Original article

Effectiveness of IEC interventions in reducing HIV/AIDS related stigma among high school adolescents in Hawassa, Southern Ethiopia

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Abstract

Background: Stigma and discrimination are among the major challenges in HIV/AIDS to disease prevention while IEC interventions are among the mechanisms to mitigate them.
Objective: To determine the effectiveness of IEC interventions.
Methods: Interventional study was conducted from January to March 2007 among high school adolescents in Awassa Town using four different IEC interventions namely; interpersonal communication, pamphlets, educational video and the combination of the three interventions.
Results: Stigmatizing attitudes ranged from 0-65.2%. Multivariate logistic regression analyses showed grade, religion, beliefs in HIV transmission by witchcraft and HIV transmission by feeding on uncooked egg/meat of chicken that swallowed used condom were independent predictors of avoidant behavioral intentions. Residence, fathers' education, television ownership, witchcraft transmission, healthy looking person can have HIV, HIV prevention by having sex with virgin girls and PLWHA with multiple sexual partners were found to be the main determinants of coercive attitude. ANOVA (F-statistics) revealed that the interventions were effective with and statistics=17.484 (p-value<0.0001).
Conclusion: Misconceptions on HIV transmission and prevention, stigmatizing and discriminatory attitudes were prevalent among the adolescents. Remarkable reduction in HIV related misconceptions, stigmatizing and discriminatory attitudes were observed. Hence, campaigns using combined IEC interventions on HIV/AIDS need to be intensified to dispel some of the prevailing misconceptions and associated stigma and discrimination among school adolescents. [*Ethiop.J.Health Dev.* 2008;22(3):232-242]

Introduction

AIDS has been the leading cause of death in Sub-Saharan African (1). New HIV infections were highest among young people and young women. More than a third of all people living with HIV/AIDS were under the age of 25 (2, 3).

Ethiopia is among African countries most seriously affected by the HIV/AIDS pandemic (4). A total of 1.3 million persons were living with HIV/AIDS in the country in 2005 (5). The national HIV prevalence for adults age 15-49 was 1.4%, of which 5.5% were in urban and 0.7% in rural. The HIV prevalence for Southern Nations, Nationalities and Peoples Region (SNNPR) was 0.2% (6).

From the start of the HIV/AIDS epidemic, three phases have been identified: the epidemic of HIV, the epidemic of AIDS, and the epidemic of stigma, discrimination, and denial (7). HIV-related stigma and discrimination have fuelled the transmission of HIV, creating major barriers to prevent further infection, alleviate impact and provide adequate care, support and treatment (8). Discrimination is often described as a distinction made about a person that results in their being treated unfairly and unjustly on the basis of their belonging, or being perceived to belong to a particular group (9). Stigma is generally accepted to be an "attribute that is deeply discrediting" that reduces the bearer "from a whole and usual person to a tainted, discounted one" (10-15). Information, Education and Communication (IEC) and Behavioral Change Communication (BCC) are strategies designed by the Ethiopian Federal Ministry of Health (FMOH) to improve awareness and reduce HIV/AIDS related stigma and discrimination (16). Hence, IEC interventions like interpersonal communication, pamphlets and educational video movie or the combination of the three have been developed and implemented to improve awareness and reduce HIV/AIDS related stigma and discrimination. The study conducted in Addis Ababa, Ethiopia to assess the perceived sufficiency and usefulness of HIV/AIDS information, education and communication (IEC) messages and materials as well as to identify preferences for IEC sources and methods showed that over three quarters of the respondents believed in the usefulness of IEC (17). Findings from BSS round two in Ethiopia revealed that knowledge of prevention methods increased with increasing exposure to HIV/AIDS messages in various media sources (radio, TV, and printed media) (18). A study conducted in India on effectiveness of IEC interventions among school teenagers showed that reduction in stigmatizing and discriminatory attitudes was observed after each IEC intervention. With combined interventions of interpersonal communication and educational video movie, there was remarkable reduction in the attitudes of people. However, the

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reduction was relatively lower after distribution of pamphlets (24).

In Ethiopia, there are research gaps regarding the magnitude and predictors of HIV/AIDS related stigma and discrimination and effectiveness of IEC interventions to achieve the desired changes in high school adolescents. This study, therefore, aimed to explore magnitude and predictors of HIV/AIDS related stigma and discrimination and more specifically the effectiveness of IEC interventions in reducing these attitudes among high school adolescents in Hawassa Town. The information generated from this study will enable designing appropriate IEC interventions to reduce HIV/AIDS related stigma and discrimination in Hawassa and other similar settings.

Methods

Study Area and Population: The study was conducted from 15th of January to 25th of March 2007 in high schools of Hawassa Town, Southern Ethiopia. Hawassa is the Capital of the Southern Nations, Nationalities and Peoples Regional State. The Town is about 275 km away from Addis Ababa. The Total population was estimated to be 119,623, comprising of 60,378 males and 59,245 females (32). The Town had three hospitals, two health centers, one Ethiopian Family Guidance Association clinic, one health post and several private clinics. The total number of high schools were six; three governmental and three non-governmental. The number of students in all six high schools was about 12,000.

Study Design: Interventional study was employed in four high school adolescents using four different IEC interventions namely; interpersonal communication, pamphlets, educational video or combination of the three interventions.

***Study Population and Sample Size*:** All grade 9 and 10 adolescents in the high schools of Hawassa Town were the study population. The questionnaire was pre-tested in students of Yirgalem High School, which is about 45KM south east of Hawassa and assumed to have similar setting with Hawassa Town. The mean score differences and standard deviations of the stigmatizing and discriminatory attitudes of pre and post intervention in the interpersonal communication group of pre-test study were used to compute the sample size. This group was selected because of the reduction in stigmatizing attitude using this intervention was less inconsistent compared to other interventions like pamphlets, educational video movie and combination of the three interventions taken from the study conducted in India (24). $Z_{ß}$ (one sided percentage point of the normal distribution corresponding to 100% power, if the power is 90% and $Z_{ß}$ is 1.28); $Z\alpha$ (percentage point of the normal distribution corresponding to the two-sided); Significance level of 5% and $Z\alpha$ is 1.96; σ_1 and σ_2 (standard deviations of the pre and post intervention of the pre-test study for the group provided interpersonal communication respectively. σ_1 is 0.49 and σ_2 is 0.56); μ_1 and μ_2 (the mean scores of the stigmatizing attitudes pre and post intervention of the pre-test study for interpersonal communication respectively. $\mu_1$is 2.833 and μ_2 is 3.085) and 10% non-response rate were considered. Therefore, 101 study participants were computed for each intervention areas and a total of 404 study participants were estimated.

Sampling Procedures: High schools were selected using stratified sampling with probability proportional to size in the study area. Hence two governmental and two non-governmental schools were selected from governmental and non governmental high schools respectively. Grades 9 and 10 were selected from the four high schools using purposive sampling. Sections from grades 9 and 10 were selected again using simple random sampling (50% of the sections for SOS Hermann Gmeiner, Alamura and Comboni Catholic Missionary High Schools and 25% for Hawassa Senior Secondary School since it had 28 Sections for grade 9 and 24 sections for grade 10). Stratified sampling with probability proportional to size (PPS) was used to select adolescents from both sexes. Systematic sampling was employed to select the study subjects. The types of interventions undertaken in each school were also randomly allocated to each high school as follows: interpersonal communication for SOS Hermann Gmeiner, pamphlets for Comboni, educational video movie for Hawassa Tabor and combination of the three interventions for Alamura high schools. Therefore, only one intervention was employed per school in order to control contamination of information.

***Data Collection*:** Pre-tested and self-administered questionnaires were used. Data collection supervisors were four high school teachers and three health officers. Training was given for the health officers on how to undertake the interventions and how to supervise the overall activities. The high school teachers were also trained on how to organize the intervention sessions. Self-administered questionnaires were distributed to the study subjects during the pre-intervention phase. To measure stigmatizing and discriminatory attitudes, Likert Scale ranging from 1 to 5 was used. One and two indicated negative attitudes, 3 neutral responses and 4 and 5 indicated positive attitudes. Then, the interventions were conducted once (interpersonal communication including for one hour, reading pamphlets for 30-45 minutes, educational video movie for 26 minutes, combination of the three interventions, i.e. lecture, pamphlets distributed and HIV/AIDS educational video movie were watched; and an interactive session was held by the students and the intervention implementers, which lasted 2 hours). After each intervention, the same self-administered questionnaires were distributed to assess the immediate effect of the interventions. Follow-up round was conducted after two months post-intervention using

the same questionnaires to ascertain how much of the improvements could be sustained over the period of two months.

***Data Processing and Analysis*:** The collected data were cleaned for completeness and consistencies. Responses in each question were coded for simplicity of data entry. Then, 10% of the data were entered in EPI INFO 2002 version and checked for the appropriateness of data entry. Finally, the whole data were entered to EPI INFO 2002 version package and then exported to SPSS version 13 package for analysis. Descriptive statistics were used to determine the frequency of different variables. F-test for ANOVA analytical statistics and multiple logistic regressions for multivariate analysis were applied. Results were displayed using tables and graphs. Results were interpreted as significant at a p-value of <0.05 and OR 95% CI.

Ethical Consideration: Ethical clearance was obtained from AAU, Medical Faculty. Letters were written to the high schools and other concerned bodies to obtain permission and cooperation for data collection. Students were briefed about the confidentiality of their responses and the importance of providing the right information. Informed verbal consent was secured from the study subjects to participate in the study. The interventions provided were adolescent friendly and culturally acceptable.

Results

Socio-demographic Characteristics

A total of 404 students (101 students in each school) were recruited for the study, however, 373 students from four high schools were enrolled in the study. The response rate was 94.1% for interpersonal communication, 90.1% for pamphlets, 90.1% for educational video movie and 95.1% for the combination of three interventions. The mean age of the study participants was 15.86 ±1.2 years. Most of the study participants 277(74.3%) were from urban areas. Three hundred thirty (88.5%) were between the ages of 15 and 19. Majority, 221(59.2%) were male respondents. Two hundred one (53.9%) were grade 9 students. The predominant religions of the study participants were Orthodox and Protestant Christianity, 169(45.3%) and 159(42.6%) respectively. The fathers' educational status of the study participants was tertiary in 178(47.7%), followed by secondary education in 70(18.8%) of the study participants. The educational status of the mothers of most of the study participants was secondary education in 105(28.2%) of cases followed by tertiary in 88(23.6%). Only 70(18.8%) of the study participants attended sessions on HIV/AIDS in the preceding two weeks of the study time.

Misconceptions on HIV Transmission and prevention versus the effectiveness of each intervention in improving awareness: The awareness level regarding HIV/AIDS among the study participants, ranged from 64.2% - 98.9% of the interpersonal communication group, 68.1-100% of the pamphlets group, 36.3-96.7% of the educational video group and 39.3-95.8% of the combined intervention group in the pre-intervention phase (Table1). These values rose to 71.6-100%, 78-100%, 56-100% and 94.8-100% respectively during the post intervention phase. Follow up assessment was conducted after two months and the values were found to be 70.5-100% in interpersonal communication group; 79-100% in pamphlets group; 51.6-100% in educational video group and 84.4-100% in combined intervention group.

Stigmatizing and Discriminatory attitudes of the study participants versus the effect of each intervention: The items employed in the study to describe avoidant behavioral intentions were reaction of the participants like avoid/not willing to go PLWHA barbers/beautician, purchasing from PLWHA shop owner, eating food prepared by food handlers, eating meal with PLWHA, learning/working with PLWHA, physical contact with PLWHA and learning with student from PLWHA family (Table 2). In this regard, after 2 months of follow up, it was found that the reduction in avoidant behavioral intention was 0-25.2% in interpersonal communication group, 9-17.6% in pamphlets group, 14.3-29.7% in educational video and 21.9-27.1% in the combined intervention.

Blaming Attitudes:- Regarding this aspect, the study participants were evaluated if they felt that sero-positive individuals had rightly acquired what they deserved as a result of their high risk behavior; and whether they felt that the sero-positive people didn't care if they infect others with HIV (Table 2). The reduction in blaming attitudes after 2 months of follow up was 7.4-17.9% in interpersonal communication group, 0-7.7% in pamphlets group, 0-1.1% in educational video movie and 5.6-19.8% in the combined intervention.

Coercive Attitudes: The study participants were asked for possible coercive attitudes using items like legal separation and restricting of sero-positive individuals from teaching, employment, use of medical facilities, working as health professionals, participating in public occasion, getting social service, working in schools, access to insurance services, visiting/working in Ethiopia (especially for foreigners), enforcement to publicize one's sero-status, enforcement to be tested especially high risk groups, and quarantine of sero-positive individuals (Table 2). Hence, after 2 months of follow up it was learnt that the reduction in coercive attitudes was 0-18.9% in interpersonal communication group, 0-5.5% in pamphlets group, 10-24.2% in educational video movie and 7.3-37.6% in the combined intervention.

Table 1: **Misconceptions on HIV/AIDS Transmission and prevention among the study participants of high schools of Hawassa Town January to March 2007**

HIV transmission/prevention by	SOS (interpersonal communication)			Comboni (Pamphlets)			Hawassa Tabor (Video)			Alamura (Combined)		
	Pretest	posttest	f/up	pretest	posttest	f/up	pretest	posttest	f/up	pretest	posttest	f/up
Witchcraft	98.9	100	98.9	97.8	98.9	100	80.2	100	97.8	85.4	96.9	95.9
Coughing/Sneezing	96.8	100	98.9	98.9	100	100	86.8	95.6	98.9	92.7	97.9	97.9
Eating meal with PLWHA	98.9	98.9	98.9	92.3	98.9	98.9	92.3	98.9	98.9	93.8	99	100
Insect bite	95.8	98.9	97.9	90.1	96.7	98.9	82.4	100	98.9	81.3	99	93.8
MTCT	98.9	100	100	97.8	100	100	91.2	100	98.9	93.8	100	100
Blood transfusion	98.9	100	100	98.9	100	100	96.7	98.9	98.9	95.8	100	99
sharing Public Toilets	95.8	100	98.9	97.8	98.9	100	81.3	98.9	100	92.7	100	99
Sharing Swimming pool	85.3	98.9	98.9	87.9	94.5	93.4	78	94.5	95.6	90.6	99	99
Sharing Utensils with PLWHA	89.5	100	96.8	91.2	97.8	96.7	87.9	98.9	97.8	83.3	100	99
Eating Raw Egg/meat of chicken	94.7	100	100	87.9	98.9	92.3	50.5	95.6	81.3	47.7	97.9	97.9
Raw meat prepared by PLWHA	90.5	97.9	95.9	89	95.6	94.5	74.7	92.3	90.1	86.5	97.9	94.8
Share clothes/beddings	97.9	100	100	92.3	98.9	96.7	85.7	98.9	97.8	95.8	100	100
Lubricants in Condom	68.4	96.8	95.8	79.1	95.6	92.3	70.3	100	98.9	71.9	100	97.9
Gods' punishment	70.5	90.5	84.2	68.1	78	83.5	36.3	56	51.6	39.6	95.8	84.4
Healthy looking person can have HIV	87.4	92.6	93.7	80.2	92.3	95.6	83.5	98.9	98.9	78.1	100	90.6
PLWHA had multiple partner	92.6	98.9	93.7	87.9	91.2	90.1	64.8	94.5	92.3	80.2	96.9	94.8
Presence of Responsible community for HIV	64.2	71.6	70.5	78	81.3	79	85.7	94.5	93.4	83.3	94.8	94.8
Persistent Condom use	78.9	95.8	91.6	79.1	97.6	96.7	84.6	97.8	98.9	85.4	99	95.8
Only one uninfected partner	82.1	89.5	87.4	89	95.6	95.6	91.2	98.9	97.8	92.7	99	99
Hard liquor prevents HIV	98.9	100	100	96.7	100	97.8	87.9	97.8	97.8	90.6	97.9	100
Sex with virgin girls prevents HIV	98.9	98.9	98.9	100	100	100	91.2	98.9	98.9	87.5	97.9	97.9

Values in the Table represent percentages
F/up means follow up

Table 2: **Stigmatizing and discriminatory attitudes among the study participants in the high schools of Hawassa Town January to March 2007**

HIV transmission/prevention by	Interpersonal communication (SOS)			Pamphlets (Comboni)			Video (Hawassa Tobr)			Combined (Alamura)		
	Pretest	posttest	f/up	pretest	posttest	f/up	pretest	posttest	f/up	pretest	posttest	f/up
Avoid going to Barber/Beautician	29.5	7.4	20	40.7	20.9	23.1	35.2	14.3	13.2	35.4	11.5	12.5
Avoid going to Shop owner	23.2	3.2	9.5	34.1	17.6	17.6	37.4	9.9	11	32.3	7.3	9.4
Avoid PLWHA Food handler	36.8	6.4	11.6	33	15.4	17.6	29.7	15.4	9.9	23	4.2	1
Avoid PLWHA Physical contact	14.8	0	4.3	28.6	11	11	25.3	3.3	5.5	31.3	2.1	4.2
Avoid Eating with PLWHA	7.4	1.1	7.4	24.4	13.2	15.4	28.6	8.8	14.3	31.3	2.1	4.2
Avoid Learn/work with PLWHA	5.3	0	3.2	17.7	9.9	6.6	39.6	7.7	14.3	29.2	6.2	6.2
Avoid Student from PLWHA family	4.2	0	3.2	15.4	7.7	5.5	37.4	12.1	7.7	25	5.2	3.1
PLWHA deserve HIV/AIDS	20	11.6	12.6	22	20.9	22	37.4	23.1	37.4	33.3	5.2	19.8
PLWHA don't care for others	34.8	16.9	16.9	40.7	27.5	33	35.2	25.3	34.1	32.3	12.5	26.7
PLWHA teacher shouldn't teach	0	0	0	3.3	0	3.3	25.3	3.3	4.4	17.7	2	5.2
Employers should not employ PLWHA	4.2	1.1	4.2	6.6	4.4	1.1	20.9	6.6	8.8	16.7	1.1	9.4
PLWHA use of medical facilities	1.1	1.1	1.1	3.3	2.2	2.2	23.2	2.2	4.4	15.6	5.2	5.2
PLWHA medical staffs prohibited	7.4	2.1	6.6	9.9	7.7	6.6	28.6	3.3	4.4	24	2.1	5.2
PLWHA should not participate in public occasion	3.2	3.2	1.1	4.4	1.1	3.3	18.7	7.7	4.4	19.8	6.3	5.2
Prohibit PLWHA social service	3.2	1.1	1.1	13.2	4.4	7.7	25.3	9.9	11	19.8	8.4	4.1
Prohibit PLWHA school staffs	1.1	0	1.1	3.3	2.2	3.3	19.8	3.3	4.4	13.6	2	3.1
Prohibit PLWHA foreigners	65.2	21.1	54.8	57.2	36.3	57.2	60.5	47.3	50.6	46.9	29.2	35.4
PLWHA should publicize their sero status	27.4	8.5	17.9	22	17.6	20.9	41.8	19.8	25.3	43.8	7.3	11.5
PLWHA should be denied insurance services	6.4	1.1	7.4	9.9	7.7	4.4	27.5	13.2	7.7	19.8	6.2	0
PLWHA should be quarantined	8.5	2.1	6.4	9.9	4.4	5.5	36.3	13.2	14.3	19.8	4.2	4.2
High risk groups must be tested	35.8	7.4	16.9	25.3	15.4	23.1	50.6	21.1	30.8	43.8	6.2	6.2
Deny PLWHA care	10.5	7.4	9.5	27.5	9.9	20.9	44	5.5	9.9	33.4	1	2.1
Deny PLWHA family member care	13.7	6.4	7.4	22	13.2	15.4	39.6	3.3	12.1	26	1	4.4

Values in the Table represent percentages
F/up means follow up

Sympathetic Feelings:- Regarding this, study participants were assessed whether or not they had negative sympathetic feelings for any PLWHA in the community and for a sero-positive family member (Table 2). After 2 months of follow up, it was shown that the reduction in negative sympathetic feelings was 1-6.3% in interpersonal communication group, 6.6% for both items in pamphlets group, 27.5-34.1% in educational video movie and 21.6-31.3% in the combined intervention group.

Determinants of Stigmatizing and Discriminatory Attitudes among the Participants:- Independent variables having statistically significant association with the outcome variables namely avoidant behavioral intentions, blaming attitude, coercive attitude and negative sympathetic feelings on univariate analyses were entered into the logistic regression model to find independent predictors of stigmatizing and discriminatory attitudes. In addition, odds ratios (OR) with their corresponding 95% confidence intervals (CI) were adjusted for the independent variables entered into the model.

Accordingly, only four of the variables (grade, religion, HIV transmission through witchcraft and feeding by uncooked egg/meat of chicken swallowed used condom) remained to be significantly and independently associated with the avoidant behavioral intentions (Table 3). In this analysis, it was revealed that adolescents in grade 9 were 2.23 times more likely to avoid learning/working with PLWHA than those in grade 10 (OR=2.23, 95% CI 1.2-4.1). Orthodox and Catholic religions had negative impact on avoiding learning/working with PLWHA compared to Protestant religion, (OR=0.43, 95% CI, 0.22-0.82) and (OR=0.22, 95%CI, 0.06-0.77) respectively. Adolescents who believed that HIV can be transmitted through witchcraft were 3.5 times more likely to avoid learning/working with PLWHA than those who did not (OR=3.5, CI=1.4-8.8). Moreover, adolescents who reported that HIV can be transmitted through feeding raw egg/meat of a chicken were 2.1 times more likely to avoid learning/working with PLWHA than those who reported that HIV can't be transmitted through feeding by raw egg/meat of a chicken that swallowed used condom, (OR=2.1, 95% CI, 1.1-3.9).

As it is depicted in Table 4 variables like residential areas, fathers' educational status, television ownership, transmission through witchcraft, healthy looking person can have HIV in his/her blood, HIV can be prevented by having sex with virgin girls and PLWHA are those who had multiple sexual partners were found to have statistically significant association with the outcome variable (coercive attitude). Adolescents from urban areas were 80% less likely to have coercive attitude compared to their rural counterparts. Adolescents whose fathers' educational status (read and write and elementary) were 6.4 and 5.9 times more likely to have coercive attitudes compared to those whose fathers' educational was tertiary level (OR=6.4, 95% CI, 1.02-40.42) and (OR=5.9, 95% CI, 1.0-34.6) respectively. There was an increased risk of coercive attitude among adolescents who had television in their residential houses compared to those who did not have television (OR=12.9, 95% CI 2.8-58.4). Adolescents who reported that HIV can be transmitted through witchcraft were 6.1 times more likely to have coercive attitude than those who said that HIV can't be transmitted through witchcraft (OR=6.1, 95% CI, 1.7-22.0). Adolescents who reported that HIV can be prevented by practicing sex with virgin girls were 22.3 times more likely to have coercive attitude than those who didn't report to do so (OR=22.3, 95% CI, 5.1-97.1). Participants who reported that PLWHA are people who had multiple sex partners were 2.9 times more likely to have coercive attitude than those who reported the other way (OR=2.9, 95% CI, 1.02-8.45).

Effectiveness of the interventions in reducing HIV Stigma and Discrimination:- Four IEC materials namely; interpersonal communication, pamphlets, educational video movie and a combination of those three interventions used in this study were evaluated for their effectiveness in reducing HIV related stigma and discrimination. To evaluate this, Analysis of Variance (ANOVA) was used after identifying dependent variables from the sum scores of the Likert Scale in pre intervention and follow up period. The reduction in stigmatizing attitude between the scores of follow up and that of pre intervention phase were computed. F-statistics was computed to know the difference between the follow up and pre intervention phase scores (Table 5). F-statistics was 2.6 at p-value <0.05 from F distribution. F-statistics=17.484 and p-value <0.0001 were found to be significant to reveal the differences in effectiveness of the interventions in reducing HIV related stigma and discrimination.

Discussion

This study attempted to examine the misconceptions with regard to HIV transmission and prevention and the stigmatizing and discriminatory attitudes prevailing among school adolescents in Hawassa Town. The awareness of participants on the major modes of HIV/AIDS transmission (like MTCT and blood transfusion) was higher than 91% in all four intervention groups. This result is inconsistent with the findings of other studies conducted in Sub-Saharan Africa (3, 20) and the, Demographic and Health Survey in Ethiopia (DHSE), 2005 and Behavioral Surveillance Survey (BSS) round one conducted in Ethiopia (6, 19). This could be due to the urban nature of the study area that increased accessibility to information. Findings of the post intervention phase were better than the follow up one.

Table 3: **Multiple logistic regression analysis for factors contributing for avoidant behavioral intentions among the study participants in high schools of Hawassa Town, January to March 2007**

Variables	Avoid working/ Learning with PLWHA		Adjusted OR (95% CI)	P-value
	Yes	No		
Age				
<15	19	24	2.07 (0.90 - 4.75)	.085
15+***	77	273	1	
Grade				
9	64	137	2.23 (1.20 - 4.10)	0.011*
10***	32	140	1	
Family income				
<500	25	27	1.42 (0.69 - 2.93)	0.337
500-1500	44	94	2.07 (0.73 - 5.00)	0.174
>1500***	27	156	1	
Religion				
Protestant***	62	97	1	
Orthodox	24	145	0.43 (0.22 - 0.82)	0.010 *
Muslim	2	13	0.20 (0.03 - 1.16)	0.072
Catholic	6	16	0.22 (0.06- 0.77)	0.018 *
Others	2	6	0.18(0.03 - 1.14)	0.068
Residence				
Urban***	53	224	1	
Rural	43	53	0.97 (0.35 - 2.72)	0.952
Mothers educational status				
Illiterate	26	42	2.30 (0.75 - 7.10)	0.146
Read and write	23	35	1.86 (0.73- 4.74)	0.196
Elementary	15	39	1.618 (0.50 - 5.24)	0.423
Secondary	23	82	1.10 (0.30 - 4.01)	0.888
Tertiary***	9	79	1	
Membership of anti AIDS club				
Yes	10	57	0.43 (0.18 - 1.01)	0.051
No***	86	220	1	
Television ownership by family				
Yes	44	214	1.54 (0.57 - 4.20)	0.396
No***	52	63	1	
HIV information in the preceding two weeks				
Yes	7	63	0.42 (0.17-1.05)	0.064
No***	89	214	1	
Transmission by witchcraft				
Yes	23	12	3.5 (1.40 - 8.80)	0.008 **
No***	73	265	1	
Coughing/sneezing				
Yes	12	11	1.80 (0.59-5.53)	0.304
No***	84	266	1	
MTCT				
Yes***	87	269	1	
No	9	8	1.89 (0.44 - 8.15)	0.393
Insect bite				
Yes	21	26	1.48 (0.64 - 3.45)	0.363
No***	75	251	1	
Transmission by eating with PLWHA				
Yes	11	10	1.56 (0.51 - 4.82)	0.437
No***	85	267	1	
Row meat by prepared by PLWHA				
Yes	24	31	1.84 (0.85-3.99)	0.120
No***	72	246	1	
Transmission by public toilets				
Yes	15	15	0.78 (0.26 - 2.37)	0.659
No***	81	262	1	
Raw egg/meat of chicken swallowed condom				
Yes	81	225	2.1 (1.1 - 3.9)	0.027*
No***	15	52	1	

*=P-value<0.05, **=P-value<0.01, ***=Reference Category, Chi-square=108.345, -2 Log likelihood=317.092

Table 4: **Multiple logistic regression analysis for factors contributing for avoidant behavioral intentions among the study participants in high schools of Hawassa Town, January to March 2007**

Variables	HIV = Teacher?? should be prohibited		Adjusted OR (95% CI)	P-value
	Yes	No		
Family income				
<500	21	31	1.44(0.40-5.14)	0.574
500-1500	25	113	1.65(0.39-6.99)	0.500
>1500***	6	177	1	
Religion				
Protestant***	29	130	1	
Orthodox	10	159	1.43(0.47-4.33)	0.524
Muslim	3	12	0.93(0.09-9.60)	0.951
Catholic	8	14	3.27(0.82-12.97)	.092
Others	2	6	1.28(0.14-11.75)	0.830
Residence				
Urban	20	257	0.2(0.05-0.80)	0.022*
Rural***	32	64	1	
Fathers educational status				
Illiterate	12	23	1.69(0.36-7.91)	.504
Read and write	13	36	6.43(1.02-40.42)	.047*
Elementary	11	30	5.9(1.0-34.6)	.050*
Secondary	10	60	1.50(0.2-11.28)	.693
Tertiary***	6	172	1	
Radio ownership by family				
Yes***	41	301	1	
No	11	20	1.16(0.31-4.39)	.822
Television ownership by family				
Yes***	11	247	1	
No	41	74	12.9(2.8-58.4)	.001**
HIV information in the preceding two weeks				
Yes	1	69	0.11 (0.01-1.16)	.066
No***	51	252	1	
Transmission by witchcraft				
Yes	17	18	6.1(1.7-22.0)	.005**
No***	35	303	1	
Coughing/sneezing				
Yes	10	13	2.17(0.52-9.13)	.290
No***	42	308	1	
Insect bite				
Yes	13	34	1.62(0.53-5.02)	.400
No***	39	287	1	
Row meat by prepared by PLWHA				
Yes	15	40	1.02(0.33-3.17)	.968
No***	37	281	1	
Transmission swimming pool				
Yes	13	41	1.25(0.41-3.81)	.692
No***	39	280	1	
Raw egg/meat of chicken swallowed condom				
Yes	28	64	2.06(0.81-5.24)	.129
No***	24	257	1	
HIV is Gods' punishment				
Yes	35	138	2.55(0.92-7.04)	.071
No***	17	183	1	
Sex with virgin girls can prevent HIV				
Yes	15	6	22.3(5.1-97.5)	.000***
No***	37	315	1	
PLWHA had multiple partner				
Yes	20	49	2.9(1.02-8.45)	.045*
No***	32	272	1	

*=P-value<0.05, **=P-value<0.01, ***=P-value <0.001, ****=Reference Category, Chi-square=108.345, -2 Log likelihood=317.092

Table 5: **Analysis of variance (ANOVA) comparing the effectiveness of different IEC interventions in reducing HIV related stigmatizing and discriminatory attitudes among adolescents in the High Schools of Hawassa Town, January to March 2007**

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	12087.901	3	4029.300	17.484	.000
Within Groups	85038.222	369	230.456		
Total	97126.123	372			

This could be explained by reduced memory after two months follow up period which is in line with the findings of the study conducted in India (24).

This study showed misconceptions among the study participants, but the level of misconception differed from one intervention group to another. Studies undertaken in Ethiopia and elsewhere showed similar findings on misconceptions (3, 6, 11 – 15, 19, 20, 22). The misconceptions were higher among the study participants in Hawassa Tabor and Alamura than in SOS and Comboni high schools. This could be due to the differences in income and educational status of families of the adolescents. The misconceptions were reduced remarkably in the post intervention than follow up phases among the study participants. The reduction in misconception was higher in the immediate post intervention than follow up phase, which could be explained by reduced memory during the two months period. But in some cases, the reduction in follow up phase was found to be higher than that of post intervention, which could be due to exposure of the study participants to some other updating sessions on HIV/AIDS during the two months. With regard to effectiveness of the interventions, a combined intervention was found to be more effective followed by interpersonal communication and educational video movie. Pamphlets were found to be relatively less effective in improving awareness and reducing misconceptions compared to the other three interventions, which is in line with the findings conducted in India (24).This could be due to the fact that printed materials are less powerful compared to others in passing messages since people do not take time to read pamphlets though it is one of the method of communication.

In this study, preventive measures of HIV/AIDS transmission like persistent condom use and having only one uninfected sexual partner were evaluated. It was revealed that the awareness level for both was 78.9 - 82.1% in interpersonal communication group, 79.1-89% in pamphlets, 84.6-91.2% in the educational video movie and 85.4-92.7% in combined intervention in the pre intervention phase. This is better than the results of DHSE 2005(6). The improvement after each intervention was also promising both in post intervention and follow up phases. The awareness level was better among the study participants of Hawassa Tabor and Alamura than SOS and Comboni high schools which could be due to the difference in exposure to sessions on prevention of HIV/AIDS.

This study also indicated various levels of stigmatizing and discriminatory attitudes among the study participants in the different intervention groups with variation from one item to another. The least stigmatizing and discriminatory attitude observed was on 'HIV+ teacher should be prohibited from teaching' except in adolescents of Hawassa Tabor High School. The commonly observed stigmatizing/discriminatory attitude in all groups was 'PLWHA foreigners should be prohibited from visiting Ethiopia'. Studies in Ethiopia and elsewhere on HIV and AIDS stigma and discrimination among adolescents showed consistent results with this study (6, 19, 21, 23, 24, 25, 31).The reduction in stigmatizing and discriminatory attitudes was remarkable in post intervention phase and relatively smaller in follow up phase which is consistent with the findings elsewhere (24).

In this study, there was more than two folds increase in avoiding learning/working with PLWHA in grade 9 students than in grade 10. The possible explanation for this could be that grade 9 students may have less exposure to information sources on HIV compared to those in grade 10. Religion-wise, Orthodox and Catholic religions had negative impact on avoiding learning/working with PLWHA compared to adolescents whose religion was Protestant. This could be explained by the differences in factors like residence and income status between the two groups, moreover; exposure to HIV related stigma reducing information could be more in Orthodox and Catholic followers. The presence of misconception like HIV can be transmitted through witchcraft among the study participants had 3.5 folds of increase in avoiding learning/working with PLWHA compared to those who reported HIV can't be acquired through witchcraft. This could be explained by HIV related stigma and discrimination that could emanate from misconceptions on HIV transmission. The other item was eating raw egg/meat of chicken that swallowed used condom can transmit HIV was also found to have statistically significant association with avoiding learning/working with PLWHA. This could also be explained by HIV related stigma and discrimination and

could be preceded by misconceptions on HIV transmission. Studies conducted in Ethiopia and elsewhere around the world in adolescents and other population groups revealed that socio-demographic factors and misconceptions on the modes of transmission of HIV/AIDS were found to be predictors of HIV/AIDS related stigma and discrimination (20, 23, 26-30).

In this study, it was found that coercive attitude like HIV positive teacher should be prohibited from teaching was 80% less in adolescents from urban than in rural areas. This could be explained by urban adolescents having a better access to information related to HIV/AIDS compared to their rural counterparts. There were also about six folds in coercive attitude among adolescents whose fathers' educational statuses were read and write and elementary compared to adolescents whose fathers' educational status was tertiary. The possible explanation could be due to better discussion of highly educated fathers with their family members on HIV/AIDS issues compared to those fathers who were less educated. Adolescents who didn't have television in their houses had increased risk of coercive attitude compared to their counter parts. In the presence of television, exposure to information related to HIV was better. Acquisition of HIV/AIDS through witchcraft had also statistically significant association with coercive attitude. There was also an increased risk of coercive attitude among adolescents who reported that sex with virgin girls can prevent HIV and in those who reported that PLWHA are people who had multiple sexual partners. This was also consistent with the findings of a pilot study conducted in Zambia (22).

In this study, ANOVA (F-statistics), also indicated that all the four interventions implemented were effective in reducing HIV related stigma and discrimination (p-value<0.0001). But the level of reduction differed from one intervention to another.

In conclusion, misconceptions on HIV transmission/prevention and stigmatizing and discriminatory attitudes were prevalent among the adolescents. Misconceptions were found to be predictors of HIV related stigma and discrimination. Remarkable reduction in the HIV related misconceptions, stigmatizing and discriminatory attitudes were observed using the combined interventions. Hence, campaigns using combined IEC interventions need to be intensified to dispel the prevailing misconceptions in transmission and prevention of HIV/AIDS and the associated stigma and discrimination.

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