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Youth sexual and reproductive health in Bosnia and Herzegovina:
Informing intervention strategies using quantitative methods.

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An abstract of
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Abstract

Youth sexual and reproductive health in Bosnia and Herzegovina:
Informing intervention strategies using quantitative methods

by Glen R. Abedi

Youth sexual and reproductive health represents an area of healthcare that is in particular need of development in Bosnia-Herzegovina. However, little research on this subject has been conducted to date to guide policy and programming. CARE Northwest Balkans, a regional subsidiary of CARE International, completed a quantitative survey on youth sexual and reproductive health in Bosnia-Herzegovina in 2006. Respondents consisted(Mann, Drucker, Tarantola, & McCabe, 1994) of university students above the age of 18. They answered questions about their behaviors and attitudes associated with sexual and reproductive health (SRH) and related behaviors.

The largest ethnic group represented in the sample was Serbs (71.56%), followed by Bosniaks (23.85%). The median age of respondents was 22.21 years. Only 5.50% of respondents reported ever having been tested for sexually transmitted infections (STI) although 69.72% reported having engaged in sexual intercourse in the previous year. The most popular sources of information on sexual and reproductive health were TV & radio, printed materials, and school. The effectiveness of these sources of information as avenues for public health communications remains unclear.

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Introduction

Sexual and reproductive health worldwide

Globally, issues related to sexual and reproductive health (SRH) constitute a significant cause for concern, especially among young people. In 2002, the WHO (as cited in Glasier, Gulmezoglu, Schmid, Moreno, and Van Look, 2006, p. 1597) "identified unsafe sex as the second most important risk factor for disease, disability, or death in the poorest communities and the ninth in developed countries." Complications associated with pregnancy account for part of this risk, with "80 million women each year [having] unwanted or unintended pregnancies, 45 million of which are terminated." Over 40 percent of these abortions are unsafe, and a similar proportion are conducted on women under the age of 25 (Glasier et al., 2006, p. 1597).

Sexually transmitted infections also contribute heavily to the risk unsafe sex poses on disease, disability, and death. The WHO estimated a yearly global incidence of 340 million cases of gonorrhea, syphilis, chlamydia, and trichomonas in 1999, "at least a third of which affect people aged under 25" (cited in Glasier et al., 2006, pp. 1597, 1599). This is in addition to "nearly 5 million new HIV infections and 257,000 deaths from cervical cancer every year" (Glasier et al., 2006, p. 1597). The burden of sexually transmitted diseases fall largely upon the young because "their sexual relations are often unplanned, sometimes a result of pressure or force, and typically happen before they have the experience

and skills to protect themselves" (Glasier et al., 2006, p. 1600). Furthermore, young people who acquire sexually transmitted infections (STI) will suffer from their effects longer than other groups.

Sexual and reproductive health in Bosnia and Herzegovina

The wars in the former Yugoslavia in the early 1990s seriously compromised the social structures and healthcare systems of the breakaway nations (Mann, Drucker, Tarantola, McCabe, 1994). After declaring independence in 1991, armed conflict broke out in Bosnia and Herzegovina (BH) among its three main ethnic groups: Bosniaks, Serbs, and Croats, which are historically associated with the religions of Islam, Orthodox Christianity, and Catholic Christianity, respectively. The war ended with the 1995 Dayton Peace Accords, which partitioned 51% of BH's territory into a Bosniak-Croat coalition entity, the Federation of Bosnia and Herzegovina, and 49% to a Serb entity, RepublikaSrpska. These two political entities differ markedly in their ethnic makeup and governing structure.(Overview of the constitutional system in Bosnia and Herzegovina: Secretariat Memorandum, 1996).

BH witnessed the destruction of hospitals and health facilities while the war placed increasing burdens on the health system. Reproductive health concerns fell as priorities, and rates of maternal and perinatal mortality, unwanted pregnancies, and abortions rose during the conflict (Omeragic, 1998). Moreover, an article published in *Safe Motherhood* in 1997 reports that "during armed conflict in Bosnia, it was deliberate policy to rape young women…" (Sexual violence against women is a weapon of war. Special feature--mothers as refugees, 1997, p. 8). Furthermore, Simic (2006) reports that abortion is a

primary means of birth control, with an estimated third of all pregnancies ending in abortion. Now,nearly a decade and a half since the Dayton Peace Accord ended the armed conflict in BH, the war's impact on sexual and reproductive health remains.

According to a report submitted by Bosnia and Herzegovina to the UNAIDS Secretariat, the country had 163 officially registered HIV-positive cases by 2009, 75% of whom were males. Reported transmission modalities included heterosexual intercourse (57.4% of cases), male-male sexual intercourse (17.2%), and intravenous drug use (12.7%), with the remainder attributed to hemophilia, mother-to-child transmission, and unknown causes (UNGASS Country Progress Report--Bosnia and Herzegovina: Reporting period January 2008 - December 2009, 2010, p. 6). Simic (2006) corroborates the intravenous drug use statistic, reporting that in 2003 14% of new HIV infections occurred due to intravenous drug use. By that time, it had overtaken homosexual intercourse as the leading cause of HIV transmission.It must be kept in mind, however, that the number of reported HIV-positive cases may represent only a fraction of the true number of cases. In 2002, UNAIDS (as cited in Kelly and Amirkhanian, 2003, p. 363) estimated that 900 actual persons in BH were living with HIV, a population over 9 times larger than what was reported at the time.

Rates of other STIs appear to have remained relatively low throughout the 2000s. The WHO Programme on Sexually Transmiitted Infections/HIV/AIDS in Europe (as cited in Kelly and Amirkhanian, 2003, p. 363) estimated the incidence of syphilis and gonorrhea to be .5/100,000 and

1.2/100,000, respectively, in 2002. The findings for syphilis are corroborated by Uuskula, Puur, Toompere, and DeHovitz (2010, p. 10), who report that from 1996-2005, the incidence rate consistently hovered near 0/100,000.

The Medium Range Strategic Plan for CARE Bosnia-Herzegovina, Croatia, & Serbia-Montenegro (BHCSM) reports that "conflict in the region has brought with it an increasing culture of violence against women, and the reawakening of patriarchal attitudes" (Medium Range Strategic Plan: 2006 to 2010, 2006, p. 19). The impact of these attitudes in terms of gender-based violence and barriers to SRH issues and services has yet to be quantified on a large, comprehensive scale in the region. A 2004 study among high school students in Mostar, BH's fourth largest city, showed that 82% of subjects knew of condoms as a contraceptive method, 77% knew of the pill, while 17% did not know about any contraceptive method(Selak, Juric, Hren, &Guric, 2004, pp. 45-47). The main sources of information on contraception included magazines (69%), TV/radio (50%), school (37%), and friends (36%).

The quality of such information, however, demands scrutiny. A 2001 report by the American Academy of Pediatrics' (AAP) Committee on Public Education found that "the average American adolescent will view nearly 14,000 sexual references per year, yet only 165 of these references deal with birth control, self-control, abstinence, or the risk of pregnancy or STDs" (American Academy of Pediatrics, 2001, p. 191). This view is corroborated by the UNAIDS Inter-agency Task Team on Young People (2006, p. 206), who state in particular regard to HIV/AIDS that

> most governments have turned to the mass media as a means of informing their population, shaping social norms, and influencing behaviour associated with the transmission of HIV. Given that adolescents are so attuned to mass media for information and cues about how to behave, the media have tremendous potential for reaching them with messages about HIV and AIDS…
>
> [However,] because the epidemic has continued to spread in many countries, it has been concluded that mass media interventions are not an effective means of preventing the spread of HIV. The evidence in the published literature on the effectiveness of communication programmes is sparse…

By contrast, schools are "well placed to achieve the…goal of decreasing HIV prevalence among youths" because in many societies most youth are enrolled around the time they become sexually active and "offer opportunities to encourage young people to delay their onset of sexual activity and increase their use of condoms and contraceptives after sexual initiation" (UNAIDS Inter-agency Task Team on Young People, 2006, p. 104). However, these conclusions are at best supported by only weak evidence. Detailed and extensive studies must be conducted toprecisely and accurately measure the effect of health communications campaigns on outcomes.Such studies should also examine attitudes on gender relations and SRH issues and service access.

Media in Bosnia and Herzegovina

In a 2006 review of media interventions conducted by the United States Agency for International Development (USAID), ARD, Inc. reported on the overall state of radio, television, and print media outlets in BH. There are around 150 radio stations in the country, many of which have "achieved a high level of professionalism and financial stability" and over 60 of which are state-owned (ARD, Inc., 2006,

pp. 5-6). Among all media outlets, the television showed the most development from 2003 to 2006, by which time some national outlets had developed program formats targeted to specific audience groups. Television's development contrasts with the relatively small progress that the print sector has made. ARD reports that "the quality of news content by and large remains low, with few named sources, confusing texts and a preponderance of sensationalist material…" (ARD, Inc., 2006, p. 6), a result of which is low readership. Paid circulation for all daily publications in the country is estimated at about 40,000 copies. The picture overall is of a media sector that is still transitioning from a post-Socialist, state-run model to a free-market one characterized by the targeting of specific demographic groups. In this regard, television has progressed the most, followed by radio and print media. The relative popularity of these outlets, the types of audiences they reach, and cost should be considered when developing health communication strategies.

Purpose of this study

As shown above, the evidence base for trends in youth SRH behavior in BH is currently weak, compiled from various sources using various methods. The purpose of this research is to provide a clearer picture of SRH behaviors and attitudesheld among youth in Bosnia-Herzegovina than has previously been understood in order to identify areas toward which effective SRH programming and interventions may be directed.

In order to assess the SRH behavior of Bosnian youth, a quantitative survey was conducted among students from the University of Banja Luka and the University of Tuzla. Banja Luka is the second most populous city of BH after the capital, Sarajevo, and largest of the majority Serb RepublikaSrpska (RS)(RepublikaSrpska Institute of Statistics, 2009). Tuzla is the third most populous city of BH and the second largest of the majority Bosniak-Croat Federation of Bosnia and Herzegovina (FBiH) after Sarajevo; together, the two political entities of RS and FBiH comprise the country of Bosnia and Herzegovina (BH) (Federation Office of Statistics, 2010).The University of Banja Luka is comprised of 16 academic faculties and has a student population of around 17,000(O Univerzitetu [Banja Luka], 2010). By comparison, the University of Tuzla has 16,771 undergraduate and 1,500 graduate students divided into 13 academic faculties. Both universities are public institutions(O Univerzitetu [Tuzla], 2010).University students were chosen to represent the BH youth population primarily because of their accessibility and because they tended to be older than 17 years and therefore able to give informed consent.

Methods

Study population

The study's base population consisted of Bosnian students enrolled and residing in Banja Luka University from June 13-15, 2006 and in Tuzla University on July 12, 2006. The number of students residing in university housing at either institution is unknown.

The sample population was drawn from the base population using a different method at each university. At Banja Luka, initial attempts were made to draw a stratified random sample by seeking one participant from every odd-numbered room in the on-campus dormitories. However, the unavailability of a list of dormitory residents, an inability to establish how many students were residing in each dormitory room, and the constant out-flow of students back home from university, coincident with the end of the spring term at both universities, made getting a reliable, stratified random sample impossible. By the time of survey distribution in Tuzla, only a few students remained, so all students housed in the dormitories at that time were included in the sample. What resulted can best be described as a convenience sample.

All potential respondents were informed of the study and offered an informed consent form and a questionnaire that they completed on their own. The survey volunteers returned to the respondents' rooms after 15-20 minutes to collect the completed surveys, which were sealed in unmarked envelopes to ensure confidentiality. At Banja Luka,163 completed questionnaires were collected while, at Tuzla, completed

questionnaires were collected from 55 respondents. This yielded a study population of 218. Non-respondents either refused to provide informed consent and participate in the survey or were not present in their rooms at the time of survey distribution.

Questionnaire Design

The survey instrument contained 39 questions covering a range of areas from demographic information to SRH behavior. One translator was hired to translate the survey instrument and informed consent form from English to Latin-script Serbo-Croatian. Resources were not available to hire a second translator to check the translation by translating from the local language to English, but the materials were reviewed by other CARE staff with knowledge of both languages.

The questionnaire was administered along with the informed consent form, and an unmarked envelope was also provided. Study participants provided verbal consent. After completion of the survey, respondents sealed the questionnaire in the envelope and submitted the envelope and signed informed consent form to the survey administrators.

The first section of the questionnaire dealt with demographic information, such as age, ethnic identification, religious affiliation, university, and field & year of study. In the second section, which dealt with sexual health and behavior, respondents were asked about general RH behavior, STI status, and condom usage. The third section dealt with intravenous drug use (IDU), and the final section, reserved only for female respondents,dealt with abortion.

Data entry and cleaning

The envelopes containing the questionnaires were sorted and organized according to the university where they were collected during survey distribution. After the survey distribution period ended, all of the completed questionnaires were removed from their envelopes, marked according to their university of origin, numbered, and prepared for data entry. The data were double-entered into a database and cleaned using EpiInfo 3.3.2 and SAS 9.2.

Data analysis: Demographics and SRH attitudes and behaviors

The data analysis scheme involved first describing the demographic characteristics of the study sample and then SRH attitudes and behaviors stratified by study site and gender. Finally, the role of the reported "primary source of information on SRH" was assessed as a determinant of key SRH behaviors using logistic regression modeling. All analyses described below were performed in SAS 9.2.

To assess the demographic profile of the study sample, frequencies were run on responses to the following variables: testing site, gender, ethnicity, income, place of residence, population of hometown, and age. Age was calculated by subtracting each respondent's birth date, reported in month and years, from the date of the survey administration at his or her site. Additionally, a kappa statistic was calculated between testing site and ethnicity to assess the suitability of using the former as a proxy for the latter in later analyses.

Then, reports of SRH attitudes and behaviors were considered for the entire study sample and stratified by study site and gender. Attitudes of interest were perceived risk of contracting a STI and HIV, while behaviors included having ever been tested for STI, frequency of STI testing, and having engaged in sexual intercourse in the preceding 12 months. Among those respondents who reported having had sex in the last 12 months, an additional set of SRH behaviors were considered: having used a condom at last sexual intercourse, relationship to last sexual partner, having ever discussed SRH issues with last sexual partner, frequency of condom use and withdrawal (*coitus interruptus*) during sex, age at first sexual experience, and length of last sexual relationship. Age at first sexual experience was calculated by subtracting the reported month and date of the respondent's first sexual experience from the date of survey administration. For the subset of participants who reported sex in the past 12 months, responses were also stratified by study site and gender.

Data analysis: Assessing the effect of source of information on SRH on selected SRH behaviors

The exposure under study is source of information on sexual and reproductive health. The data for the exposure came from the responses to the question:

> The following is a list of potential sources of information on sexual and reproductive health. Please rank them from 1 – 6, with 1 being that from which you have learned the most about sexual and reproductive health and 6 being that from which you have learned the least.
>
> __ Parents
> __ Printed media
> __ School
> __ Internet

__ Television and radio

__ Friends and peers

Each of the above 6 response fields corresponds with a unique ordinal variable in the dataset, whose values may be any integer from 1 to 6.

Table 1. "Information source" fields and their corresponding variables in the dataset.

Response field	Corresponding variable name
Parents	Info_1
Printed media	Info_2
School	Info_3
Internet	Info_4
Television & radio	Info_5
Friends & peers	Info_6

A number of respondents reported duplicate values, where two or more response fields had the same value (e.g., one respondent assigned the value “2” to two fields, reporting values of “1, 2, 2, 3, 4, 5” instead of the expected “1, 2, 3, 4, 5, 6”). Among individuals who duplicated values, those who assigned a single value to three fields were included in the study population whereas those who assigned a single value to four or more fields were excluded. The responses of duplicating individuals retained in the study population were weighted in the following way:

1. The reported values were placed in numerical order and ranked from 1 to 6.
2. The ranks of the duplicated reported values were averaged, and this averaged value was assigned to the new, weighted value of that field.
3. The ranks of the non-duplicated reported values were assigned as the weighted values of that field.
4. Weighting in this way ensured that all responses summed to a common value, 21.

Examples of this procedure are provided in Tables 2 and 3.

Table 2.First example of weighting and recoding procedure.

Field	Rank	Reported value	Weighted value
Printed material	1	1	1
School	2	2	2.5
Internet	3	2	2.5
Parents	4	3	4
Television & radio	5	4	5.5
Friends & peers	6	4	5.5

Table 3.Second example of weighting and recoding procedure.

Field	Rank	Reported value	Weighted value
Internet	1	1	1
Parents	2	3	3
Television & radio	3	3	3
Friends & peers	4	3	3
Printed materials	5	4	5
School	6	5	6

After recoding, each "information source" variable was dichotomized such that, for each respondent, those sources of information given a recoded value of 1 were defined as that respondent's primary source of information on SRH whereas the five others were defined as non-primary sources. Then, individuals identifying "parents" and "friends and peers" as primary sources were grouped together in a new source of information category, "other people." Similarly, respondents who identified "printed material" and "internet" as primary sources were subsumed under the group, "reading material." Overall, this reduced the number of "information source" categories from 6 to 4, as shown in Table 4. Potential sources of information were analyzed as exposures using these definitions.

The effects of respondents' primary source of information about SRH on their behaviors were analyzed using logistic regression models. The outcomes of interest were having engaged in sexual intercourse at all in the preceding 12 months, use of a condom at last sexual intercourse, frequency of condom usage during sex, frequency of the practice of withdrawal (*coitus interruptus*) during sex, age at first sex, number of lifetime sexual partners, and having discussed SRH issues with the respondent's most recent sexual partner. The variable "age at first sex" was dichotomized into "under 18" and "18 and over" groups based on the distribution showing 18 years as the median age at first sex. Similarly, the variable "number of lifetime sexual partners" was dichotomized into "1 or less" and "more than 1" based on the distribution showing 1 as the median number of partners. The ordinal variables for "frequency of condom

use during sex" and "frequency of practicing withdrawal during sex" were dichotomized for the logistic regression analysis such that the extreme values of each, "always use/practice," were coded as the event value. The confounders considered in each model were study site (Banja Luka or Tuzla), age, and gender. Outcomes, exposures, and confounders areshown in Table 4.

Table 4. List of outcomes, exposures, and confounders analyzed using logistic regression.

Outcomes – SRH behaviors	
O_1	Sex in the preceding 12 months
O_2	Use of condom at last sex
O_3	Always use condom during sex
O_4	Always practice withdrawal during sex
O_5	Ever discussed SRH with last sexual partner
O_6	Less than 18 years at first sex
O_7	More than 1 lifetime sexual partner
Exposures – Sources of SRH information	
Referent	Reading material (printed media, internet)
E_1	School
E_2	Television & radio
E_3	Other people (friends & peers, parents)
Confounders – Demographic characteristics	
C_1	Study site
C_2	Age
C_3	Gender

Separate logistic regression models were run for the seven outcomes listed above using the same set of exposures, confounders, and interaction terms. The confounder terms in these full models were tested for significance against a reduced model that excluded them using a likelihood ratio test. The full and reduced logistic regression models are shown in Equation 1 and Equation 2, respectively.

Equation 1. Full logistic regression model with exposure and confounder terms.

$$logit\ P(O_n) = \alpha + \beta_1 E_1 + ... + \beta_3 E_3 + \gamma_1 C_1 + ... + \gamma_3 C_3$$

Equation 2. Reduced logistic regression model with only exposure terms.

$$logit\ P(O_n) = \alpha + \beta_1 E_1 + ... + \beta_3 E_3$$

If the confounder terms were not found to significantly contribute to the model, they were removed and odds ratios of terms in the reduced model were reported. Otherwise, the full model was subjected to backwards elimination with a p-value cut-off of .30. Odds ratios and Wald 95% confidence intervals from the exposure terms in the resulting model were then reported.

Results

Demographic characteristics

Of the respondents, 163 (74.77%) were students at the University of Banja Luka, and 55 (25.23%) were from the University of Tuzla. Females constituted 51.38% of the sample. The median age was 22.21 years, with a range of 18.75 to 30.66 years. Overall, 156 (71.56%) respondents identified their ethnicity as "Serb" and 52 (23.85%) as "Bosniak," with the remaining 10 identifying as "Croat" (1 respondent), of "mixed ethnicity" (8 respondents), or "other" (1 respondent). There was a preponderance of self-identified "Serbs" in Banja Luka (95.09% of respondents) and of self-identified "Bosniaks" in Tuzla (94.55%). Furthermore, the correlations between study site, ethnicity, and declared religion were high, with weighted kappa coefficients of .77for the site-ethnicity, .82for the ethnicity-religion, and .84for the site-religion combinations (all $p<.0001$). Because of the high correlation of these variables and the dichotomous nature of the study site variable, study site was used as a proxy for ethnicity and religion in later analyses.

The vast majority of respondents, 90.91%, reported annual household incomes of less than 15,000 convertible marks (9,784.65 USD) (Historical Exchange Rates, 2010). A similarly large proportion of respondents (90.32%) stated that they were originally from towns or cities other than the one in which they were attending university. Overall, 31.48% of respondents reported the size of their hometown to be

less than 10,000 and 48.61% reported a hometown size between 10,000 and 49,999 with the remainder originating from towns or cities with populations of 50,000 or more.

Table 5.Demographic characteristics of sample.

Parameter	*n*(%)
Number of respondents	218 (100.00)
Testing site	
Banja Luka	163 (74.77)
Tuzla	55 (25.23)
Gender	
Female	112 (51.38)
Male	106 (48.62)
Ethnicity	
Serb	156 (71.56)
Bosniak	52 (23.85)
Mixed ethnicity	8 (3.67)
Croat	1 (0.46)
Other	1 (0.46)
Income *	
< 1.999	68 (31.19)
2.000 -- 5.999	63 (28.90)
6.000 -- 14.999	59 (27.06)
15.000 -- 24.999	12 (5.50)
25.000 -- 49.999	1 (0.46)
> 50.000	6 (2.75)
No response	9 (4.13)
Originally from	
In town	21 (9.63)
Out of town	193 (88.53)
Out of country	3 (1.38)
No response	2 (0.92)
Population of hometown	
< 9.999	68 (31.19)
10.000 -- 49.999	105 (48.17)
50.000 -- 99.999	30 (13.76)
100.000 -- 499.999	11 (5.05)
> 500.000	2 (0.92)
No response	2 (0.92)

* Income reported in Bosnian convertible marks.

The age of respondents ranged from 18.75 to 30.66 years with a median at 22.21 years. The distribution of ages is shown in Figure 1.

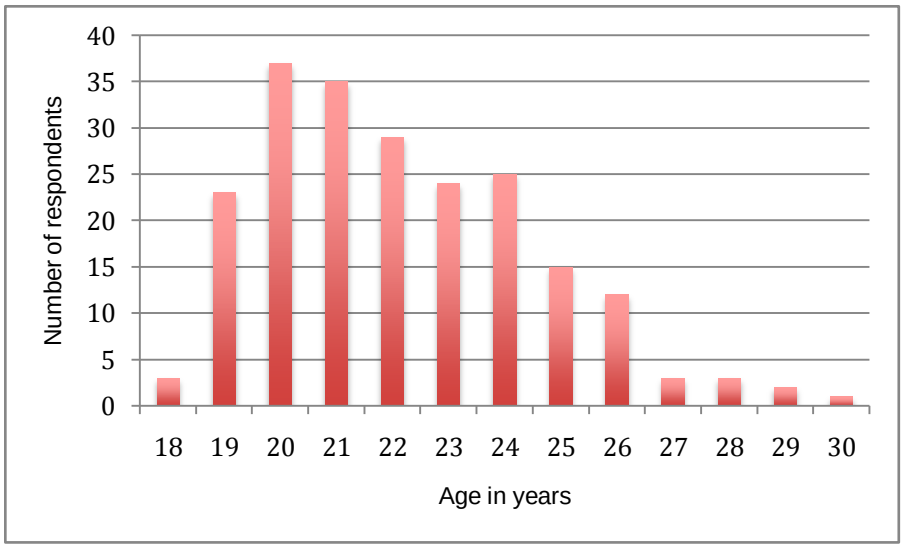

Figure 1.Age distribution of respondents.

Sexual and reproductive health behaviors

Study participants who reported having had sex within the last 12 months were also asked about behaviors related to sexual health. Table 6 presents the responses,stratified by site and gender, of survey participants to questions of SRH attitudes, which include perceived risk for STI and HIV, and behaviors, which include STI testing history and frequency and sex in the past year. As shown, 77.64% of respondents from Banja Luka reported sex in the last 12 months compared with only 47.27% of Tuzla respondents (difference significant at $p<.0001$ using chi-square testing). While responses to the perceived risk of STI and HIV questions appeared to differ by site, pooled t-testing revealed that the difference was not significant ($p=.58$ for the difference in STI risk by site and $p=.66$ for the difference in HIV riks).

Rates of ever having been tested for STI were low for all groups, but higher among Banja Luka and Tuzla males than their female counterparts (difference significant at p=.06 using chi-square testing).

Table 6. Reports of SRH attitudes and behavior by study site and gender.

	Banja Luka			Tuzla			Total		
	Female (n=91)	Male (n=72)	Total (n=163)	Female (n=21)	Male (n=34)	Total (n=55)	Female (n=112)	Male (n=106)	Total (n=218)
Risk of STI									
Very low	53 (58.24)	36 (50.00)	89 (54.60)	17 (80.95)	20 (58.82)	37 (67.27)	70 (62.50)	56 (52.83)	126 (57.80)
Somewhat low	20 (21.98)	20 (27.78)	40 (24.54)	3 (14.29)	3 (8.82)	6 (10.91)	23 (20.54)	23 (21.70)	46 (21.10)
Moderate	13 (14.29)	13 (18.06)	26 (15.95)	1 (4.76)	9 (26.47)	10 (18.18)	14 (12.50)	22 (20.75)	36 (16.51)
Somewhat high	4 (4.40)	3 (4.17)	7 (4.29)	0 (0.00)	0 (0.00)	0 (0.00)	4 (3.57)	3 (2.83)	7 (3.21)
Very high	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	2 (5.88)	2 (3.64)	0 (0.00)	2 (1.89)	2 (0.92)
No response	1 (1.10)	0 (0.00)	1 (0.61)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.89)	0 (0.00)	1 (0.46)
Risk of HIV									
Very low	66 (75.53)	48 (66.67)	114 (69.94)	19 (90.48)	25 (73.53)	44 (80.00)	85 (75.89)	73 (68.87)	158 (72.48)
Somewhat low	16 (17.58)	18 (25.00)	34 (20.86)	1 (4.76)	5 (14.71)	6 (10.91)	17 (15.18)	23 (21.70)	40 (18.35)
Moderate	7 (7.70)	5 (6.94)	12 (7.36)	0 (0.00)	3 (8.82)	3 (5.45)	7 (6.25)	8 (7.55)	15 (6.88)
Somewhat high	1 (1.10)	1 (1.39)	2 (1.23)	0 (0.00)	1 (2.94)	1 (1.82)	1 (0.89)	2 (1.89)	3 (1.38)
Very high	0 (0.00)	0 (0.00)	0 (0.00)	1 (4.76)	0 (0.00)	1 (1.82)	0 (0.00)	0 (0.00)	1 (0.46)
No response	1 (1.10)	0 (0.00)	1 (0.61)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.89)	0 (0.00)	1 (0.46)
Ever tested for STI									
Yes	3 (3.30)	7 (9.72)	10 (6.13)	0 (0.00)	2 (5.88)	2 (3.64)	3 (2.68)	9 (8.49)	12 (5.50)
No	84 (92.31)	62 (86.11)	146 (89.57)	20 (95.24)	32 (94.12)	52 (94.55)	104 (92.86)	94 (88.68)	198 (90.83)
No response	4 (4.40)	3 (4.17)	7 (4.29)	1 (4.76)	0 (0.00)	1 (1.82)	5 (4.46)	3 (2.83)	8 (3.67)
STI test frequency									
At least every year	1 (1.10)	3 (4.17)	4 (2.45)	0 (0.00)	1 (2.94)	1 (1.82)	1 (0.89)	4 (3.77)	5 (2.29)
At least every 2 years	1 (1.10)	3 (4.17)	4 (2.45)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.89)	3 (2.83)	4 (1.83)
At least every 5 years	1 (1.10)	0 (0.00)	1 (0.61)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.89)	0 (0.00)	1 (0.46)
None of the above	0 (0.00)	1 (1.39)	1 (0.61)	0 (0.00)	1 (2.94)	1 (1.82)	0 (0.00)	2 (1.89)	2 (0.92)
No response	88 (96.70)	65 (90.28)	153 (93.87)	21 (100.00)	32 (94.12)	53 (96.36)	109 (97.32)	97 (91.51)	206 (94.50)
Sex in last year									
Yes	69 (75.82)	57 (79.17)	126 (77.30)	6 (28.57)	20 (58.82)	26 (47.27)	75 (66.96)	77 (72.64)	152 (69.72)
No	21 (23.08)	15 (20.83)	36 (22.09)	15 (71.43)	14 (41.18)	29 (52.73)	36 (32.14)	29 (27.36)	65 (29.82)
No response	1 (1.10)	0 (0.00)	1 (0.61)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.89)	0 (0.00)	1 (0.46)

Many analyses that follow involve only the 152 respondents who reported having had sex in the last 12 months. Demographic characteristics were compared between those who had and had not had sex using the tests cited in Table 7. Those who reported sex in the last year were significantly older than those who did not by almost 2 years. Furthermore, a significantly higher proportion of respondents reported sex in the previous year identified as Serb (78.95%) than as Bosniaks. The gender distribution between those who reported sex in the last year and those who did not was not significantly different. Responses to the questions on sexual behavior from the 152 participants who reported sex within the preceding 12 months are shown in Table 8.

Table 7. Comparison of demographic characteristics between those who reported sex in the last year and those that did not.

	Sex in last yr. - Yes	Sex in last yr. - No	p (α=.01)	Test	Conclusion
Age (yr)			<.0001	Student's 2-sided t-test	Reject H_0
n	148	63			
Mean	23.1335	21.5772			
Variance	5.8429	3.7466			
Gender (%)			0.4147	Pearson's χ^2	Cannot reject H_0
n	152	65			
Male	50.66	44.62			
Female	49.34	55.38			
Ethnicity (%)			.0003	Fisher's exact	Reject H_0
n	152	65			
Bosniak	16.45	41.54			
Serb	78.95	53.85			
Croat	0.00	1.54			
Mixed ethnicity	3.95	3.08			
Other	0.66	0.00			

Table 8. Reported SRH-related behaviors by study site and gender among those who reported having had sex within the preceding 12 months. Percentages of *n* for each category are shown in parentheses.

	Banja Luka Females n=69	Males n=57	Total n=126	Tuzla Females n=6	Males n=20	Total n=26	Total Females n=75	Males n=77	Total n=152
Condom used at last sex									
Yes	41 (59.42)	27 (47.37)	68 (53.97)	2 (33.33)	8 (40.00)	10 (38.46)	43 (57.33)	35 (45.45)	78 (51.32)
No	28 (40.58)	30 (52.63)	58 (46.03)	4 (66.67)	12 (60.00)	16 (61.54)	32 (42.67)	42 (54.55)	74 (48.68)
No response	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Relationship to last sexual partner									
Husband, cohab. partner (male)	0 (0.00)	1 (1.75)	1 (0.79)	1 (16.67)	0 (0.00)	1 (3.85)	1 (1.33)	1 (1.30)	2 (1.32)
Boyfriend, fiancée (male)	61 (88.41)	0 (0.00)	61 (48.41)	5 (83.33)	1 (5.00)	6 (23.08)	66 (88.00)	1 (1.30)	67 (44.08)
Other friend (male)	5 (7.25)	0 (0.00)	5 (3.97)	0 (0.00)	0 (0.00)	0 (0.00)	5 (6.67)	0 (0.00)	5 (3.29)
Casual acquaintance (male)	1 (1.45)	0 (0.00)	1 (0.79)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.33)	0 (0.00)	1 (0.66)
Wife, cohabiting partner (female)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Girlfriend, fiancée (female)	0 (0.00)	37 (64.91)	37 (29.37)	0 (0.00)	11 (55.00)	11 (42.31)	0 (0.00)	48 (62.34)	48 (31.58)
Other friend (female)	0 (0.00)	12 (21.05)	12 (9.52)	0 (0.00)	2 (10.00)	2 (7.69)	0 (0.00)	14 (18.18)	14 (9.21)
Casual acquaintance (female)	0 (0.00)	4 (7.02)	4 (3.17)	0 (0.00)	5 (25.00)	5 (19.23)	0 (0.00)	9 (11.69)	9 (5.92)
Other	1 (1.45)	3 (5.26)	4 (3.17)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.33)	3 (3.90)	4 (2.63)
No response	1 (1.45)	0 (0.00)	1 (0.79)	0 (0.00)	1 (5.00)	1 (3.85)	1 (1.33)	1 (1.30)	2 (1.32)
Discussed SRH with last partner									
Yes	59 (85.51)	44 (77.19)	103(81.75)	5 (83.33)	11 (55.00)	16 (61.54)	64 (85.33)	55 (71.43)	119(78.29)
No	9 (13.04)	13 (22.81)	22 (17.46)	1 (16.67)	9 (45.00)	10 (38.46)	10 (13.33)	22 (28.57)	32 (21.05)
No response	1 (1.45)	0 (0.00)	1 (0.79)	0 (0.00)	0 (0.00)	0 (0.00)	1 (1.33)	0 (0.00)	1 (0.66)
Frequency of condom use									
Always	16 (23.19)	14 (24.56)	30 (23.81)	1 (16.67)	5 (25.00)	6 (23.08)	17 (22.67)	19 (24.68)	36 (23.68)
Often	25 (36.23)	16 (28.07)	41 (32.54)	1 (16.67)	1 (5.00)	2 (7.69)	26 (34.67)	17 (22.08)	43 (28.29)
Sometimes	12 (17.39)	10 (17.54)	22 (17.46)	1 (16.67)	6 (30.00)	7 (26.92)	13 (17.33)	16 (20.78)	29 (19.08)
Rarely	8 (11.59)	7 (12.28)	15 (11.90)	1 (16.67)	1 (5.00)	2 (7.69)	9 (12.00)	8 (10.39)	17 (11.18)
Never	6 (8.70)	10 (17.54)	16 (12.70)	2 (33.33)	7 (35.00)	9 (34.62)	8 (10.67)	17 (22.08)	25 (16.45)
No response	2 (2.90)	0 (0.00)	2 (1.59)	0 (0.00)	0 (0.00)	0 (0.00)	2 (2.67)	0 (0.00)	2 (1.32)
Frequency of withdrawal									
Always	19 (27.54)	20 (35.09)	39 (30.95)	5 (83.33)	10 (50.00)	15 (57.69)	24 (32.00)	30 (38.96)	54 (35.53)
Often	14 (20.29)	5 (8.77)	19 (15.08)	0 (0.00)	1 (5.00)	1 (3.85)	14 (18.67)	6 (7.79)	20 (13.16)
Sometimes	11 (15.94)	13 (22.81)	24 (19.05)	0 (0.00)	3 (15.00)	3 (11.54)	11 (14.67)	16 (20.78)	27 (17.76)
Rarely	8 (11.59)	8 (14.04)	16 (12.70)	0 (0.00)	0 (0.00)	0 (0.00)	8 (10.67)	8 (10.39)	16 (10.53)
Never	17 (24.64)	7 (12.28)	24 (19.05)	1 (16.67)	2 (10.00)	3 (11.54)	18 (24.00)	9 (11.69)	27 (17.76)
No response	0 (0.00)	4 (7.02)	4 (3.17)	0 (0.00)	4 (20.00)	4 (15.38)	0 (0.00)	8 (10.39)	8 (5.26)

Table 8, cont. Reported SRH-related behaviors by study site and gender among those who reported having had sex within the preceding 12 months. Percentages of *n* for each category are shown in parentheses

	Banja Luka Females n=69	Males n=57	Total n=126	Tuzla Females n=6	Males n=20	Total n=26	Total Females n=75	Males n=77	Total n=152
Age at first sex									
Median (years)	19.39	17.33	18.42	20.21	17.42	18.00	19.50	17.37	18.33
Minimum	15.09	12.75	12.75	19.41	11.92	11.92	15.09	11.92	11.92
Maximum	24.10	21.84	24.10	25.34	22.17	25.34	25.34	22.17	25.34
Missing responses	1	6	7	0	5	5	1	11	12
Length of last sexual relationship									
Median (months)	19	10	14	29.5	4	7	19	9.5	13
Minimum	0	0	0	0	0	0	0	0	0
Maximum	108	72	108	58	56	58	108	72	108
Missing responses	0	4	4	0	1	1	0	5	5
Number of lifetime sexual partners									
Median	1	2	1	1	1	1	1	1	1
Minimum	0	1	0	1	0	0	0	0	0
Maximum	6	8	8	1	20	20	6	20	20
Missing responses	2	2	4	1	1	2	3	3	6

The median age at sexual debut among those who reported having engaged in sexual intercourse in the preceding year ranged from 11 to 25 years, with a median at 19 years of age. The distribution for age at sexual debut is shown in Figure 2. Pooled T-testing showed no significant difference in age at sexual debut between Banja Luka and Tuzla respondents (median ages 18.42 and 18.00, respectively; p=.4968); however, there was a difference between females and males (median ages 19.50 and 17.37, respectively; p<.0001).

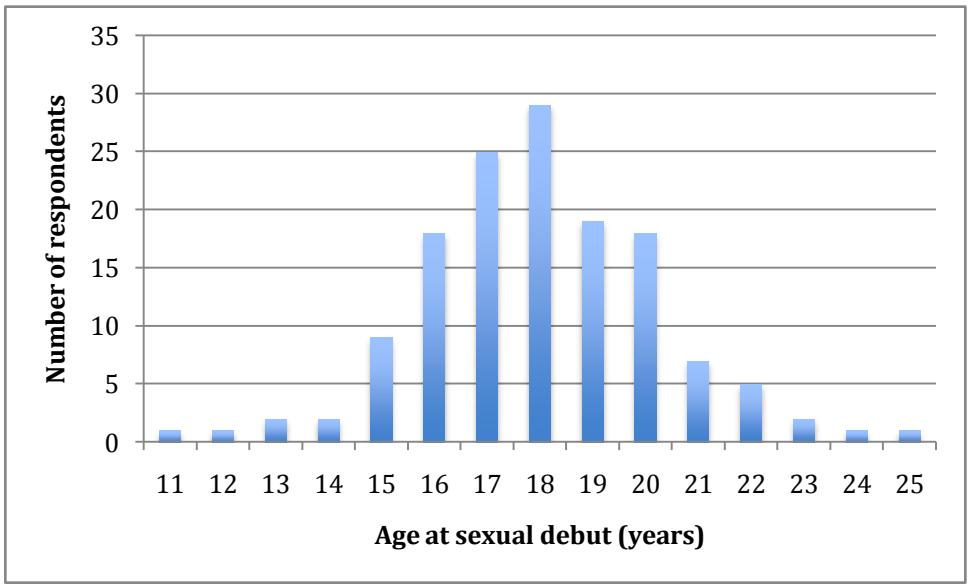

Figure 2.Distribution of respondents that reported sex in the past 12 months by age at sexual debut.

The majority of respondents reported having had one sexual partner in their lifetime as shown in Figure 3.

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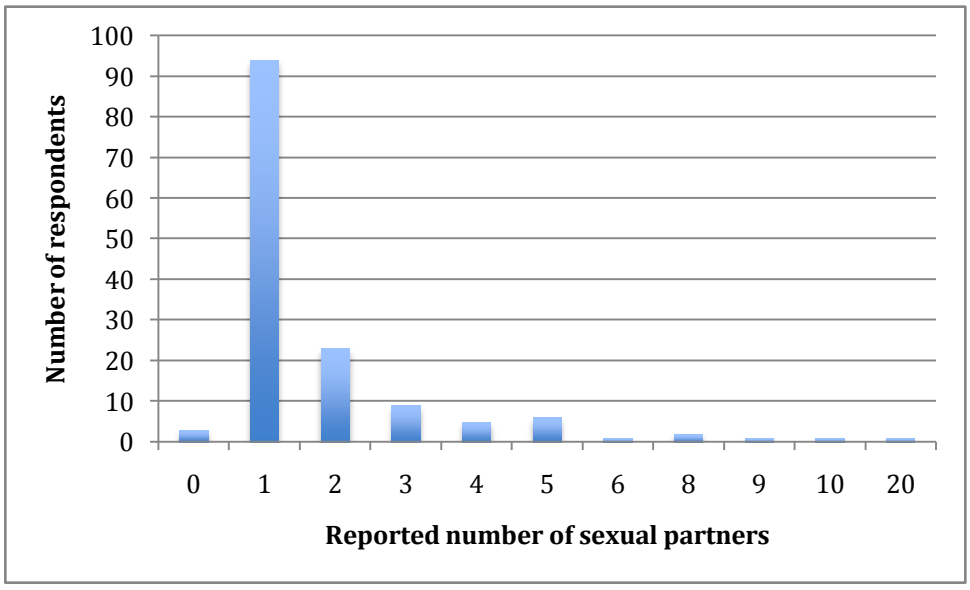

Figure 3.Distribution of respondents that reported sex in the past 12 months by number of sexual partners.

Defining the "information source" variables as the exposure of interest

One hundred eighty-two (182) respondents were found to have each appropriately identified one source of information as their primary source for SRH information. The number of respondents who reported each source of information is shown in Figure 4 by assigned rank. The six potential sources of information were analyzed as exposures using this sub-population. The percentage of respondents reporting each source of information as their primary one is shown in Table 9. For inclusion in the logistic regression model, each of the "source of information" variables was dichotomizedsuch that those ranked as "1" were kept as "1," and those given any other rank were coded as "0."

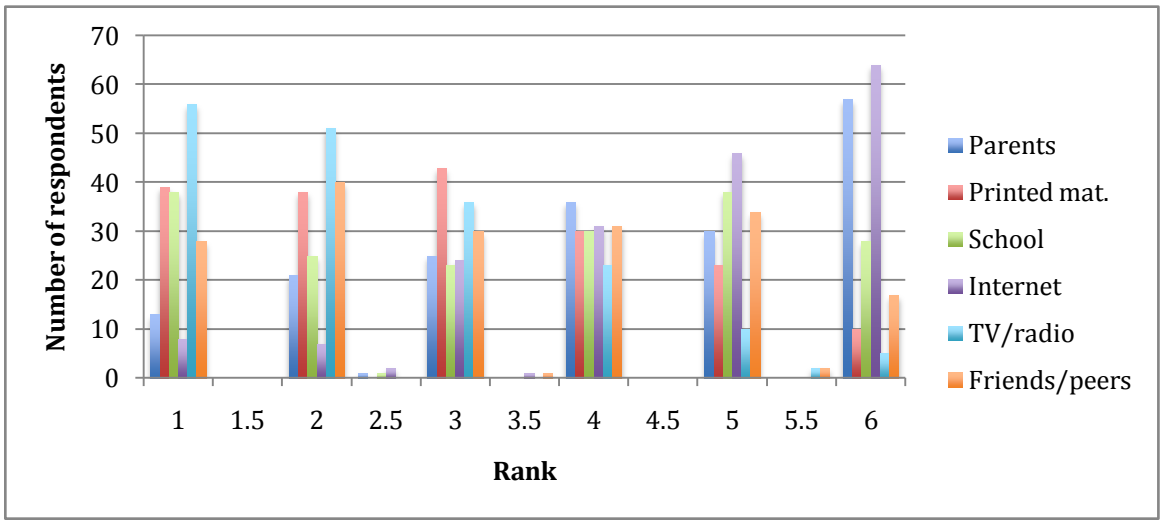

Figure 4. The number of respondents who reported on each source of information on SRH by assigned rank (*n*=182).

Table 9.Percentage of respondents reporting the potential sources of information as primary ones.

Source of information	Primary source (%*)
Parents	7.14
Printed material	21.43
School	20.88
Internet	4.40
TV & radio	30.77
Friends & peers	15.38

* *n*=182

Associations between primary sources of information on SRH and SRH-related behaviors

The outcomes of interest are the respondents' having engaged in sex in the preceding 12 months, having used a condom at last sexual intercourse, always using a condom during sex, always practicing withdrawal (*coitus interruptus*) during sex, having first had sex before the age of 18, and having had more than one lifetime sexual partner.

The correlation between the ordinal "frequency of condom use" and "used condom at last sex" variables was high (Pearson's correlation coefficient of .76, p<.0001).The correlation between the

dichotomized "always use condom" and "used condom at last sex" variables was inversely correlated (Pearson's correlation coefficient of -.54, $p<.0001$).

Logistic regression models were built for each of the dichotomized outcome variables using the same set of exposure, confounder, and interaction terms as shown in Equations 1 and 2. The full model was tested against the reduced model without them for each outcome using the likelihood ratio test. Table 10 shows the -2 log l values for each model. The -2 log l value of the full model was subtracted from that of the reduced model to yield an estimated χ^2. At 3 degrees of freedom, which is the number of confounder terms included in the full model and excluded from the reduced model, the estimated χ^2 value was never shown to exceed the χ^2 value of α, which was set at .05. Therefore, the interaction terms were not shown to make any significant contribution to the logistic regression model, and the reduced model was used to calculate odds ratios.

Table 10.Likelihood ratio test for significance of interaction terms by comparing full model to reduced model.

	-2 log l **				
Outcome*	Full model	Reduced model	$\chi2$	DF	p (α=.05)
Sex in the preceding 12 months	180.3	216.0	35.7	3	p>α
Use of condom at last sex	160.5	176.4	15.9	3	p>α
Always use condom during sex	131.0	136.9	5.9	3	p<α
Always practice withdrawal during sex	147.2	160.0	12.8	3	p>α
Ever discussed SRH with last sexual partner	124.9	131.8	6.9	3	p<α
Age at sexual debut less than 18	132.5	160.4	27.9	3	p>α
More than 1 lifetime sexual partner	117.0	149.5	32.5	3	p>α

* The full population of respondents was included in the model for "sex in the preceding 12 months;" however, only those respondents who reported sex in the past year were included in the models for the other outcomes.

** For intercepts and covariates.

Exposure and coefficient estimates for each term of the final models are shown in Table 11 for all outcomes, and Table 12 shows the estimated odds ratio for each "source of information" term compared with the referent, which is the entire group of exposure variables excluded from each model. For the models that were shown using likelihood ratio testing not to need confounder terms— "always use condom during sex" and "ever discussed SRH with last sexual partner,"—those terms were removed, leaving only exposures. Individuals who chose "school" as their primary source of information were 3.14 times more likely to report "always use a condom during sex" than those in the "reading materials" group. Similarly, those who chose "other people" as their primary source were 2.11 times more likely to have reported consistent condom use than those in the "reading materials" group. For the outcome "ever discussed SRH with last sexual partner," conclusions about associations could not be madebecause of the large confidence intervals and odds ratios that approached 1.

After the backwards elimination procedure was conducted for the other five outcomes, all of the terms that remained were significant at the p=0.30 level. For the outcome "used condom at last sex," no exposure variables had $p < 0.30$, so all were eliminated. In these final models, there was only one instance where an exposure variable approached significance. Individuals who chose "school" as their primary source were 3.41 (95% confidence limits 1.00-11.66, p=.05) times as likely as those who chose "reading materials" or "TV and radio" to report always using condoms during sex.

Table 11.Results from final models including all remaining exposure variables (with "reading materials" as referent) and confounders.

	Intercept	Exposures			Confounders		
		School	TV/radio	People	B. Luka	Age	Male
Outcome	α	β_1	β_2	β_3	γ_1	γ_2	γ_3
Sex in the preceding 12 months	-8.66	.73	--	.51	1.60	.37	--
Use of condom at last sex	5.12	--	--	--	.74	-.24	--
Always use condom during sex	-1.76	1.23	.51	.75	--	--	--
Always practice withdrawal during sex	0.61	0.56	0.81	--	-1.71	--	--
Ever discussed SRH with last sexual partner	1.39	-0.35	.07	*	--	--	--
Age at sexual debut less than 18	3.02	--	--	-0.58	--	-0.19	2.27
More than 1 lifetime sexual partner	2.71	0.67	--	--	--	-0.28	2.48

* Approaching zero.

Table 12.Odds ratio estimates for exposure terms relative to referent, which is "read material" in addition to any sources removed from the model as indicated in Table 12 and controlling for study site, age, and gender where applicable.

	Odds ratio estimate (95% Wald confidence limits)		
Outcome	School	TV/radio	People
Sex in the preceding 12 months	2.07 (0.79-5.46)	--	1.66 (0.68-4.07)
Use of condom at last sex	--	--	--
Always use condom during sex	**3.41 (1.00-11.66)**	1.66 (0.48-5.68)	2.11 (0.61-7.34)
Always practice withdrawal during sex	1.76 (.64-4.79)	2.25 (0.92-5.51)	--
Ever discussed SRH with last sexual partner	.71 (0.22-2.36)	1.01 (0.33-3.44)	1.00 (0.30-3.38)
Age at sexual debut less than 18	--	--	0.56 (0.20-1.55)
More than 1 lifetime sexual partner	1.96 (0.64-5.98)	--	--

Conclusions

The purpose of this study was to gather information on the situation of SRH practice among BH youth in order to inform and direct public health interventions. The analysis presented above suggests a number of areas in need of intervention, ways to direct such interventions, and areas that must be researched further.

Given the primacy of ethnicity as an issue in BH society and politics since the civil war, it is important to consider the role it plays in SRH behaviors. The finding that a larger proportion of survey respondents who identified as Serb reported sex in the prior 12 months than those who identified as Bosniak indicates that there may exist significantly different approaches to sex among different ethnic groups.

The choice of study sites within fractious BH, with its history of ethnic cleansing, drove the ethnic composition of the study sample, with Banja Luka a majority Serb city and Tuzla majority Bosniak. Majority Croat areas were not included in the study. There was a high correlation between study site and ethnicity (kappa coefficient of 0.77),with 95.09% of respondents from Banja Luka identifying as Serb, the 94.55% of Tuzla respondents identifying as Bosniak.

One surprising finding was that respondents did not overwhelmingly rank their risk for STI and HIV as “extremely low.” Epidemiologic studies are needed to assess prevalence and incidence of major STIs in BH in order to assess risk posed to sexually active individuals. In addition, more research needs to be done on factors contributing to perceived risk as well as actual risks in the population. If sexually active individuals in this society do feel that they are at significant risk for STI or HIV, then educational campaigns and increasing access to contraceptive options, testing, and health services is necessary. Another important point to note is the extremely low prevalence of respondents reporting having ever been tested. Given the high number of students that reported sex in last 12 months, testing rates should be much higher.

"Sex in the previous year" was used in this study as proxy measure for "ever had sex in lifetime," but its utility as such was limited as there may be individuals who have had sex in their lifetimes, but just not in the last year. Tuzla students reported lower rates of "having had sex in the last 12 months" than Banja Luka students. No measures were available in this study to validate the responses to this question, so it is not known if the lower reporting of "having had sex in the last 12 months" among Tuzla residents truly reflected behavior or simply underreporting. Culture and religion may have played a role here, and more research needs to determine if this is true. Do Tuzlastudents engage in less sex than their Banja Luka counterparts? Is that especially true for females? Sitewas highly correlated with religion; specifically, Tuzla was correlated with identification as a Muslim and Banja Luka was highly correlated with Orthodox Christianity. As a result, this observation of different rates of "sex in the previous year" by site may actually have been a function of religion. It is also worth noting that among Tuzla respondents who reported sex in last 12 months, gender-specific median age at sexual debut did not differ markedly from that of Banja Luka respondents. This suggests that while fewer respondents at Tuzlahad engaged in sex by the time that they had begun university, those who had were comparable in age at first sex to Banja Luka respondents. It is possible that stigma or other social constructs may be at play among students at Tuzla, who are predominantly Bosniaks and Muslims, that are not functioning in the same way among students at Banja Luka. This could result in underreporting on this question by Tuzla students.

Age at sexual debut for individuals who reported sex in last 12 months appeared normally distributed around a median of just over 18 years. Again, Banja Luka and Tuzla respondents did not differ significantly in age at sexual debut, but males and females did. The median onset for females was over 19 years, 2 years later than their male counter parts, whose median debut occurred between 17 and 18 years.

Source of information and associations with SRH behavior outcomes

Almost one-fifth of respondents did not rank the potential sources of information on SRH in a manner meaningful to the study. Among those who did, the most popular source of information was TV and radio, with almost one-third of those with meaningful responses ranking it as their primary source.

This is consistent with ARD, Inc.'s findings on the development and popularity of media outlets in BH (ARD, Inc., 2006). TV and radio were followed by printed material (selected by about one-fifth), school, friends and peers, parents, and internet. It is surprising to note that internet ranks so low as a source of information for this young population and may be due to limited connectivity in the country at the time of this study.

While TV and radio were the most popular sources of SRH information, the findings of this study suggest that they were no more highly associated than other sources with positive SRH behavior change. As a result, intervention planners may wish to weigh the somewhat greater reach of TV and radio against the cost of communicating a message through these media relative to other media, like printed materials. The question may be asked in this way: Given that TV and radio have a somewhat greater audience than, for example, printed materials, is this increased audience large enough to warrant the higher cost of a TV and radio campaign relative to a cheaper printed materials campaign?

"Reading material," a combined grouping of "printed material" and "internet" was chosen as the referent group for the other sources of information in the logistic regression models because of its relative popularity as a means of conveying public health information.

Logistic regression modeling showed that, overall, source of information was found to be relatively unimportant as an influence upon SRH outcomes. Although TV and radio were the most popular sources of information on SRH, respondents who identified these as their primary source were, at best, not significantly more likely to have engaged in positive SRH outcomes than those for whom printed materials was the primary source.

The strongest association was between "school" and "always using a condom during sex," suggesting that school has an influence upon the protective practice of consistent condom use. This may simply be a reflection of having the message provided through more than one mode, i.e., a person (teacher), and printed material. More research will be required to better understand this association.

It is worth noting that findings for the outcome "use of condom at last sex" differed markedly from "always uses condom during sex." A significant part of this discrepancy may lie in the fact that

although the full, 5-level ordinal variable "frequency of condom use" was highly correlated with the variable "use of condom at last sex," the dichotomized variable "always use a condom" was not directly correlated with "use of condom at last sex." This may have been due to the exclusion of the choice "often use a condom" from the variable "always use a condom." Further, the lack of positive correlation between consistent use of condom during sex and use of condom during last sex may indicate sporadic or inconsistent condom use.

Indications for future interventions

The three most popular sources of information were TV and radio, printed material, and school, with almost three fourths of respondents choosing at least one of these as their primary source. The popularity of these three sources suggests that they may be the best means by which to communicate health messages to a large number of people.

However, when evaluating the suitability of these sources as avenues for SRH communications, their sizes of their respective audiences must be considered alongside their ability to effect positive behavior change in the target audience. In other words, while one communication medium may reach a large number of people, the messages being communicated or the characteristics inherent to the medium may not be delivering good health information, as the AAP's Committee on Public Education showed regarding American media (American Academy of Pediatrics, 2001).

Interpretations of the results of the logistic regression analysis must be made while keeping the following considerations in mind: a) the cross-sectional nature of the study precludes definitive conclusions regarding causality and b) the large confidence limits around these odds ratios, most likely a result of small sample size, are evidence of poor precision. It does not appear that any given source of information had an effect, positive or negative, on any outcome or vice versa, and the odds ratios are at most only to be taken as indications of positive or negative association and not precise measures of effect.

Furthermore, more extensive research needs to be conducted on the prevalence and incidence of STIs and HIV in BH so that public health professionals can effectively target interventions for high-risk

diseases to populations at risk. Research is also needed to understand the factors contributing to the differential rates of key sexual behaviors like age at first sex and attitudes toward sex between ethnic groups as different intervention strategies may be warranted for each group.

Strengths and limitations

Questionnaire design

One strength of this study was the calculation of age at time of survey and age at sexual debut from date variables. This provided for more precise measurements than could be obtained by simply asking for integer responses for these questions. The actually date of birth was not sought, so as to mitigate the risk of personal identification.

Another strength was the careful attention to the anonymity of a participant's responses. Studies have demonstrated that self-report of sensitive behaviors by young people is more accurate when anonymity is provided (Selak et al., 2004).

Flaws in the design of the survey instrument were also present and became apparent during data collection, cleaning, and analysis. In Question 14, respondents were asked to rank 6 potential sources of sexual and reproductive health according to how much each had contributed to their knowledge on the subject. The list should have, but did not, include health workers, such as doctors and nurses, as they may comprise a significant source of information to youth on sexual and reproductive health.

In Question 15, respondents were asked if they had engaged in sexual intercourse within the last 12 months. Those who answered in the affirmative were then instructed to answer Questions 16 to 23, which sought information on sexual debut, relationships with sex partners, and contraception. Those who answered in the negative were instructed to skip these 7 questions, with the result that data on the aforementioned subjects were collected only from individuals who reported having engaged in sexual intercourse in the preceding 12 months. Had Question 15 been worded differently, valuable data may have been gleaned from individuals who may have been sexually active in the past, but not in the preceding 12 months. Additionally, Question 15 excluded individuals who may have engaged in non-

intercourse sexual activity. The questionnaire may have benefitted in this regard by a) asking the respondent if they had ever engaged in sexual intercourse and b) attempting to define sexual intercourse for the purposes of the survey.

In the section titled "Abuse," Questions 29 and 31 asked if anyone had ever touched the respondent's sexual organs against his or her will and if anyone had ever had sexual intercourse with that person against his or her will. Respondents who answered "No" to Question 29 were instructed to skip all other questions in the "Abuse" section, including Question 31, under the assumption that respondents would consider sexual intercourse to be a subset of touching sexual organs, i.e. respondents reported unwanted sexual intercourse would necessarily report unwanted touching of sexual organs. Contrary to this assumption, two respondents answered "No" to Question 29, disregarded the instructions to skip the subsequent questions, and answered "Yes" to Question 31. This indicates that not all respondents considered sexual intercourse to be a subset of touching sexual organs. In hindsight, the instruction to skip after the touching question should not have been included, and both the touching and intercourse questions should have been posed to all study participants. It is impossible to tell how many respondents who skipped Question 31 might otherwise have answered that question in the affirmative. For the analytical purposes of this study, the response to Question 29 of any respondent who answered "Yes" to Question 31 was recoded as "Yes," to reflect that sexual intercourse is a subset of touching sexual organs.

As follow-up to Questions 29 (unwanted touching) and 31 (unwanted sexual intercourse), Questions 30 and 32 asked subjects who answered "Yes" to the immediately preceding question at what age they first experienced unwanted touching of their sexual organs and unwanted sexual intercourse, respectively. In both questions, respondents chose one of four age categories: "(1) Less than 6 years; (2) Between 6 and 12 years; (3) Between 12 and 16 years, and (4) Older than 16 years." The time intervals of two of these categories overlap with two other categories, and those of the other two categories overlap with one other age category. These overlaps constitute a flaw in the survey instrument that may have resulted in a systematic error that adversely affected the internal validity of responses to these two questions. For example, if a respondent intended to report a first instance of unwanted sexual intercourse

at age 6, he or she may choose either option (1) or (2). The case is likewise for individuals who would have reported the incident at age 12 or 16. It is impossible to judge which respondents would have reported the incident at age 6, 12, or 16 or to which age category such respondents should belong. A total of 14 individuals responded to Question 30 and 9 to Question 32.

Study population

A strength of this study is that it provides information on a variety of the SRH behaviors of almost 200 university students in BH, a group that has been relatively ignored. There are limitations, however, in the representativeness of the study participants. The base population for this study consisted of students residing in on-campus housing at the Universities of Banja Luka and Tuzla in June and July 2006. These two universities were very representative of Serbs/Orthodox Christians and Bosniaks/Muslims, respectively. After recruiting, the ethnic composition of the study sample was weighted heavily toward Serbs (almost three-fourths), with Bosniaks comprising the next largest group (almost one-fourth). Not enough Croat respondents, a group associated in BH with Catholic Christianity, were captured in the sample to make any conclusions about that group based on ethnicity or religion.

The base population was originally intended to consist of all students enrolled at eachselected university at the time of the study by sampling from a campus directory listing the names and contact information of enrolled students or by obtaining rosters of enrolled students from the universities' administrative bodies. This plan proved untenable as a single, unified directory of students was unavailable. Since CARE had partnered with these universities on previous projects, their cooperation was expected for this study as well; however, the university administrations claimed that they did not keep unified student rosters, citing the decentralized nature of university structure in the region, in which the responsibility of keeping rosters of enrolled students is devolved onto the constituent academic faculties. Combined, the two universities contained a total of 26 faculties; therefore, compiling a university-wide roster of enrolled students would have necessitated asking every faculty, individually, for its roster. With the time available for data collection limited by the fast approaching end of the academic

term, a new data collection strategy was designed, which also necessitated a change in the base population.

In the absence of a university-wide list of students, a base population comprised of the university's student body was not possible. The survey distribution protocol was ultimately revised to focus on student housing at the universities, which provided a reasonably stable population of students at defined locations during the survey period. Accordingly, the base population was redefined as those individuals residing in student housing at the time of the survey.

The new survey distribution protocol, which entailed door-to-door distribution as described in the Methodology section above, presented its own limitations. The surveys were administered during the final exam period at both universities, which is a time when students start leaving for the interterm break. For this reason, it was difficult to know the number or demographic profile of the students who had left the university by the time of survey distribution, and to compare them to those of students who were included in the base population. Additionally, while the use of students in university housing was an attempt at preserving some of the demographic profile of the entire student body at the time of the survey, a comparison could not be made between the two groups, limiting the extent to which the former can be said to be representative of the latter.

Sample population: Convenience sample

The sample design was initially intended to be systematic and random, but complications arose during survey distribution that compromised the randomization. The original distribution protocol targeted odd-numbered rooms in the on-campus dormitories. If no one answered when the survey distributors knocked on the doors of these rooms, they would return and try again after 20 minutes. If no one answered the second time, survey distributors would note the room as "No response." If someone answered the door, the survey distributors would describe the survey to the individual who answered and offer them an informed consent document, the questionnaire, and an unmarked, sealable envelope in which to place the completed questionnaire. If the individual refused to participate, the survey distributors

would note the room as "Refusal." Those who agreed to participate would be given approximately 20 minutes to complete the questionnaire and seal it in the envelope, after which time the survey distributors would return to collect the completed questionnaires and store them for data entry.

A number of problems arose, requiring changes in the above described survey protocol. They were as follows:

1. Ambiguous rooms. On certain floors, there existed rooms whose layout and placement differed significantly from the majority of the other dormitory rooms. Although some of these were being used as regular dormitory rooms, it was unclear if all such rooms were being used in this way or if they had other functions. Moreover, these rooms were not clearly numbered like the other, conventional dormitory rooms. The survey distributors initially attempted to include these rooms in the sample population, but ultimately excluded them. However, one survey was collected from one of these rooms before the decision to exclude them had been made, and it is included in the sample.
2. Extra survey participants. The sample population was initially intended to only include the individual who answered the door when the survey distributors knocked. In many rooms in which more than one person was present at the time of survey distribution, however, individuals other than the person who answered the door expressed interest in the survey and volunteered to participate without being asked. These individuals were, thus, included in the sample population despite the compromise they presented to randomization. In Banja Luka, survey distributors noted the number of rooms that took 2, 3, and 4 surveys; however, such details were not noted in Tuzla (see (4) below).
3. Inability to distinguish between residents of a room and visitors. Of those individuals who agreed to participate in the survey, it was unclear who was the actual resident of any given room as opposed to its visitors. In the interest of preserving anonymity, but to the detriment of randomization, the survey distributors did not attempt to make any such distinction.

4. End of the academic term. The University of Tuzla's academic term was in its final days by the time survey distribution began there. Because it was expected that the majority of students residing in on campus housing had vacated by this time, all students present in the dormitory rooms at the time of survey distribution were included in the sample population.

Although a systematic random sample was initially intended, limitations in the survey distribution listed above compromised randomization. Therefore, the sample design can be best described as a convenience sample.

Ethical Considerations

A significant strength of the study was that confidentiality was given the highest priority due to the sensitivity of the questions asked. No personal identifiers were ever collected, so it is not possible to match any survey to any individual. Names were not even collected as part of the informed consent process because consent was given verbally. Upon completion, respondents sealed their questionnaires in envelopes that the survey distributors individually collected 15-20 minutes after distribution to ensure that all distributed surveys were accounted for. Participation in this study carried no foreseeable adverse risk to individual respondents or to society at large.

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Appendix A. Informed consent document

CARE INTERNATIONAL

Consent to be a Research Participant

Youth Sexual & Reproductive Health in Bosnia & Herzegovina

Principal Investigator
Glen Abedi
Phone: (51) 211 309

Sponsors
CARE International
Emory University

INTRODUCTION & PURPOSE

We at CARE in Bosnia & Herzegovina are conducting this survey as part of a larger effort to expand our activities into the area of youth sexual and reproductive health and related issues. About 500 individuals are participating in this survey. Through it, we hope to collect information on sexual health and behavior, intravenous drug use, abuse, and abortion.

This survey is completely anonymous, and all of your responses will be kept in strict confidentiality. You are under no obligation to take part in this survey, as participation is completely voluntary. We appreciate your honesty in answering these questions because the information from this survey will help broaden the understanding of youth sexual and reproductive health in BH.

The survey will take you about 15 minutes to complete.

Your responses will help guide future CARE programming in the field of youth sexual and reproductive health.

PROCEDURES

Please complete the enclosed questionnaire to the best of your ability. It may take you about 15 minutes to complete. Please answer all questions as honestly and accurately as possible.

Once you have completed the questionnaire, place it in the envelope provided and seal it. Return the envelope and consent form to the survey administrator. The unopened envelope will be placed into a secure container with other sealed quesitonnaires.

RISKS

Many of the questions in the questionnaire deal with very sensitive subjects, such as sexual behavior, intravenous drug use, abuse, and abortion. As a result, you may feel some discomfort while completing the questionnaire. However, please remember that your responses are confidential.

BENEFITS

By taking part in this survey, you are helping us at CARE better understand areas of need with regard to youth sexual and reproductive health. This information will guide CARE's future programming in these areas.

CONFIDENTIALITY

The questionnaire does not include any personally identifying information. For this reason, you cannot be directly linked to your responses.

CONTACT PERSONS

If you have any questions about this survey, please call Glen Abedi at 065/ 709 424.

Call Dr. James W. Keller, chair of the Emory University Institutional Review Board in Atlanta, Georgia, USA, if you have any questions about your rights as a participant in this research study at + (404) 712 0720.

VOLUNTARY PARTICIPATION AND WITHDRAWAL

Your participation in this survey is completely voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may choose not to complete or submit the questionnaire.

Please keep this document for your records. Do not return it with your completed questionnaire. By submitting your questionnaire, you indicate your consent to provide this information to CARE International and Emory University.

Appendix B. Questionnaire

Youth Sexual & Reproductive Health in Bosnia & Herzegovina

For the following questions, circle the number next to your selection, as shown in the example below. Please take care to circle only one choice for each question unless otherwise specified.

0 Do you currently reside in Banja Luka?
(1) Yes
2 No

The first section of questions deals with demographic information and your course of study.

Section I. General Information

1 In what month and year were you born?
__ __ / __ __ __ __
M M Y YYY

2 What is your gender?
1 Male
2 Female

3 How do you identify in terms of ethnicity?
1 Serb
2 Bosniak
3 Croat
4 Mixed ethnicity
5 Other (please specify)
_____

4 What is your religious affiliation?
1 Orthodox
2 Muslim
3 Catholic
4 Other (specify) _____
5 None

5 In which faculty are you currently enrolled?
1 Academy of Arts
2 Faculty of Architecture and Civil Engineering
3 Faculty of Economics
4 Faculty of Electrical Engineering
5 Faculty of Philosophy
6 Faculty of Mechanical Engineering
7 Medical Faculty
8 Faculty of Agriculture
9 Faculty of Law
10 Faculty of Natural Sciences and Mathematics
11 Faculty of Technology

12 Faculty of Forestry

6 In what year of university study are you?
1 1st
2 2nd
3 3rd
4 4th
5 5th
6 6th
7 Absolvent

7 What is your family's yearly household income?
1 Less than KM 1.999
2 Between KM 2.000 and KM 5.999
3 Between KM 6.000 and 14.999
4 Between KM 15.000 and 24.999
5 Between KM 25.000 and 49.999
6 Greater than KM 50.000

8 Where did you live just before you came to university in Banja Luka?
1 Banja Luka
2 Other town or city in RepublikaSrpska
3 In the Federation of BiH
4 Outside BiH

9 What is the population of the town or city in which you lived just before coming to university in Banja Luka?
1 Less than 9.999
2 Between 10.000 and 49.999
3 Between 50.000 and 99.999
4 Between 100.000 and 499.999
5 Greater than 500.000

The next section of questions deals with testing for sexually transmitted infections (STIs) and HIV.

Section II. Sexual Health and Behavior

10 What do you think your level of risk is for contracting an STI?
1 Very high
2 Somewhat high
3 Moderate
4 Somewhat low
5 Very low

11 What do you think your level of risk is for contracting HIV?
1 Very high
2 Somewhat high

3 Moderate
4 Somewhat low
5 Very low

12 Have you ever been tested for STI or HIV?
1 Yes
2 No (Skip to question 14.)

13 In general, how often do you get tested for STI/HIV? (Please choose one.)
1 At least once a year
2 At least once every 2 years
3 At least once every 5 years
4 None of the above

14 The following is a list of potential sources of information on sexual and reproductive health. Please rank them from 1 – 6, with 1 being that from which you have learned the most about sexual and reproductive health and 6 being that from which you have learned the least.
__ Parents
__ Printed media
__ School
__ Internet
__ Television and radio
__ Friends and peers

The following questions deal with behavior related to sexual and reproductive health.

15 Have you engaged in sexual intercourse within the past 12 months?
1 Yes
2 No (Skip to quesiton 24)

16 When did you begin having sexual relationships?
__ __ / __ __ __ __
M M Y YYY

17 When you last had sexual intercourse, was a condom used?
1 Yes
2 No

18 What is your relationship to the person with whom you last had sexual intercourse? (i.e. Who is this person to you?)
1 Husband, cohabiting partner (male)
2 Boyfriend, fiancée (male)
3 Other friend (male)
4 Casual acquaintance (male)
5 Wife, cohabiting partner (female)
6 Girlfriend, fiancée (female)
7 Other friend (female)
8 Casual acquaintance (female)
9 Other (please specify) _____

19 For how long have you been in this relationship?
__ __ months (If less than 1 month, please write “00.”)

20 Have you and this person ever had a discussion about STIs and safer sex practices?
1 Yes
2 No

21 With how many different individuals have you had sexual intercourse in the last 12 months?
__ __ individuals

22 How often have you used a condom during sexual intercourse in the last 12 months?
1 Always
2 Often
3 Sometimes
4 Rarely
5 Never

23 How often do you use withdrawal (coitus interruptus) as a contraceptive method?
1 Always
2 Often
3 Sometimes
4 Rarely
5 Never

The following section deals with the use of intravenous recreational drugs.

Section III. Intravenous Drug Use

24 Have you ever injected drugs?
1 Yes
2 No (Skip to question 29.)

25 Have you injected drugs in the past 12 months?
1 Yes
2 No

26 Have you ever shared a needle with someone else?
1 Yes
2 No

If you answered "No" in question 15, skip to question 29. If you answered "Yes," please continue.

27 Is the person with whom you last had sex aware that you have injected drugs?
1 Yes
2 No

28 How often do you tell new sexual partners that you have injected drugs?
1 Always
2 Often
3 Sometimes
4 Rarely
5 Never

The following section deals with abuse, specifically forced sexual behavior.

Section IV. Abuse

29 Has anyone ever tried with sexual intent to touch your sex organs against your will?
1 Yes
2 No (Skip to question 39.)

30 How old were you when this event first occurred?
1 Less than 6 years
2 Between 6 and 12 years
3 Between 12 and 16 years
4 Older than 16 years

31 Has anyone ever tried to have sexual intercourse with you against your will?
1 Yes
2 No (Skip to the end of this section.)

32 How old were you when this event first occurred?
1 Less than 6 years
2 Between 6 and 12 years
3 Between 12 and 16 years
4 Older than 16 years

33 Whom have you told about this/these experience(s)? (Please choose all that apply.)
1 A family member
2 Spouse, cohabiting partner
3 Boyfriend/girlfriend, fiancée
4 Other friend
5 A teacher, principal, professor, dean, school counselor
6 A religious leader
7 A doctor, psychiatrist, psychologist, nurse, social worker, or other medical worker
8 Other (Please specify.)
_____
9 No one

Male respondents, this concludes the survey. Do not continue to the next section. Thank you for your participation.

Female respondents, please continue to the next section.

The following section is to be completed by female respondents only.

Section IV. Abortion

34 Have you ever used any of the following contraceptives? Please select all that apply.
1 Birth control pill
2 Emergency contraceptive pill
3 Intrauterine device

4 Diaphragm
5 Other (please specify) _____
6 None

35 Have you ever been pregnant?
1 Yes
2 No (End of survey.)

36 Have you ever had a pregnancy end in abortion?
1 Yes
2 No (End of survey.)

37 Where was this abortion performed? (*If you have had more than one abortion, please indicate where your first abortion was performed.*)
1 Hospital
2 State-run clinic, medical center
3 Private clinic
4 Other (Please specify.)
_____

38 Did your partner (the father of the baby) know about this abortion?
1 Yes
2 No

39 Other than medical personnel, whom did you inform when deciding on your last abortion? (Select all that apply.)
1 A parent
2 Other family
3 A friend
4 A teacher, principal, professor, dean, or school counselor
5 A religious leader
6 No one

This concludes the survey. Thank you for your participation.