ORIGINAL RESEARCH

# Lifetime Experience of Childhood Abuse and Neglect Among High School Students at Debre Tabor Town, South Gondar Zone, Northwest Ethiopia: An Institution-Based Cross-Sectional Study

Demewoz Kefale [1], Mastewal Endalew[2], Worku Necho Asferie [3], Solomon Demis [3], Tigabu Munye [4], Yohannes Tesfahun [5], Amare Simegn[6], Mahilet Wondim[7], Amare Kassaw [1], Gashaw Kerebeh[1], Demeke Mesfin Belay [1], Binyam Minuye [3], Shegaw Zeleke [4]

[1]Department of Pediatrics and Child Health Nursing, College of Health Sciences, Debre Tabor University, Debre Tabor, Ethiopia; [2]Department of Environmental and Occupational Health and Safety, Institute of Public Health, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia; [3]Department of Maternal and Neonatal Health Nursing, College of Health Science, Debre Tabor University, Debre Tabor, Ethiopia; [4]Department of Adult Health Nursing, College of Health Sciences, Debre Tabor University, Debre Tabor, Ethiopia; [5]Department of Emergency and Critical Health Nursing, College of Health Sciences, Debre Tabor University, Debre Tabor, Ethiopia; [6]Department of Reproductive Health, College of Health Sciences, Debre Tabor University, Debre Tabor, Ethiopia; [7]Department of Midwifery, South Gondar Zone Health Office, Debre Tabor, Ethiopia

Correspondence: Demewoz Kefale, Tel +251920253332, Email demewozk@yahoo.com

**Background:** Childhood abuse and neglect is defined as any intentional harm or mistreatment of a child that results in actual or potential harm to the child's health, survival and development. It has been linked to an increased risk of a wide range of serious short- and long-term medical and mental health problems. Although it is a complex societal issue, it receives limited research attention in the area.

**Objective:** To assess lifetime prevalence of childhood abuse and neglect among high school students in Debre Tabor town, south Gondar Zone, Northwest Ethiopia, 2022.

**Methods:** A cross-sectional study design was used to assess 423 high school students, chosen through a systematic sampling technique. Data were collected using a pre-tested, structured and self-administered international child abuse screening tool, child version (ICAST-C). The effect of independent variables on the outcome variable was explored using logistic regression analyses. The level of significances were determined using an odds ratio with a 95% confidence interval.

**Results:** Of the 423 study participants, 84.4% had lifetime experience of childhood abuse and neglect. Being female (AOR=4.5, 95% CI: 2.38, 8.60), parental marital status (AOR=5.4, 95% CI: 1.07, 27.3), illiteracy of father (AOR=1.65, 95% CI: 4.5, 6.03), birth order (AOR=4.5, 95% CI: 1.57, 13.0), open family discussion of sexual matters (AOR=0.37, 95% CI:1.74, 7.86), and watching pornography (AOR=0.08, 95% CI: 0.02, 0.40) were significantly associated with lifetime experience of childhood abuse and neglect.

**Conclusion:** Lifetime experience of childhood abuse and neglect was high as compared with previous studies. Being female, parental marital status, illiterate fathers, watching pornography, and open family discussion of sexual matters were predictors of childhood abuse and neglect. Dealing with this issue should be considered an integral component of high school students' care, including parental education and respite care.

**Keywords:** childhood abuse, neglect, high school students, ICAST-C

## Introduction

Childhood abuse and neglect is defined as any intentional harm or mistreatment of a child that results in actual or potential harm to the child's health, survival, development, and dignity.[1,2] Child abuse and neglect can be emotional,

**3991**

sexual, and physical.[3] Children may be abused and neglected by both adults and other children in the form of intentional or unintentional acts that frequently result in omission of care or commission of abuse.[4–6]

Child abuse and neglect has affected 120 million young women under the age of 20.[7–9] Every year, 4–16% of children are physically abused, and one in ten is neglected or psychologically abused. During childhood, 5–10% of girls and up to 5% of boys are exposed to penetrative sexual abuse, and up to three times this number are exposed to any type of sexual abuse in high-income countries.[10,11] Physical and sexual abuse and child neglect account for 41.5, 28.4, and 4.5% of cases, respectively).[12]

The pooled prevalence of multi-type child abuse is 97.6%, whereas the prevalence of physical, emotional, and sexual abuse is 82.1, 21.8 and 24.7%, respectively.[13] Child sexual abuse prevalence is 29.8%, and is higher for females (37.8%) than males (21.2%) in Egypt[7]; in Ethiopia it is 34.9%.[8] Based on a systematic review conducted in developing countries, school-based and community-level strategies and interventions to avert childhood abuse and neglect are necessary.[9,10]

Globalization and modern technology may increase the risk of abuse and neglect, which is caused by the interaction of multiple forces such as parental background, socioeconomic environment, family structure or family relationships, and child characteristics.[11] It is frequently an indicator of family problems that have devastating effects on those concerned, which are not only visible in the lives of the victimized children but whose long-term effects are also a burden for society in general.[12]

Childhood abuse and neglect has been linked to an increased risk of diabetes, malnutrition, functional limitations, brain damage, pulmonary disease, and cancer.[14] Not only that, but it also causes long- and short-term problems such as delinquency, unwanted pregnancy, abortion, sexually transmitted infections (STIs), human immunodeficiency virus (HIV), substance abuse, and school failure, all of which can have long-term consequences for their future life.[15,16] Abused and neglected children frequently suffer from injuries such as cuts, burns, broken bones, and stress, which can disrupt early brain development and harm the development of nervous and immune systems, increasing the risk of various health threats such as alcoholism, depression, post-traumatic stress disorder (PTSD), drug abuse, anxiety, eating disorders, obesity, high-risk sexual behaviors, smoking, suicide, and chronic diseases.[14,17–19]

Despite various efforts to prevent and respond to child abuse and neglect, such as life skills training, gender and reproductive health education, the Child Abuse Prevention and Treatment Act, parental reconciliation with their own childhood history of abuse,[20] and psychosocial interventions, the impact of childhood abuse and neglect resonates in all areas of health. Furthermore, the prevalence and factors associated with lifetime experience of childhood abuse and neglect have not been well-documented in low-income populations, particularly in Ethiopia.[21] This study provides baseline data on the prevalence of and possible factors for childhood abuse and neglect in the study area for program managers, policy makers and researchers responsible for the design, proper implementation and evaluation of programs to reduce childhood abuse and neglect. Assessing the prevalence and associated factors of lifetime experience of childhood abuse and neglect among high school students in Debre Tabor town, South Gondar zone is critical.

## Methods
### Study Design, Setting and Period
A cross-sectional study was conducted among high school students at Debre Tabor town, Northwest Ethiopia from February 30 to April 30 2022.

### Source and Study Population
The source population consisted of all Debre Tabor town high school students enrolled in the academic year 2021/2022. The students from a selected high school class in Debre Tabor town during the academic year 2021/2022 were the study population. Students who were unable to respond due to serious illness were excluded from the study.

**3992**

Journal of Multidisciplinary Healthcare 2023:16

## Sample Size Determination and Sampling Technique

The sample size was calculated using a single population proportion formula with the following assumptions: the proportion of children abused and neglected in high school is 50%, the confidence level is 95%, the margin of error is 5%, and the non-response rate is 10%. The final sample size was 423 study participants, with each person chosen using a systematic sampling method. There are three high schools in the area, and the number of students in each was determined using a proportional sample size allocation. Six BSc nurses who collected data and three MSc supervisors were trained.

## Data Collection and Measurements

A pre-tested and structured self-administered questionnaire was adapted from various sources.[11,22,23] The questionnaire was written in English, translated into Amharic by a language expert, and then back-translated into English by a second language expert to ensure consistency. Participants who met the inclusion criteria and agreed to participate were recruited. The questionnaires had four sections: socio-demographic characteristics, student characteristics questionnaire, parental or family-related characteristics, and the international childhood abuse screening tool, child version (ICAST-C). The ICAST-C can assess lifetime prevalence of childhood abuse.[24] The translated questionnaire was pre-tested among 22 (5%) Mekaneyesus high school students two weeks before actual data collection, and minor changes were made. Participants who met the inclusion criteria and provided consent were invited to sign the informed consent after a brief explanation of the study's objective and scope.

## Operational Definitions

Physical abuse is the intentional use of physical force against a child that results in harm. Sexual abuse can be defined as the involvement of a child in sexual activity that he or she does not fully comprehend or is not developmentally prepared for or that violates the laws or social taboos of society. Emotional abuse is inappropriate verbal or symbolic acts towards a child. Child neglect refers to isolated incidents as well as a pattern of failure over time on the part of a parent or other family member to provide for the development and wellbeing of the child. Each form of abuse is measured using ICAST-C criteria with dichotomized responses, "Yes" or "No"; if a child responds "yes" more than or equal to one, she/he was abused for each category. For lifetime childhood abuse and neglect, when a child responds "yes" more than or equal to one, she/he was abused and neglected in this category of ICAST-C-29 item questions.

## Data Analysis and Interpretation

The collected data were manually checked for completion, and any questions that were incomplete or misfiled were cleaned and saved for consistency. The data was then coded and entered into EP-data version 4.2 software, which was then transformed into SPSS version 24 for analysis. The descriptive statistic results were presented in the form of text and tables. A binary logistic regression model was used to identify factors associated with lifetime childhood abuse and neglect. Variables with p-values less than 0.25 in the bivariable analysis were included in the multivariable logistic regression analysis. To demonstrate the strength of the relationship, the adjusted odds ratio (AOR) with the corresponding 95% confidence interval (CI) was used.

## **Results**
### Socio-Demographic Characteristics of Students

A total of 423 students were involved in this study, with a response rate of 100%. The mean ± SD of students' ages was 17.3 ±1.5 years. Additionally, more than half of the students (296, 70.0%) were female. Two hundred and thirty-two students (54.8%) lived in urban areas, and the majority (297, 70.2%) lived with their parents. More than half (245, 57.9%) had a parent primary caregiver, and 250 (48.5%) had four to six family members (Table 1).

**Table 1** Socio-Demographic Characteristic of High School Students at Debre Tabor Town, South Gondar Zone, Northwest Ethiopia, 2022 (n=423)

| Variables | Categories | Frequency | Percentage (%) |
|---|---|---|---|
| Age of students (years) | <18 years | 319 | 75.4 |
| | ≥18 years | 104 | 24.6 |
| Sex | Male | 127 | 30 |
| | Female | 296 | 70 |
| Religion | Orthodox | 238 | 56.3 |
| | Protestant | 157 | 37.1 |
| | Muslim | 23 | 5.4 |
| | Other | 5 | 1.2 |
| Residence | Urban | 232 | 54.8 |
| | Rural | 191 | 45.2 |
| Marital status of student | Single | 359 | 84.9 |
| | Widowed | 9 | 2.1 |
| | Married | 47 | 11.1 |
| | Divorced | 8 | 1.9 |
| Family size | 1–3 | 137 | 32.4 |
| | 4–6 | 205 | 48.5 |
| | ≥6 | 74 | 17.5 |
| | Others | 7 | 1.7 |

## Students-Related Factors

The majority of high school students (257, 60.8%) were social media users; more than half (252, 59.6%) did not watch pornography. Two hundred and seventy-three (64.5%) students had a history of alcohol use, and half (209, 49.4%) were the firstborn child in their family (Table 2).

## Parental and Family-Related Factors

Two hundred and fifty-six (60.5%) high school students had fathers who could read and write. Almost 60% had parents as their primary caregivers. Less than half (45.9%) had a single parent. Two hundred and ninety-seven (70.2%) students lived at home with their parents. Furthermore, 238 (56.3%) had open family discussions about sexual matters (Table 3).

**Table 2** Student-Related Factors (n=423)

| Variables | Categories | Frequency | Percentage (%) |
|---|---|---|---|
| Birth order | First | 209 | 49.4 |
| | Middle | 171 | 40.4 |
| | Last | 43 | 10.2 |
| Alcohol drinking | Yes | 273 | 64.5 |
| | No | 150 | 35.5 |
| Cigarette smoking | Yes | 170 | 40.2 |
| | No | 253 | 59.8 |
| Chat chewing | Yes | 158 | 37.4 |
| | No | 265 | 62.6 |
| Watching pornography | Yes | 171 | 40.4 |
| | No | 252 | 59.6 |
| Using social media | Yes | 257 | 60.8 |
| | No | 166 | 39.2 |

**Table 3** Parental-Related Factors (n=423)

| Variables | Categories | Frequency | Percentage (%) |
|---|---|---|---|
| Educational level of father | Cannot read and write | 167 | 39.5 |
| | Can read and write | 202 | 47.8 |
| | Primary school | 18 | 4.3 |
| | High school | 13 | 3.1 |
| | Diploma and above | 23 | 5.3 |
| Educational level of mother | Cannot read and write | 194 | 45.9 |
| | Can read and write | 173 | 40.9 |
| | Primary school | 26 | 6.1 |
| | High school | 21 | 5.0 |
| | Diploma and above | 9 | 2.1 |
| Primary caregiver | Parent | 245 | 57.9 |
| | Relative | 144 | 34.0 |
| | Friend | 27 | 6.4 |
| | Other | 7 | 1.7 |
| Parental loss | Single | 194 | 45.9 |
| | Both | 81 | 19.1 |
| | Both alive | 148 | 35 |
| Type of family currently living with | With parents | 297 | 70.2 |
| | Alone | 91 | 21.5 |
| | With friends | 28 | 6.6 |
| | With adopters | 6 | 1.4 |
| | Others | 1 | 0.2 |
| Marital status of parents | Single | 126 | 29.8 |
| | Widowed | 150 | 35.5 |
| | Married | 135 | 31.9 |
| | Divorced | 12 | 2.8 |
| Parental occupation | Daily laborer | 152 | 35.9 |
| | Government employee | 150 | 35.5 |
| | Farmer | 83 | 19.6 |
| | Merchant | 31 | 7.3 |
| | Student | 1 | 0.2 |
| | Others | 6 | 1.4 |
| Owner of house | Owned | 302 | 71.4 |
| | Rented | 121 | 28.6 |
| Open family discussion on sexual issues | Yes | 238 | 56.3 |
| | No | 185 | 43.7 |

## Prevalence of Lifetime Experience of Childhood Abuse and Neglect

Pooled prevalence of lifetime childhood abuse and neglect accounted for 357 students (84.4%, CI=80.9–87.9) (Figure 1): physical abuse (n=311, 73.5%), emotional abuse (n=304, 71.9%), neglect (n=260, 61.5%), and sexual abuse (n=249, 58.9%), respectively (Figure 2).

## Association Between Independent Variables and Lifetime Experience of Childhood Abuse and Neglect Among High School Students

In bivariate logistic regression analysis, factors that were significantly associated with lifetime experience of childhood abuse and neglect were sex of the student, parental marital status, father's educational level, open family discussion on sexual matters, parental loss, birth order, alcohol drinking, watching pornography, cigarette smoking and social media use. Variables revealed as significant by bivariate analysis were introduced into multiple logistic regression analysis. In multiple logistic

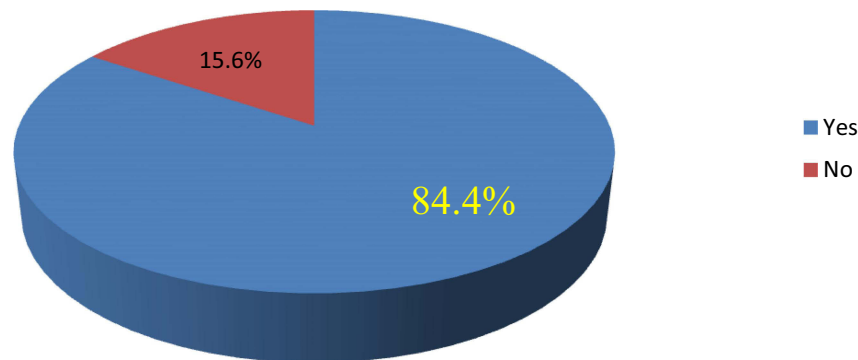## Pooled Prevalence of Lifetime experience of Childhood abuse and neglect



**Figure 1** Pooled prevalence of lifetime experience of childhood abuse and neglect among high school students, Debre Tabor town, South Gondar Zone, Northwest, Ethiopia, 2022.
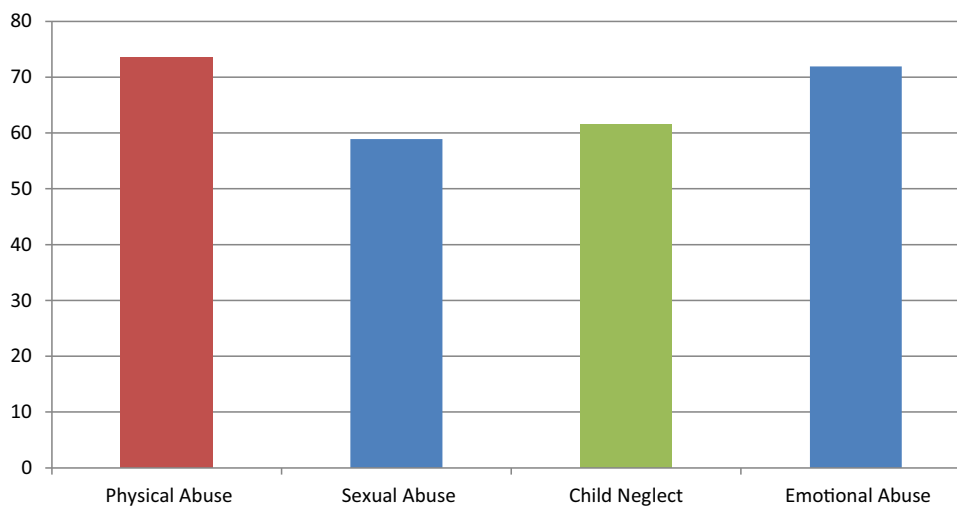


**Figure 2** Types of lifetime experience of childhood abuse and neglect among high school students, Debre Tabor town, South Gondar Zone, Northwest, Ethiopia, 2022. Values are presented as percentages.

regression analysis, sex of the student, parental marital status, open family discussion on sexual matters, birth order, and watching pornography were significantly associated with lifetime experience of childhood abuse and neglect. Female high school students were 4 times more likely to be exposed to childhood abuse and neglect than male high school students (AOR=4.5, 95% CI: 2.38, 8.60). Students who had an unmarried parent were 5 times more likely to be exposed to childhood abuse and neglect than those whose parents were divorced (AOR=5.4, 95% CI: 1.07, 27.3). Students who haduneducated fathers were twice as likely to be exposed to childhood abuse and neglect than those whose fathers had a diploma and above level of education (AOR=1.65, 95% CI: 4.5, 6.03). Similarly, students who were the eldest in their family were five times more likely to be abused and neglected than those who were the youngest (AOR=4.5, 95% CI: 1.57, 13.0). Participants who openly discussed sexual matters with their family were less likely to be exposed to abuse and neglect than those who did not (AOR=0.37, 95% CI: 1.74, 7.86). Finally, students who watched pornography were less likely to be abused and neglected than those who did not(AOR=0.08, 95% CI: 0.02–0.40) (Table 4).

**Table 4** Bivariate and Multivariate Logistic Regression Analysis of Factors Associated with Lifetime Experience of Childhood Abuse and Neglect (n=357)

| Variables | Childhood Abuse | | COR (95% CI) | AOR (95% CI) | P-value |
|---|---|---|---|---|---|
| | Yes, N (%) | No, N (%) | | | |
| Sex | | | | | |
| Male | 88(69.3) | 39(30.7) | - | - | - |
| Female | 267(90.8) | 27(9.2) | 4.4(2.56–7.63) | 4.5(2.38–8.60) | 0.001** |
| Parental marital status | | | | | |
| Unmarried | 111(88.1) | 15(11.9) | 3.7(9.9–13.8) | 5.4(1.07–27.3) | 0.041** |
| Windowed | 130(86.7) | 20(13.3) | 3.3(8.95–11.8) | 4.1(8.1–21.0) | 0.09 |
| Married | 108(80.0) | 27(20.0) | 2.0(5.6–7.1) | 4.97(0.09–22.7) | 0.04 |
| Divorced | 18(81.8) | 4(18.2) | - | - | - |
| Father educational level | | | | | |
| Cannot read & write | 145(86.8) | 22(13.2) | 2.3(6.53–8.3) | 1.65(4.5–6.03) | 0.045** |
| Can read & write | 170(84.2) | 32(15.8) | 1.88(5.1–6.87) | 1.97(0.58–6.65) | 0.28 |
| Primary school | 13(72.2) | 5(27.8) | 0.9(2.29–3.68) | 1.61(0.3–8.6) | 0.58 |
| Secondary school | 12(92.3) | 1(7.7) | 0.42(4.5–39.9) | 5.9(0.48–72.0) | 0.17 |
| Diploma & above | 17(73.9) | 6(26.1) | - | - | - |
| Birth order | | | | | |
| First | 192(91.9) | 17(8.1) | 3.88(1.67–9.05) | 4.5(1.57–13.0) | 0.005** |
| Middle | 133(77.8) | 38(22.2) | 1.2(1.55–2.61) | 2.4(0.94–5.94) | 0.07 |
| Last | 32(74.4) | 11(25.6) | | | |
| Open family discussion on sexual issues | | | | | |
| Yes | 194(81.5) | 44(18.5) | 0.17(0.97–2.92) | 0.37(1.74–7.86) | 0.001** |
| No | 163(88.1) | 22(11.9) | | | |
| Parental loss | | | | | |
| Single | 171(88.1) | 23(11.9) | 1.58(0.86–2.91) | 0.5(0.2–1.3) | 0.15 |
| Both | 64(79.0) | 17(21.0) | 0.8(0.41–1.59) | 0.66(0.24–1.85) | 0.43 |
| Both alive | 122(82.4) | 26(17.6) | | | |
| Alcohol drinking | | | | | |
| Yes | 239(87.5) | 34(12.5) | 1.5(0.31–0.89) | 0.65(0.23–1.46) | 0.297 |
| No | 118(78.7) | 32(21.3) | | | |
| Cigarette smoking | | | | | |
| Yes | 163(95.9) | 7(4.1) | 1.14(0.06–0.32) | 0.9(0.24–3.2) | 0.84 |
| No | 194(76.7) | 59(23.3) | | | |
| Watching pornography | | | | | |
| Yes | 168(98.2) | 3(1.8) | 0.05(0.02–0.17) | 0.08(0.02–0.40) | 0.002** |
| No | 189(75.0) | 63(25.0) | | | |
| Using social media | | | | | |
| Yes | 236(91.8) | 21(8.2) | 0.24(0.14–0.42) | 0.7(0.34–1.45) | 0.34 |
| No | 121(72.9) | 45(27.1) | | | |

**Note**: **P-value <0.01.

# Discussion

The findings of this study showed that the pooled prevalence of lifetime experience of childhood abuse and neglect among high school students was 84.4%. This finding is similar to that of a study conducted in China,[25,26] but lower than that of a study conducted in Iran.[25] Studies conducted in Rome, Canada, China, Egypt, Ethiopia found higher prevalence levels.[15,27–29] These discrepancies might be attributed to socio-cultural variations in study setting, study period, and sample size. Differences in incidence are affected by how the disclosure and reporting of cases are understood in various cultures, parenting type and skill differences that provide higher levels of parental supervision and less opportunity for exposure to abuse and neglect.

This finding revealed that female high school students had a higher prevalence of lifetime experience of childhood abuse and neglect than males, 90.8% and 69.3%, respectively. This could be because females are more

vulnerable to abuse and neglect in our study setting because they are typically used as domestic servants and are child labor victims. Another reason may be that females exhibit early physical maturation, making them appear physically attractive and thus vulnerable to unwanted seduction by older and more experienced males; they are also perceived as being responsible for indoor work and caring for siblings compared to males. Furthermore, it is widely assumed that boys are much more reluctant than girls to disclose abuse and neglect because of the gender stereotype that males are of stronger character. But this finding is inconsistent with that of study conducted in China.[26] This variation might be because child abuse and neglect in China is not seen as a gender-based issue; that is, all children are expected to obey their parents, and parents apply strict discipline.

This study revealed that high school students who had unmarried parents were more likely to be exposed to childhood abuse and neglect than others. This implies that children of divorced and never-married parents are far more likely to be exposed to childhood abuse and neglect than children with married parents. This is similar to a study conducted in the US.[30] The possible explanation for this might be that parents who have never married are more likely to expose their child to a step-parent who does not have a biological tie to them, which increases the likelihood of that child experiencing domestic violence.[31] Furthermore, the financial dependence of female parents on male parents is likely to have played a role here.

In this study, students with illiterate fathers were more likely to be exposed to childhood abuse and neglect than those with literate fathers; however, this situation is reversed for mothers in other countries. One possible explanation is that fathers are the most common abusers, with mothers coming in second. Also, among families of lower socio-economic status, the expectations and frustrations related to improving the future living conditions of the family generally fall on fathers, who apply strict disciplinary measures in the family. This finding is consistent with those of studies in Pakistan and Ethiopia.[32,33]

High school students who were first in the family birth order were more likely to be exposed to childhood abuse and neglect than those who were last. This finding is inconsistent with a study in Pakistan,[34] probably because first children in a family are the only child for a period of time and receive their parents' full attention during infancy and early childhood, which is not the case for subsequent siblings. But this finding is consistent with an Australian study.[35,36] Because firstborn children provide care for their younger siblings, they are considered to take on a parental role within the family. Families give their first child tasks that are too onerous and also force them into vocations not of their own choice.

High school students who had open family discussions on sexual matters were less likely to be exposed to lifetime childhood abuse and neglect than those who did not(AOR=0.37, 95% CI: 1.74, 7.86, P=0.001). Since families are the primary socializing agent of their children, open discussion about sexual issues can affect family functioning and initiate behaviors to address the child's present emotional needs and affect future behavioral outcomes. Open family discussion about sexual issues provides an opportunity for parents to explore how to navigate talking with their children about sex and relationships. Helping children talk in open and developmentally appropriate ways with their families can prevent potential challenges related to childhood abuse and neglect. This finding is similar to that of a study conducted in the US.[37–39]

Study participants who watched pornography were less likely to be exposed to childhood abuse and neglect than those who did not (AOR=0.08, 95% CI: 0.02, 0.40 P=0.002). Even though pornography is known to cause sexual arousal in perpetrators and make them deceive or lure their victims, watching pornography for the students/victims might give them an early understanding of the causes of abuse and neglect and prevent them from being easily exposed to such. Viewing pornography decreases the likelihood of child sexual abuse because it can help students predict the outcomes of actual abuse and neglect. In contrast, viewing pornography might increase the occurrence of childhood abuse and neglect because it normalizes and/or legitimizes sexual interest in children and might eventually cease to satisfy the user. This is consistent with a study conducted in Germany.[40,41]

## Strengths and Limitations of the Study

This is a pioneering effort in investigating childhood abuse and neglect among high school students, the first study in this area showing the different types of childhood abuse and neglect. Hence the results can used as a baseline for future research.

Childhood abuse and neglect can be perceived as a taboo, particularly in our study context. This could have resulted in social desirability bias because respondents may have been reluctant to be completely honest about their actual experiences and unwilling to provide correct information. The study used a cross-sectional design, and assessing lifetime experience of childhood abuse and neglect can be affected by multiple confounding variables, which could be addressed by a long-term follow-up study. As child abuse and neglect can be assesed by using ICAST-C (child version) only, ICAST-P (parent version) only, and ICAST-T(teacher version) and by combinig all as multiple informats therefore in this study we used only ICAST-C.

## Conclusion

The findings of this study showed that lifetime experience of childhood abuse and neglect among high school students was high when compared with previous studies. Sex, parental marital status, fathers' educational level, birth order, open family discussion on sexual issues, and watching pornography were also significantly associated with lifetime childhood abuse and neglect. This study highlights the importance of considering childhood abuse and neglect an integral component of school students' care.

## Abbreviations

AOR, Adjusted odds ratio; BSc, Bachelor of Science; CA, Childhood abuse; CI, Confidence interval; DTU, Debre Tabor University; ICAST-C, International childhood abuse screening tool, child version; ISPCAN, International Society for the Prevention of Childhood Abuse and Neglect; MSc, Master of Science; SPSS, Statical Package for the Social Sciences; WHO, World Health Organization; UNICEF, United Nations Children's Fund.

## Data Sharing Statement

The datasets used in this study are available from the corresponding author and are accessible on reasonable request.

## Ethics Approval and Consent to Participate

This study was approved by the College of Health Science ethics review committee of Debre Tabor University (CHS-256, 2022). It was conducted in accordance with the Declaration of Helsinki. Each study participant was well informed about the aim of the study, benefits, and risks; informed written consent was secured from them and confidentiality was maintained; and no personal identifiers were used in the data collection questionnaire and codes were used in place of them.

## Disclosure

The authors declare that they have no conflicts of interest for this work.

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