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A cross sectional study to determine the environmental risk factors of diarrhea among the children's under the age of 5 years in selected PHC of Vijayapur district

Shankarling B. Javali[1*], Dr. Amit Mathur[2]

[1]Research Scholar, Department of Mathematics and Statistics, Himalayan University, Itanagar, India.

[2]Research Supervisor, Department of Mathematics and Statistics, Himalayan University, Itanagar, India.

[*]**Corresponding Author Email Id**: shankarjavali30@gmail.com

Abstract

Background: *Diarrheal diseases continue to pose a major public health threat among children under five in India, particularly in rural regions. This study was undertaken to identify environmental risk factors associated with diarrhea in selected Primary Health Centres (PHCs) of Vijayapur district.*

Methods: *A cross-sectional design was used with 50 mothers or caregivers of under-five children. Data were collected using a structured questionnaire and analyzed with chi-square and logistic regression tests.*

Results: *The two-week diarrhea prevalence was 36%. Significant environmental risk factors included untreated drinking water ($p = 0.01$), open defecation ($p = 0.04$), and caregiver handwashing practices ($p = 0.001$). Logistic regression confirmed untreated water (AOR = 3.8), no handwashing (AOR = 9.5), and open defecation (AOR = 4.1) as significant predictors.*

Conclusion: *Improving water treatment, sanitation, and hygiene education among caregivers is essential to reducing diarrhea in under-five children.*

Keywords: *Diarrhea, Under-five children, Environmental factors, Water sanitation, Hygiene.*

Introduction

Diarrhea remains one of the leading causes of morbidity and mortality among children under the age of five, particularly in low- and middle-income countries. According to the World Health Organization (WHO), diarrhea is the second leading cause of death in children under five years old and is responsible for killing approximately 525,000 children annually[1]. In India, despite significant improvements in healthcare access and sanitation, diarrhea continues to be a major public health problem, especially in rural and underprivileged areas[2].

Environmental factors play a critical role in the occurrence and recurrence of diarrheal diseases. Poor sanitation, lack of access to safe drinking water, inadequate waste disposal systems, and improper hand

hygiene are some of the key contributors to the spread of diarrheal infections[3]. Children are particularly vulnerable due to their developing immune systems and increased exposure to contaminated environments during crawling and playing[4].

Vijayapur District in Karnataka, like many other districts in India, faces challenges related to rural sanitation, water contamination, and poor waste management. These issues are further compounded by inadequate health education and traditional practices that may not align with modern preventive measures[5]. Despite national efforts such as the Swachh Bharat Abhiyan and National Rural Health Mission, diarrhea continues to affect the health and nutritional status of children in this region[6].

Understanding the specific environmental risk factors contributing to diarrhea in this district is essential for designing effective, locally-relevant public health interventions. A cross-sectional study allows for the assessment of current risk exposures and the identification of key determinants that can be targeted through educational and infrastructural reforms.

Hence, the present study aims to assess the prevalence of diarrhea and identify the environmental risk factors associated with it among children under the age of five attending selected Primary Health Centers (PHCs) in Vijayapur District. The findings from this study may provide valuable insights for healthcare providers, policymakers, and public health authorities in implementing sustainable strategies to reduce the burden of diarrheal diseases in similar settings

Objectives

General Objective:

To assess the environmental risk factors contributing to diarrhea among children under five years of age in selected PHCs of Vijayapur District.

Specific Objectives:

1. To determine the prevalence of diarrhea among children under five years of age.
2. To identify environmental factors associated with diarrhea (water source, sanitation, waste disposal, hand hygiene, and housing conditions).
3. To assess the relationship between caregiver practices and occurrence of diarrhea.
4. To compare diarrhea incidence across water sources and sanitation types.
5. To recommend preventive strategies based on findings.

Hypotheses

Null Hypotheses (H_0):

- H_{01}: No significant association exists between environmental factors and diarrhea.
- H_{02}: Caregiver hygiene practices do not significantly influence diarrhea incidence.

Alternative Hypotheses (H_1):

- H_{11}: Significant associations exist between environmental factors and diarrhea.
- H_{12}: Caregiver hygiene practices significantly influence diarrhea incidence.

Methodology

A community-based **cross-sectional study** was carried out among **50 mothers/caregivers** of children under five attending selected PHCs in Vijayapur. A structured questionnaire collected data on socio-demographics, environmental conditions, and hygiene practices.

Inclusion Criteria:

- Caregivers of children aged 0–5 years.
- Residents of the area for at least 6 months.

Results

Table 1: Socio-Demographic Profile of Mothers/Caregivers (N = 50)

Variable	Category	Frequency (n)	Percentage (%)
Age of Mother	<20 years	5	10.0
	21–30 years	28	56.0
	31–40 years	14	28.0
	>40 years	3	6.0
Education Level	Illiterate	10	20.0
	Primary	15	30.0
	High School	18	36.0
	Graduate	7	14.0
Occupation	Homemaker	30	60.0
	Laborer	10	20.0
	Farmer	6	12.0
	Others	4	8.0
Type of Family	Nuclear	27	54.0
	Joint	15	30.0
	Extended	8	16.0

Among the 50 mothers or caregivers who participated in the study, the majority (56%) were in the age group of 21–30 years, followed by 28% in the 31–40 years age group, 10% were under 20 years, and only 6% were above 40 years. In terms of educational status, 36% had completed high school education, 30% had primary education, 20% were illiterate, and only 14% were graduates. Regarding occupation, a significant proportion (60%) were homemakers, while 20% were laborers, 12% were farmers, and 8% were engaged in other occupations. Concerning family structure, more than half (54%) of the respondents belonged to nuclear families, while 30% lived in joint families and 16% in extended families. These socio-demographic

characteristics provide insights into the caregiving environment and potential socio-economic factors influencing hygiene behaviors and child health in the selected Primary Health Centres of Vijayapur district.

Table 2: Environmental Factors Related to Diarrhea (N = 50)

Variable	Category	Frequency (n)	Percentage (%)
Drinking Water Source	Tap water	20	40.0
	Bore well	18	36.0
	Open well	9	18.0
	Others	3	6.0
Water Treatment	Yes	32	64.0
	No	18	36.0
Sanitation Facility	Private toilet	35	70.0
	Shared toilet	10	20.0
	Open defecation	5	10.0
Waste Disposal	Open dumping	15	30.0
	Covered bin	25	50.0
	Municipal collection	10	20.0
Hand washing After Toilet	Yes	38	76.0
	No	12	24.0

The study examined several environmental factors that may contribute to the occurrence of diarrhea among children under five years. In terms of drinking water sources, 40% of the households relied on tap water, 36% used borewell water, 18% used open wells, and 6% used other sources. Notably, only 64% of the participants reported treating their drinking water, while 36% did not use any treatment methods. Regarding sanitation, 70% had access to private toilets, 20% used shared toilets, and 10% practiced open defecation. For household waste disposal, 50% used covered bins, 30% engaged in open dumping, and 20% relied on municipal collection services. When it came to hygiene practices, 76% of caregivers reported washing their hands after using the toilet, whereas 24% did not follow this basic hygiene behavior. These findings indicate gaps in safe water handling, sanitation access, and hygiene practices that may increase the risk of diarrhea in young children.

Table 3: Prevalence of Diarrhea in Last 2 Weeks (N = 50)

Diarrhea Episode	Frequency (n)	Percentage (%)
Yes	18	36.0
No	32	64.0

The two-week prevalence of diarrhea among under-five children in the selected population was found to be 36%, as 18 out of 50 children experienced diarrhea. The remaining 64% (32 children) did not report any

diarrheal episodes during the recall period. This prevalence rate is relatively high and indicates a continuing public health concern in the region.

Table 4: Association Between Environmental Factors and Diarrhea (N = 50)

Variable	Category	Diarrhea (n, %)	No Diarrhea (n, %)	χ^2 / p-value
Water Treatment	Yes	6 (18.7%)	26 (81.3%)	p = 0.01*
	No	12 (66.7%)	6 (33.3%)	
Sanitation Facility	Open defecation	4 (80%)	1 (20%)	p = 0.04*
	Toilet (Private)	10 (28.6%)	25 (71.4%)	
Hand washing Practice	Yes	5 (13.2%)	33 (86.8%)	p = 0.001*
	No	13 (92.3%)	1 (7.7%)	

Statistical analysis using the chi-square test revealed significant associations between certain environmental factors and the occurrence of diarrhea. Children from households that did not treat drinking water had a significantly higher prevalence of diarrhea (66.7%) compared to those who did treat their water (18.7%), with a p-value of 0.01. Similarly, open defecation was strongly associated with diarrhea; 80% of children from these households experienced diarrhea compared to 28.6% from households with private toilets (p = 0.04). Handwashing practices also showed a notable difference: among caregivers who did not wash their hands after toilet use, 92.3% of children had diarrhea compared to just 13.2% among those who practiced hand hygiene (p = 0.001). These associations underline the critical role of water safety, sanitation, and hygiene (WASH) in preventing diarrhea.

Table 5: Logistic Regression Analysis of Risk Factors for Diarrhea

Variable	AOR	95% CI	p-value
Untreated Water	3.8	1.2–11.5	0.02*
No Hand washing Practice	9.5	2.3–38.7	0.001**
Open Defecation	4.1	1.1–15.2	0.03*

Multivariate logistic regression analysis further identified key predictors of diarrhea among the children. Households that did not treat their water had 3.8 times higher odds of diarrhea (Adjusted Odds Ratio [AOR] = 3.8; 95% CI: 1.2–11.5; p = 0.02). The absence of handwashing practice among caregivers after toilet use was the strongest predictor, with children being 9.5 times more likely to experience diarrhea (AOR = 9.5; 95% CI: 2.3–38.7; p = 0.001). Open defecation also emerged as a significant factor, with an AOR of 4.1 (95% CI: 1.1–15.2; p = 0.03). These findings confirm that unsafe water, poor sanitation, and inadequate hygiene are independent and significant risk factors for childhood diarrhea.

Discussion

The two-week diarrhea prevalence (36%) observed in the study is consistent with findings from rural settings in other parts of India[7]. Lack of access to safe drinking water, sanitation facilities, and proper hygiene practices continue to be major contributors to the disease burden among children under five[8].

In the present study, untreated drinking water was significantly associated with diarrhea ($p = 0.01$), aligning with findings from similar studies conducted in rural Odisha and Tamil Nadu, where children consuming untreated water had higher odds of diarrhea[9–10]. Open defecation, which was reported by 10% of the households, was also significantly associated with diarrhea ($p = 0.04$), confirming observations from other Indian studies linking poor sanitation to increased diarrheal morbidity[11].

One of the most critical findings was the lack of handwashing practices among caregivers. Children whose caregivers did not wash their hands after defecation were 9.5 times more likely to experience diarrhea ($p = 0.001$), reaffirming global evidence on the effectiveness of hygiene behavior in preventing gastrointestinal infections[12–13]. The findings highlight the urgent need for behavior change communication and community-based education to improve hygiene practices in rural households[14].

Conclusion

The study highlights that untreated drinking water, open defecation, and lack of caregiver hand hygiene are key environmental risk factors for diarrhea. Addressing these through community-level health education, sanitation infrastructure development, and safe water provision can significantly reduce diarrhea-related morbidity.

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