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BOIL WATER ADVISORIES

CANADIAN ENVIRONMENTAL
SUSTAINABILITY INDICATORS



Canada 

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CANADIAN ENVIRONMENTAL SUSTAINABILITY INDICATORS

BOIL WATER ADVISORIES

June 2022

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Boil water advisories

Drinking water advisories are public health protection messages about real or potential health risks related to drinking water. These advisories are generally precautionary, meaning they are typically issued before drinking water quality problems occur. The advisories can take 3 forms: Do not consume, Do not use and Boil water. Boil water advisories are by far the most common, representing about 98% of the drinking water advisory data each year. Therefore, this analysis looks only at this type of advisory.

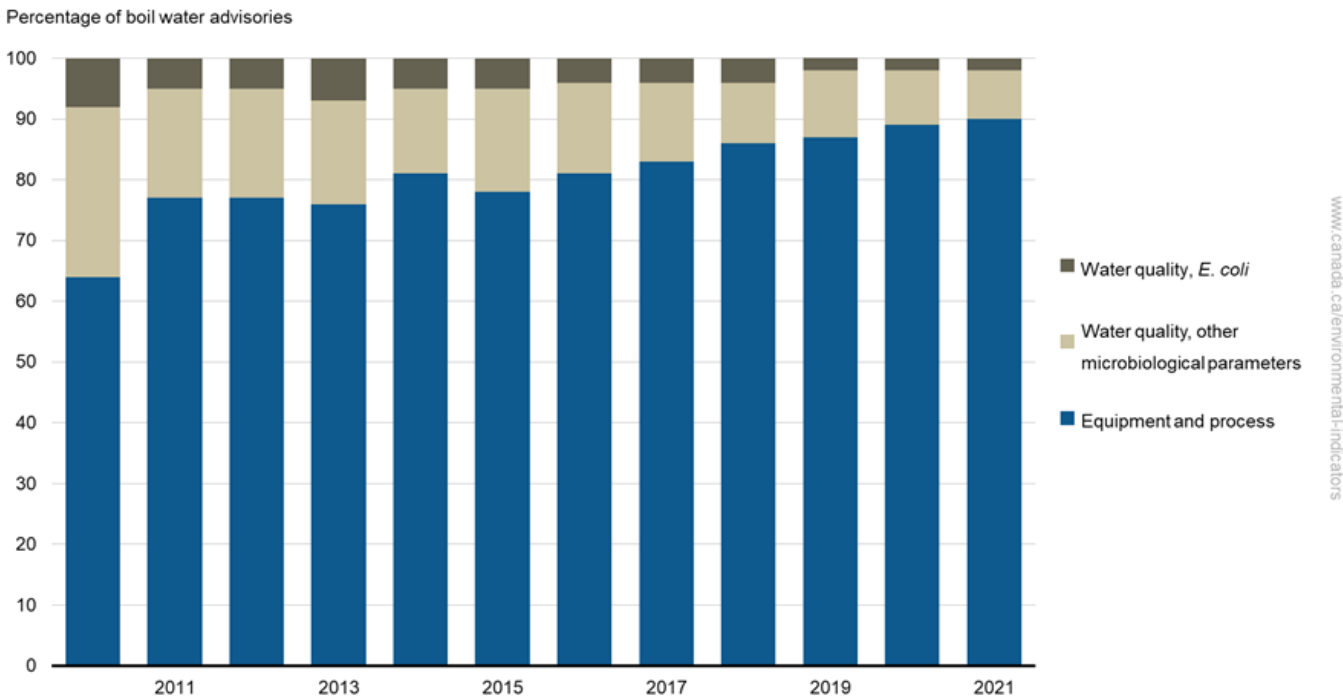
There are 2 indicators for boil water advisories: the first provides a general overview of why boil water advisories are issued in Canada. The second shows the relationship between community size and the frequency of boil water advisories.

Causes of boil water advisories

Key results

- In 2021,
 - 2% of boil water advisories were due to the detection of *Escherichia coli* (*E. coli*)
 - 8% were due to other microbiological parameters
 - the remaining 90% were due to equipment and process-related problems
- Between 2010 and 2021, the percentage of boil water advisories issued on a precautionary basis due to *E. coli* and other microbiological parameters decreased, while the percentage of boil water advisories issued due to equipment and process-related problems increased

Figure 1. Causes of boil water advisories, Canada, 2010 to 2021



[Data for Figure 1](#)

Note: Data used in this indicator come from various agencies and jurisdictions across Canada that use or share information with the Canadian Network for Public Health Intelligence's Drinking Water Advisories application. They represent a subset (less than 50%) of the Canadian population. A more comprehensive national dataset is not available. The "Water quality, other microbiological parameters" category includes detection of total coliform bacteria and high turbidity levels in drinking water systems. The "Equipment and process" category includes issues such as broken water mains, planned system maintenance, power failures or equipment problems. See the [Data sources and methods](#) section for more information.

Source: Canadian Network for Public Health Intelligence (2022) Drinking Water Advisories application.

Boil water advisories are issued as a means to inform consumers that they need to boil their water in order to protect their health against the potential presence of disease-causing bacteria, viruses or parasites.

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. In 2021, this accounted for 90% of boil water advisories.

The "Water quality, *E. coli*" category includes boil water advisories issued due to the detection of *E. coli* in drinking water samples. This can indicate the potential presence of disease-causing bacteria, viruses or parasites in the water. In 2021, *E. coli*-related boil water advisories accounted for 2% of the total, which is slightly lower than previous years.

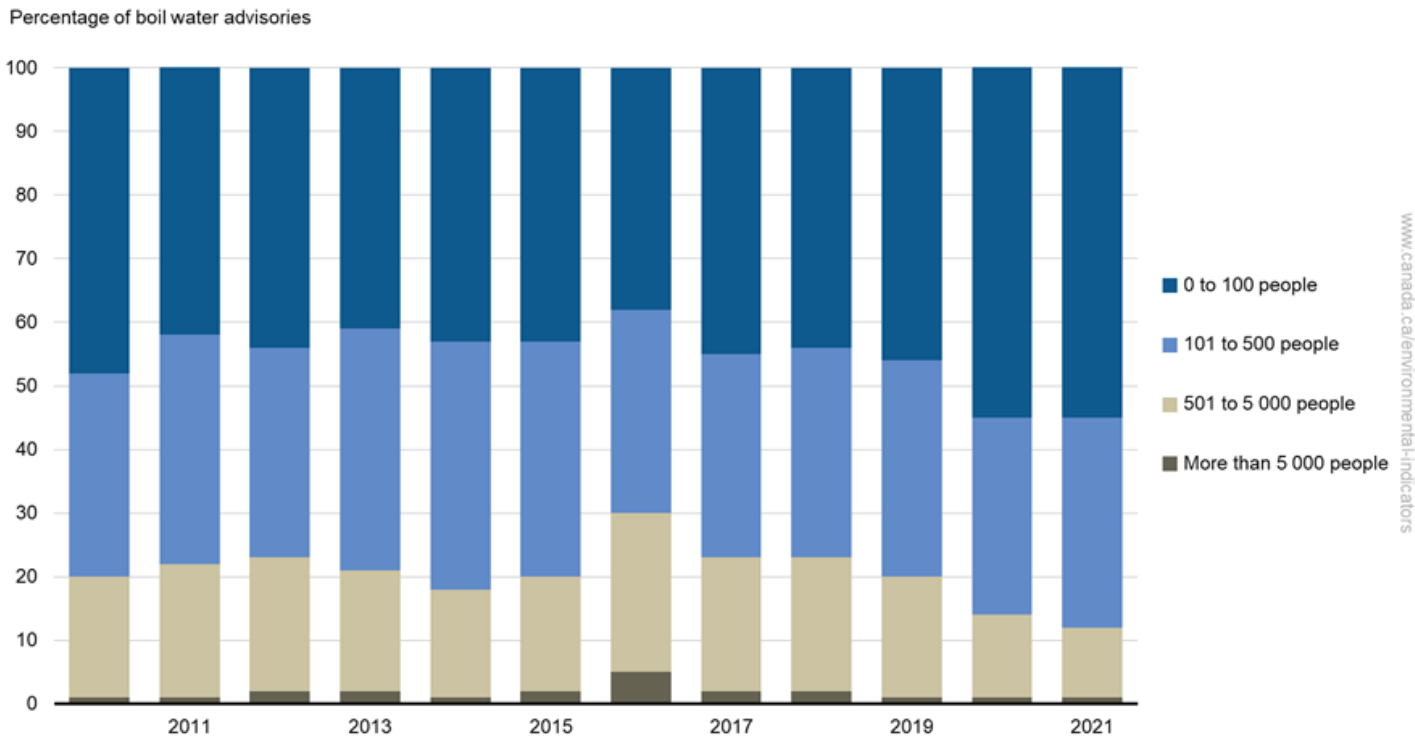
The "Water quality, other microbiological parameters" category includes boil water advisories issued due to the detection of total coliform bacteria or elevated turbidity levels in drinking water. These parameters are not directly linked to health but provide an indication of changing conditions within a drinking water system. This category accounted for 8% of boil water advisories in 2021.

Boil water advisories by community size

Key results

- In 2021, 89% of boil water advisories were issued for drinking water systems serving communities of 500 people or less

Figure 2. Boil water advisories by community size, Canada, 2010 to 2021



[Data for Figure 2](#)

Note: Data used in this indicator come from various agencies and jurisdictions across Canada that use or share information with the Canadian Network for Public Health Intelligence's Drinking Water Advisories application. They represent a subset (less than 50%) of the Canadian population. A more comprehensive national dataset is not available. See the [Data sources and methods](#) section for more information.

Source: Canadian Network for Public Health Intelligence (2022) Drinking Water Advisories application.

Between 2010 and 2021, the majority of boil water advisories were issued in communities of 500 or fewer people. Boil water advisories are more common in small communities because of the unique challenges those communities face, including limited operational capacity.¹ For example, a broken water main in a larger city is usually isolated and repaired quickly by staff with no need for a boil water advisory. In a smaller community, the same problem may take longer to fix and a boil water advisory may be issued while repairs are completed.

Annual variations in the proportion of boil water advisories issued for communities of a specific size may be explained by several factors, including:

- many communities have populations around the 500 or 5 000 mark
 - a community's population may fluctuate from one side of the category boundary to the other
- approximately 50% of advisories each year are due to broken water mains or planned maintenance work on distribution systems
 - these are often localized in an affected sub-area of a bigger municipal distribution system
 - some agencies and jurisdictions will estimate and report on the size of the population affected in the localized area only (because the advisory does not apply to other parts of the town or city), whereas others will report on the overall population served by the entire distribution system, even if only a portion is affected

¹ World Health Organization (2012) [Water safety planning for small community water supplies: step-by-step risk management guidance for drinking-water supplies in small communities](#). Retrieved on June 14, 2022.

About the indicators

What the indicators measure

The Boil water advisories indicators provide an overview 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 microorganisms in drinking water
- as a precaution, due to other microbiological parameters, which are non-health-related water quality indicators
- as a precaution, due to equipment and process-related issues

They also report on the relationship between community size and the percentage of boil water advisories issued each year. The indicators exclude "Do not consume" and "Do not use" advisories, which represent approximately 2% of all drinking water advisories in Canada annually. They also do not report on the length of time a boil water advisory is in effect.

Why these indicators are important

Drinking water advisories are public health protection messages issued by public health or regulatory authorities. The advisories inform those impacted about actions they should take to protect themselves from real or potential health risks related to their drinking water supply.

Although Canada's drinking water is among the safest in the world,² understanding key trends related to drinking water advisories helps identify priorities to improve our drinking water infrastructure and operations. This information helps foster consistency and coordination of efforts to enhance the safety and sustainability of drinking water in Canada.



Clean drinking water

These indicators support the measurement of progress towards the following [2019 to 2022 Federal Sustainable Development Strategy](#) long-term goal: All Canadians have access to safe drinking water and, in particular, the significant challenges Indigenous communities face are addressed.

These indicators are being proposed to track progress in the draft [2022 to 2026 Federal Sustainable Development Strategy](#).

In addition, the indicators contribute to the [Sustainable Development Goals of the 2030 Agenda for Sustainable Development](#). They are linked to Goal 6, Clean water and sanitation and Target 6.1, "By 2030, achieve universal and equitable access to safe and affordable drinking water for all."

Related indicators

The [Number of long-term drinking water advisories on public systems on reserve](#) indicator shows progress towards lifting [long-term drinking water advisories affecting First Nations communities](#).

The [Water quality in Canadian rivers](#) indicators provide a measure of the ability of river water across Canada to support plants and animals.

The [Phosphorus levels in the offshore waters of the Great Lakes](#), [Nutrients in the St. Lawrence River](#), [Nutrients in Lake Winnipeg](#) and [Reductions in phosphorus loads to Lake Winnipeg](#) indicators report the status of total phosphorus and total nitrogen levels in these 3 ecosystems.

² World Health Organization (2009) Country profiles of environmental burden of disease: Canada. Quantifying environmental health impacts.

Data sources and methods

Data sources

Data used in these indicators originate from various agencies and jurisdictions across Canada, using or sharing information with the Canadian Network for Public Health Intelligence Drinking Water Advisories application. The data do not currently represent all jurisdictions. However, the results are representative of key drinking water issues in Canada.

Data for these indicators cover the period from January 1, 2010 to December 31, 2021. They represent all boil water advisories issued by participating agencies and jurisdictions included in the Drinking Water Advisories application (the application) for that period.

The indicators are reported biennially, but data are contributed to the application by participating agencies and jurisdictions when the advisories are issued, or shortly thereafter. The Boil water advisories indicators are calculated using the most recent data available at the time when the indicator is produced. As new agencies and jurisdictions begin to use the application, they may choose to add historic data to the system. In such cases, the historic data are included in the appropriate year.

More information

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's Drinking Water Advisories application has been created to meet the needs of the agencies and jurisdictions responsible for overseeing the safety of drinking water. The application enables them to manage and share information to coordinate response efforts during a drinking water incident. It also helps capture, analyze and report on the context of drinking water advisories so that lessons can be learned and priorities identified.

In Canada, the responsibility for making sure drinking water supplies are safe is shared between federal, provincial, territorial and municipal governments. Drinking water advisory data are generated by oversight agencies as the advisories are issued. In First Nations communities, it is the responsibility of the Chief and Council to issue or rescind a drinking water advisory and take necessary actions under the recommendation of an Environmental Public Health Officer.

When an advisory is issued, the CNPHI's Drinking Water Advisories application helps the agency or jurisdiction quickly communicate it to personnel at the local and regional level while capturing key information describing the incident. The system helps agencies and jurisdictions communicate information to the public quickly and 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.

Methods

To calculate the indicators for each year, all boil water advisories in the Drinking Water Advisories application (the application) were categorized. The number of boil water advisories in each category were then summed and divided by the total number of boil water advisories captured by the application.

More information

The reasons for issuing boil water advisories are organized into 3 categories:

1. Water quality, *E. coli*
2. Water quality, other microbiological parameters
3. Equipment and process

These categories represent a consolidation of the broad array of more detailed water quality reasons for boil water advisories captured by the application (Table 1). Figure 3 shows how all individual reasons contributed to the issuance of boil water advisories.

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 includes issues such as broken water mains, planned system maintenance, power failures or equipment problems. In some cases, climate change impacts such as extreme weather (for example, heavy rains) or forest fires may cause the quality of surface or ground water sources to temporarily worsen, challenging the drinking water treatment and distribution system. Boil water advisories issued for equipment and process-related reasons are generally issued before any actual decline in drinking water quality occurs and are in place until conditions return to normal.

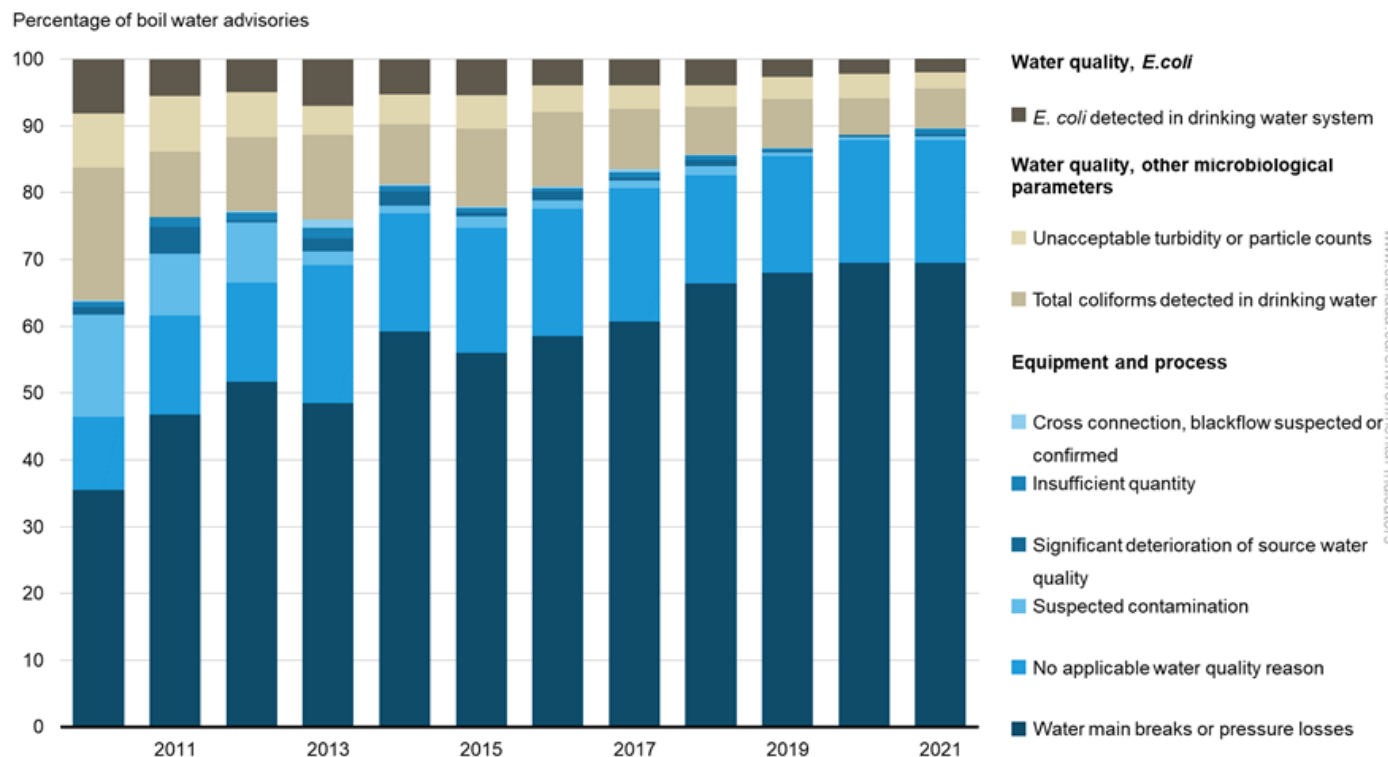
E. coli is naturally found in the digestive systems of all warm-blooded animals, including humans, and is commonly found in lakes and rivers. However, its presence in treated drinking water indicates a serious breach in treatment and/or fecal contamination. Some strains of *E. coli* can cause stomach illness and more serious health problems in humans.

The "Water quality, other microbiological parameters" category identifies advisories issued due to changing conditions inside the drinking water system that typically do not represent a health risk to consumers. This category includes total coliform bacteria and turbidity. Total coliforms are a broad family of bacteria commonly found in the environment. 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.

Table 1. Categories of boil water advisories used in the indicators

Indicator category	Reason	Definition
Water quality, <i>E. coli</i>	<i>E. coli</i> detected in drinking water system	The most widely used bacterial indicator of drinking water safety. Its presence indicates fecal contamination and the possible presence of disease-causing micro-organisms in drinking water.
Water quality, other microbiological criteria	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 group of environmental bacteria used to assess general conditions within the drinking water system. Also provides information on the effectiveness of treatment.
Equipment and process	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	Contamination is suspected due to observed operational conditions and not due to test results.
Equipment and process	No applicable water quality reason	Operational reasons with no observed water quality issues.
Equipment and process	Insufficient quantity	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	Decline in source water quality has potentially impacted drinking water quality.
Equipment and process	Cross-connection, backflow suspected or confirmed	Inappropriate connections to a drinking water system resulting in potential contamination of drinking water.

Figure 3. Percentage of boil water advisories grouped by the reason for issuance, Canada, 2010 to 2021



[Data for Figure 3](#)

Note: Data used in this indicator come from various agencies and jurisdictions across Canada that use or share information with the Canadian Network for Public Health Intelligence's Drinking Water Advisories application. They represent a subset (less than 50%) of the Canadian population. A more comprehensive national dataset is not available. See the [Data sources and methods](#) section for more information.

Source: Canadian Network for Public Health Intelligence (2022) Drinking Water Advisories application.

Recent changes

As new agencies and jurisdictions adopt the Drinking Water Advisories application, they may add retrospective data to the system. However, for this update, the results for 2010 to 2018 remain unchanged, while the results for 2019 were updated and those for 2020 and 2021 have been added.

Caveats and limitations

The indicators focus on boil water advisories as they are the most common type of drinking water advisory and represent the vast majority of the data (98%). "Do not consume" and "Do not use" advisories represent approximately 2% of advisories each year. These 2 types of advisories may be issued in response to operational issues or when a chemical contaminant is suspected, or confirmed, in the drinking water system. They may also 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 were excluded from the indicators. Boil water advisories can be considered representative of the general situation in Canada with respect to drinking water advisories.

The Canadian Network for Public Health Intelligence Drinking Water Advisories application (the application) 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 and health protection agencies who oversee drinking water safety. The data in the system belong to these agencies and jurisdictions as they created that data in the course of their oversight activities.

The application became a live surveillance and alerting tool in 2008. The number of agencies and jurisdictions using the system is growing each year, and the end goal for the Boil water advisories indicators is to represent the full national picture. Although this has not yet been achieved, 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 Boil water advisories indicators present an overall view of the trends emerging in the system, rather than focusing on the specific data for any particular province, territory, agency or jurisdiction. Percentages reported in these indicators may differ from previous and future publications as historic data are added to the system and as new agencies and jurisdictions adopt the application.

Resources

References

Health Canada (2009) [Guidance for Issuing and Rescinding Drinking Water Avoidance Advisories in Emergency Situations](#). Retrieved on June 14, 2022.

Health Canada (2012) [Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Turbidity](#). Retrieved on June 14, 2022.

Health Canada (2012) [Our Health, Our Environment: A Snapshot of Environmental Health in Canada](#). Retrieved on June 14, 2022.

Health Canada (2015) [Guidance for Issuing and Rescinding Boil Water Advisories in Canadian Drinking Water Supplies](#). Retrieved on June 14, 2022.

Health Canada (2020) [Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – *Escherichia coli*](#). Retrieved on June 14, 2022.

Health Canada (2020) [Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Total Coliforms](#). Retrieved on June 14, 2022.

Related information

[Drinking water quality in Canada](#)

[Water quality – reports and publications](#)

[Water in First Nations communities](#)

[First Nations and Inuit Primary Health Care Program Indicators](#)

[First Nations Health Authority – Drinking Water Safety Program](#)

Annex

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

Year	Water quality, <i>E. coli</i> (percentage of boil water advisories)	Water quality, other microbiological parameters (percentage of boil water advisories)	Equipment and process (percentage of boil water advisories)
2010	8	28	64
2011	5	18	77
2012	5	18	77
2013	7	17	76
2014	5	14	81
2015	5	17	78
2016	4	15	81
2017	4	13	83
2018	4	10	86
2019	3	11	87
2020	2	9	89
2021	2	8	90

Note: Percentages may not add up to 100 due to rounding. Data used in this indicator come from various agencies and jurisdictions across Canada that use or share information with the Canadian Network for Public Health Intelligence's Drinking Water Advisories application. They represent a subset (less than 50%) of the Canadian population. A more comprehensive national dataset is not available. The "Water quality, other microbiological parameters" category includes detection of total coliform bacteria and high turbidity levels in drinking water systems. The "Equipment and process" category includes issues such as broken water mains, planned system maintenance, power failures or equipment problems. See the [Data sources and methods](#) section for more information.

Source: Canadian Network for Public Health Intelligence (2022) Drinking Water Advisories application.

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

Year	0 to 100 people (percentage of boil water advisories)	101 to 500 people (percentage of boil water advisories)	501 to 5 000 people (percentage of boil water advisories)	More than 5 000 people (percentage of boil water advisories)
2010	48	32	19	1
2011	43	36	21	1
2012	44	33	21	2
2013	41	38	19	2
2014	43	39	17	1
2015	43	37	18	2
2016	38	32	25	5
2017	45	32	21	2
2018	44	33	21	2
2019	46	34	19	1
2020	56	31	13	1
2021	56	33	11	1

Note: Percentages may not add up to 100 due to rounding. Data used in this indicator come from various agencies and jurisdictions across Canada that use or share information with the Canadian Network for Public Health Intelligence's Drinking Water Advisories application. They represent a subset (less than 50%) of the Canadian population. A more comprehensive national dataset is not available. See the [Data sources and methods](#) section for more information.

Source: Canadian Network for Public Health Intelligence (2022) Drinking Water Advisories application.

Table A.3. Data for Figure 3. Percentage of boil water advisories grouped by the reason for issuance, Canada, 2010 to

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	5.5	4.9	7.0	5.3	5.4
Unacceptable turbidity or particle counts	Water quality, other microbiological parameters	8.1	8.3	6.8	4.3	4.4	5.0
Total coliforms detected in drinking water	Water quality, other microbiological parameters	19.9	9.9	11.0	12.7	9.1	11.7
Cross connection, backflow suspected or confirmed	Equipment and process	0.2	0.0	0.3	1.2	0.2	0.2
Insufficient quantity	Equipment and process	0.8	1.4	1.1	1.6	0.8	0.7
Significant deterioration of source water quality	Equipment and process	1.2	4.0	0.3	2.0	2.2	0.5
Suspected contamination	Equipment and process	15.3	9.3	9.1	2.0	1.1	1.7
No applicable water quality reason	Equipment and process	10.9	14.8	14.8	20.7	17.7	18.8
Water main breaks or pressure losses	Equipment and process	35.5	46.8	51.7	48.5	59.2	56.0

Reason for boil water advisory	General category of reason for boil water advisory	2016 (percentage of boil water advisories)	2017 (percentage of boil water advisories)	2018 (percentage of boil water advisories)	2019 (percentage of boil water advisories)	2020 (percentage of boil water advisories)	2021 (percentage of boil water advisories)
<i>E. coli</i> detected in drinking water system	Water quality, <i>E. coli</i>	3.9	3.9	3.9	2.7	2.2	2.0
Unacceptable turbidity or particle counts	Water quality, other microbiological parameters	4.0	3.6	3.2	3.3	3.7	2.5
Total coliforms detected in drinking water	Water quality, other microbiological parameters	11.2	9.0	7.2	7.3	5.4	5.9
Cross connection, backflow suspected or confirmed	Equipment and process	0.2	0.4	0.1	0.1	0.0	0.08

Reason for boil water advisory	General category of reason for boil water advisory	2016 (percentage of boil water advisories)	2017 (percentage of boil water advisories)	2018 (percentage of boil water advisories)	2019 (percentage of boil water advisories)	2020 (percentage of boil water advisories)	2021 (percentage of boil water advisories)
Insufficient quantity	Equipment and process	0.5	0.8	0.7	0.3	0.1	0.8
Significant deterioration of source water quality	Equipment and process	1.4	0.5	0.9	0.2	0.3	0.4
Suspected contamination	Equipment and process	1.2	1.1	1.4	0.6	0.4	0.5
No applicable water quality reason	Equipment and process	19.1	20.0	16.2	17.5	18.4	18.4
Water main breaks or pressure losses	Equipment and process	58.5	60.7	66.4	68.0	69.5	69.5

Note: Data used in this indicator come from various agencies and jurisdictions across Canada that use or share information with the Canadian Network for Public Health Intelligence's Drinking Water Advisories application. They represent a subset (less than 50%) of the Canadian population. A more comprehensive national dataset is not available. See the [Data sources and methods](#) section for more information.

Source: Canadian Network for Public Health Intelligence (2022) Drinking Water Advisories application.

Additional information can be obtained at:

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