Case Study Brief: Porterville, CA

Point-of-Use Filtration & Bottled Water Delivery Pilot Program to Protect Pregnant People and Infants from Nitrates in Private Well Water

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INTRODUCTION

Formula-fed infants and pregnant people are at particular risk from elevated nitrate levels in drinking water.[1,2] This case study describes the Porterville, California, Point-of-Use Filtration & Bottled Water Delivery Pilot Program (hereinafter "Porterville Program") administered by the non-profit organization Self-Help Enterprises from fall of 2017 to summer of 2019. The Porterville Program partnered with existing local organizations to provide pregnant people and families with young children in unincorporated communities around the City of Porterville, CA with nitrate testing of private well water. Through targeted outreach, the Porterville Program tested the well water of 117 households for nitrates and, when indicated, provided an interim water supply (home water filtration system or bottled water delivery) to 34 families with pregnant people, infants or very young children who experience low income.[3(p46)] The Porterville Program demonstrates how strategic partnerships can support direct outreach strategies for pregnant people and families with young children living in water-insecure areas. Lessons learned can be used to inform efforts to reduce barriers to safe home water in communities that have been historically disadvantaged and promote greater health equity.

This case study is part of a series of six descriptive case studies of state and local safe home water access policies and programs. The research team collected and reviewed available background materials for each case and conducted semi-structured interviews with key informants about relevant community context and policies, program design, program implementation, and lessons learned. All six case studies and a summary report are available at: https://www.hsph.harvard.edu/prc/projects/safe-home-water

The research team also developed and compared estimates of the population reach and costs for widespread implementation of each case study policy or program based upon the prevalence of families with children 0-5 experiencing low income with concerns about tap water and/or lack of access to safe home tap water.

PROGRAM RATIONALE

The City of Porterville is located in Tulare County in the San Joaquin Valley of California. The county has a long history of contamination of drinking water by nitrate from animal waste and agricultural fertilizers that disproportionately impacts Latinx and Black residents living in unincorporated communities near cities like Porterville.[4–6] The legal status of these unincorporated communities in California has resulted in discrimination and social exclusion that perpetuates unequal access to safe drinking water.[7]

The Porterville Program started in 2017 and was designed to raise awareness about the health issue of nitrates in drinking water through targeted outreach to families living in unincorporated communities and to reduce the cost of safe water by providing private well water testing and water filters or bottled water as needed. For example, East Porterville was one of the unincorporated communities served by the Porterville Program. Seventy-one percent of its residents of speak a language other than English, and Spanish is the predominant language. In the 2010's, the San Joaquin Valley had an acute water crisis due to a prolonged drought. Despite its close proximity to the Porterville municipal water systems, because East Porterville is an unincorporated community, residents were reliant on private wells and experienced periods of no running water due to dry wells or wells with higher concentrations of nitrate due to low water volumes. Tulare County began delivering bottled water to drought-affected homes, and, after years of advocacy, between 2016 and 2018 most East Porterville homes were connected to the Porterville municipal water system.[8] Water-insecure families living in other unincorporated communities continue to rely on private wells and bottled water delivery from Tulare County.[9]

COMMUNITY PARTNERS

The Porterville Program arose through a strategic partnership between Self-Help Enterprises (SHE) and the Porterville office of the Special Supplemental Nutrition Program for Women, Infants, and Children (hereinafter "Porterville WIC"). SHE is a non-profit organization focused on affordable housing, rural development, and safe drinking water at schools.[10] The WIC program provides supplemental foods, referrals and education supports to pregnant people and young children experiencing low income who are at nutritional risk.[11] Almost two-thirds (67.6 percent) of the infants participating in WIC are exclusively fed infant formula, most often in a dry, powdered format that must be mixed with plain water.[12(p8)] The Porterville WIC office is part of the Tulare County Public Health Department and serves more than 6,000 clients. Porterville WIC was an ideal community partner because of its existing capacity to reach the families most vulnerable to health harms due to nitrate-contaminated drinking water. SHE also partnered with other Porterville area organizations to assist with community outreach and water sample analysis.

Porterville Program Community Partners:

- Porterville WIC Office
- Family Healthcare Network
- Community Services Employment & Training (CSET)
- Porterville Area Coordinating Council (PACC)
- City of Porterville Public Works Department's Laboratory

PROGRAM FINANCING

The Central Valley Salinity Coalition for Long-Term Sustainability (CVSC) is a nonprofit coalition of public agencies, business associations, and other members with a public interest in managing the concentration of dissolved salts like nitrate in Central Valley water. CVSC provided SHE with $236,895 to implement the Porterville Program.[3]

KEY PROGRAM ACTIVITIES

The Porterville Program included several key elements:

- Formalized commitments between SHE and its community partners
- Training for WIC and other community partner staff by SHE
- Focused outreach efforts to identify eligible participants by SHE and community partners
- Collection of water samples and test samples for nitrate by program participants and SHE
- Communication of water testing results to participants by SHE
- Installation of home water filtration systems or bottled water delivery by private companies, and
- Follow-up testing for nitrate in drinking water at homes where filtration systems were installed by SHE

SHE entered into formal memoranda of understanding with the Porterville WIC office and the other community partners that assisted with outreach and referrals. SHE developed educational materials for its own staff and its community partners about the dangers of nitrates in water to pregnant people and young children; program prompts; an intake questionnaire to identify families with private well water; and a consent form. All program materials distributed were available in Spanish and English. SHE conducted trainings with community partners about the program and how to screen families for a private well and how to refer them to SHE for water quality testing assistance. SHE also used mass media (press releases and local media) and community events to conduct additional outreach.

Once SHE staff obtained the contact information of eligible participants and their consent forms from community partners, they coordinated the water quality testing and then followed up with families to explain their test results. Households with a test documenting an elevated nitrate level were provided with a point-of-use (POU) water filtration system or bottled water delivery by a private company (Culligan) and follow-up water quality monitoring by SHE.

PROGRAM DESIGN STRATEGIES TO REACH PREGNANT PEOPLE AND FAMILIES WITH YOUNG CHILDREN

The community context and barriers to participation are key factors when designing public health programs.[13(pp10-13)] To be eligible for the Porterville Program, participants had to live in a home reliant on a private well for drinking water in the Porterville area and be a current WIC participant. The program's initial design, described in Table 1, addressed barriers to participation in the program. A strength of the program was its ability to adapt during implementation to better serve participants. These program adjustments are discussed in the Program Results and Findings section below.

Table 1: Initial Program Design Elements to Meet the Needs of WIC Families

Potential Barrier to Participation	Program Design Element
Ensuring Participants Can Access Water Test Kits, Return Water Samples and Obtain Water Filters	Participants were initially given water test kits and asked to return them within 48 hours. This was not feasible for some families due to transportation challenges.
Addressing Issues Associated with Living in Rental Housing or a Home Owned by Another Person	Both water filtration systems and bottled water delivery were offered to avoid the barrier of having to obtain landlord or homeowner approval for water treatment devices that would need to be connected to a plumbing system.
Maintaining Contact with Participants Identified by the Initial Screening	SHE followed-up by telephone with families that expressed interest in the program.
Ensuring that Water Sampling and Test Result Information Is Easy to Understand	In addition to written notification of test results, SHE followed up by telephone with families with elevated nitrate levels to explain their test results and to offer an interim drinking water supply.

PROGRAM RESULTS AND FINDINGS

This section summarizes participation in the Porterville Program (Table 2) and adjustments the program made to improve participation.

Identifying Households Eligible for the Program

As the result of SHE's outreach efforts through its community partners and the mass media, SHE identified 190 eligible households interested in the program.[3(p44)] The most effective partnership for identifying eligible households was via the Porterville WIC office. General mass media outreach was too broad and generated interest from households in communities not eligible for the program.[3(p50)]

Water Sampling & Testing

Well water sampling and testing was completed for 117 households.[3(p44)] When the program began, families were responsible for collecting home water samples and returning samples to the Porterville WIC office within 48 hours. Samples were then taken by courier to a private lab in Fresno, CA. During this phase of the program, 59 water samples were collected and 21 (35 percent) demonstrated a nitrate exceedance.[3(p22)] A lack of transportation options experienced by many WIC families was identified by SHE as a barrier to participation. The Porterville Program subsequently shifted course. SHE staff verified eligibility for program participation, and SHE staff visited homes to take water samples, and transported the samples to the local, City of Porterville Public Works Department Laboratory for nitrate testing.[3(pp7, 9, 14, 25, 26)] During the home water sampling phase of the program, 58 samples were collected and 28 (48 percent) demonstrated a nitrate exceedance.[3(p45)] The home water sampling phase of the program improved communication with participants and SHE's ability to educate participants about private well water quality.

Table 2: Program Participants

Eligible households identified during outreach efforts, that expressed interest in participating in the program	190
Households that had a well water sample tested	117
Households found to have elevated nitrate levels	49
Households provided with bottled water	19
Households provided with a POU system and water quality monitoring	15
Households that discontinued participation in the program before receiving an interim water supply	15

Bottled Water Delivery

Bottled water was delivered by a private company directly to 19 homes with an elevated nitrate level in their well water.[3(p46)] Families could receive up to 50 gallons per week, or more upon request. The weight of 5-gallon carboys of water posed an accessibility challenge for some families. For future programs, SHE suggests delivery of one-gallon jugs rather than 5-gallon carboys.

POU Devices & Monitoring

Fifteen households had a reverse osmosis POU device installed under the kitchen sink by a private company (Culligan).[3(p46)] These households received educational materials about how to maintain their POU device. SHE also conducted water quality monitoring (83 total samples taken) to ensure that the POU devices were effectively removing nitrate.[3(p47)] Nitrate removal rates ranged from 55-94 percent.[3(p47)] POU devices installed in homes with very low water pressure did not effectively remove nitrate. When low water pressure was initially identified as an issue, SHE worked with a private company (Culligan) to install booster pumps to increase water pressure.[3(p47)] The program activities were then adapted to take a water pressure reading during the initial water sampling.[3(p40)]

The program also found that the filtration rate of the reverse osmosis POU systems provided to households could not keep up with the water volume needs of larger families.[3(p42)] Bottled water was provided to homes where POU systems were ineffective at bringing down high nitrate levels or where additional water volumes were needed due to family size. For future programs, SHE suggests providing large families with a larger water storage tank and/or bottled water in addition to the POU filtration device.[3(p42)]

PROGRAM IMPLICATIONS

A key element of the Porterville Program was forming strategic partnerships with existing entities like the Porterville WIC office to conduct outreach directly to pregnant people and families with young children. The Porterville WIC office was the single largest source of interest for the program. Through its community partnerships, SHE successfully identified 49 families meeting the program's eligibility criteria that had a nitrate exceedance and provided bottled water delivery or a POU system to 34 of those families.[3(pp22, 47)] These were families with infants and young children at high risk from nitrate-contaminated drinking water who were not effectively treating their well water and were not being served by other programs in the county such as the Tulare County bottled water delivery program. The program findings also demonstrate that to reduce the true cost of safe drinking water for families with low incomes, in addition to the cost of water testing, bottled water delivery, and effective filtration devices programs must factor in costs associated with communication, transportation, family size, and accessibility.

SUGGESTED CITATION

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