Real-time monitoring could reduce First Nations water advisories by one third, study finds

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University of Guelph researchers have found that the majority of drinking water advisories in First Nations communities across Canada are precautionary, and that installing real-time monitoring systems could reduce the number of these advisories by more than one-third.

Drinking water advisories are issued because of equipment malfunction, inadequate disinfection and high microbial counts, said School of Engineering professor Ed McBean, lead author of the study and Canada Research Chair in Water Supply Security.

"While many of the drinking water advisories are in place for long periods of time, they do not necessarily indicate unacceptable water quality," said McBean, who worked on the study with Kerry Black, a former U of G PhD student and now an Assistant Professor at the University of British Columbia. "Installing real-time monitoring systems would allow operators to identify issues and possibly make corrections or repairs very quickly, thereby reducing the number of precautionary-based drinking water advisories as well as the frequency and duration of all drinking water advisories."

Between 2004 and 2014, 64 per cent of First Nations in Canada experienced at least one drinking water advisory; as of September 2017, 144 advisories were in effect in 98 First Nations communities.

The federal government has committed to eliminating drinking water advisories on First Nations within five years.

Published in the *Journal of Water Supply: Research and Technology-AQUA*, the study analyzed extensive data on drinking water advisories in First Nations communities across Canada. The researchers also interviewed many community members and First Nations organizations in Ontario, Saskatchewan, Alberta and British Columbia.

"In 2015, 78 per cent of boil water advisories were issued on a precautionary basis due to problems with drinking water equipment or processes," said McBean.

Boil water advisories related to equipment and process challenges, he said, are generally issued before any actual decline in drinking water quality and are in place until conditions return to normal.

Real-time monitoring technology could significantly reduce precautionary advisories by clarifying whether problems exist with water, equipment or processes, he added.

Monitoring systems consisting of a series of probes can provide real-time information on flow rates, turbidity, pH, water temperatures and free chlorine - all possible threats to human health.

"Something like turbidity - cloudiness or haziness in the water - is dangerous because pathogens can reside in it. If you can detect an increase in turbidity, you can quickly increase your disinfection. This advance detection alerts operators to take preventative measures that keep the water supply safe while reducing the number of advisories if no water quality problems are detected."

First Nations often have just one water system operator who may have

more than one job, said McBean. Monitoring technology keeps an eye on the system even when the operator is not watching over it, he added.

Although real-time monitoring would significantly reduce drinking water advisories, particularly precautionary ones, eliminating advisories in First Nation communities will require a multi-faceted approach, said McBean.

Previously, he and his collaborators explored the need for proper training for water system operators in First Nations communities.

"Addressing the issue of water security in Indigenous communities and reducing the number of drinking water advisories is a top priority," he said. "It's a serious problem. Everyone has the right to safe and reliable drinking water."

More information: Kerry Black et al, Drinking water supply systems: decreasing advisories and improving treatment through real-time water quality monitoring, *Journal of Water Supply: Research and Technology - Aqua* (2018). DOI: 10.2166/aqua.2018.091

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