International Journal of Maternal and Child Health and AIDS (2020), Volume 9, Issue 3, 397-407

IJMA

Available online at www.mchandaids.org

INTERNATIONAL JOURNAL of MATERNAL and CHILD HEALTH and AIDS
ISSN 2161-864X (Online)
ISSN 2161-8674 (Print)
DOI: 10.21106/ijma.412

ORIGINAL ARTICLE | HIV/AIDS IN ECUADOR

HIV/AIDS-related Knowledge and Behavior among School-attending Afro-Descendant Youths in Ecuador

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ABSTRACT

Background or Objectives: HIV/AIDS transmission in Ecuador is considered a concentrated epidemic; therefore, there are some studies on high risk groups but there is limited published data regarding the HIV/AIDS risk factors among adolescents of African descent. In this study, we sought to explore the determinants of HIV/AIDS-related knowledge and behavior among afro-descendant youths attending schools in the city of Esmeraldas, Ecuador.

Methods: A cross-sectional survey among school-attending youths was conducted in Esmeraldas, Ecuador in 2010. Our target population was afro-descendant youths attending the last two years of high school. Thirty public high schools enrolling students in junior and senior years were identified. Outcome data were analyzed in the form of three composite variables. A multivariate linear regression model was built for each outcome.

Results: A total of 213 school-attending afro-descendant youths aged 14 to 21 years old were enrolled in this study. Gender distribution was almost equal with a 1:1.17 male to female ratio. Overall, students in this population scored well in comprehensive knowledge of HIV with 88% having medium or higher knowledge.

Conclusion and Global Health Implications: Knowledge of HIV and its determinants was medium to high, but knowledge of sexually transmitted diseases was low among afro-descendant Ecuadorian adolescents in our study. Results of this study might be instrumental in facilitating decision-making processes related to the planning, implementation, and evaluation of HIV/AIDS prevention and control strategies in this specific population.

Key words: • Afro-descendant • Adolescents • HIV/AIDS • Ecuador • Condom use • Risk factors • Epidemiology • Youths • Sexually transmitted infections • Transmission

1. Introduction

1.1. Background of the Study

Health issues among adolescents (i.e. 13-19 years) and youths (i.e. up to 24 years old) should be urgently addressed especially in developing countries. Firstly, it is been estimated that the existing cohort of youths is the largest that has ever lived or will ever live in the world.[1] Additionally, it is widely accepted that health issues during early years may have lifelong consequences expanding even into the next generation.[2] Moreover, adolescence is a difficult transitional period of life when people seem to begin to explore their sexuality.[3] Worldwide, adolescence is a critical period of increased risk for HIV transmission; it also represents a great opportunity to implement appropriate preventive and control strategies.

The Joint United Nations Program on HIV/AIDS (UNAIDS) estimates that there were 36.9 million people living with HIV (PLHIV) worldwide by the end of 2017.[4] Although the number of new HIV infections and AIDS-related deaths has decreased in recent years, it is believed that an even stronger resurgence of the disease might follow if current prevention and control efforts are not scaled up, especially in low and middle-income countries.[5] Moreover, there is an increase in the incidence of HIV among the adolescent and youths population, thus leading to an increase in the PLHIV global population.[6] Worldwide, an estimated 670,000 youths aged 15-24 (including 250,000 aged 15-19) received a new diagnosis of HIV in 2013 representing 6% of all PLHIV and 12% of new HIV infections. In 2012, it was estimated that worldwide nearly 830 adolescents became infected with HIV daily.[3] This increased proportion of adolescents living with HIV/AIDS when added to a tendency for risk-taking behaviors among adolescents[7] may translate into risky sexual behavior, could provide an unfortunate combination of syndemic conditions favoring HIV transmission among youths populations.[7]

According to the World Health Organization (WHO), HIV is currently the second leading cause of death among adolescents worldwide.[2] It has been estimated that the number of AIDS-related deaths among youths aged 15-19 and 20-24 years has steadily increased since 2001 onwards as opposed to the declining trend observed among other population groups like children or younger adolescents (i.e. aged 10-14 years), at least from year 2005 onwards.[8] Although the reasons for this observed increase in HIV deaths among adolescents are not completely understood, it is possible that it may reflect improved survival into adolescence of children infected with HIV.[2] Another compelling factor for focusing on adolescents for HIV/AIDS prevention is the fact that, in most affected countries, the observed decrease in HIV prevalence is concomitant to adolescents and young people embracing safer sexual behavior, with lower rates of sex before age 15, promiscuity, and sex without condoms.[8]

There is limited published data regarding the overall characteristics of the HIV/AIDS epidemic among adolescents in Ecuador. Ecuador is experiencing a concentrated epidemic and according to the 2014 Ecuador HIV/AIDS progress report (UNGASS Progress Report), there are 54,641 PLHIV in Ecuador,[9] up from 21,810 reported in 2010.[6] The latter report shows that the number of HIV cases begins to sharply increase at age groups 15-19 years and 20-24 years and that 14.9% of the total reported AIDS cases and 25.3% of the total reported HIV cases in 2009 were among youths aged 15-24 years.[10] The latest available Country Progress Report (2014) states that the percentage of youths 15-24 years living with HIV in Ecuador is 0.43%.[11] The recently released UNAIDS Ecuador Country Progress Report 2018 mentions that the level of knowledge about HIV/AIDS among youths is still low.[12] Moreover, in Ecuador there is no plan in existence designed to promote theknowledge and preventive skills for HIV among adolescents and youths.[4,10,12]

Our study location Esmeraldas is the province with the 3rd highest prevalence of HIV/AIDS in Ecuador. It requires further attention because of the following reasons: (1) it has the highest national rate of increase in the number of AIDS cases as well as in the prevalence of HIV among pregnant women between 2008 and 2009[13]; (2) it bears a disproportionate burden of the HIV/

AIDS epidemic;[14-16] (3) it is composed of ethnic backgrounds that are significantly different from national averages with afro-descendants representing an important proportion of the population (43.9%);[17] and, (4) Esmeraldas ranks 6th and 7th among the 24 provinces, as province of origen of PLHIV, for adults and adolescents respectively.[14-16] Moreover, it has been reported that 52% of women aged 15-24 in Esmeraldas have had at least one sexual encounter with only 16% of them using any contraceptive method during the first sexual encounter.[18] Additionally, 29% of adolescents aged 15-19 years and 84% of those aged 20-24 years report having sexual experience with 65% of these sexual encounters being premarital.[18] Also, women belonging to lowest socioeconomic quintile report higher sexual experience compared to those in the highest quintile, 58% vs. 44%.[18] Altogether, these data suggest a high rate of sexual initiation and increasing sexual encounters as age increases which would put youths at increased risk of HIV transmission in Esmeraldas.

In this study, we sought to explore the determinants of HIV/AIDS-related knowledge and behavior among afro-descendant youths population attending schools in the city of Esmeraldas, Ecuador. Specifically, this study sought to explore the socio-economic, demographic, family structure, knowledge, attitudes, and practices that may determine the incidence of sexually transmitted infections (STIs) including HIV among among this population. It is hypothetized that the independent variables may be determining the increasing incidence of STIs including HIV among these adolescents.

2. Methods

A cross-sectional survey among school-attending youths was conducted in Esmeraldas, Ecuador, in 2010. Surveys were administered to each participant and collected relevant demographic information as well as information regarding knowledge, attitudes and practices about HIV/AIDS and related high-risk sexual behavior. Our target population was youths attending the two last years of high school, which can be compared to junior and senior high school years in the United States. Thirty public high schools enrolling students in junior and senior years were identified. The total number of students in the last two years of high school was estimated at 6,000. The inclusion criteria were: (1) student regularly attending the last two years of high school in the daytime; (2) For minors, informed consent given by parents or legal tutor and being able to understand and provide assent; (3) For legal adults (18 years or older), being able to understand and willing to provide informed consent. It was assumed that 50% were sexually active and we allowed a standard error of 5% giving a 95% confidence interval of 40% to 60%. Then a minimum of 200 school-attending youths (aged 16 to 21 years) were needed and it was expected up to 10% refusals. After enrolment, students were asked to provide answers to questions from a structured questionnaire. Questions covered socio-demographic variables, knowledge of HIV/AIDS and STIs and sexual behavior. Participants received HIV/AIDS and STI-related information and a small compensation for their time.

Since we mainly dealt with minors (<18 years), parents' or legal tutors' approval was essential and therefore recruitment and enrolment occurred in a three-step procedure as follows. Firstly, principals of the identified high schools (n=30) were invited to attend a meeting at which they received information regarding the purpose of the study. Principals had the opportunity to ask any questions about the study. This meeting was mostly viewed as an opportunity to disseminate information about the study and about HIV/AIDS as well as to engage the school community in the research process. Secondly, principals convened a meeting with parents and legal tutors to inform them about the study. Parents or any attendee had the opportunity to ask any questions or request any clarification about the study. Parents and legal tutors were then invited to sign a consent form about their child taking part in the study before leaving the meeting. Two copies were signed; the researchers kept one and the other was given to the parent/tutor. Finally, eligible students were contacted and recruited through a random sampling procedure.

Questionnaires were administered only to sampled students. An interviewer greeted the student in a separate room at the school dispensary, away from

any public area. The interviewer explained the purpose of the study and the concept of assent or consent, depending on student's age. The student was able to ask any questions or request clarifications. If he/she was willing to take part in the study, the interviewer read the consent form in the presence of a witness, usually a nurse. The student received a copy of the consent form. The interviewer read the questions of the structured questionnaire aloud and the students ticked the answers on their copies of the questionnaire, thus avoiding telling the answers to the interviewer and hence helping to protect their privacy. Students could choose the 'refuse to answer' option if they did not want to answer any given question.

2.1. Study Variables

The survey, self-designed for this study (supplementary file 1), includeded questions to measure variables chosen to represent seven broad themes: (1) Familial; (2) Socioeconomic context; (3) Demographic context; (4) Attitudes towards HIV/AIDS; (5) General knowledge of STIs; (6) Comprehensive knowledge of HIV/AIDS; and (7) Risk behavior. Of these, the last three themes were used as outcomes in this study. General knowledge of STI was defined as the number of correct answers to a set of five questions including the ability to name one or more STIs and questions regarding living with HIV/AIDS and its treatment but excluding questions related to transmission of STIs or HIV/AIDS (Table 1). The variable "general knowledge of STIs" is a summary of the information contained in these 5 questions as follows: for each correct answer subjects received a score of "one" and the composite variable corresponds to the addition of correct answers. Similar procedures were used to code the variables "comprehensive knowledge of HIV/AIDS" and "risk behavior". The variable "comprehensive knowledge of HIV/AIDS" was defined as the number of correct answers to a set of 15 questions regarding transmission mechanisms of HIV/AIDS (Table 1). Finally, the variable "risk behavior" assessed the information from 10 behavioral questions (Table 1). For each "risk behavior" question there is one behavior or characteristic that is considered "high-risk". The "risk behavior" variable was measured by the total number of high-risk behaviors that any individual would engage in.

2.2. Statistical Analysis

Two independent databases were created with data from the questionnaires using EPI-INFO software, version 6 (Centers for Disease Control and Prevention; Atlanta, GA, US) and exported as a Microsoft Excel for Microsoft 365 (Microsoft, 2018) file with no personal identifiers at Universidad San Francisco de Quito. Excel data were then exported into SAS software, version 9.3 (SAS System for Windows, SAS Institute Inc., Cary, NC, USA) for statistical analysis at University of South Florida. Variables were classified as qualitative or quantitative variables according to their nature. Appropriate descriptive statistics of all variables were performed. Outcome data was analysed in the form of three composite variables in this study. Chi-square and Student's t-tests were used to study associations between groups for qualitative and quantitative variables. To analyze the relationship between quantitative variables, we first used Pearson's correlation coefficients. A multivariate stepwise backward linear regression model was built for each outcome to control for possible confounders. Associations were considered statistically significant at $p < 0.05$.

2.3. Ethical Approval

This cross-sectional survey and the subsequent data analysis were approved by two registered Institutional Review Boards in Ecuador (Comité de Bioética, Centro de Biomedicina, Universidad Central del Ecuador) and the United States (Institutional Review Board, University of South Florida).

3. Results

3.1. Sociodemographic Characteristics

A total of 213 school-attending afro-descendant youths aged 14 to 21 years old were enrolled in this study. Gender distribution was almost equal with a 1:1.17 male to female ratio. Most of the participants (86%) lived in an urban area and had been living in the city for more than one year (97%). Participants were mostly single (84%) and only 40% of participants lived with both parents whereas 18% did not live with any of their parents. There was a 14% employment rate and among those who work,

Table 1: Questions used to assess general knowledge of sexually transmitted infections (STIs), comprehensive knowledge of HIV/AIDS and sexual behavior (Study Questionnaire)

Variable	Question (number)	Question (description)
General knowledge of STI	1	Do you know of any disease that can be STI? If yes, name at least one.
	2	Have you ever read/listened to OR received any information about HIV/AIDS?
	3	Can a woman with HIV/AIDS get pregnant?
	4	Do you know if HIV can be cured with medicines?
	5	Do these medicines make it possible for a person living with HIV to have a normal life?
Comprehensive knowledge of HIV/AIDS	1	Can HIV/AIDS be transmitted by sex without condoms?
	2	Can HIV be transmitted by sharing the toilet with an infected person?
	3	Can HIV be transmitted by sharing needles used during IV drug use with an infected person?
	4	Can HIV be transmitted by blood transfusions?
	5	Can HIV be transmitted by sharing cutlery with an infected person?
	6	Can HIV be transmitted by sharing razors?
	7	Can HIV be transmitted through contact with an infected person's sweat
	8	Can HIV be transmitted from a pregnant woman to her baby?
	9	Can HIV be transmitted by mosquito bites?
	10	Can HIV be transmitted by kissing an infected person in the mouth?
	11	Can you tell if a person has HIV just by the looks?
	12	Do you think that one can be protected from STIs and HIV/AIDS (COPS*) by having more than one partner?
	13	COPS* by using condoms?
	14	COPS* by penetration without ejaculation OR ejaculation outside vagina?
	15	COPS* by having a healthy life?
Sexual behavior	1	Have you ever been tested for HIV?
	2	Have you ever had sexual relations?
	3	How old were you when you first had a sexual encounter?
	4	Did you use condom during your first sexual encounter?
	5	Have you had a sexual relation in previous 6 months?
	6	How many sexual relations did you have in the previous 6 months?
	7	Who did you have these sexual relations with?
	8	In the previous 6 months, have you had more than 1 sexual partner at the same time?
	9	Did you use a condom during your sexual encounters?
	10 (males)	Ever sex with men and/or ever getting a woman pregnant
	10 (female)	Ever been pregnant?

*Can one protect self (COPS)

40% had a stable income which was mostly 100 US Dollars or less (Table 2).

3.2. Knowledge of STI and its Determinants

Most study participants (75%) had low knowledge of STIs, defined as a score of 2 or less, with a mean number of correct answers of 3.3 for the study population (Table 3). Bivariate analysis showed that only student's relationship status had a significant association with the general knowledge of STI scores. Relevant variables known to be associated with knowledge of STIs and HIV/AIDS were included in the multivariate analysis. After controlling for all possible confounders, relationship status remained

Table 2: Baseline characteristics of study population

Characteristic		Frequency (%) (n = 213)
Gender		
	Male	98 (46%)
	Female	115 (54%)
Age		
	14 to 17 years old	164 (77%)
	18 to 21 years old	49 (23%)
Residence		
	Urban	183 (86%)
	Not Urban	30 (14%)
Length of residence in Esmeraldas		
	Less than one year	6 (3%)
	More than one year	203 (97%)
Family composition		
	Lives with both parents	84 (40%)
	Lives with one parent	90 (42%)
	Lives with other people	39 (18%)
Relationship Status		
	Single	178 (84%)
	Not single	35 (16%)
Employment		
	Employed	30 (14%)
	Not employed	183 (86%)
Type of Employment*		
	Stable	12 (40%)
	Independent work	18 (60%)
Salary**		
	10 to 100 USD	10 (56%)
	101 to 300 USD	8 (44%)

* n= 30; ** n= 18

Table 3: Knowledge and behavior among school-attending afro-descendant youths

Characteristic		Values
General knowledge of STIs*		
	Total score, mean (SD)	3.3 (1.3)
	Higher knowledge n, %	53, 25%
	Lower knowledge n, %	160, 75%
Comprehensive knowledge of HIV**		
	Total score, mean (SD)	9.4 (3.4)
	Higher knowledge n,%	97, 46%
	Medium knowledge n, %	90, 42%
	Lower knowledge n, %	26, 12%
Risk behavior***		
	Total score, mean (SD)	3 (2.5)
	High risk	13, 6%
	Medium risk	69, 32%
	Low risk	131, 62%

* Lower Knowledge = 0-2; Higher Knowledge = 3-5
** Lower Knowledge = 0-5; Medium Knowledge = 6-10; Higher Knowledge = 11-15
*** Low Risk = 0-3; Medium Risk = 4-7; High Risk = 8-10

significantly associated with general knowledge of STIs and HIV/AIDS with single youths having higher knowledge ($p < 0.01$) (Table 4).

3.3. Knowledge of HIV and its Determinants

Overall, students in this population scored well in comprehensive knowledge of HIV with 88% having medium or higher knowledge, where medium knowledge is defined as 6-10 correct answers and higher knowledge defined as 11-15 correct answers (Table 3). The average score for Comprehensive Knowledge was 9.4 (Table 3). Bivariate analysis showed that age ($p < 0.05$), willingness to test for HIV ($p = 0.07$), and relationship status ($p < 0.01$) were either marginally or significantly associated with comprehensive knowledge. After controlling for possible confounders, we observed that relationship status remained significantly associated with comprehensive knowledge ($p < 0.001$) where single youths had higher comprehensive knowledge. Interestingly, multivariate models showed that those who were willing to test for HIV in the future had higher comprehensive knowledge ($p = 0.09$; Table 4).

3.4. Sexual Risk Behavior and its Determinants

The majority (62%) of afro-descendant youths from this study population reported low levels of risky sexual behavior with a mean risk behavior score of 3 (Table 3). Bivariate analysis showed that gender ($p < 0.05$), employment ($p < 0.05$), willingness to test for HIV ($p < 0.05$) and preferred testing laboratory facility (i.e. governmental vs. non-governmental, $p < 0.05$) were all significantly associated with risk behavior.

All these variables remained significantly associated with risk behavior after controlling for possible confounders. Males, those willing to test for

Table 4: Determinants of general knowledge of sexually transmitted infections (STI) scores, comprehensive knowledge of HIV scores and risk behavior scores among school-attending afro-descendant youths

Variable	Initial model			Final model		
	Estimate	SE	p-value	Estimate	SE	p-value
General knowledge of STI scores						
Relationship status	0.74	0.24	0.0023	0.79	0.24	0.0011
Gender	0.13	0.18	0.4772	----	----	----
Age in years	-0.07	0.07	0.3378	----	----	----
Length of residence in Esmeraldas	0.46	0.52	0.3835	----	----	----
Knows a PLHIV	0.31	0.20	0.1182	----	----	----
If needed, Choice of lab	-0.14	0.19	0.4542	----	----	----
Comprehensive knowledge of HIV scores						
Relationship Status	2.34	0.62	0.0002	2.40	0.61	0.0001
Age in years	-0.21	0.19	0.2543	----	----	----
Residence	0.43	0.67	0.5219	----	----	----
Gender	-0.08	0.46	0.8601			
Length of residence in Esmeraldas	1.11	1.36	0.4148	----	----	----
Family composition	0.13	0.32	0.6822			
Knows a PLHIV	0.64	0.51	0.2095	----	----	----
Willingness to test HIV	0.91	0.54	0.0918	0.90	0.53	0.0940
Risk behavior scores						
Relationship status	-0.21	0.44	0.6300	----	----	----
Age in years	0.04	0.13	0.7018	----	----	----
Gender	-0.89	0.33	0.0078	-0.92	0.33	0.0051
Knows a PLHIV	0.28	0.37	0.4433	----	----	----
Willingness to test HIV	0.81	0.39	0.0356	0.80	0.38	0.0371
Employment	1.08	0.47	0.0236	1.13	0.47	0.0162
Preferred lab testing facility	0.76	0.35	0.0325	0.79	0.35	0.0253

HIV, those employed and those who would prefer to test in a government laboratory facility had higher scores in the risk behavior scale as compared to females, not willing to test for HIV, unemployed (i.e. youths that only studies and does not work), and those who would prefer to test in non-government facilities (i.e. Red Cross or private laboratories). (Table 4).

4. Discussion

This study has, to the best of our knowledge, pioneered the capture of socio-cultural and HIV-related behavioral context of youths living in a high HIV prevalence area in Ecuador with a uniquely high proportion of afro-descendant Ecuadorian population. The findings of this study show information that could be crucial in understanding the present context of HIV-related knowledge, attitude and risk behavior among youths in Esmeraldas. The findings provide evidence to justify the need for further detailed and widespread study in Ecuador. In general, participants whose relationship status was single were found to have more general STI-related knowledge and comprehensive knowledge of HIV/AIDS compared to their 'non-single' counterparts. Males had higher scores in risk behavior scale compared to female participants.

The results indicated that after adjusting for other socio-demographic factors, single participants had higher knowledge of STIs and higher comprehensive

knowledge of HIV and its determinants. The finding could be an indication that participants with knowledge of STIs refrained from sexual activity, hence, placing them in the "single" category. Ecuador was amongst the first countries in Latin America to name reproductive and sexual health as constitutionally guaranteed human rights and public health programs focused mostly on high school and university students.[19] Previous surveys indicate average age of sexual activity initiation as 15 years for males and 17 years for females.[20] Consequently, delayed sexual initiation among participants with higher knowledge of STIs and comprehensive knowledge of HIV and its determinants in the present study sample could be possible.

However, the relationship between knowledge and behavioral practice is not always linear. Theories of health behavior change that apply at individual level such as the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB) help in defining how constructs such as an individuals' attitudes, subjective norms and perceived control together form the intention to perform behavior, which in turn affects the actual performance of behavior.[21] Specifically talking about HIV, another model called the Information-motivation-Behavioral Skills (IMB) Model posits that information, motivation and behavioral skills are important factors that determine the actual HIV-related behavior in an individual.[22] Assessing the relationship between HIV knowledge and practice among adolescents in Esmeraldas using constructs of such theories might help in better understanding the rates in relation to actual behaviors and help in developing behavioral interventions that cater to the real needs.

This finding also points towards the need for interventions to increase knowledge early on so that adolescents can either choose not to change their status to "non-single" or even if they do, practice safe sex.[23] A previous study by Park et al., among adolescents in Ecuador, showed that educational aspirations past high school and residence in an urban area were significantly associated with decreased HIV risk (condom use at last intercourse and abstinence).[24] The inverse relationship between education and fertility, especially among females has been established and replicated by numerous studies[25-27] and for cultures where marriage mostly precedes fertility, same inverse relationship could be true between education and marriage. In the present study, married participants made up almost 95% of the "non-single" category. So, the finding could be indicative of adolescents with more knowledge tending to delay marriage. However, it is also true that in developing societies such as Esmeraldas and many other parts of Latin America, possibility of higher education is related to higher socio-economic status. Thus, the difference in risk behaviors could partly reflect "polarized" social structure.[28] On the other hand, it could also be true that married adolescents had lower knowledge of STIs and HIV. This could be because being married might change schooling experience or learning process somehow leading to lower exposure or retention of these information presented in school or via peers or even access to health care and social media. The cross-sectional nature of the data in the study makes it impossible to determine the surety of these ways of reasoning. However, exploring these factors could add to the understanding of this complex relationship among afro-descendant adolescents in Esmeraldas.

Talking about risk behaviors, males had higher scores in the risk behavior scale as compared to females. In a systematic review, it was found that among adolescents, being male is a significant risk factor for premarital sex in deveoping countries, which might have been because of the social norms there.[29] Similarly, a study conducted among adults in Guayaquil, Ecuador found that men were more likely to accept a spouse who had premarital sex, but women were not.[30] Higher scores in the risk behavior scale were seen for employed participants, in agreement with prior studies conducted among European-American adolescents.[31] Being employed could mean that adolescents get more disengaged in learning process in school and be vulnerable to other external exposures as compared to unemployed youths.

Another interesting finding from the study was that of respondents willing to test for HIV having higher scores in the risk behavior scale. This could

be because they might have different levels of risk perception. For example, a study showed that the willingness to get tested for HIV was associated with higher perception of risk for HIV among injecting drug users in Thailand.[32] Participants who would prefer to get tested for HIV in a governmental laboratory facility had higher scores in the risk behavior scale as compared to those who would prefer to test in non-governmental facilities (e.g. private laboratories). It is necessary to understand the health system of Ecuador to contextualize this finding. A study done by Lopez-Cevallos and Chi analyzing inequality in health care utilization in Ecuador found a significant negative relationship between socioeconomic status and utilization of preventive and curative care.[33] Seeking health care in private clinics and hospitals would generally be more costly as compared to governmental laboratory facilities. With health care utilization already low among people belonging to lower socioeconomic status and ethnic minorities, the likelihood of choosing private clinics would be minimal.

4.1. Limitations

It is necessary to point out some limitations of this study. Esmeraldas Province is unique because of its predominant afro-descendant population and their socioeconomic conditions; therefore, the results might not be generalizable for other provinces which have less than 5% of afro-descendant Ecuadorians. The sample size was small, and the outcome measures were all self-reported. Accuracy of self-reporting in this age group has been debated. It should also stressed that between data collection and this report are almost 10 years, but knowing this population characteristics, we know that minimal cultural changes occur. Nonetheless, the study also has some unique strengths. This is the first study to assess HIV and its determinants among Afro-Ecuadorians, an ethnic minority in Ecuador and there is a possibility of comparable findings to other afro-descendant population in Latin America. Our findings are also consistent with increasing understanding in public health arena and especially HIV prevention that having knowledge solely might not result in prevention behaviors.

5. Conclusion and Global Health Implications

This study posits important contribution pertaining to the potential direction for further research areas. The study points out several gaps in information about knowledge and risk behaviors among young afro descent population in Ecuador. Therefore, the results of this study might be instrumental in facilitating decision-making processes related to the planning, implementation and evaluation of HIV/AIDS prevention and control strategies in this population.

Compliance with Ethical Standards

Conflicts of Interest: *The authors declare that they have no competing interests.* ***Financial Disclosure:*** *The authors received no financial support for the research, authorship, and/or publication of this article. Funding/ Support: N/A.* ***Ethics Approval:*** *Since we mainly dealt with minors (<18, parents' or legal tutors' approval was essential. For that, principals of the identified high schools (n=30) convened a meeting with parents and legal tutors to inform them about the study. Parents and legal tutors were then invited to sign a consent form about their child taking part in the study before leaving the meeting. This cross-sectional survey and the subsequent data analysis were approved by registered IRBs in Ecuador (Comité de Bioética, Centro de Biomedicina, Universidad Central del Ecuador) and the United States (Institutional Review Board, University of South Florida).* ***Acknowledgements:*** *The authors would like to acknowledge the support offered by the different institutions that made this work possible, including Universidad San Francisco de Quito, University of South Florida, and Fundación Raíces.*

Key Messages

- HIV incidence among afro-descendant youths in Ecuador is increasing and public health interventions are needed to reduce risky behaviors to STIs including HIV.
- Afro-descendant populations, including adolescents, have been marginalized in Ecuador.
- In order to implement public health interventions among adolescents it is important to study the determinants of risky behaviors in relation to STIs including HIV.

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