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EMPOWERING COMMUNITIES FOR SAFE WATER: APPLYING THE COMMUNITY AS PARTNER MODEL IN URBAN SLUMS OF PAKISTAN

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ABSTRACT

Background: Access to clean drinking water remains a significant public health challenge in low-income urban areas of Pakistan. This project aimed to promote low-cost, home-based water purification methods in an urban slum of Jamshoro using the Community as Partner (CAP) model.

Methods: Conducted between January and March 2023, this participatory project engaged ng local stakeholders. A cross-sectional pilot survey was conducted with 33 female residents to assess knowledge, attitudes, and practices (KAP) regarding water purification. Data were collected through structured, interviewer-administered questionnaires. Descriptive analysis identified key trends. Community awareness sessions were conducted following the baseline assessment.

Results: The majority of participants (77%) used government-supplied water, with 60% not treating drinking water at home. Barriers included perceived cleanliness (65%), lack of knowledge (25%), and taste alteration (10%). Among those treating water, boiling (19%), cloth filtration (11%), and filtration (10%) were used. About 85% reported family members suffering from waterborne diseases. Post-intervention feedback showed improved community understanding and engagement.

	Conclusion: The CAP model effectively facilitated stakeholder engagement and health education. Low-cost interventions like boiling and solar disinfection were well received and could be scaled up. This model has promise for enhancing sustainable hygiene practices in underserved communities.

INTRODUCTION:

According to the Sustainable Development Goals (SDGs), "access to safe drinking water is the most basic human need for health and well-being'[1]. However, the affordability and accessibility of safe drinking water are a serious public health concern. In 2022, approximately 2.2 billion people worldwide were estimated to have limited access to safe drinking water[1]. This scenario is more challenging in the developing world. For instance, in Pakistan, approximately 2.1 million people lack access to safe water[2]. Consequently, people in the developing world are at great risk of waterborne diseases, such as diarrhea, typhoid, and hepatitis A and E[3]. Approximately 80% of the diseases in developing countries are waterborne[4], as polluted water with pathogenic microbes poses numerous health risks,

Statistics from 2017 revealed that in Pakistan, 2.5 million deaths were due to diarrhea, and 40% of these deaths were related to impure water[5]. These figures indicate a strong need for interventions to reduce the chance of waterborne diseases by promoting accessible, low-cost water purification strategies. Simple, low-cost, and acceptable strategies at the community household level can help improve the microbial quality of water and decrease the chances of diarrhoeal problems[6,7].

While a multisectoral approach is an ideal way of addressing the challenges related to safe drinking water, as the SDGs suggest an 'integrated and holistic approach to water management'[1], a community participatory approach can play a prime role in mitigating the issue of unsafe drinking water in under-resourced settings where other approaches are scarce and/or difficult to access.

Promoting community awareness through campaigns that focus on cost-effective and practical water purification methods is crucial for reducing the occurrence of waterborne diseases and lowering the burden on the healthcare system in disadvantaged areas. The integration of the Community as a Partner (CAP) model can offer valuable insights into how to engage diverse communities to address unsafe drinking water challenges in future work.

The community as partner (CAP) model[8] can be an effective strategy to minimize the occurrence of waterborne diseases and thereby improve the well-being of people in low-income marginalized communities, where other approaches are scarce and difficult to access. Through the use of the CAP lens, academic partners and community entities can engage in co-learning to better identify and address community priorities and needs[9,10].

The CAP approach can support the development of strategies that are more relevant to community-identified the problems, incorporate local norms and values into intervention strategies, enhance cultural sensitivity in interpreting findings[5], and increase the potential for translating evidence-based research into sustainable community changes[11]. A project implemented using a CAP model focused on identifying problems related to impure water,

exploring household-level purification methods, and preventing waterborne diseases in an under-resourced community in Jamshoro.

Methodology:

Study design and setting:

A participatory, community-based cross-sectional pilot study was conducted from January to March 2023 in a low-income neighborhood of Jamshoro District, Sindh, Pakistan.

Participants:

Thirty-three adult female household heads were selected using purposive sampling. Inclusion criteria included residence in the area for at least six months and willingness to participate.

Ethical Consideration:

Verbal and written informed consent was obtained. The project was considered minimal risk and exempt from full ethical board review.

Data Collection:

A structured questionnaire, developed in local language and pilot tested, was used to assess participants' knowledge, attitudes, and practices related to water sources, purification methods, storage practices, and health outcomes. Interviews were conducted privately by trained data collectors.

Data Analysis:

Descriptive statistics were used to analyze the frequency and percentage distributions of responses. The data were grouped into themes: water sources, purification practices, perceptions of water safety, and self-reported health outcomes.

Results:

Phase 1: Assessment of Community Needs

Socio-Demographic Characteristics of Participants (n=33)

The study included 33 participants, with the majority (39.4%) aged between 18 and 30 years. Most respondents (72.7%) reported having no formal education. Household sizes predominantly ranged from 6 to 8 members, accounting for 51.5% of the participants (Table 1).

Table 1: Socio-Demographic Characteristics of Participants (n=33)

Variables	Frequency (%)
Age group (18-30 yrs)	39.4%
Education (no formal education)	72.7
Household size (6-8 members)	51.5

Sources of Water, Treatment, and Storage Practices

Water Sources

The majority of participants (77%) reported that their primary source of drinking water was government supply. Smaller proportions relied on borewells (4%) and community taps (8%).

Water Treatment Practices

About 40% of the participants treated their water at home, with the most common method being boiling (19%), followed by cloth straining (11%) and filtration (10%). However, the majority (60%) did not treat their water, citing reasons such as perceiving the water as clean (65%), lack of awareness of treatment methods (25%), or disliking the taste of treated water (10%).

Water Storage and Sanitation

For storing drinking water, 52% of participants used coolers, 37% stored water in traditional pots (*matka*), and 11% relied on tanks. Most participants (79%) reported cleaning their storage containers daily, while others cleaned them every two days (11%) or weekly (10%).

Table 2: Sources of Water, Treatment, and Storage Practices

INDICATOR	FREQUENCY (%)
Source of Water	
Government supply	77
Borewell	4
Tap	8
Water Treatment at Home	
Yes	40
No	60
Method Used for Water Purification	
Boiling	19
Cloth Straining	11
Filtration	10
Storage Type	
Water Cooler	52
Matka (Traditional pot made of Mud)	37
Tank	11
	Cooler =
Frequency of Washing Containers	
Daily	79
Occasionally	11

Water Quality and Health

When asked if the water was safe for drinking, 38% of respondents believed it was safe, while 50% disagreed, and 11.5% were unsure. A significant majority (84.6%) stated that water quality affected their health, with 84.7% reporting that their family members had experienced waterborne diseases, such as diarrhea, vomiting, abdominal pain, and typhoid.Participants also highlighted sensory issues with their water supply. About 45% noted a distinct taste, 38.5% reported a smell, and 63.5% described the water as cloudy or dirty (Table: 3).

Table 3: Perceptions and Health Outcomes

Indicators	Frequency (%)
Belief water is safe	38
Waterborne illness in family	84.7
Water Characteristics	
Taste	45
Smell	38.5
Cloudiness	63.5

Summary of Key Trends

- **Water Sources and Perceptions**: Despite 77% relying on government water supplies, 50% viewed their water as unsafe.
- **Water Treatment**: Limited adoption of water treatment practices was evident, with only 40% treating water at home.
- **Health Impact**: The overwhelming prevalence (84.7%) of waterborne illnesses underscores the urgent need for interventions.

Phase 2: Implementation of Community-Based Interventions

Based on assessment findings, two awareness sessions were conducted to introduce home-based water purification methods**:**

- **Boiling** – a simple method, although limited by availability of gas.
- **Solar disinfection (SODIS)** – germicidal effect using UV light.
- **Cloth filtration** – low-cost, practical, reduces cholera by up to 48%.
- **Alum use** – effective traditional coagulant reducing bacterial load.
- **Chlorination** – cost-effective with residual protection.

In addition, participants were educated on:

- Handwashing before handling water
- Use of clean, covered containers
- Avoiding hand contact with stored water

This phase aimed to promote simple and affordable strategies relevant to local resources.

Phase 3: Ongoing Evaluation and Community Engagement

Throughout the sessions, participants were actively engaged in demonstrations and discussions. Feedback was collected and misconceptions were clarified. A group redemonstration was conducted to assess knowledge retention and skill application.

Although a summative evaluation of behavior change was not conducted due to time constraints, **formative observations** suggested positive recall and acceptance of the water purification methods taught.

Discussion:

Although access to safe drinking water plays a pivotal role in preserving human health, many developing countries to face serious challenges in securing clean water supplies[17]. Efforts to improve the quality of water at the household level must include the meaningful engagement of local stakeholders and community people in the development and implementation of various strategies to address the issue of unsafe drinking water. When communities equally in such initiatives, a sense of ownership develops, often reflected in their commitment to the action and the results of that action[8]. A key factor in the Community as Partner (CAP) model is the critical influence of social context. The model supports the development of strategies that explicitly acknowledge the socioeconomic and environmental determinants of health[17]. These foundational concepts significantly shaped the implementation and outcomes of this project. The CAP assessment and planning process centered on the local context by recognizing community needs and shaping an action plan accordingly. The finding revealed that although over 50% of participants considered their drinking water to be safe, many expressed concerns regarding its quality. Specifically, 38.5% reported that the water had an unpleasant odor, including foul, rotten egg-like smell or muddy smells. Additionally, 63.5% indicated that the water appeared cloudy,

dirty, or muddy. Despite these concerns, 60% of participants did not treat their water before consumption.

These findings align with studies conducted in parts of Punjab where dissatisfaction with water sources and treatment practices was similarly reported [18.19]. In the current study, 40% of participants treated their water at home, employing methods, such as boiling (19%), filtration (10%), and cloth straining (11%). Consistent with these results, Khalid et al. reported that 66.7% of people in Punjab consumed untreated water[18].

When asked why they did not treat their water, 65% of participants believed the water was already clean, 25% were unaware of available treatment methods, and 10% said they disliked the taste of treated water. However, 84.7% of participants reported that family members had suffered from waterborne illnesses, such as diarrhea, vomiting, abdominal pain, and typhoid. Similarly, 77.8% of respondents in the Punjab study reported illness related to waterborne diseases[18].

Given the high likelihood of enteric pathogens being present in untreated drinking water[20], reducing microbial contamination through home-based treatment methods is crucial for improving health outcomes[21]. The present study offers empirical evidence that the use of untreated, contaminated water poses significant health risks due to microbial contamination. Additionally, the findings highlight a gap in awareness regarding the importance of treating water before consumption.

This underscores the urgent need for awareness sessions, developed in collaboration with the community, to educate individuals on the health risks associated with unsafe water and to promote low-cost, accessible, and effective water purification methods.

Community involvement in the action planning process proved instrumental in creating relevant and practical intervention strategies. These strategies aimed to promote safe water practices by building locally accessible resources and strengthening community-based networks. The plan emphasized the hazards associated with unsafe water and introduced affordable, home-based purification techniques such as boiling, solar disinfection (SODIS), cloth filtration, alum sedimentation, and chlorination. These methods have been shown to improve microbial water quality and reduce the risk of waterborne diseases[22].

Two awareness sessions were conducted to enhance community knowledge. Participants were introduced to various water purification techniques and the health benefits of using safe drinking water. The sessions also integrated local knowledge and traditional practices, enhancing cultural relevance and reinforcing the effectiveness of indigenous methods. Active community participation was central to this initiative, increasing the likelihood of long-term acceptance and sustainability of the intervention.

A formative evaluation was carried out during the sessions through verbal questioning and re-demonstration of techniques. However, due to time constraints, a summative evaluation to assess changes in attitudes and long-term practices related to water purification could not be conducted.

Conclusion

This project demonstrated that the Community as Partner (CAP) model is effective in promoting safe drinking water practices through community involvement. The model guided the assessment, planning, and implementation of low-cost water purification strategies that were both acceptable and practical for the local context. By engaging community members and local stakeholders, the project helped raise awareness about the risks of unsafe water and encouraged simple, home-

based solutions. The awareness sessions supported the adoption of healthier practices, contributing to the prevention of waterborne diseases. Such community-based programs are essential in low-resource settings and should be expanded to other areas to improve public health through safe water use.

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