

# Adolescent Health Risk and Behavior Survey: A School Based Survey in Central Nepal

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## ABSTRACT

### Background

A comprehensive study of adolescent health risk specific to the Dhulikhel catchment area has not been performed.

### Objective

This survey assesses trends in demographics, nutrition, hygiene and related infrastructure, causes of injury, violence, mental health, substance abuse, and menstrual hygiene.

### Method

A 40 question survey was adapted from the Center for Disease Control (CDC) Youth Risk Behavior Surveillance System, translated into the Nepali language, and administered to 1200 students in eight different schools in central Nepal. Descriptive statistics were used to summarize the data.

### Result

The data has identified nutrition, infrastructure, mental health, and menstrual hygiene as areas for improvement. The number of adolescents who reported going hungry some, most, or all of the time (30.5%, 25.8%, 13.9%) reveals a need for better food access. Approximately 44.5 % of students had no access to soap and water at school. Students who endorse dissatisfaction with themselves was 6.5% and those with suicidal ideation or attempt was 11.8% of the surveyed population. A significantly greater percentage of students who reported suicidal ideation also reported engaging in behaviors related to physical violence, substance abuse, being dissatisfaction with themselves, insomnia due to anxiety, and loneliness. Of the female students, 40.1% reported missing school at least once in the last three months due to their period.

### Conclusion

This data shows a need for better food access, improved infrastructure in schools in central Nepal, and the need to address the prevalence of mental health issues through program interventions.

## KEY WORDS

*Adolescent health, School health, Survey*

## INTRODUCTION

Choices made during adolescence can have lifelong impact on health.<sup>1</sup> In Nepal, adolescents comprise 24% of the population, so improving adolescent health can help reduce the future burden of chronic disease.<sup>2</sup>

There have been several studies done related to issues of adolescent health. Previous studies have found elevated blood pressure in 12% of adolescents and young adults in rural Nepal, hypertriglyceridemia in 8.5%, and low high density lipoprotein C in 78%.<sup>3</sup> Regarding tobacco use, the Global Youth Tobacco Survey showed that peer influence contributes to increased tobacco consumption risk in adolescence and that 24% of Nepalese students had friends who used tobacco.<sup>4</sup> Female reproductive health is of significant concern; an ethnographic study demonstrates that one out of four problems mentioned by adolescent girls involved reproductive health.<sup>5</sup> Among Nepalese adolescents attending an adolescent-friendly center, 32.0% of girls presented with menstrual issues and 22.1% had concerns about pregnancy.<sup>6</sup> These identified adolescent health issues can be addressed through interventions.

Currently, there is one national study assessing adolescent behavioral health risk factors in Nepal, which can be used as a point of reference when analyzing region-specific data.<sup>7</sup> Dhulikhel Hospital in central Nepal has a catchment area of schools where targeted programs can be implemented. The purpose of this study is to gather comprehensive data on the specific population of adolescents in the Dhulikhel Hospital catchment area to direct future interventions. Twelve hundred adolescents participated in the survey and the data was analyzed to determine behavioral health trends.

## METHODS

This is a cross-sectional survey study to assess demographic and behavioural risk factors. The participants of this study were adolescents from the rural villages of central Nepal. All participants were enrolled in schools of Dhulikhel Hospital's catchment area. Childrens below 12 years old and adolescents above 16 years old were excluded. The only selection criteria was being ages 12-16 years. The survey was administered in eight schools in rural villages of Central Nepal. The specific geographical area was chosen due to the existing school health program established by Dhulikhel Hospital. The sample size was limited to 1200 students. This number of surveys was chosen based on school populations and the amount of time needed to travel to each site.

The guidelines for developing the survey were based on the CDC survey, which states the intent "to describe the prevalence of health-risk behaviors among youths, to assess trends in health risk behaviors over time, and evaluate and improve health related policies and

programs".<sup>8</sup> After taking into consideration data from the CDC questionnaire, the Unicef statistical report and WHO's Causes for Mortality in Southeast Asia, it was determined that the survey would focus on key areas of morbidity and mortality – specifically behaviors relating to nutrition, sanitation, unintentional injury, violence, mental health, substance use, and menstrual hygiene.<sup>9-12</sup> In addition to data-gathering, this survey tool can be used in subsequent years to assess the progress of community programs and provide direction for new areas of disease prevention and behavioral intervention.

The survey utilizes the CDC's Youth Risk and Behavior Surveillance System, in which a questionnaire is administered to high school and middle school students in an effort to assess risk factors and behaviors in the United States.<sup>9,13</sup> This survey has been used to monitor trends in some of the leading causes of death in adolescents in the United States, including behaviors that contribute to unintentional injuries, alcohol, drug and tobacco use, diet, and physical activity.<sup>8</sup> A similar study gathering information about adolescents has also been conducted as a single data set in countries like India.<sup>10</sup> Based on these precedents, modeling a survey on the CDC's established and validated survey system and aligning it with the culture and lifestyle of rural Nepal was thought to be a reasonable approach to assessing health risk behaviors in rural Nepal.

Once the survey tool was developed it was translated into the Nepali language by a bilingual faculty member and back-translated into English by a another bilingual faculty unrelated to this study for accuracy. The survey and study design were approved by Internal Review Board of the Medical College of Wisconsin (USA) and the Internal Review Committee of Kathmandu University (Nepal).

Two researchers from the Medical College of Wisconsin coordinated with the Department of Community Programs at Dhulikhel Hospital and traveled to eight schools in central Nepal to administer the survey in the summer of 2016. Trained research assistants who spoke the local language served as translators at field sites. The survey was voluntary and offered to all students within the proper age range. Students were given the option to decline. Permission was obtained by communication between trained research assistants, principals, and parents.

Once collected, responses were coded and encrypted. Statistical analysis was performed at the Medical College of Wisconsin using R version 3.3.1.<sup>14</sup> Survey responses were summarized by the mean and standard deviation for continuous variables, and by frequency and percentage for categorical variables. Missing values were excluded from the analysis (listwise deletion)

Chi-squared tests and Fisher's exact tests were used to analyze nominal categorical variables. Continuous and ordered categorical variables were analyzed using the Wilcoxon rank-sum test. The Jonckheere-Terpstra trend test was used for comparisons of two ordinal variables.

## RESULTS

The study surveyed 643 females and 517 males ages 12-16 from 7 different locations. Most students identified with either the Tamang caste (26.9%) or the Bhramin caste (26.4%), while the majority religion was Hinduism (71.2%). Heads of families in these areas were most often employed in agriculture (75.1%), followed by daily wage labor (5.5%) and teaching (5.3%).

When asked how often they had gone hungry that month due to lack of food at home, 30.5% of students reported “sometimes” going hungry, another 25.8% reported going hungry “most of the time”, and 13.9% reported “always” going hungry. Most adolescents reported eating fruit one or more times per day (59.5%) and eating vegetables one or more times per day (71.4%). Consumption of meat is less frequent, as 71.5% of adolescents reported eating meat one day a week or less.

The majority of these adolescents perceived themselves to be about the right weight (57.8%); 25.9% thought they were “slightly” or “very” underweight, while 12.5% thought they were “slightly” or “very” overweight.

The majority of adolescents reported brushing their teeth one or more times a day (82.5%). The majority of adolescents reported always washing their hands after using the bathroom (84.7%), always washing their hands before eating (84.2%), and always using soap while washing their hands (69.8%). At school, 44.5% of students said that there is no place to wash their hands with soap and water and 12.5% said that there is no source of clean drinking water. In the home, 69.3% of students have access to tap water, 50.7% have a modern latrine, and 74.3% have a shower available.

Adolescents reported being injured most commonly while playing a sport (20.1%) and doing unpaid work (12.8%). A significantly greater percentage of male students were injured while playing or training for a sport (30.8%) compared to female students (11.8%;  $p < 0.001$ ); a significantly greater percentage of female students were injured while doing household work (17.7%) compared to male students (7.1%;  $p < 0.001$ ). Only 20.5% of students have previously been injured while crossing the street, but 11.7% reported riding a vehicle driven by someone who had consumed alcohol.

About a fifth of students said they had previously been in a physical fight (20.1%). A greater percentage of students reported carrying a weapon to protect themselves (5.9%) rather than carrying a weapon with an intent to harm (2.4%). Compared to female students, a significantly greater percentage of male students reported engaging in a physical fight (16.9% vs 24.5%;  $p = 0.002$ ).

Compared to students who did not report suicidal ideation, a significantly greater percentage students who reported suicidal ideation have also been in a physical fight, carried a weapon with the intent of harming someone, or carried a weapon for self-protection (Table 1).

When asked about happiness with themselves, 6.5% of students reported never being happy with who they are. Similarly, 6.5% of students experienced loneliness “always” or “most of the time”, and 8.3% reported having no close friends. When asked about suicidal ideation or attempt, 11.8% of students responded that they have thought about or attempted to commit suicide. Although 77.9% of students reported sleeping seven or more hours a night, 5.7% reported experiencing anxiety that caused insomnia always or most of the time in the past year.

**Table 1. Association of suicidal ideation or attempt with violence and substance use.**

Category	Response	Suicidal ideation or attempt (n = 141)	No suicidal ideation or attempt (n = 973)	p-value
Previously participated in a physical fight	Yes	30.9%	19.1%	0.002
	No	69.1%	80.9%	
Previously carried a weapon with intention of harming someone	Yes	6.8%	1.8%	0.003
	No	93.2%	98.2%	
Previously carried a weapon for protection	Yes	14.7%	5.1%	<0.001
	No	85.3%	94.9%	
Tried a cigarette	Yes	10.2%	4.7%	0.014
	No	89.8%	95.3%	
Tried other tobacco product	Yes	8.1%	2.0%	<0.001
	No	91.9%	98.0%	
Tried alcohol	Yes	23.8%	12.9%	0.002
	No	76.2%	87.1%	
Tried marijuana	Yes	8.7%	2.9%	0.002
	No	91.3%	97.1%	
Tried other illicit drugs	Yes	6.8%	1.9%	0.003
	No	93.2%	98.1%	

**Table 2.** Association of suicidal ideation or attempt with mental health.

Category	Response	Suicidal ideation or attempt (n = 141)	No suicidal ideation or attempt (n = 973)	p-value
Happy with who you are	All of the time	52.1%	65.7%	0.002
	Some of the time	39.3%	28.0%	
	None of the time	8.6%	6.3%	
Frequency of insomnia due to anxiety in past year	Never	42.9%	57.7%	<0.001
	Rarely	11.3%	8.1%	
	Sometimes	32.3%	29.3%	
	Most of the time	10.5%	4.2%	
	Always	3.0%	0.7%	
Frequency of loneliness in past year	Never	41.9%	59.5%	<0.001
	Rarely	11.8%	8.0%	
	Sometimes	31.6%	27.4%	
	Most of the time	9.6%	4.2%	
	Always	5.1%	0.9%	

**Table 3.** Association of mental health with happiness.

	Response	Happy all the time (n = 760)	Happy some of the time (n = 341)	Happy none of the time (n = 78)	p-value
Frequency of insomnia due to anxiety in last year	Never	63.5%	39.6%	48.6%	<0.001
	Rarely	7.8%	11.4%	5.4%	
	Sometimes	25.2%	38.4%	35.1%	
	Most of the time	2.9%	9.0%	8.1%	
	Always	0.5%	1.5%	2.7%	
Frequency of loneliness in past year	Never	63.5%	42.0%	58.7%	<0.001
	Rarely	7.4%	11.7%	5.3%	
	Sometimes	24.0%	36.9%	24.0%	
	Most of the time	4.0%	7.8%	6.7%	
	Always	1.1%	1.5%	5.3%	

A significantly greater percentage of female students reported losing sleep due to anxiety “always” or “most of the time” compared to male students (6.3% vs 5.2%;  $p < 0.001$ ). A significantly greater percentage of female students reported suicidal ideation or attempt compared to male students (14.5% vs 10.0%;  $p = 0.032$ ).

Compared to students who did not report suicidal ideation, a significantly greater percentage of students who reported suicidal ideation have also tried smoking, other tobacco products, alcohol, marijuana, and other illicit drugs (Table 1). Compared to students who did not report suicidal ideation, a significantly greater percentage of students who reported suicidal ideation also reported being happy “none of the time”, “always” experiencing anxiety that caused insomnia, and “always” feeling lonely (Table 2). Compared to students who reported being happy with themselves “all the time”, a significantly greater percentage of students who reported being happy with themselves “none of the time” also reported “always” experiencing anxiety that caused insomnia and “always” feeling lonely (Table 3).

Of the adolescents surveyed, 5.2% have tried a cigarette,

and 2.7% reported being eight years old or younger when they smoked for the first time. Similarly, 12.8% reported ever having a drink and 4.6% reported being eight years old or younger when they first had a drink. When asked about drug use, 3.3% of adolescents reported trying marijuana and 2.3% reported trying other illicit drugs.

A significantly greater percentage of male students have tried a cigarette compared to female students (8.4% vs 2.4%;  $p < 0.001$ ). Similarly, compared to females a significantly greater percentage of male students have tried other tobacco products (1.5% vs 3.8%,  $p < 0.019$ ) and alcohol (9.8% vs 20.3%;  $p < 0.001$ ).

When asked what hygienic products they use during their period, 34.7% of female students reported using pads while another 34.7% reported using both pads and cloth. Many female students (40.1%) reported missing at least one day of school in the last three months due to menstruation. The most common reason for missing school was worrying they would get blood on school clothes (16.9%) but 5.6% of female students cited a lack of privacy in the bathroom and 3.5% of female students cited a lack of place to wash

as reasons for missing school. Regarding hygiene during their period, 56.1% of female students reported bathing daily, 17.1% reported bathing once in 4 or 5 days, and 2.2% reported bathing once in 7 days.

## DISCUSSION

The survey identified some positive aspects of health that point to advances in the well-being of this population. The ratio of females to males ages 10-19 counted in a 2011 national census was 1.00.<sup>2</sup> In comparison, the ratio of females to males ages 12-16 in school in this study was 1.24, which may be taken as a positive indication of female literacy in this area. Motor vehicle accidents were a less common cause of injury in this rural area, which is expected to be lower than national data reporting that road traffic accidents cause 28.75% of all injuries and comprise the highest proportion of all categories.<sup>15</sup> In the surveyed population, most injuries occurred while playing sports or doing household work. A diet of more fruits and vegetables and less meat consumption is expected of rural village life, and most adolescents reported eating fruit and vegetables at least once a day. Obesity is not a prevailing perception issue in this area, as most adolescents perceived themselves to be about the right weight. This is consistent with obesity rates nationally as only 6.7% of students across Nepal were found to be overweight.<sup>7</sup>

The survey results also identified several areas for improvement. Although fruits and vegetables are common in the diet, the number of adolescents who reported going hungry some, most, or all of the time reveals a need for better food access. Poverty is likely a contributing factor to inadequate food access because 25.2% of the nation lives in poverty.<sup>16</sup> Poverty and malnutrition are well recognized determinants of future health issues and need to be addressed on a systematic level.

Infrastructure is another area for improvement. The surveyed adolescents reported high rates of brushing teeth and washing hands; this correlates with national data showing that only 4.2% of adolescents never or rarely wash hands before eating and only 4.8% never or rarely wash hands after using the toilet.<sup>7</sup> Good hygienic behavioral outcomes in the studied could potentially be due to the efficacy of previous community hand-washing education programs implemented at these schools. One concern is that some schools may lack infrastructure to encourage good hygienic behaviors, such as availability of a place to wash hands with soap and water. The percentage of students who reported previously engaging in a physical fight (20.9%) was fairly high but it was less than the 39.3% of adolescents nationally who reported engaged in a physical fight in the previous year.<sup>7</sup> This data, though is comparable to similar regions in countries like Indonesia and Thailand.<sup>17,18</sup> The rate of weapon-carrying was much lower than the rate of physical fighting, and more students

reported carried a weapon for self-protection rather than with violent intent. A significantly greater percentage of male students reported engaging in a physical fight compared to female students, which is consistent with physical violence trends in other countries Indonesia and Thailand.<sup>17,18</sup> The higher prevalence of physical violence in males should be taken into account when targeting future interventions. In addition, the data shows an association between physical violence and mental health. Compared to students who did not report suicidal ideation, a significantly greater percentage of students who reported suicidal ideation also reported having been in a physical fight, carrying a weapon with the intent to harm, or carrying a weapon for self-protection. This suggests that interventions addressing physical violence may be more effective if they also address mental health issues.

Even considered separately from the potential link to violence, mental health has been identified as a significant area for improvement. The percentage of students who reported experiencing frequent loneliness is similar to the national data finding of 6.6%.<sup>7</sup> However, the percentage of students who reported frequent insomnia due to anxiety in this study was greater than the national data finding of 4.6%, and this study identified significant gender differences in the occurrence of insomnia due to anxiety that were not seen in the national data.<sup>7</sup> The percentage of students who endorsed suicidal ideation or attempt was comparable to the national data finding, which reported that 13.9% of adolescents endorsed suicidal ideation and 10.7% had attempted suicide in the last year; however, this study identified significant gender differences in reported suicidal ideation or attempt that were not seen in the national data.<sup>7</sup> The prevalence of mental health issues in this population is concerning and must be addressed to prevent negative consequences and similar issues later in life. Although more data is needed to pinpoint the specific causes of mental health issues, many of the mental health outcomes appear to be linked. Mental health outcomes such as insomnia due to anxiety and loneliness differed significantly depending on whether students reported being happy with themselves; outcomes such as happiness with themselves, insomnia due to anxiety, and loneliness also differed significantly depending on whether students reported suicidal ideation or attempt. Further research is warranted to identify factors contributing to mental health issues using the outcomes listed above.

There may also be an association between mental health and substance use, as has been seen in previous research studies; one particular study found that the lifetime and 12 month prevalence of major depressive disorder in patients who were undergoing treatment for an alcohol use disorder was 45% and 36% respectively.<sup>19</sup> Of the students who reported suicidal ideation, many have also tried alcohol, marijuana, other illicit drugs, smoking, and other tobacco products; these values are significantly higher when compared to students who did not report suicidal ideation.

The prevalence of smoking and alcohol use in this population is fairly low as expected, as the use of tobacco among youths has been found to be lower in rural areas compared to urban areas.<sup>20</sup> However, those who try smoking and alcohol in the sampled population appear to start early, so educational interventions in early school years could be valuable. Compared to female students, a significantly greater percentage of male students reported ever trying a cigarette, other tobacco products, or alcohol; this gender difference is similar to the trend in national data, where a significantly greater percentage of male students reported consuming alcohol or smoking within the last month compared to female students.<sup>7</sup> Early intervention and gender differences should be taken into account when focusing future interventions.

Menstrual hygiene in this rural area also shows need for improvement due to the high percentage of female students who reported missing at least one day of school in the last three months due to menstruation. This was predominantly due to concern that they would get blood on their school clothes. Improving access to hygienic products or improving school facilities for female students may reduce any negative impact of menstruation on girls' education. Menstrual hygiene is an important issue across all of Southeast Asia; in India, one in four girls missed one or more school days during menstruation due to reasons such as physical discomfort or pain, lack of water, hygiene and disposal facilities in school toilets, fear of staining their clothes, and restrictions imposed by relatives or teachers.<sup>21</sup>

In addition to the listed implications for future interventions, analyzing previous program implementation in Nepal provides insight into successful tactics. A study aiming to improve sanitation in Nepal has shown that providing resources and education improves efficacy more than providing resources alone.<sup>22</sup> For example, a program that taught mothers about agriculture and livestock to improve child nutrition gained success by grounding interventions in the development of social capital and increasing empowerment.<sup>23</sup> Additionally, tailoring programs specifically to the resources that the community has contributed to long-term viability. One

study demonstrated this by analyzing programs in health-promoting schools and found that the efficacy of school health interventions depended on an understanding of school resources, organizational capacity, and culture; health interventions that were tailored to these three areas were more successful.<sup>24</sup> These two studies demonstrate important considerations in program design.

There are several limitations to this study. The greatest limitation is that as a survey-based study, the validity and consistency of data depends on students' responses and the assumption that all students were able to understand the questions correctly. Additionally, there is some missing data due to unanswered questions. There are also limitations inherent to cross-cultural research. While the survey was translated, back-translated, and adapted to fit Nepali culture, it is still possible that certain aspects of the survey were not properly conveyed. The trained research assistants administered the survey and described the purpose at each school, but it is possible that the message may not have been well understood.

## CONCLUSION

Adolescence is a crucial time that affects health and behavior in adulthood. This survey identified specific areas for improvement across multiple domains of health for students attending schools of Dhulikhel Hospital's catchment area in central Nepal. In the future, this data can be used to create targeted interventions through school or community health programs, and will be a framework to measure the success of such interventions. This data also provides direction for more specific research efforts to determine the underlying causes of these health concerns.

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