ABSTRACT
In South Africa, suicidal behaviour in the younger generations has become exponential, constituting a major public health problem. National preventative programmes, strategies and priorities in many other countries have been developed, but in South Africa this is still needed. This Chapter discusses comparative epidemiological trends in suicidal behaviour to obtain a better understanding of the South African situation on the one hand, and on the other, to assist in planning and implementing effective preventative strategies, as well as research and policy priorities to reduce suicidal behaviour in young people. Suicidal behaviour can range from being lethal, with high intent to die (fatal suicidal behaviour) to non-lethal attempts (non-fatal suicidal behaviour) with low or no intent to die. Figures reflect only a part of the problem, and reported prevalence rates are diverse. Data must be interpreted with caution when making cross-national, cross-cultural and cross-regional comparisons. Suicidal behaviour among children aged 10 years has been reported, but most occur in the 15-19 year age group, followed by the 10-14 year age group. About 9.5% of non-natural deaths in young people are because of suicides and 10 to 20 times more non-fatal suicidal behaviours occur per year. Weekends and year-end are high-risk periods. Leading suicide methods are: hanging, poisoning (including overdose with medical substances), firearms, gassing and fenestration (jumping from high places). In non-fatal suicidal behaviour, overdose and self-lacerations are most common. Between 4% and 47% of school children surveyed expressed suicidal ideation. There is a female preponderance in non-fatal suicidal behaviour compared with fatal suicidal behaviour, where males predominate. Risk factors and aetiology are multifactorial and multidimensional. They include: the influence of the mass media and information technology, imitation or copycat effects, dysfunctional family dynamics, poor problem-solving skills, neurobiological and genetic correlates, familial transmission, substance abuse, aggression, impulsivity, brain pathology, depression, acute and chronic stress, and various other psychopathological conditions. The high suicidal prevalence rates have considerable implications for mental health care facilities in the country. Early recognition of risk factors is important for the prevention of suicidal behaviour and the need to develop appropriate, cost-effective interventions. Regional suicide preventative programmes and service agencies are in place in some instances, but a national suicide preventative programme, which has already been recommended, is yet to be implemented.

Keywords: suicidal behaviour, youth, prevention

INTRODUCTION
In South Africa suicidal behaviour in the young has become exponential and constitutes a major public health problem with significant implications for mental health care facilities in the country (Burrows & Schlebusch, 2009; Schlebusch, 2004, 2005, 2011a). Age is an important socio-demographic marker for suicide mortality (Burrows, 2005), and following the lead of other international researchers (Apter,
Bursztein, Bertolote, Fleischman & Wasserman, 2009; Malone & Yap, 2009) in this Chapter, the term “young people” includes children and adolescents, because most South African studies tend to group them together. Where there are exceptions, these are noted. The objectives of this Chapter are to obtain a better understanding of suicidal behaviour in young South Africans on the one hand, and on the other, to assist in planning and implementing effective preventative strategies, as well as research and policy priorities to reduce suicidal behaviour in young people. To do so, it is important to:

a. Provide a definition of suicidal behaviour.
b. Give an overview of comparative epidemiological trends internationally and in South Africa, to consider methods of choice used in suicidal behaviour.
c. Examine risk factors which are multi-factorial and multidimensional.
d. Identify gaps in knowledge and make recommendations.

DEFINING SUICIDAL BEHAVIOUR
Although suicidal behaviour in the young can encompass an unambiguous act of self-demise, it can also include a heterogeneous spectrum of acts that can range from lethal attempts, with high intent to die (fatal suicidal behaviour) to non-lethal attempts (non-fatal suicidal behaviour), with low or no intent to die (Schlebusch, 2005). Suicidal behaviour is a process and suicidal ideation forms part of its evolution, i.e. thinking about engaging in it, writing or talking about it, or planning it (Schlebusch, 2005; Wasserman & Wasserman, 2009). In low intent suicide attempts (sometimes also referred to as parasuicides), young people might ingest a seemingly innocuous substance or engage in superficial acts of self-cutting, frequently as a cry for help or as an inappropriate problem-solving skill (Schlebusch, 2005). There have been many attempts to precisely define suicidal behaviour. One succinct definition of suicidal behaviour (Schlebusch, 2005) is given in the Box to follow.

A definition of suicidal behaviour

- Suicidal behaviour occurs in different forms that involve a degree of severity that can range from a person wishing him- or herself dead to actually killing him- or herself.
- It denotes a wide range of self-destructive or self-damaging acts in which people engage, owing to varying degrees of levels of distress, psychopathology, motive, lethal intent, awareness and expectations of the deleterious consequences or outcome of the behaviour.
- Suicidal behaviour is further divided into fatal and non-fatal suicidal behaviours.
- Given this, fatal suicidal behaviour refers to self-committed, completed suicidal behaviour that embodied the victim’s intent or aim to die and where that person managed to achieve that predetermined goal. As opposed to this, non-fatal suicidal behaviour refers to self-inflicted suicidal behaviour that did not succeed in ending the victim’s life, and which embodies several manifestations such as those seen in attempted suicide and parasuicide (Schlebusch, 2005).

EPIDEMIOLOGICAL GLOBAL TRENDS
Globally, suicidal behaviour in adults and children is an increasingly serious public health problem (Bertolote, 2001; Hawton & Van Heeringen, 2000; Wasserman & Wasserman, 2009). This trend has been observed in both high-income, as well as low-income countries, including all major ethnic groups in South Africa (Donson, 2008; Schlebusch, 2005). Nevertheless, researchers (Bertolote, 2001; Schlebusch 2005; Wasserman & Wasserman, 2009) caution that reported data must be interpreted with caution when making cross-national, cross-cultural and even cross-regional comparisons. Reasons for this include: variations in the reliability of statistics; differences in reported rates by different investigators; differences between reported rates per 100 000 of the population and the actual number of suicides in a particular country or region; and the fact that many studies are hospital and/or mortuary-based and therefore do not reflect the true magnitude of the problem and the hidden burden of
Suicidal Behaviour

Suicidal behaviour, especially in rural areas. Under-reporting is also affected by a variety of other factors ranging from cultural, religious to socio-economic variables and research limitations.

Worldwide, approximately one million people of all ages die from suicide every year with an overall yearly rate of 14 to 16 per 100 000 suicides of the population (most recently 18 per 100 000 for males and 11 per 100 000 for females) (Bertolote, Fleischmann, De Leo & Wasserman, 2009; Schlebusch, 2005; World Health Organization [WHO], 1999). According to the WHO, this number will increase by 2020 to approximately 1.53 million people per annum (Bertolote, 2001; Bertolote et al., 2009).

About 10 to 20 times more suicide attempts occur per year (Bertolote, 2001), although in some regions these could be up to 40 times more frequent than suicides (WHO, 1999), giving an estimated fatal to non-fatal suicidal behaviour ratio that ranges between 1:10 and 1:40. Estimated figures suggest one death by suicide occurs every forty seconds and one attempt is made every one to three seconds. By 2020, these predictions are expected to increase worldwide to one death every 20 seconds and one suicidal attempt made every one to two seconds (Bertolote, 2001). This constitutes an approximate 60% rise over the last five decades, with suicide rates increasing by about 49% for males and 33% for females (Bertolote, 2001), and currently representing about 1.8% of the global burden of disease, a figure expected to rise to 2.4% by 2020 (Bertolote et al., 2009). Such figures indicate that, on average, more people globally die annually from suicide than they do during war (Bertolote, 2001).

Traditionally, suicide rates have shown a positive relationship with age, in that they tended to increase in older people (some six to eight times higher than in younger people), however, recent statistics show that, on a global spectrum, more younger people die from suicide than older people (Bertolote et al., 2009). When actual numbers and frequencies are considered in relation to age, from a global perspective, suicidal behaviour has tended to move from the elderly towards younger people. Statistics reflect the percentage of suicides by age group and sex on average in selected countries for males and females respectively, as 0.7 and 0.9 deaths per 100 000 in the 5-14 year age group as opposed to 12.7 and 13.3 in the 15-24 year age group (Bertolote, 2001). Currently, more suicides are committed by people in the 5-44 year age group (55%) than in the older age groups, while most suicides occur in the 35-44 year-old group for both males and females across the world (Bertolote et al., 2009). Given this downward trend in the age of clinical populations in both absolute and relative terms, sometimes referred to as the “ungreying” phenomenon (Bertolote, 2001), suicide is currently among the top five causes of death for both males and females in the younger age groups and becomes even more significant in light of the overall ageing of the world’s population (Bertolote et al., 2009). The global incidence of suicide in under 15-year-olds has, in fact, more than doubled since 1960 in both males and females (Malone & Yap, 2009).

The predominance of male over female suicide rates seems to have remained relatively constant, i.e. 3.2:1 (in 1950) to 3.6:1 (in 1995) and with a predicted 3.9:1 in 2020. China, with one of the highest suicide rates (up to 30% higher than in Europe), is the exception to this. There, female suicide rates tend, on average, to be higher than those of males (Bertolote, 2001; Bertolote et al., 2009). Such global figures usually include all age groups and do not always reflect differences between the various age groups, especially in low-income countries.
Epidemiological trends in Africa

Most research on suicidal behaviour in the young, focuses on high-income countries (Apter et al., 2009), but a steady flow of research (Schlebusch, 2011a; Schlebusch & Burrows, 2009) has shown that suicidal behaviour in both adults and the young has increased significantly in parts of Africa, a fact not always appreciated. There are several reasons for this lack of awareness, including (Schlebusch, 2011a; Schlebusch & Burrows, 2009) divergent cultural and religious perceptions of suicidal behaviour, in some instances it is a matter of social taboo, a crime, or being subjected to secrecy or negative socio-cultural sanctions, reduced trustworthiness of statistics and data compilation with a lack of standardised research designs and assessment instruments, and poor research infrastructure/collaboration. Consequently, not only do figures often reflect only part of the problem, but reported suicidal behaviour prevalence rates are also diverse. Furthermore, literature from many African countries is sparse (Apter et al., 2009; Schlebusch, 2011a). Accordingly, generalisations on the continent are difficult and only broad trend analyses are possible. Nevertheless, contrary to early publications that indicated low suicide rates in Africans, more recent data from a number of African countries suggest that, in many instances, it has the same prevalence across the world (Schlebusch, 2011a; Schlebusch & Burrows, 2009). When compared with those in the east and south, it seems lower in countries in the west and north of the continent. As in other parts of the world, studies (Schlebusch, 2011a; Schlebusch & Burrows, 2009) tend to report that the young are at increasing risk. For example, a lifetime prevalence-rate of attempted suicide of 14.3% has been found in high school students in Addis Ababa and studies from Butajira, Kampala, Ibadan and Benin City reported that non-fatal suicidal behaviours are common in the younger age groups, often precipitated by psycho-social difficulties and dysfunctional interpersonal relationships (especially with parents), (Schlebusch & Burrows, 2009). In Egypt, several studies (Apter et al., 2009) reported a high percentage of suicide attempts in the 15-44 year age group, crude rates of suicide attempts of 38.5 and of suicides of 3.5 per 100 000 of the population and the fact that the majority of attempted suicides tend to occur amongst young females in large, over-sized families.

South Africa

Reliable statistics on child and adolescent suicidal behaviour in South Africa are more readily accessible compared with elsewhere in Africa. Several rich sources of data are available. These include those listed in the Box below.

Data sources on epidemiological trends

- Numerous ad hoc studies (Schlebusch, 2005).
- The National Injury Mortality Surveillance System (NIMMS) (Donson, 2008).
- The Durban Parasuicide Study (DPS) that originated in 1978 (Schlebusch, 2005).
- As part of its global suicide prevention programme, the WHO’s Multi-site Intervention Study on Suicidal Behaviours (SUPRE-MISS) launched in 2002 (Bertolote et al., 2009) with Durban as its Africa research site.
- The latter two projects are under the research leadership of the author.

The community survey component of SUPRE-MISS (Bertolote et al., 2009) listed above consisted of research conducted with subjects in the general population of nine cities/towns on the five continents, viz.: Brisbane (Australia); Campinas (Brazil); Chennai (India); Colombo (Sri Lanka); Durban (South Africa); Hanoi (Vietnam); Karaj (Iran); Tallinn (Estonia); and Yuncheng (China). In total, 20 000 subjects who participated were interviewed, and the number of subjects per city varied from 500 to 13 810. Figures from these studies of suicidal behaviour in the young point to the seriousness of the nature and size of the problem and provide further support for the noted international “ungreying” phenomenon in suicidal behaviour, which is also observed in South Africa.
FATAL SUICIDAL BEHAVIOUR
Suicide prevalence rates in young people in South Africa in all major ethnic groups are a significant cause for concern (Donson, 2008; Schlebusch, 2005, 2011a; Schlebusch & Burrows, 2009). Studies indicate that, in some instances, suicide is the third-leading cause of death in the young (Schlebusch, 2005), although in 2001 more suicides occurred in the 15-19 year-old group than in the 10-14 year-old group. Data (Schlebusch, 2005) from 2002 revealed a similar trend, where the highest suicide numbers were in the 15 to 19 year age group, followed by the 10-14 year age group. Some studies (Bradshaw, Masiteng & Nannan, 2000) show that in South Africa in the 10-19 year age group more females (12%) than males (7%) commit suicide. Compared with the reported adult suicide rates internationally and in South Africa (generally reflect more male than female suicides), it is noteworthy that in young people, more young females than young males in South Africa commit suicide, although this requires further research (Schlebusch, 2005).

Disturbingly, according to some studies (Schlebusch, 2005), the average 9.5% non-natural deaths due to suicides in young people in South Africa is almost as high as the overall (including adult) suicide rate of around 11%. In 2007, the latter figure was similar (10.32%) according to a NIMSS report (Donson, 2008), which also showed that adult suicides peaked in the 25-29 year age group (16.24%), followed respectively by the 30-34 year age group (15.84%) and the 20-24 year age group (15.38%). Nearly 50% (47.64%) of all suicides recorded in that study were in the 20-34 year age group, but in young people most suicides occurred in the 15-19 year age group (8.35%), followed by the 10-14 year age group (1.57%), giving an average of nearly 10% (9.92%) in the 10-19 year age group. In the same study, a few suicides under the age of 10 were also recorded, while overall, the peak time for suicides was (06h00-20h00), mostly over weekends (Mondays – 16.4%, Saturdays – 14.6%, and Sundays – 14.5%) and towards the end of the year (December – 10.1%, September – 9.5% and October – 8.9%). These figures accord with earlier findings (Schlebusch, 2005) of suicides under the age of 10 years and that in South Africa, weekends and the end of the year, in the case of the latter and also because of examination pressures, are high-risk periods for suicidal behaviour in the young.

The leading choice of method in young people are: hanging, poisoning (including overdose with medical substances), firearms, gassing and fenestration (jumping from high places) (Donson, 2008; Schlebusch, 2005).

NON-FATAL SUICIDAL BEHAVIOUR
In South Africa non-fatal suicidal behaviour in the young is as serious a problem as is fatal suicidal behaviour. According to DPS (Schlebusch, 2005) and other findings (Schlebusch & Burrows, 2009) the 10-19 year age group is the second-most at-risk age group for non-fatal suicidal behaviour after young adults in the 20-29 year age group. Several studies (Schlebusch, 2005) have reported that up to one-third of all non-fatal suicidal behaviours involved children and adolescents, while others (Mhlongo & Peltzer, 1999) report high general hospital referral rates in the young for attempted suicides and parasuicides, in some as young as four years old (Schlebusch, 2005). Hospital-based research (Schlebusch, 2005) has noted a sharp rise in non-fatal suicidal behaviour in African youth aged 18 years and younger. In one study (Schlebusch, Vawda & Bosch, 2003) this group constituted 24.5% of the total sample of suicidal behaviour patients admitted to a general hospital.

Non-hospital-based South African studies (Schlebusch, 2005) have also reported wide-ranging non-fatal suicidal behaviour figures in the youth, some showing that between 4% and 47% of school children surveyed express suicidal ideation, whilst
one study amongst African youth in the Eastern Cape (Mayekiso & Mkize, 1995) reported that 18% had definite plans to commit suicide. In a study among secondary high school pupils in the Limpopo Province, parasuicide rates of 17% for boys and 13% for girls were reported (Peltzer & Cherian, 1998), while in another (Madu & Matla, 2003) conducted among African secondary school learners (where only 4.5% were from other ethnic groups), it was found that 37% of these surveyed thought of taking their lives, 17% had threatened to do so, 16% had made plans to commit suicide, and 21% had actually made suicide attempts. Such findings have important implications for school-based suicide prevention and school counselling programmes. Excluded from these cohorts, that represent groups that are not usually seen in hospitals, are suicidal behaviours in rural areas which are frequently not accounted for because they simply are not included in research samples. This contributes to a major dearth in our knowledge base.

The community survey component (in which subjects were at least 15-years-old) of the SUPREMISS study referred to earlier (Bertolote et al., 2009) showed a remarkable disparity across the sites where the research was done. This further illustrates how careful one must be when making national, international and/or regional comparisons. For example, the proportion of subjects in the general population that admitted to having had suicidal thoughts in their lifetime varied from 25.4% in Durban to 2.6% in Chennai, while subjects who planned a suicidal act varied from 15.2% in Durban to 1.1% in Hanoi. Compared to Hanoi, Durban had 13.8 times more subjects who planned suicide. When rates of planning suicides and attempted suicide rates were compared, they ranged from 80% in Chennai to 22% in Durban (i.e. in Chennai, 80% of subjects who planned suicide made an attempt compared to 22% of subjects surveyed in Durban). Consistent with international research, South African studies (Schlebusch, 2005) generally report a female preponderance in non-fatal suicidal behaviour in the younger age groups (with an average female to male ratio of 3:1), which is different from the male to female ratio in fatal suicidal behaviour in youngsters where males predominate. Leading choice of methods are 90% overdose and 10% other methods, which largely comprise self-lacerations (Schlebusch, 2005).

**RISK FACTORS**

Suicidal behaviour is a complex phenomenon across all age groups, and risk factors and aetiology are multifactorial and multidimensional. They are wide ranging and include psychiatric, psychological, biological, sociological, genetic, cultural, somatic, personality, substance abuse, family dynamics, interpersonal problems, stress and other variables (Hawton & Van Heeringen, 2000; Schlebusch, 2005; Wasserman, 2001; Wasserman & Wasserman, 2009). Space does not allow for an in-depth discussion of all of these here, so I shall focus only on a specific few areas, based on South African research findings in relation to international research.

**Imitation effects and suicidal transmission**

The influence of the mass media and information technology on vulnerable young people and suicidal behaviour has received considerable attention because of imitation or copycat effects (Hawton & Van Heeringen, 2000; Schlebusch, 2005; Wasserman & Wasserman, 2009). Such effects, however, also need to be correlated with other risk factors (Schmidtke, Schaller & Wasserman, 2001; Van Heeringen, Hawton & Williams, 2000). The term “Werther effect” derives from a character in Goethe’s novel, The Sorrows of Young Werther published in the eighteenth century. Soon after its publication, a spate of young people in Europe committed suicide in a similar way as the suicide of the novel’s hero, Werther. Various other examples of the imitation of suicidal behaviour have
been described. For example, suicide pacts that involve a mutual agreement between youngsters to kill themselves, usually at the same time and place and during times of religious persecution, political oppression, social upheaval and so on (Colt, 1991; Schlebusch, 2005).

In addition, modern communication methods are apparently increasingly tolerant of suicidal behaviour and the concept of suicidal transmission is becoming extremely relevant amongst young people who learn about suicide through mass media publicity (Bille-Brahe, 2000; Schlebusch, 2005). Furthermore, there are websites that graphically describe suicide methods and information technology and media development have created expanded opportunities to influence vulnerable young people thereby enhancing the contagious effects of suicidal behaviour (Hawton & Van Heeringen, 2000; Wasserman & Wasserman, 2009). Internet and cellular telephone use in South Africa have blossomed amongst young people and worrying trends about their influence on suicidal behaviour are clearly discernable in media reports. Although further research is required (Schlebusch, 2005), South African youth who are predisposed or vulnerable to suicidal behaviour through imitation effects appear to be the most vulnerable to these modern influences. On the positive side, the media and internet sites can play a proactive role in the prevention of suicidal transmission by not sensationalising coverage about suicidal behaviour and by providing information about available help (Schlebusch, 2005).

Family dynamics
South African studies (Schlebusch, 2005) frequently have reported on the important contributory role of family dynamics in suicidal behaviour, including on the following: significantly higher prevalence rates of family conflicts as recent stressors; marital problems between parents; partner relational problems between youngsters who are dating; other family problems (involving feelings of loss of support because of inadequately managed family change caused by parental separation, divorce and remarriage, adverse parent-child interactions, and parental bereavement); socio-economic pressures and financial problems in the family; inordinate stress; child abuse and sexual abuse or incest; family psychopathology such as a history of family members’ prior suicidal behaviour, substance abuse and other psychological disorders (notably depression) in family members; school-related and academic problems in young people (especially in a non-supportive or over-demanding family environment); exposure to family violence; inflexibility and poor cohesion in family functioning; rigid problem-solving behaviour and over-controlling parenting styles; a lack of tolerance for developmental or role changes in the young; over-involved or over-protective families who allow little or no room for individuation and developmental progression; self-punitive wishes in young people (involving dissatisfaction with parent-child relationships and the degree of family acceptance); high prevalence rates of violence and trauma in families; the influences of First World forces in an internationally less isolated, post-Apartheid South Africa, resulting in high expectations being placed on young people that are not always realised following transformation; and problems with acculturation. Not only should such risk factors be urgently addressed to prevent them from forming a breeding ground for potential suicide, but any preventative efforts should be undertaken within the context of respect for cross-cultural sensitivity. The latter, in particular, is a sine qua non, given South Africa’s diverse cultures.

These risk factors can be ongoing, with the suicidal behaviour occurring at a threshold point in the crisis build-up, indicating the young person’s inability to function appropriately within the family environment. A young person’s perceptions of suicidal behaviour
may be a significant factor in this regard – giving rise to an unpremeditated, impulsive suicidal act in the face of a predominant interpersonal or family crisis. Dysfunctional cognitive schemata in children, caused by growing up with more unhappy than happy memories, can from a cognitive behaviour therapy perspective, lead to the later onset of depression and other psychopathology, all contributing to suicidal behaviour (Schlebusch, 2005). In addition, researchers (Schlebusch, 2005) have persistently cautioned that as children grow up, the prevalence of suicidal behaviour can increase dramatically during later childhood and adolescence if risk factors are not timeously identified and addressed.

Dysfunctional problem-solving skills
Suicidal young people are often poor at solving interpersonal problems (Hawton & van Heeringen, 2000; Schlebusch, 2005). In this context, suicidal behaviour has been viewed as an inappropriate problem-solving strategy and method of communication when young people feel unable to express their psychological anguish in a conventional manner, and when alternative attempts to deal with their problems, fail. Research data from the DPS group (Schlebusch, 2005) has provided ample support for the hypothesis, that in such instances (as part of the suicidal process), suicidal behaviour can be employed as a more desperate cry for help and a first-line, crisis-management technique by young people, often in the absence of overt psychological morbidity.

Since at least 80% of suicidal behaviours are preceded by either verbal or non-verbal behavioural cues that indicate the suicidal person’s intentions, the commonly held belief that young people who threaten to commit suicide are not serious about it, is an artefact (Schlebusch, 2005). According to South African research (Schlebusch, 2005), more than two-thirds of people who engage in suicidal behaviour communicate their intent to do so within three months preceding the suicidal act or consult their general practitioners for treatment for a psychological disorder (usually depression) at least two weeks before the suicidal act. This is consistent with international research which indicates that a substantial proportion of people who commit or attempt suicide have either indicated a need for help or have had some contact with a medical health professional (Pirkis & Burgess, 1998; Schlebusch, 2005). However, in South Africa, a significant number of suicidal young people do not have access to specialised mental health services or even a general practitioner at the time of a suicidal crisis, which is extremely disconcerting, given the gravity of the problem (Schlebusch, 2005).

Neuro-psychological and neurobiological correlates, genetics and familial transmission
Significant correlates of suicidal behaviour in young people are associated with personality functioning, involving substance abuse, emotional liability, aggression and impulsivity (Schlebusch, 2005). Of additional clinical importance, is that head injury and/or neuro-psychological deficits can be related to aggressiveness/impulsivity (Lishman, 2005) which also has a bi-directional relationship with substance abuse (especially alcohol) and suicidal behaviour (Mann, 2002). Moreover, brain pathology can trigger depression, suicidal ideation and disinhibition or lack of restraint (Lishman, 2005; Mann, 2002; Wasserman & Wasserman, 2009). Related ongoing work on neuro-imaging is enhancing the understanding of biological vulnerability in suicidal behaviour (Hawton & Van Heeringen, 2000; Wasserman & Wasserman, 2009), but there is a paucity of such research in South African youth.

Reduced serotonergic input to the orbital pre-frontal cortex (part of the brain involved in behavioural inhibition and decision making) may result in aggressiveness/impulsivity. In such instances, there are decreases in pesynaptic binding sites in the
prefrontal cortex (altered receptor population) and serotonergic hypofunction which may be associated with more lethal methods of choice in suicidal behaviour (Hawton & Van Heeringen, 2000; Mann, 2002; Wasserman & Wasserman, 2009). Further, aggressiveness or impulsiveness are not only common co-morbid variables in suicidal behaviour, but can also be associated with violence. There is a link between suicidal behaviour and violence (Schlebusch, 2005) regarding certain lethal methods of choice. Themes that overlap include increased aggressiveness, impulsiveness, emotional liability, disinhibition, dysfunctional decision-making and reasoning, and an underlying biological or genetic predisposition that could result in increased aggressiveness and violent acting out and suicidal behaviour (Mann, 2002; Nock & Marzuk, 2000; Schlebusch, 2005).

The questions of a genetic component that can trigger suicidal behaviour, reduced cholesterol (being associated with reduced serotonergic activity and increased aggression), analgesic abuse and tobacco smoking have all been addressed in suicidology research (Mann, 2002; Schlebusch, 2005). In addition, patients who engage in suicidal behaviour often have a higher rate of suicidal behaviour in their families, and studies of familial transmission indicate that parents of youth suicidal behaviour victims have higher rates of suicidal behaviour, independent of the presence of psychopathology (Mann, 2002). Twin studies have demonstrated a higher concordance rate for suicidal behaviour in monozygotic compared with dizygotic twins and studies of adoptees who have engaged in suicidal behaviour have shown increased rates of suicidal behaviour in the biological parents of such adoptees, compared to controls, indicating familial correlates of suicidal behaviour in the young (Mann, 2002). Having stated that, it needs to be noted, though, and as emphasised earlier, that non-genetic co-morbid family variables can also significantly influence suicidal behaviour in young people.

Extended suicides and family murders
Extended suicide and murder-suicide are possibly some of the most extreme examples of the link between violence and suicidal behaviour (Nock & Marzuk, 2000; Schlebusch, 2005). An escalation in ‘crimes of passion’ and family murders have been reported in South Africa, where studies (Schlebusch, 2005) have examined the role of psychopathology and personality disorders (especially the dependent personality disorder) and the distinction between murder-suicide and extended suicide (Graser, 1992). In murder suicide, the family murder occurs primarily as an act of murder, and secondarily as a suicide, in order to avoid facing the legal consequences of the murder(s) of family members, whereas in extended suicide there is an original intention to commit suicide, but before doing so, the perpetrator kills the family as part of the planned extended suicide (Schlebusch, 2005), in line with international research (Felthouse & Hempel, 1995; Hawton & Van Heeringen, 2000; Wasserman & Wasserman, 2009). In South African research (Osborne, 2001; Schlebusch, 2005; Townsend, 2003) murder-suicide has been found to be constant across cultures, being more akin to suicides than homicides in which work-related stress and Post-Traumatic Stress Disorder (PTSD), as well as the availability of and familiarity with firearms, are common. Additional precipitators of family slayings cited in South Africa include socio-economic pressures, the trauma resulting from child abuse and various psychological factors or disorders including, personality disorders, depression and substance abuse (Schlebusch, 2005).

Two of the primary motives for suicidal behaviour include murderous impulses and a need to escape from unbearable psychological pain/anguish which can develop when love objects or social support systems are threatened, lost or become unobtainable (Schlebusch, 2005). This, in turn, can result in feelings of intolerable aloneness, severe hopelessness and intense self-contempt with murderous impulses being directed at the
threatened or unattainable love object, such as the immediate family. Murderous impulses may then be turned not only on the self, but through the processes of introjection and projection, also on the family, thus resulting in family murder as an extended suicide. Sometimes children are murdered as a first step to annihilate the family, but when there are surviving children, they are frequently the first to face the full horror of the events, and are often the ones who summon neighbours or the police. Clearly, the emotional sequelae of such experiences can have a devastating impact on the psychological health of the surviving children with future suicidal implications (Schlebusch, 2005).

Murder-suicide can occur amongst all cultural and ethnic groups (Felthous & Hempel, 1995), but early South African studies indicated that in the 1980s this predominated amongst white people (Roos, Beyers & Visser, 1992; Schlebusch, 2005). More recent South African studies reported more Africans to be victims of murder-suicides, which probably reflect the major ethnic composition of the geographical study areas (Osborne, 2001; Schlebusch, 2005; Townsend, 2003).

**Stress**

Acute and chronic stress are critical co-morbid aetiological variables in suicidal behaviour in both adults and children (Hawton & Van Heeringen, 2000; Schlebusch, 2000, 2005; Wasserman & Wasserman, 2009). Several stress-diathesis models, with significant advantages for treatment and prevention, have been advanced to provide a better understanding of the suicidal process and the interactive stress-related dynamics. Two such important models are a stress-diathesis model and a stress-vulnerability model. The stress-diathesis model comprises a comprehensive practical, explanatory and predictive model of suicidal behaviour (Mann, 2002). It proposes that the stress component includes factors such as a psychiatric disorder, as well as life events, and the diathesis includes elements like impulsivity, aggression, pessimism/hopelessness and neurobiological correlates and a range of other potential variables such as gender, religion, familial and genetic components, chronic disease, alcohol/substance abuse, traumatic childhood experiences and psycho-social support systems. This model can be supplemented by the stress-vulnerability model (Wasserman, 2001) that involves factors such as the suicidal individual’s cognitive style, personality, environmental issues, culture and various protective factors against individual vulnerability.

Additional considerations are sleep deprivation and dietary inefficiency because of potential effects on neurotransmitter functioning (Wasserman, 2001). Micronutrient deficiencies can have adverse psychophysiological consequences, more stress-related symptoms, progressively reduced stress tolerance (Schlebusch et al., 2000), and impact adversely on brain structures and memory which, in turn, may impair appropriate coping strategies in a suicidal person (Schlebusch, 2000, 2005; Wasserman, 2001). Inordinate stress can result in the secretion of endogenous stress hormones that affect how memories are laid down. Stress-related elevated cortisol levels, for example, are known to be toxic to the hippocampus (van der Kolk, McFarlane & Weisaeth, 1996), a brain structure that constitutes a major component of the memory system that has a primal role in learning, retention and rapid association of information received from different cortical areas (Lezak, Howieson & Loring, 2004). Stress, therefore, can have major implications for disturbances in various neurotransmitters (Wasserman, 2001) and neurohormones (van der Kolk et al., 1996), with significant co-morbid aetiological considerations for suicidal behaviour (Schlebusch, 2005), also in young people.

In addition, South African researchers (Schlebusch, 2000, 2005; Schlebusch & Bosch, 2002; Schlebusch
et al., 2003) have, amongst others, clearly documented:

- The role of dysfunctional perceptions in stress arousal associated with a range of psychological problems in young people, including suicidal behaviour.
- Suicidal implications of stress-related conflicts in social roles in young people from traditional backgrounds who have to cope with new roles and a more Western-orientated culture in a multicultural, South African society.
- Stress that can act as suicidal triggers precipitated by factors such as acculturation, socio-economic pressures, high crime and violence rates, human rights violations, difficulty to cope with the process of transformation, rising expectations, and an increasing competitiveness in education.
- A reduced appreciation of traditional roles and value systems in suicidal behaviour in the young.
- The effect on suicidal behaviour in the young of trauma-producing behaviours that result from emotional injuries sustained from exposure to direct or indirect violence.

Retrospective analyses (Schlebusch, 2005; Schlebusch & Burrows, 2008) of stress-related risk factors in South African youth have shown that repeated suicidal behaviour can increase in order to secure help, as attempts at non-fatal suicidal behaviour do not get the desired effect from significant others on whom the suicidal behaviour is supposed to impact (i.e. if the cry for help fails), and repeated attempts can result in more severe and lethal methods being used until the precipitators (causes) are appropriately addressed.

**Socio-economic correlates**

Durkheim, in his book Le Suicide, published as early as 1897, is probably the most well-known in this regard when he explained the variation in the frequency of suicidal behaviour by societal conditions and reactions to life’s difficulties (Durkheim, 1951). Although some studies on the relationship between socio-economic changes have produced divergent results, others have highlighted the impact on suicidal behaviour of both adverse socio-economic factors, as well as economic development (Schlebusch, 2005). Contemporary research (Wasserman & Wasserman, 2009) has shown that low socio-economic status increases the risk of suicidal behaviour, as do low educational levels and long-term unemployment. On the other hand, economic development can also result in social problems that can increase suicidal behaviour. Examples include reactions to major economic losses in families, increased pathological gambling, increased divorce rates, increased alcohol and drug abuse, increased health care costs that make it difficult for families to access this, weakening of family ties and social support, migration to urban areas and an increasing economic and social gap between the rich and the poor, resulting in high levels of frustration (Wasserman & Wasserman, 2009).

South African studies (Schlebusch, 2005) have found that the role of socio-economic correlates that contribute to suicidal behaviour risks in particular are: financial problems and associated feelings of loss of parental support, the effects of rapid urbanisation, an increased competitiveness in education and employment, as well as rising expectations in the young, as young people move away from traditional value systems and norms.

**Psychological disorders**

Across all age groups various psychopathological conditions have been shown as co-morbid factors in the aetiology of suicidal behaviour (Hawton & Van Heeringen, 2000; Wasserman & Wasserman, 2009). However, in the majority of suicides, there has been...
at least one psychiatric disorder present and mood disorders (depression) and substance-use disorders, in particular, have been implicated (Bertolote, Fleischmann, De Leo & Wasserman, 2004; Lonnqvist, 2000; Wasserman & Wasserman, 2009). A similar diagnostic profile has been found in South Africa in all ethnic groups (Schlebusch, 2005), whereby as early as 1990, depression was considered such a major problem that a group of experts recommended a national treatment programme (Schlebusch, 1990). In a South African study amongst African youths on suicide and the prevalence of depression (Mayekiso, 1995), up to 38% of the sample was diagnosed as mildly depressed, 20% as moderately depressed and 13% as severely depressed.

Nevertheless, research findings show that mood disorders associated with suicidal behaviour are often clinically undetected in South African youth (Schlebusch, 2005). There are several reasons for this. In the young, clinical depression and suicidal ideation frequently tend to be more prevalent and/or severe with increasing age. The boundaries are sometimes unclear and can be influenced by developmental issues and age that affect the expression of depressive symptomatology. Children’s moods and risk for attempting suicide are also often associated with family discord, abuse and neglect (Sadock & Sadock, 2007; Schlebusch, 2005). South African research (Schlebusch, 2005) has indicated that there is some evidence that culture can modify the expression of depressive symptomatology in some groups. For example, not understanding certain traditional beliefs could obfuscate the diagnosis of depression, resulting in under-diagnosis of the condition, although exact data on this remains unclear (Schlebusch, 2005). However, experts do agree that a combination of the accompanying psycho-social, biovegetative and other dysfunction, and the intensity, severity and duration of the depressive symptoms are important markers when making an accurate diagnosis of the disorder (Kaplan & Sadock, 1995; Lasich & Schlebusch, 1999; Schlebusch, 1990, 2005).

Additional considerations with underlying psychopathology in young people include: school phobia, reduced socialisation (social inhibition), irritability, excessive clinginess to parents, poor academic performance, substance abuse, antisocial/conduct-disordered behaviour, running away from home, persistent sadness, heightened feelings of anxiety, anger, guilt and shame and sexual promiscuity (Sadock & Sadock, 2007; Schlebusch, 2005). Improved treatment modalities utilising both psychotrophic and psychological techniques (especially cognitive behaviour therapy) and parent counselling, offer significant opportunities to reduce suicidal behaviour in young people, but there is a high risk when suicidal individuals are considered to have responded to treatment and have not yet recovered completely and drop out of treatment (Schlebusch, 2005).

Somatic co-morbidity
There can be a relationship between physical disease and suicidal behaviour (Schlebusch, 2005, 2011c; Wasserman & Wasserman, 2009). For example, in some instances, a link has been shown between indirect self-destructive behaviour resulting in analgesic nephropathy (end-stage renal disease as a result of analgesic abuse), and suicidal behaviour and potentially life-threatening diseases such as cancer and HIV/AIDS (Schlebusch, 2005, 2011c). There is growing evidence of the long-term sequelae in childhood cancer that can contribute to suicide risk factors in adulthood due to the traumatic experiences of children with cancer as a result of hospitalisation, oncology treatment and altered social contact (Recklitis et al., 2010; Wasserman & Wasserman, 2009). However, knowledge in this area regarding young people remains sparse. Nevertheless, they can be psychologically severely affected should there be an adult suicide or attempt.
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in their family as a result of physical disease, which can act as a risk factor for later suicide attempts in children.

PREVENTION, RESEARCH AND POLICY PRIORITIES

National prevention programmes and strategies have been developed in many countries (Wasserman & Wasserman, 2009). Although individual and regional suicide prevention programmes and service agencies are in place in South Africa, in some areas (Schlebusch, 2005), a national suicide prevention programme which has been recommended (Burrows & Schlebusch, 2008, 2009) has not yet been implemented. To prevent suicidal behaviour and promote mental health, a national programme for suicide prevention should provide a strategic framework for action at all levels, i.e. national, provincial, regional and local. The goals should include:

- Reducing suicide deaths and non-fatal suicidal behaviour.
- Reducing risk factors and promoting protective factors.
- Promoting early detection of new trends and a reversal of emerging problem areas.
- Promoting public awareness of suicidal behaviour, its causes and possibilities for prevention.
- Increasing support to individuals, families and communities affected by suicidal behaviour.

It has been proposed (Burrows & Schlebusch, 2008) that to achieve this, requires a framework based on a set of guiding principles and a range of strategies that should be pursued through health care services or directed at the general population. Important principles include the creation of partnerships and alliances with the community, professional groups, NGOs and government sectors; using a diversity of approaches; targeting the whole population, specific population subgroups and individuals at risk; developing an evidence-based and outcome-focused programme, with ongoing research and evaluations as an integral part; developing activities that are appropriate and responsive to the social and cultural needs of the groups or populations they serve; developing a rights-based approach as people have a right to be involved in determining their future; and building on strengths, capacities and capabilities of individuals, families and communities.

Specific objectives should include (Burrows & Schlebusch, 2008) improving research and national data collection systems and accurate information on suicidal behaviour; addressing social attitudes by increasing knowledge of suicidal behaviour to reduce stigma and discrimination; controlling the environment such as reducing the availability of and access to suicide methods, through gun possession control, detoxification of domestic gas, detoxification of car emissions, improved control of availability of toxic substances including pharmaceutical drugs, fencing high buildings and bridges, as well as toning down dramatic reports in the media that can have a copy-cat effect on the young; and providing social and medical support and treatment including crisis centres, telephone emergency lines, mental health and medical services. Training and promoting skills development should form an essential part of providing adequate support and treatment and achieving the objectives.

It is critical to have a thorough understanding of the risk factors and causes of suicidal behaviour in order to deal with them. A primary strategy for suicide prevention is the recognition and effective treatment with both pharmacological and psychological methods of depression and other underlying psychopathology that often go undetected in young people and contribute to suicidal behaviour. It is also essential that school children and students be trained to identify and manage conflict situations and crises that could result in suicidal behaviour. Stress management is particularly important in this
respect (Schlebusch, 2000). Regarding child and adolescent mental health policy, introducing a multi-level system with the first tier incorporating schools is important. Risk factors in families, children and students need to be identified. Educators should be made aware of suicide risk factors, such as dysfunctional family backgrounds, problematic relationships, changes in living conditions and potential psychopathology in the young. The fact that there are no school counsellors in many schools should be addressed, as this has a negative impact on the mental health of learners at risk for suicidal behaviour, and who could utilise school counselling services. Close co-operation between educators and health service providers is strongly recommended. Finally, suicide prevention efforts need to take cognisance of the numerous stressors that a country in transition presents to its youth, and local data collection and collaborative research need to be strengthened and sustained to improve prevention efforts on an ongoing basis (Burrows & Schlebusch, 2008; Schlebusch, 2004, 2005).

CONCLUSIONS
Suicidal behaviour and/or suicidal ideation in the younger age groups in South Africa are inordinately high. This has considerable implications for mental health care facilities in the country. In many cases of suicide, threats or non-fatal suicidal behaviour, parents and other adults do not always take the behaviour seriously for various reasons. They often consider it as mere gestures or threats to manipulate, or because they want to avoid publicity and social embarrassment. This can only make the situation worse and increase the number of fatal suicidal behaviours. Given the research findings, the severity of the problem in young people in South Africa should not be underestimated. The loss of one young person through suicide, is one too many. The faces of the youth need to be filled with hope, not hopelessness which is the link between suicidal ideation and acting on it. Early recognition of risk factors are important for prevention of suicidal behaviour, as is the need to develop appropriate, cost-effective therapeutic interventions and research, as well as policy priorities.

Key messages
• Suicidal behaviour in the young can range from lethal attempts with high intent to die (fatal suicidal behaviour) to non-lethal attempts (non-fatal suicidal behaviour) with low or no intent to die.
• Low intent suicidal behaviour is often a cry for help or an inappropriate problem-solving skill.
• Globally and in South Africa, suicidal behaviour, in the young is an increasingly serious public health problem, which has considerable implications for mental health care facilities in the country.
• In South Africa, about 9.5% of non-natural deaths in young people are because of suicides and ten to twenty times more non-fatal suicidal behaviours occur per year.
• Week-ends and year-end are high risk periods.
• Most common suicide methods are: hanging, poisoning (including overdose with medical substances), firearms, gassing, and fenestration (jumping from high places). In non-fatal suicidal behaviour, overdose and self-lacerations are most common.
• Risk factors are multifactorial and multidimensional, and their early recognition is important for prevention of suicidal behaviour.
• Regional suicide prevention programmes and service agencies are in place in some instances, but a recommended national suicide prevention programme, has yet to be implemented.
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