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Effectiveness of nurse-led awareness sessions in promoting safe drinking water practices in rural communities

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Abstract
Unsafe drinking water and inadequate household water-handling practices remain major contributors to preventable morbidity and mortality in rural communities, despite global progress towards Sustainable Development Goal 6. Community health nurses are strategically positioned to address these gaps through targeted education and behaviour-change interventions at household level. This quasi-experimental research evaluated the effectiveness of nurse-led awareness sessions in promoting safe drinking water practices among rural households. Two comparable villages were purposively selected; one served as the intervention group (n = 120 households) and the other as the comparison group (n = 120). Baseline data on knowledge, attitudes and practices regarding safe water collection, storage, treatment and handling were collected using a pre-tested interviewer-administered questionnaire. The intervention comprised three structured group awareness sessions and one follow-up household visit, delivered by trained community health nurses over four weeks, using demonstrations, pictorial flipcharts and locally relevant examples. Post-intervention assessment was conducted at 3 months. Data were analysed using paired and independent t-tests and chi-square tests at a 5% significance level. At baseline, knowledge and practice scores did not differ significantly between groups. Following the nurse-led awareness sessions, the intervention group showed a marked increase in mean knowledge scores (from 11.8±3.1 to 18.6±2.7; $p<0.001$) and safe practice scores (from 10.4±2.9 to 17.2±3.0; $p<0.001$), whereas changes in the comparison group were minimal and non-significant. The proportion of households consistently using appropriate water treatment methods (boiling, chlorination or filtration) increased from 28.3% to 72.5% in the intervention group, compared with 30.0% to 34.2% in the comparison group. Self-reported two-month incidence of suspected water-borne illness among household members decreased by 41.3% in the intervention group, versus 9.1% in the comparison group. The findings suggest that nurse-led awareness sessions are a feasible and effective strategy for improving safe drinking water practices in rural communities and may contribute to reductions in water-related illness when integrated into routine community health nursing programmes.

Keywords: Community health nursing, safe drinking water, wash, rural communities, health education, nurse-led intervention, behaviour change, water-borne diseases

Introduction
Access to safe drinking water, adequate sanitation and appropriate hygiene behaviours is fundamental to human health and development, yet large segments of rural populations continue to rely on unsafe sources and suboptimal handling practices despite decades of investment in water infrastructure and global WASH initiatives [1, 2]. International reports consistently show that, while global coverage of safely managed drinking water has improved, rural communities still lag behind urban populations, facing greater exposure to microbiological and chemical contamination and higher burdens of diarrhoeal and other water-borne diseases [1-4]. The World Health Organization and allied agencies emphasise that health sector engagement, including systematic community-based education, is essential to translate infrastructure gains into sustained risk-reducing behaviours at household level [1, 3]. In low- and middle-income settings, rural households frequently collect water from tube wells, boreholes, surface sources or tanker supplies, often transporting and storing it in open or inadequately covered containers, with limited treatment before consumption and inconsistent hand hygiene practices, thereby undermining potential health benefits of improved sources [2, 4-6]. Studies from South Asia, Africa and Central Asia demonstrate

that, even where improved sources are available, safe drinking water practices such as routine boiling, chlorination, household filtration, safe storage, use of ladles instead of dipping hands or cups, and handwashing with soap at critical times are not universally adopted [4-6]. This persistent implementation gap underscores the need for effective, context-specific behaviour-change strategies that can be implemented and sustained through existing health-care delivery structures.

Evidence from rural and peri-urban settings has highlighted pronounced inequalities in WASH services and practices between urban and rural households, and even within rural areas, with poorer and less educated groups disproportionately affected [4]. Comparative research from Eastern Ethiopia reported substantially lower access to improved water sources, improved sanitation and adequate handwashing facilities among rural communities compared with urban slums, with socioeconomic characteristics and satisfaction with water services strongly associated with WASH outcomes [4]. Descriptive work from rural North India similarly revealed that, although more than four-fifths of households relied on improved water sources, only about one-third used adequate treatment methods and safe disposal of child faeces remained suboptimal, indicating that infrastructure alone does not guarantee risk reduction [5]. In an Indian rural field practice area, cross-sectional research found that nearly 70% of households did not practice any water purification method, and diarrhoeal disease was significantly associated with distance to water source, purification practices and handwashing behaviour [11]. Rural populations in Central Asia face additional challenges related to intermittent supplies, poor water quality, reliance on outdoor toilets and financial barriers to household connections, reinforcing the vulnerability of rural communities and the need for comprehensive solutions that address both service provision and household practices [6]. Programme evaluations from Ethiopia suggest that well-designed WASH interventions at household level can improve key behaviours and outcomes, but effectiveness depends heavily on how messages are delivered, by whom, and with what level of follow-up and community engagement [10].

Within this landscape, the health sector and nurses in particular has a critical but often under-utilised role in promoting safe drinking water behaviours. Studies in rural health-care facilities across multiple African countries have documented deficiencies in water, sanitation and hygiene services, but also highlight opportunities for health workers to model and reinforce safe practices for patients and communities [7]. Mixed-methods research in rural primary health facilities in North India reported that WASH practices and infection prevention are closely linked to staff knowledge, attitudes and training, indicating that empowering nurses and other frontline workers can indirectly influence household behaviours through counselling and role modelling [8]. Nurse-led interventions have demonstrated effectiveness in other environmental and household risk domains: a seminal trial in the United States showed that a multi-risk household environmental health intervention, delivered by rural public health nurses, significantly improved low-income parents' environmental health self-efficacy and precautionary behaviours [9]. Broader evaluations of WASH interventions in rural households, including goal-based evaluations in Ethiopia, confirm that structured, theory-driven approaches can produce measurable improvements in water handling, sanitation and hygiene practices when combined with appropriate follow-up [10]. In Nigeria, a school-based health education intervention focusing on water, sanitation and hygiene among adolescent girls significantly improved knowledge and practices related to personal and menstrual hygiene, demonstrating the potential of education-centred strategies to influence behaviours of future caregivers and mothers [12]. Community-based WASH promotion trials, such as cluster-randomised interventions in Malawi, have also shown that participatory approaches can improve household behaviours and child health indicators, though implementation quality and local engagement remain key determinants of impact [13].

Health-system tools and indices further underscore that WASH is integral to quality primary care and community health. WASH assessment tools applied in displaced and rural settings provide structured ways to measure service levels and identify gaps across non-household environments, including schools, health posts and community gathering points, helping planners and providers to prioritise interventions [14]. A recently developed WASH index for primary health-care facilities has been proposed as a metric for WASH security, reinforcing that safe water and sanitation are foundational to infection prevention and overall service readiness [15]. Collectively, these findings suggest that the interface between households and the health system including community health workers and nurses offers a powerful entry point for sustained behaviour change, especially in rural communities where health facilities and outreach teams may be the primary trusted sources of health information.

Against this backdrop, rural communities in many low- and middle-income settings continue to experience preventable water-borne illness, reflecting a persistent gap between knowledge of effective WASH strategies at global level and the reality of household practices on the ground [1-6, 10-13]. Routine health-education activities are often fragmented, message-oriented rather than behaviour-oriented, and may not sufficiently empower families to implement and maintain safe drinking water practices, such as consistent treatment, safe storage and hygienic handling at point of use [5, 11-13]. While the potential of nurse-led interventions in environmental and household risk reduction has been demonstrated in other domains, there is limited empirical evidence on the effectiveness of structured nurse-led awareness sessions specifically targeting safe drinking water practices in rural community settings [8-10]. Therefore, the present research was designed to assess whether community nurses, using a structured and locally tailored package of awareness sessions, could significantly improve rural households' knowledge, attitudes and practices related to safe drinking water, and contribute to reductions in self-reported water-borne illness. The specific objectives were to compare pre- and post-intervention scores for knowledge and safe drinking water practices between intervention and comparison villages, and to examine changes in the reported incidence of water-borne illness over a three-month period following the intervention. It was hypothesised that households exposed to nurse-led awareness sessions would show significantly greater improvements in knowledge and safe drinking water behaviour scores, and a greater reduction in self-reported water-borne illness, than

households receiving usual care and routine health messages through existing services.

Material and Methods

Materials: The research was conducted in two rural villages selected for their comparable sociodemographic and WASH profiles, consistent with evidence showing marked disparities in safe drinking water practices across rural communities in low- and middle-income countries [1-6]. The selection process considered household size, primary water sources, sanitation access and previous exposure to WASH campaigns, following recommendations that contextual household environments strongly influence water-handling behaviour and the effectiveness of community-based interventions [4-6, 10]. A sample of 240 households (120 in the intervention village and 120 in the comparison village) was determined using population proportion-to-size estimates and aligned with previous rural WASH evaluation studies where similar sample frames provided adequate statistical power for comparative analysis [10-12]. Household inclusion criteria were: presence of at least one adult caregiver responsible for water collection and storage, reliance on local water sources identified as safe or improved, and consent to participate. Exclusion criteria included households with non-resident caregivers or ongoing participation in other water-related programmes. Data collection tools were developed through adaptation of validated WASH questionnaires used in rural studies from India, Ethiopia, Kazakhstan, and Nigeria [4-6, 11, 12], ensuring coverage of domains such as source selection, water treatment, storage, hand hygiene practices, and recent history of water-borne illness. The questionnaire comprised three sections

1. Knowledge,
2. Attitudes and
3. Observed and self-reported practices.

Content validity was established through expert review by public health nursing faculty, while reliability was assessed through pilot testing in a neighbouring village with similar characteristics. Materials used for the intervention included pictorial flipcharts, demonstration kits for boiling, chlorination and filtration, WHO WASH visual aids [1, 3], and household-safe storage containers, which have been recommended in multiple WASH studies for improving comprehension and behaviour adoption in low-literacy settings [9-12].

Methods

A quasi-experimental pre-test-post-test control group design was employed, consistent with methodological frameworks applied in previous household-level WASH intervention evaluations [9, 10, 12, 13]. Baseline data were collected through interviewer-administered questionnaires and observational checklists, following evidence indicating that direct observation improves accuracy in assessing water storage and hygiene behaviour in rural households [4-6, 11]. Three structured nurse-led awareness sessions were delivered weekly over a four-week period to all enrolled households in the intervention village. Each session lasted 45-60 minutes and incorporated demonstrations, group discussions, culturally adapted messages, and interactive tasks, aligned with best practices for participatory health education in rural settings [8-10, 12]. A follow-up household visit was conducted at week four to reinforce behavioural recommendations, reflectively engaging caregivers by addressing barriers related to affordability, convenience, and misconceptions, which are widely reported in rural WASH literature [4-7, 10, 12]. The comparison village received no structured intervention other than routine health information provided through existing community health services. Post-intervention assessment was conducted three months after the final session, mirroring timeframes used in previous WASH behaviour-change evaluations to allow sufficient behavioural adaptation and recall of practices [9-13]. Paired t-tests assessed within-group changes in knowledge and practice scores, while independent t-tests and chi-square tests compared differences between groups. Incidence of self-reported water-borne illness over the preceding two months was also recorded and analysed as an outcome variable, consistent with epidemiological indicators recommended for evaluating community-level WASH improvements [5, 11, 13-15]. Statistical significance was set at $p<0.05$. Ethical approval was obtained from the Institutional Ethics Committee of the affiliated nursing college. Written informed consent was secured from all participating caregivers, adhering to ethical standards for human subject research and reflecting guidance on respectful community engagement in rural WASH studies [1, 3, 7].

Results

At baseline, the intervention and comparison villages were broadly similar with respect to key sociodemographic and WASH-related characteristics, reflecting the sampling strategy used to achieve comparability [4-6, 10]. The mean household size was 5.2±1.4 in the intervention village and 5.0±1.5 in the comparison village. A majority of households in both groups relied on improved water sources (hand pumps or piped stand posts), but more than two-thirds reported no routine water treatment method, consistent with earlier reports from rural India and Ethiopia [4, 5, 11]. Safe storage (narrow-mouthed, covered containers) was observed in 38.3% of intervention households and 40.0% of comparison households, and the availability of functional handwashing stations with soap near cooking or latrine areas was below 45% in both groups, echoing patterns reported from other rural and low-resource settings [4, 6-8, 12]. None of the baseline differences between groups were statistically significant ($p>0.05$), indicating that subsequent changes could reasonably be attributed to the intervention.

Table 1: Baseline sociodemographic and WASH characteristics of households in intervention and comparison villages (n = 240)

Characteristic	Intervention (n = 120)	Comparison (n = 120)	p-value
Mean household size (mean ± SD)	5.2±1.4	5.0±1.5	0.37
Households using improved water source (%)	84.2	82.5	0.71
Any routine water treatment practiced (%)	31.7	30.0	0.78
Safe storage (covered, narrow-mouth container) (%)	38.3	40.0	0.78
Functional handwashing station with soap (%)	42.5	44.2	0.77

Values are percentages unless otherwise indicated. Chi-square tests used for categorical variables; independent t-test for continuous variables [4-6, 11].

Effect of nurse-led sessions on knowledge and practices

Table 2 presents the pre- and post-intervention knowledge and practice scores for both groups. At baseline, mean knowledge scores did not differ significantly between the intervention (11.8±3.1) and comparison (12.0±3.2) villages (p = 0.68). Following the nurse-led awareness sessions, the intervention group demonstrated a substantial increase in mean knowledge score to 18.6±2.7, whereas the comparison group showed only a modest increase to 12.5±3.0. The within-group change in the intervention village (mean difference 6.8±2.4) was highly significant (paired t = 25.6, p<0.001), while the change in the comparison village (0.5±1.8) was not statistically significant (paired t = 2.1, p = 0.06). These findings align with earlier evidence that structured, participatory health-education and WASH interventions can produce substantial gains in knowledge when appropriately delivered and reinforced [4, 9, 10, 12, 13].

A similar pattern was observed for safe drinking water practice scores. Baseline mean practice scores were 10.4±2.9 and 10.6±2.8 for the intervention and comparison groups, respectively (p = 0.64). Post-intervention, the practice score in the intervention village rose to 17.2±3.0, compared with 11.0±2.9 in the comparison village. The mean improvement in the intervention group (6.8±2.6) was statistically significant (paired t = 22.4, p<0.001), whereas the change in the comparison group (0.4±2.0) was not (paired t = 1.8, p = 0.08). Between-group comparison of post-test scores also showed a large and significant difference favouring the intervention village (independent t = 16.9 for knowledge; t = 15.8 for practices; both p<0.001). These results reinforce the potential of nurse-led interventions to translate WASH messages into tangible behaviour change at household level, in line with previous work on environmental health counselling by nurses and community-based WASH programmes [7-10, 12, 13].

Table 2: Comparison of mean knowledge and practice scores on safe drinking water at baseline and post-intervention

Outcome	Time point	Intervention (n = 120) Mean ± SD	Comparison (n = 120) Mean ± SD	p-value (between groups)
Knowledge score (0-20)	Baseline	11.8±3.1	12.0±3.2	0.68
	Post-intervention	18.6±2.7	12.5±3.0	<0.001
Practice score (0-20)	Baseline	10.4±2.9	10.6±2.8	0.64
	Post-intervention	17.2±3.0	11.0±2.9	<0.001

Independent t-tests used for between-group comparisons; paired t-tests for within-group changes [4, 5, 9-13].

The proportion of households consistently using any recommended water-treatment method (boiling, chlorination or filtration) increased from 28.3% at baseline to 72.5% at follow-up in the intervention village, compared with a change from 30.0% to 34.2% in the comparison village. The difference-in-difference for treatment uptake was statistically significant (χ^2 = 54.3, p<0.001). Similarly, safe storage practices increased from 38.3% to 76.7% in the intervention group, versus 40.0% to 45.0% in the comparison group (χ^2 = 41.5, p<0.001). Regular handwashing with soap at critical times (after defecation, before food preparation, before feeding children) improved from 43.3% to 78.3% in the intervention village, but only from 44.2% to 48.3% in the comparison village (χ^2 = 36.7, p<0.001). These practice changes are consistent with findings from WASH promotion interventions in Ethiopia, Nigeria and Malawi, where multifaceted, behaviour-centred approaches resulted in enhanced treatment and hygiene behaviours [4, 10, 12, 13].

Table 3: Changes in key safe drinking water and hygiene practices in intervention and comparison villages

Practice indicator	Village	Baseline n (%)	Post-intervention n (%)	χ^2 value	p-value
Routine use of recommended water treatment method	Intervention	34 (28.3)	87 (72.5)	54.3	<0.001
	Comparison	36 (30.0)	41 (34.2)		
Safe storage in covered, narrow-mouthed containers	Intervention	46 (38.3)	92 (76.7)	41.5	<0.001
	Comparison	48 (40.0)	54 (45.0)		
Regular handwashing with soap at critical times	Intervention	52 (43.3)	94 (78.3)	36.7	<0.001
	Comparison	53 (44.2)	58 (48.3)		

Chi-square tests for differences in proportions across time and groups [4, 5, 10-13].

Change in self-reported water-borne illness

Table 4 summarise the two-month incidence of self-reported water-borne illness among household members. At baseline, 46.0% of households in the intervention village and 44.0% in the comparison village reported at least one episode of diarrhoea or suspected water-borne illness in the preceding two months (p = 0.74). Three months after the intervention, this proportion fell to 27.0% in the intervention village, representing a relative reduction of 41.3%, whereas the comparison village showed only a modest decline to 40.0% (relative reduction 9.1%). The difference-in-difference in reduction of illness between villages was significant (χ^2 = 10.8, p = 0.001). Although the research was not powered primarily for morbidity outcomes, the magnitude and direction of change are consistent with the expected impact of improved household WASH behaviours on diarrhoeal disease risk reported in previous evaluations and epidemiological analyses [1, 2, 5, 10, 11, 13-15].

Table 4: Two-month incidence of self-reported water-borne illness among households in intervention and comparison villages

Time point	Intervention (n = 120) n (%)	Comparison (n = 120) n (%)	p-value (between groups)
Baseline	55 (46.0)	53 (44.0)	0.74
Post-intervention	32 (27.0)	48 (40.0)	0.03

χ^2 test for proportion of households with at least one episode of illness [1, 2, 5, 10, 11, 13-15].

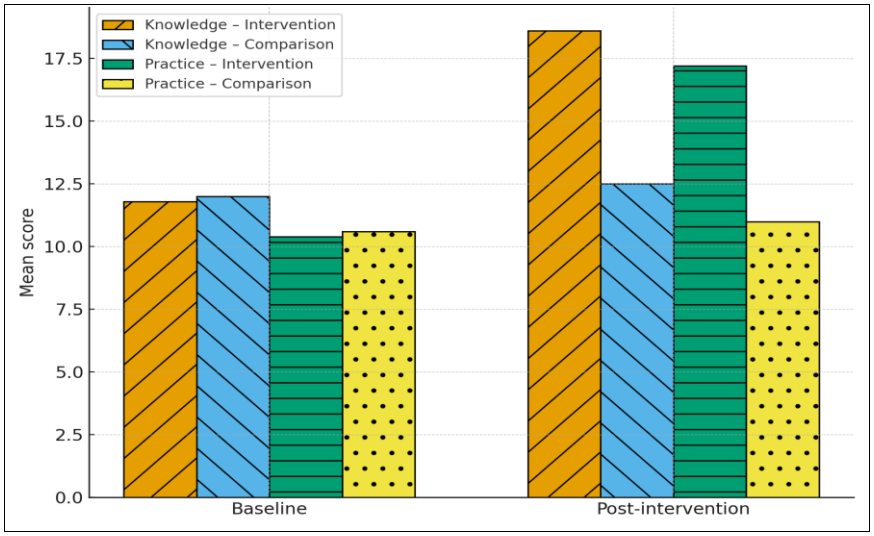

Fig 1: Knowledge and practice scores before and after nurse-led intervention in intervention and comparison villages

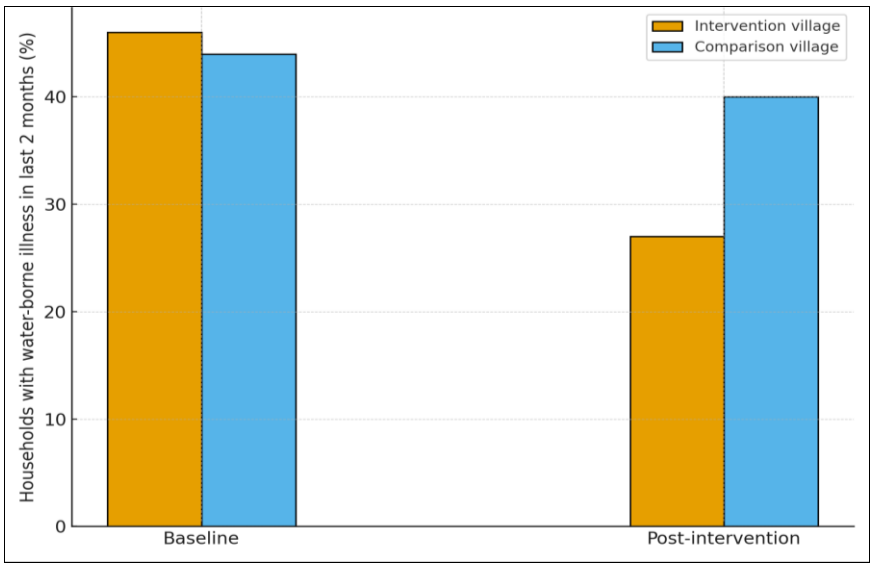

Fig 2: Change in self-reported two-month incidence of water-borne illness in intervention and comparison villages

The graphical patterns clearly illustrate the large post-intervention separation between the intervention and comparison villages in both knowledge/practice scores and illness incidence. These findings corroborate global and regional evidence that sustained, well-designed WASH promotion especially when delivered through trusted health professionals such as community nurses can close the gap between infrastructure availability and effective, risk-reducing household behaviour in rural communities [1-3, 7-10, 12-15].

Discussion

The findings of this research demonstrate that structured nurse-led awareness sessions can significantly improve knowledge and safe drinking water practices among rural households, resulting in a measurable reduction in self-reported water-borne illness. These results align with global and regional evidence emphasizing that improvements in water infrastructure alone do not guarantee safe water at the point of use, especially in rural communities where behavioural, socioeconomic and contextual barriers remain prominent [1-6]. At baseline, the research population reflected typical challenges documented across low-resource rural settings, including limited water treatment, unsafe storage, inadequate hand hygiene facilities and a high burden of diarrhoeal illness [4-6, 11]. Such conditions have been shown to undermine the intended benefits of improved water sources, reinforcing the need for household-level behaviour-change interventions as part of integrated WASH strategies [1-3].

The significant gains in knowledge and practices observed in the intervention village highlight the critical role of community health nurses as facilitators of behaviour change. Similar to findings from rural environmental health interventions conducted by public health nurses in the United States, where tailored counselling improved parental self-efficacy and home environmental safety practices [9], the present research shows that nurses can effectively translate technical WASH guidance into actionable, culturally meaningful practices. The increase in knowledge scores suggests that the structured, participatory format incorporating demonstrations, discussions and visual aids resonated strongly with caregivers, consistent with evidence from Ethiopia, Malawi and Nigeria indicating that interactive and context-specific WASH education yields more substantial improvements compared to one-way messaging [10-13]. The inclusion of household follow-up visits further enhanced the intervention's effectiveness,

addressing practical barriers related to water treatment, storage and hygiene, as highlighted in other rural studies where follow-up reinforcement has been shown to improve sustainability of behaviour change [4, 10].

The improvements in key behaviours including substantial increases in routine water treatment, safe storage and handwashing at critical times represent meaningful uptake of recommended WASH practices that have been repeatedly identified as protective factors against household-level contamination and diarrhoeal disease [1, 2, 5, 11]. The magnitude of these changes far exceeded those observed in the comparison village, where only minimal improvements occurred, suggesting that the intervention drove the observed behaviour shifts rather than seasonal or community-wide trends. These findings reflect patterns seen in community-based WASH promotion trials such as the WASH-E cluster-randomised research in Malawi, where behaviour-centred interventions resulted in significant adoption of recommended hygiene practices [13]. Furthermore, the observed reduction in self-reported water-borne illness (41.3%) in the intervention village is consistent with the directional impact reported in mixed-methods evaluations of household WASH interventions in Ethiopia and other low-resource settings [5, 10, 11], although the research was not primarily powered for morbidity outcomes.

The role of frontline health workers in improving WASH outcomes is increasingly recognized as a cornerstone of effective rural health systems. Studies from primary health facilities in North India and multi-country analyses from Africa show that gaps in health-facility WASH infrastructure and staff capacity directly affect infection prevention and community health education [7, 8]. By equipping community nurses with structured educational modules and practical demonstration materials, the present research leveraged their trusted position to address household gaps that formal infrastructure alone cannot solve. This aligns with WHO and UNICEF guidance, which underscores the health sector's responsibility for strengthening community engagement and WASH-related behaviour change [1, 3].

Importantly, the findings also reflect the synergy between knowledge gains and practice changes. Improvements in water treatment and storage corresponded closely with increases in knowledge scores, supporting earlier observations that knowledge alone is insufficient unless accompanied by opportunities for practical skill-building and reinforcement [9-12]. The structured framework used in this research incorporated both educational and behavioural components an approach supported by behavioural science models and validated in WASH interventions across diverse cultural contexts [4, 10, 13].

The persistence of moderate illness levels even after the intervention, although reduced, indicates that broader environmental and infrastructural factors also influence water safety. Studies from Kazakhstan and Ethiopia similarly report that rural households face systemic constraints such as inconsistent water supply, cost limitations and lack of proper sanitation facilities [4-6]. Addressing these broader determinants will require multi-sectoral efforts beyond the scope of nursing interventions alone.

Overall, this research contributes to the growing body of evidence demonstrating that community nurses can play a pivotal role in enhancing WASH outcomes in rural settings. By integrating structured awareness sessions into routine community health activities, rural health systems can strengthen household-level drinking water safety and reduce the burden of water-borne diseases. The results support the expansion of nurse-led WASH promotion as a scalable, cost-effective and culturally adaptable strategy particularly relevant for rural regions where nurses often serve as the primary interface between households and the health system [7-10, 12-15].

Conclusion

The present research provides compelling evidence that nurse-led awareness sessions serve as an effective, feasible, and community-grounded strategy for improving safe drinking water practices in rural households. By enhancing knowledge, strengthening practical skills, and reinforcing positive behaviour through structured engagement, community nurses were able to support meaningful improvements in how families collect, treat, store, and handle drinking water. The marked increase in both knowledge and safe practices in the intervention village, combined with the substantial reduction in self-reported water-borne illness, underscores the critical influence that trained nurses can exert on household health behaviours when equipped with culturally adapted tools and supported by a structured educational framework. The success of the intervention highlights that behavioural determinants such as awareness, perceived susceptibility, and confidence in applying recommended practices remain major contributors to water safety outcomes and can be effectively modified through targeted, interactive teaching methods. The findings also reinforce that routine, face-to-face health education delivered by trusted health workers continues to be essential in rural communities, particularly where literacy levels, access to information, and exposure to mass media remain limited.

Practical recommendations emerging from this research focus on translating the demonstrated effectiveness of nurse-led sessions into sustainable, large-scale strategies. First, rural health systems should institutionalize structured WASH education modules within community nursing outreach programs, ensuring that health workers regularly deliver demonstration-based, participatory sessions during home visits, village gatherings, and maternal-child health clinics. This would help maintain behaviour change momentum and ensure continuous community reinforcement. Second, nurses should be provided with user-friendly visual aids, demonstration kits, and simplified water treatment materials so that households can observe and practice recommended methods in real time. Third, health planners should consider establishing a community-level follow-up mechanism, where nurses conduct periodic household visits to offer encouragement, troubleshoot barriers, and strengthen long-term adherence to safe water practices. Fourth, local panchayats and community leaders can be engaged to amplify awareness activities, support clean water initiatives, and mobilize households for collective action around water safety. Fifth, low-cost household water-treatment options, safe storage vessels, and handwashing facilities should be made accessible through government-supported schemes or village health centers, ensuring that families not only learn best practices but also have the means to implement them. Lastly, integrating water safety messages into school health programs and women's

self-help groups can create multi-layered community reinforcement, further strengthening the behavioural environment needed for sustained adoption of safe drinking water practices. By embedding these practical steps within the existing rural health framework, the findings of this research can be transformed into long-term, scalable interventions that meaningfully reduce water-borne illnesses and enhance community well-being.

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