

Well Water Research Project and Program Update

To: Chair and Members of the Board of Health

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Recommendations

It is recommended that the Board of Health:

1. Receive this report for information.

Key Points

- The Well Water Survey ran from May 1, 2018 to April 30, 2019, collecting 820 surveys in total:
 - 11.7% of 820 respondents tested their well water three or more times a year;
 - 68.3% of respondents (n=560/820) reported not testing their well water at least once a year
 - Of these respondents, 54.6% (n=306/560) said that they intend to test more often but forget;
 - More than 75% of respondents expressed some interest (Yes or Maybe) in an email reminder to test their well water.

- Development of a web-based, interactive, automated water sample submission system is underway with a small pilot project completed in Grand Valley in August 2019. The rationale for an automated water sample submission system are:
 - Well water testing rates across Ontario are about 25%, whereas rates in WDG are closer to 10%
 - Approximately 21% of tested wells in WDG tested positive for significant bacterial contamination.
 - 13% of the 3,087 WDG wells that submitted a sample in 2018 had a sample rejected because i) the sample was “too old” (8%), or ii) because “insufficient information was supplied with the sample” (5%).
 - Overall WDG residents reported intending to sample their water but forget and feel a reminder would assist them in submitting regular well water samples.

Discussion

Overview

The purpose of this Report is to provide an update on the Well Water Research Project, conducted by Wellington-Dufferin-Guelph Public Health (WDGPH) on data for private drinking water wells located in Wellington-Dufferin-Guelph (WDG). Information on this project was provided in three previous Board of Health reports.¹⁻³ This Report introduces the development of an automated, web-based, interactive water sample submission system for use by WDG residents and WDGPH staff.

Update on the Well Water Research Project

With a total of 820 surveys collected, there was very little change in the frequency distributions of the survey questions compared to those reported from the 524 surveys collected at the time of the October 2018 Board Report (Appendix A).³

Of the 560 (68.3%) respondents who reported not testing their well water at least once every year, more than half (54.6%) reported they intended to test more often but forget to do so.

Most respondents indicated interest in an email reminder service to prompt them to test their well water (Yes (60.8%) or Maybe (15.5%); combined = 76.3%).

The survey data will be combined with available well water lab results to address future research questions. Specifically, analyses will be done to (i) determine risk factors for adverse well water test results; and (ii) develop a risk assessment tool that can direct tailored reminders to WDG residents to test their well water.

An important program update is the process whereby addresses are “cleaned” within the data base. Approximately 85% of addresses in the Public Health Ontario Laboratory (PHO Lab) results have been matched to those in the WDGPH Master Address List, thereby making geospatial mapping and analyses possible. This “cleaning” process, which previously took many hours of staff time, has now been automated and is part of the automated system described in the next section.

Interactive Water Sample System Development

WISE is the WDGPH interactive system that makes it easier for area residents to submit well water samples and access their results. WISE stands for **W**eb-based, **I**nteractive, **S**ystem for your **E**vidence-based decision making...it's *Your Home, Your Health, Your Choice*.

WISE automatically informs WDGPH staff of adverse test results so that a Public Health Inspector (PHI) can follow up with the resident to help them understand their result and determine a solution to address the bacterial contamination.

Registering in WISE is quick and easy. It requires the user to provide their contact information, well location(s), well characteristics (9 questions), and they can choose to subscribe to reminder and/or result emails. Once registered, users can easily prepare and print a PDF of the PHO Lab form at home, or at one of the three main WDGPH offices. Then, they can drop off their sample at any of the water drop off locations. When their results become available from the PHO Lab, the WISE system will automatically send an email to Registered Users (RU) informing them that their results are available and providing a link in the email so they may log in to WISE and view/print their results immediately.

Rationale

The risk of enteric illness is five (5) times greater in those who take their drinking water from a private well, as compared to from a municipal supply.⁴ Research, in communities across Ontario, has demonstrated that well water testing rates are low, with only about 25% of well owners in Ontario submitting samples for bacteriological testing.^{5,6} Additionally, contamination rates are significant, with approximately 34% of private drinking water wells, on farm properties in Ontario, testing positive for significant evidence of bacterial contamination.⁷ There are an estimated 31,000 private, residential wells in WDG (n=30,712). In 2018, PHO Lab received 5,618 samples from 3,087 unique wells. That is, only 10% of wells in WDG were tested for bacterial contamination in

2018. Of those wells tested, 21% showed evidence of bacterial contamination. In summary, testing rates are low and contamination rates are significant.

Also relevant is that rejection rates, of samples by PHO Lab, were common. Specifically, 13% of the 3,087 wells that submitted a sample, in 2018, had a sample rejected because (i) the sample was “too old” (8%), or (ii) because “insufficient information was supplied with the sample” (5%). Interestingly, year-over-year since 2011, approximately 9% of all submitted samples are rejected each year. Of these rejected samples, approximately 90% are rejected for one or the other of these two reasons. Almost 1 in 10 lab samples being rejected is a significant waste of resources for the PHO lab and a strong deterrent for the home owner.

Overall, this data suggests two areas for improvement. First, that many well owners could be better informed about the risks associated with private well water and the importance of testing their water. Secondly, with the knowledge gained from the Well Water Survey (e.g. that WDG residents intend to test but forget, and that WDG residents would be interested in email reminders to test their well water), there is strong rationale for the development of a system to help WDG residents to easily and successfully submit water samples for bacteriological testing.

Anticipated Benefits

It is anticipated the development and use of this system will offer many benefits to private well owners, WDGPH and the PHO Lab. The primary goal is to improve the experience for residents and remove barriers to testing their well water. Some of the benefits for residents are outlined below. For more detailed information on the many benefits of this system, refer to Appendix B.

Benefits for WDG Residents include:

- Ease of sample submission;
- Fewer sample rejections;
- Test results emailed to Registered Users electronically as soon as available;
- Ability to view historical results; and
- Reminder-to-test emails.

The Grand Valley pilot test

In August, the system was tested on a small scale with WDG residents. Grand Valley was selected for this initial pilot because of its relatively small number of wells (n=794).

As well, in 2018, only 48 (6%) of Grand Valley residents with a private well tested their water and, of those wells tested, 25% showed evidence of bacterial contamination.

A notice was placed in the tax insert of the Grand Valley Municipal Newsletter encouraging residents to pick up a water sample bottle and drop it off for testing. Readers were informed that staff from WDGPH would be present at the Municipal Office in Grand Valley from August 20-22, 2019 to show them how we're making it easier for people to test their well water.

Residents who visited the Municipal Office to pay their taxes were very receptive to hearing information provided in person by the WDG staff who were present. Of 15 well-owners who were approached, 13 registered in the WISE system and used it to submit a water sample for bacteriological testing. All 13 had their sample successfully received and tested by the PHO Lab. All 13 subscribed to, and did, receive email notification of their results by the WISE system, and 11 (85%) subscribed to receive regular email reminders to test their well water throughout the year.

Of those 13 registered users, 6 (46%) had not submitted a water sample in the past 5 years. These represent true new users and the potential for success of this system in helping people submit samples.

WDGHP would like to acknowledge the help and support provided to agency staff at the Grand Valley municipal office.

Next Steps

Future directions of the Well Water Program will include:

- Analyses to determine risk factors for adverse well water test results;
- Development of a risk assessment tool to be used to direct tailored reminders to WDG residents regarding testing their well water; and
- Continued development, testing and roll-out of WISE.

Conclusion

Information from previous research, the Well Water Survey and PHO Lab data provide rationale for the development of WISE, our web-based, interactive, automated, water sample submission system. The Pilot Test in Grand Valley identified further work necessary to refine the system while also revealing the potential for this system to help non-testers to register and begin testing their well water.

Ontario Public Health Standard

Safe Water program standard.

WDGPH Strategic Direction(s)

- ☒ **Health Equity:** We will provide programs and services that integrate health equity principles to reduce or eliminate health differences between population groups.
- ☒ **Organizational Capacity:** We will improve our capacity to effectively deliver public health programs and services.
- ☒ **Service Centred Approach:** We are committed to providing excellent service to anyone interacting with WDG Public Health.
- ☒ **Building Healthy Communities:** We will work with communities to support the health and well-being of everyone.

Health Equity

WDGPH will use the results of this research and information collected in WISE, to inform interventions that reduce disparities in well water testing and promote safe drinking water for all residents. Identifying barriers to sampling in areas with low sampling rates will allow WDGPH to implement evidence informed interventions across WDG. Health equity considerations will also be included in every step of intervention planning and implementation.

References

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Appendices

Appendix A – Frequency distributions of the responses for selected questions from 820 surveys collected from May 2018 – April 2019

Appendix B – Anticipated Benefits of WISE

Appendix A

Frequency distributions of responses for selected questions from 820 surveys collected from May2018 – April2019

Selected Questions from the Survey	Response Options	Total n* (%) Oct 2018 n=524	Total n* (%) Oct 2019 n=820
Surveys Submitted	Online	318 (60.7)	430 (52.4)
	Paper	206 (39.3)	390 (47.6)
How did you hear about the survey? **	Newspaper ad	84 (16.0)	88 (10.7)
	PH* website, Twitter, Facebook	81 (15.5)	118 (14.4)
	Received survey in mail	147 (28.1)	171 (20.9)
	Received survey through school	8 (1.5)	18 (2.2)
	Community event	5 (1.0)	8 (1.0)
	Pickup location ***	181 (34.5)	378 (46.1)
	Other	42 (8.0)	65 (7.9)
Homeowner Status	Owner	507 (96.8)	779 (95.0)
	Tenant	17 (3.2)	41 (5.0)
Plan to submit water sample around same time as completing the survey?	Maybe	93 (17.8)	124 (15.1)
	No	157 (30.0)	205 (25.0)
	Yes	274 (52.3)	490 (59.8)
Number of years owned/lived at property:	<1 year	30 (5.7)	51 (6.2)
	1-5 years	123 (23.5)	202 (24.6)
	6-10 years	75 (14.3)	124 (15.1)
	10+ years	296 (56.5)	443 (54.0)
Is the well water used for drinking?	No	36 (6.9)	53 (6.5)
	Yes	488 (93.1)	766 (93.5)
If the well water is not used for drinking, why not? **	Don't like taste/odour/appearance	23 (63.9)	33 (62.3)
	Concerned about safety	22 (61.1)	34 (64.2)
How often do you test the well water?	I have never tested my well water	88 (16.8)	151 (18.4)
	Less than once per year	249 (47.5)	369 (45.0)
	1-2 times per year	101 (19.3)	164 (20.0)
	At least three times a year	63 (12.0)	96 (11.7)
	Unsure	23 (4.4)	40 (4.9)
If the water is not tested at least once every year, why not?	Not concerned about safety	108 (30.0)	155 (27.7)
	Well water is not used for drinking	10 (2.8)	14 (2.5)
	There is a treatment system on the well water	51 (14.2)	70 (12.5)
	Locations for pick-up/drop-off not convenient	70 (19.4)	85 (15.2)
	Hours for pick-up/drop-off not convenient	56 (15.6)	72 (12.9)
	I intend to test more often, but I forget to do so	198 (55.0)	306 (54.6)
	The well water is tested regularly (every year)	12 (3.3)	14 (2.5)
Would you like an email reminder to test your well water?	Maybe	80 (15.4)	126 (15.5)
	No	123 (23.6)	192 (23.7)
	Yes	318 (61.0)	494 (60.8)

*n – number; PH – Public Health;

**Respondents could select more than one response and, so, percentages may sum to more than 100%;

***Pickup locations included WDGPH offices, municipal offices, libraries, hospitals.

Appendix B

Anticipated Benefits of WISE

It is anticipated the development and use of this system will offer many benefits to WDG residents, WDGPH and the PHO Lab.

WDG Residents

Ease of sample submission

- Log in (from home or at kiosk)
- Enter date and time of sample collection
- Enter/scan barcode (from bottle)
- “Submit” (print and enclose the printed PDF of the PHO Lab form with bottle)
- Drop off

Fewer sample rejections

- Can’t “Submit” without all PHO Lab-required information
- When they hit “Submit,” they will either get a list of drop-off locations and deadlines, or a Warning if “Too Late” and the sample is likely to be rejected by the Lab.

Test results emailed to Registered Users (RU) electronically as soon as available

- Every morning, we log in to PHO Lab and extract any new results for our Health Unit (2266). An email is sent, automatically, to every relevant RU, informing them that their results are ready and providing a link to WISE where they can view said result.

View historical results

- Each RU will be able to view test results for their registered well(s), back to 2011.

Reminder-to-test emails

- Regular
- Tailored

WDGPH

Improved data quality

- Standard addresses

Program Assistant (PA) portal

- Search results...information lookups

- Export results (csv files)
- Manual fixing of problematic records

Public Health Inspector (PHI) Portal

- Easily see outstanding adverse results requiring calls
- Allows multiple PHI's to add/view comments on any given record

Future

- Increase in # of clients

Public Health Ontario Laboratory

Fewer transcription challenges

- No more hand-writing to decipher

More correct & standardly entered addresses

- We are facilitating Standardization of addresses through the selection of an address from our Master List
- Good for PHO Lab summary reports:
 - because addresses can be entered 5 times, in 5 different ways, for example...all correct, but slightly different from each other, which can result in misleading summary statistics in terms of number of unique wells submitting samples

Fewer rejections for “Too Old” or “Not enough Info”

Form & bottle linked by barcode...by resident, BEFORE drop-off

- Barcode, pre-printed on Form at “Submit,” links form to sample bottle
- Helpful if form becomes separated from sample

Future

- Use of QR code could eliminate need for transcription & PHO Lab Form
- Decreased costs:
 - Printing forms
 - Sample kit assembly (no form required)
 - Staff time for transcription and problem solving
 - Postage
 - Increase in # of clients