1-2013

Self - inflicted Serious Injuries among Adolescents in Zambia

Adamson S. Muula
University of Malawi, amuula@medcol.mw

Seter Siziya
University of Zambia, ssiziya@gmail.com

Emmanuel Rudatsikira
Andrews University, rudatsikira@andrews.edu

Tanzania Journal of Health Research
Volume 15, Number 1, January 2013
Doi: http://dx.doi.org/10.4314/thrb.v15i1.7

Self-inflicted serious injuries among adolescents in Zambia

ADAMSON S. MUULA[*1], SETER SIZIYA[2] and EMMANUEL RUDATSIKIRA[3]
[1] *Department of Community Health, University of Malawi, College of Medicine, Blantyre, Malawi*
[2]*Department of Public Health, University of Zambia, School of Medicine, Lusaka, Zambia*
[3] *School of Community and Environmental Health, Old Dominion University, Virginia, United States of America*

Abstract: Injuries are a growing cause of morbidity and mortality in the world. Data from Southern Africa are limited, possibly because of limited research prioritization of the issue and pre-occupation with communicable diseases. This study was conducted to estimate the prevalence of, and assess factors associated with, self-inflicted serious injuries among in-school adolescents in Zambia. We used data collected from the 2004 Zambia Global School-Based Health Survey to estimate prevalence of self-inflicted serious injury within the past 12 months. Logistic regression analysis was conducted to assess the association between selected predictor variables and reported history of having seriously injured oneself. Out of 2,136 adolescents who participated in the Zambia 2004 Global School-based Student Health Survey, 927 (43.4%) reported seriously injuring themselves. Of these who reported injuries, 110 (11.9%) reported seriously injuring themselves on purpose. The following variables were associated with history of self inflicted injury: worry; sadness; suicidal behaviour; history of ever having been drunk and marijuana use. Reported history of injury and self-inflicted injury among in-school adolescents in Zambia are common. History of self-inflicted injury was associated with other lifestyle and psychological concerns among the study participants.

Keywords: Adolescent health, injury, self-inflicted injury, Zambia

Introduction

Injuries from diverse causes are an important global public health problem. These primarily affect young adults, and often result in severe, disabling consequences. In 2001, injuries alone accounted for 16% of the adult burden of ill-health and premature death worldwide. Of special and growing concern is the burden from road traffic accidents in the developing countries of sub-Saharan Africa and South and Southeast Asia (Lopez *et al.*, 2002; Lopez and Mathers; 2006; Mathers & Loncar, 2006). Intentional injuries, which include self-inflicted injuries account for an increasing share of the injury disease burden, especially among economically productive young adults. In high income countries, suicides account for the largest share of the intentional injury burden; in low income nations interpersonal violence and war are the major sources (Lopez *et al*., 2002, 2006; Lopez and Mathers, 2006; Mathers *et al*., 2009).

Self-inflicted injuries in various forms (firearm, burns, hanging) exact an enormous personal and societal cost (Mzezewa *et al.*, 1999). Although there is growing interest in research on self inflicted injuries, use of health services by individuals who harm themselves, the economic and social impact of self-harm and risk factors, many of the published reports are from developed nations (Lopez *et al.*, 2002, 2006; Lopez and Mathers, 2006; Mathers *et al*., 2009). There is paucity of data on non-fatal self-inflicted injuries among adolescents in Zambia.

An estimated 372,722 patients were treated in hospital emergency departments (EDs) for intentional, nonfatal self-inflicted injuries in the United States in 2005 (CDC, 2005). Intentional self-inflicted injuries are particularly common among adolescents and young adults (CDC, 2002). A study

[*] Correspondence: Adamson S. Muula; E-mail: amuula@medcol.mw

Doi: http://dx.doi.org/10.4314/thrb.v15i1.7

of eight states in the United States reported an annual rate of 259 emergency department evaluations for deliberate self-harm per 100, 000 population aged 15 to 19 years (Brent *et al*., 1993). Prospective longitudinal and observational studies with young people have shown that deliberate self-harm is an important risk factor for subsequent suicide (Shaffer *et al*., 1996; Spicer & Miller, 2000; Reith *et al*., 2003). Doshi *et al.* (2005) have suggested that adolescents may be particularly vulnerable to self inflicted harm as they may be confronted with issues in which they experience feelings of stress, self-doubt, pressure to succeed, and role confusion coupled with limited resources to deal with these issues. In some teenagers with other predisposing risk factors, such as depression and substance abuse, these fears and stresses may lead to suicide attempts.

In order to contribute to the literature on self-inflicted serious injuries, we conducted an analysis of the 2004 Zambia Global School-Based Health Survey (GSHS) to estimate the 12 months prevalence of the outcome. We also assessed the association between a list of predictor variables and self reported history of injury among in-school adolescents.

Materials and Methods

Study design and participant recruitment in the GSHS

The current study involved secondary analysis of data from the Zambia Global School-Based Health Survey (GSHS) conducted in 2004. A comprehensive description of the GSHS has been described elsewhere (Granero *et al.*, 2005; Siziya *et al*., 2007). The GSHS was developed by the World Health Organization (WHO) in collaboration with UNICEF, UNESCO, and UNAIDS with technical assistance from the Centers for Diseases Control and Prevention (CDC), Atlanta, Georgia, United States. The main purpose of the GSHS is to provide data on health and social behaviours primarily among in-school adolescents aged 13-15 years.

The GSHS uses a two-stage probability sampling technique. In the first stage of sampling, primary sampling units are schools that are selected with a probability proportional to their student enrolment size. In the Zambia survey, 50 out of 4621 government schools were selected from all the nine administrative provinces. However, only 47 (94%) schools participated in the survey. In the second step of the sampling, a sample of classes in the selected school was obtained. All students in the selected classes are eligible to participate. Most of the children of age 13-15 years are in Grades 7-9 in Zambia. However all children in Grades 7-10 were requested to participate in the study. Out of 3021 adolescents who were in the eligible grades, 2257 participated in the survey, giving a response rate of 75%. There was no replacement for eligible students who failed to participate in the study. Data from only 2136 participants were complete to be usable for analysis in this report.

Questionnaire administration

A standard GSHS questionnaire with core questions (the same for country to country) was anonymously completed by the students. Completion of questionnaires occurred within one class period, and 12 trained research assistants supervised the process. To maintain confidentiality, students were advised not to report any personal identifiers such as names.

Primary and secondary education in Zambia

The Zambia education system consists of 7 years primary education (Grades 1 to 7), 2 years of junior secondary education (Grades 8 and 9), and senior secondary school (Grades 10 to 12). The official age at which children are enrolled into primary schools is 7 years but some children are enrolled when they are below this age. In 2002, 85% of boys and 78% of girls were enrolled at primary level (Ministry of Education, 2002 Education Statistical Bulletin. Directorate of Planning and Information,

Doi: http://dx.doi.org/10.4314/thrb.v15i1.7

unpublished). Out of 4,558 primary schools in Zambia in 2002, 94% were government schools, 5% private schools, 1 % government assisted schools, and the rest were other types of schools. The number of secondary schools in the same year was 335. The percentages for boys and girls enrolled in secondary schools were 15% and 11%, respectively of the age-eligible population (Ministry of Education, 2003).

Data analysis

The outcome variable for the current analysis was whether the adolescent had been seriously injured as a result of a self-inflicted incident. The following questions were asked: During the past 12 months, how many times were you seriously injured? During the past 12 months, how did the most serious injury happen to you?. Predictor variables assessed were: marijuana (dagga) smoking; gender, having ever been drunk; having felt lonely; having felt sad; having considered committing suicide. Some of the questions asked were: During your life, how many times have you used dagga or marijuana? During your life, how many times did you drink so much alcohol that you were really drunk?

Data analysis was performed using SPSS version 14.0 software. A weighting factor was used in the analysis to reflect the likelihood of sampling each student and to reduce bias by compensating for differing patterns of non-response. We obtained frequencies as estimation of prevalence. We conducted logistic regression analysis using a backward variable selection procedure to estimate associations between relevant predictor variables and sexual intercourse within the last 12 months. Statistical tests used to determine associations in bivariate analysis were the Chi-square test or the Yates' corrected Chi-square test. Odds ratios were used to estimate magnitudes of associations in multivariate analysis.

Ethical considerations

For the Zambia Global School Based Health Survey, ethical review and permission to conduct the survey was obtained from both the Ministry of Health and Education. Students invited to participate in the study were informed that they were free not to participate and that they were free not to answer any questions on the questionnaire. Study participants self-completed the questionnaire without any personal identifiers. At each of study sites, the head teacher provided permission for data collection. For this study, we obtained de-identified data from the World Health Organization for our analysis.

Results

Out of 2,136 adolescents who participated in the Zambia 2004 Global School-based Student Health Survey, 927 (43.4%) reported seriously injuring themselves. Of these, 110 (11.9%) reported seriously injuring themselves on purpose. Table 1 shows results from bivariate analyses for the factors that were associated with purposively self inflicted serious injuries. All the factors in table 1 were significantly ($P<0.001$) associated with self inflicted serious injury on purpose.

All the factors in Table 1 were considered in a multivariate analysis, and the results are shown in Table 2. Female respondents were 21% (95% CI 1.19, 1.23) more likely to seriously injure themselves on purpose compared to males. Compared to adolescents of age $\leq$ 13 years, those of age 14 years and 16+ years were 71% (95% CI 1.65, 1.77) more likely and 48% (OR=0.52, 95% CI 0.51, 0.54) less likely to injure themselves, respectively. Compared to persons who never felt lonely, those that rarely (OR=0.69, 95% CI 0.66, 0.73) and sometimes (OR=0.81, 95% CI 0.78, 0.84) felt lonely were less likely to injure themselves on purpose. However persons who most of the time (OR=1.05, 95% CI 1.00, 1.09) or

Doi: http://dx.doi.org/10.4314/thrb.v15i1.7

always (OR=2.39, 95% CI 2.28, 2.51) felt lonely were more likely to injure themselves compared to those that never felt lonely. Respondents who always were so worried that they could not sleep at night were 72% (95% CI 1.64, 1.80) more likely to injure themselves compared to those that were never worried. Feeling so sad or hopeless was positively associated with injuring oneself on purpose (OR=1.14, 95% CI 1.12, 1.16). Respondents who seriously considered attempting suicide were 4% (95% CI 1.01, 1.06) more likely to injure themselves compared to those that had no such attempts.

Table 1: Associated factors of self-inflicted injury among adolescents in Zambia, 2004

Factor	Response	Total seriously injured oneself*	Seriously injured one-self on purpose (%)**
Age	13	160	23 (14.4)
	14	164	26 (15.9)
	15	237	30 (12.7)
	16+	333	25 (7.5)
Sex	Male	462	44 (47.6)
	Female	435	61 (52.4)
No. of times felt lonely in past 12 months	Never	259	23 (8.9)
	Rarely	110	12 (10.9)
	Sometimes	360	38 (10.6)
	Most of the times	110	21 (19.1)
	Always	58	13 (22.4)
No. of times been so worried that failed to sleep at night	Never	269	25 (9.3)
	Rarely	103	16 (15.5)
	Sometimes	323	33 (10.2)
	Most of the times	131	19 (14.5)
	Always	76	13 17.1)
Felt sad or hopeless in the past 12 months	No	440	45 (10.2)
	Yes	449	58 (12.9)
Seriously considered attempting suicide in past 12 months	No	614	65 (10.6)
	Yes	263	35 (13.3)
Number of times had got drunk in lifetime	0	533	48 (9.0)
	1 to 2	192	29 (15.1)
	3 to 9	84	16 (19.0)
	10 or more	58	6 (10.3)
No. of time have used marijuana	0	623	54 (8.7)
	1 to 2	148	26 (17.6)
	3 to 9	64	11(17.2)
	10 or more	47	11 (23.4)

*number of study participants who reported having injured oneself (not necessarily intentional)
** reported those who injured themselves intentionally among those reported self injury

While respondents who had got drunk 10+ times in lifetime were less likely to injure themselves on purpose (OR=0.60, 95% CI0.75, 0.85), those that had got drunk for less than 10 times were more likely to injure themselves (OR=1.13, 95% CI 1.09, 1.18 for 1-2 times, and OR=1.22, 95% CI 1.16, 1.28 for 3-9 times). The likelihood of injuring oneself on purpose increased with the number of times the respondents used dagga. Compared to respondents who had never used dagga, those who had used dagga 10+ times were 34% (95% CI 1.26, 1.42) more likely to injure themselves on purpose.

Doi: http://dx.doi.org/10.4314/thrb.v15i1.7

Table 2: Associations of selected variables and seriously injuring oneself on purpose in multivariate analysis, adjusted for age and sex

Factor	Response	AOR (95% CI)
Number of times felt lonely in the past 12 months	Never	1
	Rarely	0.69 (0.66, 0.73)
	Sometimes	0.81 (0.78, 0.84)
	Most of the time	1.05 (1.00, 1.09)
	Always	2.39 (2.28, 2.51)
Number of times been so worried that could not sleep at night	Never	1
	Rarely	0.48 (0.45, 0.51)
	Sometimes	1.01 (0.98, 1.05)
	Most of the time	0.81 (0.78, 0.85)
	Always	1.72 (1.64, 1.80)
Felt so sad or hopeless in the past 12 months	No	1
	Yes	1.14 (1.12, 1.16)
Seriously considered attempting suicide in the past 12 months	No	1
	Yes	1.04 (1.01, 1.06)
Number of times had got drunk in lifetime	0	1
	1-2	1.13 (1.09, 1.18)
	3-9	1.22 (1.16, 1.28)
	10+	0.80 (0.75, 0.85)
Number of times used dagga in lifetime	0	1
	1-2	1.15 (1.11, 1.19)
	3-9	1.16 (1.10, 1.22)
	10+	1.34 (1.26, 1.42)

Discussion

We have reported a study of in-school adolescents in Zambia who reported having seriously injured oneself in the past 12 months. Of the students who had injured themselves seriously, 11.9% reported having done so on purpose. We have also found that the following variables or personal characteristics were positively associated with having hurt oneself intentionally: having been lonely most of the times or always; having been worried always; having felt sad or hopeless in past 12 months; lifetime drunkenness and having used dagga or marijuana.

In bivariate analyses, among participants who had injured themselves, females, younger study participants and those reporting higher levels of sadness, loneliness, substance use and worry were more likely to have done so on purpose. The results of multivariable logistic regression analysis show similar findings. Previous research findings in the United States have shown that females were more likely to present for emergency medical care following intentional self harm. Marbella *et al*. (2005) has reported that females aged 12-17 years had twice as many medication-related injuries as male. In a 2000 study reported by Levine *et al*, (2005), an estimated 32, 655 adolescents aged 10 to 19 years were admitted to a medical hospital in the United States after a suicide attempt. Of these 70.3% were females. The differences in rates between males and females could be an indication of how the two sexes differ in dealing with life stressors.

We found that psychological problems (loneliness, sadness or hopelessness and drunkenness) were associated with having intentionally harmed oneself. Vajani *et al*. (2007) have reported that psychological problems including substance use were associated with self-inflicted harm among children aged 10 to 14 years in the United States. Olfson *et al.* (2005) have reported that

Doi: http://dx.doi.org/10.4314/thrb.v15i1.7

mental disorders were diagnosed in roughly one half of emergency department visits by young people following an episode of deliberate self-harm.

While the risk factors associated with self-harm are identified, it is also important to reflect on predicted protective factors that have been previously reported in the literature. Einsenberg *et al.* (2007) have reported that family connectedness, teacher caring, other adult caring, and school safety are associated with lower likelihood of self harm among adolescents. Researchers, public health personnel and school administrators and parents may therefore wish to explore and encourage these attributes within society which may prevent adolescents harming themselves.

In a study of suicides among young people, Fortune *et al.* (2007) reported that suicides may occur following longstanding difficulties which spanned the developmental domains of home, school and peers. In such cases, the suicidal process was longstanding, and included deliberate self-harm prior to their death and direct communication to friends and family about suicidal ideas and plans. Another group of cases was characterized by evidence of an established psychiatric disorder. Two subgroups were identified, namely those individuals with a protracted suicidal process. A final group comprised those with a brief suicidal process. We believe many of study participants in our study who reported self-inflicted injury may fall in any of the above groups too: i.e. long standing difficulties within the developmental domain, psychiatric diagnoses and brief periods of stressful life-events.

Although we have suggested that many adolescents may suffer significant psychological stresses, we are unaware of any concerted programmes aimed to specifically identify and provide mental health care to in-school adolescents in Zambia. We propose consideration by the Ministries of Health and Education for such services.

Our study has several limitations. Firstly, eligible study participants were only those adolescents who were enrolled in schools. Our findings may therefore not be applicable to out of school adolescents in Zambia. Secondly, only students who were present in school on the day the survey was administered at a particular school were surveyed. No effort was made to follow-up on absent students. To the extent that out of school adolescents may be different in their behaviours and experiences, our findings may not be applicable to them. Furthermore, due to the cross sectional nature of the survey, it is not possible to assign causation to the factors that are associated with physical fighting. The GSHS asks students to report on sensitive personal information and study participants may intentionally provide inaccurate information. Furthermore, as this study aimed to assess self reported incident, inevitably we report only non-fatal incidents. The prevalence of overall self-inflicted injury among adolescents may therefore be higher than has been reported here if there had been completed suicides within the past 12 months preceding the survey.

Although few evaluated prevention programmes have focused on adolescents in the region, promising strategies exist, such as better identification and treatment of clinical psychological factors and increased social support for persons at risk (Corso *et al.*, 2007). The findings in this study illustrate the need for primary prevention measures that focus on the adolescent population.

Author contributions

ASM contributed to the interpretation of findings, led the drafting of manuscript and is the guarantor of the paper. SS conducted the data analysis, participated in the interpretation of findings and contributed to the drafting of manuscript. ER participated in the interpretation of findings and contributed to the drafting of manuscript

Doi: http://dx.doi.org/10.4314/thrb.v15i1.7

Acknowledgements

The authors extend their gratitude to the World Health Organization (Geneva) for making the data from the Zambia Global Health Survey available for analysis. The World Health Organization however had no input in the analysis, interpretation and drafting of the manuscript. We also thank all the students who participated in the survey.

References

Brent, D.A., Perper, J.A., Moritz, G., Allman, C., Friend, A., Roth, C., Schweers, J., Balach,
L. & Baugher, M. (1993) Psychiatric risk factors for adolescent suicide: a case-control study. *Journal of the American Academy of Child and Adolescent Psychiatry* 32, 521-529.

CDC (2002) Non-fatal self-inflicted injuries treated in hospital emergency departments---United States, 2000. *Morbidity Mortality Weekly Reports* 51, 436--438.

CDC (2005) Nonfatal self-inflicted injuries among adults aged > or = 65 years--United States. *Morbidity Mortality Weekly Reports* 56, 989-93.

Corso, P.S., Mercy, J.A., Simon, T.R., Finkelstein, E.A. & Miller, T.R. (2007) Medical costs and productivity losses due to interpersonal and self-directed violence in the United States. *American Journal of Preventive Medicine* 32, 474-482.

Doshi ,A., Boudreaux, E.D., Wang, N., Pelletier, A.J. & Camargo, C.A. Jr. (2005) National study of US emergency department visits for attempted suicide and self-inflicted injury, 1997-2001. *Annals of Emergency Medicine* 46, 369-375.

Eisenberg, M.E., Ackard, D.M. & Resnick, M.D. (2007) Protective factors and suicide risk in adolescents with a history of sexual abuse. *Journal of Pediatrics* 151, 482-487.

Fortune, S., Stewart, A., Yadav,V. & Hawton, K. (2007) Suicide in adolescents: using life charts to understand the suicidal process. *Journal of Affective Disorders* 100, 199-210.

Granero, R., Poni, E.S. & Sánchez, Z. (2007) Sexuality among 7th, 8th and 9th grade students in the state of Lara, Venezuela. The Global School Health Survey, 2003-2004. *Puerto Rico Health Sciences Journal* 26, 213-219.

Levine, L.J., Schwarz, D.F., Argon, J., Mandell, D.S. & Feudtner, C. (2005) Discharge disposition of adolescents admitted to medical hospitals after attempting suicide. *Archives of Pediatric and Adolescent Medicine* 159, 860-866.

Lopez, A.D. & Mathers, C.D. (2006) Measuring the global burden of disease and epidemiological transitions: 2002-2030. *Annals of Tropical Medicine and Parasitology* 100, 481-499.

Lopez, A.D., Mathers, C.D., Ezzati, M., Jamison, D.T. & Murray, C.J.L. (2006) Measuring the global burden of disease and risk factors. Global Burden of Disease and Risk Factors. Washington (DC): World Bank.

Lopez, A.D., Mathers, C.D., Ezzati, M., Jamison, D.T. & Murray, C.J. (2006) Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet* 367, 17470-174757.

Marbella, A.M., Yang, H., Guse, C.E., Meurer, J.R. & Layde, P.M. (2005) Adolescent hospital discharges associated with self-poisonings in Wisconsin, 2000-2002. *Wisconsin Medical Journal* 104, 59-64.

Mathers, C.D., Boerma, T. & Ma, Fat, D. (2009) Global and regional causes of death. *British Medical Bull*etin 9, 7-32.

Mathers, C.D. & Loncar D. (2006) Projections of global mortality and burden of disease from 2002 to 2030. *Plos Medicine* 3, e422

Doi: http://dx.doi.org/10.4314/thrb.v15i1.7

Ministry of Education (2003) Strategic Plan 2003-2007. Republic of Zambia, Lusaka, Zambia.

Mzezewa, S., Jonsson, K., Aberg, M. & Salemark, L. (1999) A prospective study on the epidemiology of burns in patients admitted to the Harare burn units. *Burns* 25, 499-504.

Olfson, M., Gameroff, M.J., Marcus, S.C., Greenberg, T. & Shaffer, D. (2005) Emergency treatment of young people following deliberate self-harm. *Archives of General Psychiatry* 62, 1122-1128.

Reith, D.M., Whyte, I., Carter, G. & McPherson, M. (2003) Adolescent self-poisoning: a cohort study of subsequent suicide and premature deaths. *Crisis* 24, 79-84.

Shaffer, D., Gould, M.S., Fisher, P., Trautman, P., Moreau, D., Kleinman, M. & Flory, M. (1996) Psychiatric diagnosis in child and adolescent suicide. *Archives of General Psychiatry* 5, 339-348.

Siziya, S., Muula, A.S. & Rudatsikira, E. (2007) Prevalence and correlates of truancy among adolescents in Swaziland: findings from the Global School-Based Health Survey. *Child Adolescent Psychiatry and Mental Health* 1, 15.

Spicer, RS. & Miller, T.R. (2000) Suicide acts in 8 states: incidence and case fatality rates by demographics and method. *American Journal of Public Health* 90, 1885-1891.

Vajani, M., Annest, J.L., Crosby, A.E., Alexander, J.D. & Millet, L.M. (2007) Nonfatal and fatal self-harm injuries among children aged 10-14 years--United States and Oregon, 2001-2003. *Suicide and Life Threatening Behaviour* 37, 493-506.