



Improved Public Satisfaction with Drinking-Water Quality over the Last Thirty-Five Years in Idaho

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Abstract

This thirty-five-year survey study documents how the public in Idaho has improved their satisfaction with drinking-water quality. A statistically designed repeated measures survey was designed in 1988 and conducted in 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023 to document trends about (a) the importance of drinking water, (b) water supply source, (c) bottled water use, (d) use of in-home supplemental water filters, (e) water testing, and (f) potential contaminants in drinking water. Over 94% of Idahoans consider drinking-water quality very important. Bottled-water use in residences increased from 21% in 1988 to 36% in 2007 and then decreased again to 23% in 2023. The recent decrease in bottled-water use was linked to concern about single-use plastic water containers. In-home supplemental filter use increased from 14% in 1988 to 39% in 2023, a trend that is statistically significant. The frequency of water testing for residents receiving water from unregulated sources ranged from 33% in 1988 to a high of 54% in 2023, a trend linked to increased consumer education and that is also statistically significant. At no time did more than 16% of Idahoans identify a suspected contaminant of concern in their drinking water.

Keywords: drinking-water quality; water supply source; bottled water; in-home water filters; water testing; potential water contaminants; documented public actions

Introduction

Even though water covers over 70% of the Earth's surface, only about 3.5% of the water is fresh and suitable for most human use. The United Nations suggests that each human requires 900,000 liters of fresh water per year to meet their needs (Arnell et al. 2011 and Postel et al. 1996). With a human population on Earth of 8.2 billion in 2025, over thirty countries cannot meet the required freshwater needs of its citizens. Based on current per capita freshwater needs, more than fifty countries will not meet this standard for its citizens by 2050, when the human population is projected to exceed 9.8 billion (Gleick 1998 and Chenoweth 2008).

From a freshwater standpoint, Idaho has a larger supply of water resources on a per capita basis than all but two other western states. Much of Idaho's fresh water falls as mountain snow in the Idaho portion of the Rocky Mountains in the colder parts of the year. The state also receives water from the melting snowpacks in Wyoming, Montana, and the Canadian province of British Columbia. The water is stored as snowpack in the winter; when temperatures warm in late March and April–June, the snow melts and flows down streams and rivers, where it can be captured to support economic activity in Idaho and in the downriver states of Washington and Oregon. The snowpack, through rivers and indirectly through groundwater recharge, provides irrigation water for over 1,700,000 ha (hectares) of agricultural land in Idaho. In addition, surface waters flow through numerous dams that meet over 60% of Idaho's electricity needs. The rivers support the transport of economic goods and provide numerous recreational activities for Idaho residents and for tourists from five continents.

Indirectly and directly, mountain snow provides drinking water for Idaho citizens, which is stored as groundwater in many of Idaho's aquifers and as surface water in over seventy-five reservoirs and mountain lakes. Indeed, most drinking water in Idaho originates as groundwater. The water from the snowpack provides excellent quality drinking water and it is of sufficient quantity to meet the current needs of Idaho citizens.

From a population standpoint, Idaho has been the fourth fastest-growing state in the United States over the last thirty-five years. In fact, Idaho's population has nearly doubled during the thirty-five-year study period. In 1988, the beginning of the survey study, Idaho's population was 985,000;

however, by 2023 the state had grown to 1,965,000 people, a 99.5% increase. The rapid population growth since 1988 reveals several demographic changes, notably a shift from a predominantly rural-based population to one that lives in or near cities.

During this same period, a plentiful supply of irrigation water allowed the Idaho desert to bloom, enabling agriculture to become Idaho's major industry. Only three other states have more farmland under irrigation (California, Texas, and Nebraska). Hence the potato, Idaho's most valuable irrigated crop, appears on Idaho's license plate with the moniker, "Famous Potatoes."

Even though fast population growth in the last three decades has made Idaho more urban, agriculture and associated food processing still make Idaho one of the five (of fifty) states most dependent on agriculture. Indeed, over 60% of Idahoans today consider irrigated agriculture an important cultural aspect of life.

The University of Idaho Extension water resources program began in 1988. Historically, the evaluation of Extension programs has been difficult and few agree on the best methods for short-, medium-, and long-term evaluations of them (Shepard 2002). Consequently, an evaluation strategy was developed at the program's start. The evaluation effort was based on a survey program of the public conducted every five or six years. The survey program was developed to determine public preferences and knowledge about water issues, including public knowledge about drinking water—the concerns and the types of actions voluntarily taken by the public to improve drinking-water quality in Idaho. The survey process initially designed in 1988 was meant to be repeated in 1993, 1997, 2002, 2007, 2012, 2017, and 2023 using the same survey questions. The survey included approximately sixty questions, of which eight were about drinking water. The answers from the surveys were plotted by survey year and the trends allowed evaluators to determine if outreach programs were successful.

This paper covers the eight survey questions related to drinking-water quality. The objective of this long-term survey study was to determine how the public in Idaho dealt with drinking-water issues and to observe trends over a thirty-five-year period that would provide valuable information for educators, political scientists, public policymakers, and water scientists. It also reveals important drinking-water quality trends in the state.

Materials and Methods

In 1988, a repeated measures survey was designed to measure public attitudes, knowledge, and actions taken in Idaho about water resource issues. The survey consisted of sixty questions about water resources and seven questions about the demographics associated with each survey taker. The survey was designed to be sent out to the public in that year with identical surveys administered to Idaho residents in five-year intervals the following forty years to measure change over time. The survey contained eight questions about drinking water consumed in the home. The answers to the eight questions serve as the basis for this paper. The questions in this survey were as follows:

- Q-1. How important is clean drinking water to you? Possible answers (choose only one): a. Very important; b. Important; c. Not important; d. No opinion.
- Q-2. What is the source of your water supply within your home? Possible answers (choose only one): a. City water system; b. Private water system that serves more than twenty homes; c. Private water system that serves less than sixteen residences; d. My own well; e. I don't know.
- Q-3. Do you use store-bought bottled water to supplement tap water in your home? Possible

answers (choose only one): a. Yes, over half of the water used for drinking in my home is bottled water; b. Yes, between 10% and 50% of the water used for drinking in my home is bottled water; c. No, bottled water is not consumed in my home; d. I don't know.

- Q-4. When traveling in an automobile, bus, train, or airplane, how do you obtain your drinking water? Possible answers (choose only one): a. I buy bottled water; b. I fill my thermos or vessels with tap water or water from a water fountain; c. I carry a supply of water with me—I never buy bottled water; d. It depends on the traveling situation (one-hundred-mile car trip versus ten-hour plane trip).
- Q-5. Do you supplement the tap water provided in your home by using an additional filter to improve its safety and/or taste? Possible answers (choose only one): a. Yes, I have a simple pour-through filter in my kitchen (like a Brita filter); b. Yes, I have a filter plumbed into my water faucet in the kitchen; c. Yes, I have a simple distiller or reverse-osmosis unit plumbed into my home; d. No, I do not use a supplemental filter; e. I don't know.
- Q-6. Do you have your home drinking water tested on a regular basis (every 2–3 years)? Possible answers (choose only one): a. Yes, tested regularly; b. Yes, tested in the past, but not within the last three years; c. No, never tested; d. I don't know.
- Q-7. Please select up to three of the following potential water contaminants that you think are problems in your water supply based on your knowledge, media reports, and/or conversations with neighbors. Potential water contaminants: a. Bacteria/pathogens; b. Nitrates; c. Pesticides; d. Heavy metals; e. Industrial chemicals; f. Minerals (hard water); g. Cryptosporidium/Giardia (pathogens).
- Q-8. Do you have a water softener in your home? Possible answers (choose only one): a. Yes; b. No; c. I don't know.

In addition to the eight survey questions the following demographic information was collected from each Idahoan who completed the survey: (1) gender, (2) age, (3) highest formal education level attained, (4) size of the town lived in, (5) county of residence, (6) city of residence, (7) length of time residing in Idaho, and (8) resident self-labeling of living in a rural, suburban, or urban community.

The survey questions and survey were submitted to the University of Idaho Institutional Review Board (IRB) in 1987–88. The IRB approved the survey instrument as exempt.

The survey was sent to 1,240 random Idaho residents in 1988. The identical survey was then again sent to 1,240 random Idaho residents in 1993, 1997, 2002, 2007, 2012, 2017, and 2023. Mailing addresses were obtained from a social science survey company (SSI, Norwich, Conn.). The distribution of surveys was based on two factors. First, ten were sent to residents of each of the forty-four counties in Idaho (four hundred forty surveys). Second, the remaining eight hundred were sent to residents of Idaho counties based on their percentage of state residents at the time that the United States Census 1988 was conducted. This resulted in another six hundred surveys sent to the ten most populous counties in Idaho, while the remaining thirty-four counties received an additional collective total of two hundred surveys. The ten highly populated counties of Ada (172 surveys), Canyon (89), Bonneville (67), Bannock (65), Kootenai (60), Twin Falls (53), Nez Perce (33), and Latah (29) received the highest survey allocations in addition to the initial ten surveys.

A target of six hundred twenty completed questionnaires was chosen as the goal in each of the eight survey years (1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023) to result in a sampling error of 5%–6% percent (Dillman 2000). The survey process was designed to receive a completed return rate of 50%. Four mailings were planned to achieve the 50% return rate (Salent and Dillman 1994).

The survey's mailing strategy developed by Dillman was similar in design to the other twenty-four conducted in Idaho between 1988 and 2024 (Babbie 1983; Mahler et al. 2004; Mahler et al. 2005; Mahler 2019; Mahler and Barber 2015). The mailings for each survey year were as follows: The first included a copy of the water resources survey form, a business reply envelope, and a cover letter that (1) identified the survey's authors, (2) explained the purpose of the survey, (3) assured respondents of anonymity, and (4) asked potential respondents to fill out the survey and return it in the supplied business reply envelope. The second mailing occurred five weeks later and consisted of a postcard that stressed the importance of the survey and a reminder to fill out and return the completed survey. Five weeks later, the third mailing was sent to residents who did not respond to the first or second mailing. The mailing included a more urgent reminder letter, another copy of the survey, and a business reply envelope. Five weeks after that mailing a fourth consisted of a reminder postcard sent to every resident that had not returned a completed survey yet. The survey data was statistically analyzed using Statistical Analysis System (SAS) software and paired t-tests (SAS Institute 2004; Steel and Torrie 1960).

Results and Discussion

A significant portion of the UI Extension water resource programming was devoted to developing and conducting a statistically valid public survey program about public perceptions and actions toward water resources in Idaho. These surveys allowed Extension to determine the effectiveness of its programs by tracking public knowledge and perceptions of water issues and by measuring voluntary actions taken by the public that positively impacted Idaho's waters. Major surveys were designed and conducted in 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023. Survey results over this period were plotted to evaluate trends and understand Extension's impact on Idaho's water resources.

The survey methodology used in the thirty-five-year survey study was not designed to be unique, but rather as a tool to track opinions and actions about water resources. The 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023 surveys received completed return rates of 52.6%, 55.2%, 52.3%, 51.9%, 54.6%, 53.2%, 50.9%, and 53.4%, respectively. Consequently, the target return rate of at least 50% was achieved for each survey year. The Dillman methodology was in large part responsible for the high survey return rate (Dillman 2000; Salent and Dillman 1994). However, the high level of interest in water by Idaho citizens also contributed to the high survey completion rate.

Recent University of Idaho studies have shown that between 82% and 94% of Idahoans are satisfied with their quality of drinking water (Mahler et al. 2015; Mahler and Barber 2016). The results of the first survey question used in the long-term survey study confirmed that Idahoans felt that clean drinking water was very important to them (Table 1). In all survey years, at least 94% of the public that completed this survey felt that clean drinking water was very important to them. There were no statistical trends apparent over time because the importance was uniform regardless of the survey year. In addition, the only demographic factor that significantly affected survey responses was gender. Females were more likely to consider clean drinking water very important than males (98% versus 95%). This statistic, however, is probably not important because at least nineteen out of twenty men and women considered clean drinking water very important.

Table 1. The importance of drinking water being clean to Idahoans in 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023.

Survey Year	Importance of Drinking Water Being Clean, %			
	Very important	Important	Not important	No opinion
1988	97	2	0	1
1993	95	3	1	1
1997	95	4	0	1
2002	96	1	2	1
2007	97	1	0	2
2012	98	0	1	1
2017	96	2	0	2
2023	94	4	0	2

Source of Water Supply

The four water supply choices that residents had were (1) the city water system, (2) a community water system (CWS) that serves more than twenty residences, (3) a private water system that serves less than fifteen residences, and (4) a private well. The first two choices represent a CWS that is regulated by the Environmental Protection Agency (US-EPA) and that requires regular testing and treatment of water distributed to residents (CWS). The other two represent water systems unregulated by US-EPA and thus do not require testing and treatment of distributed water (RWS). Consequently, CWS numbers represent the sum of answers a + b, while RWS represent the sum of answers c + d.

The sources of water supply for Idahoans are shown in Figure 1. Over 85% of Idahoans knew what the water source was for their primary residence in every survey year. Between 71% and 83% of survey respondents were served by a CWS between 1988 and 2023. This upward trend over time was statistically significant. Conversely, the use of RWS decreased from 24% of residents in 1988 to 8% in 2023. The downward trend is also statistically significant. Note that both trends make sense due to population changes in Idaho in the last thirty-five years. Idaho’s population doubled during the survey years, much of it due to immigration into the state. Most of this influx has been to urban areas where CWSs are the norm. Even though the percentage of the public using RWS has decreased, the actual number of RWS has not decreased—it just looks like a lower number because most recent immigrants into Idaho use CWS systems.

The demographic factors of gender, age, education level, and time living in Idaho did not impact water coming from a CWS versus an RWS system. However, community size and the self-choice of a rural/suburban/urban lifestyle did statistically affect an RWS. People living in small communities with less than two thousand people were much more likely to have an RWS as their water source than people living in communities larger than eight thousand people. Also, Idahoans who indicated that they live in rural areas also were significantly more likely to have an RWS provide water to their residences than Idahoans that self-labeled as suburban or urban.

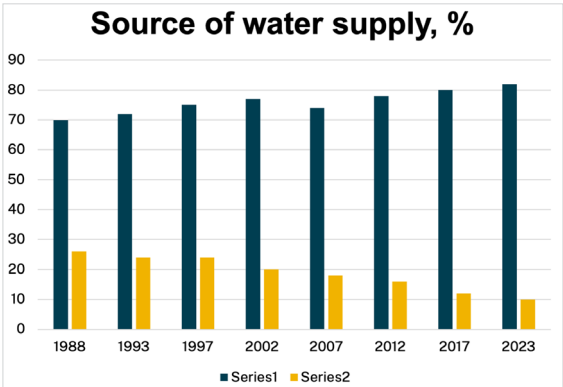


Figure 1. Percentage of Idahoans that get their in-home water from community water systems (CWS) and rural water supplies (RWS), based on University of Idaho surveys conducted in 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023.

Use of Bottled Water

When asked about their use of bottled water at home, Idahoans had the following four choices: (a) Over half of the water used for drinking in my home is bottled water; (b) Between 10% and 50% of the water used for drinking in my home is bottled water; (c) Bottled water is not consumed in my home; and (d) I don't know. A or b responses indicated a bottled water user; however, c responses indicated no bottled water usage in a home. The percentage of Idahoans that supplement their water use at home with bottled water is shown in Figure 2. Bottled-water usage in the home increased from 21% of residents in 1988 to 36% of residents in 2007, a significant trend. However, bottled-water usage after 2007 decreased to 23% by 2023, a significant downward trend.

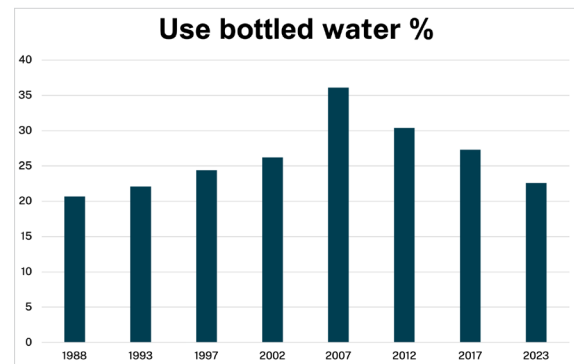


Figure 2. Percentage of Idahoans that supplement their tap water with bottled water to meet their drinking water needs, based on University of Idaho surveys conducted in 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023.

Many Idahoans use bottled water even though treated tap water is considered safe and healthy for most people (Hu et al. 2011). Bottled water for drinking use peaked in 2007 and then significantly decreased in popularity, likely for at least four different reasons. First, the airing of educational programs that show the similarity in the safety of tap water compared to bottled water may have impacted use. Second, waste reduction advocates' characterization of the plastic bottle as wasteful and harmful to the environment, a message to which a segment of the public in Idaho (particularly children) have responded. Third, compared to the cost of gasoline, bottled water is expensive. Fourth, distribution of bottled water from a manufacturing plant to a retail store consumes a lot of energy, especially when a bottled water product is imported from sources thousands of miles away.

Of the Idahoans that use bottled water regularly, approximately 68% said that bottled water supplied between 10% and 50% of their residential drinking water. Conversely, 32% reported that bottled water was responsible for over 50% of the drinking water consumed at home. These numbers are consistent over the survey years.

The demographic factors of gender, age, education level, time lived in Idaho, and rural/suburban/urban residence impacted the use of bottled water in Idaho over the thirty-five-year study period (Table 2). Females were much more likely to use bottled water than males. Idahoans between the ages of forty and sixty were more likely to use bottled water than older and younger Idahoans. Idahoans with a high school diploma or less were much less likely to use bottled water than survey respondents with more formal education. People who lived in Idaho for less than five years were the most likely to consume bottled water, while respondents less than thirty years old were least likely. Idahoans considering themselves as suburban residents were almost twice as likely to use bottled water than both self-labeled urban and rural residents.

From a geographical standpoint, residents of southwestern Idaho, including the cities of Boise, Meridian, and Nampa, were more likely to use bottled water than residents of other parts of Idaho. Rankings of bottled water use from a more detailed geographical standpoint (going from greatest to least use of bottled water) are as follows: residents of southwestern Idaho > residents of northern Idaho > residents of southcentral Idaho > residents of southeastern Idaho.

Table 2. The influence of the demographic factors of age, gender, education, community size, length of time living in Idaho, and location (urban/suburban/rural) on the use of bottled water during the thirty-five-year study period.

Demographic Factor	Significance	Important Finding
Age	0.035**	Idahoans between the ages of forty and sixty were most likely to use bottled water.
Gender	0.006***	Females were more likely to use bottled water than males.
Education	0.038**	Idahoans with a high school diploma or less were least likely to use bottled water.
Community Size	0.43 NS	No differences
Time in Idaho	0.024***	People living in Idaho less than five years were most likely to use bottled water.
Rural/Suburban/Urban	0.0008****	Suburban residents were most likely to use bottled water.

, *, and **** = Significant at the 0.05, 0.01, and 0.001 levels of probability, respectively.
 NS = not significant

Use of Drinking Water when Traveling

Idahoans drink water when traveling by automobile, airplane, bus, and train. Survey data did not indicate how Idahoans obtained this drinking water. Approximately 62% of Idahoans buy bottled water either before or during a trip (Table 3). Buying bottled water is a traveling convenience that is important for many Idahoans. Another 15% of survey respondents use tap or filtered water to fill drinking vessels either before or during a trip. It is assumed that this could include taps at campgrounds. Twelve percent of Idahoans carry a supply of water with them (container not specified) while traveling, while 11% said that the travel situation determined how they would obtain drinking water. Another comment that was common, but unsolicited, was that water was needed while camping, fishing, or hunting. In these locations, people used a local river or lake to obtain drinking water, an indication reported eighty-four times during the survey. Interestingly, a water source was treated for bacteria/protozoa contamination about 35% of the time. It is interesting to note that several Idahoans know that Giardia is a common protozoa parasite present in many water bodies in remote areas of Idaho that are used for rafting, fishing, hunting, hiking, and camping. There are appropriate situations for using bottled water and a majority of Idahoans opt to do participate in them.

Table 3. The most common way Idahoans obtained water when traveling by automobile, bus, train, or airplane, based on surveys conducted in Idaho in 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023.

Most Common Way of Obtaining Water	% of Respondents
I buy bottled water either before or during a trip	62
I use tap water to fill my thermos and/or drinking vessels	15
I carry a supply of water with me — I never buy	12
Depends on the travel situation	11

In-Home Water Filters

When asked about their use of an in-home water filter to improve the quality of tap water, Idahoans were given the following five choices: (a) I have a simple pour-through filter in my kitchen (like a Brita); (b) I have a filter plumbed into my water faucet in the kitchen; (c) I have a simple distiller or reverse osmosis (RO) unit plumbed into my home; (d) I do not use a supplemental filter; (e) I don't know. A, b, or c responses indicated usage of an additional in-home water filter; however, d responses were counted as not using an additional in-home water filter. The percentage of Idahoans using supplemental filters to improve the quality of their tap water is shown in Figure 3. In-home supplemental filter use increased from 14% in 1988 to 39% in 2023 (Figure 3), a statistically significant trend of increased in-home filter use.

The demographic factors of gender, age, education level, community size, and rural/suburban/urban residence impacted the use of supplemental in-home filters to improve the safety and/or taste of drinking water over the thirty-five-year study period (Table 4). Females were much more likely to use in-home pour-through water filters than males. Idahoans between the ages of forty and sixty were more likely to use in-home water filters than older ones. Those with at least two years of college were much more likely to use in-home water filters than residents with less formal education. Idahoans living in communities with more than twenty thousand people were more likely to use in-home filters than those living in smaller communities. Suburban residents were more likely to use in-home water filters than both self-labeled urban and rural residents.

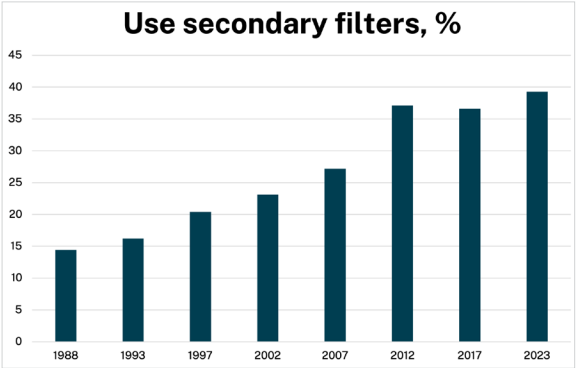


Figure 3. Percentage of Idahoans that supplement their tap water with secondary filters to meet their in-home water needs, based on University of Idaho surveys conducted in 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023.

Table 4. The influence of the demographic factors of age, gender, education, community size, length of time living in Idaho, and location (urban/suburban/rural) on the use of a supplemental in-home filter to improve tap-water safety and or/taste during the thirty-five-year study period.

Demographic Factor	Significance	Important Finding
Age	0.041**	Idahoans between the ages of forty and sixty were more likely to in-home water filters than older residents.
Gender	0.0003****	Females were more likely to use in-home water filters than males.
Education	0.027**	Idahoans with at least two years of college education were more likely to use in-home filters than residents with less formal education.
Community Size	0.016**	Residents from communities larger than twenty thousand were more likely to use in-home filters than those in smaller towns.
Time in Idaho	0.29 NS	No data
Rural/Suburban/Urban	0.04**	Suburban residents were most likely to use in-home water filters.

** ***, and **** = Significant at the 0.05, 0.01, and 0.001 levels of probability, respectively.
NS = not significant

Water Testing

The sixth survey question about the frequency of testing drinking water had four potential answers. The answers were based on whether or not residents tested their home drinking water every two to three years. Answer choices for this question were (a) Yes, tested regularly; (b) Yes, tested in the past but not within the last three years; (c) No, never tested; and (d) I don't know. To adequately interpret answers to this question, the respondent's source of in-home water also had to be reported. Because US-EPA regulations require that a water provider regularly test water and remove any potential harmful contaminants prior to distribution to residents, some Idahoans more easily can provide this information, since those receiving their water from a CWS don't need to test their water. The water-testing frequency of Idahoans who receive their water from a CWS is shown in Figure 4. Over the thirty-five-year study, the water-testing frequency for those residents receiving water from a CWS ranged from 7% to 15%. The percentage of water testing was low; however, because water is already tested by the CWS, there is no cause for concern with the low percentages. Consequently, no significant water-testing trends over time were observed for residents receiving CWS-supplied water over the length of the survey study.

Conversely, residents receiving water supplied by an RWS (non-CWS) system did not automatically have their water tested by the water distributor, meaning that water-testing responsibilities were up to the individual receiving the water. The frequency of water testing ranged from 33% in 1988 to a high of 54% in 2023 (Figure 4), a statistically significant trend. The increased testing of water received from an RWS was primarily due to increased consumer education.

The findings from the water-testing survey question were encouraging because a majority of residents receiving water from RWS systems regularly had their water tested, based on the 2023 survey. This indicates that the public made strides in protecting their drinking water compared to prior survey years.

Potential Water Contaminants

The seventh and eighth survey questions deal with potential water contaminants. The seventh survey asked respondents to identify up to three potential contaminants that they thought might be present in their drinking-water supply. Potential answers included (a) Bacteria (pathogens); (b) Nitrates; (c) Pesticides; (d) Heavy metals; (e) Industrial chemicals, (f) Minerals, and (g) Protozoa (*Cryptosporidium/Giardia*) pathogens. Survey results are shown in Table 5. The eighth survey asked about the presence of a water softener in the home. Possible answers to this survey question included (a) Yes; (b) No; and (c) I don't know.

At no time in any survey year did more than 16% of survey respondents identify one of the seven listed potential contaminants as being something they were concerned about in their drinking water based on personal knowledge, media reports, or by talking with neighbors. (Table 5). Because of these low numbers, it is likely that Idaho residents were not concerned about potential drinking-water contaminants. In addition, neither downward nor upward trends over time were apparent for any of the seven potential contaminants (Table 5).

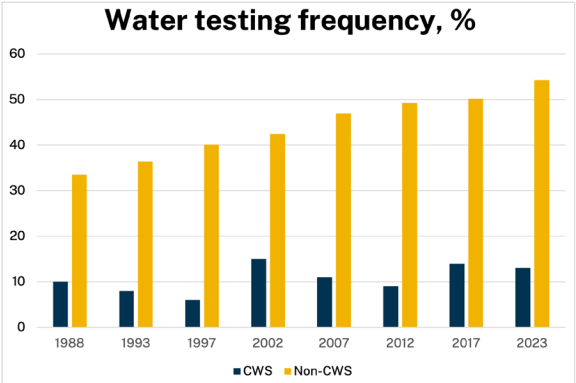


Figure 4. Water-testing frequency (at least once every three years) of Idaho residents getting their in-home water from a community water system (CWS) and non-CWS water sources, based on University of Idaho surveys conducted in 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023.

Table 5. The percentage of Idaho respondents who reported drinking-water contaminants that are potential problems (up to three contaminants) in the 1988, 1993, 1997, 2002, 2007, 2012, 2017, and 2023 surveys.

Contaminant	1988	1993	1997	2002	2007	2012	2017	2023
				%				
Bacteria (pathogen)	6	8	4	9	5	3	8	4
Protozoa (pathogen)	5	4	2	7	9	10	4	7
Nitrates	10	8	11	7	14	8	7	5
Pesticides	3	6	6	4	2	7	2	4
Heavy metals	1	3	4	2	5	8	3	2
Industrial chemicals	2	4	3	1	0	2	0	4
Minerals (hard water)	14	11	12	16	14	15	12	10

Based on survey question seven, Idaho residents were most concerned about minerals in their water (between 10% and 16% of Idahoans, regardless of the survey year). These minerals had the potential to make their water hard, which can cause dry skin, chalky deposits on fixtures and appliances, inefficient cleaning with soaps and detergents, and appliance damage. Indeed, UI Extension fields many questions about hard water and water softeners.

Survey question eight gauged how widely Idahoans use water softeners in their homes. Results indicate that approximately 10% of residences relied on water softeners or filtering devices to reduce high levels of calcium and magnesium in their water supply. Based on results from survey questions seven and eight, the Idaho public has an acceptable knowledge level about common contaminants in drinking water and understands that the listed contaminants are not commonly found in Idaho drinking water supplies.

Summary and Conclusion

The thirty-five-year survey study provides much useful information about Idaho’s drinking water for adult educators. First, it reveals the durability of relying on a methodological approach, no matter how outdated, when conducting a multiyear survey. The one used for the study relied on a set of mail-based questions first developed for the 1988 survey, a less common mode in use today. Indeed, since 1988, most surveys conducted by researchers have been internet- or telephone-based. Despite this development, it was important that researchers use the same methodology (mail-based surveys) in order to accurately document and compare public answers for the entire thirty-five-year period studied. Furthermore, over 50% of people who were contacted for these surveys by mail (those who actually filled out the surveys) embodies a very low sampling error. With an internet-based survey, achieving a response rate as high as 20% would have been difficult and would have resulted in a much greater sampling error.

The second most significant findings of this long-term study involve some of the statistical results and include the following:

- At least 94% of Idahoans consider drinking-water quality very important.
- Between 71% and 83% of Idahoans were served by CWS between 1988 and 2023. The upward trend over time is statistically significant. Conversely, the use of RWS systems decreased from 24% in 1988 to 8% in 2023. The percentage decline is also statistically significant and relates to the demographic movement of Idaho from primarily a rural-based population to an urban-based one.

- Bottled-water use in residences increased from 21% in 1988 to 36% in 2007 and then decreased again to 23% in 2023. Both the increase from 1988 to 2007 and the decrease from 2007 to 2023 are statistically significant. Four reasons for the decreased use of drinking water between 2007 and 2023 were identified.
- In-home supplemental filter use increased from 14% in 1988 to 39% in 2023. The trend of increasing use is statistically significant. The demographic factors of gender, age, education level, community size, and rural/suburban/urban identification had a significant impact on residents' choice to purchase supplemental in-home water treatment devices.
- The frequency of water testing for residents receiving water from an RWS system ranged from 33% in 1988 to a high of 54% in 2023. The increased trend for having water tested is statistically significant. Increased testing from an RWS was primarily due to increased consumer education.
- At no time did over 16% of survey respondents identify one of the seven listed potential contaminants (bacterial pathogens, protozoal pathogens, nitrates, pesticides, heavy metals, industrial chemicals, minerals) as possibly being in their drinking water based on their own knowledge, media reports, and/or by talking with neighbors. It is likely that Idaho residents are not concerned about potential contaminants in their drinking water.

Long-term survey studies about public reactions to drinking water issues are rare. It is common to see studies span a two-to-five-year period; however, the collection of data over a much longer time period, showing trends of public perceptions, don't exist. Consequently, a study of this type is important to the scientific literature. In this day and age, grants are required to conduct these types of survey studies; however, most grants only cover a limited time period, which is most often less than five years. Because researchers depend on grants, few long-term studies about the public's knowledge of drinking-water quality, their concerns about it, and actions taken to improve it have been conducted nor likely will be conducted in the future.

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