Association between sexual and reproductive health education in peer group and comprehensive knowledge of HIV among adolescent girls in rural eastern Ethiopia: a community-based cross-sectional study

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ABSTRACT

Objectives This study examined the association between sexual and reproductive health (SRH) education in peer-group discussion and comprehensive knowledge of HIV among young adolescent girls in rural eastern Ethiopia.

Design The study analysed data from a large quasi-experimental study involving 3290 young adolescent girls aged 13–17 years. The intervention targeted adolescent girls aged 10–14 years. Data were collected using a comprehensive HIV knowledge tool adopted from the demographic and health survey questionnaire. Multi-level mixed-effect logistic regression analysis was employed to examine associations using STATA/SE V.14 statistical software.

Setting West Hararghe, rural Ethiopia.

Participants 3290 adolescent girls.

Results Magnitude of comprehensive knowledge of HIV among those who received SRH education and those who did not receive SRH education was 16.78% (95% CI 14.41% to 19.45%) and 14.01% (95% CI 12.38% to 15.81%), respectively. Overall, 14.84% (95% CI 13.4% to 16.39%) of the adolescent girls aged 13–17 years had comprehensive knowledge of HIV. The odds of having comprehensive HIV knowledge were higher (1.36 times) among adolescent girls who received SRH education compared with those who did not receive SRH education (adjusted OR 1.36, 95% CI 1.01 to 1.84) after controlling for selected potential confounders. Odds of having comprehensive HIV knowledge were also higher (1.73 times) among older adolescent girls (adjusted OR 1.733 95% CI 1.098 to 2.735) and (3.89 times) among those who attended secondary school (adjusted OR=3.889 95% CI 1.836 to 8.235) compared with young adolescent girls and the uneducated, respectively.

Conclusions Comprehensive knowledge of HIV among young adolescent girls was very low. Providing SRH education for young adolescent girls improved their comprehensive knowledge of HIV in rural eastern Ethiopia. Initiating sexual education at an early age would benefit HIV prevention efforts.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study used standard outcome measurement, enabling better comparison among other studies.
⇒ The study did not assess health promotion exposure through media as a covariate which other studies have assessed.
⇒ The study was also conducted in few rural districts in eastern Ethiopia; hence generalisability is restricted only to rural communities with similar contexts.

INTRODUCTION

It is estimated that more than half of new HIV infections worldwide occur among youth aged 15–24 years old1 with the adolescent girls and young women being 5–14 times more likely to be infected with HIV than their male peers.2 In Ethiopia, with a rapidly growing youth population, HIV prevalence among youth is estimated to be at 2.9%.3 The increased risk of HIV among adolescent girls is attributed to the many challenges they face including gender inequality, unfavourable social norms, early marriage, low access to education and limited access to condoms.4 Early sexual debut makes adolescent girls more vulnerable to the risks of sexually transmitted infections (STIs) including HIV.5 Adolescents in low-income countries, especially in rural areas, often have limited school-based sexuality education,6 low uptake of HIV testing, inconsistent condom use behaviour, unprotected first sexual intercourse and multiple sexual partners due to a lack of comprehensive sexual reproductive knowledge.7,8 Worldwide, population-based studies show that more than 90% of people have ever heard of AIDS, but much less fully understand...
the HIV transmission and prevention methods which are crucial for the control of new HIV infections. Evidence from sub-Saharan Africa shows that in-depth knowledge of HIV is generally low. Improved understanding of the level of HIV knowledge and the determinants provide a platform for designing impactful interventions to prevent and reduce HIV infections. A systematic review of studies conducted in Africa, Asia, and Latin America has also shown that school-based sexual health education programmes improves HIV knowledge. However, comprehensive knowledge of HIV was rarely assessed among unmarried and very young adolescent girls in low-income settings. The International HIV/AIDS Alliance’s theory of change indicates that person-centred HIV interventions are important to improve HIV knowledge and reduce HIV incidence. Without the increase in the coverage of effective HIV prevention interventions, adolescent infections are projected to go up by 13%, leading to 3.5 million new infections by 2030.

This study draws data from an implementation project undertaken to improve adolescent girls’ sexual and reproductive (SRH) health. This study aims to examine the association between Adolescent girls’ comprehensive knowledge of HIV and receiving SRH health education from peer-group.

METHODS
Study design and participants
The study used data extracted from a cross-sectional survey conducted at the end of an implementation project in the Western Harargeh Zone, Oromia Region, Ethiopia. The end-line survey was conducted from September to November 2019. The study was conducted in the West Harargeh zone of the Oromia regional state in Eastern Ethiopia. The majority of the population in this area belongs to the Oromo ethnic group and follows the Islam faith. Around 85% of the people in rural areas depend on subsistence agriculture for a living. The proportion of adult women with comprehensive knowledge of HIV in the region is 17.3%, while the proportion of women who have tested for HIV in the past 12 months is 15.4%. The Abdiboru project implemented interventions in the study areas (Boke, Chiro, Doba and Mesela districts) to improve the SRH of adolescents. The Abdiboru intervention included organising young adolescent girls into girls’ peer groups to discuss SRH issues, including STIs and HIV, among other things. The study recruited peer-group leaders and trained them on the SRH module so they would be able to discuss these matters with their peers during the girls’ club meetings. Adolescent girls who did not participate in the girls’ peer groups while being in the intervention district and girls from the control district will serve as the comparison group. The intervention was implemented over 3 years and targeted adolescent girls in the age group of 10–14 years. This cohort of girls who received the interventions were in the age group 13–17 years at the time of the survey. The study used a multistage sampling method to select the study participants. In the first stage, 114 clusters (neighbourhoods, locally referred to as local development zone) were selected using simple random sampling after obtaining a complete list of the clusters in the selected districts from the respective district health office. In the second stage, a complete household listing was done in the selected clusters to identify households with eligible adolescent girls. Then, 30 households with eligible adolescent girls were randomly selected from the freshly prepared list using a computer-generated random number. If there were more than one eligible adolescent girl in the household, one was selected randomly using lottery method.

Data protection
For participants below the age of 15 years, additional parental/guardian-informed verbal consent was obtained. All interviews took place in a private setting to ensure confidentiality. The data were deidentified when extracted from the larger dataset for this study.

Data collection tools, procedures and data management
Data were collected using a structured and pretested interviewer-administered questionnaire that was translated into the local language, Affaan Oromo, for field use. The translation was checked by a panel of public health experts who were fluent in both languages. In addition, the appropriateness of the wordings was checked during the training of field workers and pretest.

Interviewers and field supervisors were trained for 2 weeks on survey procedures, study tools and related issues. A pretest was done in a similar setting, not included in the main study, to test the appropriateness of the questions, language, flow and understandability. Adolescent girls were interviewed at their residential compound in a private space. The Open Data Kit, an electronic data collection programme, was used to collect the data. Data were uploaded on a secure server from the field whenever internet service was available.

Measures of comprehensive knowledge of HIV
The outcome variable was comprehensive knowledge of HIV based on questions adopted from the 2016 Ethiopian demographic and health survey. Adolescent girls who knew consistent use of condoms during sexual intercourse (said ‘yes’ to ‘Can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?’), having just one uninfected faithful partner can reduce the chances of getting HIV (said ‘yes’ to ‘Can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?’), said ‘yes’ to a healthy-looking person can have HIV, and rejected(said ‘no’) to the two most common local misconceptions about transmission or prevention of HIV (mosquito bites can transmit HIV and a person can become infected by sharing food with a person who has HIV) were considered having comprehensive knowledge.
Covariates
For exposure to SRH education in peer group discussion, adolescent girls who were a member of the peer group and said ‘yes’ to attending discussion sessions on STI, including HIV (its mode of transmission, prevention and treatment) during their girls’ group meeting were considered to have been exposed to SRH education. Other covariates considered in the analysis include the place of residence, wealth status (lowest, second, middle, fourth, highest) calculated using principal component analysis, adolescent girl’s age, education (never attended school, grade 1–8, grade 9–12), marital status (ever married, never married), perceived confidence in communication (no/little confidence, moderate confidence, high confidence), perceived confidence in negotiation skills (no/little confidence, moderate confidence, high confidence) and contact with health extension workers (yes, no).

Statistical analyses
The data were analysed using STATA/SE V.14.0. For the outcome variable (comprehensive HIV knowledge) percentage with a 95% CI was calculated. The intraclass correlation coefficient was found to be statistically significant, hence multilevel mixed-effect logistic regression model was used for the final analysis. Cluster-ID was considered a random component. Initially, a bivariate analysis was done, and conceptually relevant covariates were included in the multivariable analysis. Association was described using an OR with 95% CIs, and statistical significance was declared at p<0.05. Appropriate weighting was done to account for the complex survey design and analysis.

RESULTS
A total of 3290 adolescent girls participated in the study, with a response rate of 96.2%. The majority of the respondents were never married (90.65%), had primary school education (54.83%) and were followers of the Islam faith (87.77%) (table 1).

Regarding adolescent girls’ perceived communication skills level, half of them reported having high confidence in their communication skills level. Only 9.4% of girls reported that they ever had contact with health extension workers.

Among girls who participated in the study, 29.93% of adolescent girls reported being exposed to SRH-STI (mode of transmission+prevention and treatment+HIV) education during their group meetings (table 2).

**Table 1** Background characteristics of adolescent girls, west Hararghe, eastern Ethiopia, 2019

| Characteristics                  | Frequency | Per cent (weighted) |
|----------------------------------|-----------|---------------------|
| Place of residence               |           |                     |
| Mesela district                  | 1116      | 32.71               |
| Chiro and Doba districts         | 1093      | 39.27               |
| Boke district                    | 1081      | 28.02               |
| Household wealth status          |           |                     |
| Lowest                           | 594       | 20.66               |
| Second                           | 594       | 19.59               |
| Middle                           | 587       | 19.72               |
| Fourth                           | 590       | 20.11               |
| Highest                          | 591       | 19.92               |
| Religion                         |           |                     |
| Christian                        | 342       | 12.23               |
| Muslim                           | 2948      | 87.77               |
| Adolescent girls’ age            |           |                     |
| 13                               | 940       | 24.49               |
| 14                               | 792       | 21.95               |
| 15                               | 751       | 25.2                |
| 16                               | 474       | 14.73               |
| 17                               | 333       | 13.52               |
| Adolescent girls’ marital status |           |                     |
| Never married                    | 3067      | 90.65               |
| Ever married                     | 223       | 9.35                |
| Adolescent girls’ educational status |       |                     |
| Never attended                   | 194       | 12.1                |
| Primary                          | 1804      | 51.97               |
| Junior secondary                 | 1150      | 31.24               |
| Secondary                        | 142       | 4.69                |

Comprehensive knowledge of HIV among adolescent girls
Among adolescent girls who were asked about their knowledge of HIV prevention methods, 67.1% (95% CI 64.73 to 69.39%) correctly said having just one uninfected partner can reduce the chance of getting HIV, while 28.44% (95% CI 25.56 to 31.52%) correctly said consistent condom use reduce the chance of getting HIV. With regards to the misconceptions about HIV, 39% (95% CI 36.25 to 41.82%) correctly answered the questions ‘Can people get the AIDS virus from mosquito bites?’ and ‘Can people get the AIDS virus by sharing food with a person who has AIDS?’. The magnitude of comprehensive knowledge of HIV among those exposed and not exposed to SRH education in the peer-group discussion was 16.78% (95% CI 14.41 to 19.45%) and 14.01% (95% CI 12.38% to 15.81%), respectively. Overall, 14.84% (95% CI 13.4% to 16.39%) of the adolescent girls had comprehensive knowledge of HIV (figure 1). Subanalysis of in-between age groups also showed that magnitude of comprehensive knowledge among 13–14 years old and 15–17 years old girls was 12.75% (95% CI 10.9% to 14.86%) and 17.11% (95% CI 14.95% to 19.52%), respectively.

Determinants of comprehensive knowledge of HIV among adolescent girls
The weighted mixed-effect logistic regression analysis showed that the odds of having comprehensive HIV
knowledge among adolescent girls exposed to SRH education in peer-group was 36% higher than those not exposed to SRH education discussion (adjusted OR 1.36, 95% CI 1.01 to 1.84). Moreover, the odds of having comprehensive HIV knowledge among older adolescent girls attending secondary school were higher (3.89 times) compared with those who never attended school (adjusted OR 3.89, 95% CI 1.84 to 8.23). Older adolescents also had higher (1.73 times) odds of having comprehensive HIV knowledge compared with younger adolescents (adjusted OR 1.73, 95% CI 1.09 to 2.73). (table 3)

**DISCUSSION**

Only 14.84% (95% CI 13.4% to 16.39%) of the young adolescent in rural eastern Ethiopia had comprehensive knowledge of HIV. Exposure to SRH education in peer-group discussion was significantly associated with Comprehensive knowledge. In addition, the odds of having comprehensive HIV knowledge were greater among older adolescent girls (adjusted OR 1.73, 95% CI 1.09 to 2.73) and those who attended secondary school (adjusted OR 3.88, 95% CI 1.83 to 8.23).

The comprehensive HIV knowledge level among 15–17 years old girls was slightly lower compared with the Ethiopian DHS in 2016. This might be because the current study was only among rural adolescent girls, while the DHS involved both rural and urban populations; girls from urban areas tend to have better comprehensive knowledge, which could be due to better access to media and essential health promotion services. Other studies also showed comprehensive HIV knowledge is generally low among adolescent girls in Ethiopia and also lower than the average for sub-Saharan Africa, which is 41%. This might be because of poor access to education, media and healthcare facilities. It could also be because the health extension programme implementation, which contains HIV education as one of the packages, usually targets mothers through home-to-home visits instead of adolescents. But, other studies from Kenya and Uganda reported a much higher level of comprehensive HIV knowledge, 48.8% and 51.9%, respectively.

Adolescent girls exposed to SRH education in peer group discussions had better comprehensive knowledge of HIV than those who reported no exposure. This result was consistent with another cross-sectional study from Eastern Ethiopia. Another comparable survey in Kenya showed that primary school HIV education intervention improved HIV-related knowledge. Peer-assisted sexual education for adolescents aged 14 years and above in Tanzania also significantly improved HIV knowledge. Peer education has also improved HIV knowledge among in-school adolescents in Nigeria. A meta-analysis of HIV educational interventions showed that HIV-related knowledge was significantly better among those who received peer education on HIV. This could be because if girls are taught within the circle of their peers in these girls’ groups, knowledge can be gained as they might feel comfortable being thought with their peers while being cost-effective.

Comprehensive knowledge of HIV was also significantly associated with education level, which is consistent with previous studies conducted in Ethiopia, Kenya and Burundi, Cameroon, Uganda, Nigeria, South Africa, Bangladesh, Pakistan and India. Data from eight sub-Saharan countries also showed that adolescent girls who were in school had better HIV knowledge than those who were not in school. This could be because adolescent girls who stay longer in school might be more exposed to HIV knowledge through the school curriculum and HIV school clubs. There has been a growing call for
sequential, age-appropriate HIV education curricula that respond to the preadolescent and adolescent’s changing cognitive capabilities and social skills as it will serve as a window of opportunity to intervene early and be effective in inculcating HIV knowledge.\textsuperscript{40} Culturally appropriate school-based SRH education programmes have also been seen to get more support from parents to improve adolescent SRH outcomes.\textsuperscript{41, 42}

Comprehensive knowledge of HIV was also significantly associated with increased age. This result is consistent with another study done in Ethiopia.\textsuperscript{8} Other studies in Burundi and Kenya,\textsuperscript{32} Nigeria,\textsuperscript{11} Uganda\textsuperscript{26} and multicountry

| Table 3 | Multilevel mixed-effect regression indicating factors associated with comprehensive knowledge of HIV among adolescent girls, west Hararghe, eastern Ethiopia, 2019 |
|-------------------------------|---------------------------------|-----------------|-----------------|
| Characteristics | Comprehensive knowledge of HIV | Unadjusted bivariate (weighted) | Adjusted multivariable (weighted) |
| | Yes | No | COR (95% CI) | P value | AOR (95% CI) | P value |
| Adolescent girls’ exposed to SRH education in peer group discussion | | | | | | |
| Yes | 169 | 817 | 1.264 (1.013 to 1.576) | 0.037 | 1.359 (1.006 to 1.839) | 0.046 |
| No | 333 | 1971 | 1 | 1 | | |
| Place of residence | | | | | | |
| Mesela district | 162 | 954 | 0.878 (0.666 to 1.157) | 0.357 | 0.842 (0.599 to 1.183) | 0.323 |
| Chiro and Doba districts | 159 | 934 | 0.883 (0.667 to 1.170) | 0.388 | 0.717 (0.499 to 1.029) | 0.072 |
| Boke district | 181 | 900 | 1 | 1 | | |
| Household wealth status | | | | | | |
| Lowest | 71 | 523 | 1 | 1 | | |
| Second | 79 | 515 | 1.092 (0.738 to 1.618) | 0.657 | 1.058 (0.714 to 1.568) | 0.778 |
| Middle | 91 | 496 | 1.355 (0.956 to 1.919) | 0.087 | 1.279 (0.906 to 1.685) | 0.161 |
| Fourth | 101 | 489 | 1.480 (0.984 to 2.225) | 0.059 | 1.336 (0.902 to 1.979) | 0.148 |
| Highest | 100 | 491 | 1.396 (0.911 to 2.139) | 0.125 | 1.191 (0.776 to 1.825) | 0.423 |
| Adolescent girls’ age | | | | | | |
| 13 | 115 | 828 | 1 | 1 | | |
| 14 | 111 | 681 | 1.159 (0.875 to 1.535) | 0.302 | 1.129 (0.837 to 1.523) | 0.426 |
| 15 | 120 | 631 | 1.360 (0.991 to 1.867) | 0.057 | 1.402 (0.978 to 2.010) | 0.065 |
| 16 | 85 | 389 | 1.500 (1.080 to 2.802) | 0.015 | 1.336 (0.909 to 1.963) | 0.140 |
| 17 | 71 | 262 | 2.020 (1.366 to 2.987) | 0.001 | 1.733 (1.098 to 2.735) | 0.018 |
| Adolescent girls’ marital status | | | | | | |
| Never married | 459 | 2608 | 0.702 (0.499 to 0.987) | 0.042 | 0.956 (0.630 to 1.452) | 0.836 |
| Ever married | 43 | 180 | 1 | 1 | | |
| Adolescent girls’ educational status | | | | | | |
| Never attended | 20 | 174 | 1 | 1 | | |
| Primary (1–8) | 439 | 2515 | 1.692 (1.001 to 2.858) | 0.050 | 1.781 (0.973 to 3.263) | 0.061 |
| Secondary (9–12) | 43 | 99 | 4.623 (2.333 to 9.157) | 0.001 | 3.889 (1.836 to 8.235) | <0.001 |
| Adolescent girls’ perceived negotiation skill level | | | | | | |
| Little/no confidence | 51 | 367 | 1 | 1 | | |
| Moderate confidence | 171 | 1082 | 1.096 (0.668 to 1.796) | 0.716 | 1.030 (0.636 to 1.670) | 0.902 |
| High confidence | 280 | 1335 | 1.389 (0.838 to 2.302) | 0.202 | 1.018 (0.589 to 1.759) | 0.949 |
| Adolescent girls’ perceived communication skill level | | | | | | |
| Little/no confidence | 49 | 366 | 1 | 1 | | |
| Moderate confidence | 177 | 1102 | 1.076 (0.669 to 1.731) | 0.762 | 1.117 (0.699 to 1.785) | 0.643 |
| High confidence | 276 | 1314 | 1.374 (0.839 to 2.251) | 0.207 | 1.317 (0.764 to 2.268) | 0.321 |
| Adolescent girls’ contact with health extension worker | | | | | | |
| Yes | 68 | 238 | 1.657 (1.150 to 2.387) | 0.007 | 1.232 (0.289 to 1.813) | 0.289 |
| No | 434 | 2550 | 1 | 1 | | |

The bold values indicate the significant characteristics.
AOR, adjusted OR; COR, crude OR; SRH, sexual and reproductive health.
studies from sub-Saharan Africa also showed a similar association. Other similar studies from Bangladesh and another study from India also identified age as a factor. This might be because as adolescents get older, they are more likely to be exposed to sexual health education and services, which might have increased their HIV knowledge.

**Strengths and limitations of the study**

The study had a relatively large sample size with a good response rate (96.2%). The study also used standard outcome measurement, enabling better comparison among other studies. Regarding limitations, the study did not assess health promotion exposure through media. The study could also be biases as some adolescent girls may tend to answer certain questions based on their perceived expectations or opinion of their adult interviewers. The study was also conducted in a few rural districts in eastern Ethiopia, hence generalisability is restricted only to rural communities with similar contexts.

**Conclusion and policy implications**

Overall, less than one-sixth of the young adolescent girls had comprehensive knowledge of HIV. Adolescent girls exposed to SRH education in peer groups had better comprehensive HIV knowledge. Introducing HIV education and communication at an early age can improve comprehensive knowledge of HIV. Further study in different settings is needed to evaluate the feasibility and effectiveness of the intervention for scale-up.

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NF, YB and AW were responsible for conceptualising, reviewing, and editing the manuscript. NF, AW and AWT were responsible for data collection. NF was responsible for formal analyses and writing the original draft. LO and AWT contributed and critically revised the manuscript. NF accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish. All authors read and given their approval for the publication.

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None declared.

**Patient and public involvement**

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication**

Not applicable.

**Ethics approval**

This study involves human participants and was approved by Institutional Review Board of Addis Continental Institute of Public Health (IRB registration/identification No. 0029). Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review**

Not commissioned; externally peer reviewed.

**Data availability statement**

All data relevant to the study are included in the article or uploaded as online supplemental information.

**Open access**

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