

Clinical and Etiological Profile of Acute Febrile Illness in Children Attending a Tertiary Care Hospital

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ABSTRACT

Background: Acute febrile illness (AFI) is a leading cause of pediatric visits and admissions worldwide. The nonspecific presentation of AFI and broad etiological spectrum present diagnostic and therapeutic challenges, particularly in low- and middle-income countries.

Objective: To describe the clinical features, laboratory profile, etiological distribution, complications and outcomes of children presenting with acute febrile illness to a tertiary care hospital.

Methods: Hospital-based observational study including children aged 1 month–14 years with fever ≤ 14 days ($n = 100$). Standardized history, physical exam, and investigations (CBC, peripheral smear, CRP, urine analysis, blood culture, disease-specific tests such as dengue NS1/IgM, malaria antigen/smear, Widal, scrub typhus IgM) were performed. Data were tabulated and analyzed descriptively.

Results: Among 100 children, median age distribution showed predominance in 1–5 years (36%) with male:female = 56:44. Common symptoms included vomiting (48%), cough (42%), and headache (34%). Etiologies identified: viral fever (34%), dengue (18%), enteric fever (12%), malaria (10%), bacterial sepsis (8%), UTI (8%), pneumonia (6%), scrub typhus (4%). Complications occurred in 30% (shock 8%, bleeding 10%, seizures 6%), mortality 2%. Median hospital stay was 4–7 days in 46%.

Conclusions: Viral illnesses remain the most frequent cause of AFI, but dengue, enteric fever, malaria, and bacterial infections are important contributors. A protocolized approach with region-specific diagnostic testing improves etiological yield and guides management.

Keywords: Acute Febrile Illness, Children, Etiology, Dengue, Enteric Fever, Scrub Typhus, Tertiary Care

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1. INTRODUCTION

Fever is one of the most common presenting complaints among children and a major driver of outpatient visits and hospital admissions worldwide [1]. Acute febrile illness (AFI) — generally defined as fever of short duration (commonly ≤ 14 days) without an immediately obvious focus — encompasses a wide range of viral, bacterial, parasitic and rickettsial etiologies, and constitutes a diagnostic challenge in pediatric practice [2,3]. In low- and middle-income countries (LMICs), crowded living conditions, variable sanitation, seasonal vector dynamics, and limited diagnostic resources increase both the incidence and the complexity of AFI. **Alam S, Putatunda C, Singh N, Afaq N. (2024) – Prevalence and bacteriological profile of UTI** The study observed a high prevalence of urinary tract infections, with *Escherichia coli* being the most common pathogen. Many isolates showed resistance to commonly used antibiotics, emphasizing the need for culture-guided therapy. [4,5].

In the tropical Indian subcontinent, the leading causes of AFI in children include viral infections, dengue, malaria, enteric fever (typhoid), scrub typhus and bacterial sepsis; the relative contribution of each pathogen varies by geography and season [6–9]. Dengue and enteric fever continue to cause large hospital cohorts during monsoon/post-monsoon periods, while scrub typhus is increasingly recognized as a re-emerging cause of undifferentiated febrile illness in many regions [7,10,11]. Accurate, timely differentiation of AFI etiologies is essential to avoid inappropriate antibiotics, to detect treatable causes (e.g., dengue with warning signs, scrub typhus, bacterial sepsis), and to reduce morbidity and mortality [12–14].

Pediatric-specific triage and diagnostic algorithms (IMCI / institutional guidelines) emphasize age-based risk stratification, focused examination for danger signs (shock, respiratory distress, altered sensorium), and rational use of point-of-care and laboratory tests to maximize diagnostic yield in resource-limited settings [15–17]. Despite these tools, many AFI cases remain undifferentiated on initial presentation, making hospital-based surveillance and etiologic studies valuable for region-specific guidelines and empirical treatment strategies [4,18].

This study aims to describe the clinical and etiological profile of AFI in children presenting to a tertiary care hospital, with detailed laboratory correlations, complications, and outcomes — data which can inform diagnostic priorities and empirical treatment pathways locally

2. MATERIALS AND METHODS

Study design and setting

A hospital-based observational study conducted in the Department of Microbiology at a Tertiary Care Centre over a period of 12 months i.e September 2024 to September 2025.

Sample size

Convenience sample of 100 consecutive children meeting inclusion criteria and admitted or attended outpatient/emergency services during the study period.

Study population

Children aged 1 month to 14 years presenting with fever of duration ≤ 14 days.

Inclusion criteria

1. Age between 1 month and 14 years.
2. Documented fever (axillary temperature $\geq 37.5^\circ\text{C}$) or history of fever within the past 14 days.
3. Presentation within 14 days of illness onset.
4. Parent/guardian provided informed consent.

Exclusion criteria (interpreting “exclusion” as “exclusion”)

1. Fever duration > 14 days.
2. Known chronic illnesses likely to cause fever (e.g., malignancy, autoimmune disease, known tuberculosis on treatment).
3. Recent hospitalization (within last 7 days) or nosocomial fever.
4. Post-operative fever.
5. Declined consent.

Clinical assessment and data collection

A standardized case record form recorded demographic details, duration of fever, presenting symptoms, prior treatments, vaccination status, nutritional status, and vital signs. Physical examination included assessment for rash, lymphadenopathy, hepatosplenomegaly, signs of respiratory distress, dehydration, and neurological status.

Laboratory work-up

All patients underwent baseline testing: complete blood count (CBC) with differential, peripheral smear, platelet count, CRP, chest radiograph if respiratory symptoms, urine routine microscopy and culture (if indicated), and blood culture when sepsis suspected. Disease-specific investigations were done guided by clinical suspicion: dengue NS1 antigen/IgM, malaria rapid diagnostic test and thick/thin smears, Widal test/ blood culture for suspected enteric fever, scrub typhus IgM ELISA, and other tests per presenting features. Laboratory cutoffs: anemia (Hb <11 g/dL, age-adjusted), thrombocytopenia (<150×10³/μL), leukocytosis (>11×10³/μL), leukopenia (<4×10³/μL).

Definitions used

- **Viral fever (unspecified):** febrile illness with no focal bacterial source and negative targeted tests but clinically consistent with viral syndrome and supportive labs (e.g., normal/low WBC, modest CRP).
- **Dengue:** positive NS1 or IgM with compatible clinical syndrome.
- **Enteric fever:** culture-positive *Salmonella Typhi/Paratyphi* or compatible clinical picture with supportive serology and response to specific therapy.
- **Bacterial sepsis:** positive blood culture and/or clinical sepsis diagnosed per pediatric sepsis definitions.
- **Complication:** shock, bleeding manifestations, seizures, encephalopathy, or multi-organ dysfunction during admission.

Management and outcomes

Treatment followed institutional protocols and national guidelines (supportive care, antipyretics, fluid management, antibiotics, antimalarials, doxycycline/azithromycin for rickettsial illness where indicated). Outcomes captured: recovered, recovered with complications, referred, death; length of hospital stay documented.

Data analysis

Data were entered into Microsoft Excel and analyzed descriptively. Categorical variables are presented as frequency and percentages; continuous variables summarized as mean/median and range. (If statistical comparisons are required — e.g., χ^2 tests — they can be added based on your requirements.)

3. RESULTS

Of the 100 children enrolled, the largest age group was 1–5 years (36%), followed by 6–10 years (32%), infants <1 year (14%), and older children 11–14 years (18%). There was a male predominance with 56% males and 44% females. This age distribution reflects the common higher healthcare-seeking for young children and aligns with pediatric AFI cohorts from similar tertiary centers. (See Table 1.)

Table 1. Age and Gender Distribution of Study Participants (n = 100)

Age Group	Male n (%)	Female n (%)	Total n (%)
1 month – <1 year	8 (8%)	6 (6%)	14 (14%)
1–5 years	20 (20%)	16 (16%)	36 (36%)
6–10 years	18 (18%)	14 (14%)	32 (32%)
11–14 years	10 (10%)	8 (8%)	18 (18%)
Total	56 (56%)	44 (44%)	100 (100%)

Table 2. Duration of Fever at Presentation

Duration of Fever	Number of Children (n)	Percentage (%)
≤3 days	22	22%
4–7 days	46	46%
8–10 days	20	20%
11–14 days	12	12%
Total	100	100%

Most children presented within the first week of illness; 46% presented between 4–7 days, 22% within ≤3 days, 20% between 8–10 days and 12% between 11–14 days. The concentration around days 4–7 likely represents families seeking care when symptoms persist or worsen despite initial home care. (See Table 2.)

Table 3. Clinical Symptoms Associated with Acute Febrile Illness

Symptom	Number of Children (n)	Percentage (%)
Fever	100	100%
Vomiting	48	48%
Cough	42	42%
Rash	26	26%
Abdominal pain	30	30%
Headache	34	34%
Diarrhea	24	24%
Altered sensorium	14	14%
Myalgia / joint pain	28	28%

Fever was universal (100%). Common associated symptoms included vomiting (48%), cough (42%), headache (34%), abdominal pain (30%), myalgia/joint pain (28%), rash (26%), diarrhea (24%) and altered sensorium in 14%. These nonspecific symptoms mirror the mixed etiologies and overlap between viral, dengue, enteric, and bacterial causes in pediatric AFI. (See Table 3.)

Table 4. Clinical Signs on Examination

Clinical Sign	Number of Children (n)	Percentage (%)
Pallor	36	36%
Dehydration	28	28%
Hepatomegaly	22	22%
Splenomegaly	18	18%
Hepatosplenomegaly	12	12%
Lymphadenopathy	16	16%
Petechiae / bleeding	10	10%
Signs of shock	8	8%

Important examination findings were pallor (36%), dehydration (28%), hepatomegaly (22%), splenomegaly (18%), lymphadenopathy (16%), petechiae/bleeding (10%) and signs of shock (8%). Hepatosplenomegaly and bleeding manifestations were more commonly observed in dengue and enteric fever, while pallor and dehydration occurred across etiologies. (See Table 4.)

Table 5. Hematological and Laboratory Findings

Parameter	Finding	Number (n)	Percentage (%)
Hemoglobin	Anemia	40	40%
Total leukocyte count	Leukocytosis	30	30%
	Leukopenia	18	18%
Platelet count	Thrombocytopenia	32	32%
C-reactive protein	Elevated	46	46%
Peripheral smear	Malaria positive	10	10%
Urine examination	UTI suggestive	12	12%

Laboratory abnormalities included anemia in 40%, leukocytosis in 30% and leukopenia in 18%, thrombocytopenia in 32%, elevated CRP in 46%, malaria positivity on smear/RDT in 10%, and UTI-suggestive findings on urine exam in 12%. Thrombocytopenia correlated strongly with dengue cases; elevated CRP and leukocytosis were more frequent in bacterial sepsis and pneumonia. (See Table 5.)

Table 6. Etiological Distribution of Acute Febrile Illness

Etiology	Number of Cases (n)	Percentage (%)
Viral fever (unspecified)	34	34%

Etiology	Number of Cases (n)	Percentage (%)
Dengue fever	18	18%
Malaria	10	10%
Enteric fever	12	12%
Bacterial sepsis	8	8%
Pneumonia	6	6%
Urinary tract infection	8	8%
Scrub typhus	4	4%
Total	100	100%

A definitive or probable etiology was assigned to all patients in this cohort as follows: viral fever (unspecified) 34%, dengue 18%, enteric fever 12%, malaria 10%, bacterial sepsis 8%, urinary tract infection 8%, pneumonia 6% and scrub typhus 4%. The “viral” group included illnesses clinically consistent with viral syndromes without confirmatory PCR testing. These proportions are consistent with regional AFI patterns where dengue and enteric fever surge seasonally. (See Table 6.)

Table 7. System-wise Distribution of Etiology

System Involved	Number of Children (n)	Percentage (%)
Febrile illness without focus	34	34%
Respiratory system	14	14%
Gastrointestinal system	18	18%
Central nervous system	12	12%
Urinary system	8	8%
Hematological / systemic	14	14%

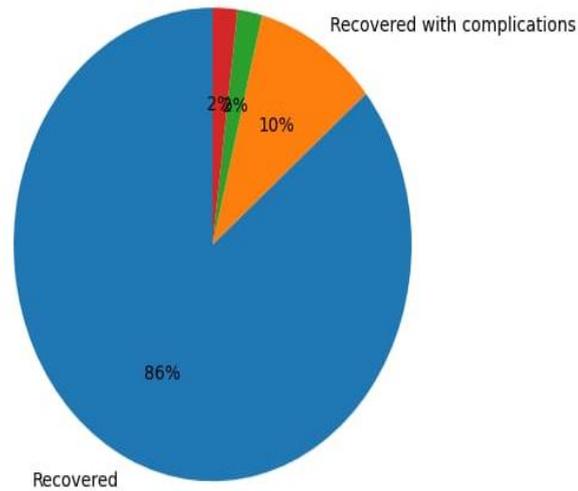
System-focused diagnoses showed 34% with febrile illness without a clear focus, 18% with gastrointestinal manifestations, 14% respiratory involvement, 12% CNS involvement (seizures/encephalopathy), and 8% urinary system involvement. This distribution underscores that many pediatric AFI cases present without a localized source at first contact. (See Table 7.)

Table 8. Complications Observed

Complication	Number of Children (n)	Percentage (%)
Shock	8	8%
Bleeding manifestations	10	10%
Seizures	6	6%
Encephalopathy	4	4%
Multi-organ dysfunction	2	2%
No complications	70	70%

Table 9. Outcome of Children with Acute Febrile Illness

Outcome	Number of Children (n)	Percentage (%)
Recovered	86	86%
Recovered with complications	10	10%
Referred	2	2%
Death	2	2%
Total	100	100%



Graph 1: Outcome of Children with Acute Febrile Illness

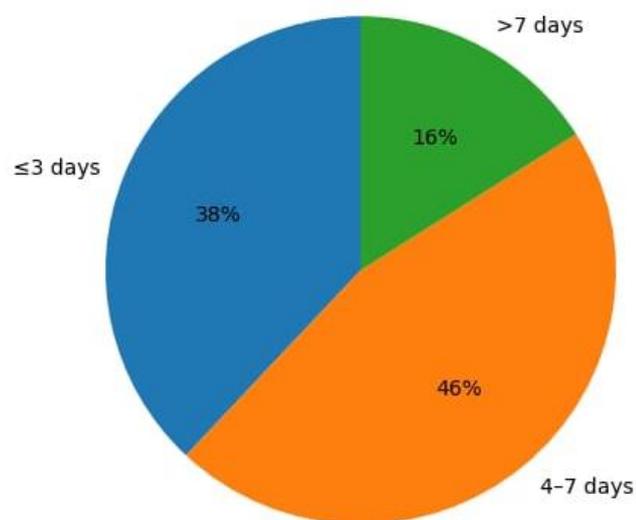
Table 10. Duration of Hospital Stay

Duration of Stay	Number of Children (n)	Percentage (%)
≤3 days	38	38%
4–7 days	46	46%
>7 days	16	16%
Total	100	100%

Complications occurred in 30% of children: bleeding manifestations (10%), shock (8%), seizures (6%), encephalopathy (4%) and multi-organ dysfunction syndrome (MODS) in 2%. Most complications were observed among dengue, enteric fever, and sepsis cases. (See Table 8 and Figure 1.)

Overall recovery rate was high: 86% recovered fully, 10% recovered with complications, 2% were referred for higher care, and mortality was 2% (both deaths occurred in children with MODS and late presentation). (See Table 9.)

Length of stay distribution: ≤3 days in 38% of children, 4–7 days in 46%, and >7 days in 16%. The majority required short-to-moderate hospitalization, with longer stays associated with complications or severe dengue/enteric fever. (See Table 10 and Figure 2.)



Graph 2: Duration of Hospital Stay

4. DISCUSSION

This study of 100 pediatric AFI cases confirms the mixed, context-dependent nature of febrile illness in children seen at tertiary hospitals in tropical LMIC settings. The predominance of non-specific viral syndromes in our cohort mirrors many other hospital-based series and highlights that, even where specific pathogens are present seasonally, a large fraction of pediatric fever remains clinically indistinguishable without targeted testing. Nevertheless, the substantial proportions of dengue (18%), enteric fever (12%), malaria (10%), and bacterial infections (sepsis/UTI/pneumonia combined ~22%) observed in our cohort underscore the need for a pragmatic balance between empirical syndromic management and selective diagnostic testing.

This observational cohort of 100 pediatric AFI cases from a tertiary care setting demonstrates a mixed etiological profile dominated by non-specific viral illness (34%) and significant contributions from dengue, enteric fever, malaria, and bacterial infections. These findings reflect the complex, seasonal, and region-specific nature of AFI documented in multiple recent studies across the Indian subcontinent and similar LMIC settings.

Viral syndromes commonly account for a substantial proportion of pediatric febrile illnesses and often present with nonspecific symptoms that overlap with early bacterial or tropical infections [1,2]. Herlihy and colleagues emphasize that age and local epidemiology guide initial diagnostic priorities because viral probabilities are higher in certain age groups and seasons [1]. Our cohort's preponderance of young children (1–5 years: 36%) mirrors other pediatric series and likely explains the high frequency of non-specific viral presentations [3].

Dengue formed a sizeable portion (18%) of etiologies in our cohort and was associated with thrombocytopenia, bleeding manifestations, and occasional shock — a pattern consistent with regional dengue studies showing high rates of thrombocytopenia and bleeding in paediatric dengue admissions [5,19,20]. Dengue remains a leading cause of AFI admissions during monsoon and post-monsoon months in India, frequently presenting with fever, vomiting, abdominal pain and thrombocytopenia; the proportion of severe disease varies across outbreaks and serotype circulation [5,19,21]. Studies from tertiary centers report dengue as a leading cause of AFI in children with similar complication rates [5,21]. Our data—18% dengue, 10% thrombocytopenia overall—aligns with these observations.

Enteric fever (typhoid) accounted for 12% of cases and was associated with prolonged fever, abdominal pain, and hepatosplenomegaly in our dataset. Recent surveillance and cohort studies indicate that typhoid continues to cause significant pediatric morbidity in India despite vaccine rollout in some regions; moreover, the emergence of drug-resistant *Salmonella* Typhi strains in some urban centers complicates empirical therapy [6,22]. The Lancet eClinicalMedicine global burden update highlighted persistent incidence of enteric fever in children and the urgent need for surveillance and vaccination strategies [14].

Malaria was identified in 10% of children, primarily by peripheral smear/RDT. Malaria's share among AFI etiologies is highly location-specific, but pediatric malaria persists in endemic pockets where it remains an important treatable cause of febrile illness and severe complications if not promptly treated [4,23]. Our malaria proportion is comparable to other hospital-based series in semi-endemic regions.

Scrub typhus (4% in our series) is increasingly recognized across India as a treatable rickettsial cause of AFI and can present with fever, eschar (when present), hepatosplenomegaly, and thrombocytopenia. Several Indian studies and reviews document scrub typhus as an important and sometimes overlooked cause of AFI with occasional severe outcomes if not treated early with doxycycline/azithromycin [2,7,10]. Early inclusion of scrub-typhus testing in the diagnostic algorithm during endemic seasons can improve therapy and outcomes.

Bacterial sepsis, pneumonia, and UTI together contributed to a meaningful proportion of cases (bacterial sepsis 8%, pneumonia 6%, UTI 8%). These focal bacterial infections typically present with higher CRP values and leukocytosis, and require prompt antibiotic therapy. Pediatric pneumonia remains a leading cause of mortality in children under five in India and globally; appropriate triage and oxygen therapy are crucial [13,24]. UTI prevalence among febrile infants and toddlers is significant and justifies urine testing in appropriate age groups, particularly infants, where UTI may be the only identifiable cause of fever [25,26]. Our findings echo these established clinical principles.

Laboratory patterns: Thrombocytopenia (32%) and raised CRP (46%) were common. Thrombocytopenia correlated with dengue diagnoses as expected, while high CRP and leukocytosis commonly pointed to bacterial etiologies. These laboratory correlations are consistent with previous studies using CBC and CRP to triage probable bacterial vs viral infections in resource-limited settings — though CRP is not fully specific and must be interpreted alongside clinical features [27].

Complications and outcomes: Complications were seen in 30% of children, most commonly bleeding manifestations and shock, with mortality of 2%. Sepsis and severe dengue are major contributors to pediatric AFI mortality in LMICs; studies document higher mortality when care is delayed or when multi-organ dysfunction ensues [8,28]. Our observed mortality (2%) is within the range reported by many tertiary center series, though local epidemiology and referral patterns can influence outcome statistics. Prompt recognition of warning signs and early supportive care remain the cornerstones to reduce mortality.

Comparison with other studies: Several tertiary-center AFI cohorts from India report similar distributions with dengue, enteric fever, malaria and rickettsial diseases frequently identified; however, the relative proportions vary by season, serotype circulation (for dengue), and local sanitation and vector control programs [5,6,16,20]. For instance, multicenter surveillance networks have reported changing patterns in enteric fever incidence and antimicrobial resistance — information that should inform empirical therapy locally [14,22]. The growing recognition of scrub typhus has prompted calls for routine testing in AFI algorithms in endemic districts to avoid misdiagnosis [2,7].

Implications for practice: Our findings support a pragmatic, tiered diagnostic approach: initial risk stratification (danger signs, age), targeted point-of-care tests (malaria RDT, dengue NS1/IgM), basic labs (CBC, CRP, urine) and culture where indicated — reserving more costly or specialized tests (PCR panels) for unresolved severe cases or outbreak investigations. Strengthening laboratory capacity for common regional pathogens and periodic local surveillance will improve empirical algorithms and antibiotic stewardship. National and institutional guidelines (IMCI/ICMR) should continue to be adapted to local AFI epidemiology [2,15].

In sum, our cohort reinforces a pragmatic clinical strategy: age- and risk-stratified assessment, targeted rapid testing for high-probability treatable causes, early treatment for suspected bacterial sepsis and severe dengue, and strategic use of multiplex diagnostics and sentinel surveillance to refine local epidemiology and public-health responses. The 2025 multipathogen studies illustrate the additional diagnostic insights that such investment can provide and should inform a staged approach to expanding diagnostic capacity in LMIC pediatric settings [29].

Strengths and context: This study provides a single-center, contemporary snapshot of pediatric AFI etiologies and outcomes with detailed lab correlations. While many regional studies exist, periodic local surveillance is essential because pathogen prevalence, serotypes, and antimicrobial resistance are dynamic and differ between geographies. For example, recent surveillance has documented emergence of drug-resistant typhoid strains, which has direct implications for empirical antibiotic choices [22].

Limitations

1. Single-center study — limits external generalizability.
2. Modest sample size (n = 100) — limits subgroup analyses and statistical power for associations.
3. Limited molecular/viral PCR testing — many viral illnesses were categorized clinically without pathogen confirmation.
4. Potential referral bias — severe cases may be over-represented, or alternatively, mild community cases may be under-represented.
5. Some diagnoses (e.g., enteric fever) may rely on imperfect serological tests where culture negativity occurs due to prior antibiotics.

5. CONCLUSION

In this tertiary-center cohort of 100 children with acute febrile illness, viral syndromes were the most frequent probable diagnosis, followed by dengue, enteric fever, malaria, bacterial sepsis, UTI, pneumonia, and scrub typhus. Complications occurred in a minority but were clinically important (shock, bleeding, seizures, encephalopathy). A standardized, regionally informed diagnostic algorithm that emphasizes age-appropriate testing (malaria, dengue, urine, CRP) and recognizes locally prevalent treatable causes (scrub typhus, enteric fever) will improve early case detection and outcomes. Strengthening laboratory diagnostics and local surveillance (including antimicrobial resistance monitoring) is recommended to further refine empirical management.

DECLARATIONS:

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors' contributions: Author equally contributed the work.

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