

1 **Prevalence and possible risk factor of Premarital Sexual Behaviour among**
2 **Nepalese Adolescents**

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15 Running title: PSB in Nepalese adolescents

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22

23 ABSTRACT

24

25 **Background:** To determine the prevalence of premarital sex and its risk factors in Nepal.

26 **Methods:** A cross-sectional study was carried out among adolescents in Nepal. A self-
27 administered questionnaire was used to collect information from 6,147 unmarried adolescents.
28 Random sampling by using a lottery method was applied to select 20 colleges from all three
29 districts. All the students who were studying at those colleges were enrolled in the study. Simple
30 and multivariate logistic regression analyses were carried out to analyse the associations of risk
31 factors and premarital sex.

32 **Results:** The prevalence of premarital sex was 38.1%. Male students were more likely to engage
33 in premarital sex (adjusted odds ratio [AOR]=2.04, confidence interval [CI]=1.76-2.36) than
34 female students. Alcohol consumption (AOR=1.26, CI=1.08-1.47), smoking (AOR=1.69,
35 CI=1.41-2.02), drug use (AOR=1.85, CI=1.23-2.83), going to night clubs (AOR=1.46, CI=1.24-
36 1.70), clothing style of girls AOR=1.35, CI=1.15-1.58), clothing style of boys (AOR=3.51,
37 CI=2.74-4.53), and unmarried friends having sex (AOR= 1.51, CI=1.31-1.73) were found to be
38 major influencing factors for premarital sex. Moreover, students who had never received sex
39 education were 2.92 times more likely to engage in premarital sex (CI=2.22-3.85) than those
40 who had previously received sex education.

41 **Conclusions:** We found several risk factors associated with premarital sex in Nepal. Preventing
42 premarital sex may require the promotion of sex education.

43

44 **Keywords:** Adolescents, behaviour, premarital sex, sex education, Nepal

45

46 **Plain English summary**

47 The study is conducted in Nepal because of the similar socio economic background and
48 perceptions this study reflects the status of premarital sex and its factors among adolescents of
49 entire South Asian countries. Pre-marital sex among adolescents has been increasing globally,
50 and is being more acceptable. This study will help as baseline information for the policy maker
51 and other government workers as the clear picture of the current scenario of the sexual health
52 among adolescents in Nepal.

53

54 **Introduction**

55 Premarital sex is defined as any and all forms of sex before marriage (1). Youth risk behaviour
56 surveillance in 2013 revealed that 46% of the students in the USA had engaged in sexual
57 intercourse. The prevalence of ever having sex was highest among black males, followed by
58 Hispanic students. Approximately 14% of the black students had sexual intercourse before the
59 age of 13 (1). In 2016, the prevalence of premarital sex was 27.6% among secondary school
60 students in Nigeria (2). Moreover, the prevalence of premarital sex was 39.7% among young
61 people in Ethiopia (3). Results from developing countries such as Indonesia, Nepal, Thailand,
62 and the Philippines suggest that risky behaviours such as premarital sex and substance abuse are
63 increasing among adolescents (4). Premarital sex may result in sexually transmitted infections
64 (STIs), including human immunodeficiency virus (HIV). Particularly, adolescent girls may
65 experience an unwanted pregnancy and seek abortion, which can cause various complications,
66 including death. In addition, girls may drop out of school to raise their children, and in most
67 cases, they become economically dependent upon their parents (5). Girls also may experience the
68 additional burdens of premarital child bearing and rearing (6). The reasons for premarital sex
69 among adolescents are complex and may include easy access to various sexual content in movies
70 as well as internet-based pornography. Similarly, adolescents are also likely to experiment with
71 risky behaviours because of physiological and emotional transitions during this stage of
72 development (7). Addressing the burden of premarital sexual behaviour, along with focusing on
73 intervention research, can help reduce the risks associated with it.

74

75 Previous studies on kindred area suggest that individual, family and peer factors such as age;
76 rural family residence; alcohol consumption; smoking habits; attitude towards virginity; having a
77 boyfriend; peers' sexual behaviour, including having friends with dating experience; having
78 close unmarried friends engaging in premarital sex; discussing sexual matters with friends; going
79 to night clubs; viewing pornographic materials; parents education; and parental status (whether
80 raised by a single parent or both parents) had a strong influence on premarital sex among higher
81 secondary level students (8-11). Notably, household, community and country differences are also
82 considered to be predictors of the risk of premarital sex (12). However, many factors are still
83 unknown, especially in underdeveloped areas.

84 Previous reports on premarital sex in Nepal show that one-third (32%) of the Nepalese
85 population is aged 10-24 years, and this age group has the greatest need for sexual and
86 reproductive health services (13). As in other Asian countries, premarital sex is taboo in Nepal,
87 discouraging sexual contact between young unmarried males and females (10). Due to the
88 increase in late marriage, decrease in family influence on adolescents, and increase in
89 urbanization as well as exposure to media, globalization and modernization, sexual and
90 reproductive behaviour among adolescents have been changing (10, 11). Although sufficient
91 information and formal education about sexual and reproductive health are provided, the rate of
92 premarital sex has been increasing worldwide (14). An average of 29% of boys and 23% of girls
93 are sexually active and engage in premarital sex in many parts of the world (15).

94
95 Over the past few decades, premarital sex among adolescents has increased globally, especially
96 in the Western world, and it is becoming increasingly acceptable (16, 17). Some studies have
97 shown that premarital sex is increasing in Nepal. A study conducted in colleges in Kathmandu
98 Valley showed that almost two-fifths of the students had engaged in premarital sex (10).
99 However, the study did not explore possible lifestyle factors and was conducted with a small
100 sample size. Based on the above, this study investigated more than 6,147 adolescents aged 17-19
101 years in three regions by random stratification; it was expected that risky lifestyles would be
102 related to premarital sexual behaviour, providing a theoretical basis for subsequent universal
103 education and interventions. Therefore, we performed a study to assess the prevalence of and risk
104 factors for premarital sex in Nepal.

105

106 **Methods**

107 An institution-based quantitative survey was conducted among 6,147 students aged 17, 18, and
108 19 years from colleges in Kathmandu Valley after written informed consent was obtained.
109 Kathmandu Valley was selected as the study area because it comprises three districts
110 (Kathmandu, Bhaktapur, and Lalitpur). It is also the capital of Nepal. The majority of students
111 come to this area from different parts of the country after completion of secondary level
112 education to attend higher education institutions. Thus, Kathmandu was selected as the study site
113 so that we could obtain a sample of adolescents from all regions of the country.

114

115 *Ethical aspects*

116 The study was approved by the ethical review board of the Nepal Health Research Council.
117 Confidentiality was assured, and no personal information of students, as well as colleges, was
118 disclosed without the permission of the respondents. A specific code was assigned to each
119 college and its students, and they were asked not to include their name or the name of the
120 institution on their questionnaire. The sample colleges were not publicly disclosed, so the
121 possibility of anyone outside the core research team tracing the reported sexual behaviour of
122 respondents and their associated college was impossible.

123

124 *Sample size and sampling*

125 We used the following formula to calculate the sample size:

$$n = \left(\frac{Z_{\alpha}}{E} \right)^2 PQ$$

126 where,

127 n= required sample size

128 $\alpha = 5\%$ (desired level of significance)

129 $Z_{\alpha} = Z_{0.05} = 1.96$ (from the normal table)

130 $P = 18.3 \sim 20\%$, i.e., 0.2 (prevalence of premarital sex) (8).

131 $Q = 1 - P = 0.8$

132 $E = 0.01$ (desired error)

$$n = \left(\frac{1.96}{0.01}\right)^2 \times 0.20 \times 0.80 = 6146.56$$

~6147

133 The minimum sample size required was 6,147.

134 Random sampling by using a lottery method was applied to select 20 colleges from all three
135 districts. The list of all public and private colleges from the Nepal Education Board was
136 considered the sample frame. All the students who were studying at those colleges were enrolled
137 in the study.

138

139 *Data collection and analysis*

140 The data were collected using a structured self-administered questionnaire prepared in the local
141 language (Nepali). The questionnaire consisted of questions about sociodemographic
142 information, risk behaviour, sexual behaviour and knowledge about health consequences.
143 Questions related to the knowledge and practice of premarital sex were asked to obtain research
144 data. The participants were asked, “Do you have a boyfriend/girlfriend?”, “Have you ever been
145 involved in sexual activities?”, “Do you smoke/consume alcohol/use drugs/go to night clubs?”.
146 Additionally, major questions related to their family relationships and pocket expenses were
147 asked. If a participant answered “Yes”, he or she was considered to have had premarital sex. The
148 outcome was thus converted to a dichotomous variable. Approximately 30 minutes was provided
149 to complete the questionnaire. The validity of the questionnaires was verified by pretesting 400
150 samples before actual data collection. All the students who were unmarried and willing to
151 participate were eligible to participate in the study. The information of all the students at each
152 college was collected at the same time so that information bias was minimal. Due to the sensitive
153 nature of the study, the students were asked to sit on separate benches (one student per bench)
154 during the break time. Written informed consent was obtained from the students prior to
155 administering the questionnaire and information sheet. Students were told to keep their
156 completed questionnaires and consent forms together and individually place them in a specific
157 location inside the classroom before leaving the classroom so that the identity of the respondents
158 would not be revealed to survey enumerators.

159

160 The data analysis was carried out using descriptive statistics and inferential statistics. Bivariate
 161 statistics including chi-square tests and t-tests were computed to evaluate the differences in
 162 sociodemographic characteristics among adolescents who engaged in or did not engage in
 163 premarital sex. A multivariate analysis was carried out using logistic regression with the
 164 following formula (18). A P-value of 0.05 was considered statistically significant.

$$\ln\left(\frac{p}{1-p}\right) = \alpha + \beta_1x_1 + \beta_2x_2 \dots \dots + \beta_px_p$$

165
$$p(y/x) = \frac{\exp(\alpha + \beta_1x_1 + \beta_2x_2 \dots \dots + \beta_px_p)}{1 + \exp(\alpha + \beta_1x_1 + \beta_2x_2 \dots \dots + \beta_px_p)}$$

166 Odds ratio: $OR = \exp^\beta$

167 | Confidence interval: $\exp\left[\hat{\beta} \pm Z_{1-\alpha/2} \times \widehat{SE}(\hat{\beta})\right]$

168
 169 The collected data were entered into Epi-data version 3.2 and then extracted and imported into
 170 Excel 2019. The final data were analysed with the help of R-studio (version 1.2.5033).

171
 172 **Results**

173 **Table 1** shows the distributions of sociodemographic variables and the associations between
 174 sociodemographic variables and premarital sex. In our study, 51.4% of the respondents were
 175 male, and 48.6% of the respondents were female. The mean±SD of the age of the respondents
 176 was 17.51 ± 0.69. The highest percentages of adolescents were from the Humanities department
 177 (43.7%), followed by the science (38.4%) and management (35.0%) departments. Furthermore,
 178 the proportion (59.1%) of students who had engaged in sex at the age of 19 years was larger than
 179 those of students who had engaged in sex at 17 and 18 years. Regarding religion, Muslim and
 180 other (44.1%) religious groups had the highest rate of premarital sex, followed by the Hindu
 181 (38.6%), Buddhist (35.4%), and Christian (30.1%) religious groups. The Newari ethnic group
 182 (44.3%) had engaged in premarital sex more frequently than the Brahmin/Chhetri, Dalit/Janajati
 183 and other ethnic groups. In addition, respondents who lived without family (48.1%), e.g., living
 184 in a hostel, alone or with friends, had a higher rate of premarital sex than those who lived with
 185 family (35.2%). Respondents belonging to a nuclear family (38.5%) had a higher rate of

186 premarital sex than those belonging to a extended family (36.8%). Nearly 45 out of 100
187 respondents consumed alcohol, and 58.7% were smokers.

188
189 **Table 2** shows the multivariate logistic regression analysis results, indicating that males were
190 more likely to have engaged in premarital sex [AOR=2.04, 95% CI(1.76, 2.36)] than females.
191 Similarly, the respondents belonging to the humanities department and science department had
192 1.56 times [95% CI (1.20, 2.03)] and 1.02 times [95% CI (0.87, 1.20)] higher rates of premarital
193 sex, respectively, than those from the management department. Respondents aged 19 years and
194 18 years were 2.07 times [95% CI (1.69, 2.54)] and 1.34 times [AOR=1.34, 95% CI (1.16, 1.54)]
195 more likely to have engaged in premarital sex, respectively, than those aged 17 years. Moreover,
196 Muslim, Hindu and Buddhist respondents were 1.70 times [95% CI (1.00, 2.92)], 1.98 times
197 [AOR=1.98, 95% CI (1.38, 2.87)] and 1.73 times [95% CI (1.15, 2.61)] more likely to have
198 engaged premarital sex, respectively, than Christian respondents. The Brahmin/Chhetri and
199 Newar ethnic groups were 1.13 times [95% CI (0.95, 1.35)] and 1.54 times [95% CI (1.25, 1.91)]
200 more likely to have engaged in premarital sex, respectively, than the Dalits/Janajatis ethnic
201 groups. Those who did not live with family were 1.16 times [95% CI (1.00, 1.35)] more likely to
202 have engaged in premarital sex than to those who lived with family. The respondents with
203 monthly expenditures >3,000 NRs were 1.40 times [95% CI (1.23, 1.59)] more likely to have
204 engaged in premarital sex than those with monthly expenditures \leq 3,000 NRs.

205
206 The respondents who were very satisfied in their relationship with their parents were 1.6 times
207 (95% CI: 1.23-2.08) more likely to have engaged in premarital sex than those who were only
208 satisfied. Respondents who consumed alcohol were 1.26 [AOR=1.26, 95% CI (1.08-1.472)]
209 times more likely to have engaged in premarital sex than those who did not consume alcohol.
210 Similarly, respondents who were smokers were 1.69 [95% CI (1.41, 2.02)] times more likely to
211 have engaged in premarital sex than non-smokers. Those who used drugs and went to night clubs
212 were 1.85 [95% CI (1.23, 2.83)] and 1.46 [95% CI (1.24, 1.70)] times more likely to have
213 engaged in premarital sex than those who did not use drugs and did not go to night clubs.
214 Respondents who preferred sexy clothing styles of girls and boys were 1.35 times [95% CI (1.15,
215 1.58)] and 3.51 times [95% CI (2.74, 4.53)] more likely to have engaged in premarital sex than
216 those who preferred the simple clothing style of girls and boys, respectively. Those respondents
217 who had unmarried friends who engaged in premarital sex were 1.51 times [95% CI (1.31,1.73)]

218 more likely to have engaged in premarital sex than those without unmarried friends who engaged
219 in premarital sex, and the respondents who never received sex education were 2.92 times [95%
220 CI (2.22, 3.85)] more likely to have engaged in premarital sex than those who received sex
221 education. However, the respondents with knowledge about premarital sex were 2.50 times [95%
222 CI (2.08, 3.02)] more likely to have engaged in premarital sex than those who did not know
223 about premarital sex.

224

225 **Discussion**

226 This study identified the situation and possible influencing factors of premarital sex in Nepal.
227 Through our research, we attempted to analyse a large sample size of adolescents from different
228 parts of the country to increase the generalizability of our findings. The study results showed that
229 there was a significant self-reported prevalence of premarital sex despite Nepal being a low-
230 income and highly religious country. In the multivariate analysis, students who smoked,
231 consumed alcohol and used drugs were more likely to have engaged in premarital sex than those
232 who did not, while receiving sex education was found to be a major protective factor.

233 This study showed that the prevalence of premarital sex among adolescents was 38.1%. The
234 findings of the Nepal Demographic and Health Survey showed that 25% of unmarried men and
235 1% of unmarried women have had premarital sex (13). An institution-based cross-sectional study
236 conducted in Nepal showed that 24.6% of the respondents had engaged in premarital sex (11).
237 Another study conducted in India reported that 16-18% of the respondents had engaged in
238 premarital sex (19). The prevalence found in our study is high compared to those in these studies.
239 This might be because adolescents today are more accepting of premarital sex than they were in
240 previous years and because the strict confidentiality measures we took enabled respondents to
241 share sensitive information. However, it is important to note that premarital sex is still a social
242 taboo in Nepal, so there might be underreporting, with the true numbers being even higher than
243 those reported here.

244 Our study found that adolescents aged 18 and 19 years were more likely to have engaged in
245 premarital sex than those aged 17 years. A study conducted in Nepal showed a significant
246 association between age and premarital sex ($\chi^2 = 7.290$, p-value: 0.007) (20). In Ethiopia, it was
247 found that adolescents aged 18 years or more were more likely to have had premarital sex than

248 those aged less than 18 years (AOR: 3.8, 95% CI 1.6-9.2) (21). Another Ethiopia-based study
249 showed that the odds of premarital sex increased by 33% with age (AOR: 1.33, 95% CI 1.05-1.7,
250 p-value: <0.01) (8). Although these studies did not have similar cut-off points for age, they
251 indicate that premarital sex becomes more common with age, which aligns with our findings.
252 This might be because as adolescents age, they start exploring the changes in their body through
253 the use of books, online media and peer circles, and the influences these resources have might
254 make them more open to premarital sex.

255 This study identified that males were more likely to have engaged in premarital sex than females.
256 A study conducted in Nepal showed that males were 1.64 times more likely to engage in
257 premarital sex than females (*Yates correlation* $\chi^2 = 38.5$, risk ratio: 1.64) (11). In Malaysia, a
258 study showed that adolescent males were three times more likely to engage in premarital sex
259 (AOR: 2.7 95% CI 1.39-5.25, p-value: 0.003) than adolescent females (22). In Ethiopia, a study
260 showed that adolescent males were 1.88 times more likely to engage in premarital sex than
261 adolescent females (AOR: 1.88 95% CI 1.21-2.93, p-value: <0.01) (15). These studies mirror the
262 findings of our research. This is likely because Nepal, as a patriarchal country, tolerates some
263 freedom for males to engage in sexual activity but greatly values female virginity, meaning
264 females are less willing to engage in premarital sex than males. Another plausible explanation
265 might be the tendency among girls to underreport information about their private sex life (23,
266 24).

267 This study showed that adolescents who were not living with family were 1.16 times more likely
268 to have engaged in premarital sex than those living with family. A World Health Organization
269 (WHO) report (25) and a United Nations Population Fund (UNFPA) review (26) identified living
270 with parents as a key protective factor against premarital sex. In Cambodia, a study showed that
271 adolescents who were living away from their families were more likely to engage in premarital
272 sex than those living with their families (OR: 1.80 95% CI 1.28-2.59, p-value: <0.001) (27). An
273 Ethiopia-based study identified that adolescents who did not live with their parents were six
274 times more likely to engage in premarital sex than those who did live with their parents (AOR:
275 6.6 95% CI 1.9-23.7, p-value: <0.05) (21). These results are consistent with our study findings.
276 This is likely because adolescents who do not live with their parents have more independence

277 and less parental monitoring than those who live with their parents, giving them more
278 opportunities and freedom to engage in premarital sex.

279 In our study, it was found that respondents whose monthly pocket expenditures were >3,000
280 were more likely to have engaged in premarital sex than those whose pocket expenditures were ≤
281 3,000. A study conducted in India identified that adolescents who had more spending money
282 were more likely to engage in premarital sex than those with less spending money (AOR: 2.13
283 95% CI 0.99-4.62) (28). In Ethiopia, a study found that college students who were given
284 spending money were more likely to engage in premarital sex than those who were not (AOR:
285 2.2 95% CI 1.14-4.05) (9). Another Ethiopia-based study also reported that providing spending
286 money significantly increased the chance of engaging in premarital sex (AOR: 3.07 95% CI
287 1.96-4.81) (15). These findings align with our study results. This is likely because adolescents
288 who receive spending money are financially able to date girls, attend parties, consume alcohol,
289 or buy pornography, all of which increase the likelihood of premarital sex. In addition,
290 adolescents who receive spending money might even pay for sex.

291 In our study, substance use was significantly associated with the practice of premarital sex.
292 Adolescents who consumed alcohol, smoked cigarettes, or used drugs were more likely to have
293 engaged in premarital sex than those who did not. The findings of a WHO report identified
294 alcohol use and cigarette smoking among males and the use of drugs in males and females as key
295 risk factors for premarital sex among adolescents (25). In Malaysia, it was found that adolescents
296 who consumed alcohol (AOR: 2.7 95% CI 1.99-3.66), smoked (AOR: 4.1 95% CI 3.06-5.56) or
297 used drugs such as marijuana (AOR: 10.6 95% CI 6.99-16.13), heroin (AOR: 17.5 95% CI 8.55-
298 35.71) or intravenous drugs (AOR: 15.6 95% CI 7.58-32.26) were more likely to engage in
299 premarital sex than those who did not (29). Another study conducted in Cambodia reported that
300 unmarried adolescents who used alcohol (male: AOR= 6.2 95% CI 1.9-20.2, female: AOR= 3.7
301 95% CI 1.5-8.7) or drugs (male: AOR= 3.0 95% CI 2.0-4.4, female: AOR= 5.8 95% CI 1.5-22.0)
302 were more likely to be engaged in sexual behaviours than those who did not (30). These findings
303 align with our study results. This might be because substance use decreases self-control and
304 rational thinking ability among adolescents, leading them to engage in activities that they might
305 otherwise hesitate to do.

306 This study showed that adolescents who had unmarried friends who had sex were more likely to
307 have engaged in premarital sex. The Army Welfare Housing Organisation (AWHO) report
308 identified that having friends who have had sex was a key risk factor for premarital sex among
309 adolescents (25). A Nepal-based study showed that respondents whose close unmarried friends
310 had engaged in sex were nine times more likely to engage in premarital sex (OR: 9.2, p-value:
311 <0.001) (10). In Singapore, a study showed that adolescent males (UOR: 5.54 95% CI 3.60-8.51,
312 p-value: <0.001) as well as females (UOR: 6.47 95% CI 4.15-10.08, p-value: <0.001) who
313 perceived that one or more of their friends had engaged in sex were more likely to engage in
314 premarital sex (7). These findings are consistent with our study results. This might be because of
315 the substantial influence peers have in an adolescent's life. The constant need among adolescents
316 to fit in and the desire to experience what a peer has already experienced might increase an
317 adolescent's likelihood of having premarital sex.

318 This study found that adolescents who had heard or had knowledge about premarital sex were
319 more likely to have engaged in premarital sex than their counterparts. In India, a study found that
320 extensive knowledge about sexuality protected adolescent males from premarital sex (OR: 0.43
321 95% CI 0.18-0.98) (28). A study conducted in Ethiopia found that adolescents who had exposure
322 to reproductive health information were less likely to have premarital sex than those who did not
323 have exposure (AOR: 0.995, 95% CI 0.988-1.012) (31). These findings contrast with our study
324 results, but the difference could be explained by the source of the knowledge. It may possible
325 that the majority of the adolescents in our study obtained their knowledge from peers. There is
326 documented evidence indicating that discussing reproductive health (RH) issues with friends is a
327 risk factor for premarital sex (32, 33). This further validates the need for a strong formal sex
328 education delivery system in Nepal.

329 Our study found that adolescents who had not received sex education were three times more
330 likely to have engaged in premarital sex than those who had received sex education. A UNFPA
331 report indicated that adolescents who received appropriate comprehensive sex education
332 programmes were more likely to delay their sexual debut than those who did not receive
333 appropriate education (34). In Uganda, a study that surveyed primary schools before and after a
334 two-year educational intervention reported a higher risk ratio for sexual activity before the
335 intervention in both males (risk ratio: 2.45, p-value: 0.001) and females (risk ratio: 1.76, p-value:

336 0.001) than after the intervention (35). A study conducted in India recommended the introduction
337 of sex education in primary schools to ensure safe sexual behaviour among adolescents (36).
338 These studies align with the findings of our study. This is likely because adolescents who do not
339 receive sex education have very few opportunities to discuss their RH queries, and they are likely
340 to discuss RH with peers who have incomplete knowledge, purchase pornography or are
341 involved in paid sex, thus preventing them from making healthy decisions about their sex life.

342 There are some limitations in our study. First, the study was cross-sectional in nature, and a
343 causal relationship cannot be established between the variables. Due to the sensitive nature of the
344 study, the information regarding premarital sex, number of partners and age at first intercourse
345 may be affected by reporting or information bias. Additionally, our estimation of prevalence was
346 based on self-reported data from adolescents. Finally, we could not examine all the dimensions
347 and risk factors for premarital sexual activities because of time limitations. Further research is
348 required in the future to examine other factors that may help to understand the complex risk
349 factors for premarital sex. With all these limitations in mind, we conducted our study to achieve
350 the greatest possible validity and reliability.

351

352 **Conclusion**

353 This study revealed that students with a high family income and access to spending money are
354 more likely to engage in premarital sex. The risk increases when parents are uneducated and
355 when students do not live with their families. Peer influence and substance use were also strong
356 determinants of premarital sex. Sex education was a strong protective factor. Thus, preventing
357 premarital sex requires the promotion of sex education along with family and peer interventions.

358

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361 study on volunteer basis.

362

363 **Abbreviations**

364 AOR: Adjusted Odd's Ratio

365 CI: Confidence Interval

366 HIV: Human Immune Deficiency Virus
367 NDHS: Nepal Demographic Health Survey
368 NHRC: Nepal Health Research Council
369 OR: Odd's Ratio
370 RR: Risk Ratio
371 SD: Standard Deviation
372 STI/D: Sexually Transmitted Infections/Diseases
373 UOR: Unadjusted Odd's Ratio
374 UNFPA: United Nations Population Funds
375 USA: United States of America
376 WHO: World Health Organizations

377 **Authors' contributions**

378 MD, AG and RKS designed and parametrized the mathematical model, conducted the analyses,
379 and wrote the first draft of the article. CX, SK, AA and MS supported the model
380 parameterization, conducted the statistical analyses, and participated in the drafting of the article.
381 KB and RKS conceived and led the design of the study and model, analyses, and drafting of the
382 article. MD, CX and AG revised the manuscript. All authors have read and approved the final
383 article.

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388

389 **Availability of data and materials**

390 This manuscript's data will not be deposited because of sensitive nature of the study.

391

392 **Ethics approval and consent to participate**

393 The study was approved by the ethical review board of the Nepal Health Research Council.
394 Participants provided written informed consent and adolescents provided written assent.

395

396 **Consent for publication**

397 Not applicable.

398

399 **Competing interests**

400 The authors declare that they have no known competing personal interests that could have
401 appeared to influence the work reported in this paper.

402

403

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