A critical review of child maltreatment indices: Psychometric properties and application in the South African context

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Abstract
The public and academic focus on child maltreatment and neglect and their prevention has spawned a range of surveillance instruments and mechanisms intended to identify child maltreatment and measure its magnitude. While such surveillance responses are obviously important for the prevention and management of child maltreatment and neglect, there appears to have been insufficient attention directed at examining their utility in the South Africa context. A review hereof is likely to offer insights to programme planners and child safety advocates working to mobilise political and community-level actions. Accordingly, the paper considers a sample of child maltreatment scales and measures and critically evaluates them in terms of their psychometric properties, as well as their application value for South Africa. Review findings indicate that despite an obvious lack of evaluative standards for assessing the psychometric properties of child maltreatment measures, those considered in this review appear to perform well with the study populations and in cross-cultural applications. It is suggested that following an appraisal of their linguistic and cultural appropriateness, and the adoption of suitable piloting procedures, the identified scales could be applied in South Africa with confidence in their measurement capabilities.

Keywords: review, child maltreatment and neglect, indices, cross-cultural application, South Africa

INTRODUCTION

Every child has the right to health and a life free from violence. Each year, though, millions of children around the world are the victims and witnesses of physical, sexual and emotional violence. Child maltreatment is a huge global problem with a serious impact on the victims’ physical and mental health, well-being and development throughout their lives – and, by extension, on society in general (WHO 2006b:1).

Early studies of child maltreatment have been dominated by epidemiological investigations conducted in collaboration with child protection services (Clement & Chamberland 2007; Straus, Hamby, Finkelhor, Moore & Runyan 1998). As a result, many studies have examined, confirmed or substantiated cases of child maltreatment, while the many unreported cases go unnoticed. This is not to say that these studies are not important, but rather that these tend to highlight only the most severe forms of child maltreatment and only ‘scratch the surface’ of the phenomenon of child maltreatment (Clement & Chamberland 2007; Dawes & Mushwana 2007; Makoa, Dawes, Loffell & Ward 2008; Straus et al 1998).

This very difficulty in assessing child maltreatment has to do with the very complex issues of defining child maltreatment, cultural differences in what is deemed to be maltreatment, as well as the difficulties in separating sub-optimum parenting from maltreatment. As such, definitions of child maltreatment differ across contexts and depend, to an extent, on study aims. According to the World Health Organization (WHO) (2006b:7), “child maltreatment refers to the physical and emotional mistreatment, sexual abuse, neglect and negligent treatment of children, as well as to
their commercial or other exploitation”. In examining other definitions of child maltreatment, it appears that the commonality across them is the reference to emotional, physical and sexual abuse, neglect or omission of care, and exploitation of children. Despite this apparent consensus, much debate surrounds the definition of child maltreatment.1

The literature reveals that scholars have written extensively on definitions, the problems inherent in definitions, as well as the discourses ensuing from the use of these various definitions (Hutchison 1990; Straus & Kantor 2005). A salient feature herein is the argument that definitions reflect the specific cultural beliefs and values of the contexts within which they were developed. What one culture sees as ‘negligent’ or ‘exploitative’ is not the same in another culture. Accordingly, it is argued that the application of research instruments across contexts can lead to some contexts being viewed negatively on the basis of differing cultural practices. For example, in some countries it is acceptable – although illegal – for children to start working as early as 6 years of age, while in other countries this would be unacceptable and categorised as abuse.2,3

To elaborate, other debates surrounding the lack of consensus on definitions of child maltreatment include the contention that child maltreatment is a legal matter and as such is defined by social service systems and not researchers (Cicchetti & Toth 2005). This implies that criteria for diagnosing abuse are largely more overt and physically substantiated. Moreover, there is no agreed-upon set of standards to differentiate acceptable from unacceptable parenting practices. This is further compounded by what to take into consideration when defining what is abusive, that is, is it overt physical signs such as bruises or can more unseen consequences be considered, such as mental health/psychological trauma (Cicchetti & Toth 2005). There have also been variations across periods of history and cultures regarding acceptable versus maltreating parenting, which further complicates the possibility of standardisation or consensus. The notion of intention is frequently linked with these debates (Cicchetti & Toth 2005). Lastly, the literature emphasises the idea that definitions serve different purposes, resulting in not only a lack of consensus, but also the development of many different definitions. For example, what is acceptable in a research setting would not be viable in a legal setting and, hence, the development of variant definitions (Cicchetti & Toth 2005). Similarly, the adoption of different theoretical orientations yields distinct definitions (Cicchetti & Toth 2005).

Owing to studies on child maltreatment focusing on different indicators and definitions of child maltreatment, statistics on child maltreatment generally present as fragmented and, often, as under-representative of the true magnitude of the problem. Where data does exist, statistics appear not to be comparable across countries and are often not comparable across groups of a population either. As such, global rates of child maltreatment are not available; however, estimates of violence against children disaggregated into specific types, such as child homicide rates, female genital mutilation, punishment in the home, forced sexual intercourse and child labour, are obtainable. To draw from some of these statistics, the WHO Global burden of disease (2004) figures indicate that 17 699 boys and 13 175 girls between the ages of 0–14 years died in 2004 due to violence. This figure represents 5.15% of all deaths due to intentional violence and 0.05% of the total burden of disease for this age group.4 Although not specifically presented as an estimate of child maltreatment, it does indicate a


2 It is estimated that in economically developing countries, “at least 120 million children between 5 and 15 are working full time, and more than twice as many (or about 250 million) work on a part-time basis” (Maffei, Raabe & Ursprung 2006:211).

3 See ISPCAN’s World perspectives on child abuse (7th ed 2006) for a more detailed discussion of cross-cultural differences in what is perceived as abusive and what is not.

4 These calculations are based on data from the 2004 WHO report on the Global Burden of Disease.
high incidence of child-directed violence globally. Of these deaths, 7129 boys and 5817 girls in Africa between the ages of 0–14 died due to violence (WHO 2004).\(^5\) This accounts for a substantial proportion of the global estimate.

South Africa, like other countries, lacks rigorous monitoring systems for child maltreatment (Dawes & Mushwana 2007), making comprehensive, reliable and valid statistics on child maltreatment difficult to estimate and attain (e.g. Dawes, Long, Alexander & Ward 2006). As such, estimates are interpreted and reported with caution, taking into account the vast potential for under-reporting and non-counting. According to official statistics of the South African Police Service, 48732 crimes against children were reported for the year 2008/9. Of these, there were 4034 substantiated reports of the neglect and ill treatment of children (South African Police Service 2010). There were also 843 cases of murder, 782 cases of attempted murder, 12422 cases of assault with the intent to do grievous bodily harm, 14544 cases of common assault and 20141 cases of sexual offences. Reports provided by Childline, a 24-hour helpline for children, reported 1048 calls related to sexual abuse, 2535 for physical abuse, 2914 for emotional abuse and 3356 for neglect for the year 2007/8 (Childline 2007–8).\(^6\)

Against this backdrop of divergent definitions and deficient data on child maltreatment, the exigency for valid child maltreatment measures continues to receive attention in the public and academic spheres. It is observed that this focus on child maltreatment and neglect and its prevention has spawned a range of surveillance instruments and mechanisms intended to capture, identify and predict child maltreatment, as well as measure the magnitude of child maltreatment encompassing more than just reported cases. While such surveillance responses are obviously important for the prevention and management of child maltreatment and neglect, Hamby and Finkelhor (2000) argue that there have been few endeavours to examine the utility, definitions, discourses and theories that underlie the instruments. Reviews of one or more of these elements can offer insights to programme planners\(^7\) and child safety advocates working to mobilise political and community-level actions. We therefore structure our paper around the following aims:8

- to evaluate the psychometric properties of a group of existing scales designed to assess child maltreatment
- to discuss their cross-cultural application and specific utility within the South African context

**METHODOLOGY**

In order to assess the psychometric properties of the child maltreatment scales, the authors conducted a review of existing research literature. The focus was on studies where the scales were either being validated or used for research purposes. In order to access the literature, the following search engines where used to search for literature on child maltreatment indices: Ebescohost, Science Direct, Jstor, Pubmed and Springer-link. The keywords informing the search were child maltreatment, child abuse, child neglect, physical abuse, sexual abuse, emotional abuse, index, indices, measures, scales, tools and assessments. Initially our search focused on indices of child maltreatment more broadly, which resulted in over 6000 articles being identified. After reviewing the literature that had been accessed, the search was further refined to include those indices identified as most used and endorsed, as well as those most thoroughly evaluated. A further search included the names of the scales (e.g. Child Trauma Questionnaire), as well as the relevant acronyms (e.g. CTQ). Owing to concerns about space and the imperative to focus the review in terms of depth rather than breadth, the authors excluded some scales from this

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5 This report and data are the latest available from the WHO.
6 The 2009/10 report was not available at the time of review and so the data provided represents the most up-to-date statistics available.
7 The scales reviewed have and can be used by a wide range of professionals, including researchers, nurses, NGO practitioners, social workers and clinical psychologists, to name only a few.
8 It is important to note that this review informs the child maltreatment component of a larger project aimed at child safety, and is therefore one part of a composite research protocol on child injury.
review in favour of granting particular attention to those scales endorsed by the WHO, which has extended a call for a robust engagement with these measures. The focus on these scales in relation to South Africa is observed as an attempt to do just that. In the initial search, the year of publication was restricted to the time span of 2006 up to the present, so that the most current sources could be consulted. However, earlier studies subsequently had to be included because of the paucity of literature for the given period, which specifically included an analysis of psychometric assessments undertaken on the indices. Only studies using the full assessment tool were included and reviewed, as this allowed for a more thorough and less fragmented evaluation of the tool’s utility. For the purpose of this review, only English articles were selected.

The measures to be assessed

The following assessment tools are highlighted as being appropriate for the study of the prevalence and incidence of child maltreatment, as well as for assessing the efficacy of intervention and prevention programmes: (a) Parent-Child Conflict Tactics Scales (CTS, CTS-PC); (b) Adverse Childhood Experiences Study Questionnaire (ACE); (c) Juvenile Victimization Questionnaire (JVQ); (d) International Society for Prevention of Child Abuse and Neglect (ISPCAN) Child Abuse Screening Tools (I-CAST C, I-CAST R and I-CAST P); (e) Adult-Adolescent Parenting Inventory (AAPI); (f) Child Trauma Questionnaire (CTQ); and (g) Child Abuse Potential Inventory (CAPI), all of which show strong evidence of utilisation and assessment.

The review revealed that not only are there varying definitions of child maltreatment being used, but also that the theory underlying the scales differs greatly. This has meant that the scales developed offer very different perspectives on child maltreatment. Hence, some of the scales are self-report retrospective measures of early abuse, while other scales measure abuse directly or assess predictors of abuse and micro-level behaviours associated with abuse potential. A consideration of when and how each scale is used is therefore important. The identified scales are thus reviewed in relation to a brief description of the theory underpinning them, what they measure, and when and how they can be used, with a more substantial focus on their psychometric properties.

REVIEW FINDINGS

The Conflict Tactics Scale – Parent-Child (CTS-PC)

The CTS-PC looks at behaviours that are associated with child abuse. It is based on conflict theory (Calvete, Corral & Estévez 2007), which suggests that conflict is inevitable and a necessary part of life. According to this theory, the relationship between conflict and group wellbeing is curvilinear, with too much or too little conflict leading to adverse group outcomes (Calvete, Corral & Estévez 2007). Although there are many tactics that can potentially be utilised to resolve conflict, the CTS-PC chooses three modes of dealing with conflict that are particularly important for testing the ‘catharsis theory’ of violence control, namely: (a) rational discussion, argument and reasoning, (b) the use of verbal and non-verbal acts that symbolically hurt the other and (c) the use of physical force. These tactics inform the constructs assessed by the scale, namely aggression and violence. The subscales of the measure include non-violent discipline, psychological aggression and physical assault. Sixty-two questions make up the three subscales and are scored on a Likert scale. Two versions have been developed, an adult scale and a child scale, the latter allowing for the assessment of young children. It can be used as both self-administered or interview-format styles and is suitable for groups (Straus & Hamby 1997; Straus et al 1998). This scale has been used extensively for epidemiological investigations (Straus & Hamby 1997; Straus et al 1998), but has also been used to assess programme outcomes (Straus & Hamby 1997).

The Conflict Tactics Scale (CTS) and Conflict Tactics Scale Parent-Child (CTS-PC) are some of the most rigorously
evaluated of all the scales reviewed here. Reports of internal consistency reliability include: 0.58 (Straus & Hamby 1997); 0.74–0.89 (Straus 2004); 0.54–0.77 (Ro & Lawrence 2007); and 0.77 (Straus 2007). Test-retest reliabilities are more scarce, with the following being reported: 0.80 (Straus & Hamby 1997); 0.30–0.79 for self-report; and 0.53–0.86 for partner report (Vega & O’Leary 2007) and 0.72 (Straus 2007). Not all studies reported validity coefficient, with many only reporting convergent validity (Straus 2004; Straus 2007; Straus & Hamby 1997; Ro & Lawrence 2007). More specifically, the CTS has been correlated with other theoretically similar constructs as a means of establishing validity. Straus (2004) correlated assault in the CTS with injury reports and obtained a mean correlation coefficient of 0.76. Similarly, Ro and Lawrence (2007) correlate the CTS with a multidimensional measure of emotional abuse and a test on negative social exchange and they report significant correlations of 0.69 and 0.51 respectively. The results of the CTS-PC have been consistent and stable across contexts and present promising results. Both reliability and validity coefficients show potential; however, these are to be interpreted with caution, as the lower bounds reported, namely test-retest reliability as low as 0.3 (Vega & O’Leary 2007), are not even acceptable for research purposes.10

**Adverse Childhood Experiences Questionnaire (ACE)**

Adverse childhood experiences have been linked with many negative health outcomes in later life; these include premature death, delinquency, teenage pregnancy, drug abuse and a myriad of other psychological and social problems. Based on this, the ACE questionnaire looks at adverse childhood experiences that can be linked with negative outcomes in adulthood. The ACE questionnaire includes questions about adverse childhood experiences specifically during the respondent’s first 18 years of life. These experiences include physical abuse, verbal abuse, sexual abuse, having a battered mother, parental separation or divorce, and four types of household dysfunction: exposure in the household to drug abuse, mental illness, suicide or criminal behaviour. This assessment tool is used by drawing correlations with negative adult or adolescent outcomes. Some examples are the relationship between ACE and teenage pregnancy (Hillis et al 2004), drug use (Dube et al 2006) and causes of death (Felitti et al 1998).

The psychometric data for the ACE questionnaire were less accessible, although they are widely used especially in longitudinal data collection projects. Test re-test reliabilities for the questionnaire have been good and are reported as follows: the kappa coefficient for emotional abuse was .66 (95% CI, .55–.76); for physical abuse it was .55 (95% CI, .47–.63); and for sexual abuse, it was .69 (95% CI, .61–.77). The kappa coefficient for growing up with household substance abuse was .75 (95% CI, .68–.81) and for growing up witnessing interpersonal violence, it was .77 (95% CI, .68–.85), both of which are high. Additionally, the weighted-kappa coefficient for the ACE score (range: 0–8) was .64 (95% CI, .36–.60). This indicates good test-retest reliability (Dube et al 2004) and is the only study found to report the reliability of the measure.

The convergent validity of the ACE questionnaire has been provided by Edwards et al (2001), where the ACE questionnaire is correlated with previous self-reports of child sexual abuse. Edwards et al (2001) attempted to establish whether participants who indicated having suffered child sexual abuse on another occasion, would answer the ACE questions in accordance with their previous indications. Overall, 5.9% of all respondents answered affirmatively to the question on child sexual abuse. The prevalence of child sexual abuse was 6.1%, while in the non-respondent group it was 5.4%. Persons with a history of child sexual abuse were somewhat more likely to be respondents (Odds ratio = 1.4, CI = 1.1–1.6, p < .001). The results were positive and significant, adding to the evidence of the validity and reliability of the measure. This is further supported by Felitti et al (1998) and Dube et al (2003).

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10 Generally, lower bounds are acceptable in terms of reliability for research purposes than for clinical purposes and diagnosis. While a reliability of .60 is acceptable for research, a coefficient of .30 is considered to be too low to be acceptable (Tabachnick & Fidell 2001).
The Juvenile Victimization Questionnaire (JVQ)

The JVQ was developed out of recognition of the increased exposure of children to different forms of victimisation and the extent to which victimisation affects children in later life (Finkelhor, Ormrod, Turner & Hamby 2005b; Turner, Finkelhor & Ormrod 2005). The rationale behind the JVQ was to develop an instrument that would be comprehensive, take into consideration important developmental stages, as well as tap into official categorisations of victimisation, leading to the development of victimisation profiles (Finkelhor et al 2005b; Turner et al 2005). This tool allows for the epidemiological assessment of different forms of victimisation, provides an important assessment tool in socio-legal contexts and also serves as a tool for programme evaluation. The JVQ contains screening questions about 34 offences against youth, which cover five general areas of concern: (1) conventional crime, (2) child maltreatment, (3) peer and sibling victimisation, (4) sexual victimisation and (5) witnessing and indirect victimisation. The instrument provides some short, closed-ended follow-up questions to follow endorsement of a victimisation-screening question for more in-depth information. The questionnaire is designed for interview format with children as young as age 8 and as old as age 17. It can be used in a self-administered format for juveniles of 12 years and older. There is also a “caregiver version”, in which a caregiver could be interviewed as a proxy for a child, especially a child under age 8. The primary versions of the JVQ enquire about the previous year as the time frame for victimisation reports. However, the instrument can be adapted for a lifetime perspective and for retrospective reporting of childhood events by adult respondents (Finkelhor et al 2005b; Turner et al 2005).

In terms of test re-test reliability, the questionnaire was administered to a small proportion of the original sample, three to four weeks after the first assessment. The mean $\kappa$ was .59, with a range from .22 to 1.00 ($\kappa$’s in the range of .40–.75 were considered fair to good; above .75 was excellent; and below .40 was poor). However, the small test-retest sample is not an adequate evaluation of the scale because of low base rates for some items. For example, some screener items had only two endorsements per 100 participants. This has a drastic effect on the $\kappa$ in that the coefficient has only a few items in the analysis and hence offers skewed results (Finkelhor et al 2005a). The internal consistency reliability was reported as follows: the full JVQ .80; Conventional Crime .61; Physical Assault .64; Property Victimisation .38; Child Maltreatment .39; Sexual Victimisation .51; Sexual Assault .35; Peer or Sibling Victimisation .55; and Peer or Sibling Assault .35. Again, although the low base rate of reporting of the different constructs affects the reliability coefficient, besides property victimisation, child maltreatment and peer or sibling assault, the coefficients are acceptable.

According to Finkelhor et al (2005a), the construct validity of an instrument can be tested by whether it produces results expected by theory or previous research. One of the major and consistent findings from the victimisation literature is that victimisation is associated with trauma-related symptomatology. The correlation coefficients between the JVQ and both the Trauma Symptoms Checklist for Children (TCSS) and Trauma Symptom Checklist for Young Children (TSCYC) show significance at the 0.05 and 0.01 levels. The correlations range from 0.00 for items with low endorsement to 0.35. Although statistically significant, the practical significance of this is questionable, suggesting that the validity of the scale be considered with caution.

The ISPCAN Childhood Abuse Screening Tool (ICAST)

The ICAST was developed using a large bank of questions, subject to two rounds of Delphi review (Runyan et al 2009b). The ICAST-C (child version) focuses on treatment of a child that could potentially be victimising. Screener questions about each type of victimisation were designed to map the categories of assault or child maltreatment conventionally used in legal, research and programmatic settings. The scale includes the following two sections: home victimisation and victimisation at school or work (institutional). In the home module, there are five subscales: physical abuse, physical punishment, psychological abuse, sexual abuse and neglect. In the institutional module, there are three subscales: sexual assault, physical assault and psychological victimisation. The ICAST-C Home has 38 items and the ICAST-C Institution has 44 items. All questions are
asked of the respondent with reference to the previous year. Children are provided with response options of frequency, for example “many times”. If children respond affirmatively, they are asked to identify the perpetrator as adult, child or other. This is designed for use with children/youth between 12 and 17 years of age. There is also a parent version, a retrospective version and a peer/sibling version. This tool allows for the assessment of child abuse currently or retrospectively. It can also been used as a screening tool and in epidemiological surveys (Runyan et al 2009b).

The ICAST is a relatively new measure, with only one study published to date (Zolotor et al 2009) outlining its psychometric properties. The strength of the ICAST appears to lie in its cross-cultural application. The data available on the scale are drawn from a cross-national pilot study. Internal consistency reliability for each scale of the home victimisation component is as follows: home exposure to violence 0.69; physical abuse 0.77; psychological abuse 0.78; sexual abuse 0.72; and neglect 0.86. For the institutional victimisation section of the instrument, internal consistency reliability is as follows: physical victimisation 0.85; psychological victimisation 0.86; and sexual victimisation 0.78 (Zolotor et al 2009). Although these reflect promising initial results with high coefficients, more research is needed on the reliability and, more importantly, the validity of this scale. Despite its extensive use, the literature suggests that psychometric evaluations of the scale are lacking.

**Adult Adolescent Parenting Inventory (AAPI)**

The AAPI arose from a need to empirically locate perpetuation theory (Bavolek 1990; Bavolek & Keene 2009). In terms of child maltreatment, perpetuation theory suggests that learned patterns of abusive parenting are transmitted from parent to child and are replicated by the child upon becoming a parent. Bavolek and Keene (2009) found that an existing theme among the abusive parent population is a reference to their own past abusive childhood histories. Seeking to discover what percentage of abused children become abusive parents as a result of their early childhood maltreatment, Bavolek and Keene (2009) embarked on a construct analysis of the literature on child abuse and neglect to clarify what it constituted. They synthesised what was generally thought to be abusive parenting practices into meaningful constructs comprising the items of the scale (Bavolek & Keene 2009). The AAPI has four subscales: (a) reversing parent-child family roles (role reversal), (b) lack of empathic awareness of children’s needs (empathy), (c) inappropriate developmental expectations of children (developmental expectations), and (d) strong parental beliefs in the use of corporal punishment (corporal punishment). The 32 items are answered on a five-point Likert-type scale, ranging from “strongly agree” to “strongly disagree”. This scale can be used to assess potential of child maltreatment, as well as for epidemiology and programme evaluation (Paulusic, Crum, Bliss & Bavolek 2008; Weiman, Schreiber & Robinson 1992).

Bavolek (1990) found the AAPI to have an internal reliability of .70 to .86. The internal consistency showed appropriate levels of reliability for each of the subscales (Expectations = .70; Empathy = .75; Corporal Punishment = .81; and Role Reversal = .82). Test-retest reliability of the inventory showed an adequate level of stability over a week’s period (.76) (Bavolek 1990).

The original AAPI produced five factors representing the five subscales of the instrument. In a later study by Conners et al (2005), this factor structure was not achieved. Using confirmatory factor analysis, as well as exploratory factor analysis and principal components, analysis yielded differing results, with the emergence of a ten-factor model. In these, eigen values where low, with the ten-factor structure accounting for 56.2% of the total variance. Alpha reliability coefficients were computed for each scale. For the full 40-item scale, the $\alpha$ value was .85. The $\alpha$ coefficients for the subscales were highest for the Lack of Empathy and Value Corporal Punishment scales (.79). The scale demonstrating the lowest internal consistency was Oppressing Children’s Power and Independence (.50). Construct validity has been shown by correlating the AAPI with other theoretically similar measures. Correlations are as follows: AAPI with HOME Warmth .19; HOME Acceptance .18; PDMI (Parental Discipline Methods Interview) – Harsh Discipline .36; Parenting Style – Harsh Control

and PKBS (Preschool and Kindergarten Behavior Scales) Problem Behavior .23. All are significant at a level of 0.01 and as suggested by theory. For internal consistency reliability, chronbach alpha values ranged from 0.86 to 0.96. Similarly, Spearman-Brown \( r \) values ranged from 0.87 to 0.96, both indicating the high internal consistency of the scale and subscales (Bavolek & Keene 2009). The scale also shows discriminant validity in that it discriminated between abusing and non-abusing parents (Bavolek & Keene 2009).

**Childhood Trauma Questionnaire (CTQ)**

Similar to the JVQ, the CTQ is based on literature showing that childhood trauma has significant negative outcomes for children in later life (Bernstein et al 1994). The CTQ measures the construct of victimisation in the form of maltreatment, including emotional, physical and sexual abuse, as well as emotional and physical neglect. Two versions have been developed, namely a long version comprising 70 items and a shortened version comprising only 28 questions. In addition to the five subscales mentioned above, the CTQ is also equipped with a minimisation/denial scale for the detection of false-negative trauma reports. This is a self-report retrospective measure that, like those mentioned above, asks about respondents’ “experiences growing up”. Much like the other scales, the CTQ can also be used to evaluate programmes for epidemiological purposes, as well as ‘one-off’ assessments. The scale can be used for children 12 years and older, but is not suitable for younger children or parents as proxies. Items are rated on a five-point Likert-type scale, with response options ranging from “never true” to “very often true”.

 Bernstein et al (1997) found a five-factor structure using principal component analysis for the JVQ. The internal consistency of the scale was found to be 0.97, with the range between scales at between 0.81 and 0.95 (Bernstein et al 1997). Similarly, Bernstein and Fink (1998) found test-retest reliabilities from 0.79 to 0.86 (four-month interval) and internal consistency reliability of 0.66 to 0.92. They also showed convergent validity in terms of correlations with clinician-rated interviews of child abuse. Bernstein and Fink (1998) also found a consistent five-factor structure, as was found in previous research. In a community sample, Scher et al (2001) found a test-retest reliability for the whole scale of 0.91. The five-factor structure of the CTQ was confirmed, providing an “excellent fit”. \( S – B_\chi^2 = 312.70, df = 258; S – B_\chi^2/df = 1.22; CFI-R = 0.96; RMSEA = 0.05 \) and SRMR = 0.09. In another study using street-based sex workers, Villano et al (2004) found internal consistency reliability of between 0.58 and 0.93 for the subscales. A confirmatory factor analysis provided an inadequate fit with an exploratory factor analysis; however, using an oblique rotation produced more desirable results. No factor emerged in this sample for physical neglect, suggesting this construct of the CTQ was not conceptually distinct for this sample (Villano et al 2004). This result was closely replicated in an evaluation of a Swedish version of the CTQ (see Lungren et al 2002).

 Pavio and Cramer (2004) tested both the four-factor and five-factor models using confirmatory factor analysis, with poor results. When performing an exploratory factor analysis, the five-factor structure emerged and was statistically significant. The factor model explained 53.4% of the variance and reported the internal validity of the whole scale at 0.96 and test-retest reliability at 0.85. Thombs et al (2009) confirmed the five-factor structure shown in a Dutch sample and also showed the scale to have good internal consistency (0.63–0.95). In addition, using a known group’s validity analysis, the authors demonstrated the scale to accurately and significantly differentiate between patients and non-clinical controls in the sample (Thombs et al 2009).

 The validity and reliability of the scale shown above are promising. Moreover, the scale has produced some sound results when used with different groups in cross-cultural settings. However, an area of concern is the differing factor structures, which could indicate conceptual differences in the understanding of constructs and, therefore, possibly detract from the scale’s validity and utility across contexts. Having said that, considering cultural norms and reviewing potentially culturally loaded questions could yield more consistent results and potentially replicate the original factor structure. Despite this concern, the scale has been used in South Africa, although not for the assessment of child maltreatment; it has been used primarily in research on HIV risk behaviours and violence against women (see Abrahams & Jewkes 2005; Dunkle et al 2007; Jewkes et al 2006a; Jewkes et al 2006b; Jewkes et al 2006c). The results of these studies revealed no problems in the application of the scale. However, no psychometric properties are reported for South African samples.
Child Abuse Potential Inventory (CAPI)

The CAPI was designed primarily as a screening tool for the detection of physical child abuse by protective services workers in their investigations of reported child abuse cases. It measures the potential to abuse, using six personality factors that have been shown to be associated with abuse, namely distress; rigidity; unhappiness; problems with the child and self; problems with the family; and problems with others (Milner, Gold & Wimberly 1986; Milner & Wimberley 1979; Robertson & Milner 1983). This scale is used to assess adults, not children, and is an appropriate screening tool for groups and individuals who are considered to be at risk for perpetrating physical child abuse (Milner 1994). Although best used for screening, the CAPI is also utilised for pre- and post-treatment and follow-up assessments in evaluations of programmes involving parents. Included in the 160 items making up the six subscales of the CAPI are three validity scales measuring lie, random response and inconsistency.

Grietans et al (2007) found internal consistency of 0.90 and split-half reliability of 0.89 (Guttman r (362) = 0.89). Internal consistency of the lie scale was 0.76; of the random response scale, 0.06; and of the inconsistency scale, 0.23. Convergent validity was shown through the significant prediction of child abuse by parenting attribution with regards to child rearing and parenting stress ($f^2 [2, 352] = 84.18, p < 0.01$). In another study, Walker and Davies (2010) found internal consistency reliability ranging from 0.91–0.95. The reliability of the Greek version of the CAPI showed internal consistency coefficients of .91 for the abuse scale; .93 for the distress factor scale; .86 for the rigidity factor scale; and .80 for the inconsistency validity scale. For the other four-factor scales and two validity scales, reliability coefficients were as follows: unhappiness .41; problems with child and self .26; problems with family .52; problems with others .50; lie .24; and random response .33 (Diareme et al 1997).

Chan et al (2006) reported that a confirmatory factor analysis in a Hong Kong sample showed 66 of the 77 items had factor loadings greater than 3($\chi^2 = 4615.203 (p = 0.00)$, RMSEA = 0.031, NFI = 0.930 and GFI = 0.869). Internal consistency of the abuse subscales were as follows: distress 0.92; rigidity 0.69; unhappiness 0.36; problems with child 0.38; problems with family 0.54; and problems with others 0.54. The CAPI showed convergent validity with the 12-item general health questionnaire, 36-item short-form parenting stress index, as well as the 20-item revised UCLA loneliness scale. A discriminant function analysis showed that the abuse scale has an overall correct classification rate of between 90.4% and 97.1% (Chan et al 2006).

Merritt (2009) correlated the CAPI with various neighborhood factors related to child maltreatment, including neighbourhood rates of child maltreatment ($r = 0.12, p = 0.02$), in order to establish concurrent validity. Results indicated that variations in CAPI scores across neighbourhoods can be explained by variations in the neighbourhood maltreatment rates. Computations based on these variations indicated that the proportion of variance in the mean CAPI scores explained by the child maltreatment rate is 0.99. The construct validity of the instrument was tested by examining the factorial structure using varimax rotations. Only five factors were meaningful for the study, explaining 34.1% of the variance in the data set. As demonstrated by Chan et al (2006), a factor analysis yields inconsistent results across samples and groups.

The reliability and validity reported by the above studies are adequate, although not very high. The inconsistency of the factor analyses are of concern and allude to problems with construct validity. Although the CAPI appears to be widely used, a review of its psychometric properties suggests caution in the use of this scale; which would be appropriately addressed through a consideration of the revision and piloting of items for use in specific contexts.11

DISCUSSION

As much in South Africa as globally, child maltreatment presents a pervasive and debilitating social ill, not only for individuals, but for society in general. Given this, the ability to measure and assess the extent of the problem is particularly important. In addition, in situations where large resources are allocated to programmes aimed at the prevention and treatment of child maltreatment, measurement and evaluation become important for gauging programme impact and outcomes. In line with the aims of the paper, the assessment tools reviewed here mark different attempts at furthering our knowledge of child maltreatment and evaluating its magnitude. As can be discerned from the review findings, the measures are all developed from and located within different theoretical standpoints. They not only measure the phenomenon through diverse conceptual lenses, but also measure the phenomenon from different perspectives (i.e. child, parent, retrospective) and time frames (i.e. current, previous year, during first 18 years of life, etc.). This variation in measurement instruments appears, in some part, to be the result of inconsistencies in the definitions of child maltreatment and differing study objectives.

The reliabilities of scales presented in this review are arguably good in that they average around $r = 0.6$. An area of concern, however, is that this is an acceptable coefficient value for research, but not necessarily for diagnostic purposes (Field 2005; Tabachnick & Fidell 2001). Their diagnostic function refers to the use of these tools as screening measures, that is, for admittance to intervention programmes, as is frequently the case. A ‘misdiagnosis’ here would mean that an individual potentially fails to access relevant support services. As reported, validity statistics are far less available and the variations in factor structures across samples suggest differences in the conceptualisation and development of items, which tend to undermine the scales’ validity. Although some variations can be overcome with language changes and the elimination of culturally loaded items, it is an area that is particularly significant in the matter of their cross-cultural application. The lack of systematic evaluations of the indicated child maltreatment scales, as well as the reporting of evaluation results, is evident from this review. Nonetheless, the scales show promise and allude to their potential utility within the South African context.

More specifically, of the studies reported, limitations relate to sample sizes being small, non-probability samples being used and samples often not being representative of the group or population being studied. In addition, Chan et al. (2006) argue for a greater use of matched samples, which would contribute greatly to establishing the validity of the scales. More critical to the cross-cultural application of these measures, there appears to be an over-reliance on exploratory factor analysis. This method is useful for the initial development of assessment tools and to understand how factors perform across contexts; however, it should not be used when seeking to test the validity of an assessment tool (Tabachnick & Fidell 2001).

In terms of their application in South Africa, only the CTQ is observed to have been utilised. The CTQ has been used mainly in studies of HIV and risky sexual behaviour, with at least one study having employed it to examine the experience of child abuse and how it relates to violent behaviour in adults (see Dunkle et al 2007; Jewkes et al 2006a, 2006b, 2006c). The authors are aware that the ACE questionnaire is currently being applied by a South African research institution. At the time of writing, however, no further information or data was available on its psychometric properties and applicability to the South African context. Nevertheless, Pierce and Bozalek (2004) propose that these scales are potentially appropriate for use in South Africa, since they are based on risk factors and conceptualisations of child maltreatment that are relevant to the South African setting, provided that cognisance is taken of the fact that South Africa is a multicultural and multilingual society. It would therefore be important not only to achieve language equivalence; attention would also need to be directed to conceptual and cultural equivalence so that the scales can be used reliably and validly.

In the absence of South African-developed child maltreatment instruments, the scales reviewed seem promising

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12 These include low socioeconomic status, low birth weight, child temperament, ethnicity, child disability, family structure, family size and single parenting, maternal age, maternal educational attainment, parental involvement, parent-child interactions, social isolation, social support, unemployment and population density (Mersky, Berger, Reynolds & Gromoske 2009; Sith et al 2009)
in furthering study on the epidemiology, aetiology and prevention of child maltreatment in the country. Nevertheless, it is acknowledged that this review is limited in its scope and analysis. There are other scales available that could be as applicable, if not more so, to the study of child maltreatment in South Africa, but their limited endorsement excluded them from this analysis. Similarly, restrictive access to some international literature on the subject means that not all available and published literature could be reviewed. Future research would be instructive if it focused on the piloting and application of tools demonstrated to be promising. Ultimately, the development of a comprehensive framework is needed for the construction and evaluation of child maltreatment tools to prevent further fragmentation of focus, disciplinary isolation, development discontinuities and methodological inconsistencies (Hamby & Finkelhor 2000).

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References


Pattern and severity of childhood unintentional injuries in Ismailia city, Egypt

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Abstract
In 2009, more than 746,000 injury cases were registered in the Ministry of Health hospitals in Egypt, with an injury rate of 1,004/100,000 population. Around 38% of all injuries occur among children and young adults less than 20 years of age. Furthermore, more than 20,000 people lose their lives to injuries every year (27/100,000). However, these data lack information on injury pattern, severity, provided care and outcome of injuries, which are essential data for planning injury-control programmes.

The aim of this study was to determine the frequency, nature and risk factors of childhood injuries in the Suez Canal University Hospital Emergency Department.

The study included a total of 551 children of 12 years of age. The most common causes of injuries among those children were falls (60%), road traffic injuries (15%) and burns (7%). The most commonly sustained injuries were fractures (23%), cuts or open wounds (21%), sprains (20%) and burns (13%). Overall injury severity scores (ISSs) were low across all injury types, except road traffic injuries (RTIs). The majority of patients were treated and discharged without disability (50.5%), while 7.4% had long-term temporary disability that lasted for more than 6 weeks, and 1.9% sustained permanent disability. There were two deaths (0.4% proportionate mortality); both of them were due to falls from a height.

In conclusion, the study confirms the feasibility of documenting the burden of childhood injuries on health systems in Egypt. It also confirmed the need for tailored injury-prevention research in Egypt. The resulting data should encourage interventional trials to be conducted, appropriate injury-prevention strategies to be implemented and timely interventions to be planned.

Keywords: Childhood unintentional injuries, Egypt, risk factors.

INTRODUCTION
Child injuries are a growing global public health problem. They are a significant area of concern from the age of one year onward and they contribute increasingly to overall rates of death until children reach adulthood. Hundreds of thousands of children die each year from injuries or violence, and millions suffer the consequences of non-fatal injuries. For each area of child injury, there are proven ways to reduce both the likelihood and severity of injury – yet awareness of the problem and its preventability, as well as political commitment to act to prevent child injury, remains unacceptably low. In 2005, The World Health Organization (WHO) issued a call for a greatly expanded global effort to prevent child injury (WHO 2005). This was
followed in 2006 by WHO’s ten-year plan of action on child injury (WHO 2006), which was followed in 2008 by the World report on child injury prevention (WHO 2008).

It was estimated that as many as 90% of unintentional injuries can be prevented (Centers for Disease Control and Prevention [CDC] 2006). A combination of education, environmental improvements, engineering modifications, enactment and enforcement of legislation and regulations, economic incentives, community empowerment and programme evaluation is effective at reducing the incidence and severity of unintentional injury-related death and disability (National SAFE KIDS Campaign 2004).

In 1999, an injury surveillance system was implemented in Egypt. Its main objectives were to assess the contribution of injuries to the overall burden of diseases in the country and to determine the incidence and characteristics of the different types of injuries. In 2007, the national injury surveillance programme reported 20 000 deaths and more than 746 000 injuries (WHO/EMRO & Ministry of Health [Egypt] 2010). With the need to increase our understanding of injuries, their pattern and characteristics, and the impact of injuries on affected individuals, the recommendation was made to conduct more in-depth studies, such as surveys or active surveillances (Kobusingye et al 2001; WHO 2001; El-Sayed et al 2003).

This study was initiated in response to the lack of reliable child injury data in Egypt. A standardised protocol was designed and implemented for data collection. The study objectives were to determine the frequency, nature and risk factors of childhood injuries in Ismailia city by means of an injury surveillance system for data collection in the Emergency Department (ED) of Suez Canal University Hospital.

The study represents the Egyptian chapter of the global childhood unintentional injury surveillance (GCUIS), which was intended to enhance the global evidence base for planning child injury interventions (Hyder et al 2009). Furthermore, this work was conducted in preparation for joining the Egyptian injury surveillance system.

**METHODOLOGY**

The study was conducted in the Suez Canal University Hospital, which is an 800-bed teaching referral tertiary hospital in Ismailia city. The city has a population of 300 000 inhabitants. All emergency patients are first seen in the Emergency Department (ED). From a common registration desk, patients are triaged into surgical or medical sections. Trauma patients, within our inclusion criteria, were included in the study.

A standard surveillance form was administered to the caretakers of injured children seen at the ED. The surveillance questions were based on a variety of sources, including the International Classification of External Causes of Injuries (ICECI), the South African Red Cross War Memorial Children’s Hospital injury surveillance study instrument, and previous work done in Pakistan (Ghaffar et al 2004; International Classification of External Causes of Injuries Coordination and Maintenance Group 2004; Laloo & Van As 2004; Fatmi et al 2007). By using a standardised electronic data entry form in Epi-Info version 3.3.2 (CDC 2006), the following data were recorded: demographic information; data on mortality and disability from injuries; injury severity score (ISS) (Baker et al 1974); risk factors such as age, gender, time of day and activity of the child when injured; use of safety measures; outcome of treatment in the ED; and expected outcome of the injury based on its ISS score. Physicians in the ED of the hospital were given comprehensive guidelines and training on using the surveillance instrument and how to grade injury severity (Gennarelli & Wodzin 2006).

In the study, injury was operationally defined as any type of unintentional damage to any body part. The study focused on children less than 12 years of age of either gender who presented to the ED. Quota sampling of 551 patients was collected from the ED for three months (August to October 2007). Excluded from the study were children who suffered intentional injuries perpetrated by others (i.e. stabbings, gunshot wounds, other physical violence or sexual abuse).
self-inflicted injury, and children without a parent or legal guardian. The respondent for the surveillance system was the caretaker who accompanied the child to the ED, while the unit of analysis was the injured child. Ethical approval for the study was secured from the research ethics committee (IRB) of the Suez Canal Medical School.

A pilot study was conducted in the Emergency Department of Suez Canal University Hospital. Results of the pilot study, which was based on non-random sequential sampling, were submitted to the multi-centre GCUIS study coordinating centre at Johns Hopkins University, Bloomberg School of Public Health (JHBSPH) for quality checks (Hyder et al 2009). Oral consent from caregivers was obtained and the research assistant conducted ten-minute interviews with the caregivers of the injured children.

RESULTS

The study sample consisted of 551 children less than 12 years of age that were seen in the Suez Canal University Hospital ED in Ismailia city in Egypt. Of the total study cases, 361 were males (66%). About 78% of injuries occurred while children were playing (figure 1). The majority of the children arrived at the ED by private vehicle (34%), while only 22% arrived by ambulances (public or private). Most children were brought to the ED by their mothers (51%) or fathers (44%). Injuries that were not traffic-related occurred mostly in and around the home or at school (table 1). The most common external causes of injuries were falls (60%), road traffic injuries (15%) and burns (7%) (figure 2). The most commonly sustained injuries were fractures (23%), cuts or open wounds (21%), sprains (20%), concussion (13%) and burns (13%) (figure 3). The majority of injured children in this study were treated and discharged, while 17% of them were admitted to the hospital and two died in the ED, both as a result of falls from a height. Of the children treated, 51% were expected to suffer no disability, 40% were expected to suffer short-term disability (< 6 weeks), 7% would probably suffer long-term disability (≥ 6 weeks), and 2% would suffer permanent disability. Overall ISSs were low across all injury types, except RTI (table 2).

Around 60% of families reported supervising their children while bathing, and 43% stored hazardous material away from children. However, only a few families recounted using car seatbelts (3%), car child restraints (1%), car air bags (0.5%) or bicycle helmets (1%) (table 3). The majority of children received care via the government insurance system.

Falls were the most common cause of injury among children who presented to the ED, which included 333 children (60%). They occurred mainly from stairs (37%) or from beds or other furniture (26%). Most falls occurred during play (88%), and those who fell were generally treated and discharged with no disability (73%). The mean ISS was 4, while the median was 3. Two children died from fall-related injuries (table 2).

Of the 81 children involved in road traffic injuries, 12% were pedestrians, 40% were car passengers and 21% were motorcycle or three-wheeler riders. The striking vehicles were cars (22%), motorcycles or three-wheelers (11%) and buses or trucks (10%) (table 4). About 15% of the road traffic injury cases required hospitalisation, and this form of injury was the second-highest injury to cause long-term disability (15%). The mean ISS for road traffic injury victims was 13, which was the highest of all injuries (table 2).

Of the 41 children with burns, 63% of them were burned by hot liquids, 17% by fire or flames, and 12% by hot objects. Burned children had the highest admission rate (61%), while their mean ISS was only 4 (table 2).
Table 1: Descriptive data surrounding childhood injuries (n = 551)

<table>
<thead>
<tr>
<th></th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mode of transport of injured child to hospital</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private car</td>
<td>185</td>
<td>33.6</td>
</tr>
<tr>
<td>Walking</td>
<td>124</td>
<td>22.5</td>
</tr>
<tr>
<td>Public ambulance</td>
<td>115</td>
<td>20.9</td>
</tr>
<tr>
<td>Taxi</td>
<td>95</td>
<td>17.2</td>
</tr>
<tr>
<td>Private ambulance</td>
<td>7</td>
<td>1.3</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Bicycle</td>
<td>21</td>
<td>3.8</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Who brought child to hospital?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>279</td>
<td>50.9</td>
</tr>
<tr>
<td>Father</td>
<td>242</td>
<td>43.9</td>
</tr>
<tr>
<td>Other family member</td>
<td>17</td>
<td>3.1</td>
</tr>
<tr>
<td>Teacher</td>
<td>6</td>
<td>1.1</td>
</tr>
<tr>
<td>Friend</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Where did injury occur?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home: outside</td>
<td>188</td>
<td>34.1</td>
</tr>
<tr>
<td>Home: inside</td>
<td>24</td>
<td>4.4</td>
</tr>
<tr>
<td>Road, street, highway</td>
<td>84</td>
<td>15.2</td>
</tr>
<tr>
<td>Schools and other public buildings</td>
<td>222</td>
<td>40.3</td>
</tr>
<tr>
<td>Farm and countryside</td>
<td>14</td>
<td>2.5</td>
</tr>
<tr>
<td>Sports/play area</td>
<td>6</td>
<td>1.1</td>
</tr>
<tr>
<td>Other/refused to answer/doesn’t know/no answer</td>
<td>13</td>
<td>2.4</td>
</tr>
</tbody>
</table>
Table 2: Outcome and projected effect of childhood injuries (485)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>RTI</th>
<th>Fall</th>
<th>Burn</th>
<th>Poisoning</th>
<th>Drowning</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Outcome of injury:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Treated and discharged with no disability</td>
<td>45</td>
<td>55.6</td>
<td>241</td>
<td>72.4</td>
<td>14</td>
<td>34.1</td>
</tr>
<tr>
<td>– Treated and discharged with disability</td>
<td>15</td>
<td>18.5</td>
<td>54</td>
<td>16.2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>– Admitted to hospital</td>
<td>12</td>
<td>14.8</td>
<td>17</td>
<td>5.1</td>
<td>25</td>
<td>61.0</td>
</tr>
<tr>
<td>– Died</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0.6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>– Other</td>
<td>9</td>
<td>11.1</td>
<td>19</td>
<td>5.7</td>
<td>2</td>
<td>4.9</td>
</tr>
<tr>
<td>Projected effect of injury:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– No significant disability</td>
<td>44</td>
<td>54.3</td>
<td>162</td>
<td>48.6</td>
<td>17</td>
<td>41.5</td>
</tr>
<tr>
<td>– Temporary disability (&lt; 6 weeks)</td>
<td>22</td>
<td>27.2</td>
<td>155</td>
<td>46.5</td>
<td>12</td>
<td>29.3</td>
</tr>
<tr>
<td>– Long-term disability (&gt; 6 weeks)</td>
<td>12</td>
<td>14.8</td>
<td>14</td>
<td>4.2</td>
<td>8</td>
<td>19.5</td>
</tr>
<tr>
<td>– Permanent disability</td>
<td>3</td>
<td>3.7</td>
<td>2</td>
<td>0.6</td>
<td>4</td>
<td>9.8</td>
</tr>
</tbody>
</table>

Injury severity score

| – Mean                           | 13      | 4      | 4      | 4         | 4         | 7       |
| – Median                         | 18      | 3      | 9      | 5         | 4         | 4       |

Total (No.)   81  333  41  19  11  485

Table 3: Safety measure used by participating families

<table>
<thead>
<tr>
<th>Safety measure</th>
<th>Number (Total 485)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision of bathing child</td>
<td>276</td>
<td>56.9</td>
</tr>
<tr>
<td>Storage of hazardous material</td>
<td>207</td>
<td>42.7</td>
</tr>
<tr>
<td>Use of bicycle helmet</td>
<td>6</td>
<td>1.2</td>
</tr>
<tr>
<td>Use of car seatbelt</td>
<td>11</td>
<td>2.7</td>
</tr>
<tr>
<td>Use of car child restraints</td>
<td>4</td>
<td>0.8</td>
</tr>
<tr>
<td>Use of car air bag</td>
<td>2</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Table 4: Road traffic injury data ($n = 81$)

<table>
<thead>
<tr>
<th>Road traffic injury data</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mode of transit: #</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Passenger car</td>
<td>32</td>
<td>39.5</td>
</tr>
<tr>
<td>– Three-wheeler</td>
<td>12</td>
<td>14.8</td>
</tr>
<tr>
<td>– Motorcycle</td>
<td>5</td>
<td>6.2</td>
</tr>
<tr>
<td>– Bus (&gt; 10 people)</td>
<td>6</td>
<td>7.4</td>
</tr>
<tr>
<td>– Minibus (&lt; 10 people)</td>
<td>5</td>
<td>6.2</td>
</tr>
<tr>
<td>– Bicycle</td>
<td>6</td>
<td>7.4</td>
</tr>
<tr>
<td>– Walk/Run</td>
<td>10</td>
<td>12.3</td>
</tr>
<tr>
<td>– Other/Unknown</td>
<td>6</td>
<td>7.4</td>
</tr>
<tr>
<td><strong>Striking vehicle or object: #</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Car</td>
<td>18</td>
<td>22.2</td>
</tr>
<tr>
<td>– Three-wheeler</td>
<td>7</td>
<td>8.6</td>
</tr>
<tr>
<td>– Motorcycle</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>– Bus (&gt; 10 people)</td>
<td>4</td>
<td>4.9</td>
</tr>
<tr>
<td>– Truck or heavy car</td>
<td>4</td>
<td>4.9</td>
</tr>
<tr>
<td>– Bicycle</td>
<td>4</td>
<td>4.9</td>
</tr>
<tr>
<td>– Other/Unknown</td>
<td>42</td>
<td>51.9</td>
</tr>
</tbody>
</table>

# Not all the respondents responded to these questions.

Figure 1: Activity of children at time of injury
DISCUSSION

This study describes the Egyptian chapter of the Global Childhood Unintentional Injury Surveillance (GCUIS) study in four cities in developing countries (Hyder et al 2009). The study describes ED-based injury surveillance systems for children in Egypt, based on a standardised method. The results provide insight into the burden of childhood injuries in Ismailia city in Egypt.

The present study showed that the most common external causes of injuries were falls (60%), road traffic injuries (15%) and burns (7%). Males included two-thirds (66%) of all injured children presented to the ED. The GCUIS study reported that the proportion of external causes of injuries in the four study sites (Egypt, Pakistan, Bangladesh and Colombia) were fairly similar (Hyder et al 2009).
Although fall injuries were numerous in this study, they caused much lower morbidity than road traffic injuries or burns. In many parts of the world, most childhood injuries treated in hospitals are due to falls that occur mainly at home (Bangdiwala et al 1990). These findings were common in the other countries involved in the GCUIS study (Hyder et al 2009). Falls were also the most common cause of injury in an early study conducted among school children in Ismailia city, Egypt (El-Sayed et al 2003). Furthermore, a study conducted in Tanzania reported that falls were also the most common cause of severe injuries in children less than 10 years of age (Kamala et al 2011). The study findings of a preponderance of falls from stairs or beds and other furniture while children were at play in and around the home suggests the need for a mixed intervention consisting of safer play areas, safer construction, safer furniture for sleeping and playing, and improved supervision (Butchart 2000; WHO 2005).

The fact that a high proportion of children suffered road traffic injuries (RTIs) and were either vehicle occupants or pedestrians suggests that children of all ages are vulnerable to RTIs. In studies from Pakistan, pedestrians and motorcyclists accounted for most of those injured and killed on the road, and 80% of all unintentional injuries and 67% of all resulting deaths in children were related to road traffic injuries (Razzak et al 2004). A study in Port-Said city in Egypt reported that pedestrians were involved in 81% of road traffic injuries (Hassan & El-Sheikh 1998). However, the present study showed that pedestrians represent only 12% of all RTIs. The study data also call attention to the frequent role of commercial vehicles in road traffic injuries in Egypt, where buses, trucks and three-wheelers were the striking vehicle in a large proportion of childhood injury cases. In other studies, buses have been the most common striking vehicle, even though they represent a small proportion of all vehicles on the road (Razzak et al 2004).

Most children affected by burns often required hospital admission. However, in the present study and the other countries of the GCUIS study, younger children were found to be at risk from playing near hot liquids at home (Cuenca-Pardo et al 2008; Hyder et al 2009). An epidemiological review of burns highlighted the importance of certain risk factors, such as low maternal education and lack of supervision (WHO 2006; Forjuoh 2006).

The present study and the other countries involved in the GCUIS study showed a considerable number of poisoning cases, predominantly with medicines and kerosene (Hyder et al 2009). Furthermore, our study showed that more than 57% of all families did not store hazardous material in safe places, which put children at risk of accidental poisoning that could be fatal without rapid treatment. Management of such cases requires intensive supportive care, provision of appropriate antidotes and removal of the substance from the body, all of which place substantial demands on the health-care system (Meyer et al 2007).

In the present study and the other GCUIS study countries, children who drowned or nearly drowned comprised only a small number of the injured children presenting to the ED. However, in a previous school-based study in Ismailia in Egypt, the prevalence of near-drowning among school children was 16% (El-Sayed et al 2007). This observation could be due to the fact that in low- and middle-income countries (LMICs) most drowning victims die before reaching health facilities. Our study showed that more than 43% of parents reported that they do not supervise their children while bathing, which suggests a potential point of intervention (Brenner 2002).

The results of a facility-based surveillance system such as this study cannot be representative of the entire population, as the data are dependent on how often individuals seek care for injured children and are thus subject to a host of financial, social and cultural factors and injury severity, which influence the decision to seek care (D’Souza 1999). Hospital-based data, especially in developing countries with lower rates of utilisation, underestimate the injury burden. The results of this study were therefore never meant to represent population-based morbidity from injuries.

The study focused only on unintentional injuries in children less than 12 years of age. As a result, the burden of intentional injuries (violence) and of injuries in children older than 12 years has not been captured. Another shortcoming is that the study was conducted over a period of three months; therefore, seasonal variability may have influenced the results.
Capacity development was essential for the study implementation. The Ministry of Health in Egypt is including university hospitals among MOH hospitals in the national injury surveillance programme (WHO/EMRO & MOH 2010). Since Suez Canal University Hospital will be included in this programme, this study was a very useful step for capacity building in preparation for the implementation of the injury surveillance programme in the hospital.

CONCLUSIONS

The results of the study illustrate the feasibility of documenting the burden of childhood injuries on health systems in Egypt and of undertaking standardised child injury surveillance. They also suggest the need for tailored injury-prevention research in the country, where the resulting data should encourage the conduct of interventional trials. The next step would be to implement appropriate injury-prevention strategies, such as safe storage of medicines and cleaning supplies, protection of children from hot liquids, improved pedestrian safety, supervision during bathing, and use of stair-blocking gates. Ongoing child injury surveillance using standardised methods in Egypt is a strategy needed to track injuries and their risk factors and to monitor the impact of appropriate interventions (WHO/EMRO & MOH 2010).

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COMPETING INTERESTS

None declared.

REFERENCES


Urban and rural differences in child injury deaths in South Africa: A one-year review

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Abstract

Injury, a major cause of morbidity and mortality for children worldwide, is concentrated in low- to middle-income countries (LMICs). Despite the growing rate of childhood injury in LMICs, effective prevention and control remain inadequate owing to the lack of comprehensive epidemiological information on the external causes and magnitude of this problem. This population-based study examined whether the incidence and the pattern of fatal injuries among children differ in rural and urban areas of South Africa. The National Injury Mortality Surveillance System (NIMSS) was used to select cases for the period of 2007. Age- and gender-specific incidence rates for rural and urban children were computed for specific injury types. Following a cross-sectional method, we analysed all deaths among children below 15 years of age in Gauteng (urban) and Mpumalanga (rural) who died in 2007. For the year 2007, NIMSS recorded a total of 612 injury deaths among children in Mpumalanga (rural) and another 1 400 injury deaths among children in Gauteng (urban). Equally high overall injury death rates were found among children from Gauteng (31.7/100 000) and Mpumalanga (29.2/100 000). The study also revealed several differences with respect to the primary external causes of child injury-related deaths across the two provinces. In particular, passenger-related motor vehicle deaths were more evident among children in rural areas than in urban areas, while other unintentional (non-transport-related) deaths – specifically those associated with burns – were more common among urban children than among rural children.

Such differences may arise because of the many environmental and infrastructure-related differences that exist between rural and urban areas. Therefore, prevention and intervention efforts in South Africa should focus on the risk factors that are unique to urban and rural children respectively.

Keywords: childhood, urban, rural, deaths

INTRODUCTION

Globally, the magnitude and patterns of injury death and disability among children (see Peden, Oyegbite, Ozanne-Smith, Hyder, Branche, Fazlur Rahman, Rivara & Bartolomeos 2008) are influenced by factors such as stage of development, inexperience, and the physical and socioeconomic environments in which they live. Geography is as an important explanatory factor in accounts of injury variation. For instance, child injury death rates are higher in low- and middle-income countries than in high-income countries (UNICEF 2001). Within individual countries, the frequency and patterns of child injury
mortality vary between rural and urban areas, with several studies having reported variations in the frequency and type of injury occurring in rural versus urban areas (Boland, Staines, Fitzpatrick & Scallan 2005; Coyne-Beasley, Schoenbach & Herman-Giddens 1999; Du, Finch, Hayden & Hatfield 2007; Fingerhut, Ingram & Feldman 1998; Hwang, Stallones & Keefe 1997; Kmet & Macarthur 2006; Nance, Denysenko, Durbin, Branas, Stafford & Schwab 2002).

Studies conducted in Australia, Canada, Ireland and the United States of America (USA) have found that unintentional injury death rates, especially those related to motor vehicle injury deaths, are considerably higher among rural children than among their urban counterparts (Boland et al 2005; Du et al 2007; Hwang et al 1997; Kmet & Macarthur 2006). Rural children’s vulnerability may be related to their challenging living environments (Boland et al 2005), the lack of access to medical care services and differences in behavioural norms (Zwerling, Peek-Asa, Whitten, Choi, Sprince & Jones 2005). The pattern is somewhat different for intentional injuries, where studies in the United States reveal that urban children are more susceptible to homicides and assaults, particularly those associated with firearms, compared with children living in rural or small urban areas (Coyne-Beasley et al 1999; Fingerhut et al 1998; Nance et al 2002).

Such studies highlight the need for childhood injury prevention strategies and interventions to be sensitive to geographic variations. However, most of our understanding of the influence of geography on childhood injury magnitude and patterns arises from studies conducted in high-income countries. Of the limited research conducted in LMICs, urban–rural differences appear to differ according to geographical region. For example, a review of community-based studies of unintentional injuries in children in Southeast Asian countries found that injury rates for road traffic incidents, drowning and burns were higher among rural than among urban children in all countries (Pant & Towner 2010). However, in a study examining injury patterns in rural and urban Uganda, the overall injury rate was higher in the urban setting (Kobusingye, Guwatudde & Lett 2001). Furthermore, road traffic injuries were the leading cause of death in the city, while drowning was the main cause in the rural setting. In another study conducted in Tanzania (Africa), transport-related nonfatal injuries were higher in the urban area of Dar es Salaam, while nonfatal injuries due to falls and cuts were higher among rural residents in Hai (Moshiro, Heuch, Åstrøm, Setel, Hemed & Kvåle 2005). This shows a need to consider low- to middle-income country particularities in geographical analyses of childhood injuries.

For instance, in South Africa, the rate of urbanisation has increased dramatically over the past few years, partly as a result of natural population growth and migration into urban areas. The 2001 Census indicated that the majority (56%) of South Africans lived in urban areas (Statistics South Africa 2006). In the context of rapid urbanisation, many children live in informal settlements, on the periphery of cities. These areas are characterised by inadequate housing, poor sanitation and high levels of unemployment and poverty (South African Cities Network 2011) – conditions that increase children’s risk of injury. In South Africa, as in other low- and middle-income countries, rapid urbanisation has placed a strain on local and national authorities to provide basic services. The current rapid pace of urban growth typically exceeds the capacity of most cities to provide adequate services for their residents (Cohen 2006).

Despite the high level of urbanisation, most of South Africa’s children (54%) reside in rural areas (Children’s Institute 2007) where poverty is prevalent. About 54% of rural households experience poverty, in comparison with around 22% of urban households. In addition, within rural areas, access to important services and facilities, such as medical care, is often linked with long travelling distances, making it more expensive (Armstrong, Lekezwa & Siebrits 2008).

In an attempt to consider such particularities and help to improve geographically focused analysis, this article aims to compare the magnitude and patterns of childhood injury mortality in two South African provinces, namely Gauteng and Mpumalanga. Whereas Gauteng is defined as predominantly urban, Mpumalanga is mainly rural in nature. Although there are no agreed-upon universal criteria delineating rural and urban areas, they may be distinguished by differences along several dimensions, including infrastructure, social services, non-agricultural employment, income and population density (World Bank 2011).
Studies drawing on urban-based data systems show that in South Africa, road traffic injuries (particularly pedestrian incidents), burns, drowning and – in some cities – firearm injuries are among the leading causes of unnatural death for children aged 14 and younger (Matzopoulos 2004; Burrows, Van Niekerk & Laflamme 2010), while pedestrian injuries, burns, falls and poison ingestion are the leading causes of nonfatal injuries among children. In South African cities, injuries in general appear to be concentrated in low-income neighbourhoods characterised by a lack of infrastructure and resources, overcrowding and high levels of unemployment and poverty – conditions that are typical of informal settlements (Butchart, Kruger & Lekoba 2000; Van Niekerk, Seedat, Bulbulia & Kruger 2001). Poor housing, including the lack of clearly demarcated areas for cooking or washing, inadequate recreation space, the use of open fires and paraffin (kerosene) stoves and heaters – owing to the lack of electricity – and the lack of safe storage for paraffin and other harmful substances, are among the major hazards that place children at risk of burns, poisoning and fall-related injuries (Butchart et al 2000; Van Niekerk, Rode & Laflamme 2004). These high rates highlight the urgent need for intervention to reduce child injury deaths in South Africa. However, as already alluded to above, much of the analysis on childhood fatal injuries in South Africa is based on the National Injury Mortality Surveillance System (NIMSS), which assumed an urban concentration. Limited rural-based studies in South Africa suggest that major causes of injury mortality among rural children may differ somewhat from urban children. For example, a study conducted in a rural district of KwaZulu-Natal province found that road traffic incidents (mainly pedestrian) were the single most common cause of death among children (0–9 years), while from the age of 10 upwards, homicide dominated as the leading cause of injury death (Garrib, Herbst, Hosegood & Newell 2011). Similarly, in the rural region of Transkei in the Eastern Cape province, Meel (2006; 2008) found that motor vehicle accidents and homicides were the leading causes of injury death among children. Therefore, interventions to reduce child injury deaths in South Africa must take into account the unique needs of urban and rural children respectively.

In recent years, the NIMSS has expanded its coverage to include rural areas. In 2007 the NIMSS obtained full injury death coverage of two of South Africa’s nine provinces, namely Gauteng and Mpumalanga. Even though full coverage was not continuous for subsequent years because of various institutional factors, the 2007 data present an empirical opportunity to examine urban–rural injury mortality rates of the general population across the two provinces (see Sherriff, Mackenzie, Swart, Seedat, Bangdiwala & Ngude, forthcoming). Therefore, our study specifically aims to compare the following: (1) the overall injury death rates and the distribution of unintentional and intentional injury deaths; (2) the top five external causes of injury death; (3) traffic mortality rates by road-user type; (4) non-traffic unintentional death rates by external cause; (5) homicide rates by external cause; and (6) suicide rates by external cause among children (0–14 years) across urban Gauteng and rural Mpumalanga in South Africa for the year 2007.

**METHODS**

In South Africa, the Children’s Act 38 of 2005 defines a child as a person under the age of 18 years, which is consistent with the definition specified in the United Nations International Convention on the Rights of the Child (1989). The literature on child injury, however, uses various ranges, such as 0–14 years, 0–17 years and 0–19 years (see Peden et al 2008; UNICEF 2001). In this study we specifically focus on children between the ages of 0 and 14 years, as – both locally and internationally – injuries assume a significant intentional dimension from the age of 15 years upwards (Matzopoulos 2004; Pinheiro 2006).

**Site information**

Urban areas are defined as localities characterised by a threshold population of greater than 1 000 and a population density of greater than or equal to 500 per square kilometre. Following this definition, Statistics South Africa (2003b) classifies 88.5% of the population in Gauteng and 38.33% of the population in Mpumalanga as urban dwellers. (See table 1 for a description of selected population and housing characteristics of the two provinces).
Gauteng, a predominantly urban province, has the smallest land surface of the nine provinces in South Africa, covering just over 17 000 square kilometres. Despite its size, the province is highly urbanised, with three of South Africa’s eight metropolitan municipalities being located in Gauteng, namely the City of Johannesburg, the City of Tshwane (Greater Pretoria) and the Ekurhuleni Metropolitan. The province contributes 33.5% to the national gross domestic product (GDP) (Statistics South Africa 2009). Gauteng has the second-largest population (8 837 178) (Statistics South Africa 2003a) of the nine provinces in South Africa, with a population density of 519.5 people per square kilometre. Mid-year population estimates for 2007 revealed that just over 2.5 million children (0 to 14 years) live in Gauteng, constituting just over a quarter of the total population (Statistics South Africa 2007).

Mpumalanga is the second-smallest province in South Africa, covering 79 490 square kilometres. The province is primarily rural, comprising coal mines, farmlands, forest plantations and nature reserves; it contributes 6.9% to the national GDP. With a population of 3 122 990 (Statistics South Africa 2003a), Mpumalanga has approximately 39.3 people per square kilometre. Just over 1.2 million children (0 to 14 years) live in Mpumalanga, constituting over a third of the total population (Statistics South Africa 2007).

Table 1 provides selected population and housing characteristics for Gauteng and Mpumalanga provinces. With respect to family structure, just over half (54.6%) of Gauteng’s children live with their biological parents, while less than a third (30.8%) of Mpumalanga’s children do so.

Unemployment and poverty levels are also higher in Mpumalanga than in Gauteng. Even though most (82.3%) of Gauteng children live in households with at least one employed adult, almost half (47.5%) are living below the poverty line. Around 12.4% also live in households where there is reported hunger. Conditions are different in Mpumalanga: less than two-thirds (64.7%) of children live in households where there is at least one employed adult. The vast majority (74.2%) live in income poverty, and 16.1% live in households where there is reported hunger.

Most of Gauteng’s (96.0%) and Mpumalanga’s (97.7%) school-age children attend school, with children living in Mpumalanga generally having further to travel to school than those living in Gauteng. Similarly, more children in Mpumalanga than in Gauteng live far from the nearest clinic. The availability and distribution of health services is also poorer in Mpumalanga than in Gauteng. For example, in 2007 the ratio of the population per qualified nurse in Mpumalanga was 359:1, compared with 182:1 in Gauteng (South African Nursing Council 2007).

Fewer of Gauteng’s children (67.9%) than Mpumalanga’s (79.8%) live in formal housing. Furthermore, around a third (30.6%) of Gauteng’s children live in overcrowded households, compared with around a quarter (24.6%) in Mpumalanga. However, a higher percentage of children in Gauteng than in Mpumalanga have access to basic services, such as water on site (91.0% vs 71.8%) and basic sanitation (87.7% vs 52.2%), while slightly more children in Mpumalanga than in Gauteng have access to electricity (88.4% vs 82.0%). Household usage of wood for cooking is higher in Mpumalanga than in Gauteng, while the use of paraffin for cooking is higher in Gauteng.

With regard to road traffic, Gauteng has a considerably higher volume (55 vehicles per one kilometre of road) than Mpumalanga (8 vehicles per one kilometre of road). However, vehicle occupancy rates are much higher in Mpumalanga (8.54 persons per vehicle and 161 persons per passenger transport vehicle) than in Gauteng (3.36 persons per vehicle and 85 persons per passenger transport vehicle). In terms of mode of travel, 38.6% of Gauteng children travel on foot, 13.7% travel by car (as a passenger) and 12.2% travel by public transport, such as minibus-taxis and buses, while more than half (56.3%) of Mpumalanga children travel on foot, 3.4% travel by car (as a passenger) and 5.2% travel by public transport.
Table 1: Selected population and housing characteristics of Gauteng and Mpumalanga provinces

<table>
<thead>
<tr>
<th>Province</th>
<th>Gauteng</th>
<th>Mpumalanga</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong>a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9 688 100</td>
<td>3 536 300</td>
</tr>
<tr>
<td>Number of children (0-14 years)</td>
<td>2 544 000</td>
<td>1 232 500</td>
</tr>
<tr>
<td>Male</td>
<td>1 285 800</td>
<td>616 800</td>
</tr>
<tr>
<td>Female</td>
<td>1 258 200</td>
<td>615 700</td>
</tr>
<tr>
<td><strong>Family structure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living with biological parentsb</td>
<td>54.6%</td>
<td>30.8%</td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living with biological mother onlyb</td>
<td>31.7%</td>
<td>42.4%</td>
</tr>
<tr>
<td>Child-headed householdsb</td>
<td>0.2%</td>
<td>0.6%</td>
</tr>
<tr>
<td><strong>Unemployment and poverty</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living in households with an employed adultb</td>
<td>82.3%</td>
<td>64.7%</td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living in income povertyb</td>
<td>47.5%</td>
<td>74.2%</td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living in households where there is reported hungerb</td>
<td>12.4%</td>
<td>16.1%</td>
</tr>
<tr>
<td><strong>Access to health care services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living far from the nearest clinicb</td>
<td>21.8%</td>
<td>37.6%</td>
</tr>
<tr>
<td>Population per qualified nursef</td>
<td>186:1</td>
<td>294:1</td>
</tr>
<tr>
<td><strong>Access to education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of school-age children attending schoolb</td>
<td>96.0%</td>
<td>97.7%</td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living far from the nearest primary schoolb</td>
<td>11.1%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living far from the nearest secondary schoolb</td>
<td>17.1%</td>
<td>32.5%</td>
</tr>
<tr>
<td><strong>Access to housing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living in formal housingb</td>
<td>67.9%</td>
<td>79.8%</td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living in overcrowded householdsb</td>
<td>30.6%</td>
<td>24.6%</td>
</tr>
<tr>
<td><strong>Access to basic services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living in households with water on siteb</td>
<td>91.0%</td>
<td>71.8%</td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living in households with basic sanitationb</td>
<td>87.7%</td>
<td>52.2%</td>
</tr>
<tr>
<td>Percentage of children (0–17 years) living in households with electricity connectionb</td>
<td>82.0%</td>
<td>88.4%</td>
</tr>
<tr>
<td>Percentage of households using wood for cookingc</td>
<td>0.9%</td>
<td>20.2%</td>
</tr>
<tr>
<td>Percentage of households using paraffin for cookingc</td>
<td>10.3%</td>
<td>6.4%</td>
</tr>
<tr>
<td><strong>Mode of travel</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of children (0–14 years) who travel on footd</td>
<td>38.4%</td>
<td>53.0%</td>
</tr>
<tr>
<td>Percentage of children (0–14 years) who travel by car as passengerd</td>
<td>14.6%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Percentage of children (0–14 years) who travel by minibus/taxihe</td>
<td>6.8%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Percentage of children (0–14 years) who travel by busd</td>
<td>3.5%</td>
<td>2.4%</td>
</tr>
<tr>
<td><strong>Road traffic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of vehicles per one kilometre of roadd</td>
<td>55</td>
<td>8</td>
</tr>
<tr>
<td>Number of persons per vehicle (excluding trucks)d</td>
<td>3.36</td>
<td>8.54</td>
</tr>
<tr>
<td>Number of persons per passenger transport vehicle (minibuses and buses)d</td>
<td>85</td>
<td>161</td>
</tr>
</tbody>
</table>

Sources:
(b) Pendlebury, S. Lake, L & Smith, C. (eds). (2009). South African child gauge 2008/2009. Cape Town: Children’s Institute, University of Cape Town. (Children are defined as those individuals younger than 18 years.)
(c) Statistics South Africa. (2003). Census in brief.
Data analysis

The frequency and percentage of the apparent manner and external cause of death are presented to compare the distribution of unintentional, homicide and suicide deaths, as well as the top five external causes of injury death among children in both provinces. To compare traffic, non-traffic unintentional, homicide, and suicide child injury deaths, age- and sex-specific rates were computed for each province. Mid-year population estimates for the specific age group, sex and province were used to calculate the rates for 2007 (Statistics South Africa 2007) (see table 1 for population estimates). Whenever at least one of the provinces had more than 10 cases of a specific external cause of child injury death, differences between the rates (urban vs rural) were computed to draw a comparison between the two provinces. The formulas outlined by the Pennsylvania Department of Health’s Tools of the trade were used to compute the 95% confidence interval directly for the difference between the two province rates to determine whether a significant difference exists. A 95% confidence limit (CL) was constructed for each of the two province rates (CL = 1.96 x (rate/square root of number of injury deaths)). Then the 95% confidence interval (CI) for the difference between the two rates (D) was computed using the following formula:

\[
CI = D \pm \sqrt{CL1^2 + CL2^2}
\]

where: \(CL1 = \text{confidence limit for Gauteng rate}\) and \(CL2 = \text{confidence limit for Mpumalanga rate}\). Confidence intervals (CIs) not containing the value 0 indicate that the difference between the province rates is significantly different with 95% confidence (Pennsylvania Department of Health, n.d.).

RESULTS

The NIMSS recorded a total of 800 child injury deaths in Gauteng and 360 in Mpumalanga for the year 2007. Total overall injury death rates were slightly higher among children in Gauteng (31.7/100 000) than among those in Mpumalanga (29.2/100 000). Of the child injury deaths in Gauteng, the overwhelming majority were unintentional (\(n = 712; 89.0\%\)), followed by homicide (\(n = 72; 9.0\%\)) and suicide (\(n = 16; 2.0\%\)). A similar pattern was noted for Mpumalanga, where 87.5\% (\(n = 315\)) of the child injury deaths were unintentional, 10.5\% (\(n = 38\)) were homicide and 2.0\% (\(n = 7\)) were suicide.

Figure 1 presents the top five causes of child injury death in Gauteng and Mpumalanga respectively. In Gauteng, child injury deaths were caused primarily by pedestrian injuries, followed by burns, drowning, passenger-related injuries and fall-related injuries, which together accounted for more than two-thirds (\(n = 558; 69.8\%\)) of all child injury deaths in that province. In Mpumalanga, pedestrian injuries, followed by passenger-related deaths, drowning, burns and poisoning were
the main causes of child injury deaths. Over three-quarters \((n = 278; 77.2\%)\) of all the child injury deaths in Mpumalanga were the result of one of the top five causes of fatal injury.

![Top five causes of fatal injury in children aged 0–14 years by province, 2007](image)

**Figure 1: Top five causes of fatal injury in children aged 0–14 years by province, 2007**

**Traffic-related injuries**

Although the motor vehicle injury death rates were generally higher among Mpumalanga children, only female deaths were significantly higher in Mpumalanga \((13.5/100 000)\) than in Gauteng \((8.6/100 000)\) (see table 2). Pedestrian injuries were the leading cause of traffic mortality among male and female children in both provinces, with no significant differences between the rates for the provinces. However, for motor vehicle passenger deaths, the rates were significantly higher for both boys and girls in Mpumalanga \((7.3/100 000 \text{ and } 6.3/100 000)\) than in Gauteng \((3.1/100 000 \text{ and } 1.5/100 000)\). For both provinces, male pedestrian and passenger fatalities were higher than those for females.

**Table 2: Child traffic-related injury death rates/100 000 and rate ratios by province by external cause and sex, South Africa 2007**

<table>
<thead>
<tr>
<th>External Cause</th>
<th>Gauteng N</th>
<th>Rate</th>
<th>Gauteng N</th>
<th>Rate</th>
<th>Difference in rates</th>
<th>(95% CI)(^a)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children (0–14 yrs)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrian</td>
<td>211</td>
<td>16.4</td>
<td>120</td>
<td>19.5</td>
<td>-3.0</td>
<td>(-7.2 \text{ to } 1.1)</td>
</tr>
<tr>
<td>Passenger</td>
<td>145</td>
<td>11.3</td>
<td>65</td>
<td>10.5</td>
<td>0.7</td>
<td>(-2.4 \text{ to } 3.9)</td>
</tr>
<tr>
<td>Other</td>
<td>40</td>
<td>3.1</td>
<td>45</td>
<td>7.3</td>
<td>-4.2</td>
<td>(-6.5 \text{ to } -1.8)</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestrian</td>
<td>108</td>
<td>8.6</td>
<td>83</td>
<td>13.5</td>
<td>-4.9</td>
<td>(-8.2 \text{ to } -1.6)</td>
</tr>
<tr>
<td>Passenger</td>
<td>78</td>
<td>6.2</td>
<td>42</td>
<td>6.8</td>
<td>-0.6</td>
<td>(-3.1 \text{ to } 1.9)</td>
</tr>
<tr>
<td>Other</td>
<td>19</td>
<td>1.5</td>
<td>39</td>
<td>6.3</td>
<td>-4.8</td>
<td>(-6.9 \text{ to } -2.7)</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>0.9</td>
<td>2</td>
<td>0.3</td>
<td>0.5</td>
<td>(-0.1 \text{ to } 1.2)</td>
</tr>
</tbody>
</table>

\(^a\) Significant injury rate ratios are in bold.

**Other unintentional injuries**

The overall unintentional (non-transport-related) injury deaths were significantly higher among Gauteng boys \((18.8/100 000)\) and girls \((12.2/100 000)\) than among Mpumalanga boys \((13.0/100 000)\) and girls \((5.4/100 000)\) (see table 3). Among male children, the burns death rate was significantly higher for Gauteng \((6.1/100 000)\) than for Mpumalanga \((2.6/100 000)\).
Table 3: Unintentional injury death rates/100 000 and rate ratios comparing rural and urban children by external cause and gender, South Africa 2007

<table>
<thead>
<tr>
<th></th>
<th>Gauteng</th>
<th>Mpumalanga</th>
<th>Difference in rates</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children (0–14 yrs)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Males</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burns</td>
<td>242</td>
<td>78</td>
<td>5.9</td>
<td>2.1 to 9.6</td>
</tr>
<tr>
<td>Drowning</td>
<td>74</td>
<td>35</td>
<td>0.1</td>
<td>–2.2 to 2.4</td>
</tr>
<tr>
<td>Poisoning</td>
<td>16</td>
<td>11</td>
<td>–0.5</td>
<td>–1.8 to 0.7</td>
</tr>
<tr>
<td>Electrocution</td>
<td>16</td>
<td>5</td>
<td>0.4</td>
<td>–0.5 to 1.4</td>
</tr>
<tr>
<td>Falls</td>
<td>22</td>
<td>2</td>
<td>1.4</td>
<td>0.5 to 2.2</td>
</tr>
<tr>
<td>Medical procedure</td>
<td>15</td>
<td>1</td>
<td>1.0</td>
<td>0.3 to 1.7</td>
</tr>
<tr>
<td>Suffocation</td>
<td>11</td>
<td>1</td>
<td>0.7</td>
<td>0.1 to 1.3</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>9</td>
<td>–0.7</td>
<td>–1.7 to 0.4</td>
</tr>
<tr>
<td><strong>Females</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burns</td>
<td>153</td>
<td>60</td>
<td>6.8</td>
<td>4.1 to 9.5</td>
</tr>
<tr>
<td>Drowning</td>
<td>32</td>
<td>14</td>
<td>0.3</td>
<td>–1.2 to 1.8</td>
</tr>
<tr>
<td>Poisoning</td>
<td>14</td>
<td>3</td>
<td>0.6</td>
<td>–0.2 to 1.4</td>
</tr>
<tr>
<td>Electrocution</td>
<td>4</td>
<td>1</td>
<td>0.2</td>
<td>–0.3 to 0.6</td>
</tr>
<tr>
<td>Falls</td>
<td>10</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Medical procedure</td>
<td>14</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Suffocation</td>
<td>3</td>
<td>0</td>
<td>–0.2</td>
<td>–0.9 to 0.4</td>
</tr>
<tr>
<td>Other</td>
<td>16</td>
<td>4</td>
<td>0.6</td>
<td>–0.3 to 1.5</td>
</tr>
</tbody>
</table>

*Excludes traffic-related injury deaths*

The rates for deaths associated with falls, medical procedures and suffocation were also significantly elevated for Gauteng boys in comparison with Mpumalanga boys. Similarly, the burns death rate was significantly higher among Gauteng girls (4.8/100 000) than among girls in Mpumalanga (2.6/100 000).

Although no significant differences were noted across the two provinces, drowning was one of the leading causes of unintentional deaths among children, with the rates being more pronounced for male children than for female children in both provinces.

**Homicides**

Compared with traffic and other unintentional injury death rates, homicide rates were generally low among children, with no significant differences between the provinces (see table 4). However, whereas blunt objects (1.2/100 000) were the leading external cause of male child homicides in Gauteng, firearms (1.1/100 000) were the leading contributor to male child homicides in Mpumalanga. Child female homicide rates for both provinces, on the other hand, were caused primarily by blunt objects and strangulation.
Table 4: Homicide death rates/100 000 and rate ratios comparing urban and rural children (0–14 years) by external cause and gender, South Africa 2007

<table>
<thead>
<tr>
<th></th>
<th>Gauteng</th>
<th>N</th>
<th>Rate</th>
<th>Mpumalanga</th>
<th>N</th>
<th>Rate</th>
<th>Difference in rates</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children (0–14 yrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firearms</td>
<td></td>
<td>11</td>
<td>0.9</td>
<td></td>
<td>7</td>
<td>1.1</td>
<td>−0.3</td>
<td>−1.3 to 0.7</td>
</tr>
<tr>
<td>Sharp object</td>
<td></td>
<td>4</td>
<td>0.3</td>
<td></td>
<td>3</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blunt object</td>
<td></td>
<td>16</td>
<td>1.2</td>
<td></td>
<td>4</td>
<td>0.6</td>
<td>0.6</td>
<td>−0.3 to 1.5</td>
</tr>
<tr>
<td>Strangulation</td>
<td></td>
<td>2</td>
<td>0.2</td>
<td></td>
<td>4</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>12</td>
<td>0.9</td>
<td></td>
<td>8</td>
<td>1.3</td>
<td>−0.4</td>
<td>−1.4 to 0.7</td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firearms</td>
<td></td>
<td>3</td>
<td>0.2</td>
<td></td>
<td>2</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sharp object</td>
<td></td>
<td>1</td>
<td>0.1</td>
<td></td>
<td>1</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blunt object</td>
<td></td>
<td>6</td>
<td>0.5</td>
<td></td>
<td>5</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strangulation</td>
<td></td>
<td>6</td>
<td>0.5</td>
<td></td>
<td>3</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>11</td>
<td>0.9</td>
<td></td>
<td>1</td>
<td>0.2</td>
<td>0.7</td>
<td>0.1 to 1.3</td>
</tr>
</tbody>
</table>

Suicides

Suicides were relatively uncommon among children, with no significant difference noted across the two provinces (see table 5). The majority of suicides for both boys and girls in Gauteng and Mpumalanga were associated with hanging.

Table 5: Suicide death rates/100 000 and rate ratios comparing rural and urban children (0–14 years) by external cause and gender, South Africa 2007

<table>
<thead>
<tr>
<th></th>
<th>Gauteng</th>
<th>N</th>
<th>Rate</th>
<th>Mpumalanga</th>
<th>N</th>
<th>Rate</th>
<th>Difference in rates</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children (0–14 yrs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td></td>
<td>10</td>
<td>0.8</td>
<td></td>
<td>6</td>
<td>1.0</td>
<td>−0.2</td>
<td>−1.1 to 0.7</td>
</tr>
<tr>
<td>Hanging</td>
<td></td>
<td>8</td>
<td>0.6</td>
<td></td>
<td>5</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>2</td>
<td>0.2</td>
<td></td>
<td>1</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hanging</td>
<td></td>
<td>6</td>
<td>0.5</td>
<td></td>
<td>1</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>5</td>
<td>0.4</td>
<td></td>
<td>1</td>
<td>0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>1</td>
<td>0.1</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

Child injury deaths appear to be a major problem in both urban and rural areas in South Africa, with the current study reporting equally high overall injury deaths rates among children from Gauteng (31.7/100 000) and Mpumalanga.
While the overwhelming majority of these child deaths were unintentional, the study revealed several differences with respect to the primary external causes of child injury-related deaths across the two provinces. In Gauteng the child injury death rate was primarily caused by pedestrian road traffic incidents, burns, drowning, motor vehicle passenger injuries and falls, while in Mpumalanga, pedestrian motor vehicle incidents, followed by motor vehicle passenger-related injuries, drowning, burns and poisoning were the primary causes of child injury deaths. Accordingly, pedestrian-related injury deaths and drowning among children are a problem across urban and rural areas. However, passenger-related motor vehicle injury deaths were more evident among children in rural than in urban areas, while other unintentional (non-transport-related) deaths, specifically those associated with burns, were more common among urban children than among rural children.

Consistent with previous research comparing rural and urban environments, the current study found that the incidence of motor vehicle passenger deaths among children is higher in rural than in urban areas (Zwerling et al 2005). Differences in transport usage and consequent traffic patterns between the two provinces may partly account for the variation in child motor vehicle passenger deaths. The much lower traffic volume in the more rural province of Mpumalanga, compared with the volume in urban Gauteng, suggests that travelling speeds in Mpumalanga are likely to be higher; consequently, motor vehicle collisions occurring in that province result in more severe injuries and deaths than do those collisions that occur in Gauteng. Furthermore, a larger proportion of children and adolescents in Mpumalanga travel long distances to access services such as health and education. Therefore, even though a lower percentage of Mpumalanga children may make use of motorised transport, they may nevertheless be more at risk for sustaining severe injuries as a motor vehicle passenger owing to higher travelling speeds for longer distances in Mpumalanga than in Gauteng. Furthermore, many of the vehicles transporting passengers in South Africa, such as minibus-taxis and buses, are not equipped with occupant restraints. Environmental and infrastructural factors, such as the increased number of heavy and long vehicles – especially large slow-moving trucks hauling coal, steel and timber – on Mpumalanga road networks, as well as poor road conditions and insufficient maintenance, may also contribute to passenger deaths in Mpumalanga. In addition, the limited availability of emergency services may also contribute to the higher fatality rates in Mpumalanga (Muellemann & Mueller 1996; Wylie & Kimball 1997). Rural motor vehicle accidents may not be witnessed; as a result, efforts to summon help may be significantly delayed. Response time may also be longer because of the distance that may have to be travelled in the event of a crash (Brodsky 1993; Young et al 1997; Zwerling et al 2005). Interventions to reduce motor vehicle passenger deaths inMpumalanga should focus on motor vehicle travelling speeds and the improvement of road conditions to accommodate various types of vehicles sharing the roads. Finally, bringing basic services such as health care and education closer to where rural children live would minimise the need for motorised travel and thus reduce the incidence of childhood motor vehicle passenger deaths.

The increased risk of burn-related deaths among children in the primarily urban province of Gauteng may be attributed to the higher percentage of children living in informal settlements in and around the cities of Johannesburg, Ekurhuleni and Tswane than is the case with children in Mpumalanga. Inadequate housing facilities, overcrowding and poverty are among the conditions that place children living in informal settlements at risk of burn-related injuries. In particular, the use of low-cost paraffin and open fires for cooking, heating and lighting are among the major hazards that place children at risk (Van Niekerk, Rode & Laffamme 2004). Furthermore, the close proximity of shacks means that uncontained fires are likely to spread quickly through the informal settlement areas. Accordingly, child burn prevention initiatives in urban areas need to include a focus on general socioeconomic and environmental upliftment, particularly in these low-income informal areas (Van Niekerk et al 2004).

Despite the above differences in injuries noted among rural and urban children, the study also found injuries of which children from both provinces were equally at risk. In particular, pedestrian deaths were high among children from both provinces. Similarly, drowning appeared to be a specific problem for male children from both provinces. While efforts
to manage the injury problem among South African children require that the problem of pedestrian injury deaths and drowning be addressed, further research is needed to determine the unique risk profiles for both injury types for the two provinces so that appropriate interventions for prevention may be implemented.

CONCLUSION

In conclusion, our findings have shown that the rates of urban and rural childhood deaths differ, which suggests that prevention and intervention programmes could be better targeted to the needs of specific geographic populations of South African children. However, the current study has several limitations that need to be addressed in further studies. First, the analysis was restricted to a single year of data; thus the rates reported in this study are based on small numbers of events that may fluctuate widely from year to year, and may therefore lack stability, as suggested by some of the wide confidence intervals. Accordingly, the analyses may have lacked power; consequently, significant differences in rates between the urban and rural areas may have been underestimated. The study is also limited in that the NIMSS does not provide an extensive picture of injury risk. In particular, information regarding the scene and circumstances of the injury event are also essential for understanding the injury risk profile for children in rural and urban areas. Therefore, further research (e.g. social, demographic and environmental factors) is needed to elaborate on the specific risks of rural and urban areas in South Africa so that prevention measures may be tailored to address and reduce the injury death rates among children.

REFERENCES


Children’s Institute, University of Cape Town. Children count – Abantwana babalulekile.


Demographic and contextual influences in injury risk among adolescents in a low-income country setting: Results from a school-based survey in Tanzania

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Abstract

Objective: This study investigated the social, demographic and contextual factors associated with injury among adolescents in a low-income urban sub-Saharan African setting.

Methods: Data on 2,176 adolescents aged 11–16 years were divided into three groups: Those that reported not being injured, those that had been injured once, and those that had been injured multiple times within a 12-month recall period. We conducted bivariate analyses to screen for associations with several social, demographic and contextual factors. Then a multinomial logistic regression was performed to examine associations while adjusting for covariates.

Results: Within the recall period, 22.14% of participants reported one serious injury and 10.96% reported multiple injuries. Compared with non-injured participants, those injured two or more times were mainly male (relative risk ratio (RRR) = 1.71 [1.27–2.31]), younger (RRR = 0.77 [0.68–0.86]), depressed (RRR = 1.98 [1.43–2.74]) and had high rates of truancy (RRR = 2.56; CI = 1.71–3.84). A travel time of more than 30 minutes to and from school was also associated with increased rates of injury (RRR = 1.61; CI = 1.13–2.29).

Conclusions: Injuries are an important source of morbidity among school-attending adolescents in Dar es Salaam. The findings support more research into the contextual factors that predispose adolescents to excessive injury in the region. School settings have the potential to provide safety education in the region.

Keywords: injury, sub-Saharan Africa, urban setting, school health
INTRODUCTION

Injuries represent a significant cause of mortality worldwide, resulting in approximately 950,000 deaths each year (Peden et al. 2008). The majority of these deaths occur among the world’s poor and in settings where a focus on infectious disease control obscures the excessive mortality caused by injury. In sub-Saharan Africa (SSA), injury has become the third leading cause of death, and traffic collisions account for a large share of the burden (Moshiro et al. 2001; Ruiz-Casares 2009). For children below the age of five years, injuries contribute to more deaths annually than the combined totals of deaths from diphtheria, measles, polio, tetanus and whooping cough. Beyond the first five years of life, injuries pose the greatest threat to child and adolescent survival in the region. However, despite having the world’s fastest-growing population of adolescents, relatively little is known about the determinants or contextual circumstances that predispose them to excessive injury (Peden et al. 2008; Peltzer 2008).

In high-income country (HIC) settings, the behavioural attributes of adolescents at increased risk for injury have received significant research attention in recent years. This is partially due to an increasing recognition of adolescence as being a distinct period of life associated with substantial transitions – whether physiological, neurological or hormonal (Patton et al. 2010; Wilson 2012). In Canada, for example, steep gradients in injury risk were found among adolescents who engaged in substance use, who were disengaged from school or who argued with their parents (Pickett et al. 2002). In a recent study it was found that early engagement in risky behaviours consistently predicted increases in the risk of injury by age 15 years across 25 North American and European countries (Looze et al. 2012).

In low- and middle-income countries (LMICs), by contrast, research has tended to focus on the contextual circumstances of injury risk (Ruiz-Casares 2009). For example, large-scale population migration from rural areas to large cities has been identified as a factor in the rise of crowded unplanned settlements. These settlement patterns exacerbate the social and environmental conditions that stimulate increases in hazardous living spaces (Kojima 1996; Prothero 1994). Residential fires, roadways that compete with children’s play areas and makeshift waste disposal sites have increased the likelihood of youth being burned, hit as pedestrians in a motor vehicle collision or coming into contact with poisons (Burrows et al. 2010). Injury patterns often differ by age and gender. Additionally, prior studies (DeVore & Ginsburg 2005; Engström et al. 2002; Pickett et al. 2005; Posner et al. 2002; Schoenhuber & Gentilini 1988; Towner et al. 1994; Yiengprugsawan et al. 2012) have found injury to be associated with poverty, anxiety, signs of depression, physical activity, parental supervision, type of exposure to the traffic environment and truancy.

In SSA, injured adolescents are unlikely to have adequate access to treatment, reconstructive surgery or psychosocial rehabilitation. If disfigured, they are unlikely to return to school; and without an education, they are more likely to have difficulty in securing employment as an adult (Wilson 2012). Families must often borrow money to care for an injured child, which drives already poor households deeper into poverty (Mock et al. 2003; Wilson 2012).

Few nations in the region have the comprehensive health surveillance that exists in more affluent settings. In those that have hospital-based surveillance systems that include injuries, problems with data quality have been identified, as it is difficult to ascertain risk or protective factors from clinical case reports (Roman et al. 2011). Additional complications arise in meeting the needs of young people before they become injured, as there are few centres in the region that respond to the unique needs of adolescents (Michaud et al. 2010).

In the United Republic of Tanzania, several studies have attempted to document injury patterns via hospital- and population-based data collection (Justin-Temu et al. 2008; Moshiro et al. 2005). However, these studies fell short of exploring determinants for injury patterns specific to adolescents. In addition to the limits of hospital-
based data previously mentioned, few population-based cohorts were specifically designed to measure injury-related risk or protective factors (Kamala, Wilson & Hasselberg 2011). The aim of this study was to explore the socio-demographic and contextual factors associated with injuries among adolescents in a low-income urban African setting, and to assess whether variations in risk differed according to the number of injury events.

**METHODS**

**Sample**

Our data were drawn from the 2006 Tanzanian Global School-based Student Health Survey (GSHS), a self-administered questionnaire that collects information on risk and protective factors for school-attending adolescents in 43 mainly low- and middle-income countries. The complete data collection methods and procedures are reported elsewhere (WHO 2012). Briefly, data were collected in Tanzania via a two-stage cluster sampling procedure representative of all secondary schools in Dar es Salaam (DES). At stage one, schools were selected with a probability proportional to the school’s enrolment size. At stage two, classes were randomly selected, with all students in selected classes being eligible to participate. The school response rate was 100%, with the overall student response rate being 87%. A total of 2,176 students aged 11–16 years participated in the survey. We excluded 22 participants who did not have complete data, resulting in a final sample of 2,154 (52% were female). At the time of data collection, the study was approved by the Ministry of Health and Social Welfare.

**Measurements**

We defined injury using the survey question: “During the past 12 months, how many times were you seriously injured?” The response categories were “0 times”, “1 time”, “2 or 3 times”, “4 or 5 times”, “6 or 7 times”, “8 or 9 times”, “10 or 11 times” and “12 or more times”. We trichotomised the responses into 0 times (reference category), one time, and two or more times.

In line with our research aim, we explored several associations in the present sample, using the following questions from the GSHS:

Associations with hunger were examined using the question: “During the past 30 days, how often did you go hungry because there was not enough food in your home?” The responses were “never”, “rarely”, “sometimes”, “most of the time” or “always” and were dichotomised into “sometimes/most of the time/always” against “never/rarely”.

Anxiety was examined using the question: “During the past 12 months, how often have you been so worried about something that you could not sleep at night?” The responses were “never”, “rarely”, “sometimes”, “most of the time” or “always” and were dichotomised into “sometimes/most of the time/always” against “never/rarely”.

We examined signs of depression using the question: “During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing your usual activities?” (Yes/No).

We examined days of physical activity using the question “During the last 7 days, on how many days were you physically active for a total of at least 60 minutes per day?” The responses ranged from “0” to “all 7 days” and were used in all analyses as a continuous variable.

We examined transit time to and from school using the question: “During the past 7 days, how long did it usually take for you to get to and from school each day?” The responses were “less than 10 minutes per day”, “10–19 minutes”, “20–29 minutes”, “30–39 minutes”, “40–49 minutes”, “50 to 59 minutes” and “60 or more minutes”. We trichotomised these responses into three categories: “< 10 minutes”, “10 to 29 minutes” and “30 or more minutes”.

We examined associations with truancy using the question: “During the past 30 days, on how many days did you miss classes or school without permission?” The responses were “0 days”, “1 to 2 days”, “3 to 5 days”, “6 to 9 days” and “10 or more days”. Students were considered truant if they missed more than 3 days of school within the 30 days prior to the survey.

Associations with three forms of parental supervision were examined using the question: “During the past 30 days, how often did your parents or guardians check to see if your homework was done?”; “During the past 30 days, how often did your parents or guardians understand your problems and worries?”; and “During the past 30 days, how often did your parents or guardians really know what you were doing with your free time?” The responses to each were “never”, “rarely”, “sometimes”, “most of the time” or “always”. For each of these, we dichotomised the responses into “most of the time/sometimes/always” and “rarely/never”.

**Statistical analysis**

We first conducted bivariate analyses in which we screened for associations between the trichotomised injury variable and the dichotomised independent variables. We used Pearson’s chi-square for categorical variables and ANOVA for continuous variables. Subsequently, we employed multinomial logistic regression to examine the associations with each injury category compared with non-injured participants, while adjusting for age, gender, hunger status, days of physical activity, truancy, travel time to school and mental health variables. The measures of association for the regression were reported as relative risk ratios (RRR), with confidence intervals (CI) being computed at the 95% level. All analyses were conducted using Stata 12 (StataCorp, 2011) for open source Linux (www.linuxmint.com).

**Results**

Within the recall period, 22.14% (n = 477) participants reported having had one serious injury and 10.96% (n = 236) reported having had two or more. Among the specified causes of injuries were “I fell” (47%), “something else” (17.85%), “something fell on or hit me” (14.21%), “I was in a fire” (7.77%), “I was fighting with someone” (5.79%), “motor vehicle accident” (4.96%) and “I was attacked or assaulted” (2.64%). Participants were mainly injured while engaged in a sporting activity (37.4%), walking or running (21%), doing nothing (16%) or while riding a bicycle or scooter (13%).

From the survey question: “During the past 7 days, on how many days did you walk or ride a bicycle to and from school?”, we computed that 36% of participants reported that they walked or rode a bicycle to and from school. No further information was available on other types of transportation.

**Bivariate analyses**

In the bivariate analysis (table 1), the percentage of males, the level of hunger, mental health problems (anxiety and signs of depression), longer travel time to school and truancy increased with the number of injuries. No differences were found for age, days of physical activity or any form of parental supervision.
Table 1: Bivariate analyses of serious injury among school-attending adolescents in Dar es Salaam, Tanzania (2006)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Rates of serious injury and percentages of total</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None (n = 1441)</td>
<td>One (n = 477)</td>
<td>Two or more (n = 236)</td>
<td></td>
<td>P-value</td>
</tr>
<tr>
<td>Mean age (SD)</td>
<td>13.02 (1.36)</td>
<td>13.10 (1.21)</td>
<td>12.73 (1.27)</td>
<td></td>
<td>0.258</td>
</tr>
<tr>
<td>Gender (male)</td>
<td>44.96</td>
<td>52.53</td>
<td>57.14</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Hunger (yes)</td>
<td>10.55</td>
<td>12.58</td>
<td>16.10</td>
<td></td>
<td>0.036</td>
</tr>
<tr>
<td>Anxiety (yes)</td>
<td>10.96</td>
<td>19.29</td>
<td>24.58</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Signs of depression (yes)</td>
<td>19.15</td>
<td>29.56</td>
<td>33.05</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Mean days of physical activity (SD)</td>
<td>3.84 (2.70)</td>
<td>4.13 (2.77)</td>
<td>4.53 (2.67)</td>
<td></td>
<td>0.763</td>
</tr>
<tr>
<td>Travel time to school</td>
<td>0.012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;10 minutes per day</td>
<td>44.00</td>
<td>44.03</td>
<td>33.90</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>10–29 minutes per day</td>
<td>28.80</td>
<td>29.98</td>
<td>29.24</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>&gt; 30 minutes per day</td>
<td>27.20</td>
<td>26.00</td>
<td>36.86</td>
<td></td>
<td>–</td>
</tr>
<tr>
<td>Truancy (&gt; 3 days)</td>
<td>8.12</td>
<td>9.43</td>
<td>20.76</td>
<td></td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Parents involved with homework (yes)</td>
<td>56.77</td>
<td>56.60</td>
<td>54.24</td>
<td></td>
<td>0.766</td>
</tr>
<tr>
<td>Had understanding parents (yes)</td>
<td>36.43</td>
<td>34.17</td>
<td>43.22</td>
<td></td>
<td>0.600</td>
</tr>
<tr>
<td>Parents knew about what they did in their free time (yes)</td>
<td>13.12</td>
<td>13.00</td>
<td>15.68</td>
<td></td>
<td>0.543</td>
</tr>
</tbody>
</table>

**Multivariate analysis**

Compared with non-injured participants (table 2), those reporting one injury within the recall period were more likely to be male (RRR = 1.29 [1.04–1.60]) and to have increased anxiety (RRR = 1.60 [1.19–2.16]) and signs of depression (RRR = 1.60 [1.25–2.04]). Those who reported two or more serious injuries were also mainly male (RRR = 1.71 [1.27–2.32]), younger (RRR = 0.77 [0.68–0.86]), anxious (RRR = 1.80 [1.23–2.63]), had signs of depression (RRR = 1.98 [1.43–2.74]), doing more physical activity (RRR = 1.10 [1.04–1.16]), more likely to be truant (RRR = 2.56 [1.71–3.84]) and to have a daily transit time of 10–29 minutes (RRR = 1.44 [1.00–2.07]) or greater than 30 minutes to and from school (RRR = 1.61 [1.13–2.29]).
Table 2: Multivariate analysis of serious injury among school-attending adolescents in Dar es Salaam, Tanzania (2006)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ratio of serious injuries as relative risks RRR (95% CI)*</th>
<th>One injury</th>
<th>P-value</th>
<th>Two or more injuries</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>1.00 (0.92–1.08)</td>
<td>0.966</td>
<td>0.77 (0.68–0.86)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Gender (male)</td>
<td></td>
<td>1.29 (1.04–1.60)</td>
<td>0.022</td>
<td>1.71 (1.27–2.32)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Hunger (yes)</td>
<td></td>
<td>1.13 (0.81–1.57)</td>
<td>0.470</td>
<td>1.20 (0.78–1.86)</td>
<td>0.407</td>
</tr>
<tr>
<td>Anxiety (yes)</td>
<td></td>
<td>1.60 (1.19–2.16)</td>
<td>0.002</td>
<td>1.80 (1.23–2.63)</td>
<td>0.002</td>
</tr>
<tr>
<td>Signs of depression (yes)</td>
<td></td>
<td>1.60 (1.25–2.04)</td>
<td>&lt; 0.001</td>
<td>1.98 (1.43–2.74)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Days of physical activity</td>
<td></td>
<td>1.03 (1.00–1.08)</td>
<td>0.053</td>
<td>1.10 (1.04–1.16)</td>
<td>0.001</td>
</tr>
<tr>
<td>Travel time to school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 10 minutes daily</td>
<td></td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>10–29 minutes daily</td>
<td></td>
<td>1.02 (0.79–1.32)</td>
<td>0.859</td>
<td>1.44 (1.00–2.07)</td>
<td>0.050</td>
</tr>
<tr>
<td>&gt; 30 minutes daily</td>
<td></td>
<td>0.91 (0.70–1.18)</td>
<td>0.604</td>
<td>1.61 (1.13–2.29)</td>
<td>0.009</td>
</tr>
<tr>
<td>Truancy (&gt;3 days)</td>
<td></td>
<td>1.07 (0.73–1.56)</td>
<td>0.742</td>
<td>2.56 (1.71–3.84)</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

*Reference group: no injuries

*Model adjusted for all variables indicated

**DISCUSSION**

To our knowledge, this was the first study to examine injury correlates among a school-based population in DES. Overall, we found the frequencies of reported injuries in DES to be within the ranges reported across the SSA region for single injuries during a similar period of recall: Kenya (23%), Namibia (23%), Swaziland (22%), Uganda (28%), Zambia (25%), Zimbabwe (31%) (Peltzer 2008). The DES rates also fell within the highest and lowest values found among 35 HICs for one medically attended injury (lowest/highest: Greenland 18.2%/Lithuania 33.0%), but on the lower end for two or more medically attended injuries (Poland 10.1%/England 35.1%) (Pickett et al 2005). Comparisons with prior studies in Tanzania were rendered somewhat difficult owing to differences in the aggregation of injury data by age. For example, in one study, population rates are dichotomised into two population groups, 5–14 years and 15–44 years, making comparisons among adolescents difficult. However children aged 5–14 years did have slightly higher odds of sustaining a minor injury compared with their older counterparts (Moshiro et al 2005).

We found that older adolescents were less likely to be injured two or more times. An additional body of literature (Baxter-Jones, Maffulli & Helms 1993; Caine, DiFiori & Maffulli 2006; Newgard & Lewis 2005) suggests that owing to the effects of puberty on physical changes in the body, injury risk may reach an apex during the early stages of puberty. An additional later increase in risk occurs when youth begin using motorised light vehicles such as scooters (Hasselberg, Laflamme & Weitoft 2001). However, the limited age range under study did not allow for a fuller exploration of this phenomenon. Additionally, the low average rates of secondary school attendance in the region may mean that those who are able to reach secondary school may have had home and social environments that were conducive to better overall levels of health and safety, in turn promoting scholastic achievement (Filmer & Pritchett 1999; Hargreaves et al 2008).

Consistent with indications in the literature (Heath, Pate & Pratt 1993; Ruiz-Casares 2009), males were over-represented among those injured, and being injured was accompanied by poorer states of mental health. Rates of injury...
increased with physical activity and injured adolescents were more likely to be absent from school, all findings consistent with the published literature (Backx, Erich, Kemper & Verbeek 1989; Barnes et al 2001).

In the bivariate analyses, we found a significant association between hunger and serious injuries; the association did not remain significant, however, when adjusted for covariates. We hypothesised that the lack of variability in the sample (limited to school-attending adolescents) may have been a contributing factor. As secondary school attendance rates in Tanzania are below the SSA average (Bommier & Lambert 2000), the inclusion of adolescents outside of school settings may have contributed more meaningful variability to detect statistically significant differences with regard to hunger status.

We found no significant association between injury and parental supervision in the present sample, despite indications in the literature that suggested otherwise (DeVore & Ginsburg 2005). One hypothesis is that supervision likely plays a greater role in modifying injury risks among younger children than it does among adolescents (Morrongiello, Corbett, McCourt & Johnston 2006).

The present study provides an important examination of injury patterns and associations specific to an adolescent population in DES, Tanzania. The strengths that enhance the reliability of our results include having data that were collected using a widely used standardised questionnaire and a sample size that was sufficient to detect statistically significant differences. However, the results must be viewed in light of their limitations. The survey did not include information on the home environment, which might have enabled the examination of contributing factors. Secondly, there was no way to determine injury severity. The injuries reported in this study as “serious” were the subjective responses of the participants. It was not possible to follow up with participants to obtain more information about their injury circumstances. Thus any mention of severity should be interpreted with caution. Thirdly, the sample is limited to adolescents that had the means to attend school. Tanzania, with a secondary school participation rate of 26% for males and 24% for females, has one of the lowest secondary school participation rates in the region (UNICEF 2012). Fourthly, the lack of information on the mode of transit was a limiting factor, which would have better supplemented the results concerning transit time. Lastly, the cross-sectional design of the study does not allow for the determination of causal relationships.

CONCLUSIONS

Using a representative sample from schools in DES, we found that more than one-third of adolescents reported having had one or multiple serious injuries within a 12-month period. These injuries occurred among young people who were likely to have been among the least socioeconomically disadvantaged, representing a possible underestimate of the injury burden. Although severity information was not available, we can still conclude that injuries represent an important health threat to adolescents in DES and that measures should be taken to advance preventive measures. Further research employing multilevel designs may help to clarify relevant contextual factors that predispose adolescents to injury in the region.

PREVENTION IMPLICATIONS

Taken together, these results highlight the potential for safety education in school-based settings. It is in these settings that a captive audience of adolescents during a high-risk period of their lives might benefit from safety instruction. Specific interventions based on these findings may include the creation of safe routes to school for adolescents who walk or cycle to and from school or general safety instructions in the area of sport.

ACKNOWLEDGEMENTS

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REFERENCES


Abstract
There is a growing recognition of the relevance and even centrality of volunteerism to adequate collective responses to poverty, housing and the promotion of human rights and, more recently, safety. Volunteerism by members of poor global South communities within their own communities has, however, remained relatively neglected and undescribed. This study explored the motivations, benefits and socio-organisational experiences that a group of volunteers reported as a result of their participation in a safety-promotion project in two under-resourced communities in the Strand, in the Western Cape, South Africa. The focus of this safety-promotion project was to enhance women’s safety and health and to reduce risks of injury and violence through the implementation of safety-promotion strategies that target the prevention of priority injuries, particularly violence, traffic injury and burns. The study used a qualitative approach and is based on the completion of questionnaires and focus group discussions with volunteers and project staff. Data analysis involved the thematic analysis of the written responses by 28 volunteers and 4 project staff to a questionnaire comprising open-ended and focused questions that explored their experiences of volunteerism. The study also involved the analysis of the transcriptions of two focus group discussions subsequently held with these volunteers to clarify, further develop and verify emerging themes. The volunteers identified both self-oriented and socially altruistic motivations and benefits. These volunteers highlighted a hope and desire to advance social change and promote safety within their communities. Volunteer experiences reflected their enthusiasm to enhance both the human and social capital of their communities simultaneously. This study highlighted the development of a volunteer identity as a necessary component for the implementation of a sustainable, volunteer-based safety-promotion project.

Keywords: Volunteerism, safety, identity, motivation, experiences

SCOPE, RATIONALE AND AIMS
There is increasing evidence and a growing recognition of the relevance and even centrality of volunteerism to the adequate provision of health care and welfare within the developed global North (Jenkins 2010). The contribution of volunteerism within the global South has not been substantially engaged with, although more recently, there has been an increased focus on South – South volunteerism by international agencies such as the United Nations and the Voluntary Service Overseas, both of which have implemented substantial volunteer programmes. These programmes, however, have tended to utilise volunteers from different communities – and, often, a different country – rather than volunteers from the host community (Adebanwi 2005; Agiling Dalisay 2005; Jenkins 2010).

Despite the broadening international interest, volunteerism by members of poor global South communities within their own communities has remained relatively hidden (Jenkins 2009a). However, there is some recognition that volunteerism varies across cultural groups and contexts, and that there is a rich history of volunteerism throughout the global South, beyond the phenomenon of international volunteering. Much of this volunteerism appears to be directed at...
the social and economic priorities prevalent among communities in the South, including issues of poverty, housing, human rights and health, and – to a lesser extent – injury prevention and safety (Jenkins 2009b).

In South Africa, a priority social and health concern is that of injury prevention and safety (Seedat, Van Niekerk, Jewkes, Suffla & Ratele 2009). It is estimated that approximately 50 000 people (Mayosi, Lawn, Van Niekerk, Bradshaw, Karim & Coovadia 2012) die annually, and up to 3.5 million seek health care, as a result of intentional or unintentional injuries (Peden & Butchart 1999). When combined, these injuries comprise the second leading cause of all disability-adjusted life years after HIV/AIDS (Norman, Matzopoulos, Groenewald & Bradshaw 2007). Injury is disproportionately concentrated in low-income settings (World Health Organization 2002). In South Africa, these settings are typically characterised by inadequate infrastructure and resources, high levels of unemployment and poverty, overcrowding, and poor health and safety service delivery (Seedat et al 2009).

Community-based prevention responses, guided by local evidence on injury magnitude, risk and resiliency factors and local partnerships, are recognised as comprising part of the constellation of essential responses required for injury prevention and safety (Butchart, Kruger & Lekoba 2000). In under-resourced settings, the participation of community residents, often as volunteers, is considered an important requirement for collective injury-prevention responses (Swart, Seedat & Sader 2004). In South Africa, the actual and potential contribution of volunteers, however, tends to be under-recognised, poorly understood and inappropriately utilised (Swart, Seedat & Sader 2004).

This is despite the impact of community and, in particular, women’s activism, which has been notable for the extent to which the latter’s collective action has resulted in the promotion of gender equality in the global South (Jenkins 2009b) and, specifically, in South Africa (Hassim 2004). The latter contributions have influenced the country’s Constitution and the design of related state institutions and policy-making procedures (Hassim 2004). Numerous women’s organisations have contributed to national campaigns, such as the 16 Days of Activism Against Women and Child Abuse (Mosavel, Ahmed & Simon 2011), and to community service delivery, including dealing with violence against women by, for example, conducting citizen’s arrests in the perceived absence of efficacy in the justice system (Hassim 2004).

This study aims to contribute to the South African knowledge of volunteering and, in particular, the motivations, benefits, volunteer identity and socio-organisational experiences that a group of volunteers reported as a result of their participation in a women-led safety- and health-promotion programme in the Strand, in the Western Cape.

VOLUNTEERISM: DEFINITION, CONTEXTS AND ANTECEDENTS

Definition
Volunteerism is typically defined as a set of “dynamic, long-term, planned, pro-social behaviors, within an organisational setting, undertaken for no financial gain, without compulsion, including political activism and where time and effort are given for the betterment of the self and the community in general” (Penner 2002:448).

Contexts and antecedents of volunteerism
volunteering is considered multi-dimensional, occurring in many different contexts, offering various individual benefits and involving persons with varying motivations. These contexts and motivations affect volunteering in diverse ways that cannot easily be incorporated into any single model (Matsuba, Hart & Atkins 2007). This study briefly reviews the empirical literature that describes the role of individual motivation, the benefits of volunteerism and the organisational and community contexts that may support longevity in volunteerism. The study draws on identity theory and the concepts of self and volunteer role identity, on the basis of which it is possible to frame the contributions of these factors to sustainable volunteerism.
Motivation

A wide variety of motivations, fulfilling different personal needs, coexist in volunteerism (Zimek 2006). Situational factors (such as the high incidence of domestic violence in a community) may influence both the initial and ongoing engagement in volunteerism (Chacon, Menard, Sans & Vecina 1998; Omoto & Snyder 1995). The initial motivation to volunteer and the total length of service are often derived from self-oriented motivations (Clary, Snyder, Ridge, Copeland, Stukas, Haugen & Mienie 1998; Omoto & Snyder 1995). Studies have highlighted the following motivations: a desire to gain knowledge; personal development; the development of skills to enhance their value in the labour market; gain status and recognition; deliver services in the hope of eventual remuneration; gain work experience; and boost self-esteem (Hardill & Baines 2007; Klaasen 2002; Omoto, Snyder & Morrino 2000; Thomas, Newell, Baral & Byanjakar 2007). Volunteers are, however, also often driven by altruism, including a desire to show community concern, social respect, religious and moral duty.

The importance and role of extrinsic incentives to motivation, such as micro-credit, have also been reported, although more regular payments, such as via wages, have been regarded not only as financially unfeasible, but as a potential threat to the social respect offered to volunteers, and thereby their motivation (Glenton, Scheel, Pradhan, Lewin, Hodgins & Shrestha 2010). Motivations and considerations of the costs and benefits of volunteerism may vary with age, gender, marital status and context (Davis, Hall & Meyer 2001; Fuertes & Jimenez 2000). A clearer understanding of what motivates people to volunteer, especially in under-resourced settings, will help in the development of more effective strategies for involving volunteers in the provision of community safety services.

Benefits

Volunteerism potentially offers a number of benefits to individuals and communities, for example the opportunity to acquire skills or knowledge on a variety of subjects; a sense of belonging and affiliation; organisational and management experience; individual career development; communication and interpersonal skills; recognition and appreciation: improved self-esteem; and becoming multi-skilled in a relatively short period of time. Benefits to communities include community cohesiveness and an increase in social and human capital, particularly among socially marginalised or excluded individuals or groups (Crook, Wei, Willems & Egdorf 2006; Dingle, Sokolowski, Saxon-Harrold, Smith & Leigh 2001; Oesterle, Johnson & Mortimer 2004; Omoto & Snyder 1995; Serow 1990; Uggen & Janikula 1999; United Nations Economic and Social Council 2001; Younnis, Mclelan & Yates 1997; Zakour 1994).

The concept of self, volunteer role identity and identity theory

The psychological literature embeds definitions of self and identity within psychoanalytic, phenomenological, clinical, experimental social and cognitive psychology perspectives (Swart & Franchi 2003). The sense of self incorporates a multiplicity of attributes, experiences, emotions, motivations and behaviours that one may identify as specific to oneself, and which may equally be influenced by the political, historical, cultural and social contexts within which individuals negotiate their personal and social identities. Identity may be considered dynamic within a given context; alternatively, it may be regarded as a composite of self-relevant traits, characteristics or features, some of which are considered stable, while others are subject to fluctuation (Swart & Franchi 2003).

The concept of volunteer role identity revolves around the extent to which a person identifies with and internalises the role of being a volunteer; or simply, the extent to which this role and the relationships associated with it become part of a person’s self or identity (Penner 2002). Grube and Piliavin (2000) report that research on volunteerism using role identity theory has explored how commitment to pro-social identities develops and leads to pro-social actions. A particular role identity is shaped by the expectations of others who interact with the person in the context of that role, and the self-attributions that result from the person’s consistently engaging in behaviours associated with that role (Grube & Piliavin
2000). Carpenter and Knowles Myers (2010) suggest that pro-social behaviour is determined by a combination of altruism, image concerns and extrinsic motivations. However, Penner (2002) posits that a person’s experience during the initial volunteerism, together with a high and consistent volunteer activity, will likely shape and produce a strong volunteer role identity over time, which results in sustained volunteerism.

Finkelstein (2009) adopted a conceptual perspective that integrates two theories of long-term helping, namely functional analysis and identity theory. Functional analysis holds that people continue volunteering to the extent that their experiences fulfil relevant motives, while role identity theory speaks to the strength and attributes of volunteer identity that have been shown to correlate with their donations of time and money. Other-oriented empathy and helpfulness were correlated with time spent volunteering and length of service in a variety of organisations.

**Organisational and community contexts and longevity in volunteerism**

The theoretical and empirical literature suggests that the following may be significantly associated with the volunteer experience and time spent as a volunteer: (1) an individual member’s perceptions and feelings about the way he or she is treated by the organisation and (2) the organisation’s reputation and approach to conducting its activities (Davis, Hall & Meyer 2001; Grube & Pilavin 2000; Lee & Chang 2007; Omoto & Snyder 1995; Penner 2002; Penner & Finkelstein 1998). Organisational factors related to the approach to screening, induction, training, supervision and recognition (symbolic rewards) have been highlighted, mainly through the provision of career-enhancement opportunities, respect shown to volunteers and opportunities for engagement with meaningful work (Cnaan & Cascio 1999; Crook et al 2006; McSweeny & Alexander 1996; Omoto & Snyder 1995; Texas Commission on Volunteerism and Community Service 1998).

Furthermore, recognition and support from the host community provides an integral backdrop for individuals and organisations to undertake volunteer activities that may promote social change and contribute to societal cooperation and civic participation (Lee & Chang 2007; Omoto, Snyder & Morrino 2000). Volunteerism also thrives within environments with high social and human capital, as well as healthy social networks characterised by strong social norms (Lipford & Yandle 2009; Matsuba, Hart & Atkins 2007; Putnam 2007; Rupasingha, Goetze & Freshwater 2006). People are also more likely to donate their time if they are able to identify with prospective recipient activities, including the discernable benefits the recipient receives (Lipford & Yandle 2009).

Jenkins (2009a) claims that a salient feature of volunteerism and its longevity and sustainability in Latin America is that it has been dominated by women’s strong affiliation and commitment to the voluntary provision of welfare in poor communities whose health needs have seldom been met adequately. However, whether the participation of women within this context of health service provision can be considered ‘truly’ voluntary requires scrutiny. The impact of poverty, inequality and deprivation on the dynamics of volunteerism remain poorly understood.

**THE STRAND VOLUNTEER SAFETY-PROMOTION PROJECT**

The study is located in Broadlands Park and Nomzamo, which are adjacent low-income communities in the Strand in the Western Cape, South Africa. The local leadership identified the increasing incidence of injury and violence in their respective neighbourhoods and highlighted the absence of safety-promotion programmes, as well as the professional expertise and assistance of other organisations to implement these. The local leadership, in consultation with a university research agency active in the area, initiated a safety-promotion intervention and research project in these communities. The safety-promotion project utilised local volunteers to implement safety interventions. The volunteers received the training and skills required to address various safety- and health-promotion issues. The focus of the project was on enhancing the capacity of women to promote safety and health through the provision of leadership and safety-promotion training, the facilitation of
environmental modification campaigns, the implementation of community safety monitoring structures, and advocacy and lobbying for safety issues and other social and health concerns. Training included safety strategies, conflict resolution and management, basic first aid and HIV/AIDS management.

Community profiles

Broadlands Park is a community that comprises low-cost government housing. At the time of the study, in 2005, it had been in existence for 7 years, with the community previously having been located in nearby informal settlements and back-yard shacks. Broadlands Park is approximately 50 km to the east of Cape Town, with approximately 10 000 residents, and is a predominantly coloured1 and Afrikaans-speaking community. The community at the time had minimal infrastructure and was concerned about unemployment, drug and alcohol abuse and other psychosocial challenges.

Nomzamo, which in Xhosa means to “rise up” or “awaken”, is an informal settlement adjacent to Broadlands Park. At the time of the study, it was gradually being transformed into a low-cost government housing neighbourhood. It is predominantly a Xhosa-speaking community with about 20 000 inhabitants and had been in existence for about 9 years at the time of the study. The community had some infrastructure, a clinic, two primary schools and one secondary school, a community hall, some tarred roads with lighting, water and sanitation, and a recently built small business centre. In 1998, a high prevalence of both intentional and unintentional injuries had been reported (Van Niekerk et al 2000).

METHODOLOGY

This study utilised a qualitative approach. Data was collected via a questionnaire and focus group discussions (FGD), with the written responses to the questionnaires and FGD transcriptions thematically analysed.

Instruments

the questionnaire was developed on the basis of the relevant literature and discussions with safety volunteers and stakeholders involved in these communities. Questionnaires were self-administered as volunteers were not always available to be interviewed in person; it was felt that this arrangement was more convenient for them, since they could complete the questionnaire at a time and place of their choosing. This particular format is also protective of anonymity. The questionnaire consisted of a combination of open-ended and focused questions and focused on the reasons for volunteering, experiences of volunteering within a disadvantaged context, lessons learnt from volunteering, impact of volunteerism on the volunteer’s life, and factors affecting the sustainability of volunteerism, including the contribution of the university agency. Questionnaires were hand-delivered to the 35 volunteers active at that time in the two communities, and they were collected two weeks later. A similar questionnaire, with a specific focus on the agency or institutional contribution to volunteerism, was sent to the 5 project staff to elicit their comments. In total, 28 volunteers responded, 20 from Nomzamo and 8 from Broadlands Park, as well as 4 project staff. The predominance of Nomzamo respondents reflects the size of the volunteer groups in the two communities, which also reflects the relative sizes of the two communities. All the questionnaires were answered in English, the primary or secondary language of most participants.

The FGDs were held with each of the two safety teams a month after the questionnaires were returned. Invitations

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1 In South Africa, the terms “African”, “coloured” (referring to mixed heritage) and “white” refer to various population groups. The use of these terms is, however, contentious and does not imply acceptance of the racist assumptions on which these labels are based. It is recognised that these categories are a social construction that has served particular political purposes. It is not implied that such categories have any anthropological or scientific basis. The terms are, however, used to reflect the differential manner in which the earlier South African policies of racial segregation, or apartheid, had impacted on the lives of various groups of South Africans, and still do.
were sent to the volunteers who were active in the safety-promotion project. Not all the volunteers could participate in the FGDs on the recommended dates because of either personal or other circumstances. Some of the participants who responded to the invitation and engaged in the FGD from the Broadlands Park community also had previous experience in community development. Participants who engaged in the FGDs were selected on the basis of their availability. The groups comprised 15 participants from Nomzamo and 8 from Broadlands Park, and they provided a complementary forum for verifying and elaborating on volunteers’ insights into the issues identified via the questionnaire, as well as for exploring and gathering additional views on volunteerism.

**Participants**

The volunteers who responded comprised 26 females and 2 males, with an average age of 33 and 23 years respectively. Most of the volunteers were unemployed, bilingual or multilingual and had a minimum of 8 years of formal education. The majority of volunteers had not had volunteer experience outside of the safety-promotion project and had participated in the project for at least a year. Four of the 5 university project staff responded – 2 males and 2 females. They had an average age of 29 years and between 2 and 15 years’ research or intervention experience.

**Data collection procedures**

The volunteers and the university agency's staff members were briefed on the purpose and significance of the study prior to the administration of the questionnaires. Consent was obtained from volunteers and staff members, and anonymity and confidentiality of these responses were discussed. The participants were invited to be frank and detailed in their responses and were requested to respond in the language of their choice; it was thus hoped that these responses would contribute to the further development of the volunteer safety-promotion project. Volunteers and staff members were given two weeks to complete the questionnaires. The questionnaires were collected from the volunteers, and staff members returned their responses via electronic mail. Process notes and observations were also documented by the authors during the supervision of the programme; these were used, where appropriate, to verify information and responses from the volunteers.

The purpose of the FGDs was explained to the participants, including the privacy and anonymity of transcriptions of their responses. The discussions were conducted in English, in an informal environment, and were audio-recorded, after permission was granted. The discussions, which lasted approximately 60 minutes, ended once the facilitator felt satisfied with the responses. Additional observations and notes and tracking of participant interaction were also documented to complement the audio-recording.

**Data analysis**

The interpretive approach to data collection and analysis, as described by Terre Blanche and Durrheim (1999), provided analytical guidelines for reviewing the responses of volunteers and staff members. The data included the written responses to the questionnaires and the verbatim transcripts of the two FGDs. The process of analysis comprised five steps. Step 1 involved collating the written responses received from volunteers and staff members and transcribing the FGDs. Step 2 involved repeated readings of the responses and transcripts to develop familiarity with the content and delineate emergent themes. Step 3 consisted of aggregating similar responses and inserting these under appropriately formulated themes. In step 4, further analysis of the aggregated responses under the themes led to a refinement of the themes and/or moving some responses to more appropriate themes. In step 5, each theme was interpreted in relation to the context in which the volunteer safety-promotion programme operated. These themes are presented and discussed in the following section of this paper.
The author and co-author verified the appropriateness and applicability of the themes used in the analysis. Discrepancies were discussed and then consensus was achieved between the authors on existing and emerging themes.

**RESEARCH FINDINGS AND ANALYSIS**

A thematic analysis of the relevant findings, emerging first from the questionnaire and then elaborated upon in the focus group discussions, is presented to provide an overall understanding of the experiences and the psychosocial and contextual challenges of volunteers engaged in implementing a safety- and health-promotion project in a low-income setting.

**Understandings of volunteerism and motivations**

Volunteers and staff articulated a similar core understanding of volunteerism, namely working without remuneration; this concurs with the understandings generally reported in the literature (Penner 2000; Thoits & Hewitt 2001; Wilson & Musick 1997). Both volunteers and staff indicated that volunteerism was highly relevant in under-resourced settings, with one staff member reporting that “[volunteer] organisations can provide assistance and augment existing social services in under resourced communities”.

The motivations for volunteerism reported in this study included those directed at individual needs and providing distinct individual benefits, such as “to understand and gain knowledge”, “to improve my life”, “to relieve stress”, and “to enjoy working with people”. Other motivations included those with social or altruistic benefits, such as “to fight crime” and to “help and [for] love for the community”. Both volunteers from Nomzamo and Broadlands Park and project staff emphasised the social or altruistic reasons for volunteerism, which highlighted time and effort spent in pursuing dynamic pro-social actions and behaviours that promoted the betterment of the self and the community in general (Penner 2002; Thoits & Hewitt 2001; Wilson & Musick 1997).

**Volunteer expectations and reflections within the community context**

The volunteers articulated their expectations of volunteerism, which overlapped with the identified individual and altruistic motivations for volunteering. There were numerous expectations, including “to increase and improve our knowledge and skills”, “to empower ourselves and the community”, “to be acknowledged and recognised”, “to become a trainer”, and “the possibility of getting employment”. The volunteers reflected on their experiences in the Strand project and indicated that the experience had “allowed us to make a difference in our own lives and the community”, “by participating in workshops and developing communication skills” and by “preventing and protecting [the] community from HIV/AIDS, accidents and child abuse”, thus allowing them to “work with people from different cultures”, be “self-sufficient” and “to be united [as a group], tolerant and understanding”.

These reflections, across both groups, resonate with those reported in other studies. This indicates that people – especially those engaged in consistent volunteer activity – may experience their personal identity while embracing the role of a volunteer. This, in turn, often results in a further increase in other-oriented motivations and a decrease in self-oriented ones. This greater integration of a volunteer role identity is considered the most potent direct cause of sustained volunteerism (Grube & Piliavin 2000; Penner 2000).

Volunteers are an important resource for engaging with the community (Newell, Baral & Byanjkar 2007). In this and other studies, the recognition and support from the community provides an integral backdrop for individuals and organisations to undertake volunteer activities to promote social change and contribute to societal cooperation and civic participation (Jenkins 2009a; 2010; Lee & Chang 2007; Lipford & Yandle 2009; Omoto, Snyder & Morrino 2000; Putnam 2007; Rupasingha et al 2006; Ziemek 2006).
**Organisational management**

Organisational variables influence volunteer behaviour and are considered significant in the maintenance of volunteerism (Davis, Hall & Meyer 2001; Grube & Piliavin 2000; Omoto & Snyder 1995; Penner & Finkelstein 1998). Both an individual member’s perceptions and feelings about the way he or she is treated by the organisation and the organisation’s reputation, ethos, commitment and prestige are significantly associated with length of tenure as a volunteer.

In this study, the following important organisation variables were identified by the volunteers: “a screening process”, a need for “clear rules of volunteering”, and “signing of a contract and commitment to that contract”. Staff highlighted that “both the organisation and volunteer teams need to be aware of each other’s expectations”. The volunteers in this project had taken the initiative and formulated a code of conduct to create an ethos of supportiveness, accountability and self-appraisal of their safety- and health-promotion activities. All organisational formalities (weekly meetings, planning and decisions) were conducted in a respectable and democratic manner. These volunteer organisational processes concur with Penner (2000), who states that “if volunteers are satisfied with their work, committed to the organisation, experience a positive affect while on the job, and believe they are partially treated, they invariably should display a higher level of volunteer activity” (p 459). Chacon and colleagues (1998) also report that integration in the organisation and feelings of satisfaction are both highly correlated with volunteers’ expectations of continuing in the organisation and are taken as a predictor of a volunteer’s duration of service.

**Challenges**

A number of concerns were raised, in varying degrees, by the Nomzamo and Broadlands Park teams. These included a “lack of seriousness and purpose among certain members”, “punctuality”, “not respecting the code of conduct”, “not communicating and agreeing on certain decisions adopted” and “gossiping when someone does good work”. Project staff identified “attrition and having financial expectations” and “group dynamics and decay”, which could be anticipated in the long term.

These challenges address diverse issues, such as divergent individual personalities and approaches and organisational dynamics, with some volunteers experiencing feelings of a lack of appreciation, acknowledgement and support from community stakeholders. Other challenges raised were the stress of working in a socioeconomically disadvantaged context with a high and persistent incidence of injuries and violence.

These adversities can undermine continued volunteer participation (McSweeney & Alexander 1996) and affect the sustainability of safety-promotion projects. The volunteers’ experiences during the implementation of the project generated specific concerns regarding aspects of continuity and sustainability of the current and future safety-promotion initiatives. The following section elaborates on this point.

**Sustainability: Enhancing human, social and intellectual capital**

Volunteers expressed enthusiasm, confidence and determination to continue engaging in safety-promotion activities, even though they were unemployed. They claimed that “the program improved our lives”, “increased our self esteem” and “created awareness and increased our knowledge”. They expressed dismay at the possibility of the project stopping, because “they would be at home doing nothing”, or “perhaps selling snacks to make some money and studying part-time”. The volunteers were committed to their teams and valued “working together as a team”, “to promote safety and health until violence stops”, “to continue to meet and share concerns and problems”, to “disseminate their skills to the community” and to “communicate and have more workshops”. However, one volunteer from the Nomzamo team stated: “I will stop volunteer work as soon as the project stops”, while another said: “I will stop once I get a job”, thus highlighting an ever-present concern about the limited employment opportunities in these settings.
One contentious issue is the financial remuneration of volunteers. Many initiatives provide only small stipends or non-monetary incentives, such as cycles, free health care or future job opportunities, although others provide salaries, as in the case of many community health worker programmes (Glenton et al 2010). However, two recent guidelines from the World Health Organization (WHO) regard payment as necessary for the long-term sustainability of community health worker programmes (World Health Organization 2007; World Health Organization and Global Health Workforce Alliance 2008). The WHO acknowledges the contribution of short-term or part-time volunteers, but states that trained health workers who are providing essential health services, including community health workers and safety volunteers, should receive adequate wages or other appropriate and commensurate incentives (World Health Organization and Global Health Workforce Alliance 2008). They indicate that there is virtually no evidence that volunteerism can be sustained for long periods and that stipends, travel allowances and other non-financial incentives are not enough to ensure the livelihood of volunteers; moreover, the absence of adequate wages will threaten the effectiveness and long-term sustainability of the affected programmes (World Health Organization and Global Health Workforce Alliance 2008).

This study highlighted the critical importance of clear lines of communication and mutual collaboration between the volunteers and external agencies, such as the university agency that was involved in this project. Issues such as the implementation complexities around safety-intervention research, limited funding and resources, and individual and organisational expectations were identified by both volunteers and staff.

Staff and volunteers indicated that despite the nature of these challenges, discussions on the latter engendered trust and programme efficacy. Volunteers mentioned how important it was “to be acknowledged and recognised”, and staff indicated the importance of communicating “recognition of their [volunteers’] efforts and contribution”. Previous case studies have revealed that tensions are possible when mutual expectations are not lucid and communicated (Swart et al 2004).

CONCLUSION

In communities where a formalised injury-prevention and safety infrastructure is absent or underdeveloped, and where professional expertise and resources are scarce or absent, employing community members to serve as volunteers may be integral to ensuring the required injury-prevention responses (Swart et al 2003). This study highlights volunteers’ experiences in developing a volunteer identity and enhancing their social, human and intellectual capital in collaboration with a university agency’s implementation of a safety-promotion project. These reflections concur with studies depicting volunteerism as both a source and a reflection of social capital that is vital in nurturing a community’s social networks, participation, advocacy and development efforts, particular within a context of poverty (United Nations Economic and Social Council 2001).

Numerous organisations depend on volunteers as a cost-effective way of implementing and extending their services to vulnerable groups and communities. Aside from the indirect financial investment, volunteers add significant value in that they are often indigenous, accessible, responsive and proactive in terms of their communities’ safety and development concerns. Local volunteers have special insights into the community they serve, increase the likelihood that interventions will be relevant, sensitive, appropriate and credible, and thus add quality to the services provided or not available.

In the future, sustainable volunteer-based safety-promotion programmes should focus on capacity building that promotes volunteer financial autonomy and organisational governance and management (e.g. communications, proposal writing and fundraising). Volunteers need to establish clearly defined roles and expectations among themselves and within partner programmes; protocols or codes of conduct could also ensure that these are explicit. Ensuring strategic buy-in from relevant stakeholders from the outset of the safety-promotion programme and encouraging local government and
businesses to provide incentives – such as educational bursaries and support for volunteers and their children, free health care, enrolment in various training and learnership programmes, and creating opportunities for employment and redeployment of skills in communities – may help to strengthen and sustain volunteer community safety-promotion initiatives in under-resourced contexts.

One contentious issue is the financial remuneration of volunteers. Many initiatives provide small stipends or non-monetary incentives (Glenton et al 2010). However, two recent guidelines from the World Health Organization regard payment as necessary for the long-term sustainability of such programmes (World Health Organization 2007; World Health Organization and Global Health Workforce Alliance 2008).

This study sought to further an understanding of safety volunteerism in an under-resourced setting. Further research should seek to reconceptualise debates around health and safety volunteerism as relevant and encompassing much broader and diverse spaces and people in a wide range of global South contexts, as opposed to predominantly Western notions of what it means to volunteer (Sheradden, Stringham, Sow & McBride 2006; Jenkins 2010). This includes a gendered understanding of volunteerism. The strong historical association between women and caring responsibilities in many cultures, as well as the emphasis on their long-term engagement in volunteerism, often goes unrecognised and provides an indication of the disproportionate burden of health and safety care assumed by women in poor communities.

Volunteers evidently have a role to play in communities and can effect change as advocates of safety and health promotion. Safety volunteerism is therefore a socially important concern that demands more thorough interrogation and attention, particularly in the South African context.

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