

Original Research Article

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Assessment of Injury-Related Chief Complaints Among School Children Managed by School Nurses in Nepal

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Abstract: Background: In Low- and Middle-Income Countries (LMICs) like Nepal, school nurses serve as the first point of contact for managing childhood injuries and acute illnesses. However, the actual pattern of complaints they manage remains poorly documented. This study aimed to assess the prevalence and types of chief complaints, particularly injuries, among school children presenting to school nurses in rural Nepal and to identify demographic and temporal associations. **Methods:** A cross-sectional study was conducted using secondary data from five schools with qualified school nurses in Dhading district. Records of 1,167 students (aged 5–18 years) who presented with a chief complaint during school hours across three fiscal years (2022–2024) were analyzed. Complaints were categorized into ten clinical groups. Descriptive statistics, chi-square tests for associations, and trend analyses were performed. **Results:** The majority of students were female (58.4%) and aged 11–15 years (57.8%). The most common chief complaints were neurological (28.0%, primarily headache), musculoskeletal/injury (23.9%), and gastrointestinal (21.0%). Within injuries, cut injuries (34.8%) and fall injuries (15.1%) predominated. Significant associations were found between complaint type and age ($p < 0.001$) and gender ($p < 0.001$), but not ethnicity ($p = 0.204$). Male students had higher injury rates (30.5% vs. 19.2%), while females reported more neurological and reproductive complaints. Injury related consultations peaked during the monsoon months. **Conclusions:** Musculoskeletal injuries account for nearly one in four school nurse consultations, with distinct demographic and seasonal patterns. These findings provide an evidence base for strengthening school nurse training in acute injury management, developing gender-sensitive services, and implementing seasonally-targeted prevention programs in rural Nepal.

Keywords: School nursing; child injuries; Nepal; chief complaints; musculoskeletal injuries; school health



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1. Background

Globally, injuries are the leading cause of death and disability among children and adolescents aged 5–24 years, surpassing infectious diseases in many regions^[1]. This epidemiological transition is particularly pronounced in Low- and Middle-Income Countries (LMICs), where rapid urbanization, improving child survival, and changing patterns of physical activity have led to a rising burden of unintentional injuries^[2]. Nepal, a low-income country in South Asia, is no exception. Recent emergency department in Nepal demonstrated that children under 18 years represented 27% of all injury patients, with cuts, bites, and open wounds accounting for over half of these presentations^[3]. Community-based studies further estimate an annual unintentional injury prevalence of 26% in rural areas and 17.2% in urban areas, with falls (65%) and cut injuries (63%) being the most common mechanisms^[4,5].

Despite this high burden, the management of childhood injuries in Nepal is fragmented. Most injured children first present to under-resourced local health posts or directly to district hospitals, bypassing any formal school-based first response system^[3]. However, school-aged children spend a substantial portion of their waking hours in the educational environment, where school nurses (where available) are theoretically positioned to provide immediate first aid^[22], identify serious injuries requiring referral, and implement prevention strategies^[6]. In Nepal, the School Health and Nutrition Strategy explicitly includes the role of the school health nurse in providing “first aid treatment and management of minor trauma and injuries”^[7].

Yet, in practice, the effectiveness of this role is constrained by several factors. A national survey of school health nurses in Nepal revealed that none had received pre-service training specifically on child protection or injury management, and many expressed unease in handling cases that might involve interpersonal violence^[8]. Furthermore, there is no standardized national protocol for school nurses on the assessment, documentation, or referral of common injuries. Consequently, the actual pattern of injuries and other acute complaints managed by school nurses in Nepal has remained largely unquantified, representing a critical evidence gap.

This study was therefore designed to address the following questions: (1) What is the prevalence

and types of chief complaints, particularly injuries, presented to school nurses in rural Nepal? (2) Do these complaints vary significantly by student age, gender, ethnicity, or class? (3) Are there seasonal or yearly trends in complaint presentation? By answering these questions, we aimed to generate practice-based evidence to inform targeted training, resource allocation, and protocol development for school nursing services in Nepal.

2. Methods

2.1 Study Design and Setting

This was a quantitative, cross-sectional study using secondary data extracted from routine school health records. The study was conducted in Dhading district, a hilly district of central Nepal located approximately 50 km west of Kathmandu. Dhading was selected because it has a mix of rural and semi-urban settlements along the Prithvi Highway corridor, and several schools have been supported to employ qualified school nurses through a non-governmental organization initiative. The study included five schools that met the following criteria: (a) located within a 1–2 km radius of the Prithvi Highway (for accessibility), (b) had a qualified nurse (certificate level or higher) employed full-time, and (c) maintained at least two years of student health records. The five participating schools were: Shree Janakalyan Secondary School, Rashtriya Secondary School, Shankar Devi, Bageshowri, and Pipal Bhanjyang.

2.2 Sampling and Participants

The target population was all school children aged 5 to 18 years enrolled in these five schools during the study period (fiscal years 2022–2024). All students who presented to the school nurse with any health complaint during school hours and had a complete record (including age, gender, class, and chief complaint) were included. There was no active sampling; we included all available records meeting the inclusion criteria to achieve a comprehensive census of complaints within the study period.

Exclusion criteria were: (a) students who presented for routine health checks (e.g., height/weight measurement, immunization) without a specific complaint, (b) incomplete records where the chief complaint was missing or illegible, and (c) complaints that occurred outside school hours or off school premises (as these were not directly managed by the school nurse).

2.3 Data Extraction and Variables

A standardized data extraction form was developed by the research team. Two research assistants independently extracted data from the paper-based school health registers into an Excel spreadsheet. Discrepancies were resolved by consensus with the principal investigator. Extracted variables included: school name, fiscal year (2022, 2023, 2024), month (April to March), ethnicity (self-reported by student/parent and categorized as Brahmin, Chettri, Dalit, Janajati, Madhesi), age (years), sex (male/female), class/grade (1–12, plus ECD/Nursery/LKG/UKG), and chief complaint (verbatim as recorded by the nurse).

2.4 Categorization of Chief Complaints

Chief complaints, which were recorded in free text in Nepali, were translated and categorized by a panel of two registered nurses and one physician into ten mutually exclusive clinical categories based on body system and presenting symptom:

1. **Neurological:** Headache, dizziness, unconsciousness, fainting.
2. **Musculoskeletal/Injury:** Cut/laceration, fall injury, fracture, burn, sprain, insect bite, wound, foreign body.
3. **Gastrointestinal:** Abdominal pain, gastritis, diarrhea, vomiting, nausea, indigestion.
4. **Respiratory:** Common cold, cough, sore throat, tonsillitis, runny nose.
5. **Fever:** Isolated fever (without localizing signs).
6. **Dermatological/Skin:** Allergy, itching, rash, scabies, blister, fungal infection.
7. **Eye/Ear/Nose/Throat (ENT):** Ear pain, eye pain, conjunctivitis, red eye, ear discharge.
8. **Reproductive/Hormonal:** Dysmenorrhea, menarche, menstrual irregularities.
9. **Dental/Oral:** Dental pain, loose tooth, oral thrush.
10. **Cardiovascular:** Chest pain, palpitations, low blood pressure (recorded as such by the nurse).

For the primary analysis of injuries, the musculoskeletal/injury category was further sub-analyzed into specific injury types where the free text allowed (e.g., “cut injury,” “fall injury,” “fracture”).

2.5 Statistical Analysis

Data were analyzed using excel and R. Descriptive statistics (frequencies, percentages, means, standard deviations) were calculated for all demographic and

complaint variables. To examine associations between categorical variables (age category, gender, ethnicity, class category) and the primary complaint categories, Pearson’s chi-square tests were used. The assumptions for chi-square (expected cell counts > 5) were met for the primary comparisons. Statistical significance was set at a two-tailed alpha of 0.05.

For age analysis, students were grouped into four developmental categories: early childhood (≤ 5 years), middle childhood (6–10 years), early adolescence (11–15 years), and middle/late adolescence (16–20 years). For class analysis, grades were grouped into pre-primary/basic (ECD, Nursery, LKG, UKG, grades 1–5) and secondary (grades 6–12). Temporal trends were analyzed by calculating the proportion of each complaint category within each fiscal year and each month, then examining patterns visually using line graphs.

2.6 Ethical Considerations

Ethical approval was obtained from the Government of Nepal, Nepal Health Research Council (protocol registration number 597_2024). Informed consent was obtained from school principals. All data were anonymized prior to analysis. As this was a secondary data analysis of de-identified records, the requirement for individual student informed consent was waived by the IRB. However, school principals provided institutional consent, and parents were informed through school notices that anonymized health data might be used for research. All data were anonymized prior to analysis, and no individual identifiers are reported.

3. Results

3.1 Demographic Characteristics

A total of 1,167 students met the inclusion criteria and were included in the final analysis. The demographic characteristics are summarized in **Table 1**. The sample had a female predominance (58.4%). The mean age was 12.8 years (SD = 3.5; range: 3–20 years). The majority (57.8%) were early adolescents aged 11–15 years, followed by middle/late adolescents aged 16–20 years (22.7%). In terms of ethnicity, Janajati (indigenous nationalities) comprised half of the sample (50.5%), followed by Brahmin (19.7%), Dalit (18.9%), and Chettri (10.1%). Students were distributed across all grades, with the highest concentration in grades 6–10 (approximately 65% of the sample).

Table 1. Demographic characteristics of study population (N = 1,167)

Characteristic	Category	Count	Column N %
Gender	Female	682	58.4
	Male	485	41.6
Age category	5 years or lower	63	5.4
	6–10 years	165	14.1
	11–15 years	674	57.8
	16–20 years	265	22.7
Ethnicity	Brahmin	230	19.7
	Chettri	118	10.1
	Dalit	221	18.9
	Janajati	589	50.5
	Madhesi	9	0.8

3.2 Overall Chief Complaints

Table 2 presents the distribution of chief complaints across the ten clinical categories. Neurological complaints, predominantly headache, were the single most common reason for consultation (28.0%). Musculoskeletal and injury-related complaints were the second most common, accounting for nearly one-

quarter of all visits (23.9%). Gastrointestinal complaints (abdominal pain, gastritis, diarrhea) followed closely at 21.0%. Respiratory complaints (common cold, sore throat) and fever constituted 9.7% and 8.4%, respectively. All other categories (dermatological, eye/ENT, reproductive, dental, cardiovascular) together accounted for less than 10% of visits.

Table 2. Distribution of chief complaints (N = 1,167)

Complaint Category	Numbers	(%)	95% CI
Neurological	327	28.0	(25.5–30.7)
Musculoskeletal/Injury	279	23.9	(21.5–26.4)
Gastrointestinal	245	21.0	(18.7–23.4)
Respiratory	113	9.7	(8.1–11.5)
Fever	98	8.4	(6.9–10.1)
Dermatological/Skin	39	3.3	(2.4–4.5)
Eye/ENT	30	2.6	(1.8–3.6)
Reproductive/Hormonal	18	1.5	(0.9–2.4)
Dental/Oral	13	1.1	(0.6–1.9)
Cardiovascular	5	0.4	(0.1–1.0)

3.3 Injury-Specific Sub-analysis

Among the 279 students presenting with musculoskeletal/injury complaints, the specific type of injury could be identified from the free-text record in 150 cases (53.8%). In the remaining 129 cases (46.2%), the complaint was recorded as a non-specific term such as “injury,” “wound,” or “body pain.” Among the specified injuries, cut injuries (lacerations, cuts from sharp objects) were the most common (n = 97, 34.8% of all injuries), followed by fall injuries (n = 42, 15.1%). Fractures were documented in 8 cases (2.9%), burn injuries in 2 (0.7%), and insect bites in 1 (0.4%). Other injuries (sprains,

contusions, unspecified wounds) accounted for the remainder.

3.4 Age-wise Associations

There was a statistically significant association between age category and the type of chief complaint (Pearson $\chi^2 = 106.00$, $df = 27$, $p < 0.001$). As shown in **Table 3**, younger children (≤ 10 years) had higher proportions of musculoskeletal/injury complaints (32.0% vs. 20.2% in adolescents) and gastrointestinal complaints (28.1% vs. 19.2%). In contrast, adolescents aged 11–20 years had substantially higher proportions of neurological complaints (29.7% vs. 22.8% in younger children) and,

as expected, all reproductive/hormonal complaints were reported exclusively in this age group (1.9% vs. 0%).

Respiratory complaints were also more common among adolescents (10.4% vs. 7.9%).

Table 3. Chief Complaints by Age Category (N = 1,167)

Complaint Category	≤ 10 years (n = 228) n (%)	11–20 years (n = 939) n (%)
Neurological	52 (22.8)	275 (29.3)
Musculoskeletal/Injury	73 (32.0)	206 (21.9)
Gastrointestinal	64 (28.1)	181 (19.3)
Respiratory	18 (7.9)	95 (10.1)
Fever	11 (4.8)	87 (9.3)
Reproductive/Hormonal	0 (0)	18 (1.9)
All others	10 (4.4)	77 (8.2)

3.5 Gender-wise Associations

Gender was significantly associated with complaint type (Pearson $\chi^2 = 88.31$, $df = 9$, $p < 0.001$). Male students had a markedly higher proportion of musculoskeletal/injury complaints (30.5%) compared to females (19.2%). Conversely, female students had

higher proportions of neurological complaints (32.1% vs. 22.3% in males), gastrointestinal complaints (23.8% vs. 17.1%), and, as expected, all reproductive/hormonal complaints (2.5% vs. 0%). Respiratory complaints, fever, and dermatological complaints were relatively balanced across genders (Table 4).

Table 4. Chief Complaints by Gender (N = 1,167)

Complaint Category	Female (n = 682) n (%)	Male (n = 485) n (%)
Neurological	219 (32.1)	108 (22.3)
Musculoskeletal/Injury	131 (19.2)	148 (30.5)
Gastrointestinal	162 (23.8)	83 (17.1)
Respiratory	69 (10.1)	44 (9.1)
Fever	58 (8.5)	40 (8.2)
Reproductive/Hormonal	17 (2.5)	0 (0)
All others	26 (3.8)	62 (12.8)

3.6 Ethnicity-wise Associations

No statistically significant association was found between ethnicity and the main complaint category (Pearson $\chi^2 = 42.75$, $df = 36$, $p = 0.204$). Neurological and musculoskeletal complaints were consistently the top two categories across all ethnic groups, suggesting that the pattern of health complaints is relatively uniform irrespective of ethnicity in this sample. When comparing pre-primary/basic grades (grades 1–5 and ECD/Nursery/LKG/UKG) with secondary grades (6–12), a significant association emerged (Pearson $\chi^2 = 36.75$, $df = 9$, $p < 0.001$). Students in pre-primary/basic grades had higher proportions of musculoskeletal/injury complaints (29.9% vs. 21.8% in secondary), while secondary students reported more neurological complaints (29.6% vs. 24.1%) and respiratory complaints (10.7% vs. 7.5%).

3.7 Temporal Trends

Yearly Trends (2022–2024): Over the three fiscal years, neurological complaints remained the most common but showed a slight decline from 31.3% in 2022 to 24.9% in 2024. Musculoskeletal/injury complaints remained stable (23–25%). Gastrointestinal complaints increased notably in 2023 (24.5%) before declining in 2024 (18.4%). Fever complaints steadily declined from 13.2% in 2022 to 5.3% in 2024.

3.8 Monthly Trends

Musculoskeletal/injury complaints showed distinct seasonality, with peaks during June–October – the monsoon and post-monsoon months when school grounds become wet and slippery. Fever complaints peaked sharply in July–August, coinciding with the peak of monsoon-related infectious diseases. Neurological complaints (headache) were consistently

elevated across most months, with minor peaks in April-May and February-March. Gastrointestinal complaints were more common in the hot, dry months of April-June.

4. Discussion

This study provides the first systematic, multi-school analysis of chief complaints managed by school nurses in rural Nepal. The key finding is that musculoskeletal injuries constitute nearly one-quarter (23.9%) of all school nurse consultations, with cut injuries and fall injuries being the predominant mechanisms. This high burden aligns with, and extends, previous hospital-based report in Nepal, which reported that pediatric injuries, particularly cuts and open wounds, are a major cause of emergency department visits^[3]. Our data confirm that these injuries are not merely a hospital problem but are also a daily reality within the school environment, where the school nurse is the first responder.

The finding that male students had significantly higher injury rates (30.5%) than females (19.2%) is consistent with a large body of global literature^[9,10]. This disparity is typically attributed to higher levels of physical activity, greater risk-taking behavior, and more frequent participation in contact sports and rough play among boys^[11]. In the Nepalese school context, where playgrounds are often unstructured and supervision may be limited, this gender difference has important implications. School nurses should be prepared to manage injuries in boys more frequently, and injury prevention messaging may need to be specifically targeted to male students, particularly during break times and physical education classes.

The age-wise pattern, with younger children (≤ 10 years) experiencing more injuries and gastrointestinal complaints, while adolescents reported more neurological (headache) and reproductive complaints, reflects developmental transitions. Younger children have developing motor coordination, less accurate risk perception, and higher rates of hand-to-mouth behavior (increasing gastrointestinal infections)^[12]. In contrast, adolescent headaches may be related to increased academic stress, screen time, sleep deprivation, or the onset of migraine^[13]. The emergence of reproductive complaints exclusively in adolescence (1.9% of consultations) underscores the need for school nurses

to be trained in adolescent-friendly reproductive health services, including the management of dysmenorrhea and provision of menstrual education^[14].

The lack of association between ethnicity and complaint type ($p = 0.204$) is an interesting finding. While Nepal has a complex ethnic hierarchy with significant differences in socioeconomic status, health access, and cultural practices^[15], our data suggest that the types of acute complaints that present to school nurses are similar across groups. This may be because these complaints (headache, injury, abdominal pain) are largely determined by universal factors such as school environment, physical activity, and infectious disease exposure, rather than by ethnic-specific cultural practices. However, we caution that this finding may also reflect the limited sample size for some ethnic groups (e.g., Madhesi, $n = 9$).

The seasonal peaks we observed have practical utility for school health planning. The increase in injuries during the monsoon months (Asadh, Bhadra, Aashwin) is likely due to wet, slippery surfaces on school grounds, increasing the risk of falls and cut injuries from sharp objects hidden in mud or vegetation^[16]. School administrators could implement simple, low-cost prevention measures during these months, such as ensuring covered walkways, clearing debris, and postponing outdoor sports that involve running on wet surfaces. The peak in fever during Shrawan (July/August) aligns with the peak transmission season for enteric fevers (typhoid, dengue, and viral respiratory infections in Nepal^[17]). School nurses should be particularly vigilant for fever during this month, maintain a supply of oral rehydration solution and antipyretics, and have clear referral pathways for children with high fever or signs of dehydration.

4.1 Comparison with Regional and Global Studies

Our injury proportion (23.9%) is slightly lower than the 26% annual prevalence reported in community-based surveys in rural Nepal^[4], but this is expected because our data only capture injuries occurring during school hours, whereas community surveys capture all injuries regardless of location. A school-based study in Kathmandu reported that 65% of adolescents had experienced a fall and 63% a cut injury in their lifetime^[5], which is much higher than our 15% for falls and 35% for cuts among injuries. This discrepancy likely reflects differences in recall period (lifetime vs.

acute presentation) and setting (urban Kathmandu vs. rural Dhading). Our findings are more comparable to school nurse data from other LMICs. For example, a study in rural South Africa found that injuries (primarily falls and cuts) accounted for 28% of school health clinic visits ^[18], and a study in India reported that 21% of school nurse consultations were for injuries ^[19].

4.2 Clinical Implications for School Nursing Practice

Our findings have several concrete implications for school nursing in Nepal. First, the high proportion of cut injuries (34.8% of all injuries) suggests that school nurses require competency in wound assessment, cleaning, and appropriate dressing, as well as recognition of wounds requiring suturing, tetanus prophylaxis, or referral. A simple wound care protocol and a well-stocked first aid box (including sterile gauze, antiseptic solution, adhesive bandages, and gloves) are essential.

Second, the burden of fall injuries (15% of injuries) indicates a need for school nurses to be able to perform basic musculoskeletal assessments, including the ability to recognize fractures, sprains, and head injuries. The Ottawa Ankle Rules or similar clinical decision rules could be adapted for the school setting to guide when to send a child for X-ray.

Third, the high prevalence of headache (28% of all complaints) is notable. While most headaches in children are benign (tension-type, dehydration, refractive error), school nurses need to be aware of “red flags” that warrant urgent referral: sudden severe headache (“thunderclap”), headache with fever and neck stiffness (meningitis), headache following head trauma, or headache waking the child from sleep ^[20]. A simple triage checklist could be developed for school nurses.

Fourth, the 1.5% of consultations for reproductive complaints (all in females) is likely an underestimate, as many adolescent girls may feel embarrassed to discuss menstrual issues with a school nurse ^[21]. Schools should ensure private consultation spaces and that female students have access to a female nurse or health assistant for such concerns.

4.3 Strengths and Limitations

The main strengths of this study are its real-world, practice-based data from multiple schools, its inclusion of a large sample (N = 1,167), and its focus

on a rural, understudied region of Nepal. However, several limitations must be acknowledged. First, the reliance on secondary data means that the quality and completeness of records were variable. Some nurses recorded complaints in more detail than others, and we had no way to verify the accuracy of the recorded complaint. Second, we only had data on the chief complaint, not on the severity of the injury, the treatment provided, or the outcome (e.g., referral, healing without complications). Third, the study was limited to five schools along a highway corridor in a single district, which limits generalizability to remote mountainous areas or to urban schools in Kathmandu Valley. Fourth, we did not have data on the mechanism of injury (e.g., fall from height vs. same-level fall) or the specific activities at the time of injury (e.g., sports, playground, classroom). Finally, the cross-sectional design does not allow us to determine causality or to track individual students over time.

4.4 Limitations

Several limitations should be acknowledged. First, the reliance on secondary data from routine school records means that data quality and completeness were not under the researchers’ control. Some records had missing treatment information, and chief complaints were not always standardized. Second, the study was limited to five schools within a 1–2 km radius of the Prithvi Highway in Dhading district, which may not be representative of rural, remote, or urban schools in other parts of Nepal. Third, the cross-sectional design prevents causal inferences about risk factors for injuries. Fourth, only injuries occurring during school hours were captured; injuries at home, during commute, or on weekends were not included, potentially underestimating the total injury burden. Fifth, the classification of chief complaints into categories required subjective judgment by the research team, which may introduce classification bias. Finally, the absence of data on injury severity, mechanism (e.g., fall from height vs. same-level fall), and treatment outcomes limits the depth of analysis.

5. Conclusion

Musculoskeletal injuries, particularly cut injuries and falls, account for nearly one-quarter of all school nurse consultations in this rural Nepalese sample, second only to headache. Male students, younger children, and

the monsoon season are associated with higher injury rates. These findings contribute important evidence on the role of school nurses in managing childhood health complaints in Nepal. We recommend: (1) development of a national standardized training module for school nurses on acute injury assessment and first aid, including wound care and fracture recognition; (2) provision of adequately stocked first aid kits in all schools with a nurse; (3) seasonal injury prevention campaigns before the monsoon; (4) creation of private, adolescent-friendly spaces for reproductive health consultations; and (5) integration of school nurse data into the national Health Management Information System (HMIS) to enable ongoing surveillance. Future research should include prospective validation of school nurse injury assessments, evaluation of the impact of training on student outcomes, and qualitative studies exploring barriers and facilitators to injury care in the school setting.

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