Water Infrastructure Brief

Opportunities and challenges for washeterias in unpiped Alaska communities

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Summary

Approximately 3,300 homes in over 30 communities in rural Alaska lack in-home piped water, which results in challenges to health and wellbeing. While piped water may be a long way off, community water infrastructure plays an important role in critical necessities, such as bathing and laundry. Access to washeterias[a] doubles the quantity of water households in unpiped communities use from 4.6 gallons to 9.3 gallons which brings water use to 70% of the recommendation from the World Health Organization for water access to sustain health. Challenges to operate a washeteria include cost, access, technical and operational issues, hygiene and privacy concerns. This report recommends updating the technology of existing facilities, improving access, reducing closures, improving cleanliness, and decreasing the end user costs of washeteria services to improve health in unpiped communities.

Above: Handwashing basin in unpiped Atmautluak home.

Left: Birds eye view of the community of Newtok.

[a] The term washeteria in the context of Alaska specifically refers to facilities that provide the service of a laundromat, including offering laundry machines, showers, toilets and treated water.

Background

The Sustainable Development Goal for Water (SDG 6)1 describes the need to ensure availability and sustainable management of water and sanitation for all. In 2015, 2.1 billion people worldwide did not have safely managed drinking water[2] – they did not have water that was free of contamination on the premises, available when needed for drinking, cooking and hygiene. In the United States in 2012, 1.6 million people did not have access to a toilet, tub/shower or running water in their homes.[3] Alaska has the highest percentage of housing units that lack in-home plumbing, at 6% statewide, impacting thousands of people in at least 30 remote Alaska Native communities.[4] The public health urgency of the challenge to provide water and sanitation for all requires that communities, implementers and funders pursue all possible solutions for increasing water access to vulnerable populations.

In off-road remote communities that lack access to household piped water, plumbed infrastructure in the community is typically limited to the school, teacher housing, clinic, and water plant buildings. A single water treatment plant provides an accessible tap for community members, usually for a fee, to fill containers for self-hauling water for personal use. A washeteria typically adjoins the water plant, providing a public space for communal laundry machines, showers, sinks and toilets. Households frequently haul water from natural sources such as river water, ice, snow, or rainwater to their homes as well.[5,6] Hauling water is time-consuming and laborious, especially for communities where the water source is several miles away, those without access to a vehicle for hauling, and residents with mobility challenges.[7] As a result, many homes limit the amount of water that they haul and thus have less water available for consumption and hygiene uses in the home.

Residents have developed ways to assure sufficient water for all of their needs by rationing water or reusing water for multiple uses.[8] However, these types of practices are likely to lead to increased exposure to pathogens,[b] and low water access in the home has been linked to higher rates of respiratory, skin and gastrointestinal infections.[9–11]

Water is critical for health, wellbeing, sociocultural activities, and economic activities. To meet these crucial needs, different characteristics of water quality, quantity and access are important. For global health considerations, piped water to the household is the gold standard of water service. In remote Alaska, environmental conditions, financial constraints, human resources or space inside the home provide hurdles to achieving this standard. [12]

For households where on-premise plumbing is not immediately available, alternative household and community water infrastructure must be provided.[13] Washeterias are critical for supplementing water and thus filling gaps in domestic water needs. This report synthesizes published literature and qualitative and quantitative data collected from over fifty households in three villages in rural Alaska[c] to examine the role of community water infrastructure, such as washeterias, in ensuring sufficient water access for unpiped households. This report also offers recommendations for providing sufficient community water infrastructure to reach water quantity needs to improve health and wellbeing in homes across Alaska.

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[b] Mattos et. al 2020. “Household water, sanitation and hyigene practices impact pathogen exposure in remote, rural, unpiped communities.” Journal of Environmental Engineering Science. In press. https://doi.org/10.1089/ees.2020.0283.

[c] Original data reported here is from the PASS Health and Wellbeing Study, conducted by the Alaska Native Tribal Health Consortium (ANTHC) and University of Colorado (CU) in 2018-2020 under Alaska Area Institutional Review Board (IRB) protocol #2018-03-009 and CU IRB protocol #18-0384. Tribal councils and community advisory committees have approved dissemination of the results reported here.

In- and out-of-home water use

Multiple investigators have determined that approximately 13 gallons per capita per day (gpcd) of water are needed to promote health,[14] and to assure consumption and hygiene needs can be met per person.[8,15] The World Health Organization (WHO) has further divided this total into specific recommendations of quantities for particular uses within the home[16] (Figure 1). In unpiped Alaska Native communities, a significant amount of time and effort is spent hauling water to the residence for basic needs,[17] including direct consumption of coffee, tea, or powdered drinks, cooking, dishwashing, handwashing, bathing, showering, laundry, and other common household tasks such as mopping, carpet cleaning, and washing walls. In unpiped homes, little water is used for other purposes, such as home businesses, growing food through gardening or farming, and recreation or waste disposal. Among three unpiped remote Alaska Native communities, the average in-home quantity of water used for drinking, cooking, personal washing, clothes washing and cleaning the house added up to 4.6 gpcd, amounting to only 35% of the quantity recommended for intermediate water access by the WHO as indicated on page 2.[b] This data aligns with estimates from other research,[8,12,18] indicating the maximum amount of water that households will self-haul to the home is typically less than 5 gpcd. Households indicated they were limited by such factors as time, water storage capacity, physical strength, injury, access to vehicles, and access to treated watering points.[7,18]

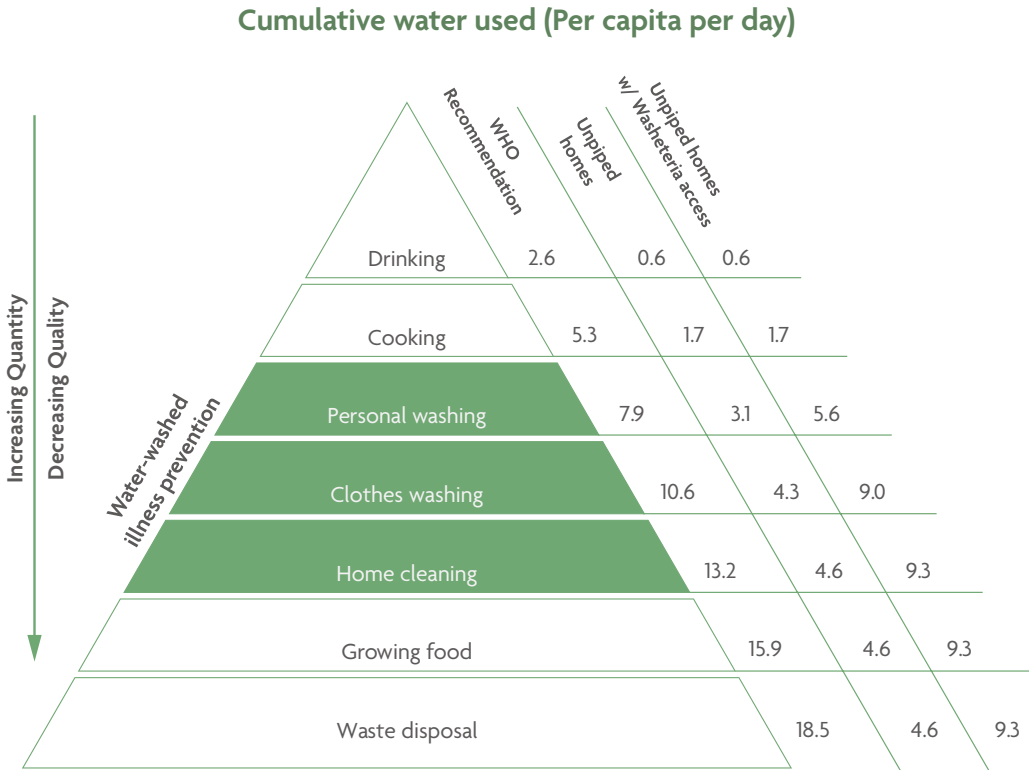

Figure 1: Water quantity requirements adapted from the World Health Organization (WHO, "Minimum water quantity needed for domestic use", reprinted with permission) are shown in the first column based on a hierarchy of their importance for health (starting at the top of the pyramid). Quantities of water used in the home for different activities are shown in the second column, based on interview data collected by ANTHC and CU from three unpiped communities in 2018-2020. Quantities of water used in unpiped homes combined with community water facilities ("washeterias") are shown in the third column (from the same interview data).

[d] Based on an allotted 10-minute shower with an average shower flow rate of 1.15 gallons/minute (measured directly), a single shower used 11.5 gallons of water.

Season	HH responding	% of HH using public showers (N)	Mean # of showers/ person/ week (range)
Fall	11	82% (9)	2.3 (0.75-5.0)
Winter	12	92% (11)	1.3 (0.5-3.0)
Spring	11	73% (8)	1.3 (0.1-3.0)
Summer	13	85% (11)	1.4 (0.3-2.0)

Table 1: Shower use at public washeteria facilities in two communities (based on interview data collected by ANTHC and CU in 2018-2020; HH = households).

With limited access to water in the home, households choose carefully how to allocate and most effectively use water.[6] These choices include limiting bathing to certain days of the week, choosing to fry food instead of steaming or boiling, or reusing water in a handwash basin multiple times before disposal.

Households also report reducing water needs in the home by using large quantities of water outside of the home for certain activities. During the summer months, families report using a local river or lake to bathe, which reduces water they must haul to the house for personal hygiene. While fishing, many people will also choose to clean their fish and tools at their water source.

Households report using the largest quantity of water outside the residence at community laundry and shower facilities. In communities where showers are open and available to community members, 73-92% of households reported using washeteria showers (table 1). Water quantity per person per day used at washeteria showers was 2-4 times higher than water used for home showering and bathing. Based on reported washeteria shower use practices, public showers increase the quantity of water used per person by an average of 2.5 gallons per day over estimates of in-home water use.

In communities where laundry machines were available at the washeteria, 75-97% of households reported using community washing machines.

Households reported a large range in water quantity used per load for laundry during home washing, and often reported reusing wash water for several loads to reduce how much they needed to haul to the home. Washeteria laundry machines used more consistent quantities of water per load, and reuse of water between loads was not reported. Based on reported washeteria laundry use practices, public laundry facilities increased the quantity of water used per person by an average of 2.2 gpcd over estimates of in-home water use.

Thus, access to showers and clothes washing facilities increases total water use for households from 4.6 gpcd (average in-home water use) to 9.3 gpcd, or 70% of the WHO recommendation for intermediate water access (Figure 1). Community facilities (washeterias) doubled the amount of water that households used and have been estimated to be capable of tripling the amount used,[19] with the greatest increases occurring in personal washing and clothes washing activities. These activities contribute to the prevention of water-washed illnesses, such as respiratory, skin and gastrointestinal infections. The availability of community water infrastructure can therefore greatly improve access to water to improve hygiene and health in unpiped Alaska Native communities.

Washeteria challenges

Getting water into the home and improving access to community water facilities present challenges. Washeterias can be expensive to build, maintain and operate. While washeterias, particularly in small communities of less than 250 residents, commonly run budget deficits and have to be supported by other tribal or municipality resources,[20] the prices charged for services can still be prohibitively expensive for residents. In one community where washing laundry was $7 per load, around 30% of households preferred to haul water

to the home to wash by hand or reported only being able to do laundry at the washeteria on pay day weekends when they had cash available.

Daily and year-round access to washeterias can also be a challenge. Some households that live far from facilities or lack vehicles may have to walk long distances to the washeteria. For elders and people with mobility issues, this can sometimes prevent use of the washeteria at all, especially during the winter. Others have reported accidents related to traveling to the washeteria in bad weather. Limited operating hours can also reduce access. Many facilities are reported to be closed on Sundays, holidays, or after 5 p.m., which limits the access for adults with full-time jobs. Challenges with water access highlight deeper challenges to equity, inclusion, and opportunity in these communities.[18] The households that have fewer resources (money, time, vehicles, etc.) likely have the least access to community facilities.

It is not unusual for communities with washeterias to experience temporary or long-term closures, due to factors such as routine maintenance, outstanding repairs, or freeze issues during the winter. Kivalina, a community in northwest Alaska, reported annual closures of up to six months due to persistent issues with their sewage drain field freezing.[7] It is also common for individual fixtures in washeterias to break down from high use or a lack of available parts and skilled technicians. Residents frequently report that one or more washing machines or showers are not functioning, increasing wait times and demand on the remaining fixtures. Recent utility management initiatives have increased the presence of trained water plant operators in many communities, but small communities still have challenges with keeping trained staff available and knowledgeable about all of the possible technical issues that may come up.

Finally, residents in unpiped remote Alaska Native communities have concerns about adequate infrastructure and cleanliness of washeterias. Residents have reported long wait times for showers and a limited number of washing machines or dryers. Some households have indicated that the crowdedness of the washeteria has prevented them from using it at all. Others have been turned off by unhygienic facilities or frustrated by the lack of privacy at having to share facilities with others instead of having access to water in the privacy of their own homes. This demonstrates the difficulty

Top: A honeybucket in a public building in the community of Kipnuk has to be frequently emptied by staff. Sign reads "Please do not overfill."

Bottom: The Kivalina washeteria is out of service due to broken pipes in the shower, toilet and sink. The washeteria currently has no functioning showers or toilets.

that these facilities have in efficiently serving the needs of all residents.

For community water infrastructure to adequately replace in-home water access, appropriate engineering, operation and hygiene standards must be maintained.

Better washeterias

The climatic conditions of Alaska challenge water and hygiene infrastructure performance. Clothes dryers in washeterias are one example, because their performance demands a considerable amount of energy to reach the required drum air temperatures during late fall, winter and early spring. The low efficiency of dryers in the late 1990s coupled with the high cost of oil and labor made washeterias prohibitively expensive to operate, and thus caused funding agencies to turn away from such projects in favor of providing individual households with premise plumbing. However, engineering solutions in the 2010s allowed dryers to perform as designed by pushing boilers towards higher operating temperatures that decreased the operation time and cost for a single load of laundry. These improvements translated to improved customer satisfaction, shorter wait times for washeteria users and larger numbers of people served. However, only two of these systems have been designed in the state, due to the prior reduction in funding for new washeterias.

Although most existing washeterias are old and working inefficiently, the benefits of improving these facilities in unpiped communities may outweigh the costs. The two main challenges to establishing efficient washeteria facilities are labor and energy costs. Washeterias require trained personnel to operate the water treatment plant and wastewater disposal infrastructure connected to the washeteria. Staff must also be capable of repairing pipes and fixtures as needed. Some communities may also require an attendant to be on duty during hours when the facility is open. To reduce energy costs,

Above: Two functioning washers and two functioning dryers are shared between 400 people at Kivalina's washeteria.

high-efficiency electrified machines must be installed, allowing communities to supplement imported fuel with renewable energy, depending on their local resources.

Recommendations

Community water infrastructure facilities can play an important role in providing access to water for improved health and hygiene outside of the home in communities still waiting for piped water infrastructure. However, these facilities are typically thought of as temporary and second-tier options, instead promoted as important services in the development of communities. This report recommends the following steps to enhance community water infrastructure to improve access and opportunities for good health:

1. **Offer alternative facilities for hygiene activities outside of the home.** In rural Alaska, washeterias are the primary facility available for community members to use water outside of the house for activities like laundry and showering. However, other facilities with piped

water could also provide hygiene opportunities, such as opening school showers for students and/or the public to access during certain days of the week.

2. **Enhance the privacy and hygiene of community facilities.** Washeterias can improve customer service and user dignity if facilities are deliberate about ensuring the privacy and cleanliness of facilities, for example, by hiring staff to frequently clean the facilities.

3. **Improve access, especially for vulnerable populations.** With enough funding and support, washeteria access hours and days can be increased to meet diverse personal schedules and needs. Extra assistance should be planned for vulnerable people, such as elders or those with mobility issues, and working parents by providing transportation assistance or extended opening hours.

4. **Develop capacity to reduce annual closures or freeze-up.** Additional engineering, planning, and training resources need to be provided to make sure that operators are available and have sufficient parts to keep facilities open year-round. This includes during challenging, but predictable, cold weather periods.

5. **Decrease costs of laundry and shower services.** By improving efficiency of facilities, electrification of machines, providing renewable energy options, and incorporating washeteria operation costs into community and health infrastructure management, the high costs to consumers can be reduced. This would encourage use of the facilities and may ultimately result in health savings through improved access to water for hygiene activities.

Next steps

For existing residents of unpiped communities, the first steps to improving washeteria use and operations are to improve cleanliness, privacy, availability, and reliability of washeterias.

To improve the efficiency and sustainability of washeterias, energy use must be reduced, and freeze-ups must be prevented. The former can be addressed by funding newer technology and electrifying washeterias to allow the incorporation of renewable energy resources specific to the local community. Freeze-up prevention lies in appropriate design, construction, and building local capacity for operation and maintenance.

Finally, modular design of washeterias is a key approach that responds to the changing needs of communities. The ability to increase or adjust the size of a facility to complement other water infrastructure, including the possibility of the construction of household piped systems, will give households the best opportunities for access to water infrastructure to meet health and wellbeing needs.

Top: Washeteria shower fee collection machine.

Bottom: Exterior of washeteria located in the community of Kipnuk.

Conclusion

Providing in-home piped water for all homes is an important goal for unpiped communities, however progress towards this goal is slow and should not preclude incremental access to water for health. Both in-home and out-of-home water use should be considered when evaluating the quantity of water available to protect human health and wellbeing for residents in unpiped communities in rural Alaska. When considering a hierarchy of water needs (Figure 1), unpiped homes in remote Alaska reach roughly one-third of the recommended quantity at each level inside the home. But not all water needs are equal for health, nor can they always be met most efficiently in the house. Households commonly divide the category of "personal washing" into handwashing and bathing or showering. Providing water inside the residence for handwashing should be prioritized for health, while bathing and showering could take place outside of the home for most individuals. Water availability for the prevention of water-washed illnesses can be improved through access to public facilities outside of the house, such as washeterias. By incorporating an additional 2.5 gpcd of water use at public showers and 2.2 gpcd of water use at public washing machines as quantified here, unpiped community water use increases from 4.6 gpcd to 9.3 gpcd, achieving roughly two thirds of the WHO recommendation for intermediate access. Additional gains in water quantity used, and therefore improvements in health, could be realized if community infrastructure access were enhanced through lower costs, improved access, and better facilities.

Left: Man fills bucket with water at the community water supply in Newtok.

Right: Two Newtok men haul buckets of water in wagon.

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