Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v6i6.1913
*Biol. Clin. Sci. Res. J., Volume 6(6), **2025**: 1913*
Original Research Article

Frequency Of Common Waterborne Diseases in the Pediatric Department Of Abbasi Shaheed Hospital, Karachi

Muhammad Salahuddin*[1], Sultan Mustafa[2], Shaheen Masood[1], Sana Mumtaz[2], Muhammad Ali Shah[1], Ahsan Ali[3]

[1]Department of Paediatrics, Abbasi Shaheed Hospital, Karachi, Pakistan
[2]Department of Paediatrics, Jinnah Medical and Dental College, Karachi, Pakistan
[3]Department of Medicine Medical Unit 01 Civil Hospital Sukkur Sindh, Pakistan
**Corresponding author`s email address:* drsalahuddin6@gmail.com

(Received, 17th March 2025, Accepted 12th June 2025, Published 30th June 2025)

Abstract: *Waterborne diseases remain a leading cause of childhood morbidity in developing countries, particularly in urban centers with poor sanitation and contaminated water supplies.* ***Objective:*** *To determine the frequency and distribution of common waterborne diseases among pediatric patients admitted to the Department of Pediatrics, Abbasi Shaheed Hospital, Karachi.* ***Methodology:*** *This descriptive cross-sectional study was conducted in the Department of Pediatrics at Abbasi Shaheed Hospital, Karachi, from February 1, 2024, to January 31, 2025. A total of 155 children, aged one month to fifteen years, presenting with clinical features suggestive of waterborne diseases, were included through non-probability consecutive sampling. Demographic data, clinical features, laboratory findings, and disease categorization were recorded using a structured proforma.* ***Results:*** *The mean age of the patients was 6.2 ± 3.7 years, with the majority (42.6%) belonging to the 2–5 year age group. Males accounted for 54.2% of the cases, and females accounted for 45.8%. Acute gastroenteritis was the most frequent diagnosis (44.5%), followed by enteric fever (23.9%), dysentery (16.1%), viral hepatitis A/E (9.0%), and cholera (6.5%). Seasonal analysis revealed a peak incidence during the monsoon months (37.4% of cases). Moderate to severe dehydration was observed in 61.3% of patients, while 11.6% required prolonged hospitalization.* ***Conclusion:*** *Waterborne diseases constitute a significant burden among pediatric patients in Karachi, with acute gastroenteritis and enteric fever being the most common. The high proportion of cases during the monsoon season underscores the impact of poor sanitation and water contamination.*

Keywords: Waterborne diseases, Acute gastroenteritis, Enteric fever, Dysentery, Viral hepatitis A/E, Cholera, Pediatrics, Karachi

[***How to Cite:*** Salahuddin M, Mustafa S, Masood S, Mumtaz S, Shah MA, Ali A. Frequency of common waterborne disease in pediatric department of Abbasi Shaheed Hospital, Karachi. *Biol. Clin. Sci. Res. J.*, **2025;** 6(6): 746-750. doi: https://doi.org/10.54112/bcsrj.v6i6.1913

Introduction

The United Nations has estimated that at least 2.5 billion people in their low- and middle-income countries do not have access to improved sanitation and 884 million people lack access to improved drinking water (1). Consequently, an estimated 2,300 million individuals globally experience water-related illnesses (2). Ingestion of pathogenic microorganisms in drinking water can pose a health hazard due to waterborne diseases (3, 4). Consumption of water is ranked among the significant microbial reservoirs in the third world. Diarrhea cases are reported to be four billion every year, and 2.2 million of these cases are proven to be deadly, and children below the age of five are the dominant targets. In addition, the disease burden is more than 90 percent contributed by the developing world (5, 6). The immunity is compromised each time by diarrhea, which in turn indirectly kills an extremely large number of people per annum (7). Transmission of waterborne diseases remains a significant health burden in many countries, especially in low- and middle-income countries, where water supply, sanitation, and hygiene (WASH) standards are regularly compromised. The World Health Organization (WHO) estimates that more than two billion cases of diarrheal diseases are associated with contaminated water annually, with the majority occurring among children under the age of five. Diarrheal diseases are a major cause of morbidity and death in this already susceptible age group and are responsible for an estimated 500,000 deaths a year across the globe (8). The above observation makes it all the more significant to examine the epidemiology of water-borne diseases in children systematically, particularly in large, dense urban centers, where water-borne diseases are more prevalent due to infrastructural problems and economic barriers to health. Even more vulnerable to water-borne diseases are children due to certain physiological, behavioural, and environmental conditions (9). Their immune systems are not yet fully developed, and their mucosal immune barriers in their gastrointestinal tracts are not yet fully developed. As a result, they are likely to ingest contaminated food or water without adhering to proper hygiene practices (10). Moreover, children are overrepresented when it comes to inheriting the aftermath of diarrheal diseases, where repetitive infections in children might lead to chronic outcomes of malnutrition, stunting, anemia, cognitive delays, and underperformance in schools (11). These negative consequences reinforce the cycle of poverty and disease in low-resource areas, and waterborne disease prevention is a priority health concern (12). In Pakistan, the burden of pediatric diseases includes water-borne diseases. It has been estimated by the Pakistan Demographic and Health Survey (PDHS) that over 53,000 children suffer and lose their lives because of diarrheal diseases, and to that count, many more children experience these diseases recurrently and have to seek medical attention (13). Other factors include the poor treatment of water at the municipal level, which occurs on a large scale; damaged or outdated pipes through which sewage enters the water; unregulated water tankers; and limited access to household water treatment technologies. The country has an even sharper problem with Karachi, the largest metropolitan center, being hit the hardest (14). Its fast population growth, unstable water supply, poor water pressure, and the vastness of the informal settlement are all factors that contribute to unsafe water practices. The notion of repeated cross-contamination of sewerage systems with drinking water supply lines only worsens the problem of contamination (15).

Thus, the present study aims to determine the frequency of common waterborne diseases among pediatric patients admitted to the Department of Pediatrics, Abbasi Shaheed Hospital, Karachi.

Methodology

This was a descriptive cross-sectional study conducted in the Department of Pediatrics at Abbasi Shaheed Hospital, Karachi, from February 1, 2024, to January 31, 2025. A total of 155 pediatric patients were included in the study. Non-probability consecutive sampling was used. All patients who fulfilled the inclusion criteria and presented during the study period were enrolled until the required sample size was achieved. Children aged 1 month to 15 years presenting to the Pediatric Department with clinical features suggestive of waterborne diseases such as acute gastroenteritis, dysentery, cholera, enteric fever, and viral hepatitis A or E. Patients admitted during the study period whose guardians gave informed consent. Children with diarrhea secondary to non-infectious causes (e.g., lactose intolerance, inflammatory bowel disease). Patients with incomplete records or those whose guardians refused consent.

Data were collected using a structured proforma specifically designed for the study. Information regarding demographic variables such as age, gender, and place of residence was recorded. Clinical details, including fever, diarrhea, vomiting, dehydration status, jaundice, and abdominal pain, were documented. The diagnosis was made based on clinical evaluation and supported by relevant laboratory investigations, including stool microscopy, culture and sensitivity tests, the Widal test, liver function tests, and serology for hepatitis A and E, as indicated. The month of presentation was also noted to determine the seasonal variation in the occurrence of different waterborne diseases. Pediatric residents and consultants examined all children, and laboratory investigations were conducted in the hospital's diagnostic laboratory according to standard protocols.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0. Descriptive statistics were used to summarize the data. Categorical variables, such as gender, diagnosis, and seasonal distribution, were expressed as frequencies and percentages. In contrast, continuous variables, such as age and duration of illness, were presented as means and standard deviations. The chi-square test was applied to determine associations between categorical variables, and a p-value of 0.05 or less was considered statistically significant.

Results

A total of 155 pediatric patients were included in the study, with a mean age of 6.2 ± 3.7 years. The largest proportion belonged to the 2–5 year age group (42.6%), followed by those under 2 years (29.7%). Older children aged 6–10 years and above 10 years constituted 18.1% and 9.7% of the sample, respectively. Males were slightly more common than females, accounting for 54.2% compared to 45.8%. The most frequent presenting complaint was diarrhea, reported in 83.2% of cases, followed by vomiting in 65.8% and fever in 56.1%. Abdominal pain was observed in 34.8% of patients, while jaundice was present in 9.0%, primarily in hepatitis A/E cases. At the time of admission, 61.3% of children presented with moderate to severe dehydration, while 14.2% had mild dehydration and 24.5% were adequately hydrated. In terms of diagnosis, acute gastroenteritis was the leading condition, representing 44.5% of cases, followed by enteric fever (23.9%), dysentery (16.1%), viral hepatitis A/E (9.0%), and cholera (6.5%). (Table 1)

The majority of children had vomiting (65.8%), fever (56.1%), and moderate to severe dehydration (61.3%) as clinical features at presentation. Abdominal pain was noted in 34.8% of patients, while jaundice was present in 9.0%, specifically among hepatitis A/E cases. Complications included electrolyte imbalance in 14.2% of children and prolonged hospital stay beyond seven days in 11.6%. (Table 2)

Age stratification revealed that acute gastroenteritis was most common among children under two years, affecting 60.9% of this group, while enteric fever was more prevalent among older children, particularly those above 10 years, where it accounted for 40.0% of cases. Dysentery was distributed across all age groups, with the highest occurrence in children aged 2–5 years (18.2%). Viral hepatitis A/E was more frequent in older children, with 14.3% of cases in the 6–10 year group and 13.3% in those above 10 years. (Table 3)

The majority of children (49.7%) required hospital admission for 3–5 days, while 24.5% were discharged within 2 days of admission. A smaller proportion, 14.2%, stayed for 6–7 days, and 11.6% required prolonged hospitalization for more than a week. (Table 4)

The majority of cases were reported among children consuming piped municipal water (40.0%) and tanker or purchased water (27.7%). In comparison, fewer cases were observed among those relying on bore wells or hand pumps (18.7%) and filtered or bottled water (13.6%). Acute gastroenteritis was most frequently reported among children using piped municipal supply (43.5%) and tanker water (26.1%), whereas enteric fever showed a relatively even distribution across municipal supply (40.5%) and tanker water (27.0%). Dysentery cases were also highest among municipal water consumers (40.0%), while hepatitis A/E was more commonly reported among children consuming bottled or filtered water (21.4%). Cholera was strongly associated with contaminated water from tanker trucks, accounting for 50.0% of cases. (Table 5)

Figure 1: Frequency of waterborne diseases

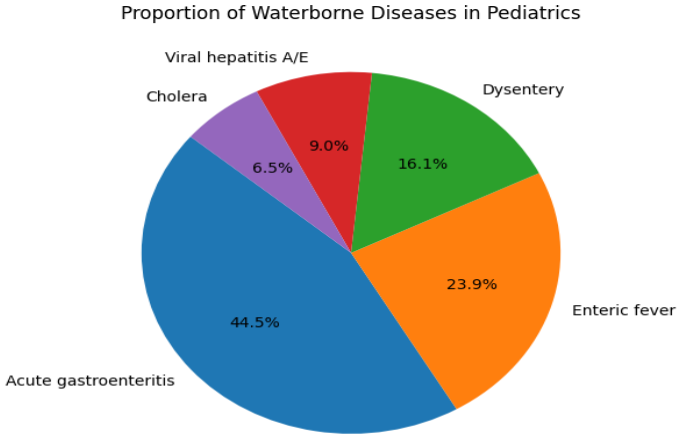

Figure 2. Percentages of complications

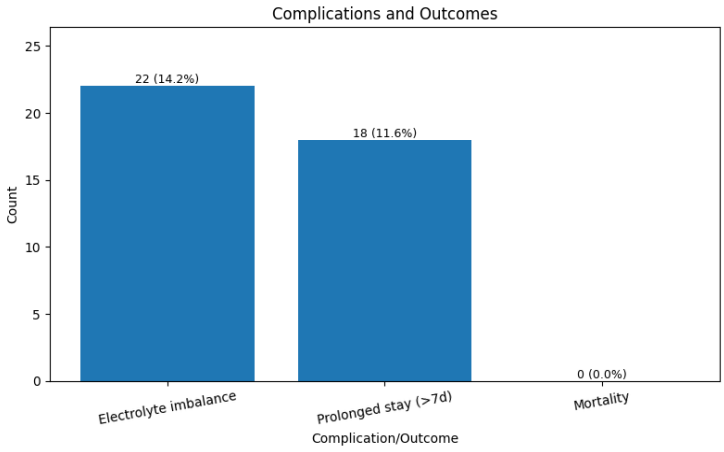

Table 1. Demographic Characteristics of Pediatric Patients (n = 155)

Variable	Frequency (n)	Percentage (%)
Mean Age (years)	6.2 ± 3.7	–
Age Group		
< 2 years	46	29.7
2–5 years	66	42.6
6–10 years	28	18.1
> 10 years	15	9.7
Gender		
Male	84	54.2
Female	71	45.8
Presenting Features		
Diarrhea (watery/bloody)	129	83.2
Vomiting	102	65.8
Fever	87	56.1
Abdominal pain	54	34.8
Jaundice	14	9.0
Hydration Status		
No dehydration	38	24.5
Mild dehydration	22	14.2
Moderate to severe dehydration	95	61.3
Diagnosis		
Acute gastroenteritis	69	44.5
Enteric fever	37	23.9
Dysentery	25	16.1
Viral hepatitis A/E	14	9.0
Cholera	10	6.5

Table 2. Clinical Features and Complications of Waterborne Diseases (n = 155)

Clinical Feature/Complication	Frequency (n)	Percentage (%)
Moderate to severe dehydration	95	61.3
Vomiting	102	65.8
Fever	87	56.1
Abdominal pain	54	34.8
Jaundice (Hepatitis A/E cases)	14	9.0
Electrolyte imbalance	22	14.2
Prolonged hospitalization (>7 days)	18	11.6
Mortality	0	0

Table 3. Distribution of Waterborne Diseases by Age Group (n = 155)

Diagnosis	< 2 years (n=46)	2–5 years (n=66)	6–10 years (n=28)	> 10 years (n=15)	Total (%)
Acute gastroenteritis	28 (60.9%)	27 (40.9%)	10 (35.7%)	4 (26.7%)	69 (44.5)
Enteric fever	5 (10.9%)	16 (24.2%)	10 (35.7%)	6 (40.0%)	37 (23.9)
Dysentery	6 (13.0%)	12 (18.2%)	5 (17.9%)	2 (13.3%)	25 (16.1)
Hepatitis A/E	3 (6.5%)	5 (7.6%)	4 (14.3%)	2 (13.3%)	14 (9.0)
Cholera	4 (8.7%)	6 (9.1%)	1 (3.6%)	0 (0.0%)	10 (6.5)

Table 4. Length of Hospital Stay among Pediatric Patients (n = 155)

Duration of Stay	Frequency (n)	Percentage (%)
≤ 2 days	38	24.5
3–5 days	77	49.7
6–7 days	22	14.2
> 7 days	18	11.6
Total	155	100

Table 5. Association between Drinking Water Sources and Waterborne Diseases (n = 155)

Drinking Water Source	Acute Gastroenteritis n (%)	Enteric Fever n (%)	Dysentery n (%)	Hepatitis A/E n (%)	Cholera n (%)	Total n (%)	p-value
Piped municipal supply	30 (43.5)	15 (40.5)	10 (40.0)	5 (35.7)	2 (20.0)	62 (40.0)	
Bore well / hand pump	14 (20.3)	7 (18.9)	5 (20.0)	2 (14.3)	1 (10.0)	29 (18.7)	

Tanker / purchased water	18 (26.1)	10 (27.0)	6 (24.0)	4 (28.6)	5 (50.0)	43 (27.7)	0.03*
Filtered/bottled water	7 (10.1)	5 (13.5)	4 (16.0)	3 (21.4)	2 (20.0)	21 (13.6)	
Total	69 (100)	37 (100)	25 (100)	14 (100)	10 (100)	155 (100)	

**Chi-square test applied; $p \leq 0.05$ considered statistically significant.*

Discussion

The present study was conducted to determine the frequency and distribution of common waterborne diseases among pediatric patients admitted to the Department of Pediatrics at Abbasi Shaheed Hospital in Karachi. These findings are in line with the epidemiology of diarrheal and enteric diseases in low- and middle-income countries, where children continue to be affected largely by lack of sanitation, the unavailability of clean drinking water, and density of residence. The high incidence of acute gastroenteritis in our study presents the current burden of diarrheal diseases as one of the common causes of morbidity among pediatric patients. Children under the age of five were also hit the hardest, given their risk of exposure and vulnerability to the action of the virus (16). The same has been shown in national surveys and prior hospital-based studies, where diarrhea remains among the top leading causes of mortality under five in Pakistan. Despite high coverage of oral rehydration therapy, the proportion of children presenting with moderate to severe dehydration in our cohort remains high, further highlighting the delayed access to timely medical care and the need for preventive measures at the household level (17).

The second-highest waterborne disease identified in our study is enteric fever, particularly in children over the age of five years. This observation is consistent with other studies in South Asia, where typhoid fever is endemic (poor sanitation, contamination of water supply with sewerage, and undercoverage with vaccines) (18). Enteric fever remains a high burden in Karachi due to increased drug-resistant strains such as the extensively drug-resistant (XDR) Salmonella Typhi, which thus poses a great therapeutic dilemma. Although the implementation of the typhoid conjugate vaccine (TCV) in Pakistan as part of the Expanded Programme on Immunization (EPI) is a significant step in the right direction, our findings suggest that surveillance, as well as focused immunization campaigns, are still necessary to minimize the occurrence of the disease. The infections were more prevalent in older children, as is consistent with the epidemiology shifts of hepatitis A infection, where cases shifted to later ages in children as sanitation improved gradually. Although in most instances the disease is self-limiting, the risk of fulminant hepatic failure, particularly in hepatitis E, requires a better understanding and preventive measures (20). The seasonal patterns observed in this research lend further support to the established association between flooding, rainfall, and waterborne diseases. The greatest incidence occurred during the monsoon months, when heavy rains typically cause flooding of sewers and contamination of drinking water. Outbreaks of cholera also increased during this period, underscoring the urgent need for a proper water management system in Karachi. Intervention can consist of preventive steps, such as chlorination of municipal water, increased quality inspection of tanker water, and public information campaigns on proper water storage and boiling, which could drastically reduce the rise in cases during the season. The average length of stay in the hospital was rather short among most patients. However, a small fraction of patients needed long-term hospitalization because of complications, including electrolyte disorders and sustained fever. There were no mortalities in our study, which is encouraging and indicative of good inpatient care, especially early treatment using rehydration and antibiotics as needed (20, 21). Nonetheless, the morbidity and economic burden of these illnesses remain considerable, with many families incurring costs for transportation, medications, and missed workdays. The implications of our findings for public health are significant. The treatment of waterborne diseases necessitates a multifaceted approach that incorporates both hospital-based interventions and community-level enhancements, as they remain a preventable illness among children. The improvement of surveillance systems in tertiary hospitals, such as Abbasi Shaheed, yields useful epidemiological data that can inform municipal policies. Additionally, there should be an increase in health education campaigns that emphasize the use of proper oral rehydration solutions, safe water storage, and hand hygiene. This study has certain limitations. As a single-center, hospital-based study, the findings may not accurately reflect the community's burden of water-borne diseases. Due to limited resources, the sample size was relatively small, and laboratory confirmation was not available for all cases. Despite these limitations, the study highlights the importance of preventive measures and offers a valuable snapshot of the disease pattern in one of Karachi's busiest pediatric departments.

Conclusion

It is concluded that waterborne diseases continue to be a significant cause of morbidity among pediatric patients presenting to Abbasi Shaheed Hospital, Karachi. Acute gastroenteritis was the most frequent diagnosis, followed by enteric fever, dysentery, viral hepatitis A/E, and cholera, with children under five years being the most affected. A clear seasonal trend was observed, with the highest burden during the monsoon months. The majority of children presented with moderate to severe dehydration, highlighting delays in seeking timely care and the continued gaps in preventive measures.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRBEC-24)
Consent for publication
Approved
Funding
Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

MS (Resident Paediatrics Paeds)
Manuscript drafting, Study Design,
SM (HOD)
Review of Literature, Data entry, Data analysis, and drafting an article.
SM (Assistant Professor)
Conception of Study, Development of Research Methodology Design,
SM (MSPH)
Study Design, manuscript review, and critical input.
MAS (Resident Paediatrics)
Manuscript drafting, Study Design,
AA (Resident Internal Medicine)
Review of Literature, Data entry, Data analysis, and drafting an article.

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

References

1. World Health Organization (WHO). Annual report WHO/UNICEF Joint Monitoring Programme (JMP) for water supply and sanitation [Internet]. Geneva: WHO; 2018 [cited 2025 Aug 27]. Available from: https://washdata.org/sites/default/files/documents/reports/2019-11/jmp-2018-annual-report_0.pdf
2. Sauer M, Smith S, Clemens B. Does it pay to invest in potable water in the developing world? Relationships between external financing and economic development in sustainable community-run integrated projects. J Int Dev. 2016;28(2):233–42. https://doi.org/10.1002/jid.2880
3. Cairncross S, Feachem R. Environmental health engineering in the tropics: water, sanitation and disease control. 3rd ed. Abingdon (UK): Routledge; 2018. https://doi.org/10.4324/9781315883946
4. Nawaz S, Ali Y. Factors affecting the performance of water treatment plants in Pakistan. Water Conserv Sci Eng. 2018;3:191–203. https://doi.org/10.1007/s41101-018-0051-9
5. Qamar K, Nchasi G, Mirha HT, Siddiqui JA, Jahangir K, Shaeen SK, et al. Water and sanitation problem in Pakistan: A review on disease prevalence, strategies for treatment and prevention. Ann Med Surg (Lond). 2022;82:104709. https://doi.org/10.1016/j.amsu.2022.104709
6. Zhang D, Sial MS, Ahmad N, Filipe AJ, Thu PA, Zia-Ud-Din M, et al. Water scarcity and sustainability in an emerging economy: A management perspective for the future. Sustainability. 2021;13(1):144. https://doi.org/10.3390/su13010144
7. Daud MK, Nafees M, Ali S, Rizwan M, Bajwa RA, Shakoor MB, et al. Drinking water quality status and contamination in Pakistan. Biomed Res Int. 2017;2017:7908183. https://doi.org/10.1155/2017/7908183
8. The cost of poor sanitation in Pakistan. Daily Times [Internet]. 2018 Dec 28 [cited 2025 Aug 27]. Available from: https://dailytimes.com.pk/343821/the-cost-of-poor-sanitation-in-pakistan/
9. Howard G. The future of water and sanitation: global challenges and the need for greater ambition. J Water Supply Res Technol Aqua. 2021;70(4):438–48. https://doi.org/10.2166/aqua.2021.127
10. Shoaib M, Aziz S, Usman M, Rehman A, Zafar MM, Ilyas M. Prevalence of pathogenic microorganisms in drinking water of Rawalpindi and Islamabad. World J Fish Mar Sci. 2016;8(1):14–21. https://doi.org/10.5829/idosi.wjfms.2016.8.1.10288
11. Murtaza F, Muzaffar M, Mustafa T, Anwer J. Water and sanitation risk exposure in children under five in Pakistan. J Fam Community Med. 2021;28(2):103–9. https://doi.org/10.4103/jfcm.jfcm_149_21
12. Awan A, Nasir MS, Shaukat I, Anwar S, Ayub I. Impact of Samanduri drain on water resources of Faisalabad. Adv Environ Biol. 2016;10:155–60.
13. Soomro Z, Khokhar W, Hussain M, Hussain I. Drinking water quality challenges in Pakistan. 2022 May 7.
14. Ahmed T, Zounemat-Kermani M, Scholz M. Climate change, water quality and water-related challenges: a review with focus on Pakistan. Int J Environ Res Public Health. 2020;17(22):8518. https://doi.org/10.3390/ijerph17228518
15. Jehan S, Ullah I, Khan S, Muhammad S, Khattak S, Khan T. Evaluation of the Swat River, Northern Pakistan, water quality using multivariate statistical techniques and water quality index (WQI) model. Environ Sci Pollut Res. 2020;27(14):17483–95. https://doi.org/10.1007/s11356-020-09688-y
16. Ahmad M, Jamal A, Tang X, Al-sughaiyer M, Hasan A, Ahmad F. Assessing potable water quality and identifying areas of waterborne diarrheal and fluorosis health risks using spatial interpolation in Peshawar, Pakistan. Water (Basel). 2020;12(8):2163. https://doi.org/10.3390/w12082163
17. Zulfiqar H, Abbas Q, Raza A, Ali A. Determinants of safe drinking water in Pakistan: a case study of Faisalabad. J Glob Innov Agric Soc Sci. 2016;4(1):40–5. https://doi.org/10.17957/JGIASS/4.1.731
18. United Nations. Water and sanitation – United Nations Sustainable Development [Internet]. [cited 2025 Aug 27]. Available from: https://www.un.org/sustainabledevelopment/water-and-sanitation/
19. GBD Diarrhoeal Diseases Collaborators. Estimates of the global, regional, and national morbidity, mortality, and aetiologies of diarrhoea in 195 countries: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Infect Dis. 2018;18(11):1211–28. https://doi.org/10.1016/S1473-3099(18)30362-1
20. Gowa M, Habib I, Tahir A, Yaqoob U, Junejo S. Disease spectrum and frequency of illness in pediatric emergency: a retrospective analysis from Karachi, Pakistan. Ochsner J. 2019;19(4):340–6. https://doi.org/10.31486/toj.18.0134
21. Ahmed J, Wong LP, Chua YP, Channa N, Mahar RB, Yasmin A, et al. Quantitative microbial risk assessment of drinking water quality to predict the risk of waterborne diseases in primary-school children. Int J Environ Res Public Health. 2020;17(8):2774. https://doi.org/10.3390/ijerph17082774