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Original article

# Associations Between Socio-Economic Factors and Prevalence of Shigella Infection: An Analysis of Isolated Cases

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**Abstract**

**Background:**
Shigella infection is a major contributor to childhood diarrhoea, particularly in settings where socio-economic and environmental disadvantages limit access to safe water, sanitation, and healthcare.

**Objective:**
This study assessed the association between socio-economic factors and Shigella prevalence among isolated paediatric cases.

**Methods:**
A hospital-based observational study was conducted from July 2021 to June 2022 in the Paediatrics inpatient department of Sylhet MAG Osmani Medical College Hospital. Ninety-eight children aged ≥6 months with diarrhoea and no recent antibiotic exposure were enrolled. Stool samples underwent culture, biochemical testing, and PCR confirmation.Associations were analysed using SPSS, with significance set at $p<0.05$.

**Results:**
Shigella species were isolated in 13 of 98 children (13.3%), predominantly among those aged 1–5 years and from lower socio-economic backgrounds, although age, gender and socio-economic class showed no significant associations.

**Conclusion:**
Shigella infection persists in disadvantaged socio-economic settings, underscoring the need for targeted preventive measures.

**Keywords:** Shigella infection, Diarrhoea, Socio-economic factors.

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## Introduction:

Shigella infection remains a significant global health problem, and its prevalence is closely related to socio-economic and environmental conditions. Shigella species are among the major bacterial causes of diarrhoeal diseases worldwide, according to the World Health Organization.[1] They contribute to a considerable burden of morbidity and mortality. The distribution and frequency of Shigella infection reflect patterns of inequality. Populations of lower socio-economic status experience greater exposure because of poor sanitation, unsafe water, and limited access to health services.[2] Low socio-economic status plays a crucial role in the persistence and transmission of Shigella. In areas with inadequate sanitation, overcrowding, and limited access to safe water, faecal–oral transmission becomes more common. These environments facilitate the spread of Shigella through contaminated food, water, or direct person-to-person contact. Studies have shown that households with lower incomes, limited education, and poor hygienic practices exhibit higher infection rates than those with better socio-economic conditions.[3,4] The combination of these factors increases the likelihood of repeated exposure and prolonged infection. It also enhances community-level outbreaks, allowing Shigella to maintain endemic transmission. Socioeconomic factors influence the predominance of specific Shigella species in analyses of isolated cases. Shigella flexneri is more prevalent in financially disadvantaged areas. Shigella sonnei tends to dominate in communities with improved sanitation and higher income levels, in contrast.[5,6] This distribution pattern indicates that the socio-economic environment directly affects both the prevalence and the types of Shigella circulating across different populations. Patterns of infection within households, neighbourhoods, and broader communities reveal that environmental conditions, crowding, and access to hygienic facilities are critical determinants of species distribution and transmission dynamics. The rise of multidrug-resistant (MDR) Shigella strains is another obstacle linked to socio-economic conditions. Uncontrolled antibiotic usage, limited diagnostic facilities, and insufficient healthcare resources have escalated the spread of resistant strains in low-income communities.[7,8] Inappropriate antibiotic use due to self-medication, lack of professional guidance, and poor knowledge contributes to treatment failure and prolonged illness. These conditions are more pronounced in areas with low healthcare affordability and accessibility. They raise the risk of community-level spread and exacerbate treatment outcomes. Nutritional status also plays a critical role in determining the risk and severity of Shigella infection. Malnourished individuals, often concentrated in socio-economically deprived areas, exhibit weaker immune responses. This increases their vulnerability to infection and its complications.[9] The interaction of malnutrition, poor sanitation, and limited healthcare access reinforces a cycle of recurrent infection and poverty. In such conditions, Shigella infection can have more severe consequences and a prolonged course of illness. This further increases the public health burden. This study aims to analyze the association between socio-economic factors and the prevalence of Shigella infection by examining isolated cases.

**Methods:**

This descriptive observational study was conducted from July 2021 to June 2022 in the Paediatrics inpatient department of Sylhet MAG Osmani Medical College Hospital, a tertiary care teaching hospital in Sylhet, Bangladesh. Ninety-eight children admitted with diarrhoeal diseases were selected using consecutive sampling. Children older than six months who had not received antibiotics in the previous week were included, while children below six months or with recent antibiotic exposure were excluded. Data on socio-economic factors, including household income, parental education, and living conditions, were collected using a pre-designed questionnaire. Stool samples were collected aseptically before antibiotic administration and transported immediately to the Microbiology Laboratory. Shigella species were identified using standard culture, Gram staining, motility, biochemical tests, and molecular confirmation was performed by PCR detection of the ipaH gene. The Institutional Review Board of Sylhet MAG Osmani Medical College obtained ethical approval. Data were analyzed using SPSS version 26, and descriptive statistics were applied. Associations between socio-economic variables and Shigella infection were assessed; $p<0.05$ was considered statistically significant.

**Results:**

Table-I showed that the study population was predominantly aged 1-5 years (52.0%), followed by infants aged 6 months to 1 year (32.6%), with only 15.3% older than 5 years; males accounted for 56.1% of participants. Most children belonged to the lower socio-economic class (63.3%), while middle-class representation was 35.7% and upper-class representation was only 1%.

**Table-I: Demographical characteristics of the study population (N=98)**

| Characteristics | no. (%) |
|---|---|
| **Age distribution** | |
| 6 months to 1 year | 32(32.60) |
| 1–5 years | 51(52.00) |
| >5 years | 15(15.30) |
| **Gender distribution** | |
| Male | 55(56.10) |
| Female | 43(43.90) |
| **Socio-economic class** | |
| Lower class | 62(63.30) |
| Middle class | 35(35.70) |
| Upper class | 1(1.00) |

Table-II indicated that watery diarrhoea was the most common presentation (54.1%), followed by mucoid diarrhoea (30.6%) and bloody diarrhoea

(15.3%). The study found 13 cases with Shigella-positive results, and the remaining 85 cases were negative.

**Table-II: Distribution of diarrhoeal children by type of diarrhoea (N=98)**

| Type of Diarrhoea | no. (%) |
|---|---|
| Mucoid | 30(30.6) |
| Watery | 53(54.1) |
| Bloody | 15(15.3) |

Table-III demonstrated no statistically significant association between Shigella isolation and age (p=0.783), gender (p=0.673), or socio-economic status (p=0.796); Shigella positivity remained low across all groups, with an overall detection rate of 13.3% (13 out of 98).

**Table-III: Associations of socio-economic factors with prevalence of shigella infection (N=98)**

| Socio-Economic Factors | Shigella Positive no. (%) | Shigella Negative no. (%) | p-value |
|---|---|---|---|
| **Age Group** | | | |
| 6 months–1 year (n=32) | 4(12.5) | 28(87.5) | 0.783 |
| 1 – 5 years (n=51) | 8(15.7) | 43(84.3) | |
| >5 years (n=15) | 1(6.67) | 14(93.3) | |
| Total (N=98) | 13 | 85 | |
| **Gender** | | | |
| Male (n=55) | 8(14.5) | 47(85.5) | 0.673 |
| Female (n=43) | 5(11.6) | 38(88.4) | |
| Total (n=98) | 13 | 85 | |
| **Socio-Economic Status** | | | |
| Lower class (n=62) | 9(14.5) | 53(85.5) | 0.796 |
| Middle class (n=35) | 4(11.4) | 32(88.6) | |
| Upper class (n=1) | 0(0.0) | 1(100.0) | |
| Total (n=98) | 13 | 85 | |

**Discussion:**

In this study, the overall isolation rate of Shigella among diarrhoeal children was 13.3%, with the majority of cases observed in the 1–5 years age group and among children from lower socio-economic backgrounds. Although associations with age, gender, and socio-economic class were not statistically significant, the distribution trends provide essential public health insight. A predominance of Shigella infection in early childhood is well documented. The Global Enteric Multicenter Study (GEMS) reported that Shigella was a leading cause of moderate-to-severe diarrhoea in children under five years in low-resource settings, with risk peaking in the toddler and preschool years.[10] In our study, 15.7% of cases in the 1–5 years group were Shigella-positive, whereas only 6.7% occurred in children aged five or older. Ferdous et al in Bangladesh also found the highest prevalence among children aged 1–5 years, citing increased exposure to contaminated food/water and immature hygiene practices at this age.[11] These patterns suggest age-related vulnerability associated with behavioural and environmental exposures. The gender distribution in our study showed slightly higher Shigella positivity among males (14.5%) than among females (11.6%), though the difference was not significant. Similar gender patterns have been reported in South Asian contexts. Rahman et al observed a mild male predominance in Shigella infections among Bangladeshi children, attributing this to higher outdoor exposure among boys in many socio-cultural settings.[12] However, gender differences are not consistently significant across studies, indicating that biological susceptibility is likely similar, while exposure differences may vary culturally. Socio-economic factors showed a more definable pattern, with most Shigella cases occurring among the lower socio-economic group (14.5%), compared to 11.4% in the middle class and none in the upper class. This association aligns with evidence that Shigella transmission is strongly linked to sanitation conditions, crowding, unsafe water, and limited access to hygiene facilities.[13] Pavlinac et al demonstrated that children in households without clean water and proper sanitation had a significantly higher risk of Shigella infection across multiple low-income regions.[14] Hossain et al, examining diarrhoeal admissions in Bangladesh, similarly highlighted a high burden of Shigella in low-income urban settlements, where poor sanitation infrastructure and overcrowding were major contributors.[15] Our findings reinforce the persistent relationship between socio-economic deprivation and enteric disease transmission. The overall Shigella isolation rate of 13.3% in this study is consistent with earlier findings from Bangladesh, where isolation rates have ranged between 10% and 20% depending on seasonal and population variations. Ferdous et al reported an isolation rate of 12.9% among paediatric diarrhoeal patients in Mirpur, Dhaka,[11] while Rahman et al found rates near 15% in rural hospital settings.[12] Although improvements in sanitation and vaccination strategies have reduced the burden of other enteric pathogens, such as rotavirus, Shigella remains a persistent pathogen due to its low infectious dose and ease of person-to-person transmission.

**Limitations:**

A small sample size, a single-center design, and a short study duration limited the study. Additionally, limited representation of upper socio-economic groups and lack of longitudinal follow-up may affect generalizability.

**Conclusion:**

Shigella infection was detected in 13.3% of cases, occurring more often among children aged 1–5 years and in those from lower socio-economic backgrounds, though these associations were not statistically significant. Overall, the findings suggest that while Shigella infection appears more common in socio-economically disadvantaged groups, no strong association with age, gender, or socio-economic status was established.For future research, a larger sample size and multiple study sites would be included to improve representativeness and reliability. Longitudinal follow-up, detailed socio-economic assessments, and molecular characterization of Shigella strains with antibiotic resistance analysis are recommended.

**References:**


1. World Health Organization. WHO preferred product characteristics for vaccines against Shigella.https://www.who.int/publications/i/item/9789240036741 [Acessed on 12th February, 2025].
2. Julian TR. Environmental transmission of diarrheal pathogens in low and middle-income countries. Environmental Science: Processes & Impacts. 2016;18(8): 944-55. doi:https://doi.org/ 10.1039/c6em 00222f
3. Paul P. Socio-demographic and environmental factors associated with diarrhoeal disease among children under five in India. BMC Public Health. 2020 Dec 7;20(1):1886. doi: 10.1186/s12889-020-09981-y.
4. Kundu S, Kundu S, Banna MHA, Ahinkorah BO, Seidu AA, Okyere J. Prevalence of and factors associated with childhood diarrhoeal disease and acute respiratory infection in Bangladesh: an analysis of a nationwide cross-sectional survey. BMJ Open. 2022 Apr 6;12(4):e051744. doi: 10.1136/bmjopen-2021-051744.
5. Abebe W, Earsido A, Taye S, Assefa M, Eyasu A, Godebo G. Prevalence and antibiotic susceptibility patterns of Shigella and Salmonella among children aged below five years with Diarrhoea attending Nigist Eleni Mohammed memorial hospital, South Ethiopia. BMC Pediatr. 2018 Jul 25;18(1):241. doi: 10.1186/s12887-018-1221-9.
6. Basnet B, Niroula D, Acharya J, Basnyat S. Antibiotic susceptibility pattern of Shigella spp. Isolated from patients suspected of acute gastroenteritis. JIST. 2021 Dec 29;26(2):1-7. doi:10.3126/jist.v26i2.41261
7. Puzari M, Sharma M, Chetia P. Emergence of antibiotic resistant Shigella species: A matter of concern. J Infect Public Health. 2018 Jul-Aug;11(4):451-454. doi: 10.1016/j.jiph.2017.09.025.
8. Houpt ER, Ferdous T, Ara R, Ibrahim M, Alam MM, Kabir M, et al.Clinical Outcomes of Drug-resistant Shigellosis Treated With Azithromycin in Bangladesh. Clin Infect Dis. 2021 May 18;72(10):1793-1798. doi: 10.1093/cid/ciaa363.
9. Platts-Mills JA, Liu J, Rogawski ET, Kabir F, Lertsethtakarn P, Siguas M, et al; MAL-ED Network Investigators. Use of quantitative molecular diagnostic methods to assess the aetiology, burden, and clinical characteristics of diarrhoea in children in low-resource settings: a reanalysis of the MAL-ED cohort study. Lancet Glob Health. 2018 Dec; 6(12):e1309-e1318. doi: 10.1016/S2214-109X(18)30349-8.
10. Kotloff KL, Nataro JP, Blackwelder WC, Nasrin D, Farag TH, Panchalingam S, et al. Burden and aetiology of diarrhoeal disease in infants and young children in developing countries (the Global Enteric Multicenter Study, GEMS): a prospective, case-control study. Lancet. 2013 Jul 20;382(9888):209-22. doi: 10.1016/S 0140-6736(13)60844-2.
11. Ferdous J. Association between maternal level of education and recent episode of diarrhea among the children under age five in Bangladesh: Evidence from Bangladesh Demography and Health Survey2017.
12. Rahman M, Haque AF, Deeba IM, Ahmed D,

Zahidi T, Rimu AH, Akter M, Akter F, Talukder KA. Emergence of extensively drug-resistant Shigella sonnei in Bangladesh. Immunol Infect Dis. 2017;5(1):1-9.doi: 10.13189/iid.2017. 050101.

13. Garcia-Williams AG, Logan N, Marsh ZA. Shigella. In:Morris JG,Vugia DJ,eds. Foodborne Infections and Intoxications.5th ed.United States:Academic Press;2021:221-236.
14. Pavlinac PB, Denno DM, John-Stewart GC, Onchiri FM, Naulikha JM, Odundo EA, et al. Failure of Syndrome-Based Diarrhea Management Guidelines to Detect Shigella Infections in Kenyan Children. J Pediatric Infect Dis Soc. 2016 Dec;5(4):366-374. doi: 10.1093/jpids/piv037.
15. Hossain MI, Faruque ASG, Sarmin M, Chisti MJ, Ahmed T. Prolonged diarrhea among under-five children in Bangladesh: Burden and risk factors. PLoS One. 2022 Oct 3;17(10):e0273148. doi: 10.1371/journal.pone.0273148.