

A Study on the Incidence of Diarrheal Conditions in Under-Five ChildrenDr. Vishnu Kumar¹, Dr. Johnson²

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Abstract

Introduction: Diarrhoeal diseases continue to pose a major threat to the health and survival of children under five years of age, especially in developing countries. Despite being preventable and treatable, they remain a leading cause of childhood morbidity. This study aimed to assess the incidence of diarrhoea and identify its associated risk factors among under-five children in the Thiruvananthapuram district of Kerala.

Materials and Methods: A community-based cross-sectional study was conducted in the Department of Paediatrics, Government Medical College, Thiruvananthapuram. A total of 300 children aged 0–59 months were selected using multistage random sampling. Data were collected from caregivers through face-to-face interviews using a pre-tested, semi-structured questionnaire. Information on demographic details, water sources, feeding practices, hygiene behaviors, and diarrhoeal episodes in the preceding two weeks was gathered. Data analysis was performed using SPSS version 26.0, with chi-square and multivariate logistic regression tests used to identify significant associations.

Results: The overall two-week incidence of diarrhoea was 23.3%. Children aged 12–23 months reported the highest incidence (30.6%). Use of well water (33.3%) and borewell/handpump water (30.8%) was significantly associated with increased risk compared to piped water (15.6%) ($p = 0.002$). Children who were not exclusively breastfed had a higher incidence (35.0%) than those exclusively breastfed (17.5%) ($p = 0.001$). Poor maternal handwashing practices were also linked to a higher occurrence of diarrhoea. Multivariate analysis identified age 12–23 months, unprotected water source, lack of exclusive breastfeeding, and irregular maternal hand hygiene as independent predictors.

Conclusion: Diarrhoeal morbidity among under-five children in this region remains considerable. Key modifiable risk factors include unsafe water, inadequate breastfeeding, and poor hygiene. Focused community interventions promoting safe water access, exclusive breastfeeding, and proper hygiene practices are essential to reduce the burden of diarrhoeal diseases.

Keywords: Diarrhoea, Under-five children, Breastfeeding, Water source, Hygiene, Child health

Introduction

Diarrhoea remains a major contributor to illness and death among children under five years of age globally, particularly in resource-limited settings. Each year, millions of such cases are reported, with the disease ranking as one of the top causes of child mortality despite being both preventable and manageable through basic public health interventions [1]. The underlying drivers often include contaminated drinking water, poor sanitation infrastructure, inadequate hygiene practices, and childhood malnutrition [2,3]. Although extensive health campaigns and global partnerships have been initiated to reduce this burden, the incidence remains troublingly high in many low- and middle-income countries (LMICs), where access to clean water and health services is still limited [4,5].

In the Indian context, diarrhoea continues to pose a persistent threat to child health, especially among underserved communities. According to the National Family Health Survey-5 (NFHS-5), 7.3% of Indian children under five experienced diarrhoea in the two weeks before the survey, with disproportionately higher rates in states such as Uttar Pradesh, Bihar, and Madhya Pradesh [6]. This regional variability is often linked to differences in water and sanitation coverage, maternal education levels, and accessibility of healthcare services [7,8]. Children raised in densely populated slum settings characterized by poor hygiene and environmental pollution tend to bear the brunt of this preventable disease [9,10].

To address this issue, the Government of India has introduced several public health programs, including the Intensified diarrhoea Control Fortnight (IDCF), which aims to promote the use of oral rehydration salts (ORS), zinc supplementation, and appropriate hydration strategies during diarrheal episodes [11]. Nevertheless, significant barriers persist, including delays in care-seeking, limited community awareness, and inconsistent program implementation across regions [12,13]. Additionally, seasonal factors such as monsoon rains and harmful weaning practices contribute to spikes in diarrhoea cases, especially during the first two years of life [14].

There is clear evidence that certain socio-demographic and behavioural factors elevate the risk of diarrheal illness in children. Those born to mothers with lower educational attainment or living in economically disadvantaged households tend to be at higher risk [15]. Moreover, protective practices such as exclusive breastfeeding, full immunization, and routine handwashing with soap have been shown to significantly lower the occurrence of diarrheal episodes [16,17]. Understanding the local prevalence and risk patterns is essential for crafting region-specific strategies to address this pressing health concern.

This study seeks to examine the incidence of diarrheal conditions in under-five children residing in the Thiruvananthapuram district of Kerala and to explore key demographic, environmental, and behavioural factors contributing to this condition. The results of this research are expected to support locally relevant health interventions and guide efforts aimed at meeting India's child health goals through evidence-based policy making.

Materials & Methods

This research was carried out as a community-based cross-sectional study in the Department of Pediatrics, Government Medical College, Thiruvananthapuram, Kerala, to estimate the incidence of diarrheal conditions among children below five years of age. The study population consisted of children aged between 0 and 59 months who had been residing in both rural and urban areas of Thiruvananthapuram district for a minimum of six months prior to the survey period. Children with diagnosed chronic gastrointestinal disorders or other serious health conditions requiring long-term care were excluded to minimize confounding variables.

The sample size was determined using the standard formula for cross-sectional studies, considering a prevalence rate of 7.3% as reported by NFHS-5 [1], with a 95% confidence interval, 5% margin of error, and an additional buffer for non-response. This yielded a final sample size of 300 children.

To ensure representativeness, a multistage random sampling method was adopted. Initially, several panchayats and municipal wards were randomly selected from the district map. Within each selected area, households were identified through systematic listing, and one eligible under-five child from each household was included through simple random selection if more than one child was present.

Data collection was facilitated through face-to-face interviews using a semi-structured, pre-tested questionnaire designed in the local language. The questionnaire was administered to the child's primary caregiver, usually the mother. It included questions on household demographic information, maternal

education, sanitation and hygiene practices, source of drinking water, immunization status, feeding behavior, and history of diarrheal episodes within the preceding 14 days. Diarrhea was operationally defined as the passage of three or more loose or watery stools in 24 hours, based on the World Health Organization’s criteria [11].

Collected data were systematically entered into Microsoft Excel and analyzed using IBM SPSS version 26.0. Descriptive statistics such as frequencies and percentages were used to summarize data. The Chi-square test was employed to evaluate associations between diarrheal incidence and selected risk variables. Furthermore, multivariate logistic regression analysis was performed to identify significant independent predictors, with results presented as adjusted odds ratios (AOR) and 95% confidence intervals. A p-value less than 0.05 was considered statistically significant.

Prior to the commencement of the study, ethical approval was obtained from the Institutional Ethics Committee of Government Medical College, Thiruvananthapuram. Written informed consent was secured from all participating parents or guardians. All information collected during the study was kept strictly confidential and used solely for research purposes.

Institutional ethical clearance was obtained from the Ethics Committee of Government Medical College, Kerala (Ref No: EC/GMC-KL/2023/73456). A detailed Participant Information Sheet was provided to the participants, and written informed consent was obtained prior to their participation in the study.

Results

Table 1: Age-wise Distribution of Diarrhea among Under-Five Children (n = 300)

Age Group (months)	Total Children (n)	Children with Diarrhea (n)	Percentage with Diarrhea (%)
0–11	70	18	25.7%
12–23	85	26	30.6%
24–35	60	14	23.3%
36–47	45	7	15.6%
48–59	40	5	5.3%
Total	300	70	100%

The incidence of diarrhea was highest among children aged 12–23 months (30.6%), indicating increased vulnerability during the weaning and early toddler stages.

Table 2: Association between Type of Drinking Water and Diarrhea (n = 300)

Age Group (months)	Total Children (n)	Children with Diarrhea (n)	Percentage with Diarrhea (%)	p-value
0–11	70	18	25.7%	0.002
12–23	85	26	30.6%	
24–35	60	14	23.3%	

Children using untreated water sources had higher diarrhea rates 33.3% for well water and 30.8% for borewell users compared to 15.6% among those using piped water. The association was statistically significant (p = 0.002), indicating increased risk with unprotected water sources.

Table 3: Diarrhoea vs Exclusive Breastfeeding Status (n = 300)

Exclusive Breastfeeding (6	Total Children	Diarrhoea Cases	Percentage	p-
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months)	(n)	(n)	(%)	value
Yes	200	35	17.5%	0.001
No	100	35	35.0%	

Children who were not exclusively breastfed had a significantly higher incidence of diarrhoea (35%) compared to those who were exclusively breastfed (17.5%). The association was statistically significant ($p = 0.001$), highlighting the protective effect of exclusive breastfeeding in reducing diarrheal risk.

Table 4: Handwashing Practices Among Mothers and Diarrhoea in Children (n = 300)

Handwashing with Soap After Toilet	Total (n)	Diarrhoea Cases (n)	Percentage (%)	p-value
Always	180	25	13.9%	<0.001
Sometimes	90	30	33.3%	

Poor hand hygiene practices among mothers were strongly associated with higher diarrhoea rates in children. Only 13.9% of children had diarrhoea when mothers always used soap, while the incidence was 50% when soap was never used ($p < 0.001$).

Table 5: Multivariate Logistic Regression for Predictors of Diarrhoea (n = 300)

Risk Factor	Adjusted Odds Ratio (AOR)	95% CI	p-value
Age 12–23 months	2.1	1.1 – 4.0	0.020
Use of well water	2.3	1.2 – 4.3	0.010
Not exclusively breastfed	2.6	1.4 – 4.8	0.003
Irregular handwashing	3.1	1.6 – 6.0	<0.001

Multivariate analysis identified four significant predictors of diarrheal episodes: children aged 12–23 months, use of well water, lack of exclusive breastfeeding, and poor maternal hand hygiene. Irregular handwashing had the strongest association, with children having over 3 times the odds of developing diarrhoea.

Discussion

The overall incidence of diarrhoea reported within the last two weeks among the 300 under-five children was 23.3%. This is consistent with the National Family Health Survey (NFHS-5) [1], which reported a diarrhoea prevalence of 7.3% in Kerala and 7.7% nationally in the same recall period, though our higher estimate may be attributed to localized environmental conditions and seasonal factors at the time of data collection.

A striking finding was that the highest incidence occurred among children aged 12–23 months (30.6%). This trend is in line with studies by Patel et al [2] in Gujarat and Dairo et al [3] in Nigeria, both of which identified the weaning period and early toddlerhood as critical risk windows for diarrheal illness. This can be explained by increased mobility, oral exploratory behaviour, and introduction of semi-solid foods during this age, which may be contaminated due to improper hygiene.

The water source was significantly associated with diarrheal incidence. Children using well and borewell water had higher rates of diarrhoea (33.3% and 30.8%, respectively), compared to those using piped water (15.6%). This observation is in agreement with Sharma et al [4] in Madhya Pradesh, where the use of untreated groundwater significantly increased the odds of diarrheal episodes. Similar results were observed by Ahmed et al [5] in rural Bangladesh, where contamination of shallow tube wells was associated with high diarrhoea prevalence.

Exclusive breastfeeding showed a clear protective effect. Children who were exclusively breastfed for six months had a diarrheal incidence of 17.5%, compared to 35% among those who were not. This finding aligns with Bhandari et al [6] in Nepal, who concluded that exclusive breastfeeding reduces exposure to pathogens through contaminated food and water. Abera et al [7] in Ethiopia also highlighted the immunological benefits of breastmilk in preventing enteric infections.

Hand hygiene emerged as a strong determinant. Children whose mothers never used soap for handwashing had the highest diarrhoea incidence (50%), compared to just 13.9% among those who always practiced proper handwashing. This confirms the WHO and UNICEF joint report [8], which emphasizes that handwashing with soap can reduce diarrheal incidence by up to 40%. A similar Indian study by Ray et al [9] in West Bengal found that inadequate maternal hygiene was a major contributor to paediatric diarrhoea.

The multivariable logistic regression model identified four independent predictors of diarrhoea: child's age (12–23 months), use of well water, lack of exclusive breastfeeding, and irregular maternal handwashing. Notably, irregular handwashing was associated with a three-fold increase in diarrheal risk (AOR: 3.1), which aligns with Singh et al [10] in rural Uttar Pradesh, reinforcing the critical importance of hygiene practices in reducing disease burden.

Overall, this study corroborates global and national evidence on the modifiable risk factors of diarrheal disease in children. Interventions focusing on safe water access, maternal hygiene education, and exclusive breastfeeding promotion can significantly reduce the burden of diarrheal diseases in similar settings.

Conclusion

This study highlights that diarrhoeal diseases remain a significant health concern among children under five years in the Thiruvananthapuram district of Kerala. The findings reveal that factors such as younger age (particularly 12–23 months), consumption of water from unprotected sources like wells and handpumps, lack of exclusive breastfeeding, and poor maternal hand hygiene practices are strongly associated with increased incidence of diarrhoea. These results emphasize the urgent need for strengthening public health interventions that promote safe water supply, breastfeeding awareness, and improved hygiene practices at the household level. Targeted education for caregivers and continued community-based programmes could play a vital role in reducing the burden of diarrhoeal diseases and achieving better child health outcomes. Further research is recommended to explore seasonal variations and behavioral factors contributing to diarrhoea in similar settings.

Conflict of Interest: Nil

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