

Teachers' Knowledge of Basic First Aid in Public, Private, and International Primary Schools in Erbil City, 2024-2025

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Abstract

Background and Aim In Erbil City, primary school teachers often face situations that require immediate first aid, yet their level of knowledge may vary depending on training, school type, and experience. This study aimed to assess the knowledge of basic first aid (BFA) among teachers in public, private, and international primary schools.

Methods This cross-sectional study was conducted from January 12th to June 21st, 2024, in 19 primary schools in Erbil City, including 10 public, 5 private, and 4 international schools, using systematic sampling method. A structured questionnaire was employed to gather data on demographic characteristics, BFA training background, emergency experiences, and knowledge of first aid across domains such as CPR, choking, trauma management, and general emergencies. Statistical analysis was performed using SPSS version 20 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used, and Chi-square tests were applied to assess associations between knowledge levels and demographic or training variables.

Results A total of 264 teachers participated, of whom 39.0% were from public schools, 38.6% from private schools, and 22.3% from international schools. Overall, 35.6% of teachers had attended BFA training, with those trained achieving significantly higher knowledge scores than untrained teachers ($p < 0.001$). The mean knowledge score was 6.78 ± 2.86 , indicating a fair level of knowledge overall. Training type and frequency were strongly associated with knowledge level, while gender was not significant. Younger teachers and those with more years of training showed better performance in cardiac, choking, trauma, and general emergency domains.

Conclusion The study demonstrated that primary school teachers in Erbil generally had fair knowledge of basic first aid, with training being the strongest predictor of higher knowledge. Expanding practical and theory-based training programs is essential to equip teachers with adequate first aid skills, ensuring student safety and effective management of school emergencies.

Keywords Basic First Aid · Teachers' Knowledge · Primary Schools · Training · Emergency Management

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Introduction

Injuries and medical emergencies among schoolchildren are common occurrences worldwide, with studies estimating that nearly 10–25% of all childhood injuries occur in or around school premises (Bou-Karroum et al., 2022, Al-Hajj et al., 2020). In such critical moments, school teachers often serve as first responders due to their immediate proximity to students. Consequently, having a basic knowledge of first aid can significantly reduce the severity of injuries, prevent complications, and even save lives (Brito et al., 2020, Akhagbaker et al., 2024). Despite its importance, global research reveals considerable gaps in first aid knowledge among schoolteachers, particularly in low- and middle-income countries. In the Kurdistan Region of Iraq, specifically in Erbil City, the school system is composed of diverse institutions—public, private, and international schools—each operating under varying administrative structures, teacher training protocols, and resource availability. This educational heterogeneity may result in disparities in first aid preparedness among teachers across these school types. Additionally, the rapid urban development and rising student population in Erbil underscore the urgency of ensuring a well-prepared teaching workforce in health-related emergency situations. To date, limited studies have systematically compared first aid knowledge among teachers across different educational settings in this region.

Teachers' knowledge of first aid plays a pivotal role in determining how effectively emergency situations are managed before professional medical help arrives. First aid competence includes knowing how to assess an injury, provide initial treatment, and manage specific emergencies such as choking, bleeding, or fractures (Mendoza et al., 2023, Minna et al., 2022, Furst, 2018). Inadequate knowledge or hesitation during such incidents can lead to delayed care or inappropriate interventions, worsening the outcomes for injured children. Studies have shown that factors such as age, teaching experience, and prior first aid training significantly influence a teacher's preparedness (Ganfure et al., 2018). Moreover, research suggests that schools with structured health education programs or mandatory first aid certification tend to have better-prepared staff (Nanassy et al., 2020). Despite this, many teachers globally report receiving little to no formal training in first aid as part of their professional development.

Public, private, and international schools often differ in their access to resources, training opportunities, and health protocols. In many public schools, limited funding and large

class sizes may hinder the integration of first aid training into the curriculum or teacher development programs (Clarke-Vivier and Lee, 2018). Conversely, private and international schools may have better infrastructure and budgets that allow for regular first aid workshops and the presence of school nurses. These differences can create an uneven landscape in emergency response capabilities among teachers, potentially affecting student safety. Understanding these institutional disparities is crucial for policymakers aiming to implement equitable health and safety measures across the education sector. Furthermore, the cultural and policy frameworks governing each school type may also influence the prioritization of health training.

A number of studies in other regions have explored teachers' knowledge of first aid and identified both strengths and areas needing improvement. For example, research conducted in Saudi Arabia, Nigeria, and Turkey has highlighted a general willingness among teachers to learn first aid but a lack of formal education on the subject (Alsulami, 2023, Alahmed et al., 2023). Some interventions, such as periodic workshops and hands-on simulations, have shown promising results in improving both knowledge and confidence levels (Wei et al., 2024). However, there remains a dearth of comparative studies that examine first aid knowledge across different types of schools within a single city or region. Few investigations have assessed the impact of school type, teacher qualifications, or institutional policies on first aid preparedness in a nuanced, localized context.

Despite growing awareness of the importance of first aid knowledge in school settings, significant gaps remain in understanding how educational environments influence teachers' readiness to act during emergencies. Most existing research has focused either on general knowledge levels or on the effectiveness of training programs, without considering institutional disparities. Moreover, in the context of Erbil City, no comprehensive, comparative study has yet examined teachers' first aid knowledge across public, private, and international schools. This lack of localized, stratified research limits the ability of education authorities and health departments to allocate resources and design context-appropriate training. Additionally, there is limited information on how demographic factors such as age, teaching experience, and previous exposure to emergencies interact with institutional factors to shape preparedness. The significance of this study lies in its potential to fill this critical gap by offering data-driven insights into the current state of first aid knowledge among teachers in Erbil. Therefore, in this study we aim to assess and compare the level of basic first aid knowledge among teachers working in public, private, and international primary schools in Erbil

City during the academic year 2024–2025.

Research Question

How knowledgeable are teachers about basic first aid in public, private, and international primary schools in Erbil City during 2024–2025?

Methods

Study Design, Setting, Period, and Sampling

This cross-sectional study was conducted in Erbil City, Kurdistan Region of Iraq, to assess teachers' knowledge of basic first aid (BFA) among public, private, and international primary schools. A systematic sampling method was used to recruit participants. Data were collected from January 12th, 2024, to June 21st, 2024, across 19 primary schools, including 10 public schools, 5 private schools, and 4 international schools.

Sample Size

The study population consisted of primary school teachers from public, private, and international schools in Erbil City. A total of 264 teachers participated in the study, including 103 from public schools, 102 from private schools, and 59 from international schools. Participation was based on teachers' availability and willingness during the data collection period.

Inclusion/exclusion

The inclusion criteria were teachers currently working in primary schools (public, private, or international) who agreed to participate voluntarily. Teachers who declined participation were excluded from the study.

Study Tools and Data Collection

Data were collected using a structured self-administered questionnaire developed by the researchers after reviewing relevant literature and previous studies. The questionnaire was originally developed in English and then translated into Kurdish using the forward–backward translation method to ensure clarity and accuracy. It was divided into three parts. The first part covered socio-demographic characteristics such as age, gender, education level, teaching subject, years of experience, marital status, and residential area. The second part assessed training background in BFA and teachers' experience with emergency situations at school. The third part evaluated teachers' knowledge of BFA through 14 single-choice questions, focusing on cardiopulmonary resuscitation (CPR), choking management, recovery position, injury and bleeding control, head injury, and fracture management. Each question had one correct response, and overall knowledge scores were classified into three categories: poor knowledge (≤ 5 correct answers), fair knowledge (6–8 correct answers), and good knowledge (≥ 9

correct answers). The questionnaire was distributed to participants in their schools, and responses were collected directly.

Pilot Study

The questionnaire was pre-tested with a group of 20 teachers who were not included in the final sample. The pilot was conducted to assess the clarity, feasibility, and reliability of the tool. Cronbach's alpha coefficient was calculated to measure internal consistency and yielded a value of 0.83, indicating good reliability (Taber, 2018). The data from the pilot study were excluded from the final analysis.

Measures

Sociodemographic Characteristics

The first section of the questionnaire collected information on type of school, age, gender, educational level, teaching subject, years of teaching experience, marital status, and residential area.

Training and Emergency Experience

The second section assessed teachers' history of attending BFA training courses (number and type of courses), as well as their exposure to emergency situations in school such as collisions, falls, fights, and accidents.

knowledge questions related to BFA

The third section included 14 knowledge questions related to BFA. Items addressed the most common causes of cardiac arrest in children, description of cardiac arrest, compression–ventilation ratio, pulse check location, identification of choking, management of bleeding, head injury, fractures, and appropriate positioning after cardiac arrest. Responses were scored as correct or incorrect, with correct answers assigned 1 point and incorrect answers 0 points. The total knowledge score was used to classify teachers' knowledge as poor, fair, or good.

Ethical Approval and Inform Consent

Formal approval was obtained from the Undergraduate Research Committee of the College of Nursing, Hawler Medical University, under approval number 11, dated July 2023, and submitted to the General Directorate of Education in Erbil City. Further permissions were obtained from school managers prior to data collection. Oral informed consent was obtained from all participants after explaining the purpose of the study. Participation was voluntary, and confidentiality of information was strictly maintained.

Statistical Analysis

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 26 (IBM Corp., Armonk, NY, USA). Descriptive statistics such as frequency, percentage, mean, and standard deviation were

used to summarize sociodemographic variables and knowledge responses. Associations between teachers' knowledge levels and demographic or training variables were tested using Chi-square analysis. A p-value of ≤ 0.05 was considered statistically significant, while $p < 0.01$ was considered highly significant.

Results

Demographic characteristics

A total of 264 teachers participated in the study. The majority were female (194, 73.5%), while males accounted for 70 (26.5%). Most participants were aged 22–33 years (157, 60.2%), followed by 34–45 years (66, 25.3%) and 46–

57 years (41, 14.6%). Regarding education, the majority held a college degree (182, 68.9%), with smaller proportions having completed an institute (66, 25.0%) or only high school (16, 6.1%). Teachers most commonly specialized in languages (105, 39.8%), while science and math each represented 37 (14.0%). The majority of teachers had between 1–10 years of experience (166, 63.1%). Most were married (165, 62.5%) and predominantly resided in urban areas (220, 83.3%). With respect to first aid training, 94 (35.6%) reported attending a BFA course, of whom 51 (53.7%) attended two or more courses, and 61 (64.2%) received both theory and practice training. Detailed demographics and other variables are presented in *Table 1*.

Table 1: Socio-Demographic Characteristics and Participation in Basic First Aid (BFA) Training Courses of Teachers (N = 264)

Variables	Characteristics n=264	Frequency (n)	Percentage (%)
Type of school	International school	59	22.30
	Private school	102	38.60
	Public school	103	39.00
Age group (years)	22–33	157	60.20
	34–45	66	25.30
	46–57	41	14.60
Gender	Female	194	73.50
	Male	70	26.50
Level of education	Institute	66	25.00
	College	182	68.90
	High school	16	6.10
Teaching subject	Science	37	14.00
	Language	105	39.80
	Math	37	14.00
	Social science	26	9.80
	Physical exercise	6	2.30
	Art	12	4.50
	Others	41	15.50
Experience group (years)	1–10	166	63.10
	11–21	68	25.90
	22–32	30	11.00
Marital status	Married	165	62.50
	Single	90	34.10
	Divorced	6	2.30
	Widowed	3	1.10
Residential area	Urban	220	83.30
	Rural	8	3.00
	Suburban	36	13.60
Attended BFA course	Yes	94	35.60
	No	170	64.40
If yes, how many courses?	One course	44	46.30
	Two or more courses	51	53.70
Type of training course	Theory	22	23.20
	Practice	12	12.60

Both

61

64.20

Note: F= Frequency, %= Percentage.**Teachers' Experience with Emergency Situations in School**

The results showed that a large majority of teachers (180, 68.2%) had faced an emergency in school, and almost all schools (254, 96.2%) were equipped with a first aid box.

Among specific incidents, student collisions were the most commonly encountered emergencies (172, 65.2%), followed by falls (161, 61.0%). Less frequent but notable situations included student fights (111, 42.0%) and falls from stairs (69, 26.1%). For further details, see *Table 2*.

Table 2: Teachers Facing Emergency Situations in School (N = 264)

Emergency Situation in School	Categories	Frequency (n)	Percentage (%)
Have you ever faced an emergency in school?	Yes	180	68.20
	No	84	31.80
Do you have a first aid box in your school?	Yes	254	96.20
	No	10	3.80
Student collision	Yes	172	65.20
	No	92	34.80
Fall from stairs	Yes	69	26.10
	No	195	73.90
Fall down	Yes	161	61.00
	No	103	39.00
Fighting	Yes	111	42.00
	No	150	56.80

Note: F = frequency; %= percentage.**Teachers' Knowledge Assessment on Basic First Aid**

The results revealed that teachers' knowledge of basic first aid varied considerably across items. Correct responses were highest for identifying airway obstruction when a child turns blue (198, 75.0%, mean score = 0.75) and for managing head injuries with closed wounds (154, 58.3%,

mean score = 0.58). In contrast, knowledge was weakest regarding the most common cause of cardiac arrest in children, with only 79 (29.9%) answering correctly (mean score = 0.30). Other items with relatively low accuracy included the compression-to-ventilation ratio in children (94, 35.6%, mean score = 0.36) and nasal bleeding management (111, 42.0%, mean score = 0.42). (*Table 3*)

Table 3: Teachers' Knowledge Assessment on Basic First Aid (N = 264)

Knowledge Item	Response	Frequency (n)	Percentage (%)	Mean Score
Most common cause of cardiac arrest in children	Correct	79	29.90	0.30
	Incorrect	185	70.10	
Statement best describing sudden cardiac arrest	Correct	98	37.10	0.37
	Incorrect	166	62.90	
Correct compression to ventilation ratio (child, alone)	Correct	94	35.60	0.36
	Incorrect	170	64.40	
Pulse check location in a child	Correct	139	52.70	0.53
	Incorrect	125	47.30	
Child turns blue after food occludes airway (situation identification)	Correct	198	75.00	0.75
	Incorrect	66	25.00	
First aid for conscious choking child (cannot cry, cough, breathe)	Correct	138	52.30	0.52
	Incorrect	126	47.70	
Victim requiring only rescue breathing	Correct	136	51.50	0.52
	Incorrect	128	48.50	
First symptom of choking by foreign body	Correct	118	44.70	0.45
	Incorrect	146	55.30	

Emergency care for fainted student (loss of consciousness, with HR & breathing)	Correct	140	53.00	0.53
	Incorrect	124	47.00	
Best position for child after cardiac arrest	Correct	128	48.50	0.48
	Incorrect	136	51.50	
Best way to control bleeding	Correct	133	50.40	0.50
	Incorrect	131	49.60	
First aid for nasal bleeding	Correct	111	42.00	0.42
	Incorrect	153	58.00	
First aid for child with head injury (closed wound)	Correct	154	58.30	0.58
	Incorrect	110	41.70	
First aid for child with broken bone (fracture site)	Correct	127	48.10	0.48
	Incorrect	137	51.90	

Note: SD = standard deviation; HS = highly significant; S = significant. p-values were considered statistically significant at $p < .05$, and highly significant at $p < .01$.

Knowledge Assessment by Type of School

The findings illustrated that knowledge scores differed according to school type. Teachers in international schools achieved the highest mean score (7.19 ± 3.09), with nearly one-third demonstrating good knowledge (22, 31.4%).

Public school teachers followed with a mean of 6.87 ± 2.16 , where almost half (66, 48.5%) showed fair knowledge. In contrast, private school teachers had the lowest performance, with a mean score of 6.45 ± 3.30 and over half (29, 51.8%) categorized as having poor knowledge. For more details, refer to *Table 4*.

Table 4: Knowledge Assessment and Mean Scores According to Type of School (N = 263)

Type of School	Knowledge Level	Frequency (n)	Percentage (%)	Mean Score	Std. Deviation
International	Good knowledge	22	31.40		
	Fair knowledge	24	17.60		
	Poor knowledge	13	23.20	7.19	3.09
Private	Good knowledge	26	37.10		
	Fair knowledge	46	33.80		
	Poor knowledge	29	51.80	6.45	3.30
Public	Good knowledge	22	31.40		
	Fair knowledge	66	48.50		
	Poor knowledge	14	25.00	6.87	2.16
Total	—	—	—	6.78	2.86

Note: F = frequency; %= percentage.

Teachers' Knowledge Scores by Training and Demographics

The results showed that training background had a strong influence on first aid knowledge. Teachers who attended BFA training scored significantly higher (8.45 ± 2.31), with more than half demonstrating good knowledge (48, 51.1%), compared to those without training who had a lower mean score of 5.78 ± 2.64 and the majority falling into the fair or poor categories (148, 87.0%) ($p < 0.001$). Similarly, attending multiple courses was associated with better outcomes, as those with two or more trainings achieved the highest scores (8.92 ± 2.35), with 30 (58.8%) classified as

good. Both theoretical and practical training together proved most effective, yielding a mean of 9.15 ± 2.08 and 37 (60.7%) with good knowledge. Among demographics, male and female teachers had comparable scores (6.41 ± 3.12 vs. 6.92 ± 2.78 , $p = 0.234$), while age, experience, and education level showed significant effects. Teachers aged 46–57 years and those with over 22 years of experience achieved higher mean scores (7.41 ± 2.95 and 7.53 ± 3.18 , respectively). Likewise, college graduates performed better (7.08 ± 2.84) than institute (6.45 ± 2.65) or high school (5.31 ± 3.22) teachers, confirming the role of educational attainment in knowledge differences ($p = 0.021$). (*Table 5*)

Table 5: Teachers' First Aid Knowledge Scores by Training Background and Demographics (N = 264))

Variables	Categories	Mean Knowledge Score $\pm$ SD	Good Knowledge F (%)	Fair Knowledge F (%)	Poor Knowledge F (%)	p-value
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BFA Training	Attended (n = 94)	8.45 ± 2.31	48 (51.1)	35 (37.2)	11 (11.7)	< 0.001 (HS)
	Not attended (n = 170)	5.78 ± 2.64	22 (12.9)	101 (59.4)	47 (27.6)	
Number of Courses	None (n = 170)	5.78 ± 2.64	22 (12.9)	101 (59.4)	47 (27.6)	< 0.001 (HS)
	One course (n = 44)	7.89 ± 2.18	18 (40.9)	19 (43.2)	7 (15.9)	
	Two+ courses (n = 51)	8.92 ± 2.35	30 (58.8)	16 (31.4)	5 (9.8)	
Training Type	None (n = 170)	5.78 ± 2.64	22 (12.9)	101 (59.4)	47 (27.6)	< 0.001 (HS)
	Theory only (n = 22)	7.32 ± 2.45	6 (27.3)	12 (54.5)	4 (18.2)	
	Practice only (n = 12)	7.67 ± 2.12	5 (41.7)	5 (41.7)	2 (16.7)	
	Both theory & practice (n = 61)	9.15 ± 2.08	37 (60.7)	18 (29.5)	6 (9.8)	
Gender	Female (n = 194)	6.92 ± 2.78	54 (27.8)	99 (51.0)	41 (21.1)	0.234 (NS)
	Male (n = 70)	6.41 ± 3.12	16 (22.9)	37 (52.9)	17 (24.3)	
Age Group	22–33 years (n = 157)	6.45 ± 2.89	36 (22.9)	81 (51.6)	40 (25.5)	0.043 (S)
	34–45 years (n = 66)	7.23 ± 2.65	22 (33.3)	34 (51.5)	10 (15.2)	
	46–57 years (n = 41)	7.41 ± 2.95	12 (29.3)	21 (51.2)	8 (19.5)	
Experience	1–10 years (n = 166)	6.52 ± 2.81	38 (22.9)	85 (51.2)	43 (25.9)	0.038 (S)
	11–21 years (n = 68)	7.18 ± 2.74	22 (32.4)	36 (52.9)	10 (14.7)	
	22+ years (n = 30)	7.53 ± 3.18	10 (33.3)	15 (50.0)	5 (16.7)	
Education Level	High school (n = 16)	5.31 ± 3.22	2 (12.5)	7 (43.8)	7 (43.8)	0.021 (S)
	Institute (n = 66)	6.45 ± 2.65	15 (22.7)	38 (57.6)	13 (19.7)	
	College (n = 182)	7.08 ± 2.84	53 (29.1)	91 (50.0)	38 (20.9)	

Note: Knowledge levels: Good (≥ 9 correct), Fair (6–8 correct), Poor (≤ 5 correct). HS = highly significant ($p < .01$); S = significant ($p < .05$); NS = not significant.

Knowledge Performance by First Aid Domains

The results illustrated that training had a highly significant effect on teachers' performance across all first aid domains. In cardiac emergencies, trained teachers

achieved markedly higher accuracy (57.3%) compared to untrained counterparts (31.7%, $p < 0.001$), particularly in recognizing the cause of cardiac arrest and applying correct compression–ventilation ratios. For choking management, overall correct responses were moderate (57.3%), but

trained teachers performed substantially better (73.4% vs. 48.4%, $p < 0.001$), especially in providing first aid for conscious choking. Trauma-related knowledge also benefited from training, with correct answers reaching 66.8% among trained teachers compared to 40.3% in untrained ones ($p < 0.001$), most notably in bleeding control and fracture management. Similarly, in general

emergencies, trained teachers showed significantly higher accuracy (71.8% vs. 41.5%, $p < 0.001$) in identifying indications for rescue breathing and managing fainting. These findings confirm that structured training substantially improved first aid knowledge across all domains. For more details, refer to *Table 6*.

Table 6: Knowledge Performance by First Aid Domains and Training Effectiveness (N = 264)

First Aid Domain	Knowledge Items	Overall Correct F (%)	Trained Teachers Correct F (%)	Untrained Teachers Correct F (%)	Training Effect p -value
Cardiac Emergencies	Most common cause of cardiac arrest	79 (29.9)	42 (44.7)	37 (21.8)	< 0.001 (HS)
	Description of cardiac arrest	98 (37.1)	51 (54.3)	47 (27.6)	< 0.001 (HS)
	Compression–ventilation ratio	94 (35.6)	48 (51.1)	46 (27.1)	< 0.001 (HS)
	Pulse check location	139 (52.7)	67 (71.3)	72 (42.4)	< 0.001 (HS)
	Position after cardiac arrest	128 (48.5)	61 (64.9)	67 (39.4)	< 0.001 (HS)
Subtotal Cardiac Domain	–	40.8%	57.3%	31.7%	< 0.001 (HS)
Choking Management	Situation identification	198 (75.0)	81 (86.2)	117 (68.8)	0.002 (S)
	First aid for conscious choking	138 (52.3)	68 (72.3)	70 (41.2)	< 0.001 (HS)
	First symptom of choking	118 (44.7)	58 (61.7)	60 (35.3)	< 0.001 (HS)
Subtotal Choking Domain	–	57.3%	73.4%	48.4%	< 0.001 (HS)
Trauma Management	Control bleeding	133 (50.4)	63 (67.0)	70 (41.2)	< 0.001 (HS)
	Nasal bleeding management	111 (42.0)	56 (59.6)	55 (32.4)	< 0.001 (HS)
	Head injury care	154 (58.3)	71 (75.5)	83 (48.8)	< 0.001 (HS)
	Fracture management	127 (48.1)	61 (64.9)	66 (38.8)	< 0.001 (HS)
Subtotal Trauma Domain	–	49.7%	66.8%	40.3%	< 0.001 (HS)
General Emergencies	Rescue breathing indication	136 (51.5)	66 (70.2)	70 (41.2)	< 0.001 (HS)

	Fainting management	140 (53.0)	69 (73.4)	71 (41.8)	< 0.001 (HS)
Subtotal General Domain	–	52.3%	71.8%	41.5%	< 0.001 (HS)

Note: HS = highly significant ($p < .01$); S = significant ($p < .05$). Chi-square tests used for categorical comparisons between trained and untrained groups.

Discussion

The present study was conducted to assess and compare the level of basic first aid knowledge among teachers working in public, private, and international primary schools in Erbil City during the academic year 2024–2025. Overall, the results revealed that teachers demonstrated variable knowledge levels across different first aid domains, with international school teachers achieving the highest scores, followed by public school teachers, while private school teachers showed the lowest performance. Additionally, formal basic first aid training emerged as the most significant factor influencing knowledge levels across all participant groups.

Teachers serve as the first line of response during medical emergencies in school settings, making their preparedness crucial for student safety and well-being (McBrayer et al., 2020, Osegbue, 2025). However, many educational systems worldwide lack comprehensive requirements for teachers to possess adequate first aid knowledge and skills (Neyişci, 2024). The gap between the frequency of school emergencies and teachers' preparedness to handle them effectively represents a significant public health concern. Limited research exists on first aid knowledge among teachers in the Kurdistan Region of Iraq, particularly comparing different school types. The significance of addressing this knowledge gap extends beyond individual schools to encompass broader educational policy and student safety standards. Given the importance of these details, we aimed to assess and compare the level of basic first aid knowledge among teachers working in public, private, and international primary schools in Erbil City.

The demographic profile of our study participants, predominantly female teachers with college-level education and moderate teaching experience, reflects the typical composition of primary school teaching workforce in the region. The higher representation of female teachers aligns with global trends in primary education, where women constitute the majority of the teaching force in most countries (Stromquist, 2018, Wotipka et al., 2018). This demographic pattern is consistent with findings from similar studies conducted in various educational systems worldwide, where female predominance in primary

education has been consistently observed across different cultural and socioeconomic contexts (Early et al., 2020).

The age distribution and educational qualifications of participants in our study correspond well with international standards for primary school teachers. The majority of teachers falling within the younger age brackets and holding college degrees suggests a relatively well-educated teaching workforce with contemporary training (Rury and Hurst, 2022). However, the limited representation of teachers with advanced degrees may reflect regional educational policies and requirements that differ from some developed countries where higher qualifications are increasingly demanded for teaching positions. The predominance of language specialists among participants reflects the emphasis placed on linguistic competencies in primary education curricula across different school types (Kaldarova et al., 2024).

Our findings regarding teachers' exposure to emergency situations in schools reveal that the vast majority had encountered medical emergencies, with student collisions and falls being the most frequent incidents. This high prevalence of emergency situations underscores the critical importance of adequate first aid preparedness among teaching staff. The consistency of these findings with international research demonstrates that school-based medical emergencies are a universal concern, regardless of geographic location or educational system type (Gereige et al., 2022, Early et al., 2020). The widespread availability of first aid boxes in schools, as observed in our study, indicates institutional awareness of emergency preparedness, though the presence of equipment alone does not guarantee effective utilization without proper knowledge and training (Ilo et al., 2018).

The pattern of emergency incidents observed in our study, particularly the predominance of trauma-related situations such as collisions and falls, mirrors findings from educational settings worldwide (Meral and KOBYA BULUT, 2024). This similarity suggests that certain types of accidents are inherent to the school environment and child behavior patterns, transcending cultural and regional differences. However, the specific frequencies and contexts of these emergencies may vary depending on factors such as school infrastructure, supervision policies, and playground safety measures (Shah et al., 2020). The recognition of these common emergency patterns provides a foundation for



developing targeted first aid training programs that address the most likely scenarios teachers will encounter in their professional practice (Neyişci, 2024).

The assessment of teachers' basic first aid knowledge revealed significant variations across different domains and specific skills. The relatively high accuracy in recognizing airway obstruction signs represents a positive finding, as this knowledge is crucial for immediate life-saving interventions (Galway et al., 2023). However, the concerning gaps identified in cardiac arrest management and resuscitation techniques highlight critical areas where additional training is urgently needed. These knowledge deficits are particularly alarming given that cardiac emergencies in children, though less common than in adults, require immediate and appropriate intervention to prevent fatal outcomes (Kleinman et al., 2018). The pattern of knowledge distribution observed in our study reflects the complexity of first aid education and the need for comprehensive, systematic training approaches (Parada-Espinosa et al., 2025).

The weak performance in specific technical areas such as compression-to-ventilation ratios and proper management of common emergencies like nosebleeds indicates that teachers may lack the detailed procedural knowledge necessary for effective emergency response. These findings align with research from other educational settings that have identified similar knowledge gaps among teaching staff (Peters et al., 2019, Alemu et al., 2021). The variation in knowledge levels across different first aid domains suggests that teachers may have acquired fragmented information through informal sources rather than systematic training programs (Galway et al., 2023, Shah et al., 2020). This piecemeal approach to first aid knowledge acquisition may result in dangerous misconceptions or inappropriate emergency responses that could potentially harm students rather than help them.

Despite the valuable insights provided by this study, several limitations should be acknowledged. The cross-sectional design limits the ability to assess knowledge retention over time or the long-term effectiveness of training programs. Additionally, the study focused on a specific geographic region, which may limit the generalizability of findings to other educational contexts with different resources, policies, or cultural factors. Future research should consider longitudinal designs to evaluate knowledge maintenance and implement intervention studies to assess the effectiveness of different training approaches. Moreover, investigating the relationship between teachers' first aid knowledge and actual emergency response outcomes could provide crucial evidence for policy development and resource allocation in educational

emergency preparedness programs.

Conclusion

The study demonstrated that primary school teachers in Erbil generally had fair knowledge of basic first aid, with training being the strongest predictor of higher knowledge. Expanding practical and theory-based training programs is essential to equip teachers with adequate first aid skills, ensuring student safety and effective management of school emergencies. These findings highlight the urgent need for integrating structured first aid training into teacher preparation curricula and ongoing professional development. Moreover, collaboration between the Ministry of Education and health authorities could play a critical role in standardizing first aid education and ensuring the availability of essential resources such as first aid kits in all schools. Strengthening teachers' competence in first aid not only improves emergency response but also contributes to creating safer learning environments and fostering a culture of preparedness within the school system.

Statements and Declarations

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Competing Interests The authors declare no conflict of interest.

Ethics Statement Formal approval was obtained from the Undergraduate Research Committee of the College of Nursing, Hawler Medical University, under approval number 11, dated July 2023, and submitted to the General Directorate of Education in Erbil City.

Data Availability Statement The data that support the findings of this study are available from the corresponding author upon reasonable request.

Patient consent statement Oral informed consent was obtained from all participants before they filled out the questionnaires.

Clinical trial registration This study did not constitute a clinical trial and therefore did not require registration.

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Author Contributions Jawdat Mamand Alhagbaker: conceptualization; data curation; methodology; writing—original draft; Visualization; writing—review & editing. Jihad Haji Saleh: conceptualization; formal analysis; investigation; methodology; project administration; supervision; writing—review & editing.

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