

Adolescent mortality in South Africa: An analysis of unnatural causes of deaths by sex, 2000-2009

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Abstract

Despite South Africa being a peaceful democracy for the past 18 years, mortality due to unnatural and violent causes still occur among the youth, who are aged between 15 and 34 years old (Presidency of the Republic of South Africa 2009). However, this is not specific to South Africa; with developed countries experiencing the same trend. In developed countries, Christoffel (1994) found that death due to unnatural causes, specifically related to violence, had increased especially among the youth. South Africa is now moving towards the same transition that is currently experienced by developed nations in the world: violent deaths as a major cause of death amongst the youth which includes some adolescents (10-19 years old) (Norman, et al, 2007). With this in mind, this paper aims to examine the different levels of male and female adolescent mortality due to five unnatural causes of death. Data from South African Death Notification Forms is analysed for the years 2000-2009. Cause-specific mortality rates and proportional mortality ratios are produced. Results show adolescents are dying from events of undetermined intent, transport accidents' and self-harm, especially males. The selected causes of death are contributing up to 27% of all adolescent male mortality and almost 12% of all female mortality in 2009. The results of this paper allude to crime, violence and safety issues in South Africa.

Keywords: adolescents, mortality, South Africa, unnatural causes of death; cause-specific mortality rates, proportional mortality ratios

Résumé

En dépit de l'Afrique du Sud étant une démocratie paisible pendant les 18 dernières années, la mortalité due aux causes artificielles et violentes se produisent toujours parmi la jeunesse, qui sont vieilles entre 15 et 34 années (présidence de la République sud-africaine 2009). des taux Causeur-spécifiques de mortalité et les rapports proportionnels de mortalité sont produits. Les adolescents d'exposition de résultats meurent des événements de l'intention, des accidents de transport' et du mal indéterminés d'individu, particulièrement mâles. Les causes choisies de la mort contribuent jusqu'à 27% de toute la mortalité masculine adolescente et presque 12% de toute la mortalité femelle en 2009. Les résultats de cet article font référence aux questions de crime, de violence et de sûreté en Afrique du Sud. Cependant, ce n'est pas spécifique en Afrique du Sud ; avec les pays développés éprouvant la même tendance. Dans les pays développés, Christoffel (1994) a trouvé cette mort due aux causes artificielles, spécifiquement liées à la violence, avait augmenté particulièrement parmi la jeunesse. L'Afrique du Sud se déplace maintenant vers la même transition qui est actuellement éprouvée par des nations développées dans le monde : les décès violentes comme cause importante de la mort parmi la jeunesse qui inclut quelques années des adolescents (10 - 19) (Normands, et autres, 2007). À cet effet, cet article vise à examiner les différents niveaux de la mortalité adolescente masculine et femelle due à 5 causes artificielles de la mort. Des données des formes sud-africaines d'avis de la mort sont analysées les années 2000 - 2009.

Mots-clés: adolescents, la mortalité, l'Afrique du Sud, des causes non naturelles de décès; les taux de mortalité par cause, les ratios de mortalité proportionnelle

Introduction

South Africa is notorious for violence and safety concerns. Urban areas are affected by issues of robberies, assaults and sexual violence (CSVR 2008; UNODC 2002). Mortality related to violent incidents is well-documented in the country

(Abrahams et al. 2010; MRC/UNISA 2008). The Medical Research Council (MRC) found that in 2007, violence accounted for 35.8% of all fatal injuries in the country and in certain national cities the percentage was even higher. For example in Cape Town, violence accounted for 46.9% of all fatal

injuries in the same year (MRC/UNISA 2008). It has been argued that adult males are most commonly the perpetrators of violent crime worldwide and South Africa is no exception. Masuku (2004) interviewed approximately 116 youth, aged 15- 25 years old, in South Africa and found that young adult males are most commonly the perpetrators of crimes such as armed robbery, theft and hijacking (Masuku 2004). With regard to victims of crime in South Africa, Altbeker (2008) found that 87% of homicide victims were male and 13% were female (Altbeker 2008). Further, South African females are most commonly the victims of sexual assaults, but suffer robberies and hijackings too (Jewkes & Abrahams 2002; Schönteich & Louw 2011; Seedat et al. 2009). Among children, Mathews et. al (2012) found that homicide, rape and neglect were the most common causes of violent deaths in South Africa (Mathews et al. 2012). In this study, it was likewise found that assault (homicide) is a leading cause of unnatural deaths among South African adolescents.

Pre-1994 South Africa was beset by violence and mortality due to the oppressive nature of the Apartheid regime (Harris 2001). Post- 1994, however, there remains a high prevalence of violence and death due to violence in the country (Seedat et al. 2009). However, this is not specific to South Africa; there have been a number of studies done in the United States of America and other developed countries with regard to this (Brismar & Bergman 1998; Christoffel 1994; Patton 2009; Roy et al. 2004). In all these studies a high prevalence of youth deaths due to unnatural causes, specifically related to violence and accidents, were found. South Africa is moving towards the same transition that is currently experienced by developed nations in the world: violent deaths as a major cause of death amongst the youth (Norman et al. 2007). In 2003 the Medical Research Council revealed that pedestrians accounted for the largest percentage (39.5%) of traffic-related deaths (MacKenzie et al. 2006). Estimates of death due to pedestrian injuries indicate that, during the period, 2001-2004 a ratio of 3.3 male deaths to one female was recorded (MacKenzie et al. 2006). Also Seedat et al (2009) found that the overall injury death rate of South Africans is 157.8 per 100,000 population, which is higher than the global average of approximately 86.9 per 100,000 (Seedat et al. 2009).

Globally adolescents and youth are acknowledged to be at higher risk of unnatural causes of death such as violence, accidents and suicides (Hawkins et al. 2000; Leon et al. 2006). South Africa is experiencing the same prevalent

causes of death, unnatural causes such as suicide or accidents, amongst the youth as is many developed countries (Norman et al. 2007). In a study conducted by the Medical Research Council (MRC) on the number of deaths amongst the youth in South Africa between 2000- 2008 found that the mortality rates increased during this period: in 2000 youth deaths between the ages of 14-19 years was 8,678 and in 2008 it was 9,890 (Reddy et al. 2010). This includes suicide, accidents and the use of firearms and it was found that in 2010 the percentage of attempted suicides among youth had increased to 32.7% (Reddy et al. 2010).

South Africa's youth comprises 37% of the total population of 50.5 million people (NYDA 2012). This large youth population are essential to the country's future growth and development making them a government priority (NYDA 2012). South African youth are defined as being between the ages of 10 – 34 years old. Within this broad age group, lie the adolescent population of 10- 19 year olds. The mortality of this particular faction of the youth population, are under-researched in South Africa, yet are of vital importance to the country. Adolescents will become economically active adults. Yet for now adolescents are a diverse group, because some are still wholly dependent on parents and care-givers (10-14 years old) while others are experiencing social and economic autonomy for the first time (15- 19 years old). It is during adolescence then, that negative lifestyle and behavioural practices (smoking, drug- abuse, violence, etc.) that will follow this cohort into adulthood is learned. Further, as the lifestyle and behavioural practices of males and females differ, as a result, so too does their mortality. With this in mind, this paper aims to examine the different levels of male and female adolescent mortality due to five specific unnatural or external causes of death.

Data and Methods

Data on causes of death from Death Notification Forms for 2000-2009 are here used (Stats SA, 2012). Adolescents, between the ages of 10 and 19 years old are studied. Both males and females have been included in the analysis. Unnatural causes of death include deaths due to injury, accident from external causes and exclude deaths from disease and pathology (natural causes). Unnatural causes of death have been selected from the frequency at which they have occurred on Death Notification Forms. The causes of death and variable descriptions are seen in Table 1.

Table 1: ICD- 10 codes for unnatural causes of death

Cause of Death	Definition
Events of undetermined intent	<ul style="list-style-type: none"> • Drowning and submersion, undetermined intent • Handgun discharge, undetermined intent • Rifle, shotgun and larger firearm discharge, undetermined intent • Other and unspecified firearm discharge, undetermined intent • Contact with explosive material, undetermined intent • Exposure to smoke, fire and flames, undetermined intent • Contact with steam, hot vapors and hot objects, undetermined intent • Contact with sharp object, undetermined intent • Contact with blunt object, undetermined intent • Falling, jumping or pushed from a high place, undetermined intent • Falling, lying or running before or into moving object, undetermined intent • Crashing of motor vehicle, undetermined intent • Other specified events, undetermined intent
Assault	<ul style="list-style-type: none"> • Assault by drowning and submersion • Assault by smoke, fire and flames including arson, cigarettes, and incendiary devices • Assault by firearm discharge • Assault by hanging, strangulation and suffocation • Assault with a sharp object • Assault by other and unspecified means
Transport Accidents	<ul style="list-style-type: none"> • Any accident involving a device designed primarily for or being used at the time primarily for, conveying persons or goods from one place to another.
Other external causes of accidental injury	<ul style="list-style-type: none"> • Slipping, tripping, stumbling and falls • Exposure to inanimate mechanical forces • Exposure to animate mechanical forces • Accidental non-transport drowning and submersion • Exposure to electric current, radiation and extreme ambient air temperature and pressure • Exposure to smoke, fire and flames • Contact with heat and hot substances • Exposure to forces of nature • Accidental exposure to other specified factors
Self- Harm	<ul style="list-style-type: none"> • Suicide • Intentional self-harm

Source:<http://www.icd10data.com/ICD10CM/Codes>

Apart from generating frequency distributions, cause-specific mortality rates are calculated for males and females separately. Cause-specific mortality rates show the number of deaths from each particular cause of death, per 10,000 populations at risk (Hinde 1998). The formula used for this is:

$$CSMR = \frac{{}_nD_x^i}{{}_nP_x} \times 10,000$$

Where ${}_nD_x^i$ is the number of deaths from a cause and ${}_nP_x$ is the total number of adolescents in the population.

Proportional Mortality Ratios (PMR) which specifies the contribution of each selected cause of death to overall mortality is used (Mallin et al. 1986). The ratios are expressed as percentages (%) and the formula used is as follows:

$$PMR = \frac{{}_nD_x^i \times 100}{{}_nD_x}$$

Where ${}_nD_x^i$ is the number of deaths from a particular cause and ${}_nD_x$ is the total number of deaths from all causes.

Results

Figure 1 shows the percentage distribution of adolescent deaths from unnatural causes by sex and year. The graph shows that overall male and female deaths from unnatural causes have remained over 15% consistently throughout the period. Further, from 2002 to 2005, the percentage of female deaths outnumbered the percentage of male deaths from these causes. However, in 2008-2009 it is seen that there is a marginally higher percentage of adolescent male deaths compared to female deaths.

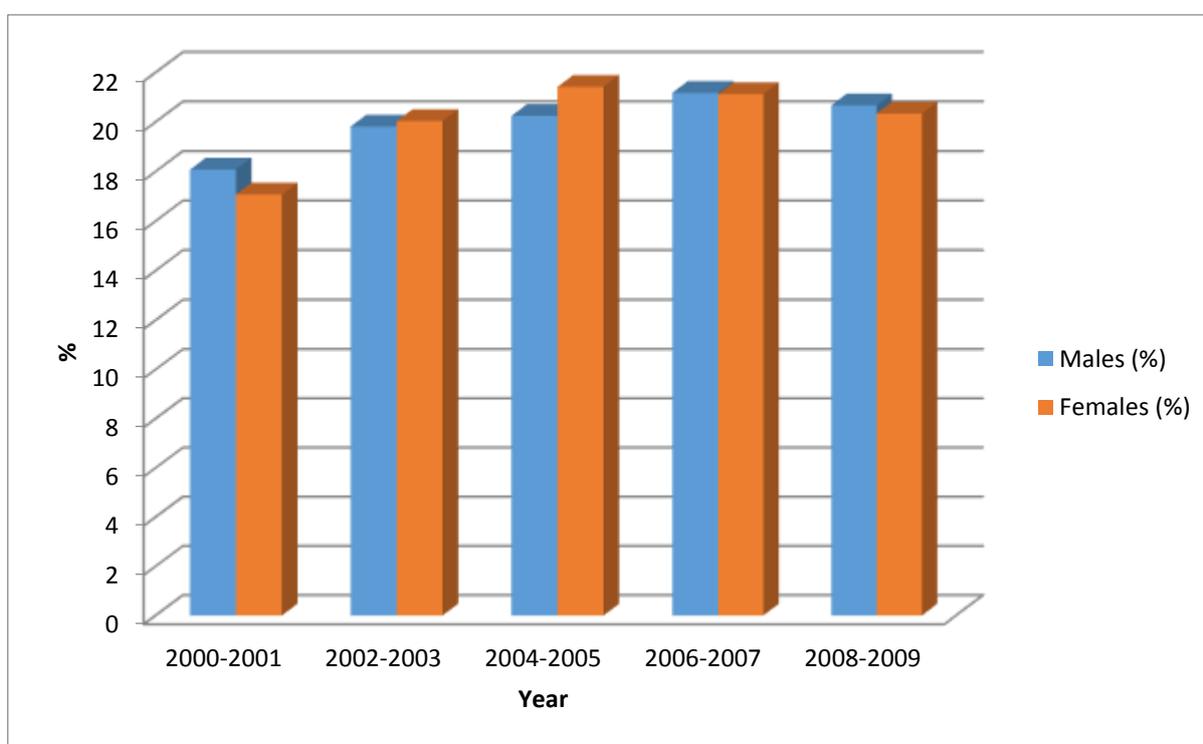


Figure 1: Percentage distribution of all- causes of adolescent mortality by sex and year

Figure 2 represents the percentage distribution of unnatural causes of death for adolescent males in South Africa for the period 2000-2009. From 2000-2001 to 2002-2003, events of undetermined intent (undetermined) and self-harm reported deaths increased. While transport accidents, assaults declined. In addition, other accidents remained consistent at just over 5% of all deaths to adolescents. Other accidents continued to remain consistently low in the 2004-2005 period before increasing dramatically in 2006-2007 and reached an

all-time high in 2006-2009. From 2002-2003 until 2004-2005, events of undetermined intent decreased. This pattern of decrease in events of undetermined intent continued from 2005-2009, decreasing to just below 5% of all deaths due to adolescent males. However, assaults, transport accidents and self-harm all increased from 2002-2003 to 2006-2007 among adolescent males in the country. From 2007-2009, assaults, transport accidents and self-harm begin to decrease.

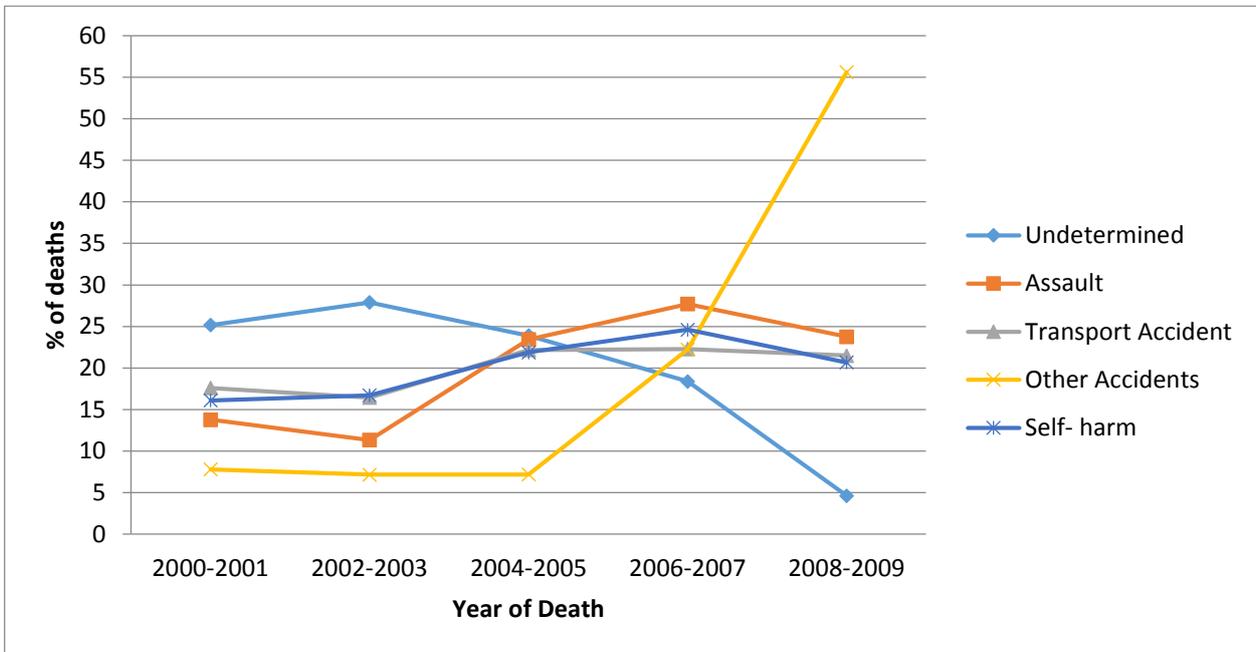


Figure 2: Distribution of adolescent deaths by unnatural causes of death for males, 2000- 2009

Figure 3 represents the percentage distribution of unnatural causes of death for adolescent females in South Africa for the period 2000-2009. Mortality due to events of undetermined intent increased from 2000-2001 to 2004-2005, then decreased from 2005-2009, reaching 5%. Deaths from assault decreased between 2000-2001 to 2002-2003 and sharply increased from 2003-2005. Deaths due to assault peaked during the 2006-2007 period and then began to decrease from 2007-2009. Transport accidents increased from 2002-2003 to 2004-2005, it then remained constant from 2006-2009. Other accidents remained steady at 10% from 2001-2005, however it

sharply increases from 2005 and reaches a peak in 2009 accounting for just over 50% of adolescent female deaths in South Africa. Female mortality due to self-harm remains constant for the period beginning in 2000 and ending in 2003. However there is a sharp increase in the period 2003-2005, from 2006 onwards it begins to level.

By way of comparison between the sexes, instances of mortality due to events of undetermined intent, transport accidents and self-harm are higher among adolescent females than males over the period. Alternatively, assault deaths are higher among males than females.

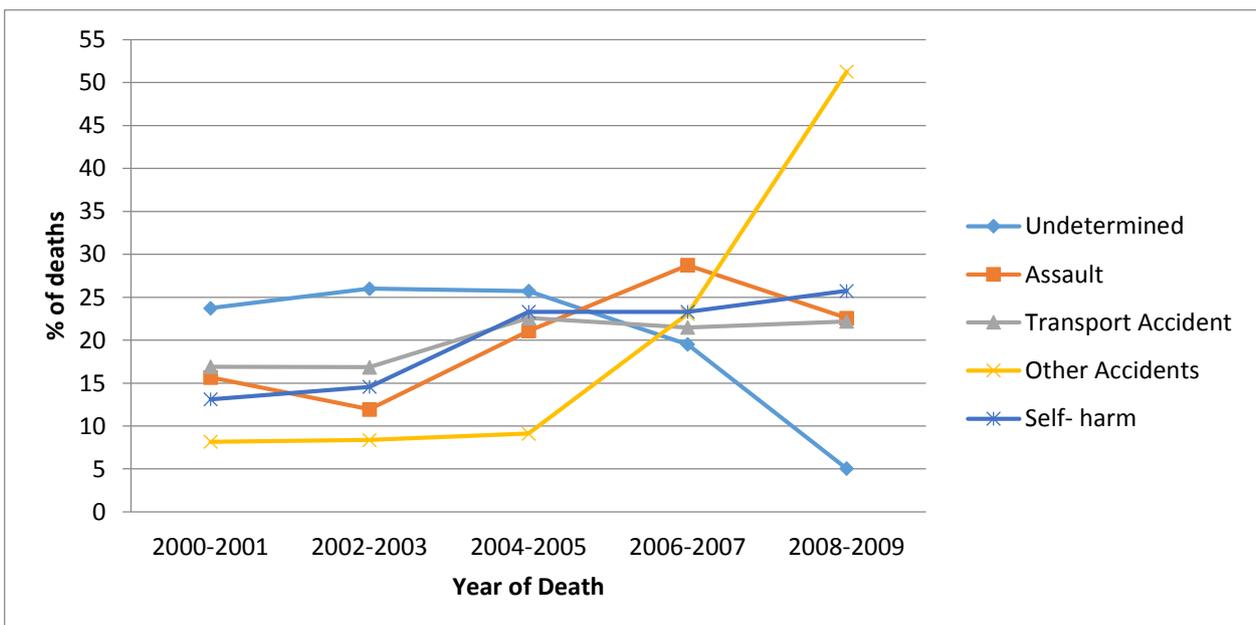


Figure 3: Distribution of adolescent deaths by unnatural causes of death for females, 2000-2009

Figure 4 represents the percentage distribution of unnatural causes of death by month of death and sex for the 2000-2009 period combined. Male adolescent deaths are higher compared to those of female adolescent deaths. The graph demonstrates that there are a higher percentage of dead adolescent males occurring during the December period- just over 3.5%. This is followed by higher male adolescent deaths in the months of November, January, October, March and July. The lowest level of adolescent male deaths occurs during the month of May- with approximately 2% dead male adolescents for the 2000-2009 period.

For females a similar pattern can be observed however at a lower percentage. The number of female adolescent deaths for the period 2000-2009 is highest in December, that is just over 1% of all deaths due to unnatural causes occur among this group at this point of the year. The lowest level recorded for females is during the month of June for the period 2000-2009. The occurrence of higher adolescent deaths over these periods in the country, suggest that it is during holiday periods, when adolescents are not in school, that unnatural causes of death occur the most.

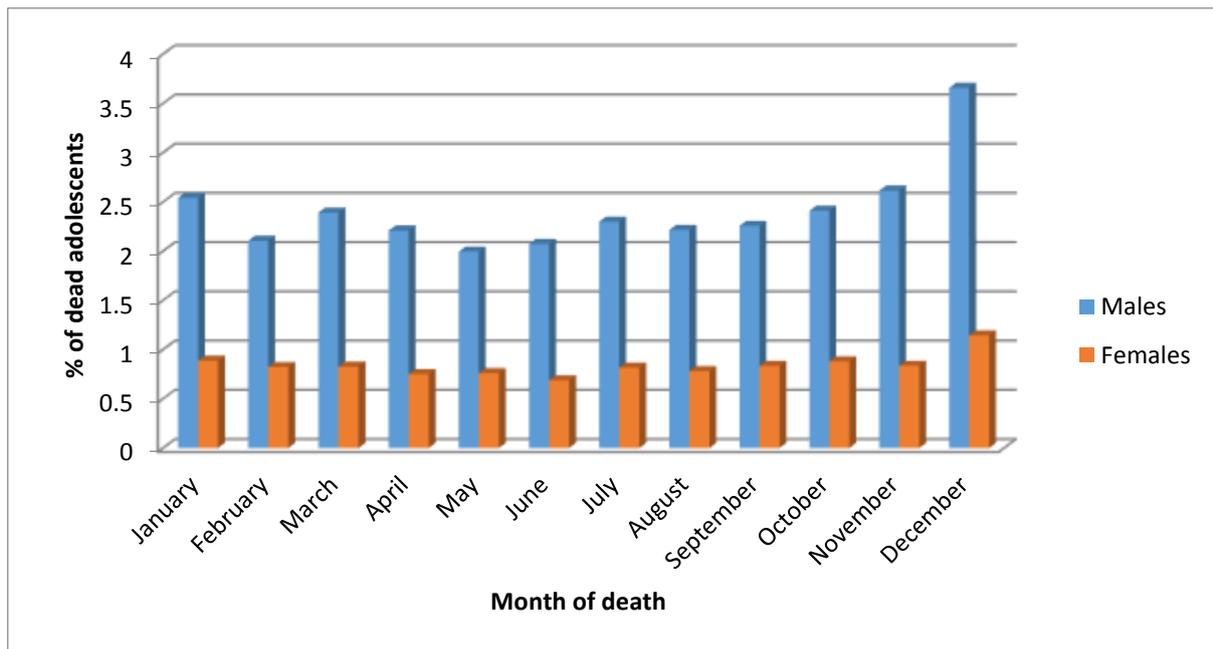


Figure 4: Percentage distribution of unnatural causes of death by month of death and sex, 2000- 2009 combined.

As a means of comparison between the sexes, it can be said that the percentage of adolescent male deaths are significantly higher than those of adolescent female deaths in South Africa for the 2000-2009 period. Furthermore, this can be compared to the distributions of unnatural causes of death between the sexes. As mentioned above, instances of mortality due to certain unnatural causes of death are higher among adolescent females than males over the period; this is in stark contrast to the percentage distribution by sex and month for the periods combined, in which instance mortality appears to be higher among male rather than female adolescents in South Africa.

Cause- Specific Mortality and Proportional Mortality Ratios:

With regard to the Cause- Specific Mortality Rates (CSMRs), male rates from all causes are consistently higher than female rates over the period. For males specifically in 2002-2003 rates were highest for deaths from events of undetermined intent at approximately 6 deaths per 10 000 population than all other causes for the period. This rate begins to decline from 2004-2009, reaching approximately 1 death per 10,000 population. The cause specific

mortality rates for males due to all other causes such as assault, transport accidents, other accidents as well as self-harm, remain at approximately 1 death per 10,000 population for the 2000-2009 period. For females, rates from all selected causes of mortality are consistently lower than that of males within the period. Specifically, the highest deaths were from events of undetermined intent at approximately 2 deaths per 10,000 population. The cause specific mortality rates for females due to all other causes such as assault, transport accidents, other accidents as well as self-harm, remain well below 1 death per 10,000 population for the 2000-2009 period. The lowest cause specific mortality recorded for females was due to self-harm.

Self-harm as a cause of death amongst males remained constant in 2000-2001 to 2002-2003 at 0.05 death per 10,000 population. This rate increases slightly during 2004-2007 to 0.07-0.08 deaths per 10,000 population, and declines in 2008-2009 to 0.07 deaths per 10,000 population.

And this remains the lowest rate of reported cause of unnatural death. Self-harm amongst females increased to 0.05 deaths per 10,000 population in 2004

Table 2: Cause- Specific Mortality Rates for unnatural causes of death by sex, 2000- 2009

Broad Underlying Cause of Death	Males					Females				
	2000-2001	2002-2003	2004-2005	2006-2007	2008-2009	2000-2001	2002-2003	2004-2005	2006-2007	2008-2009
Undetermined	5.36	5.86	5.00	3.84	0.97	1.79	1.93	1.91	1.44	0.37
Assault	0.65	0.52	1.08	1.28	1.10	0.09	0.06	0.11	0.15	0.12
Transport Accident	0.61	0.57	0.76	0.76	0.74	0.32	0.31	0.42	0.40	0.41
Other Accidents	0.59	0.53	0.53	1.64	4.11	0.23	0.24	0.26	0.65	1.46
Self- harm	0.05	0.05	0.07	0.08	0.07	0.03	0.03	0.05	0.05	0.05

*per 10,000 population

The Proportional Mortality Ratios show that among males in 2002-2003 events of undetermined intent contributed approximately 44% of all adolescent male mortality for that period (including all causes of natural deaths). The proportional mortality for males as a result of assaults decreased in 2000-2001 to 2002-2003 from 5.21 to 3.91%, respectively. For the period 2004-2007 proportional mortality increases from 7.91% to 8.94% before

slightly decreasing to 7.86% in 2008-2009. The proportional mortality ratios due to other external causes of injury' contributed approximately 5% in 2000-2001 of all male deaths; this continued to decrease for the period 2002-2005 to approximately 4% of all male deaths. This increases sharply in 2006-2009 from 11% to 29% of all adolescent male mortality in the country. For females in 2000-2001, events of undetermined intent contributed 17% of all

adolescent female mortality. This rate steadily decreased for the period 2002-2009, contributing approximately 3% of all adolescent female mortality. other external causes of injury' contributed

approximately 2% of all female deaths in 2000-2005, and this increased in 2006-2009 from 5% to approximately 12% of all female deaths.

Table 3: Proportional Mortality Rate by for unnatural causes of death sex, 2000- 2009

Unnatural Causes of death	Male PMR					Female PMR				
	2000-2001	2002-2003	2004-2005	2006-2007	2008-2009	2000-2001	2002-2003	2004-2005	2006-2007	2008-2009
Undetermined	43.18	43.64	36.60	26.93	6.96	17.25	16.10	14.90	11.46	3.07
Assault	5.21	3.91	7.91	8.94	7.86	0.82	0.54	0.88	1.22	1.00
Transport										
Accident	4.94	4.21	5.56	5.34	5.28	3.07	2.61	3.27	3.16	3.39
Other										
Accidents	4.72	3.95	3.88	11.48	29.40	2.27	1.98	2.02	5.18	11.96
Self- harm	0.43	0.41	0.52	0.56	0.49	0.27	0.25	0.38	0.38	0.44

Self-harm amongst males steadily increased from 2000-2007 (0.43%-0.56%), then decreased slightly in 2008-2009 to 0.49%. Amongst females, self-harm steadily increases from 2001-2009 (0.25%-0.44%)

Discussion

The aim of this study is to examine the different levels of male and female adolescent mortality due unnatural or external causes of death.

The general finding that adolescent males die from unnatural causes of death more than adolescent females suggests that the South African context is not very different from what is happening globally (Blum & Nelson-Mmari 2004; Patton 2009). In Latin American countries, homicide mortality peaks among males aged 15- 29 years old, making it the fifth leading cause of male mortality in the region (Blum & Nelson-Mmari 2004). In other studies that looked at both who the perpetrators and victims of violent crime are, it was found that young males are both more the victims and perpetrators of violence and crime compared to females (Perren & Hornung 2005). The fact that mortality is higher among males than females does not imply that adolescent females are not victims of violence in the country. It has been found in South Africa, that young females are victims of sexual assault more than young males (Dunkle, Jewkes, Brown, Gray, et al. 2004). It was found in Cape Town, South Africa, that 40% of interviewed adult females had a history of sexual assault (Kalichman & Simbayi 2004). A second issue, South African women face, and related to sexual assault, is the prevalence of gender- based violence in the country. In a study done in the Soweto region of the country, it was found that 55% of women attending an antenatal clinic had reported physical abuse from their partner (Dunkle, Jewkes, Brown, Yoshihama, et al. 2004). However, the consequences of such acts

did not result in a death. This prominent form of violence is not reflected in this study, since other studies are based on self- reports of sexual and physical violence and not mortality. However, since females are more susceptible to being victims of sexual violence, and presumably other forms of physical assault such as gender-based violence, it raises the question, why is it not reflected in the death reports. Possible explanations are twofold: (1) adolescent males may suffer violent acts (such as assault) less frequently than females, yet the severity of these acts are worse, which is why it results in mortality; or (2) the classification of unnatural causes of death among females require more meticulous analysis, so if the assault which caused the death was sexual or gender- based, it should be reflected. The latter, point is related to a general limitation of all mortality data, especially where certain causes of death are considered taboo or moot topics.

While deaths from self-harm remain low for both sexes, cause- specific mortality rates and proportional mortality ratios show that since 2006, other external causes of accidental injury contribute to the mortality of adolescents more than all other causes, including events of undetermined intent. The lowest rates and contribution for both sexes in the period is from causes related to self- harm. Although self- harm causes of death could have possibly been declared events of undetermined intent in the absence of any proof of suicide, such a note left by the deceased. Other studies concerning health outcomes have shown a peak in suicides and attempted suicides during adolescence (Nock et al. 2006; Wasserman et

al. 2005). In the United States of America, it was found that lifetime prevalence of having at least 1 suicide attempt was 3.8% (Dube et al. 2001). Literature suggests that this is a result of psychological problems and traumas associated with the transition from child to adulthood (Beautrais 2000). Further in a multi-country study, it was found that suicide rates vary from a low of 2.3 per 100,000 in Kuwait to a high of 27.1 per 100,000 in Finland among youth (Johnson et al. 2000). In developing countries, less research is done on suicide and self-harm. However, research has been done on the similar psychological problems and trauma shared by adolescents globally (Barbarin & Richter 2001; Cluver et al. 2007). These studies have found that the impact of HIV/AIDS and migrant status of the family are associated with increased mental distress among South African adolescents.

Challenges encountered in researching suicide in developing countries, include cultural and traditional beliefs about suicide. In Uganda, suicide (known as 'kikonko') is acknowledged as an extremely dangerous act with consequences for the bereaved community. It is here believed that when a person commits suicide, the family and the entire community will be haunted by the deceased's spirit and innocent children and livestock may be killed out of revenge (Burr et al. 1994; Mugisha et al. 2011). Religious beliefs are another barrier to the acknowledgement of suicide as a cause of death. For example, in orthodox Catholicism it is believed that the soul of a person who commits suicide cannot enter heaven (Stack & Lester 1991). Under such circumstances, it is understandable why self-harm and suicide are rarely reported as such. In light of the similar psychological experiences and trauma that South African adolescents face and the challenges in reporting suicide, it cannot then be assumed that suicide does not happen among adolescents in South Africa. It is then possible that the low figures of self-harm reflected in this study is possibly due to incorrect classification of suicide deaths in the country. Misclassification of causes of death, is not a new occurrence in South Africa. In 2005, it was reported that a number of HIV/AIDS deaths in the country had been incorrectly classified as Tuberculosis and other infectious disease causes of death (Groenewald et al. 2005). So it stands to reason that there are other causes of death which are quite possibly also misclassified.

Limitations

In addition to the limitation of misclassification of causes of death in South Africa, there is another data limitation. Death registration in South Africa takes

place at the Department of Home Affairs. After a death is registered, the Department issues a death certificate and where applicable, updates the population register. The forms are then collected by Statistics SA for processing. If the deceased is not in possession of a South African identity number or birth certificate their death cannot be registered on our National Population Register. This leaves a substantial amount of under-reporting of deaths among the poor (who do not have access to the Department of Home Affairs and were thus not issued birth certificates and identity numbers) and foreign nationals who reside in the country (Statistics SA, 2007). Stats SA have attempted to rectify this limitation, by supplementing this data with that which is collected by Census and other nationally representative surveys. This has supplemented the Death Notification Form data used in this study. However, in order for data from the National Population Register to be useful in the study of mortality in the country, the registration of deaths to persons who are not in possession of the correct documentation needs to be done.

Conclusion

Unnatural causes of death allude to existing levels of crime, violence and safety in South Africa. Because these are acts associated with inter-personal violence, the findings of this paper can inform youth programmes on the consequences of violent acts against adolescents in the country. Mortality from unnatural causes of death among South African adolescents have fluctuated over the years. It is evident that as of 2009, rates have increased. Overall this study has shown that unnatural causes of death are an increasing burden among adolescents in South Africa. Despite fluctuations over the years, these causes are contributing up to 27% of all adolescent male mortality and almost 12% of all female mortality in 2009. The paper has also showed that differences in mortality by particular cause of unnatural death between the sexes exist, in particular, when it relates to deaths from assaults and events of undetermined intent. For this reason, sex-specific programmes and interventions need to be developed to avert further increases in mortality. In addition, this study has shown that adolescent mortality from such causes occurs predominantly around holiday periods such as December. Due to adolescents being idle during such periods, since school is closed, it is important that programmes in the country institute 'holiday activities' for adolescents, so as to keep them occupied and away from violence and crime. Finally since these unnatural causes of death are largely preventable through the promotion of safe lifestyle and behavioural practices, these should be key areas

of focus in programmes and interventions aimed at South African adolescents.

All named authors have contributed sufficiently to the work submitted and that the content of the manuscript has never been previously published.

References

- Barbarin, O.A. & Richter, L. 2001. 'Economic status, community danger and psychological problems among South African children', *Childhood*, vol. 8, no. 1, pp. 115-33.
- Beautrais, A.L. 2000. 'Risk factors for suicide and attempted suicide among young people', *Australian and New Zealand Journal of Psychiatry*, vol. 34, no. 3, pp. 420-36.
- Blum, R.W. & Nelson-Mmari, K. 2004. 'The health of young people in a global context', *Journal of Adolescent Health*, vol. 35, no. 5, pp. 402-18.
- Brismar, B. & Bergman, B. 1998. 'The significance of alcohol for violence and accidents', *Alcoholism: Clinical and Experimental Research*, vol. 22, no. S7, pp. 299s-306s.
- Burr, J.A. McCall, P.L. & Powell-Griner, E. 1994. 'Catholic religion and suicide: The mediating effect of divorce', *Social Science Quarterly*.
- Christoffel, K.K. 1994. 'Reducing violence: How do we proceed?', *American Journal of Public Health*, vol. 84, no. 4.
- Cluver, L. Gardner, F. & Operario, D. 2007. 'Psychological distress amongst AIDS-orphaned children in urban South Africa', *Journal of Child Psychology and Psychiatry*, vol. 48, no. 8, pp. 755-63.
- Dube, S.R., Anda, R.F., Felitti, V.J., Chapman, D.P., Williamson, D.F. & Giles, W.H. 2001. 'Childhood abuse, household dysfunction, and the risk of attempted suicide throughout the life span', *JAMA: the journal of the American Medical Association*, vol. 286, no. 24, pp. 3089-96.
- Dunkle, K.L., Jewkes, R.K., Brown, H.C., Gray, G.E., McIntyre, J.A. & Harlow, S.D. 2004. 'Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa', *The Lancet*.
- Dunkle, K.L., Jewkes, R.K., Brown, H.C., Yoshihama, M., Gray, G.E., McIntyre, J.A. & Harlow, S.D. 2004. 'Prevalence and patterns of gender-based violence and revictimization among women attending antenatal clinics in Soweto, South Africa', *American journal of epidemiology*, vol. 160, no. 3, pp. 230-9.
- Groenewald, P., Nannan, N., Bourne, D., Laubscher, R. & Bradshaw, D. 2005. 'Identifying deaths from AIDS in South Africa', *Aids*, vol. 19, no. 2, pp. 193-201.
- Harris, B. 2001. "As for Violent Crime that's our Daily Bread": Vigilante violence during South Africa's period of transition', *Violence and Transition series: Center for the Study of Violence and Reconciliation*, vol. 1, pp. 1- 128.
- Hawkins, J.D., Herrenkohl, T.I., Farrington, D.P., Brewer, D., Catalano, R.F., Harachi, T.W. & Cothorn, L. 2000. *Predictors of youth violence*, US Department of Justice, Office of Justice Programs, Office of Juvenile Justice and Delinquency Prevention.
- Hinde, A. 1998. *Demographic methods* Arnold, London ; New York .:
- Johnson, G.R., Krug, E.G. & Potter, L.B. 2000. 'Suicide Among Adolescents and Young Adults: A Cross-National Comparison of 34 Countries', *Suicide and Life-Threatening Behavior*, vol. 30, no. 1, pp. 74-82.
- Kalichman, S.C. & Simbayi, L.C. 2004. 'Sexual assault history and risks for sexually transmitted infections among women in an African township in Cape Town, South Africa', *AIDS care*, vol. 16, no. 6, pp. 681-9.
- Leon, A.C., Marzuk, P.M., Tardiff, K., Bucciarelli, A., Markham Piper, K. & Galea, S. 2006. 'Antidepressants and youth suicide in New York City, 1999-2002', *Journal of the American Academy of Child & Adolescent Psychiatry*, vol. 45, no. 9, pp. 1054-8.
- MacKenzie, S., Seedat, M., Mabunda, M. & Swart, L. 2006. 'Pedestrian injuries and their containment: a review', *Unpublished report: UNISA Institute for Social and Health Sciences, Johannesburg*.
- Mallin, K., Berkeley, L. & Young, Q. 1986. 'A proportional mortality ratio study of workers in a construction equipment and diesel engine manufacturing plant', *American journal of industrial medicine*, vol. 10, no. 2, pp. 127-41.
- Mugisha, J., Hjelmeland, H., Kinyanda, E. & Knizek, B.L. 2011. 'Distancing: A traditional mechanism of dealing with suicide among the Baganda, Uganda', *Transcultural psychiatry*, vol. 48, no. 5, pp. 624-42.
- Nock, M.K., Joiner, T.E., Gordon, K.H., Lloyd-Richardson, E. & Prinstein, M.J. 2006. 'Non-suicidal self-injury among adolescents: Diagnostic correlates and relation to suicide attempts', *Psychiatry research*, vol. 144, no. 1, pp. 65-72.
- Norman, R., Matzopoulos, R., Groenewald, P. & Bradshaw, D. 2007. 'The High Burden of Injuries in South Africa', *Bulletin of the World Health Organization*, vol. 85, no. 8, pp. 649- 732.
- NYDA 2012. 'The Integrated Youth Development Strategy of South Africa (IYDS) 2012-2016',

- Government Gazette 2012*, vol. 35146, no. 3, pp. 1- 58.
- Patton, G.C. 2009. 'Global patterns of mortality in young people: a systematic analysis of population health data'.
- Perren, S. & Hornung, R. 2005. 'Bullying and delinquency in adolescence: Victims' and perpetrators' family and peer relations', *Swiss Journal of Psychology*, vol. 64, no. 1, pp. 51-64.
- Presidency of the Republic of South Africa 2009. *National Youth Policy*, Pretoria.
- Reddy, S.P., James, S., Sewpau, R., Koopman, F., Funani, N.I., S., S., Josie, J., Masuka , P., Kambaran, N.S. & Omardien, R.G. 2010. *Umthente Uhlaba Usamila – The South African Youth Risk Behaviour Survey 2008*, South African Medical Research Council . , South Africa.
- Roy, É., Haley, N., Leclerc, P., Sochanski, B., Boudreau, J.-F. & Boivin, J.-F. 2004. 'Mortality in a cohort of street youth in Montreal', *JAMA: the journal of the American Medical Association*, vol. 292, no. 5, pp. 569-74.
- Seedat, M., Van Niekerk, A., Jewkes, R., Suffla, S. & Ratele, K. 2009. 'Violence and injuries in South Africa: prioritising an agenda for prevention', *The Lancet*, vol. 374, no. 9694, pp. 1011-22.
- Stack, S. & Lester, D. 1991. 'The effect of religion on suicide ideation', *Social psychiatry and psychiatric epidemiology*, vol. 26, no. 4, pp. 168-70.
- Statistics SA 2007. *Mortality and causes of death in South Africa, 2006: Findings from death notification*, Statistics South Africa, Pretoria.
- Wasserman, D., Cheng, Q. & Jiang, G.-X. 2005. 'Global suicide rates among young people aged 15-19', *World Psychiatry*, vol. 4, no. 2, p. 114.