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Effects Of Health Education Intervention On Awareness, Perception And Preventive Measures On Tannery Effluent Water Pollution Among Residents Of Affected Areas In Kano State, Nigeria

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ABSTRACT

Tannery effluent pollution poses a significant public health and environmental threat in many developing countries, including Nigeria. This study assessed the effects of health education intervention on awareness, perception, and preventive measures regarding tannery effluent water pollution among residents of affected communities in Kano State, Nigeria. A quasi-experimental design was employed among 393 purposively selected residents. Data were collected using a structured interviewer-administered questionnaire before and after a four-week health education intervention. The Statistical Package for Social Sciences (SPSS) version 25.0 was used for analysis, with descriptive statistics and Chi-square tests applied at a 5% level of significance. Results revealed a significant improvement in awareness of effluent toxicity (from 36.1% to 84.5%, $p < 0.001$) and understanding of water contamination risks (42.0% to 88.8%, $p < 0.001$). Preventive practices such as avoiding use of polluted water for cooking increased from 22.7% to 71.0% ($p < 0.001$). The study concludes that health education significantly enhances awareness, perception, and adoption of preventive measures against tannery effluent pollution. Strengthening community-focused educational interventions is recommended to mitigate health risks and promote sustainable environmental practices.

Keywords: Tannery effluent, water pollution, health education, awareness, preventive measures, Nigeria

INTRODUCTION

Industrialization has brought about increased environmental pollution, with tannery industries recognized as one of the major polluters due to their discharge of untreated or poorly treated effluents into water bodies (Chowdhury et al., 2020). Tannery wastewater often contains toxic substances such as chromium, sulfides, chlorides, and suspended solids that threaten aquatic ecosystems and human health (Singh et al., 2019). In Nigeria, Kano State hosts one of the largest clusters of tanneries in West Africa, where improper effluent disposal has been linked to contamination of rivers, farmlands, and groundwater (Ajayi & Ogunbayo, 2012; Usman et al., 2021).

Communities residing around industrial areas such as Sharada, Challawa, and Dakata are often directly exposed to tannery effluents through water usage for domestic, agricultural, and recreational purposes. This exposure has been associated with dermatological conditions, gastrointestinal illnesses, and increased risks of chronic diseases (Olayinka et al., 2020). Despite the risks, awareness and preventive practices among residents remain inadequate due to poor environmental literacy and limited health promotion interventions.

Health education interventions have been recognized as effective strategies in improving community awareness, shaping perceptions, and promoting adoption of preventive measures in pollution-affected areas (Rahman et al., 2022). However, there is limited empirical evidence in Nigeria, particularly in Kano State, on the impact of such interventions in addressing tannery effluent-related health challenges.

This study, therefore, assessed the effects of health education intervention on awareness, perception, and preventive measures on tannery effluent water pollution among residents of affected areas in Kano State.

METHODOLOGY

This study employed a **quasi-experimental design** (pre- and post-test without a control group) to evaluate the effect of health education intervention on awareness, perception, and preventive measures regarding tannery effluent water pollution among residents of affected communities in Kano State, Nigeria.

Population and Sampling

The study population comprised residents of Dakata, Sharada, and Challawa industrial areas. A purposive sampling technique was used to recruit 393 participants. Inclusion criteria were: adults aged 18 years and above, residents living in the community for at least one year, and willingness to participate. Individuals below 18 years, transient visitors, and those who declined consent were excluded.

Instrument

A structured, interviewer-administered questionnaire was developed based on previous studies on industrial effluent pollution (Ajayi & Ogunbayo, 2012; Chowdhury et al., 2020). The instrument consisted of four sections: socio-demographic data, awareness, perception, and preventive measures. Content validity was ensured through expert review, while internal consistency yielded a Cronbach's alpha of 0.82, indicating good reliability.

Intervention

The intervention consisted of a health education program delivered over four weeks. It included interactive health talks, group discussions, and distribution of educational leaflets in Hausa and English. Topics covered were: composition of tannery effluents, health risks, environmental impacts, and preventive practices.

Data Collection and Analysis

Data were collected at baseline and four weeks after the intervention. The Statistical Package for Social Sciences (SPSS) version 25.0 was used for analysis. Descriptive statistics (frequency, percentage, mean, and standard deviation) summarized responses. The Chi-square (χ^2) test was employed to determine the association between categorical variables at a 5% level of significance ($p < 0.05$).

Ethical Considerations

Ethical approval was obtained from the Kano State Ministry of Health Research Ethics Committee. Informed consent was obtained from all participants, and confidentiality was maintained throughout the study.

RESULTS

Table 1: Socio-demographic Characteristics of Respondents (N = 393)

Variable	Frequency (n)	Percentage (%)
Age (years)		
18–29	104	26.5
30–39	138	35.1
40–49	97	24.7
≥50	54	13.7
Gender		
Male	211	53.7
Female	182	46.3
Education		
None	84	21.4
Primary	115	29.3
Secondary	131	33.3
Tertiary	63	16.0

Table 2: Awareness of Health Risks Associated with Tannery Effluents Before and After Intervention

Awareness Variable	Pre-test n (%)	Post-test n (%)	χ^2	p-value
Aware tannery effluents contain toxins	142 (36.1)	332 (84.5)	98.24	<0.001*
Aware effluents can contaminate water	165 (42.0)	349 (88.8)	112.77	<0.001*
Aware effluents cause skin irritation	119 (30.3)	307 (78.1)	97.65	<0.001*
Aware effluents linked to chronic illness	101 (25.7)	285 (72.5)	102.34	<0.001*

*Significant at $p < 0.05$

Table 3: Preventive Measures Adopted Before and After Intervention

Preventive Practice	Pre-test n (%)	Post-test n (%)	χ^2	p-value
Avoid using polluted water for cooking	89 (22.7)	279 (71.0)	128.5	<0.001*
Use protective gear when near effluent	67 (17.1)	241 (61.3)	110.2	<0.001*
Report illegal discharge to authorities	54 (13.7)	203 (51.7)	106.3	<0.001*
Advocate for treatment plants in community	78 (19.8)	227 (57.8)	115.6	<0.001*

($\chi^2 = 128.5, p < 0.001$)

Findings Narrative

At baseline, awareness of tannery effluent health risks was generally low. Only 36.1% knew effluents contain toxic chemicals, and 25.7% were aware of links to chronic illnesses. Post-intervention, awareness significantly improved across all domains ($p < 0.001$). For example, knowledge of effluent contamination of water increased from 42.0% to 88.8%.

Preventive practices also improved markedly after the intervention. The proportion of respondents avoiding use of contaminated water rose from 22.7% to 71.0% ($\chi^2 = 128.5, p < 0.001$). Similarly, reporting of illegal effluent discharge increased almost four-fold (13.7% to 51.7%, $p < 0.001$).

DISCUSSION

This study demonstrated that a structured health education intervention significantly improved awareness, perception, and preventive practices regarding tannery effluent pollution among residents of affected communities in Kano State.

The findings align with Chowdhury et al. (2020), who reported that community education initiatives in Bangladesh improved understanding of tannery wastewater hazards. Similarly, Singh et al. (2019) found that targeted health communication increased adoption of protective behaviors in pollution-exposed populations. In Nigeria, Ajayi and Ogunbayo (2012) emphasized the urgent need for educational and policy interventions to address effluent mismanagement in industrial zones.

The substantial increase in preventive practices, such as avoiding use of polluted water and reporting illegal effluent discharge, reflects the potential of community-based education to empower residents. This is consistent with Rahman et al. (2022), who highlighted that knowledge translation strategies reduce environmental health risks in vulnerable populations.

However, challenges remain, including limited enforcement of environmental regulations and inadequate waste treatment infrastructure (Usman et al., 2021). While education improved behavior, sustained change requires multi-sectoral collaboration, regulatory enforcement, and provision of safe alternatives.

CONCLUSION

The study concludes that health education interventions significantly enhance awareness, perception, and preventive measures regarding tannery effluent water pollution in affected communities. Strengthening such interventions, alongside regulatory enforcement and provision of alternative safe water sources, will be crucial to reducing health risks associated with industrial effluents.

RECOMMENDATIONS

1. **Scale-up health education:** Regular community sensitization campaigns should be implemented in all tannery-affected areas.
2. **Policy enforcement:** Environmental protection agencies should enforce effluent treatment standards before discharge.
3. **Community engagement:** Local leaders should be trained to champion environmental health advocacy.
4. **Provision of safe water:** Government and NGOs should ensure availability of alternative potable water to reduce dependence on contaminated sources.

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