet represent all jurisdictions. However, the results are representative of key drinking water needs and issues in Canada.

#### **Temporal coverage**

Data for this indicator span from January 1, 2010 to December 31, 2015.

#### **Data completeness**

Data included in this indicator represent all boil water advisories issued by participating jurisdictions and agencies from 2010 to 2015 that are included in the DWA.

#### **Data timeliness**

While the indicator is reported biennially, data are contributed to the DWA by participating agencies when the advisories are issued, or shortly after. The Drinking Water Advisories in Canada indicator is calculated using the most recent data available at the time of the production of the indicator. As new agencies begin to use the DWA, they may choose to add historic data to the system. In such cases, the historic data are included in the appropriate year.

## **Methods**

The Drinking Water Advisories in Canada indicator focuses on boil water advisories as they are the most common type of drinking water advisory and represent the vast majority of the data. "Do not consume" and "Do not use" advisories, representing approximately 2% of advisories each year, are not included in the indicator. "Do not consume" and "Do not use" advisories may be issued in response to operational issues or when a chemical contaminant is suspected, or confirmed, in the drinking water system. Also, they may be issued when conditions would otherwise call for a boil water advisory but where boiling is not practical, such as at school water fountains. Given the variation in their use and the rarity of "Do not consume" and "Do not use" advisories, they are excluded from the indicator. Boil water advisories can be considered representative of the general situation in Canada with respect to drinking water advisories.

The reasons that boil water advisories were issued are categorized into three categories: Water quality – *E. coli*; Water quality – Other microbiological parameters; and Equipment and process. These categories represent a consolidation of the broad array of more detailed water quality reasons captured by the Drinking Water Advisories (DWA) application (Table 1). Figure 3 shows how all individual DWA water quality reasons contributed to the issuance of boil water advisories.

To calculate the indicator for each year, all boil water advisories in the DWA were categorized and the total number of boil water advisories in each category were summed and divided by the total number of boil water advisories captured by the DWA.

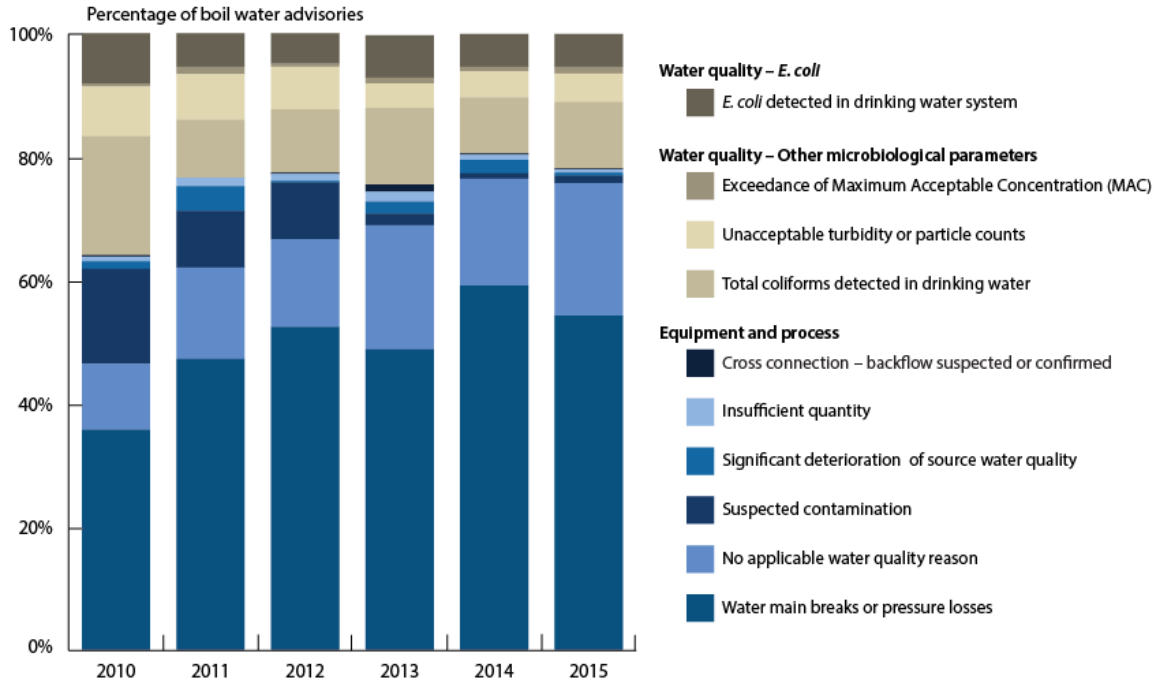
**Table 1. How the reasons why drinking water advisories were issued were grouped for the indicator**

Reason	Definition	Indicator category
<i>E. coli</i> detected in drinking water system	The chief bacterial indicator of drinking water safety. Its presence indicates recent fecal contamination and the possible presence of disease-causing micro-organisms in drinking water.	Water quality – <i>E. coli</i>
Unacceptable turbidity or particle counts	A measure of the cloudiness of water caused by suspended particles. Provides information on the effectiveness of treatment and helps identify changing conditions in the drinking water system.	Water quality – Other microbiological criteria
Total coliforms detected in drinking water system	Common environmental bacteria used to assess general conditions within the drinking water system. Also provides information on the effectiveness of treatment.	Water quality – Other microbiological criteria
Exceedance of Maximum Acceptable Concentration (MAC) or Drinking Water Standard	Used when the MAC of a contaminant has been exceeded or an operational target of relevance to microbiological water quality is not met.	Water quality – Other microbiological criteria
Water main breaks or pressure losses	Includes instances when distribution system pipes break resulting in a breach of integrity, leakage and loss of system pressure. It also includes system pressure losses due to maintenance work, power failures or depleted reservoir storage.	Equipment and process
Suspected contamination	Used when contamination is suspected due to observed operational conditions, not test results.	Equipment and process
No applicable water quality reason	Used when an advisory is issued solely for operational reasons with no observed water quality issues.	Equipment and process
Insufficient quantity	Used when the capacity of water storage is depleted resulting in a potential loss of pressure in the drinking water system.	Equipment and process
Significant deterioration of source water quality	Used when a decline in source water quality has potentially impacted drinking water quality.	Equipment and process

Reason	Definition	Indicator category
Cross-connection – backflow suspected or confirmed	Applies to inappropriate connections to a drinking water system resulting in potential contamination of drinking water.	Equipment and process

**Source:** Canadian Network for Public Health Intelligence, Drinking Water Advisories Application.

**Figure 3. Percentage of boil water advisories grouped by the water quality reasons why they were issued, Canada, 2010 to 2015**



[Data for Figure 3](#)

**Note:** Data used in this indicator come from a variety of agencies and jurisdictions across Canada and represent a subset of the Canadian population.

**Source:** Canadian Network for Public Health Intelligence, Drinking Water Advisories Application.

## Caveats and limitations

The Canadian Network for Public Health Intelligence Drinking Water Advisories application (DWA) is a national tool developed and enhanced over time through partnerships and collaborative work involving federal, provincial and territorial partners. The front line users of the system are the regulatory agencies who oversee drinking water safety. The data on the system belong to them as they have created it in the course of their oversight activities.

The DWA became a live surveillance and alerting application in 2008. The pace at which data will approach the national scale will depend on how the growing number of partner agencies adopt and implement the system. The number of agencies using the system is growing each year and the end goal for the Drinking Water Advisories in Canada indicator is to represent the full national picture. Although this is not yet the case, the data are representative of prevailing trends in a variety of regions across Canada, and provide useful insight into issues that challenge the delivery of safe drinking water.

The Drinking Water Advisories in Canada indicator presents an overall view of the trends emerging in the system and does not focus on the specific data for any particular province, territory or agency. Percentages reported in this indicator may differ from previous and future publications as historic data are added to the system and as adoption of the DWA expands to new agencies.

## Part 3. Annexes

### Annex A. Data tables for the figures presented in this document

**Table A.1. Data for Figure 1. Causes of boil water advisories, Canada, 2010 to 2015**

Cause of boil water advisory	2010 (percentage of boil water advisories)	2011 (percentage of boil water advisories)	2012 (percentage of boil water advisories)	2013 (percentage of boil water advisories)	2014 (percentage of boil water advisories)	2015 (percentage of boil water advisories)
<i>E. coli</i>	8	5	5	7	5	5
Other microbiological parameters	28	18	18	17	14	17
Equipment and process	64	77	77	76	81	78

**Note:** Data used in this indicator come from a variety of agencies and jurisdictions across Canada and represent a subset of the Canadian population. National use of the Canadian Network for Public Health Intelligence Drinking Water Advisories application has not yet been reached and national totals are not available. See this indicator's [Data Sources and Methods section](#) for more detail. The Water quality – Other microbiological parameters category includes detection of total coliform bacteria, high turbidity levels, and/or exceedances of maximum acceptable concentrations or drinking water standards in drinking water systems.

**Source:** Canadian Network for Public Health Intelligence, Drinking Water Advisories Application.

**Table A.2. Data for Figure 2. Boil water advisories by community size, Canada, 2010 to 2015**

Community size	2010 (percentage of boil water advisories)	2011 (percentage of boil water advisories)	2012 (percentage of boil water advisories)	2013 (percentage of boil water advisories)	2014 (percentage of boil water advisories)	2015 (percentage of boil water advisories)
0–100 people	48	42	42	41	43	44
101–500 people	32	36	34	37	39	35
501–5000 people	19	21	21	20	17	18
Over 5000 people	1	2	2	2	1	3

**Note:** Data used in this indicator come from a variety of agencies and jurisdictions across Canada and represent a subset of the Canadian population. National use of the Canadian Network for Public Health Intelligence Drinking Water Advisories application has not yet been reached and national totals are not available. See this indicator's [Data Sources and Methods section](#) for more detail.

**Source:** Canadian Network for Public Health Intelligence, Drinking Water Advisories Application.

**Table A.3. Data for Figure 3. Percentage of boil water advisories grouped by the water quality reasons why they were issued, Canada, 2010 to 2015**

Reason for boil water advisory	General category of reason for boil water advisory	2010 (percentage of boil water advisories)	2011 (percentage of boil water advisories)	2012 (percentage of boil water advisories)	2013 (percentage of boil water advisories)	2014 (percentage of boil water advisories)	2015 (percentage of boil water advisories)
<i>E. coli</i> detected in drinking water system	Water Quality – <i>E. coli</i>	8.1	5.4	4.9	6.9	5.3	5.3
Exceedance of Maximum Allowable Concentration (MAC) or Drinking Water Standard	Water Quality – Other microbiological parameters	0.5	1.2	0.5	0.9	0.8	1.1
Unacceptable turbidity or particle counts	Water Quality – Other microbiological parameters	8.1	7.4	6.9	4.0	4.2	4.6
Total coliforms detected in drinking water	Water Quality – Other microbiological parameters	19.3	9.4	10.3	12.4	9.1	10.8
Cross connection – backflow suspected or confirmed	Equipment and Process	0.2	0.0	0.2	1.2	0.2	0.2
Insufficient quantity	Equipment and Process	0.8	1.4	1.1	1.6	0.8	0.5
Significant deterioration of source water quality	Equipment and Process	1.2	4.0	0.3	1.9	2.2	0.5
Suspected contamination	Equipment and Process	15.4	9.2	9.2	1.9	0.9	1.2
No applicable water quality reason	Equipment and Process	10.7	14.8	14.2	20.2	17.3	21.5
Water main breaks or pressure losses	Equipment and Process	35.7	47.2	52.4	48.7	59.1	54.2

**Note:** Data used in this indicator come from a variety of agencies and jurisdictions across Canada and represent a subset of the Canadian population.

**Source:** Canadian Network for Public Health Intelligence, Drinking Water Advisories Application.

## Annex B. References and additional information

### References and further reading

Health Canada (2009) [Guidance for Issuing and Rescinding Drinking Water Avoidance Advisories in Emergency Situations](#). Retrieved on December 2, 2015.

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