Optimal dietary practices and nutritional knowledge of school adolescent girls in Jimma Town, South West Ethiopia

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ABSTRACT

Addressing the nutritional problems of adolescent girls is important as their nutritional status has a negative effect on the future generation. This study aimed to assess the optimal dietary practices and nutritional knowledge of school adolescent girls in Jimma Zone, South-west Ethiopia. School-based cross-sectional study was conducted among 455 school adolescent girls. Multivariable logistic regression was used to identify independent variables. Majority (61.3\%) of students had dietary diversity score less than five and their mean (±SD) dietary diversity score was 4.34 ± 1.41. The majority (55.8\%) of adolescent girls had a good knowledge score about nutrition related information which they earned from the school (86.6\%). Low dietary diversity of school adolescent girls was positively associated with attending government schools, lack of maternal education and low-economic status. Therefore, both government and non-government organizations need to focus on school and community based nutrition intervention to address the low dietary diversity of school girl adolescents.

Background

Adolescent girl malnutrition is a common nutritional problem due to poor diet and lack of health care service in the developing world. Mostly, household diets are predominantly starchy staples with few animal products and seasonal fruits and vegetables. Addressing the nutritional problems of adolescent girl is important as their nutritional status has a negative effect on the future generation (Choudhary, Seema, & Shukla, 2010). Being in transition, adolescents may no longer benefit from the attention and care that usually go to children, but they may not get the protections associated with adulthood either. Adolescent has typically being considered as low risk of poor health and often receive few health care resource and less attention. However, this approach ignores the fact that many health problems later in life can be improved by adapting healthier life style habit during adolescence (WHO, 2009).

Dietary diversity is the consumption of an adequate variety of food groups (Alam, Roy, Ahmed, & Ahmed, 2010; Wagah Margaret, Bader, Deligia, & Dop, 2005). A monotonous diet lacks essential micro-nutrients and contributes to the burden of malnutrition and micronutrient deficiencies (Allen, 2008). The problem is particularly critical in adolescents because they need energy and nutrient-dense foods to grow and develop both physically and mentally and to live a healthy life (Kant, 2004; Savy, Martin-Prével,
Sawadogo, Kameli, & Delpeuch, 2005). Nutritional deficiencies have far reaching consequences, especially in adolescent girls. If their nutritional needs are not met, they are likely to give birth to undernourished children, thus transmitting under nutrition to future generations (Mulugeta et al., 2009).

Malnutrition in adolescent is a major public health problem in Ethiopia. A study conducted in Tigray, Ethiopia shows 26.5% and 58.3% of school adolescent girls were stunted and wasted respectively (Mulugeta et al., 2009). Studies from different developing countries also showed that under nutrition among school girls has a strong linkage with poor household socioeconomic condition, burden of disease and unequal intra-familial distribution of food like specific food taboos and dietary restrictions during menstruation. Eating behaviors of adolescents are influenced by many factors, including peer influences, parental modeling, food preferences, cost, personal and cultural beliefs, mass media, and body image perception (Story, Neumark-Sztainer, & French, 2002; Wagah Margaret et al., 2005).

Recent studies from Jimma zone showed that integration of school based health and nutrition education had significant contribution to adolescent nutrition (Tamiru et al., 2016). Improving adolescent girls’ nutrition has benefits other than reproduction; the well-being and long-term nutritional health of women are legitimate goals in themselves (Delisle, 2005). Adolescence represents a window of opportunity to prepare nutritionally for a healthy adult life. Some nutritional problems originating earlier in life can potentially be corrected, in addition to addressing current ones. It may also be a timely period to shape and consolidate healthy eating and lifestyle behaviors, thereby preventing or postponing the onset of nutrition-related chronic diseases in adulthood (Delisle, 2005; UNICEF, 2013).

In Ethiopia, child bearing begins at an early age. Forty-five percent of the total births in the country occur among adolescent girls and young women. Most of the women in parts of sub-Saharan Africa, including Ethiopia, enter pregnancy with a poor nutritional status. It has been found that most of the time, the women may enter pregnancy with iron deficiency anemia and may have other micronutrient deficiencies which adversely affect her health and that of the fetus like low birth weight, neural tube defect and others (Bernal, Frongillo, Herrera, & Rivera, 2014; Delisle, 2005; UNICEF, 2013).

Adolescent nutrition promotion is lagging and should connect with health services on one side, and food security programs on the other. Nonetheless, schools provide a wealth of opportunities to improve nutrition: formal learning, and in particular, gardening, cooking and feeding. Despite the above mentioned facts, in developing countries like Ethiopia there is limited school based studies, assessment and interventions depending on dietary diversity and nutritional status of school adolescent girls. In addition, recently the government has planned to initiate the school nutrition program. So this study will be used as a baseline for the initiation of this program and act as guidance for further studies.

Methods and materials

Study area and period

This study was conducted in Jimma town government and private high schools. Jimma town is located at 357 km to the south west of Addis Ababa. Jimma Zone has a total population of 2,486,155, where 1,250,527 are men and 1,235,628 are women. In the town there are about ten high schools out of which six are private and the rest is government schools. The total number of students attending secondary schools was 8643, out of which 4558 were females. The study was conducted in Jimma town from 15 March 2015 to 15 April 2015.

Sample size and sampling procedure

This school based cross-sectional study was conducted among high school adolescent girls attending their education in Jimma town. The sample size was determined by using single population proportion formula with 0.05 margins of errors at 95% confidence interval and the proportion of dietary diversity practice among adolescents in Jimma zone (16.1%) (Belachew et al., 2013). By adding 10% non-response rate and considering the design effect, the total sample size was 455.
Multi-stage sampling technique was used to select the study participants. The existing high schools were stratified to government and private schools. A lottery method was used to select two schools from the government and three from private schools. A total of 455 female students were selected using simple random sampling technique. The number of students from the selected schools was determined using proportionate sampling technique. Finally, female students (14–19 years) in each class were selected from grade 9 to 12 of both government and private schools.

**Data collection and analysis methods**

Interviewer-administered questionnaire was used to collect data. Dietary diversity was measured using the WHO and FAO one day (24-h dietary recall) diversity questionnaire. The dietary diversity questionnaire which consists 15 groups foods were used to obtain information on subject’s food intake. Subjects were asked to recall all foods eaten and beverages taken in the previous 24 h inside and outside the home. Participants were asked to remember any snacks eaten between main meals. Data were collected by trained data collectors who are fluent in the local language. Mock interviews and practical field exercise was given to data collectors to ensure the quality of the field operation. During data collection, the supervisors followed data collectors and performed quality checks with the principal investigator. The questionnaire was prepared in English and translated to Amharic and Afan Oromo, then back translated to English to keep the consistency of the questions.

Data were double entered by using Epi-Data version 3.5.3 then exported to SPSS v 20 for analysis. The data were coded, cleaned, checked for completeness, outliers and missing values. Frequency table were used to display the socio-demographic characteristics and the main findings of the responses given by the participants. A bivariate analysis was used to check association between dependent and independent variables. Variables with $p$-value $<$0.25 on bivariate analysis was entered into a multivariate logistic regression model to identify the factors that independently predict the dietary diversity of adolescent girls after controlling potential confounding effects. The results were claimed to be statistically significant when the $p$-value is equal or less than 0.05. The variables having a $p$-value $<$0.25 in the bivariate logistic regression analysis were considered as candidate variables for multi variable logistic regression.

In this study dietary diversity score was created by summing up the number of food groups consumed over a 24 h period by an individual. Adolescent girls aged 10–19 years old who received goods greater than or equal to five food groups out of the nine food groups were assigned a high dietary diversity score otherwise it is called a low dietary diversity score (Kennedy, Ballard, & Dop, 2010; Steyn, Nel, Nantel, Kennedy, & Labadarios, 2006).

Nutritional knowledge about twelve food items was assessed. This was aimed to assess whether students had enough knowledge about the nutrients, advantage of diversified food and cause of malnutrition. A total nutrition knowledge score was obtained by adding the responses, scoring one for each correct answer and zero otherwise. A correct response was given a score of one, and an incorrect one was given a score of zero. The mean value for knowledge related correct responses was 5.6. The total responses above mean value were considered as good and those below mean value were considered as poor. The total possible score for knowledge was 11. ‘Good knowledge’ was described by an aggregate score of 6–11, and ‘poor knowledge’ by 5 or below.

**Ethical consideration**

Prior to data collection, letter of support were obtained from Population and Family Health department and submitted to the school director. Ethical clearance was obtained from the Institutional Review Board of Jimma University. Permission was also obtained from the Jimma town Education Office. All study participants were briefed about the purpose of the study including how the study will be beneficial to them and for the whole country.
Results

A total of 455 students aged between 14 and 19 years old were included in the study with the 100% response rate. The mean age (±SD) of study participants was 16.83(±1.292). The majority (97.8%) of students’ marital status was single (Table 1).

The majority (97.6%) of adolescent girls consumed cereal based foods. Greater than three-fourth (76.7%) of the study participants consumed legumes, nuts and seeds. Nearly a half (44.6%) of study participants consumed dark green leafy vegetables. Almost one-third (32.5%) of respondents consumed vitamin A rich fruits. A small number of students reported that they consumed organ meat (9.9%) and flesh meat (16.3%). Forty-nine (10.8%) students were consumed fish and sea foods (Table 2). The meal frequency of nearly half (49.7%) of adolescent girls was three times per a day (Table 3).

The mean (±SD) dietary diversity score of adolescent girls was 4.34(±1.415). Based on FAO 2011, the dietary diversity practice was assessed using 15 food items. Two hundred seventy-nine (61.3%) students had dietary diversity score less than five food groups (Table 4).

According to the evaluation of knowledge related responses, more than half, 254 (55.8%) of adolescent girls had good knowledge score (Table 5). The majority of school adolescent girls (86.6%) got nutrition related information from school followed by mass media 291(64) and friends 201(44.2) (Table 6).

School type, mother’s educational status, fathers educational status, father’s occupation and household income were the only candidate variables that fulfilled criteria (p < 0.25) to be entered into multivariable logistic regression. Findings of the multivariable logistic regression model showed that students studying in public schools were five times more likely to have a low dietary diversity score (AOR: 5.2, Table 1).

| Socio-demographic variables | Frequency (N) | Percent (%) |
|-----------------------------|---------------|-------------|
| **Age**                     |               |             |
| 14–16                       | 184           | 40.4        |
| 17–19                       | 271           | 59.6        |
| **School**                  |               |             |
| Government                  | 352           | 77.4        |
| Private                     | 103           | 22.6        |
| **Ethnicity**               |               |             |
| Oromo                       | 243           | 53.4        |
| Amhara                      | 86            | 18.9        |
| Others*                     | 126           | 27.3        |
| **Religion**                |               |             |
| Orthodox                    | 212           | 46.6        |
| Islam                       | 131           | 28.8        |
| Protestant                  | 103           | 22.6        |
| Catholic                    | 9             | 2           |
| **Grade level**             |               |             |
| 9                           | 160           | 35.2        |
| 10                          | 91            | 20.0        |
| 11                          | 98            | 21.5        |
| 12                          | 106           | 23.3        |
| **Marital status**          |               |             |
| Single                      | 445           | 97.8        |
| Married                     | 7             | 1.5         |
| Widow                       | 3             | 0.6         |
| **Mother education**        |               |             |
| No formal education         | 71            | 15.6        |
| Can read and write          | 87            | 19.1        |
| Primary school              | 87            | 19.1        |
| Secondary school            | 120           | 26.4        |
| Above secondary school      | 90            | 19.8        |
| **Mother occupation**       |               |             |
| House wife                  | 159           | 34.9        |
| Government employee         | 186           | 40.9        |
| Private organization        | 23            | 5.1         |
| Merchant                    | 72            | 15.8        |
| Daily laborer               | 15            | 3.3         |
| **Father education**        |               |             |
| No formal education         | 25            | 5.5         |
| Can read and write          | 30            | 6.6         |
| Primary school              | 97            | 21.3        |
| Secondary school            | 132           | 29.0        |
| Above secondary school      | 171           | 37.6        |

*Guragie, Dawuro, Tigray.
Table 2. Types of food groups consumed among school adolescent girls in Jimma town, 2015.

| Food groups                                | Frequency (n) | Percent (%) |
|--------------------------------------------|---------------|-------------|
| Cereals                                    | 444           | 97.6        |
| White roots and tubers                     | 247           | 54.3        |
| Vitamin A rich vegetables and tubers       | 247           | 54.3        |
| Dark green leafy vegetables                | 203           | 44.6        |
| Other vegetables                           | 350           | 76.9        |
| Vitamin A rich fruit                       | 148           | 32.5        |
| Other fruits                               | 94            | 20.7        |
| Organ meat                                 | 45            | 9.9         |
| Flesh meat                                 | 74            | 16.3        |
| Eggs                                       | 64            | 14.1        |
| Fish and seafood                           | 49            | 10.8        |
| Milk and milk products                     | 81            | 17.8        |
| Oils and fats                              | 399           | 87.7        |
| Sweats                                     | 371           | 81.5        |

Table 3. Meal frequency of school adolescent girls in Jimma town, 2015.

| Meal frequency consumption | Frequency | Percent |
|----------------------------|-----------|---------|
| Two times                  | 32        | 7.0     |
| Three times                | 226       | 49.7    |
| Four times                 | 197       | 43.3    |

Table 4. Distribution of school adolescent girls’ dietary diversity score in Jimma town, 2015.

| Dietary diversity score          | Frequency (n) | Percent (%) |
|----------------------------------|---------------|-------------|
| Two food groups                  | 30            | 6.6         |
| Three food groups                | 102           | 22.4        |
| Four food groups                 | 147           | 32.3        |
| Five food groups                 | 91            | 20.0        |
| Six food groups                  | 48            | 10.5        |
| Seven food groups                | 22            | 4.8         |
| Eight food groups                | 13            | 2.9         |
| Nine food groups                 | 2             | 0.4         |
| Low (Less than five food groups) | 279           | 61.3        |
| High (Five and more food groups) | 176           | 38.7        |

Table 5. Distribution of the responses given by school adolescent girls, Jimma town, 2015.

| Nutrition knowledge item                        | Yes (%) | No (%) |
|-------------------------------------------------|---------|-------|
| Knows the dietary sources carbohydrate          | 214 (47)| 241 (53)|
| Knows the dietary sources of fat                | 112 (24.6)| 343 (75.4)|
| Knows the dietary sources of fiber               | 12 (2.6) | 443 (87.4)|
| Knows the dietary sources of Vitamins            | 455 (100)| 0 (0) |   |
| Knows the dietary sources of iron deficiency    | 94 (20.7)| 361 (79.3)|
| Knows the benefits of diversified diet           | 440 (96.7)| 15 (3.3)|

Causes of malnutrition

| Causes of malnutrition                          | Yes (%) | No (%) |
|-------------------------------------------------|---------|-------|
| Knows iron deficiency                           | 94 (20.7)| 361 (79.3)|
| Knows about marasmus and kwashiorkor            | 415 (91.2)| 40 (8.8)|
| Knows the three cause of malnutrition           | 321 (70.5)| 134 (29.5)|
| Knows the causes of anemia                      | 256 (56.3)| 199 (43.7)|
| Knows the causes of goiter                      | 371 (81.5)| 84 (18.5)|
| Knows the causes of vitamin A deficiency        | 299 (65.7)| 156 (34.3)|

Dietary knowledge

| Average knowledge                          | Yes (%) | No (%) |
|--------------------------------------------|---------|-------|
| Poor knowledge                             | 201 (44.2)|
| Good knowledge                             | 254 (55.8)|
95%CI = 2.89, 9.35) when compared to adolescent girls studying in private schools. Adolescent girls whose mothers had no formal education were 8 times (AOR: 7.65, 95% = 3.40, 17.19) more likely to have low dietary diversity score when compared to adolescent girls whose mothers attended secondary school and above. Adolescent girls who had merchant fathers were 66.1% less likely (AOR: 0.28, 95%CI = 0.08, 0.95) to have low dietary diversity score when compared to adolescent girls whose fathers were farmers. Adolescent girls who had families in low economic status were two times more likely to have a low dietary diversity score (AOR: 1.87, 95%CI = 1.04, 3.35) when compared to adolescent girls who had families with high economic status (Table 7).

**Discussion**

This study demonstrated that the prevalence of low dietary diversity among high school adolescent girls in Jimma town was high (61.3%) which is relatively high when compared to study from Aksum town where 56% of the participants had DDS less than 3.4 (Weldehaweria et al., 2016). However, this finding is relatively low when compared to study done in Jimma town where 88% of school adolescents consumed greater than five food groups (Gali, Tamiru, & Tamrat, 2017). The mean dietary diversity score of adolescent girls were also relatively low when compared to the findings of study conducted among adolescent girls in Ahvaz-Iran where the mean dietary diversity score was 6.81 ± 1.75. This might be due to lack of sufficient knowledge and low socio-economic status (Belachew, Hadley, & Lindstrom, 2008; Savy et al., 2005).

The findings of this study showed that occupational status of caregivers were significantly associated with the dietary practices of school adolescent girls in Jimma town. Adolescents from public and private employee households heads were more likely to be consumers of diversified diet when compared to adolescents from daily laborers. This finding is in agreement with study done in Jimma zone where household occupational status is one of the determinant factors for high dietary diversity consumption among adolescents (Belachew et al., 2013).

Findings of this study indicated that majority of adolescent girls had knowledge about the deficiency of different kinds of micronutrients like iron, iodine and vitamin A and their consequences. This might be due to the fact that nutrition education is being given by various non-governmental organizations. Findings from India and Ghana also showed that school adolescent girls had relatively more information about the dietary deficiency of different kinds of nutrients (Choudhary et al., 2010; Nti, Brown, & Danquah, 2012). Similarly, interventional study done in Jimma zone showed that school based health and nutrition education had significant contribution in the improvement of dietary practices (Tamiru et al., 2016). Overall, dietary knowledge of adolescent girls was relatively high when compared to the findings from Bangladesh where adolescent girls could not name more than half of the main food sources of energy and protein. This difference might be due to an exposure to different nutrition related health education in the current study area (Tamiru et al., 2016).

The economic status of the family was also significantly associated with the dietary diversity of school adolescent girls where students from high class had a higher dietary diversity score compared to those girls from lower class. This finding is consistent with the study done in Jimma zone where adolescents from poor families were exposed to poor dietary intake compared adolescents from high household economic status (Belachew et al., 2013; Hadley, Stevenson, Tadesse, & Belachew, 2012; Tamiru et al., 2016).

### Table 6. Source of information about nutrition related information for Adolescent girls in Jimma town, 2015.

| Source of information | Yes   | No    |
|-----------------------|-------|-------|
| Mass media            | 291 (64) | 164 (36) |
| Friends               | 201 (44.2) | 254 (55.8) |
| Family                | 188 (41.3) | 267 (58.7) |
| School                | 394 (86.6) | 61 (13.4) |
Findings of this study showed that majority of girls were consumers of cereals based diet and green leafy vegetables. Similar studies from northern part of Ethiopia and Jimma zone showed that cereal based diet was a common food compared to animal source food (Gali et al., 2017; Herrador et al., 2015; Workicho et al., 2016). This result was also consistent with the study from Tehran where 99% of adolescents were cereal-based food consumers (Mirmiran, Azadbakht, Esmaillzadeh, & Azizi, 2004).

Lower of dietary diversity is particularly a considerable problem among poor populations in Ethiopia as their diets are predominantly based on starchy staples (Belachew et al., 2012; Oldewage-Theron & Kruger, 2009; WHO, 2003).

In the multivariate analyses, students studying in public schools were five times more likely to have a low dietary diversity score when compared to adolescent girls studying in private schools. This may be due to the fact that the children of families with better socio-economic status can afford to study at private schools hence; as demonstrated in the current study, the attendants of private schools are more likely to get access to diversified foods. In addition, adolescents from families with lower socio-economic status were more likely to have a lower dietary diversity scores among school compared to their counterparts. This may be related to poor affordability of variety of food ingredients among families with low socio-economic status (Gali et al., 2017; Tamiru et al., 2016).

### Table 7. Multi variable logistic regression model predicting the likelihood of low dietary diversity score of adolescent girls, 2015.

| Variables                      | Dietary diversity score |       |       |       |       |       |
|-------------------------------|-------------------------|-------|-------|-------|-------|-------|
|                               | Low (68.5)              | High  (31.5) | COR(95%CI) | AOR(95%CI) |       |       |
| Type of school                |                         |       |       |       |       |       |
| Government                    | 241 (68.5)              | 111 (31.5) | 3.71 (2.34, 5.87)** | 5.20 (2.89, 9.35)** |       |       |
| Private                        | 38 (36.9)               | 65 (63.1) | 1       | 1       |       |       |
| Age of students               |                         |       |       |       |       |       |
| 14–16                         | 64 (34.78)              | 120 (65.23) | 1.32 (0.90, 1.95) | –       |       |       |
| 17–19                         | 112 (41.33)             | 159 (58.67) | 1       | –       |       |       |
| Place of residence            |                         |       |       |       |       |       |
| Urban                         | 158 (37.70)             | 261 (62.39) | 1.65 (0.84, 3.27) | –       |       |       |
| Rural                         | 18 (50)                 | 18 (50) | 1       | –       |       |       |
| Mother education              |                         |       |       |       |       |       |
| No formal education           | 56 (78.9)               | 15 (21.1) | 5.34 (2.63, 10.85)** | 7.65 (3.40, 17.18)** |       |       |
| Can read and write            | 67 (77)                 | 20 (23) | 4.79 (2.49, 9.21)** | 6.03 (2.86, 12.70)** |       |       |
| Primary education             | 67 (77)                 | 20 (23) | 4.79 (2.49, 9.21)** | 5.43 (2.61, 11.32)** |       |       |
| Secondary education           | 52 (43.3)               | 68 (56.7) | 1.09 (0.63, 1.90) | 0.96 (0.51, 1.79) |       |       |
| Above secondary school        | 37 (41.1)               | 53 (58.9) | 1       | 1       |       |       |
| Family size                   |                         |       |       |       |       |       |
| <6                            | 142 (37.97)             | 232 (62.03) | 1.18 (0.73, 1.93) | –       |       |       |
| ≥6                            | 34 (41.97)              | 47 (58.02) | 1       | –       |       |       |
| Income decision               |                         |       |       |       |       |       |
| Father                        | 86 (36.59)              | 149 (63.40) | 1.19 (0.79, 1.78) | –       |       |       |
| Mother                        | 23 (41.81)              | 32 (58.18) | 0.95 (0.51, 1.77) | –       |       |       |
| Jointly                       | 67 (40.60)              | 98 (59.39) | 1       | –       |       |       |
| Economic status               |                         |       |       |       |       |       |
| Low                           | 103 (68.2)              | 48 (31.8) | 1.12 (0.69, 1.80) | 1.87 (1.04, 3.37)* |       |       |
| Medium                        | 76 (50)                 | 76 (50) | 0.52 (0.32, 0.83)** | 0.62 (0.36, 1.08) |       |       |
| High                          | 100 (65.8)              | 52 (34.2) | 1       | 1       |       |       |
| Father occupation             |                         |       |       |       |       |       |
| Farmer                        | 29 (76.3)               | 9 (23.7) | 1.28 (0.51, 3.19) | 0.98 (0.32, 3.01) |       |       |
| Government employee           | 140 (59.1)              | 97 (40.9) | 0.57 (0.31, 1.03) | 0.47 (0.22, 0.99)* |       |       |
| Private organization          | 9 (45)                  | 11 (55) | 0.32 (0.12, 0.90)* | 0.28 (0.08, 0.95)* |       |       |
| Merchant                      | 53 (57)                 | 40 (43) | 0.52 (0.27, 1.03) | 0.34 (0.18, 0.87)* |       |       |
| Daily laborer                 | 48 (71.6)               | 19 (28.4) | 1       | 1       |       |       |
| Father education              |                         |       |       |       |       |       |
| No formal education           | 16 (64)                 | 9 (36) | 1.23 (0.52, 2.95) | 0.56 (0.18, 1.75) |       |       |
| Can read and write            | 25 (85.7)               | 5 (14.3) | 3.46 (1.26, 9.49)* | 3.06 (0.91, 10.29) |       |       |
| Primary school                | 62 (63.9)               | 35 (36.1) | 1.23 (0.73, 2.05) | 0.71 (0.34, 1.49) |       |       |
| Secondary school              | 75 (56.8)               | 57 (43.2) | 0.91 (0.58, 1.44) | 0.55 (0.30, 1.00) |       |       |
| Above secondary school        | 101 (59.1)              | 70 (40.9) | 1       | 1       |       |       |

Note: ** and * indicates significance at 0.001 and 0.05 respectively.

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Generally, this study showed that a large proportion of adolescents had a low dietary diversity score. Attending public schools compared to attending private schools, lower socioeconomic status, having parents lacking formal education and having parents employed as farmers compared merchants, were more likely to be associated with the lower dietary diversity scores among school adolescent girls. Therefore, school-based nutrition education and nutrition sensitive interventions should be a part of comprehensive community based programs to reach both the students and their families.

Limitation of the study
The findings of this study have a significant contribution to address the nutritional problems of adolescent girls. However, the cross-sectional nature of this study limits us from determining causal effects as the study variables. The study assessed household and individual dietary diversity only for the last 24 h; hence, there might be lack of a correct reflection of the usual dietary habits of adolescents.

Disclosure statement
The authors declare that they have no competing interests.

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