Impact of In-home Water Service on the Rates of Infectious Diseases: Results from Four Communities in Western Alaska

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Background

About 20% of rural Alaskan homes lack in-home piped water; residents must haul water to their homes. Recent studies in Alaska demonstrated associations between increased rates of skin and respiratory tract infections and lack of in-home piped water, presumably due to a reduced quantity of water available for handwashing, bathing and laundry (termed “water-washed” infections). We assessed rates of water-related infections in residents of communities transitioning to in-home piped water.

Methods

Residents of four communities consented to review of medical records for the period 3 years before and 3 years after their community received piped water. We selected clinic and hospital encounters with ICD-9CM codes for respiratory, skin and gastrointestinal (GI) infection and calculated annual illness episodes for each infection category after adjusting for age and removing repeat encounters within 14 days of initial report.

Results

We enrolled 1032 individuals (72% of total 2010 four-community population) and obtained 5,477 person-years of observation. There were 9,840 illness episodes with at least one ICD-9CM code of interest; 8,155 (83%) respiratory, 1,666 (17%) skin, 241 (2%) GI. Water use increased from average 5.7 liters/capita/day (l/c/d) to 97.3 l/c/d. There were significant (p-value <0.05) declines in respiratory [16.4%, 95% confidence interval (CI): 11.5%-21.0%], skin (20.4%, 95%CI: 10.0%-29.7%), and GI infections (37.8%, 95%CI: 13.3%-55.3%) in homes that received piped water, mostly among those aged 0-19 years.

Discussion

Households that must haul water are severely limited in the amount of water available for personal hygiene. We demonstrated significant declines in respiratory, skin and GI infection rates among individuals in communities that transitioned from hauling water to in-home piped water. This study reinforces the importance of adequate quantities of water to address the morbidity caused by water-washed infection.