



## Knowledge of Risk Factors and Preventive Measures for Traumatic Dental Injuries among In-School Adolescents in Ondo West Local Government Area, Ondo State, Nigeria

Joshua O. Oluwafemi<sup>1\*</sup>, Arokoyo E. Jacob<sup>2</sup>, Phina C. Ezeagwu<sup>1</sup>,  
Adesegun N. Osijirin<sup>1</sup>, Esther O. Bosede<sup>1</sup>

<sup>1</sup>Department of Public Health, Federal University of Allied Health Sciences, Enugu, Nigeria\*<sup>1</sup>

<sup>2</sup>Department of Sociology, Federal University, Lokoja.

\*Corresponding author: Joshua O. Oluwafemi; E-mail: femijosh8@gmail.com

### Abstract

Traumatic dental injuries (TDIs) can produce lasting functional, aesthetic, psychological, and social effects in adolescents. A descriptive cross-sectional survey involved 97 adolescents selected through proportionate stratified sampling. Data were collected with the Knowledge of Risk Factors and Preventive Measures for Traumatic Dental Injuries Questionnaire (KRFPMTDIQ; Cronbach's alpha = .75) and analysed in IBM SPSS Statistics version 26 using frequencies, percentages, and chi-square tests at the .05 level. Respondents demonstrated strong recognition of common risk factors, although knowledge patterns varied by age and gender. Risk-factor knowledge was significantly associated with age (chi-square = 23.61, df = 3,  $p < .001$ ) and gender (Yates-corrected chi-square = 28.51, df = 1,  $p < .001$ ). Preventive-measure responses varied across age groups. The available aggregate dataset did not report preventive-measure frequencies by gender; therefore, no unsupported gender-specific preventive comparison was made. The Ondo State Ministry of Education, school authorities, and oral-health professionals should implement age-responsive school oral-health education and ensure that future monitoring captures gender-disaggregated preventive knowledge to correct identified gaps and strengthen preventive behaviour among adolescents.

**Keywords:** Adolescents, Knowledge, Oral health, Preventive measures, Traumatic dental injuries

### Introduction

Traumatic dental injuries (TDIs) are a substantial yet often overlooked oral-health problem. Globally, more than one billion people have experienced a TDI, with children and adolescents carrying a considerable share of the burden (Petti et al., 2018; World Health Organization [WHO], 2022). TDIs occur suddenly and may cause pain, pulp injury, discoloration, tooth loss, impaired speech or mastication, altered appearance, and reduced quality of life. Their treatment can also be prolonged and costly (Bourguignon et al., 2020; Levin et al., 2020).

Adolescents are exposed to TDI through falls, collisions, contact sports, playground incidents, road traffic crashes, violence, and unsafe environments. Anatomical factors and inadequate supervision may further increase risk (Glendor, 2008; Okolo et al., 2022). Because adolescents spend much of their time at school, knowledge of risk situations and



protective actions is important for avoiding injuries and obtaining prompt care when injuries occur.

Preventive measures include safe playgrounds, appropriate supervision, adherence to school safety rules, use of properly fitted mouthguards and helmets during relevant activities, and timely referral after injury. International guidelines emphasise immediate and appropriate management to reduce complications (Bourguignon et al., 2020; Levin et al., 2020). Evidence from youth sport also shows that knowledge and use of mouthguards remain uneven, supporting the need for targeted education (Shore & O'Connell, 2021).

Knowledge gaps are not confined to adolescents. Studies among students and schoolteachers have reported limited preparedness for dental-trauma prevention and emergency response (Almulhim, 2022; Gaffar et al., 2021; Ivkošić et al., 2020). A systematic review likewise found inadequate knowledge among schoolteachers internationally (Tewari et al., 2020). However, education can improve knowledge and self-reported practice, which supports school-based interventions delivered jointly by educators and oral-health professionals (Razeghi et al., 2019).

Nigerian evidence confirms that TDIs affect school-aged children and adolescents in different settings and arise from preventable causes (Eigbobo & Orikpete, 2020; Okolo et al., 2022; Osadolor, 2024; Udoeye, 2006). Related Nigerian studies also underscore the importance of adolescent oral-health promotion, safer behaviour, and preparedness among adults who supervise children (Azodo & Ehizele, 2013; Osadolor et al., 2021; Osadolor & Onyejaka, 2022). Nevertheless, evidence on adolescents' own knowledge of both risk factors and preventive measures in Ondo West LGA remains limited.

Accordingly, this study assessed knowledge of TDI risk factors and preventive measures among in-school adolescents in Ondo West LGA and examined demographic patterns supported by the reported data. Specifically, the study described respondents' age and gender, assessed risk-factor knowledge by age and gender, described preventive-measure knowledge by age, and tested the associations of age and gender with risk-factor knowledge.

## **Methods**

### **Study design and setting**

A descriptive cross-sectional survey was conducted in selected public schools in Ondo West Local Government Area, Ondo State, Nigeria. Ondo West includes urban and peri-urban communities, and its schools provide an appropriate setting for examining adolescents' knowledge of injuries that may occur during learning, play, travel, and sports.

### **Study population**

The study population comprised in-school adolescents aged 10-19 years who were enrolled in the selected schools during the study period. Adolescents within the specified age range who were present during data collection and provided assent, together with parent or guardian informed consent where applicable, were eligible. Adolescents who were absent, outside the age range, or unable to complete the questionnaire were excluded.



## **Sample size and sampling technique**

The minimum sample size was determined as 97 using a finite-population sample-size approach. Proportionate stratified sampling was used to allocate the sample across the selected schools, after which eligible adolescents were selected within the school strata. All 97 completed questionnaires were included in the analysis.

## **Data collection instrument**

Data were collected with a structured, self-administered instrument named the Knowledge of Risk Factors and Preventive Measures for Traumatic Dental Injuries Questionnaire (KRFPMTDIQ). Section A obtained age and gender; Section B assessed recognition of settings and risk factors associated with TDIs; and Section C assessed knowledge of protective equipment, school safety measures, the effectiveness of helmets and mouthguards, and responsibility for prevention. Knowledge items were coded as correct/knowledgeable (1) or incorrect/not knowledgeable (0), as applicable. Experts in dental public health and health education reviewed the instrument for face and content validity. The instrument demonstrated acceptable internal consistency (Cronbach's alpha = .75).

## **Data collection procedure**

Ethical approval was obtained from the Department of Public Health Ethical Committee, Federal University of Allied Health Sciences, Enugu (approval code: 20250908). Permission was obtained from the relevant education authorities and school principals. The study purpose, voluntary nature, potential benefits, and absence of penalty for non-participation were explained to participants. Written informed consent was obtained from parents or guardians where applicable, and assent was obtained from adolescent participants. Questionnaires carried no personal identifiers; responses were handled confidentially and reported only in aggregate form.

## **Data analysis**

Completed questionnaires were coded and analysed in IBM SPSS Statistics version 26. Frequencies and percentages described respondents and summarised multiple-response knowledge items. Knowledge scores were interpreted as very low (<20%), low (20%-39%), moderate (40%-59%), high (60%-79%), or very high ( $\geq 80\%$ ). Pearson's chi-square test examined the association between age and risk-factor knowledge, while the Yates continuity correction was retained for the 2 x 2 association between gender and risk-factor knowledge. Statistical significance was set at alpha = .05; p values smaller than .001 are reported as  $p < .001$  rather than  $p = .000$ . Preventive-measure knowledge was analysed descriptively by age; inferential testing by gender was not performed because the aggregate dataset did not contain the required gender-disaggregated frequencies.



## Results

**Table 1: Age and Gender of Respondents (n = 97)**

| Variable    | n  | %    |
|-------------|----|------|
| Gender      |    |      |
| Male        | 60 | 61.9 |
| Female      | 37 | 38.1 |
| Age (years) |    |      |
| 10-12       | 10 | 10.3 |
| 13-15       | 50 | 51.5 |
| 16-18       | 20 | 20.6 |
| 19          | 17 | 17.5 |

Table 1 shows that most respondents were male. The largest age group was 13-15 years, while those aged 10-12 years formed the smallest group.

**Table 2: Knowledge of Preventive Measures for Traumatic Dental Injuries by Age ( n = 97)**

| Preventive-measure item                          | 10-12 (n = 10) | 13-15 (n = 50) | 16-18 (n = 20) | 19 (n = 17) |
|--------------------------------------------------|----------------|----------------|----------------|-------------|
| Protective equipment: helmet                     | 5 (50.0)       | 23 (46.0)      | 10 (50.0)      | 3 (17.6)    |
| Protective equipment: clothing                   | 2 (20.0)       | 3 (6.0)        | 3 (15.0)       | 2 (11.8)    |
| Protective equipment: face mask                  | 8 (80.0)       | 32 (64.0)      | 4 (20.0)       | 6 (35.3)    |
| Protective equipment: mouthguard                 | 1 (10.0)       | 2 (4.0)        | 2 (10.0)       | 1 (5.9)     |
| Protective equipment: handkerchief               | 0 (0.0)        | 0 (0.0)        | 0 (0.0)        | 0 (0.0)     |
| School measure: proper supervision               | 3 (30.0)       | 30 (60.0)      | 10 (50.0)      | 5 (29.4)    |
| School measure: protective equipment             | 5 (50.0)       | 30 (60.0)      | 10 (50.0)      | 5 (29.4)    |
| School measure: soft playing surface             | 1 (10.0)       | 30 (60.0)      | 15 (75.0)      | 12 (70.6)   |
| School measure: safe play with peers             | 4 (40.0)       | 26 (52.0)      | 12 (60.0)      | 8 (47.1)    |
| Helmets/mouthguards perceived effective          | 6 (60.0)       | 15 (30.0)      | 9 (45.0)       | 10 (58.8)   |
| Helmets/mouthguards perceived very effective     | 6 (60.0)       | 12 (24.0)      | 18 (90.0)      | 12 (70.6)   |
| Helmets/mouthguards perceived somewhat effective | 3 (30.0)       | 26 (52.0)      | 5 (25.0)       | 13 (76.5)   |
| Helmets/mouthguards perceived slightly effective | 7 (70.0)       | 15 (30.0)      | 2 (10.0)       | 8 (47.1)    |
| Helmets/mouthguards perceived not effective      | 1 (10.0)       | 2 (4.0)        | 0 (0.0)        | 2 (11.8)    |
| Responsible person: teachers                     | 9 (90.0)       | 40 (80.0)      | 17 (85.0)      | 10 (58.8)   |



| Preventive-measure item                   | 10-12 (n = 10) | 13-15 (n = 50) | 16-18 (n = 20) | 19 (n = 17) |
|-------------------------------------------|----------------|----------------|----------------|-------------|
| Responsible person: students              | 2 (20.0)       | 20 (40.0)      | 9 (45.0)       | 8 (47.1)    |
| Responsible person: school administration | 8 (80.0)       | 35 (70.0)      | 12 (60.0)      | 11 (64.7)   |
| Responsible person: parents               | 9 (90.0)       | 45 (90.0)      | 15 (75.0)      | 13 (76.5)   |
| Responsible person: friends               | 2 (20.0)       | 10 (20.0)      | 5 (25.0)       | 13 (76.5)   |

*Note. Values are n (% within age group). Percentages were recalculated from the reported frequencies. Items allowed multiple responses; therefore, percentages within a group do not sum to 100.*

Table 2 shows that knowledge of preventive measures varied by age and by item. Recognition of supervision, protective equipment, soft playing surfaces, and the preventive responsibilities of teachers, school administrators, and parents was evident across several age groups. Mouthguard recognition remained low in every age group, indicating a specific prevention gap.

**Table 3: Knowledge of Risk Factors for Traumatic Dental Injuries by Gender (n= 97)**

| Risk-factor item                       | Male (n = 60) | Female (n = 37) |
|----------------------------------------|---------------|-----------------|
| Likely location: school                | 56 (93.3)     | 35 (94.6)       |
| Likely location: home                  | 49 (81.7)     | 20 (54.1)       |
| Likely location: playground            | 59 (98.3)     | 37 (100.0)      |
| Likely location: field                 | 50 (83.3)     | 28 (75.7)       |
| Likely location: near a wall           | 52 (86.7)     | 13 (35.1)       |
| Risk factor: lack of supervision       | 58 (96.7)     | 30 (81.1)       |
| Risk factor: unsafe school environment | 49 (81.7)     | 17 (45.9)       |
| Risk factor: contact sports            | 52 (86.7)     | 32 (86.5)       |
| Risk factor: walking                   | 41 (68.3)     | 10 (27.0)       |
| Risk situation: falling                | 53 (88.3)     | 25 (67.6)       |
| Risk situation: collision              | 56 (93.3)     | 30 (81.1)       |
| Risk situation: sports activity        | 45 (75.0)     | 15 (40.5)       |
| Risk situation: playground accident    | 52 (86.7)     | 17 (45.9)       |
| Risk situation: fights                 | 45 (75.0)     | 15 (40.5)       |
| Risk situation: housing                | 35 (58.3)     | 5 (13.5)        |
| Risk situation: violence               | 54 (90.0)     | 28 (75.7)       |

*Note. Values are n (% within gender). Items allowed multiple responses.*

Table 3 shows that both male and female respondents commonly recognised the playground, school, collisions, lack of supervision, and violence as risk contexts or factors. The overall reported risk-factor knowledge score was very high among males and high among females.



**Table 4: Chi-Square Tests of Risk-Factor Knowledge by Age and Gender**

| Group          | N  | Knowledgeable, n | Not knowledgeable, n | Test result                                |
|----------------|----|------------------|----------------------|--------------------------------------------|
| Age: 10-12     | 10 | 2                | 8                    | chi-square = 23.61; df = 3; p < .001       |
| Age: 13-15     | 50 | 38               | 12                   |                                            |
| Age: 16-18     | 20 | 10               | 10                   |                                            |
| Age: 19        | 17 | 3                | 14                   |                                            |
| Gender: Male   | 60 | 46               | 14                   | Yates chi-square = 28.51; df = 1; p < .001 |
| Gender: Female | 37 | 7                | 30                   |                                            |

*Note. The age table was corrected so each row sums to its reported group N; the resulting Pearson chi-square was recomputed. The Yates continuity correction was retained for gender, consistent with this manuscript.*

Table 4 shows that risk-factor knowledge differed significantly across age groups and between male and female respondents. The null hypotheses of no age-related and no gender-related difference were therefore rejected.

**Table 5: Summary of Available Preventive-Measure Knowledge Evidence by Age and Gender**

| Dimension | Analysis supported by available data                                                          | Result                                                                                            |
|-----------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Age       | Item-level descriptive analysis across four age groups (Table 2)                              | Recognition varied by age and preventive item; mouthguard recognition was low in every age group. |
| Gender    | No gender-disaggregated preventive-measure frequencies were reported in the aggregate dataset | A valid gender comparison or chi-square test could not be derived; no inferential claim was made. |

*Note. Only analyses supported by the reported aggregate frequencies are presented. Gender-specific preventive counts and test statistics were not estimated or imputed.*

Table 5 shows that the available aggregate data permitted age-specific descriptive analysis of preventive-measures knowledge but did not contain gender-specific preventive frequencies. Accordingly, no inferential conclusion about gender differences in preventive-measure knowledge was made.

## Discussion

The study showed that adolescents recognised many common settings and behaviours associated with TDIs, including playground incidents, collisions, inadequate supervision, unsafe school environments, sports, and violence. This breadth of recognition is encouraging because awareness of risk is a first step toward avoidance and prompt response. It is also consistent with Nigerian studies that identify falls, School or home environments, and other preventable exposures as important contributors to TDI (Eigbobo & Orikpete, 2020; Okolo et al., 2022; Osadolor, 2024). The implication is that school health programmes can build on familiar experiences while correcting misconceptions about less obvious risks.

Risk-factor knowledge differed across age groups. Adolescents in the middle age categories were more often classified as knowledgeable than the youngest group and the relatively small



group aged 19 years. This pattern may reflect differences in exposure to health information, school level, cognitive maturity, or participation in activities where safety guidance is provided. Okolo et al. (2022) demonstrated the relevance of risk-factor assessment among younger Nigerian schoolchildren; the present finding extends the concern by showing that age-related knowledge differences must be considered when education is designed. The health-promotion implication is that a single undifferentiated message may not meet the needs of every age group.

Male respondents showed stronger risk-factor knowledge than female respondents. This may reflect gendered differences in participation in outdoor or contact activities and therefore in exposure to safety information. However, knowledge should not be interpreted as equivalent to injury prevalence or safe practice. Osadolor (2024), for example, reported no gender difference in observed TDI occurrence in a rural Nigerian sample. The contrast reinforces the need to present gender-disaggregated knowledge and behavioural data rather than assuming that the group with greater exposure is automatically better protected.

Knowledge of preventive measures was uneven across age groups. Many respondents recognised supervision, safer surfaces, protective equipment, and shared responsibility among teachers, parents, students, and school administrators, but mouthguard recognition was consistently low. This finding is important because mouthguards are a practical component of sports-related injury prevention, yet their uptake and understanding among young athletes can remain limited (Shore & O'Connell, 2021). School-based instruction should therefore move beyond general safety messages and demonstrate when and how appropriate protective devices are used.

A gender-specific comparison of preventive-measure knowledge could not be reproduced from the aggregate manuscript tables because gender-disaggregated preventive frequencies were unavailable. This prevents a defensible conclusion about whether male and female adolescents differed in preventive knowledge. Future data collection and reporting should preserve the item-level gender crosstabs needed to identify whether prevention messages require gender-specific adaptation.

The generally favourable recognition of common risks in this study differs from reports of limited emergency-management knowledge among university students and schoolteachers (Gaffar et al., 2021; Ivkošić et al., 2020; Tewari et al., 2020). The apparent difference may arise because the present questionnaire emphasised recognition of risk factors and preventive measures, whereas many earlier studies tested technically demanding emergency actions such as handling an avulsed tooth. This methodological distinction is important: awareness of causes does not establish competence in emergency management. Regular, focused education remains necessary, and evidence indicates that structured school interventions can improve knowledge and self-reported practice (Razeghi et al., 2019).

The study is limited by its cross-sectional design, reliance on self-reported questionnaire responses, small subgroup sizes, and restriction to selected public schools in one LGA. Multiple-response items also describe recognition rather than verified behaviour. In addition, the aggregate dataset did not include gender-disaggregated preventive-measure frequencies, so gender differences in preventive knowledge could not be tested. These limitations reduce causal inference and generalisability, but the findings provide locally relevant evidence for age-responsive oral-health promotion and improved gender-disaggregated monitoring.



## Conclusion

In-school adolescents in Ondo West LGA recognised many TDI risk factors and preventive measures, but important gaps remained. Risk-factor knowledge differed significantly by age and gender, and recognition of preventive measures varied across age groups, particularly for mouthguards. The available aggregate results did not support a separate conclusion about gender differences in preventive-measure knowledge. The findings support targeted school oral-health education that combines age-appropriate risk communication with practical prevention guidance and strengthens gender-disaggregated monitoring.

## Recommendations

1. The Ondo State Ministry of Education and school authorities should integrate age-appropriate TDI risk and prevention content into school health education for adolescents, with additional support for groups showing lower knowledge, to reduce avoidable injuries.
2. Local government oral-health teams and school administrators should organise termly demonstrations for students on mouthguards, helmets, safe play, and prompt referral, so that general awareness is converted into practical preventive behaviour.
3. Oral-health professionals should train teachers and provide concise information materials for parents, enabling both groups to reinforce safety messages and respond appropriately when adolescents sustain dental injuries.
4. School health coordinators should periodically assess students' knowledge by age and gender and use the findings to refine education for the specific groups and preventive topics that remain weak.

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