

Non-fatal self-poisoning in Sri Lanka

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Declaration

Except where otherwise indicated, this thesis is my own work, carried out while studying for my doctoral degree at the National Institute of Mental Health Research, College of Medicine, Biology and Environment of the Australian National University.

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Abstract

Non-fatal self-poisoning is a significant public health problem in Sri Lanka. Hospital admission rates due to non-fatal self-poisoning in Sri Lanka have increased since the 1990s, while rates of completed suicides have decreased. Pesticide ingestion among males was the most common pattern of self-poisoning, but recent studies suggest that this is changing. However, little current data is available on non-fatal self-poisoning in Sri Lanka. Psychosocial factors such as psychiatric morbidity, suicide intent, and the likelihood and predictors of recurrence have not been extensively investigated.

Accordingly, the aims of this thesis on non-fatal self-poisoning in Sri Lanka are to: 1) investigate the associated socio-demographic factors, substances ingested, psychiatric morbidity and level of suicidal intent; 2) investigate why people carry out acts of non-fatal self-poisoning; 3) describe the longitudinal sequelae over one year, in terms of repetition and suicidal ideation; and, 4) examine potential methods for minimizing rates of non-fatal self-poisoning in Sri Lanka.

To achieve these aims, this research program is organized into several sections as follows: A systematic review of 27 studies of non-fatal self-poisoning in Sri Lanka; semi-qualitative interviews of 24 persons who had recently carried out acts of non-fatal self-poisoning; a large cross-sectional survey of 949 persons admitted to hospital after non-fatal self-poisoning, conducted over 14 months; and a one-year follow-up survey of 335 participants. Ethical approval for the study was obtained from the Australian National University and the University of Peradeniya, Sri Lanka.

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Several key findings emerged overall. Non-fatal self-poisoning in Sri Lanka has begun to resemble the pattern of Western countries, in that most who attempted poisoning were young (majority below 25 years), female, and the most commonly ingested substance was medicinal drug overdoses. One-third of males had ingested pesticides. As described previously in the literature, most acts of non-fatal self-poisoning occurred in the context of distress associated with recent interpersonal conflict; the desire to escape, or to die, emerged as motivational themes. A new finding was that over 50% admitted to hospital after non-fatal poisoning were depressed, and almost one-third of males had alcohol misuse. Male gender, a history of prior suicide attempts, depression, and hopelessness were significant predictors of high suicidal intent. Most participants endorsed potential preventive strategies such as talking to a close friend or family member, distraction activities and recollection of the adverse consequences of the index self-poisoning attempt. Contrary to expectations, the rate of repetition at one year was low, being only 2.7%.

These findings suggest that non-fatal self-poisoning should be a national priority in Sri Lanka and that an integrated, multi-level approach towards prevention should be implemented. In particular, the data suggest that primary prevention programs are required to increase community awareness and primary-care treatment of depression, promote safe drinking, and help young people develop interpersonal skills and distress tolerance. Secondary prevention might include screening and targeted management of high-risk individuals who have attempted self-poisoning. Restriction of access to pesticides should be continued. . Further research is needed to explore the effectiveness and acceptability of preventive strategies.

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Chapter 1

Overview: Aims and structure of the thesis

Non-fatal or attempted self-poisoning is a significant public health problem in Sri Lanka with a reported rate of 321 per 100,000 hospital admissions for self-poisoning in 2007 (De Silva, Senanayake, Dias, & Hanwella, 2012). Moreover, since the mid-1990s, hospital admissions for non-fatal self-poisoning in Sri Lanka have increased (De Silva et al., 2012).

Despite the importance of this problem, little research has been undertaken that might inform public policy and practice to reduce the prevalence of non-fatal self-poisoning. First, little is known about the factors such as psychiatric morbidity that may be associated with non-fatal self-poisoning.

Secondly, although non-fatal self-poisoning in Sri Lanka is typically carried out as an impulsive act with little premeditation (Eddleston et al., 2006; Hettiarachchi & Kodituwakku, 1989) and as a response to stress (Konradsen, van der Hoek, & Peiris, 2006) little is known about the *motivations* of those who self poison.

Third, information about short- and long-term *sequelae* among people who carry out non-fatal self-poisoning in Sri Lanka is sparse. In the West, one-year repetition rates are in the vicinity of 16% (Carroll, Metcalfe, & Gunnell, 2014). Available repetition rates for Sri Lanka are reportedly as low as 4% at 18 month follow-up (Bertolote et al., 2010), but the number of prospective follow-up studies of self-harm in Sri Lanka are very few.

Finally, apart from examining the restriction of access to means (Gunnell et al., 2007) to date there has been little research investigating strategies to prevent self-poisoning. Understanding the characteristics of non-fatal self-poisoning, motivations, and sequelae, may inform the development and implementation of prevention programs.

Accordingly, this thesis on non-fatal self-poisoning in Sri Lanka has four aims: (1) investigate the associated socio-demographic factors, substances ingested, psychiatric morbidity and level of suicidal intent associated with non-fatal self-poisoning and determine the impact of age and gender on substances ingested, psychiatric morbidity and suicidal intent; (2) investigate why people carry out acts of non-fatal self-poisoning in Sri Lanka; (3) describe the longitudinal sequelae of non-fatal self-poisoning over one year, in terms of repetition and suicidal ideation; and, (4) examine potential methods for minimizing rates of non-fatal self-poisoning in Sri Lanka.

1.2 Terminology

The terminology used to describe suicidal behaviour and self-poisoning in Sri Lankan literature (as in the rest of the world) varies considerably. Terms such as suicidal attempt, self-harm and self-poisoning are often used interchangeably and without accompanying definitions. In many publications the degree of suicidal intent underlying the act is implied rather than described. Depending on the terms used, different degrees of suicidal intent maybe implied (although often not overtly stated) – for example, the term ‘attempted suicide’ implies that the person intended to some degree, to die, whereas the term ‘non-fatal self-harm’ leaves the question of intent

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open. Thus, measures of non-fatal self-harm in Sri Lanka, as in the rest of the world, continue to be hindered by a lack of standard nomenclature (Silverman, Berman, Sanddal, O'Carroll, & Joiner, 2007).

To minimize ambiguity, for the purposes of this thesis and research, the term 'non-fatal self-poisoning' is used. Here non-fatal self-poisoning is defined as intentional ingestion of a toxic substance or of a medication in excess of its prescribed dosage, with a non-fatal outcome. Within this definition the degree of associated suicidal intent (if any) is left open, and could vary from no suicidal intent to a high degree of suicidal intent. The motivations and possible suicidal intentions associated with non-fatal self-poisoning are explored separately, in the latter part of this thesis.

1.3 The structure of the thesis

As described above, the research program focuses on four main areas – namely, characterization (Aim 1), motivations (Aim 2), sequelae (Aim 3) and directions for prevention of non-fatal self-poisoning in Sri Lanka (Aim 4). These four areas were examined via a systematic review of the literature, semi-structured interviews, a cross-sectional study, and a prospective cohort study. The findings for each of these four areas is presented in a separate Part, each comprising one or more chapters. These are described briefly below.

Part 1

Part 1 of the thesis comprises Chapters 2 to 5, and focuses on the characterization of non-fatal self-poisoning in Sri Lanka.

Chapter 2 reports the results of a systematic review of all studies on non-fatal self-poisoning in Sri Lanka. In particular, it reviews previous studies on socio-demographic characteristics and risk factors associated with non-fatal self-poisoning in Sri Lanka.

Chapter 3 reports the results of a large cross sectional survey that investigates demographic features, psychiatric morbidity and other characteristics associated with non-fatal self-poisoning in Sri Lanka. This is followed in Chapter 4 by an in-depth examination of differences in the patterns of non-fatal self-poisoning as a function of gender. It includes a consideration of differences in the role of associated factors such as substances ingested and psychiatric morbidity.

The international literature indicates that suicidal behavior varies as a function of age, with attempted suicide in older people involving greater suicidal intent. In Sri Lanka, non-fatal self-poisoning is said to be more common in the young, but variations across age have not been examined empirically. Chapter 5 describes and discusses the variations in non-fatal self-poisoning across different age groups in Sri Lanka, based on the data gathered in the cross-sectional survey described in Chapter 3.

Part 2

Part 2 of the thesis is concerned with the motivations and triggers that are associated with non-fatal self-poisoning. To date, prevention of self-poisoning in Sri Lanka has focused on the reduction of access to lethal pesticides. Perhaps in response to this intervention, the rates of completed suicide have now decreased. However, the rates of non-fatal self-poisoning appear to be increasing. This points to the need for broader, more comprehensive preventive strategies. Such strategies might be informed by an understanding of the triggers and motivations associated with non-fatal self-poisoning in Sri Lanka. Chapter 6 describes the motivations and triggers associated with non-fatal self-poisoning in Sri Lanka, based on structured interviews of survivors of a recent act of self-poisoning.

Part 3

In Part 3 of this thesis the focus is on the sequelae of self-poisoning. In particular, chapter 7 reports on the results of a follow-up survey investigating the rate of repetition of self-harm, and suicidal ideation, one year after the index episode of self-poisoning.

Part 4

Following the examination of characteristics, motivations and sequelae of non-fatal self-poisoning in Sri Lanka, Part 4 of the thesis describes the potential strategies for the prevention of non-fatal self-poisoning in Sri Lanka.

The potential methods for preventing such behaviors in the future were investigated using semi-qualitative and quantitative methodologies to explore strategies for coping with emotional distress, as elicited from participants of the

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study. These findings are discussed in chapter 8. This research is novel in that previous studies have rarely asked participants for their views about potentially useful preventive strategies.

Finally, in chapter 9 the main findings from the research program are summarized, followed by a discussion of the implications of these findings for the development of preventive strategies for non-fatal self-poisoning in Sri Lanka. Priority topics for further research are also discussed.

Part 1

Characterization of non-fatal self-poisoning in Sri Lanka

Chapter 2

Non-fatal self-poisoning in Sri Lanka: a systematic review of the literature

This chapter is an updated version of the candidate's publication in *BMC Public Health* 2013;13:331 (Appendix I).

2.1 Introduction

In the mid 1990s, Sri Lanka had one of the highest rates of suicide in the world, reaching a peak of 47 per 100,000 in 1995 (Gunnell et al., 2007b; Vijayakumar, Nagaraj, Pirkis, & Whiteford, 2005). Pesticide poisoning, estimated to account for up to one-third of the world's suicides (Gunnell, Eddleston, Phillips, & Konradsen, 2007a), is the most common method of suicide in Sri Lanka, and in other South Asian countries (Berger, 1988; Eddleston et al., 2005; Parkar, Dawani, & Weiss, 2006). After the mid 1990s, the rate of completed suicide in Sri Lanka has declined. This decline has coincided with the decreased availability of toxic pesticides due to government imposed restrictions (Gunnell et al., 2007b).

Unfortunately this has been accompanied by a parallel increase in rates of hospital admissions due to non-fatal self-poisoning, mostly by medicinal overdoses (Hanwella, Senanayake, & De Silva, 2012). Attempted suicide by non-fatal self-poisoning is a challenging problem now facing Sri Lanka (Hanwella et al., 2012). De Silva (De Silva et al., 2012) reported that the annual incidence of hospital admissions for any type of poisoning increased from 204 per 100,000 in 1995 to 321 per 100,000 in 2007. This increased incidence is comparable to the highest average age standardized attempted suicide rates for males reported in Europe, of 314 per 100,000 (Schmidtke et al., 1996).

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Non-fatal self-poisoning is associated with significant morbidity and economic cost (Gunnell & Eddleston, 2003). The cost of treating patients after self-poisoning in Sri Lanka in 2004 was estimated to be US\$ 866,304 (Wickramasinghe et al., 2009). Undoubtedly this estimate is likely to be substantially higher in 2014.

The factors associated with non-fatal self-poisoning in Sri Lanka may differ from those which operate in Western countries. Non-fatal self-poisoning in Sri Lanka has been traditionally described as impulsive, with low suicidal intent and psychiatric morbidity (Hettiarachchi & Kodituwakku, 1989). But there has been no detailed examination of psychological factors associated with non-fatal self-poisoning in Sri Lanka across gender and across differing ages. Furthermore, the heterogeneity of these Sri Lankan studies makes overall conclusions difficult. To date, there has been no overall synthesis of available evidence regarding attempted self-poisoning in Sri Lanka.

2.2 Objectives of this review

Thus the overall purpose of this chapter was to present the results of a systematic review that delineates the characteristics of non-fatal self-poisoning in Sri Lanka.

Specific objectives were to:

- Describe socio-demographic characteristics of non-fatal self-poisoning in Sri Lanka
- Determine risk factors such as psychiatric morbidity and previous self-harm associated with non-fatal self-poisoning in Sri Lanka

2.3 Method

2.3.1 Search Strategy for identification of studies

Electronic searches were conducted across bibliographic databases, namely PsychINFO, ProQuest Central, Medline and the Cochrane library from inception to April 2014. Eligible studies published in indexed journals in the English language were located using combinations of the following MeSH terms and keywords: self-poisoning, suicide attempt, attempted suicide, Sri Lanka, Ceylon (Figure 1). English is the medium used for scientific publication in Sri Lanka, and hence the search was conducted in English. The title and abstracts of all articles were perused initially, and those that clearly did not meet inclusion criteria were excluded. The full text of all remaining articles was retrieved and examined for eligibility to be included in the review. The final decision to include an article was based on the relevance of its content. Bibliographies of retrieved articles were also examined for relevant studies, and potentially relevant papers were then retrieved and reviewed using the above selection criteria. Print issues of the Ceylon Medical Journal were hand-searched from the journal's inception in 1954 onwards, for relevant papers. Print issues of The Journal of the Ceylon Branch of the British Medical Association, which was the forerunner of the Ceylon Medical Journal (1887-1954) were also hand-searched. There was no search of the grey literature.

2.3.2 Inclusion Criteria

All studies focusing on non-fatal self-poisoning in Sri Lanka, regardless of the terminology used, published in indexed journals, were eligible for inclusion in this review. This included studies in which suicidal intent associated with self-

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poisoning was overtly stated, as well as studies in which suicidal intent was implied, based on the behaviour of the participants concerned.

Studies were also included if they reported on both accidental and intentional poisoning, provided that the intentional self-poisoning group could be clearly delineated for separate examination. Given the limited number of studies available, and to be as inclusive as possible, studies which focused exclusively on survivors of intentional self-poisoning attempts, as well as those which considered participants who attempted intentional self-poisoning irrespective of outcome (i.e., which included those who survived as well as those who later died) were included. No study was excluded on the basis of methodological grounds; all types of study designs (e.g., clinical trials, cross-sectional descriptive studies, retrospective surveys, and prospective studies) were considered for the review.

2.3.3 Exclusion criteria

Studies were excluded if they were not conducted in Sri Lanka, if they were not written in English, or if they exclusively focused on the medical management of acute self-poisoning. Studies which focused solely on accidental poisoning, as well as those which focused solely on fatal self-poisoning or completed suicides in Sri Lanka were also excluded.

2.3.4 Analysis strategy

A data extraction tool was created to aid with the systematic collection of relevant data from the published literature (Appendix A). Outcomes of interest included study design, nature and size of sample, gender and age distribution, rates of self-poisoning, types of poison ingested and where available, degree of suicidal intent associated with the act, and factors associated with self-poisoning, such as

triggers, psychiatric morbidity and alcohol use disorders. The method of assessment of outcomes such as psychiatric morbidity and alcohol use disorders was noted for each study.

2.4 Results

After the initial database search, 409 abstracts were screened, of which 313 were excluded because the studies were either not based in Sri Lanka, or were solely focused only on accidental poisoning or on the medical management of acute self-poisoning (see Figure 2.1). After removal of duplicates, full text publications of the remainder ($n = 62$) were retrieved and evaluated. Forty-two publications were excluded because they focused on completed suicide or did not provide data on non-fatal self-poisoning. Twenty publications were retained after this full text screen. A further six publications were found after the examination of bibliographies. Four more publications were obtained from the Ceylon Medical Journal. Therefore, 30 publications (representing 27 studies) were included in this review.

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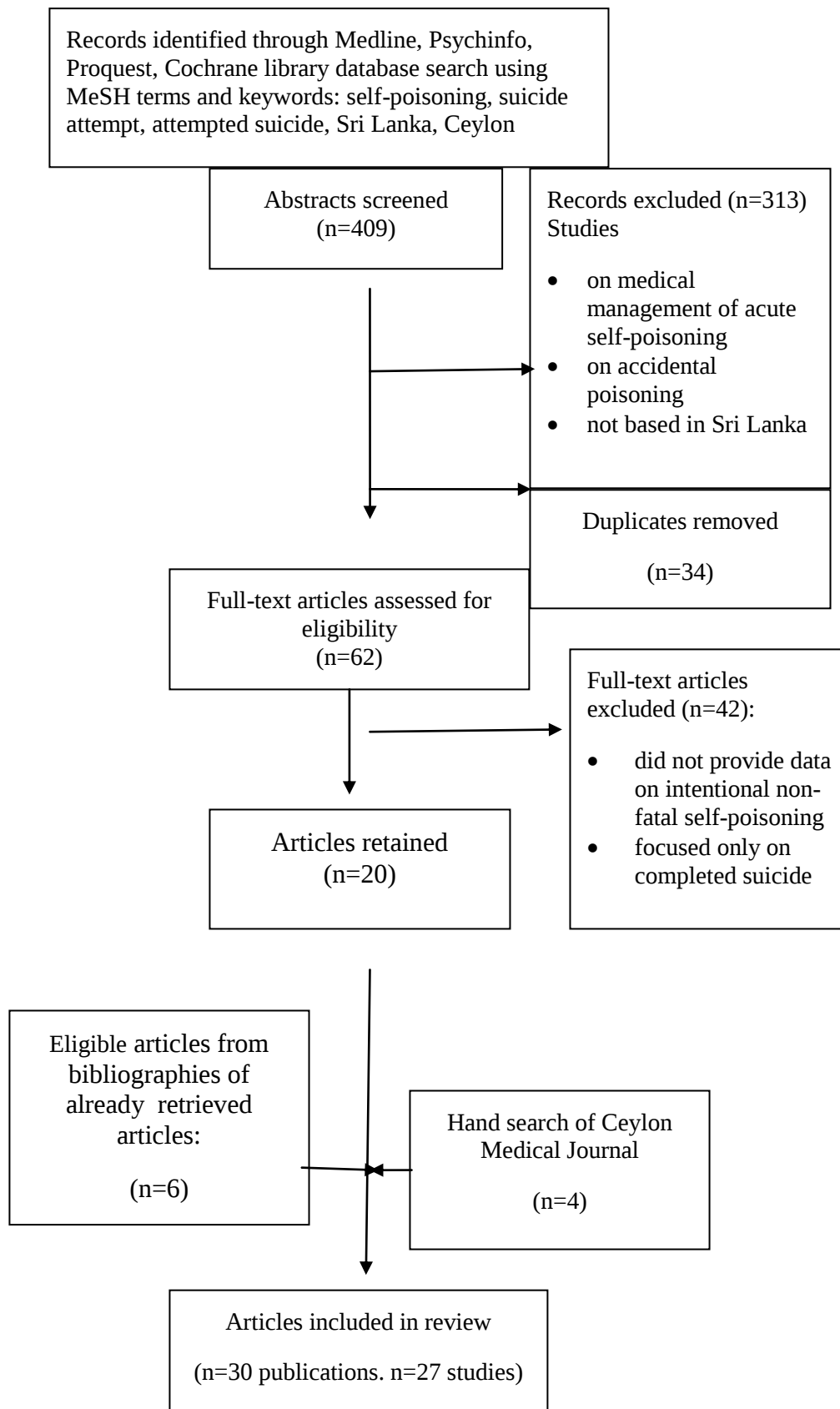


Figure 2.1: Flow diagram for literature search and review

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Of the 30 publications included in the review, three studies were represented by two publications each, since these articles gave differing objectives and results.

The 27 studies included in the review were of varying size and design. With respect to study designs, one study was a randomized controlled trial, two were case control studies, 10 were cross sectional descriptive studies conducted in hospital settings, 12 were based on retrospective review of medical records of those admitted to hospital for self-poisoning, and two were qualitative or used mixed methods (Table 2.1). Of these studies, three were nation-wide surveys (De Silva et al., 2012; Hanwella et al., 2012; Jeyaratnam, de Alwis Seneviratne, & Copplestone, 1982), whilst the remainder were conducted in defined regions of the country (Table 2.1).

2.4.1 Rates of self-poisoning and repetition

Eleven studies reported rates of self-poisoning (Tables 2.2 and 2.3). In all but one study (van der Hoek & Konradsen, 2005), the data was derived from medical records of admissions to hospitals in the study area, or based on the annual health statistics published by the Ministry of Health, Sri Lanka. The reported rates of non-fatal self-poisoning, either by pesticide ingestion, or by ingestion of any type of poison, increased in the three decades leading up to the turn of the century. In 1971-2 the reported rate of non-fatal self-poisoning (by any poison) was 26.2 per 100,000 (Kandy region) (Senewiratne & Thambipillai, 1974a), whereas in 2002 it was 315 per 100,000 (Galle region) (Table 3) (Manuel et al., 2008). Except for three studies (De Silva et al., 2012; Hanwella et al., 2012; Jeyaratnam et al., 1982), all reported self-poisoning rates were for specific regions in Sri Lanka rather than for the whole country. The island-wide survey published in 1982 (Jeyaratnam et al., 1982) examined a random sample of clinical records of patients discharged from all 10

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general hospitals, and five of the 14 base hospitals, that provided inpatient care within the government health sector in Sri Lanka in the year 1979. The rate of pesticide poisoning in Sri Lanka was reported to be 79 per 100,000 population in 1979 (of which 73% was due to non-fatal self-poisoning) (Jeyaratnam et al., 1982). A more recent nationwide survey of hospital admissions for self-poisoning (by all substances) reported an increased rate of 321 per 100,000 in 2007 (De Silva et al., 2012). Most districts showed an increased trend of hospital admissions for self-poisoning (Hanwella et al., 2012).

Prospective follow-up data regarding rates of re-attempted suicide in Sri Lanka were scarce. The WHO SUPRE-MISS study was a randomized controlled trial of the effectiveness of a brief intervention and contact for suicide attempters, conducted across 5 countries, including in Colombo, Sri Lanka (Fleischmann et al., 2008). As a part of this study in Sri Lanka, those presenting to hospital following attempted suicide (of which >90% was by self-poisoning) were randomized either to a brief intervention and contact (BIC) or treatment as usual (TAU) group, and subsequently followed up for 18 months for re attempts of suicide. In Sri Lanka, of the TAU group, 4% had repeated a suicide attempt by 18 months follow-up (Bertolote et al., 2010). Further, two other Sri Lankan studies retrospectively examined rates of previous self-harm (by any method) in those presenting to hospital with non-fatal self-poisoning, and reported rates ranging from 8% to 20% (Mohamed et al., 2010; van der Hoek & Konradsen, 2005).

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Table 2.1

Sri Lankan studies on attempted self-poisoning included in this review

Randomized Controlled Trials (RCT):				
No	Study	Study Design	N	Outcomes examined
1	Fleischmann et al 2005 (Fleischmann et al., 2005)	RCT of brief intervention following attempted suicide	1067	Demographic features, methods used and outcomes
2	Bertolote et al 2010 (Bertolote et al., 2010)	Same study as above	TAU: 149 BIC: 151	Rate of repetition of attempted suicide at 18 months
Case control:				
No	Study	Study Design	N	Outcomes examined
3	Seneviratne et al 1999 (S L Seneviratne & H J de Silva, 1999)	Case control	168 cases	Demographic features, psychiatric morbidity
4	van der Hoek et al 2005 (van der Hoek & Konradsen, 2005)	Case control	253 cases* *of which 84% was intentional	Demographic features, types of poisons, risk factors

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Cross sectional descriptive:				
No	Study	Subjects	Number of subjects	Outcomes examined
5	Fernando 1977 (Fernando, 1977)	Subjects: patients hospitalized after poisoning	101	Demographic characteristics, poisons used
6	Chandrasena 1981 (Chandrasena, 1981)	Subjects: patients hospitalized after poisoning	64	Demographic characteristics, poisons used, psychiatric morbidity
7	Jeyaratnam et al 1987 (Jeyaratnam, Lun, & Phoon, 1987)	Residents in the study area who had a history of hospital admission for poisoning + farmers in agricultural communities in 4 South Asian countries	94 (in Sri Lanka)* *of which 36.2% was intentional	Types of pesticides used ingested, awareness among consumers of health hazards of pesticides
8	Hettiarachchi et al 1989 (Hettiarachchi & Kodithuwakku, 1989a)	Patients hospitalized due to self-poisoning in South Sri Lanka.	97	Demographic features, types of poisons, reasons for choice of poison and where obtained
9	Hettiarachchi et al 1989 (Hettiarachchi & Kodituwakku, 1989)	Same study as above	97	Intent, triggers, psychiatric morbidity

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Cross sectional descriptive continued:

No	Study	Subjects	Number of subjects	Outcomes examined
12	De Silva et al 2008 (De Silva & Ratnayake, 2008)	Inpatients after self-poisoning (Colombo region)	191	Demographic characteristics, types of poisons ingested
13	Fahim et al 2010 (Mohamed et al., 2010)	Inpatients after self poisoning (Polonnaruwa & Peradeniya regions)	816	Rate of previous self-harm
14	Dawson et al 2010 (Dawson et al., 2010)	Patients admitted to two rural hospitals after deliberate ingestion of a single pesticide, from 2002 to 2008.	9302	Demographic features, type of pesticide ingested
15	Rajasuriya et al 2012 (Rajasuriya, Asanthi, & Ranaweera, 2012)	Patients admitted to Ampara hospital in 2009 (over 3 months)	230	Demographic features, type of pesticide ingested
16	Senarathna et al 2012 (Senarathna et al., 2012)	Patients admitted to hospitals in Anuradhapura from Sep 2008- Jan 2010	3813	Demographic features, type of pesticide ingested, and comparison of 2005 vs 2009

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Retrospective survey of medical records:				
No	Study	Type of records surveyed	Number of records	Outcomes examined
17	Senewiratne et al 1974 (Senewiratne & Thambipillai, 1974a)	Records of all inpatients treated at Kandy Hospital for acute poisoning, in 1970 and 1971	472* *of which 82% was intentional	Rates of attempted poisoning, demographic features, types of poisons ingested
18	Dissanayake et al 1974 (Dissanayake & De Silva, 1974)	Police records 1970-72, of the Police Post, General Hospital, Colombo region + Case notes of admissions for poisoning to Colombo Hospital 1970-72	270* *of which 49% was intentional 104 (non-random sample)	Demographic features (age and gender)
19	Jeyaratnam et al 1982 (Jeyaratnam et al., 1982)	Randomly selected hospital records of patients discharged with a diagnosis of pesticide poisoning, from hospitals throughout Sri Lanka	1000	Rates of poisoning, demographic features, types of poisons ingested

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Retrospective survey of medical records continued:				
No	Study	Type of records surveyed	Number of records	Outcomes examined
20	Senanayake et al 1986 (Senanayake & Karalliedde, 1986)	Hospital admissions for acute poisonings in hospitals in selected areas of Sri Lanka (Peradeniya, Colombo, Galle and Jaffna regions)	Peradeniya-179 Galle-100 Colombo- 101 Jaffna- 446	Demographic features, types of poisons ingested, associated illness
21	Hettiarachchi et al 1989 (Hettiarachchi & Kodithuwakku, 1989b)	Records of patients hospitalized due to non-fatal poisoning over a 1 year (1986-7) (South Sri Lanka)	669* *of which 73% was intentional	Prevalence rates, demographic features, types of poisons, case fatality.
22	Hanwella et al 2012 (Hanwella et al., 2012)	Nation-wide data on hospital admissions for self poisoning from 1995-2008, from the Ministry of Health		Time series analysis of change of rates of admissions due to ingestion of pesticides, medicinal overdoses and other non-medicinal substances, from 1995-2008
23	De Silva et al 2012 (De Silva et al., 2012)	Nation-wide data on substances ingested for self-poisoning, derived from Ministry of Health records on hospital admissions from 1995-2009		Trends in substances ingested for self-poisoning from 1995-2009

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Retrospective survey of medical records continued:					
No	Study	Type of records surveyed	Number of records		Outcomes examined
25	De Silva et al 2000 (De Silva et al., 2000)	Hospital records of patients hospitalized due to parasuicide in Kandy, Peradeniya, Kurunegala and Matale regions during 1993-94.	5036*	*of which >80% was intentional	Demographic features, type of poisons ingested
26	van der Hoek et al 2006 (van der Hoek & Flemming, 2006)	Hospital records of patients hospitalized due to poisoning, in South Sri Lanka, from 1990-2002.	8110*	*of which 64% was intentional	Demographic features, rates of poisoning, type of poisons ingested
27	Manuel et al 2008 (Manuel et al., 2008)	Hospital records of patients admitted due to self-poisoning in rural south Sri Lanka + selected economic indices of that area	844		Rates of attempted poisoning, associations with socioeconomic indices
28	Senadheera et al 2010 (Senadheera, Marecek, Hewage, & Wijayasiri, 2010)	Hospital records of children & adolescents admitted to Hospital in South Sri Lanka (Karapitiya region), due to deliberate self-harm	827*	*of which 99% was due to attempted self-poisoning	Demographic features, types of substances ingested, change of substances ingested with time

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Qualitative studies:				
No	Study	Study Design	N	Outcomes examined
29	van der Hoek et al 1998 (van der Hoek, Konradsen, Athukorala, & Wanigadewa, 1998)	Mixed methods- Retrospective analysis of hospital records for information on occurrence of pesticide poisoning in the area + Qualitative interviews of families living in a village in a rural agricultural area	526* *of which 68% was intentional	<u>Quantitative:</u> Socio-demographic features, types of pesticides ingested <u>Qualitative:</u> Exploration of daily use, practices and storage regarding pesticides
30	Konradsen et al 2006 (Konradsen et al., 2006)	Qualitative interviews with those who have attempted intentional self-poisoning, key workers in the area and focus group discussions with those from that community.	159	Exploration of factors and triggers associated with attempted self-poisoning (particularly sociological aspects).

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Table 2.2:

Rates of self-poisoning (per 100,000 population) – pesticides only

Authors	Period of study (Year)	Area studied	Rates of self-poisoning by ingestion of pesticides
Jeyaratnam et al 1982 (Jeyaratnam et al., 1982)	1979	Sri Lanka (nationwide)	79/100,000* *of which 73% was due to intentional self-poisoning
van der Hoek et al 1998 (van der Hoek et al., 1998)	1991-94	North-Central Province	260/100,000 per year to 290/100,000 per year* *of which 68% was due to intentional self-poisoning
van der Hoek et al 2005 (van der Hoek & Konradsen, 2005)	1999	Uda Walawe region	163/100,000* *of which 84% was due to intentional self-poisoning

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Table 2.3:

Rates for intentional self-poisoning (per 100,000 population) – for any type of substances including pesticides

Authors	Period of study (Year)	Area studied	Rates of self-poisoning by ingestion of any type of substance
Senewiratne et al 1974 (Senewiratne & Thambipillai, 1974a)	1971-2	Kandy region	26.2 /100,000* *of which 82% due to intentional self-poisoning.
Hettiarachchi et al 1989 (Hettiarachchi & Kodithuwakku, 1989b)	1986-87	Galle region	54.7/100,000 (all due to intentional self-poisoning)
van der Hoek et al 2006 (van der Hoek & Flemming, 2006)	1990-2002 Rate for year 2002	Southern Sri Lanka	318 per 100,000 *of which 64% were due to intentional self-poisoning 350/100,000* *of which 64% were due to intentional self-poisoning
Manuel et al 2008 (Manuel et al., 2008)	2002	Southern Sri Lanka	315/100,000 (all due to intentional self-poisoning).
Rajasuriya et al 2012 (Rajasuriya et al., 2012)	2009	Ampara	406/100,000
De Silva et al 2012 (De Silva et al., 2012)	1995-2009	Sri Lanka	204.8/100,000 (1995) 312.2/100,000 (2007)
Hanwella et al 2012 (Hanwella et al., 2012)	1995-2008	Sri Lanka	Gives mean rates per district in Sri Lanka
Senarathna et al 2012 (Senarathna et al., 2012)	2008-2010 (compared to 2005)	Anuradhapura	447/100,000 (aged above 15 years)

2.4.2 Substances used for self-poisoning

All except two studies (Dissanayake & De Silva, 1974; Manuel et al., 2008), provided details on the types of poisons ingested. Six studies comprised participants who attempted poisoning by pesticide ingestion (Dawson et al., 2010; Jeyaratnam et al., 1982; Jeyaratnam et al., 1987; Konradsen et al., 2006; van der Hoek & Konradsen, 2005; van der Hoek et al., 1998). One study focused only on those who had ingested the plant poison oleander (Eddleston et al., 1999).

The remaining 18 studies did not focus specifically on one substance type (Table 2.4). Among these studies, in 13, the most commonly ingested poison was pesticides, with rates varying from 45.2% (Senewiratne & Thambipillai, 1974b) to 77% (Chandrasena, 1981) (Table 2.4). Other commonly ingested substances were medicinal overdoses, as well as other household chemicals (e.g., petroleum derivatives such as kerosene oil), and plant poisons (e.g., oleander). In contrast, three studies conducted within the last 10 years reported a greater frequency of medicinal overdoses (De Silva & Ratnayake, 2008; De Silva et al., 2012; Hanwella et al., 2012). By 2008 the annual incidence of hospital admissions for pesticide poisoning was less than the admission rates for ingestion of medicinal and other biological substances (88.85 per100,000 for pesticide ingestion versus 115.39/per 100,000 for medicinal overdoses in 2008; compared to 105.14 per100,000 and 48.16 per100,000 respectively in 1996) (De Silva et al., 2012).

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Table 2.4:

Types of poison ingested by males and females (studies listed in order of the year in which study was carried out, oldest first)

Study	Year(s) and Place where study was conducted	First most commonly ingested poison type		Second most commonly ingested poison type	
		Among Males	Among Females	Among Males	Among Females
Senewiratne et al 1974 (Senewiratne & Thambipillai, 1974a)	1970-1971 Kandy region	Pesticides	Pesticides	Medicinal overdose	Medicinal overdose
Chandrasena et al 1981 (Chandrasena, 1981)	1976 Kandy region	Pesticides	Pesticides	Medicinal overdose	Medicinal overdose
Fernando et al 1977 (Fernando, 1977)	1976 Colombo region	Pesticides (for both genders)		Medicinal overdose (for both genders)	
Senanayake et al 1986 (Senanayake & Karalliedde, 1986)	1984 Peradeniya, Colombo, Galle, Jaffna regions	Pesticides	Pesticides	Medicinal overdose	Medicinal overdose
Hettiarachchi et al 1989 (Hettiarachchi & Kodithuwakku, 1989b)	1986-1987 Galle region	Pesticides	Pesticides	Kerosene	Kerosene

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Study	Year(s) and Place where study was conducted	First most commonly ingested poison type		Second most commonly ingested poison type	
		Among Males	Among Females	Among Males	Among Females
Hettiarachchi et al 1989 (Hettiarachchi & Kodithuwakku, 1989a)	1989 Galle region	Pesticides	Pesticides	Medicinal overdose	Medicinal overdose
De Silva 2000 (De Silva et al., 2000)	1987-1991 Central Sri Lanka	Pesticides (for both genders)		-	-
Seneviratne et al 1999 (S L Seneviratne & H J de Silva, 1999)	1996-1997 Ragama region	Pesticides (for both genders)		Medicinal overdose (for both genders)	
Van Der Hoek et al 2006 (van der Hoek & Flemming, 2006)	1990-2002 Ratnapura, Monaragala, Hambanthota regions	Pesticides	Household products (mostly kerosene derivatives)	Pesticides	Household products (mostly kerosene derivatives)

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Study	Year(s) and Place where study was conducted	First most commonly ingested poison type		Second most commonly ingested poison type	
		Among Males	Among Females	Among Males	Among Females
Eddleston et al 2005 (Eddleston et al., 2005)	2002-2003 Anuradhapura, Polonnaruwa regions	Pesticides	Pesticides	Oleander (plant)	Oleander (plant)
Fleischmann et al 2005 (Fleischmann et al., 2005)	2002- 2004 Colombo region	Pesticides	Medicinal overdose	Medicinal overdose	Pesticides
Senadheera et al 2010 (Senadheera et al., 2010)	2001-2007 Galle region	Pesticides and other poisons (e.g. kerosene, household poisons)	Medicinal overdoses		
Fahim et al 2010 (Mohamed et al., 2010)	2005-2007 Peradeniya & Polonnaruwa regions	Pesticides	Oleander (plant)	Pesticides	Oleander (plant)

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Study	Year(s) and Place where study was conducted	First most commonly ingested poison type		Second most commonly ingested poison type	
		Among Males	Among Females	Among Males	Among Females
De Silva et al 2008 (De Silva & Ratnayake, 2008)	2007 Colombo region	Medicinal overdose	Medicinal overdoses	Pesticides	Pesticides
Rajasuriya et al 2012 (Rajasuriya et al., 2012)	2009, Ampara	Pesticides (for both genders)*		Medicinal overdoses (for both genders)	
De Silva et al 2012 (De Silva et al., 2012)	1995-2009, Sri Lanka	In 1996: Pesticide ingestion	In 1996: Medicinal overdoses	In 1996: Medicinal overdoses	In 1996: Medicinal overdoses
		In 2008: Medicinal overdoses (for both genders)	In 2008: Medicinal overdoses (for both genders)	In 2008: Other non-medicinal substances (for both genders)	In 2008: Other non-medicinal substances (for both genders)
Hanwella et al 2012 (Hanwella et al., 2012)	2005-2008, Sri Lanka	Gives mean rates of hospital admissions for self-poisoning per district, for 2005-2008			
Senarathna et al 2012 (Senarathna et al., 2012)	2005-2009, Anuradhapura region	2005: Pesticides	2005: Plant poisons (oleander)	2005: Plant poisons (oleander)	2005: Plant poisons (oleander)
		2009: Pesticides** (for both genders)	2009: Medicinal overdoses (for both genders)	2009: Medicinal overdoses (for both genders)	2009: Medicinal overdoses (for both genders)

* Almost equal rate of pesticide ingestion and medicinal overdoses, with slightly higher incidence of pesticide ingestion

** From 2005 to 2009, the proportion of medicinal overdoses had increased although pesticides still remained the most commonly ingested poison

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In the older studies where pesticide ingestion was the most commonly ingested substance overall, a greater proportion of males ingested pesticides compared to females (Table 2.4). In contrast a larger proportion of females compared to males took medicinal overdoses or ingested plant poisons and petroleum derivatives (Eddleston et al., 1999; Fleischmann et al., 2005; Hettiarachchi & Kodithuwakku, 1989a; Hettiarachchi & Kodithuwakku, 1989b; Saravanapavananthan & Ganeshamoorthy, 1988; Senarathna et al., 2012; van der Hoek & Flemming, 2006).

Three studies examined reasons for choice of poison, and in all these studies, the most commonly cited reason for choice was availability (De Silva & Ratnayake, 2008; Eddleston et al., 2006; Hettiarachchi & Kodithuwakku, 1989a). Two studies reported that most persons (50-75%) had obtained the pesticides from their own homes or gardens (Eddleston et al., 2006; Hettiarachchi & Kodithuwakku, 1989a). The study in Colombo which reported medicinal overdose as the most common method of self-poisoning, indicated that 34% purchased the medicinal overdose over the counter, while 29% obtained the overdose from medication kept at home (De Silva & Ratnayake, 2008).

2.4.3 Socio-demographic factors

2.4.3.1 Age distribution

Twenty-one studies described the age distribution of those who carried out non-fatal self-poisoning. Four studies reported a peak age range of 15-24 years (Chandrasena, 1981; De Silva et al., 2000; De Silva & Ratnayake, 2008; Hettiarachchi & Kodithuwakku, 1989). Another seven studies described slightly broader, similar peak age ranges between 10-30 years (Fernando, 1977;

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Hettiarachchi & Kodithuwakku, 1989b; Jeyaratnam et al., 1982; Manuel et al., 2008; Rajasuriya et al., 2012; Senarathna et al., 2012; Senewiratne & Thambipillai, 1974b), and most remaining studies described mean or median ages of below 30 years (Dawson et al., 2010; Dissanayake & De Silva, 1974; Eddleston et al., 1999; Eddleston et al., 2005; Eddleston et al., 2006; Fleischmann et al., 2005; S L Seneviratne & H J de Silva, 1999; Senanayake & Karalliedde, 1986; van der Hoek & Flemming, 2006; van der Hoek & Konradsen, 2005).

2.4.3.2 Gender distribution

All but three studies (De Silva et al., 2012; Hanwella et al., 2012; Jeyaratnam et al., 1987) reported the gender distribution of those who carried out non-fatal self-poisoning. Sixteen studies reported higher rates of non-fatal self-poisoning among males. In these studies, the percentage of males ranged from 51% (Hettiarachchi & Kodithuwakku, 1989a) to 72% (Jeyaratnam et al., 1982). Of the remaining studies, two found the ratio between the sexes to be almost equal (Mohamed et al., 2010; Senarathna et al., 2012), and in six studies the rate was higher among females (De Silva & Ratnayake, 2008; Eddleston et al., 1999; Fleischmann et al., 2005; Rajasuriya et al., 2012; S L Seneviratne & H J de Silva, 1999; Senadheera et al., 2010). In three studies that reported a female preponderance of non-fatal self-poisoning, the type of poisons most frequently ingested were medicinal overdoses and plant poisons rather than pesticides (De Silva & Ratnayake, 2008; Eddleston et al., 1999; Senadheera et al., 2010). Gender distribution of non-fatal self-poisoning in urban areas, within the last 10 years, was reported in three studies (De Silva & Ratnayake, 2008; Fleischmann et al., 2005; Senadheera et al., 2010); all three reported a higher incidence of poisoning among females.

2.4.3.3 *Rural versus urban*

No studies have compared rates of non-fatal self-poisoning in rural versus urban areas. Most studies (15 of the 27) were conducted in rural or semi-rural agricultural areas of the country. In most rural studies, the most frequently ingested substance was pesticides. Five studies reported results from urban areas prior to 20 years ago (1985, 1976, 1971 & 1977), and these studies consistently reported that pesticide ingestion was the most common method of non-fatal self-poisoning (Chandrasena, 1981; Dissanayake & De Silva, 1974; Fernando, 1977; Senanayake & Karalliedde, 1986; Senewiratne & Thambipillai, 1974b), and rates of non-fatal self-poisoning were higher in males. In contrast, there were two studies conducted in urban areas within the past 10 years (2007 & 2004) (De Silva & Ratnayake, 2008; Fleischmann et al., 2005); these studies reported a higher rate of non-fatal self-poisoning among female adults. In one of these studies, pharmaceutical drug overdose was the most common method used by females (Fleischmann et al., 2005), whereas the other study found paracetamol use to be the most common method in both sexes (De Silva & Ratnayake, 2008). The more recent (2005-2008) nationwide survey of hospital admissions for self-poisoning (Hanwella et al., 2012) further confirmed these changing trends; in both urban and rural regions hospital admissions for medicinal overdoses had increased and pesticide ingestion had dropped.

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Table 2.5:

Rates of psychiatric illness and alcohol use in those who have attempted self-poisoning

Study	Method of Psychiatric Assessment	Rates of psychiatric illness and alcohol use among study participants (and details where available)
Fernando 1977 (Fernando, 1977)	Participants interviewed as part of the study. Further details of psychiatric assessment not available.	Psychiatric illness: 15.9% (this included schizophrenia, depression and mental retardation)
Chandrasena 1981 (Chandrasena, 1981)	Participants interviewed as part of the study. Further details of psychiatric assessment not available.	- Psychiatric illness – 13% - Alcoholism – 2%
Senanayake et al 1986 (Senanayake & Karalliedde, 1986)	Information based on hospital and Health Service administrative records.	- Psychiatric illness - 5% (in Jaffna region) & 2.3% (in Peradeniya region) - Alcohol consumption at time of poisoning: 4% (in Peradeniya region)
Hettiarachchi et al 1989 (Hettiarachchi & Kodituwakku, 1989)	Participants interviewed as part of the study. Further details of psychiatric assessment not available.	- Psychiatric illness – 13.4% (Depression and schizophrenia present in equal numbers, in 77% of psychiatric illness) - Alcoholism - 7%

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Study	Method of Psychiatric Assessment	Rates of psychiatric illness and alcohol use among study participants (and details where available)
Seneviratne et al 1999 (S L Seneviratne & H J de Silva, 1999)	A psychiatric assessment of each participant was conducted by a specialist psychiatrist.	• Depression – 18.5% • Schizophrenia – 1.2% • Alcoholism – 10.7%
Eddleston et al 1999 (Eddleston et al., 1999)	Participants interviewed as part of the study. No formal psychiatric assessment.	• Alcohol intoxicated at the time of self-poisoning: 50% of male participants
De Silva et al 2000 (De Silva et al., 2000)	Data obtained from hospital records.	• Use of alcohol before/during self-poisoning: 6%
Van Der Hoek et al 2005 (van der Hoek & Konradsen, 2005)	A small subsample of the study population was assessed using a questionnaire based on the Composite Diagnostic Interview Short Form (CIDI-SF).	• Alcohol dependence is significantly associated with increased risk of self-poisoning. • No significant association between depression and self-poisoning (sub sample) • Alcohol intoxicated at time of self-poisoning: 36%
Konradsen et al 2006 (Konradsen et al., 2006)	Based on interviews and focus group discussions.	• Life threatening illness or disability or mental illness– 8% • Alcohol intoxicated at time of self-poisoning: 32% (all males)

2.4.4 Psychiatric morbidity

Nine of the 27 studies reported psychiatric morbidity among those with non-fatal self-poisoning (Table 2.5) (Chandrasena, 1981; De Silva et al., 2000; Eddleston et al., 1999; Fernando, 1977; Hettiarachchi & Kodituwakku, 1989; Konradsen et al., 2006; S L Seneviratne & H J de Silva, 1999; Senanayake & Karalliedde, 1986; van der Hoek & Konradsen, 2005). One study included assessment of each participant by a specialist psychiatrist (S L Seneviratne & H J de Silva, 1999), and another had used a questionnaire-based on the Composite International Diagnostic Interview-Short Form (CIDI-SF) (van der Hoek & Konradsen, 2005). The remaining studies were either interview-based or based on information from medical records, and did not give details of the nature of the psychiatric assessment.

Four studies reported on the presence of depression as a disorder, of which one study reported depression in 18.5% of participants (S L Seneviratne & H J de Silva, 1999). Rates of depression were not stated in the remaining 3 studies. One study found no significant association between self-poisoning and depression (van der Hoek & Konradsen, 2005).

Three studies reported rates of alcoholism ranging from 2% to 10% (Chandrasena, 1981; Hettiarachchi & Kodituwakku, 1989; S L Seneviratne & H J de Silva, 1999). Up to 50% of males with non-fatal self-poisoning were reported to be intoxicated at the time of the attempt (Eddleston et al., 1999; Konradsen et al., 2006; van der Hoek & Konradsen, 2005).

None of the studies investigated possible associations between non-fatal self-poisoning and other psychiatric conditions such as anxiety disorders, impulse control disorders, or bipolar disorder.

2.4.5 Premeditation, triggering factors and suicidal intent

Four (of the 30 studies) reported the duration of premeditation prior to the self-poisoning act (De Silva & Ratnayake, 2008; Eddleston et al., 1999; Eddleston et al., 2006; Hettiarachchi & Kodituwakku, 1989). These studies found little premeditation. In one study, 74% of the self-poisoning acts occurred within 4 hours of making the decision to ingest poison (Hettiarachchi & Kodituwakku, 1989). Another study found more than half of the participants reported ingesting the poison within 30 minutes of interpersonal conflict (argument) (Eddleston et al., 1999). In addition, a study from urban Colombo reported that of those who purchased medication for the purpose of overdose, about 80% made the purchase within one hour of ingestion (De Silva & Ratnayake, 2008).

Six studies identified triggers that precipitated the non-fatal self-poisoning act (Chandrasena, 1981; Eddleston et al., 1999; Eddleston et al., 2006; Fernando, 1977; Hettiarachchi & Kodituwakku, 1989; Konradsen et al., 2006). Of these, five studies reported that the commonest precipitant (in >50% of those who self-poisoned) was interpersonal conflict. Common examples included domestic disputes and romantic relationship problems, leading to arguments with family members (Hettiarachchi & Kodituwakku, 1989). Konradsen et al., (2006) described alcohol misuse as a significant factor in non-fatal self-poisoning among Sri Lankan males. This study also described ways in which alcohol misuse (among males) led to domestic violence and interpersonal conflict within the home, thereby indirectly contributing to increased risk of self-poisoning in the misuser as well as his wife and children.

Intent to die (at the time of the attempt) was directly reported in only two studies. One of these studies found that 55.7% wished to die and 27% retained that

wish after surviving the act (Hettiarachchi & Kodituwakku, 1989). The other study (Eddleston et al., 1999) which examined only non-fatal self-poisoning by ingestion of oleander seed (a plant poison), reported that most who attempted did not want to die.

2.5 Discussion

Non-fatal self-poisoning is a costly burden on the individual, family, and society. In Sri Lanka, rates have been increasing over the last decade. It is important to understand non-fatal self-poisoning as it presents in the local socioeconomic and cultural context. This literature review examined non-fatal self-poisoning in Sri Lanka over the past four decades. Several key findings emerge, relevant to rates, age and gender patterns, substances used, and associated psychiatric morbidity. These are discussed below.

2.5.1 Rates

First, despite the reported drop in completed suicide rates in Sri Lanka after 1995 (Gunnell et al., 2007b), rates of non-fatal self-poisoning have increased in the last three decades (De Silva et al., 2012; Hanwella et al., 2012) (Table 2.2 and 2.3). The reported non-fatal self-poisoning rates for Sri Lanka are high in comparison with rates of self-poisoning in other developing countries, including Turkey (145 per 100,000) (Sayil, 1997) and Suriname, South America (284 per 100,000) (Graafsma, Kerkhof, Gibson, Badloe, & van de Beek, 2006). Direct country comparisons between rates of non-fatal self-poisoning require careful interpretation. The rates quoted in many of the older Sri Lankan studies are based on regional samples, and are not necessarily generalizable to the entire country. A further important confounder is that most of the available rates are derived from studies based on

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hospital admissions. Thus, factors influencing the rates of admission to hospital following non-fatal self-poisoning – such as improvement in transport services and increased numbers of peripheral hospitals – could also inflate rates of attempts. The toxicity of ingested substances may also influence hospital admission rates – prior to the restriction of the sale of toxic pesticides such as WHO Class I toxicity pesticides in Sri Lanka (Gunnell et al., 2007b), many who ingested pesticides may have died prior to admission to hospital.

2.5.2 Substances ingested

Second, in the past, the most commonly ingested substance in Sri Lanka was pesticides. But studies conducted within the last decade indicate increasing frequency of medicinal overdoses. Three studies conducted after 2001 reported medicinal overdoses to be the most common substance used, indicating an important shift in trends from pesticide ingestion to medicinal overdoses (De Silva & Ratnayake, 2008; De Silva et al., 2012; Hanwella et al., 2012) (Table 2.4). The reason for these changes has not been directly investigated. However, given that the most common reason for choice of poison is availability (De Silva & Ratnayake, 2008; Eddleston et al., 2006; Hettiarachchi & Kodithuwakku, 1989a), the finding may reflect the increasing accessibility of medicines relative to pesticides, particularly with urbanization.

2.5.3 Demographics

Third, with respect to demographics, non-fatal self-poisoning in Sri Lanka is seen predominantly among young adults aged between 15 and 30 years. This holds true of the older as well as more recent studies, and is similar to self-poisoning

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patterns described elsewhere, in both the developed and developing world (Gibbons, Elliot, Urwin, & Gibbons, 1978; Graafsma et al., 2006; Hawton et al., 1996; Parkar et al., 2006; Ramesha, Rao, & Kumar, 2009; Schmidtke et al., 1996; Thanh et al., 2005). In contrast, with respect to gender, there appears to be changing patterns with time. Older Sri Lankan studies included in this review (conducted prior to the turn of the century) report a higher or equal rate of self-poisoning among males compared to females, particularly when the ingested substance was a pesticide. This is the reverse of the findings from Western countries (Gibbons et al., 1978; Hawton et al., 1996; Schmidtke et al., 1996). For instance, in the WHO/EURO multicentre parasuicide study, in all except one centre (Helsinki), the suicide attempt rate (a majority by non-fatal self-poisoning) was higher for females with the average male: female ratio being 1:1.5 (Schmidtke et al., 1996). However, gender distribution patterns similar to Sri Lanka have been reported from elsewhere in Asia (Nguyen et al., 2010; Ramesha et al., 2009; Srivastava, Peshin, Kaleekal, & Gupta, 2005). The reason for the higher rate of non-fatal self-poisoning reported among males in older studies is not clear. One associated factor maybe the type of substance ingested when these studies were conducted – namely, pesticides. Another factor maybe the pattern of alcohol consumption in Sri Lanka – the country has high levels of alcohol consumption among males, as indicated by an increase in health problems related to alcohol misuse, in recent years (Jayasinghe & Foster, 2011). Culturally, alcohol use is much more common among men compared to women. Alcohol use disorders are known to be associated with suicidal behaviours (Brady, 2006). Studies report that almost 50% of men were under the influence of alcohol at the time of the self-poisoning act (Eddleston et al., 2006; Konradsen et al., 2006; van der Hoek & Konradsen, 2005) and it is possible that alcohol use disorders played a role in the

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high proportion of males attempting self-poisoning in older studies, though this theory needs further exploration.

In contrast to these findings from the older studies, recent studies suggest that the gender ratios in Sri Lanka too maybe shifting to greater rates among females (De Silva & Ratnayake, 2008; Fleischmann et al., 2005; Rajasuriya et al., 2012; Senarathna et al., 2012). This also parallels the increases in medicinal drug overdoses as compared to pesticide self-poisoning in these areas. Other developing countries have shown similar gender differences in non-fatal self-poisoning in rural compared to urban areas (Shahid et al., 2009; Thanh et al., 2005). For example, a study undertaken in Hanoi, Vietnam (Thanh et al., 2005), reported a higher female-to-male ratio of non-fatal self-poisoning in urban areas where medicinal overdose is more common, compared to rural areas where pesticide ingestion is more common. Notably, non-fatal self-poisoning by medication is higher among females than males in Western countries (Schmidtke et al., 1996).

2.5.4 Precipitating factors

Fourth, the most common precipitating trigger for non-fatal self-poisoning was interpersonal conflict with a close family member. In contrast, reportedly less than 5% of self-poisoning was precipitated by financial difficulties (Konradsen et al., 2006) – perhaps a surprising finding for a developing country. Similarly, Hanwella et al. (Hanwella et al., 2012) found no clear association between rates of poverty and non-fatal self-poisoning among the different districts in Sri Lanka. Interpersonal conflict has been reported to be the acute trigger associated with more than 60% of self-poisonings in Pakistan and India (Parkar et al., 2006; Syed & Khan, 2008). Previous authors have suggested that self-poisoning in Sri Lanka may be considered

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by some as an acceptable way of coping with stress and conflict (De Silva, 2003; Marecek, 1998). Many, particularly those who ingested a plant poison, knew somebody who had also carried out an act of self-poisoning (Eddleston et al., 2006).

2.5.6 Psychiatric morbidity

Depression and alcohol use disorders

Fifth, there is a paucity of information regarding psychological factors associated with non-fatal self-poisoning in Sri Lanka. For instance, only four studies in this review reported rates of depressive illness in this population, and of these, only one described the methods employed to assess psychiatric morbidity and depression. Available data suggests that rates for depression as a disorder in those who self-poison in Sri Lanka are low (Hettiarachchi & Kodituwakku, 1989; van der Hoek & Konradsen, 2005), in contrast to the West, where rates of over 40% have been reported (Hawton et al., 1996). The low levels of depression may reflect true levels or alternatively, the presence of depression may have been underreported or not diagnosed (Simon, Goldberg, Von Korff, & Üstün, 2002). Evidence from India suggests that the risk factors for suicide in Asia are similar to those described elsewhere in the world (Vijayakumar & Rajkumar, 1999). Furthermore, depression in men may have been concealed by alcohol dependency or alcohol use disorder (Pinquart & Gamble, 2009). As mentioned previously, alcohol use disorders have been reported to be associated with self-poisoning behavior in Sri Lanka (S L Seneviratne & H J de Silva, 1999; van der Hoek & Konradsen, 2005), which is similar to findings internationally (Nock et al., 2009a).

Given these indications, and considering the limited data available, the association between depression and non-fatal self-poisoning, and comorbid

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associations between depression, alcohol use disorders and non-fatal self-harm are all areas warranting further research in Sri Lanka. The findings regarding associated psychiatric morbidity may point the direction towards future preventive efforts.

Suicidal intent associated with the act of non-fatal self-poisoning

Likewise direct examination of suicidal intent associated with the non-fatal self-poisoning was only examined in two studies, with conflicting results (Eddleston et al., 1999; Hettiarachchi & Kodituwakku, 1989). One study which examined self-poisoning by ingestion of any poison reported suicidal intent in up to 55.7% of those who attempted (Hettiarachchi & Kodituwakku, 1989), whereas the other study which examined self-poisoning by ingestion of plant poison reported that most did not wish to die (Eddleston et al., 1999). One possible explanation for the discrepancy in the findings may be the differences in substances ingested in the two studies concerned. Plant poison is readily available in the garden, and may be more closely associated with impulsive attempts of self-poisoning.

Other psychological factors that may be associated with self-poisoning behaviour have not been examined at all in Sri Lanka. Impulse control disorders and anxiety have been shown to be predictive of suicidal behavior in the developing world (Nock et al., 2009a), but no data is available for Sri Lanka. Relationships between non-fatal self-poisoning and factors such as chronic stressors, hopelessness, and family history of suicide have not been delineated. Family history of suicide and chronic stressors have been shown to increase the risk of completed suicide in other Asian countries such as China (Beck, Steer, Kovacs, & Garrison, 1985; Cheng, 2000; Phillips et al., 2002). These indicate further areas for exploration to enable a better understanding of the phenomena of non-fatal self-poisoning in Sri Lanka.

2.5.5 Risk of repetition and psychiatric morbidity

Sixth, prospective follow-up data from Sri Lanka regarding suicide re-attempts following an index suicide attempt, are very limited. The single prospective study of non-fatal self-poisoning in Sri Lanka, reported a repetition rate of 4% following an index episode, which is comparable to repetition rates reported for Yungcheng in China and Chennai, India (Bertolote et al., 2010). In contrast to these low rates in Sri Lanka, prospective follow-up studies conducted in the West have reported one year repetition rates of up to 16% (Bergen, Hawton, Waters, Cooper, & Kapur, 2010; Carroll et al., 2014). The reason for this difference is not clear. One possibility might be that results in Sri Lanka are confounded by a high case fatality; those who would be potential repeaters in the West may not survive their initial self-harm attempts in Sri Lanka.

Similarly, there is also a lack of information pertaining to factors that are associated with the risks of repetition of self-poisoning. Some inferences can be made from retrospective studies, but prospective studies are needed. Based on retrospective studies, the rate of prior suicidal behaviours in those who have *completed* suicide (mostly by poisoning) in Sri Lanka is 26% (Abeyasinghe & Gunnell, 2008; Samaraweera, Sumathipala, Siribaddana, Sivayogan, & Bhugra, 2008). Identifying this high-risk group from among those who attempt suicide is an important challenge for future research.

2.6 Limitations

One limitation of this systematic review is that it was based on publications in indexed peer reviewed journals, and thus findings may be limited by publication bias. Studies and abstracts presented at conferences, in non-indexed journals, as well

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as other unpublished literature were not incorporated. As far as possible, attempts were made to ensure the search was as inclusive as possible, by searching multiple electronic databases, and by examining bibliographies of already selected articles for any further publications of relevance. A hand search was also conducted of the archives of the Ceylon Medical Journal, which is the oldest indexed medical journal in Sri Lanka. The search was conducted in the English language, but since the language used for scientific and medical publications and conferences in Sri Lanka is English, a language bias is unlikely.

Second, the mixed nature of the study designs makes comparison between studies challenging. For example, most studies have been conducted in different regions of the country, some based in the community, and others based on hospital admission data. The studies are of varying sample size, design and duration, and the nature of the poisoning also varies. Some studies examined only pesticide self-poisoning (Bertolote et al., 2005), others studied all types of poisoning (van der Hoek & Flemming, 2006), and some did not differentiate between intentional and accidental self-poisoning (Eddleston et al., 2005). The variation in the year in which the studies were conducted, ranging from 1974 to 2014, raises questions about the relevance of some of the findings to current preventive strategies. Many of the findings reported in this review are based on cross-sectional data, which provides limited information about rates of change and factors associated with attempted self-poisoning. Third, there was a paucity of studies available, and thus the review included studies which focus on intentional self-poisoning where the outcome (i.e., survival or death) was not differentiated. Fourth, during data extraction, equal weight was given to all studies, irrespective of study quality.

2.7 Conclusions and implications for further research and intervention

Certain important factors emerge from this review. The rates of hospital admissions for non-fatal self-poisoning in Sri Lanka have increased dramatically in recent years. This has been accompanied by changing patterns of substances ingested, from pesticides to medicinal overdoses, and a change of gender ratio to favour more females. Non-fatal self-poisoning in Sri Lanka is associated with interpersonal conflict, but there is a dearth of information about other potential associated factors such as depression, suicidal intent and chronic stressors.

Factors associated with non-fatal self-poisoning are complex. The findings of this study suggest that interpersonal conflict and alcohol misuse may contribute towards this phenomenon in Sri Lanka, but we know little about other possible contributory factors such as depression. The apparent low rate of repetition suggests that a primary population level intervention might be more efficacious than a secondary prevention method, but again this hypothesis, and the rate of repetition in Sri Lanka, needs further exploration. The reduction of non-fatal self-poisoning rates remains a challenge. Further research is needed to inform factors associated with non-fatal self-poisoning in Sri Lanka, in order to develop more effective preventive strategies, as well as to optimize use of limited resources.

Chapter 3

Characterization of non-fatal self-poisoning in Sri Lanka

3.1 Introduction

The rates of non-fatal self-poisoning in Sri Lanka have increased in recent years, despite a decrease in the rate of completed suicides since 1995 (Hanwella et al., 2012). Non-fatal self-poisoning in Sri Lanka is traditionally described as impulsive, following interpersonal conflict (Hettiarachchi & Kodituwakku, 1989); but there is a paucity of research about the association between self-poisoning and previous self-harm, psychiatric morbidity, chronic stressors and childhood adversity. There is evidence from other countries that some of these factors are associated with increased suicide attempts. A study undertaken in China found that high-intent suicide attempts were associated with depression and chronic stress (Conner, Phillips, & Meldrum, 2007). Further, research in developed countries has found that factors such as high suicidal intent at baseline, depression and alcohol use disorders and a history of previous self harm, are associated with increased risk of repetition and completed suicide (Harriss, Hawton, & Zahl, 2005; Kapur et al., 2006; Osváth, Kelemen, Erdös, Vörös, & Fekete, 2003).

3.2 Aims

The overall aim in this chapter was to investigate the socio demographic and psychiatric characteristics, associated stressors and substances used by those who carry out acts of non-fatal self-poisoning; and thereafter to examine for associations between these factors and the degree of suicidal intent.

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In particular, the specific objectives were to describe the:

- demographic characteristics of those who have attempted self-poisoning (including gender, age, marital status, and employment status);
- substances used for non-fatal self-poisoning, the reason for the choice of that substance (as described by the participant), and from where substances were obtained;
- stressors in the past six months in those with recent non-fatal self-poisoning;
- rates of psychiatric morbidity (depression, alcohol use disorder and anxiety and levels of hopelessness), in those who have attempted self-poisoning;
- degree of suicidal intent associated with the non-fatal self-poisoning;

Thereafter the final objective was to examine for associations between the above listed variables and degree of suicidal intent.

3.3 Hypotheses

The hypotheses of this study were derived from the findings of the systematic review in Chapter 2. These hypotheses together with the evidence on which they are based are listed below:

- Previous studies from Sri Lanka show that most who intentionally self-poison are young (Eddleston et al., 2005). Recent studies also show an increasing female preponderance (De Silva & Ratnayake, 2008). Therefore ***the first hypothesis is that most who carry out acts of non-fatal self-poisoning will be young (aged <30 years) and female.***

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- Again, previous studies on this subject indicate that most who self-poison indicate ease of availability as the most common reason for choice of poison (Eddleston et al., 2006). Recent studies also indicate increasing medicinal overdoses (De Silva & Ratnayake, 2008). Therefore regarding substance of ingestion, ***the hypothesis is that the most commonly ingested substance for non-fatal self-poisoning will be medicinal drug overdoses, and the most commonly reported reason for the choice of poison will be availability.***
- Intent associated with non-fatal self-poisoning has not been explored in depth in Sri Lanka. The available of evidence suggests that these are impulsive acts with low premeditation (Hettiarachchi & Kodituwakku, 1989). Therefore ***the hypothesis regarding this is that a majority of those who attempt self-poisoning will have relatively lower suicidal intent, as measured by a score of 0-3 on the Pierce Suicide Intent Scale (PSIS).***
- Factors associated non-fatal self-poisoning of higher suicidal intent has again not been researched in Sri Lanka. International evidence indicates that higher suicidal intent is associated with older age, male gender and psychiatric morbidity (Kreitman, 1976; Merrill & Owens, 1990; Nakaya et al., 2007). Therefore ***it is hypothesized that higher suicidal intent, as measured by a score of >10 on the PSIS, will be associated with male gender, older age, the presence of depression, anxiety, alcohol use disorders, higher levels of hopelessness, and a past history of attempted suicide.***

3.4 Methods

3.4.1 Design

This study involved the use of a cross-sectional survey design to capture the characteristics of those who had been hospitalized as a result of non-fatal self-poisoning.

3.4.2 Setting of the study

The study was conducted at the Toxicology Unit (Ward 17) of Teaching Hospital, Peradeniya, Sri Lanka. Teaching Hospital Peradeniya is a tertiary care hospital, situated in the second largest city in the Central Province of the country. All persons who present to Teaching Hospital Peradeniya for medical management of acute self-poisoning (who do not need intensive unit (ICU) care) are admitted to the Toxicology Unit, and those admitted directly to the ICU are subsequently transferred after recovery to the Toxicology Unit. This includes persons residing in urban and semi-urban areas around Peradeniya, as well as persons transferred from hospitals in rural agricultural areas in the central and north-central areas of the country; since the Toxicology Unit at Peradeniya Hospital serves as a referral unit for other hospitals in these areas.

3.4.3 Participants

All persons admitted to the Toxicology Unit from February 2012 to April 2013 (14 months) due to non-fatal self-poisoning were eligible for the study. Inclusion criteria required that they be aged at least 14 years, and be conversant in Sinhalese and/or English. Those who were not physically well enough to participate in the interviews during their hospital stay were not included.

items about the person's self-report regarding intention, understanding of lethality and premeditation (all items scored as 0,1,2, except for one item which was scored 0,1,2,3, where 0 is the lowest, and 2 or 3 the highest score per item); and a section on *risk*, which consists of two items regarding the medical lethality of the act (all items scored as 0,1,2, and where 0 is the lowest, and 2 the highest score per item) (Pierce, 1981). The total score is obtained by summing scores from all three sections. Total scores on the PSIS range from 0 to 21. According to the authors of the scale, the total scale score can also be categorized as follows: low (total score 0-3), medium (total score 4-10) and high (total score >10) suicidal intent (Pierce, 1981).

3.4.4.3 Significant life events in prior six months

Significant life events in the six months prior to the act of non-fatal self-poisoning were examined using the self-administered Bughra Life Threatening Events Questionnaire (LTE-Q) questionnaire (Appendix B) (Brugha & Cragg, 1990). Further, several items were added to the life stressors listed in the LTE-Q, to take into account the local cultural context. The LTE-Q is a tool designed to elicit events that are construed as long-term threats, and has been shown to have a good sensitivity (0.89) and specificity (0.74) for events in the 6-months prior to data collection (when compared to interview) (Brugha & Cragg, 1990). It also has good inter-rater agreement (Cohen's kappa 0.96) (

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and the Patient Health Questionnaire (PHQ-9) (Wittkamp, Naeije, Schene, Huyser, & van Weert, 2007). The PDS has been created and validated for screening of depression (as a disorder) in a Sinhala-speaking Sri Lankan population (Abeyasinghe et al., 2012). The PDS consists of 25 statements regarding the previous two weeks, each of which require a yes or no answer. Each statement is scored from 0 to 1 (yes = 1, no = 0), and a total score of 10 or more out of 25 is positive for depression, with a sensitivity of 88.5% and a specificity of 85.0% (Abeyasinghe et al., 2012). The Receiver Operating Characteristic (ROC) curve analysis showed that the area under the curve for the PDS in diagnosing depression was 0.95, indicating that the test discriminates well between persons with and without major depression (Abeyasinghe et al., 2012).

The PHQ-9 is a 9-item self-administered scale that has been validated internationally as a screening tool for the detection of depression (Wittkamp et al., 2007). Depression is diagnosed if 5 or more of the 9 depressive symptoms criteria have been present at least “more than half the days” in the past two weeks, and if one of the symptoms is depressed mood or anhedonia. The PHQ-9 score ranges from 0 to 27, since each of the 9 items can be scored from 0 (not at all) to 3 (nearly every day). A PHQ-9 score of ≥ 10 has a sensitivity of 88% and specificity of 88% for major depression (Kroenke, Spitzer, & Williams, 2001). ROC curve analysis showed that the area under the curve for the PHQ-9 in diagnosing major depression was 0.95, suggesting that the test discriminates well between persons with and without major depression (Kroenke et al., 2001). At the time of conducting this study, the PHQ-9 had not been validated for use in Sri Lanka and therefore it was translated from English into Sinhala and back translated prior to use.

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The Generalized Anxiety Disorder 7 (GAD-7) was used to screen for anxiety (Spitzer, Kroenke, Williams, & Löwe, 2006). The GAD-7 is a 7-item self-report scale developed for the identification of generalized anxiety disorder and symptom severity. Each item is scored from 0 to 3, where 0 = not at all, and 3 = nearly every day. The total score ranges from 0 to 21, and according the total score, the presence of anxiety is graded as minimal (total score 0-4), mild (total score 5-9), moderate (total score 10-14), and severe (total score 15-21). The GAD-7 has good internal consistency (cronbach's alpha 0.89), and at a cut off score of 10, it has a sensitivity of 89% and specificity of 82% (Spitzer et al., 2006). This measure was translated into Sinhala and back translated prior to use.

Alcohol misuse was assessed by using the World Health Organizations' (WHO) Alcohol Use Disorders Identification Test (AUDIT), which has been validated in Sinhala for a Sri Lankan population (De Silva, Jayawardana, & Pathmeswaran, 2007; Saunders, Aasland, Babor, FUENTE, & Grant, 1993). The AUDIT is a screening tool for detection of at risk drinking patterns as well as harmful and dependent patterns of alcohol use. The locally validated AUDIT is a 10-item interviewer-administered scale, and each item is scored from 0 to 4 (where 0 indicates the lowest or no alcohol use, and 4 indicates highest use). The total score ranges from 0 to 40, and is interpreted as follows: 0-7=low-risk drinking (LRD) (consumption of <60g of ethanol per day during the past 12 months), 8-15=hazardous drinking (HZD) (consumption of >60g alcohol per day over the past 12 months), 16-19=probable harmful use, and 20 or more=probable dependence (harmful use and dependence were also considered together as Alcohol Use Disorder, AUD) (De Silva et al., 2007). The area under the ROC curve to differentiate AUD+HZD from LRD was 0.96, and at a cut off value of 7 (total score) this had a

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sensitivity of 94.3% and a specificity of 90.3%. The area under the ROC curve to differentiate AUD from HZD+LRD was 0.97, and at a cut off value of 16 (total score) this had a sensitivity of 96.6% and a specificity of 74.7% (De Silva et al., 2007)

The Beck Hopelessness Scale (BHS) was used to assess the degree of hopelessness (Beck et al., 1985; Beck, Weissman, Lester, & Trexler, 1974a) and was translated to Sinhala and back translated prior to use (Appendix B). The BSH consists of 20 true-false statements, of which 9 are keyed false and 11 are keyed true. The response of each statement is assigned a score of 0 or 1, and the total score was the sum of the scores on the individual items, which ranged from 0 to 20. The BHS has a good internal consistency with a reliability coefficient of .93 (Beck et al., 1974a). The scale also correlated well with clinical ratings of hopelessness in general practice (.74, $p < .001$) and in those who have attempted suicide (.62, $p < .001$) (Beck et al., 1974a).

3.4.5 Procedures

Ethical clearance for the study was obtained from the Faculty of Medicine, University of Peradeniya, Sri Lanka, and the Human Research Ethics Committee of the Australian National University. The relevant information sheets and consent forms are included in Appendix C.

Potential participants were approached by the researcher and were provided information about the study, within one week on average of admission to hospital. Eligible participants who provided informed written consent were enrolled in the study. The interview was carried out in two 40-minute sessions and consisted of several questionnaires administered by the researcher, and several self-administered

screening tools. Most interviews and assessments were conducted in the Sinhala language, except in instances when English was the participant's preferred choice of communication.

3.4.6. Statistical Analysis

Data analyses were undertaken using IBM[®] SPSS[®] Statistics Version 21.0. Data screening was undertaken to check for outliers and for assumption testing (e.g., deviations from a normal Gaussian distribution and violations to heterogeneity to variance). Data screening entailed examination of descriptive statistics (e.g., skewness and kurtosis) and inspection of histograms and boxplots. Appropriate measures such as transformations or adoption of non-parametric statistics (e.g., Mann-Whitney U test) were undertaken as needed.

Predictors of suicide intent were determined by the use of hierarchical multiple regression. Factors known to be associated with attempted suicide from previous international studies (Beck et al., 1985; Bruffaerts et al., 2010; Dhossche, Meloukheia, & Chakravorty, 2000; Nock et al., 2009a; Pearson, Phillips, He, & Ji, 2002; Wu, Su, & Chen, 2009; Zhao, Yang, & Phillips, 2010), were entered into the model in a thematic hierarchical manner. Factors that showed no significant associations with the outcome (suicidal intent) based on examination of correlations, were excluded from the final model. The final regression model included the following sets of independent variables, entered in a thematic hierarchical manner, in the following order: demographic details (age, gender), prior suicidal behavior (1 item), and psychiatric morbidity (presence of anxiety, depression, alcohol use disorders and BHS scores). The overall amount of variability explained in suicidal intent by the model, which sets of variables added significantly to the prediction of

suicidal intent, and the relative importance of individual predictors were ascertained. Given the exploratory nature of the study, alpha (α) was set at .05 for all analyses. No adjustments were made for multiple comparisons because they can result in a higher type II rate, reduced power, and increased likelihood of missing important findings (Rothman, 1990).

3.6 Results

3.6.1 Sample characteristics

A total of 1334 persons met eligibility criteria to be included in the study, of whom 9.1% ($n = 121$) refused consent, and 19.8% ($n = 264$) could not be included because they either left hospital before the interviews could be conducted, or they were in hospital but were too physically unwell to participate. A total of 949 participants took part in the study, with a female preponderance – only 44.2% ($n = 419$) of the participants were males. The median age was 22 years, and 61.0% ($n = 570$) of the participants were below the age of 25 years. Females were significantly younger than males (median age for females: 20 years, for males: 25 years, Mann-Whitney U $z = -7.87, p < .001$).

3.6.2 Socio-demographic characteristics

Most participants were single (57.1%, $n = 541$), unemployed (57.5%, $n = 538$) and living with parents (53.0%, $n = 498$). The highest level of education in a majority of participants was completion of between grade six to ten (50.2%, $n = 476$) (Table 3.1).

3.6.3 Details of poison ingested

Overall the most commonly ingested substance was medicinal drug overdose (57.1%, $n = 537$) (Table 3.2). Pesticides were the second most commonly ingested substance (23.4%, $n = 220$). Other substances included chemicals kept in the home (10.7%, $n = 101$) and plant poisons (8.6%, $n = 82$).

Most participants reported that they had obtained the poison or medicinal overdose from their homes (60.5%, $n = 564$), while 27.4% ($n = 255$) had bought the substance for the purpose of ingestion. Others had obtained the substance from the field/garden (13.9%, $n = 130$). Participants gave varied reasons for the choice of poison, common reasons being the belief that it was dangerous (34.1%, $n = 314$), ease of availability (33.4%, $n = 307$) and contrastingly, the belief that it would not hurt (13.7%, $n = 126$) and that it was not dangerous (12.1%, $n = 111$).

3.6.4 Immediate and chronic stressors

More than 65% of participants described an interpersonal conflict, either with a close family member, partner or close friend, prior to the act of non-fatal self-poisoning (Table 3.3). The timing of the self-poisoning act was closely associated with the conflict and associated distress.

Participants were also asked about stressors that affected them significantly in the six months prior to the act of non-fatal self-poisoning. The responses varied, and the more commonly reported stressors were: ongoing conflicts with spouse or partner (30.1%, $n = 278$), significant financial problems (22.3%, $n = 206$), conflict with parents (16.6%, $n = 154$) and having suffered a serious injury or illness (12.4%, $n = 115$) (Table 3.4). Of the participants, 10.6% ($n = 101$) reported having been physically abused in the 6 months prior to the act of self-poisoning. This was

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ascertained by the query “have you been a victim of physical abuse within the last six months?” A smaller number (2.2%, $n = 21$) reported being victims of sexual abuse within the prior 6 months.

Table 3.1

Socio-demographic characteristics of the 949 individuals who were admitted to the Toxicology Unit for non-fatal self-poisoning

Socio-demographic variable	% (n)
Living with	
With parents	53.0 (498)
With spouse/kids	40.7 (382)
Other	6.2 (59)
Married	42.9 (406)
Highest level of education	
No schooling/ up to grade 5	5.5 (52)
Grade 6 to 10	50.2 (476)
Completed O/L Exam	28.9 (274)
Completed A/L Exam	13.7 (130)
University/Postgraduate	0.8 (8)
Occupational Status	
Employed	42.5 (398)

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Table 3.2

Substances ingested in the non-fatal self-poisoning attempt

Type of substance ingested	% (n)
Medicinal drug overdoses	57.1 (537)
Pesticides	23.4 (220)
Other chemical kept at home	10.7 (101)
Plant poison	8.7 (82)
How substance was obtained	
Ingested a substance kept at home	60.5 (564)
Ingested a substance kept in field/garden	13.9 (130)
Bought substance for purpose of ingestion	27.4 (255)
Reason for choice of substance	
Availability	33.4 (307)
It was cheap	6.6 (61)
Thought it was not dangerous	12.1 (111)
Thought it was dangerous	34.1 (314)
Thought it wouldn't hurt	13.3 (126)
Thought it would act quickly	3.7% (34)

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Table 3.3

Immediate stressors prior to non-fatal self-poisoning, as reported by participants

Immediate stressors	% (n)
Argument with spouse	23.4 (222)
Argument with parent	17.7 (168)
Argument with child	1.9 (18)
Argument with other people	9.4 (89)
Physical assault by husband	1.5 (14)
Problem with romantic relationship	15.4 (146)
Unwanted pregnancy	0.4 (1)
Severe financial difficulties	3.8 (35)
Other	27.0 (256)

Table 3.4

Stressors within the six-months prior to the act of non-fatal self-poisoning

Stressors	% (n)
Suffered a serious injury/ illness	12.4 (115)
A close relative had a serious injury/illness	7.1 (66)
Death of a parent/ spouse/ child	2.6 (24)
Death of a friend or close relative	7.5 (69)
Conflict with parents	16.6 (154)
Conflict with his/her father because of father's alcohol use	4.1 (38)
Conflict with spouse/ partner	30.1 (278)
Conflict with spouse because of alcohol use	6.2 (57)
Conflict with spouse because of mistrust	9.1 (84)
Divorce/ marital separation	5.0 (46)
Spouse went overseas for a job	1.6 (15)
Conflict with a neighbour/ friend/ relative	5.0 (46)
Loss of job	3.9 (36)
Significant financial problems	22.3 (206)
Court case / legal problems	2.1 (19)
Seeing bad dreams	10.6 (98)
Physical abuse within the past 6 months	10.6 (101)
Sexual abuse within the past 6 months	2.2 (21)

3.6.5 History of childhood adversity

Most participants recalled having had a happy childhood (88.4%, $n = 814$) and stated that their parents had provided for them “as they could” (95.2%, $n = 875$). Among those who reported childhood adversities, commonly reported adversities were, growing up with significant financial problem (31.0%, $n = 286$), significant parental conflict during childhood (20.9%, $n = 182$) and having experienced problems due to their father’s alcohol misuse (17.6%, $n = 154$) (Table 3.5).

3.6.6 Past psychiatric history and previous suicide attempts

Of all those who participated in the study, 13.5% ($n = 127$) had a history of prior suicide attempts, again most commonly by self-poisoning (71.6%, $n = 91$) (Table 3.6). Only a minority had a history of prior psychiatric treatment (outpatient 6.3%, $n = 60$, inpatient 3.3%, $n = 31$). However, 30.1% ($n = 286$) had visited a doctor in the month prior to the act of non-fatal self-poisoning, mostly for physical symptoms (83.6%, $n = 239$). A further 17.3% ($n = 164$) stated that they personally knew somebody who had self-poisoned in the past.

Table 3.5

History of childhood adversity

Reported childhood adversity	% (n)
Grew up with constant parental criticism	7.1 (65)
Was severely punished without reason	4.3 (40)
Grew up with significant financial problems	30.0 (286)
Witnessed family members being abused	1.3 (12)
Has been subjected to physical abuse as a child	4.3 (40)
Was sexually abused as a child	1.0 (9)
Had significant problems due to father's alcohol misuse	17.6 (154)
Significant parental conflict during childhood	20.9 (182)
Parents divorced/lived separately	8.1 (71)
Mother worked abroad during childhood	13.7 (122)
Mother died before person reached 16 years	3.6 (29)
Father died before person reached 16 years	12.5 (101)

Table 3.6

Past psychiatric history and previous suicide attempts

	% (n)
Past history of psychiatric treatment:	
Outpatient treatment	6.3 (60)
Inpatient treatment	3.3 (31)
History of contact with a doctor in the prior month:	30.1 (286)
For physical symptoms	83.6 (239)
For psychological symptoms	10.8 (31)
For both physical and psychological symptoms	5.6 (16)
Knew somebody who self-poisoned	17.3 (164)
Had a history of previous suicide attempts:	13.5 (127)
Of those with past suicide attempts, those who attempted suicide by previous self-poisoning	71.6 (91)

3.6.7 Psychiatric morbidity

About half (52.0%, $n = 397$) of the participants screened positive for depression (a total score of ≥ 10) on the PDS (Table 3.7). A small proportion screened positive for moderate (23.2%, $n = 167$) and severe (16.3%, $n = 117$) anxiety, according to the GAD-7. Hazardous alcohol use was found among 9.1% ($n = 85$) of the cohort, and a further 3.6% ($n = 34$) had alcohol use disorder. All those who screened positive for alcohol misuse or dependency were males.

3.6.8 Degree of suicidal intent

As measured by the PSIS, a majority of participants had either a medium (score 4-10; 45.2%, $n = 429$) or high (score ≥ 11 ; 49.4%, $n = 469$) suicide intent associated with the act of non-fatal self-poisoning (Table 3.8). When the total PSIS score was considered as a continuous measure, the mean total score was 10.20 ($SD = 3.99$).

Table 3.7

Psychiatric morbidity

Psychiatric morbidity		% (n)
PDS		
	Depressed	52.0 (397)
PHQ-9		
	Moderate/severe depression	51.1 (361)
GAD-7		
	Moderate anxiety	23.2 (167)
	Severe anxiety	16.3 (117)
AUDIT results		
	HZD drinking	9.1 (85)
	AUD	3.6 (34)
Drank alcohol prior to non-fatal self-poisoning		10.5 (97)
BHS score	Mean (SD)	5.6 (5.3)

Notes for abbreviations

PDS: Peradeniya Depression Scale. Scoring: Total score $\geq 10/25$ is a positive screening for depression

PHQ-9: Patient Health Questionnaire-9. Scoring: 10-19 moderate (includes moderate and moderately severe) depression, 20-27 severe depression

GAD-7: 7-item anxiety scale. Scoring: 5-9 Mild, 10-14 Moderate, 15-21 severe anxiety

AUDIT: Alcohol Use Disorders Identification Test. Scoring: ≥ 7 =Hazardous drinking (HZD drinking), ≥ 16 =Alcohol use disorder (AUD)

BHS: Beck Hopelessness Scale

*Valid data was available for the PDS for 763 participants, for the PHQ-9 for 707 participants, for the GAD-7 for 720 participants, for the AUDIT for 937 participants and for the BHS for 817 participants.

Table 3.8

Degree of suicidal intent - Pierce Suicide Intent Scale (PSIS)

PSIS Score:		
Total score:	Mean	10.20
Subsection scores:		
Circumstances score	Mean	4.62
Self report score	Mean	4.44
Lethality score	Mean	1.23
PSIS score by category:		
		Participants
Low intent (score 0-3)	% (n)	5.4 (51)
Medium intent (score 4-10)	% (n)	45.2 (429)
High Intent (score ≥ 11)	% (n)	49.4 (469)

Notes for abbreviations:

PSIS: Pierce Suicide Intent Scale.

PSIS total score range: 0-21.

PSIS scoring by category: low intent (total score 0-3), medium intent (total score 4-10) and high intent (total score >10).

3.6.9 Predictors of suicidal intent

The results of the multiple regression analysis are shown in Table 3.9. The Multiple R for the regression model was significantly different from zero. The adjusted R^2 value of .28 indicated that almost one third of the variability of suicidal intent associated with the act of non-fatal self-poisoning was predicted by the models.

In the final model the degree of suicidal intent was significantly predicted by the following variables: male gender ($p < .001$), having attempted suicide before ($p = .030$), higher levels of hopelessness on the BHS ($p < .001$) and the presence of depression ($p < .001$). The final block which comprised variables of psychiatric morbidity (such as the presence of depression and hopelessness scores) contributed most towards the R^2_{Δ} (contributing 22.1% towards the R^2_{Δ} , $p < .001$).

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Table 3.9

Final stepwise multiple regression model results, examining predictors of suicidal intent associated with non-fatal self-poisoning

Sets	Predictor Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
Socio Demo-graphic variables	(Constant)	10.568	.656		16.101	<.001			
	Age*	.044	.014	.113	3.125	.002	.147	.111	.109
	Gender**	-1.036	.290	-.129	-3.567	<.001	-.159	-.126	-.125
Prior help – seeking behaviour	(Constant)	8.328	.763		10.910	<.001			
	Has prior history of suicide attempts***	2.223	.406	.189	5.479	<.001	.171	.192	.188
Psychiatric Morbidity	(Constant)	8.263	.682		12.124	<.001			
	Anxiety^	.039	.033	.056	1.186	.236	.384	.042	.036
	GAD-7 Score								
	Alcohol use disorders^	.018	.030	.021	.603	.547	.129	.022	.018
	AUDIT score								
	Depression^	.195	.031	.297	6.301	<.001	.454	.220	.189
	PDS Score								
	Hopelessness^	.162	.031	.297	6.301	<.001	.454	.220	.189
	BHS Score								

*Reference category: 14-25 year age group, **Reference category: males, ***Reference category: no past history of suicide attempts, ^Reference category: no disorder

3.7 Discussion

3.7.1 Age, gender and substances ingested

At the start of this chapter, it was hypothesized that a majority who carry out acts of non-fatal self-poisoning will be young, and most will be female. The findings of this survey confirm this hypothesis. Non-fatal self-poisoning in Sri Lanka appears to be a phenomenon of young people – a majority of the participants were below the age of 30 years. This is very much in keeping with previous studies in Sri Lanka (van der Hoek & Flemming, 2006) as well as the international literature (Nock et al., 2008b; Parkar et al., 2006). Universally, those who attempt suicide and survive tend to be younger than those who complete suicide (Diekstra, 1993). Increasing psychiatric morbidity, physical illness, functional impairment and life-stressors in old age have been offered as possible explanations for higher rates of completed suicide in the elderly (Lapierre et al., 2011).

Also as hypothesized, the findings of this survey further confirm a state of transition with respect to substances being ingested in this country for non-fatal self-poisoning. In keeping with recent Sri Lankan studies (De Silva et al., 2012), but in *contrast* to older studies (Eddleston et al., 2005; van der Hoek & Flemming, 2006), the commonest ingested substance was medicinal drug overdose. This is also in keeping with the original hypothesis at the start of this chapter. These findings suggest that Sri Lanka is shifting towards Western patterns (De Leo et al., 2013), with respect to substances ingested for non-fatal self-poisoning. Greater availability of medicinal substances in comparison to pesticides as a consequence of urbanization, may be a contributing factor to this phenomenon. It is noteworthy however that this change appears to be occurring throughout the country - a recent study from Sri

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Lanka suggests that the transition from pesticides to medicinal drug overdoses is occurring not only in urban areas, but also in areas traditionally perceived to be more rural and agricultural (Hanwella et al., 2012). Similar changes from pesticide ingestion to medicinal drug overdoses have been reported in other regions in Asia (Thanh et al., 2005).

3.7.2 Proximal triggers, chronic stressors and childhood adversity

Interpersonal conflict emerged as an often-reported proximal trigger prior to the act of non-fatal self-poisoning. In many instances, the self-poisoning behavior occurred in the context of distress related to interpersonal conflict. Such patterns of coping have been commonly reported previously in Sri Lanka (Hettiarachchi & Kodituwakku, 1989), and other parts of South Asia (Khan, Islam, & Kundi, 1996; Parkar et al., 2006). It may be that the collectivistic and hierarchical aspects of the local culture (Niles, 1998) make it more challenging for vulnerable individuals to cope with interpersonal stressors. In some cases self-harm may also be perceived as a way of problem solving in such situations (De Silva, 2003; Maracek, 2006).

With regard to stressors in the prior six-months, as well as childhood adversity, two similar factors emerged: First, ongoing interpersonal conflict (in the case of stressors in the prior six months, with a parent, partner or spouse, and in the case of childhood adversity, significant parental conflict while growing up) and second, significant financial stressors - either in the prior six months or having grown up with significant financial problems. Data from the West indicate that prevalence of life problems is increased prior to attempted suicide (Bancroft, Skrimshire, Casson, Harvard-Watts, & Reynolds, 1977; Haw & Hawton, 2008). In Sri Lanka these life problems appear to take the form of either interpersonal conflict or financial stressors.

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Financial stressors are not unexpected – Sri Lanka is a developing country, and a larger proportion of the population remain within the lower socio-economic groups. A similar pattern of life events in the form of family conflicts and financial problems have been associated with attempted suicide among females in China (Pearson et al., 2002). It has been suggested that negative life-events interact with other internal individual factors, such as lower resilience and depression, in contributing towards suicidal behavior (Nruham, Holen, & Sund, 2010). Although not directly examined in this study, this interaction may be applicable to the participants in this survey as well.

Childhood adversity has been linked to adult suicidal behavior in varying ways. Children who experience significant trauma are more likely to have problems with emotional and behavioural self-regulation as an adult, and are at higher risk of self-harm and attempted suicide (Dube et al., 2001). Prolonged early exposure to trauma, such as recurrently witnessing domestic violence in early life, can disrupt biological development of the central nervous system and contribute towards emotional and behavioural issues in later life (Dube et al., 2001). The rates of physical and sexual abuse reported by participants in this study was lower than previous rates reported from the West (Dube et al., 2001); however stigma and reluctance to disclose such issues may have influenced this finding. In contrast, parental conflict while growing up, and problems due to father's alcohol misuse, were commonly reported. As described earlier, these factors during childhood may have contributed to their adult self-poisoning behaviours. This in turn would suggest that alcohol misuse affects not only the males who take alcohol, but also their families (Konradsen et al., 2006).

Despite these associations, in the final regression analysis, chronic stressors and childhood adversity did not significantly predict suicidal intent associated with the act of non-fatal self-poisoning. It is possible that other factors such as depression and alcohol misuse, mediate the relationship between life stressors, childhood adversity and suicidal intent (Dube et al., 2001); this could explain why the latter factors did not significantly predict suicide intent once the psychiatric morbidity was added to the final model.

3.7.3 Psychiatric Morbidity

A key finding in this study was that about half the participants screened positive for depression (as a diagnosis). This is in marked contrast to the relatively lower rates of depression of 18.5% or less reported by previous Sri Lankan studies (Hettiarachchi & Kodituwakku, 1989; van der Hoek & Konradsen, 2005). The findings from this study were however compatible with data from India and the West regarding depression among those who attempt suicide (Hawton et al., 1996; Parkar et al., 2006).

This finding has several implications. On the one hand, it negates the hypothesis that psychiatric illness such as depression has no role in non-fatal self-poisoning in Sri Lanka. It is likely that depression does play a role in a proportion of those who attempt who develop suicidal ideation and attempt self-poisoning (Nock, Hwang, Sampson, & Kessler, 2009b). In keeping with this hypothesis, depression was a significant predictor of greater suicidal intent, in the final regression analysis. It is also of significance that although half the participants screened positive for depression during the study, only a minority (9.8%, $n = 91$) had previously been treated for *any* psychiatric illness. Thus the identification and treatment of

depression, is likely to play an important role in the prevention of non-fatal self-harm. The finding that 30% of those who attempted self-poisoning visited a doctor in the prior month, points to a potential setting where depression could be identified and treated in the community.

Nevertheless these study findings also indicate that depression is not the only factor contributing to self-poisoning behavior; indeed, half the participants were *not* depressed. Therefore treatment of depression alone is unlikely to provide the complete answer to preventing self-poisoning.

Alcohol use disorder or hazardous use was seen in 12.6% of participants, a figure that is higher than the rate of 7.9% reported by Hawton et al., for a study undertaken in the United Kingdom (Hawton, Fagg, & McKeown, 1989). An important factor unique to the Sri Lankan setting is that all those who had a history of alcohol misuse were males; a reflection of local cultural norms in Sri Lanka where females are unlikely to use and misuse alcohol. In fact, 19% of males in the current sample had alcohol use disorder or hazardous use of alcohol. Alcohol use disorders are well known to be associated with suicidal behavior (Merrill, Milner, Owens, & Vale, 1992). Beyond its role in promoting depressive symptoms, it has been suggested that alcohol could promote suicidal behavior through a variety of mechanisms, including by increasing risky behaviours (for example, by increasing disinhibition and aggression) and through an association with negative life events and interpersonal conflict (Sher, 2006; Zhang, Conner, & Phillips, 2009). These conclusions are based on Western data, and have not been tested in Sri Lanka. However, the current survey data supports the possibility that alcohol is associated with suicidal behavior in males in Sri Lanka. Furthermore, as hypothesized, alcohol use disorder was a significant predictor of suicidal intent. This is an important

finding since data from Western countries indicates that alcohol misuse is associated with increased risk of repetition of suicidal behavior (Hawton et al., 1989). This emerges as an important gender-specific association with suicidal behavior and will be discussed further in the next chapter, which examines gender differences with respect to non-fatal self-poisoning in Sri Lanka.

3.7.4 Suicidal intent

A majority of participants had a moderate or high intent as measured by the PSIS. This is in contrast to the original hypothesis that a majority of participants would have low suicidal intent. Previous Sri Lankan studies have reported on the impulsivity and short premeditation associated with self-poisoning behavior (Eddleston et al., 2006; Hettiarachchi & Kodituwakku, 1989); but separate assessment of suicidal intent using a standardized measure is scarce. While the findings of this study support previous Sri Lankan data that non-fatal self-poisoning is associated with interpersonal conflict and relatively short premeditation, we also propose that a significant proportion of participants do have high suicidal intent, which is predicted mostly by the presence of psychiatric morbidity such as depression and hopelessness (Table 3.7). Data from other parts of South Asia is limited, but similar results have been reported from India (Bharati et al., 2013). These findings are important since it is known that in Western countries, suicidal behavior with high intent is shown to be associated with a higher risk of later repetition and completed suicide (Harriss et al., 2005). Hence these findings have implications for future behavior and risk of repetition.

On the other hand, although a majority of the study participants in the current study had a high or medium suicide intent score, the positive predictive value of a

high suicide intent is low (Harriss & Hawton, 2005). In other words, high suicidal intent is associated with significantly higher risk of future repeat attempts and completed suicide; however, since rates of completed suicide are much less than the numbers of those who attempt, identifying whom, amongst those who have a high suicidal intent, will go onto complete the act is very difficult. Predicting more precisely who among this group will go on to repeat suicidal behavior or complete suicide at a later date is a challenge that is not specific to Sri Lanka. Further research is required to explore this question. Meanwhile, intervention programs might be best targeted at the entire group of at-risk participants.

3.8 Limitations

The findings of this study were based on a cross-sectional survey of those admitted to hospital following non-fatal self-poisoning. As a result, those who did not seek hospital care following such an attempt were not included in the analysis. Also, those persons who were not able to speak either Sinhala or English could not be included in the study. These were people who were conversant in Tamil only; they comprised only a small minority of the admissions to the Toxicology Unit. The fact that 9.1% of the eligible sample refused consent, and a further 19.8% could not be included in the study is also a limitation, and may have influenced the findings. Finally certain conditions, such as impulse control disorders and personality disorders were not assessed, and the assessment of psychiatric morbidity was undertaken via screening tools rather than clinician-based diagnostic interviews. However, attempts were made to minimize false positives by the use of locally validated screening tools wherever possible.

3.9 Conclusions

At the beginning of this chapter it was hypothesized that non-fatal self-poisoning in Sri Lanka is at present a phenomena of young people, with a female preponderance and increasing medicinal overdoses. These hypotheses were confirmed by the findings of this survey. Patterns of non-fatal self-poisoning in Sri Lanka are changing to resemble Western patterns, in terms of substances ingested and increasing female preponderance (Michel et al., 2000), both of which have implications for prevention. However, pesticides remain the second most commonly ingested substance; this is still much higher than in the West and may reflect the ongoing availability of these chemicals, particularly in agricultural areas. Interpersonal conflict is a proximal trigger for most non-fatal self-poisoning acts, but in contrast to expectations, a majority have medium to high suicide intent at the time of attempting self-harm. However, as hypothesized, higher suicidal intent is predicted by male gender, prior suicide attempts, depression and higher hopelessness scores. There also appear to be gender differences in non-fatal self-poisoning. To date the variables that underpin these differences have been unclear. Accordingly, a study of gender, as well as age differences in self-poisoning are the focus of the next two chapters.

Chapter 4

Comparison of non-fatal self-poisoning among males and females, in Sri Lanka

The results from this chapter have been published in BMC Psychiatry 2014;14:221 (Appendix J).

4.1 Introduction

Gender patterns in non-fatal self-poisoning in Sri Lanka have changed, since 2000. Previously, ingestion of pesticides was reported to be the most common method of self-poisoning in Sri Lanka, second to ingestion of plant poisons and household chemicals (Eddleston et al., 2005; van der Hoek & Flemming, 2006). Moreover, the rates of self-poisoning by pesticide ingestion were equal or even higher in males than females (Eddleston et al., 2005; van der Hoek & Flemming, 2006). This gender ratio contrasted with international studies which report higher rates of attempted suicide by drug overdoses among females (Schmidtke et al., 1996), but was consistent with the reports from other developing countries where the gender ratio for non-fatal self-poisoning by pesticide ingestion is roughly 50/50 (Adityanjee, 1986; Graafsma et al., 2006; Kinyanda, Hjelmeland, & Musisi, 2004; Kumar, Ramesha, & Rao, 2009; Nguyen et al., 2010; Ramdurg, Goyal, Sharan, Goyal, & Sagar, 2012). However, the gender pattern is now changing in Sri Lanka, with more women being admitted to hospital as a result of the ingestions of medicinal drugs and other substances since about 2005 (De Silva & Ratnayake, 2008; De Silva et al., 2012). Similar patterns of change have been reported in countries in the Asian regions such as Pakistan and Vietnam (Shahid et al., 2009; Thanh et al., 2005). With increasing urbanization, gender patterns of non-fatal self-poisoning in Sri Lanka and other South Asian countries appear to be changing to resemble that of developed

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countries, accompanied by an increasing proportion of attempted suicides among females (De Silva & Ratnayake, 2008; De Silva et al., 2012; Shahid et al., 2009; Thanh et al., 2005).

International studies indicate that violent methods of self-harm, alcohol use disorders and economic stressors are associated with suicide attempts in males, whereas a history of sexual trauma and anxiety disorders are commonly associated with suicide attempts among females (Hawton, 2000; Wunderlich, Bronisch, Wittchen, & Carter, 2001; Zhang, McKeown, Hussey, Thompson, & Woods, 2005). In the West, greater suicide intent has been reported in men than women, and this may partly account for the greater proportion of attempts relative to completions in women (Harriss et al., 2005; Hawton, 2000). Despite these changing gender ratios in recent years, there has been no comparison between genders with regard to non-fatal self-poisoning in Sri Lanka.

Thus, the overall aims of this chapter were to describe gender differences in non-fatal self-poisoning in Sri Lanka, especially given the changing gender patterns in recent years. The specific objectives were to:

- Compare non-fatal self-poisoning in males and females, with respect to types of poisons ingested, chronic stressors, prior history of suicidal attempts, psychiatric morbidity, and degree of suicidal intent.
- Establish which variables may relate to higher suicidal intent in males and females respectively.

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It was hypothesized that:

- Males will be more likely than females to attempt self-poisoning by pesticide ingestion, whereas females will be more likely than males to attempt self-poisoning by drug overdose
- Males will be more likely than females to have alcohol use disorder, acute alcohol ingestion prior to the attempt, and higher suicidal intent.

4.2 Methods

Data was derived from a cross-sectional study, carried out at the Toxicology unit (ward 17) of Teaching Hospital, Peradeniya, Sri Lanka, from February 2012 onwards, over a consecutive 14-month period. The study methodology, participants, outcome measures and statistical analysis has been described previously in Chapter 3.

4.2.4 Statistical Analysis

The first analysis in this chapter involved the examination of whether there were any gender differences in the characteristics of non-fatal self-poisoning in terms of substances ingested, triggers, psychiatric morbidity and suicidal intent associated with the act. The second analysis examined factors that predicted suicidal intent in males and females.

To examine the relationship between gender and characteristics of non-fatal self-poisoning, logistic regressions were used to determine the odds ratio (*OR*) and the 95% confidence interval of the *OR*. The significance of the associations was determined using the Wald statistic. When required, additional analyses were conducted using chi-squared test (χ^2) for categorical self-poisoning measures and independent t-tests for continuous self-report measures. Significant χ^2 results for

cross-tabulations greater than a 2x2 table were explored more closely with post hoc pairwise comparison of column proportions using the Bonferroni correction. For the sake of clarity in reporting, with respect to gender differences of categorical variables with more than two levels, χ^2 and tests of differences in proportions have been reported in the text, while the *OR* are given in the tables.

Hierarchical multiple regression was used to determine predictors of suicide intent. Separate models were examined for males and females. Examination of bivariate correlations and tolerances (1-SMC) indicated that there were no problems of collinearity or multicollinearity amongst predictors. Factors known to be associated with attempted suicide from previous international studies (Beck et al., 1985; Bruffaerts et al., 2010; Dhossche et al., 2000; Nock et al., 2009a; Pearson et al., 2002; Wu et al., 2009; Zhao et al., 2010), were entered into the model in a thematic hierarchical manner. Two regression models were developed, one each for males and females. The final regression model included the following sets of independent variables, entered in a thematic hierarchical manner, in the following order: socio-demographic details (age, marital status), childhood adversity (2 items), stressors in the prior six months (4 items), prior help seeking behavior or suicidal behavior (3 items), acute triggers (1 item) and psychiatric morbidity (presence of anxiety, depression and BHS scores). From these models, it was possible to ascertain the overall amount of variability explained in suicidal intent by the model, which sets of variables added significantly to the prediction of suicidal intent as well as the relative importance of individual predictors. Given the exploratory nature of the study, alpha (α) was set at .05 for both analyses. No adjustments were made for multiple comparisons because they can result in a higher type II rate, reduced power, and increased likelihood of missing important findings (Rothman, 1990).

4.3 Results

4.3.1 Sample characteristics

A total of 949 participants took part in the study, of whom 44.2% ($n = 419$) were males. The median age of the participants was 22 years, and 60.1% ($n = 570$) of the participants were below the age of 25 years. Females were significantly younger than males (median age for females: 20 years, for males: 25 years, Mann-Whitney U $z = -7.87, p < .001$).

There were no significant gender differences with regard to marital status or with whom the participant resided (Table 4.1). Females had a higher overall level of education in that they were more likely than males to have studied beyond grade 10, but they were significantly less likely to be employed compared to males, $OR = 11.08$ (95% CI 8.16,15.06) (Table 4.1). The Population and Housing Census of 2001 for Sri Lanka reported that more males complete up to grade 10, but more females complete the G.C.E. (O/L) and G.C.E. (A/L), whilst males are more likely to be employed than females in all age groups (percentage employed in amongst those aged ≥ 10 years: Males 65.5%, females 28.1%).

4.4.2 Substances used for non-fatal self-poisoning

The details of substances used for non-fatal self-poisoning are shown in Table 4.2. There were significant gender differences in type of substance used ($\chi^2(1) = 122.7, p < .001$). Post hoc comparisons of proportions indicated that females were significantly more likely to have ingested medicinal drug overdoses, and significantly less likely than males to have ingested pesticides.

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Females were significantly more likely than males to ingest a substance that was already available in the home, $OR = 4.33$ (95% CI 3.27, 5.72), while males were more likely than females to ingest a substance kept in the field or garden, $OR = .33$ (95% CI .22, .48) or to purchase the substance with the intention of self-poisoning, $OR = .37$ (95% CI .28, .50). Females were also significantly more likely than males to cite ease of availability as a reason for the choice of type of substance ingested, $OR = 1.45$ (95% CI 1.10, 1.92).

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Table 4.1

Socio-demographic characteristics of the total cohort and for males and females

Variable	Gender ¹		p value	Odds Ratio	95% CI of OR
	Male (n=419) %(n)	Female (n=530) %(n)			
Living with:			.345		
Parents	50.5% (209)	55.0% (289)	na ²	na	na
Spouse/children	42.5% (176)	39.2% (206)	.224	0.85	0.65-1.11
Other	7.0% (29)	5.7% (30)	.293	0.75	0.44-1.28
Married	44.7% (187)	41.4% (219)	.303	0.87	0.67-1.13

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Variable	Gender ¹		p value	Odds Ratio	95% CI of OR
	Male (n=419) % (n)	Female (n=530) % (n)			
Highest level of education:			<.001		
None/ up to grade 5	9.4 (39)	2.5 (13)	na ²	na	na
Grade 6 to 10	58.0 (240)	44.9 (236)	.001	2.95	1.54-5.67
Completed O/L Exam	25.1 (104)	32.3 (170)	<.001	4.90	2.50-9.62
Completed A/L Exam	7.2 (30)	19.0 (100)	<.001	10.00	4.73-21.14
University/Postgraduate	0.2 (1)	1.3 (7)	.006	21.00	2.35-187.13
Employed	72.3 (298)	19.1 (100)	<.001	11.08	8.16-15.06

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Table 4.2

Substances ingested in non-fatal self-poisoning attempt for the total cohort and for males and females

Variable	Gender ¹		p value	Odds Ratio	95% CI of OR
	Male % (n)	Female % (n)			
Type of overdose:			<.001		
Pharmaceutical drug overdose	38.1 (157)	72.0 (380)	na ²	na	na
Agrochemical	38.1 (157)	11.9 (63)	<.001	0.17	0.12-0.23
Other chemical kept at home	12.1 (50)	9.7 (51)	<.001	0.42	0.27-0.65
Plant poison	11.7 (48)	6.4 (34)	<.001	0.29	0.18-.47
Source of substance:					
Ingested a substance kept at home	41.6 (172)	75.5 (392)	<.001	4.33	3.27-5.72
Ingested a substance kept in field/garden	21.3 (88)	8.1 (42)	<.001	0.33	0.22-0.48
Bought substance for purpose of ingestion	38.3 (158)	18.7 (98)	<.001	0.37	0.28-0.50

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Variable	Gender ¹		p value	Odds Ratio	95% CI of OR
	Male % (n)	Female % (n)			
Reason for choice ³					
Availability	28.8 (117)	37.0 (190)	.009	1.45	1.10-1.92
It was cheap	6.4 (26)	6.8 (35)	.806	1.07	0.63-1.81
Thought it was not dangerous	10.8 (44)	13.0 (67)	.310	1.23	0.82-1.85
Thought it was dangerous	37.2 (151)	31.7 (163)	.082	0.78	0.60-1.03
Thought it wouldn't hurt	13.3 (54)	14.0 (72)	.757	1.06	0.73-1.55
Thought it would act quickly	5.2 (21)	2.5 (13)	.035	0.48	0.24-0.96

4.4.3 Triggers associated with the non-fatal self-poisoning act

Interpersonal conflict was the most common precipitant or immediate trigger prior to the act of non-fatal self-poisoning – for example, arguments (with spouse/ parent/ other) or problems within a romantic relationship for both genders (Table 4.3). Females were more likely to report a conflict with parents, $OR = 1.54$ (95% CI 1.09, 2.18). Only 3.8% ($n = 35$) of all those who attempted non-fatal self-poisoning reported severe financial difficulties as the precipitant, but of those who did, males were significantly more likely to identify financial difficulties compared to females, $OR = .07$ (95% CI .02, .22).

4.4.4 Psychiatric morbidity

There was no significant gender difference in depression rates as determined by the PDS and the PHQ-9 (Table 4.4). More than half of the females (53.7%, $n = 237$) and 49.7% ($n = 160$) of males who had attempted self-poisoning screened positive for depression via the PDS; the PHQ-9 gave comparable results, with 52.0% ($n = 209$) of females and 49.8% ($n = 152$) of males scoring positive for moderate/severe depression. For the subsequent analyses we considered the results for depression as measured by the PDS (Abeyasinghe et al., 2012), since at the time of the conducting the study, the PHQ-9 was not validated for a Sri Lankan population. There was no significant difference in the extent of anxiety between males and females, as measured by the GAD-7, and similarly there was no significant difference in hopelessness scores between the genders, as measured by the BHS.

Hazardous drinking and alcohol use disorder was seen among 20.7% ($n = 85$) and 8.3% ($n = 34$) of males respectively, and 24.1% ($n = 97$) of males had ingested

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alcohol prior to the act of self-poisoning. There were no alcohol use disorders or alcohol ingestion reported among the females. Females (16.2%, $n = 85$) were significantly more likely to have a history of prior suicide attempts compared to males (10.1%, $n = 42$), $OR = 1.72$ (95% CI 1.16, 2.55).

4.4.5 Stressors in the prior six months and childhood adversity

Stressors occurring within the six months prior to the non-fatal self-poisoning are shown in Table 4.5. Females were more likely to report a history of interpersonal conflict with parents, $OR = 1.73$ (95% CI 1.20, 2.49), with her father due to his alcohol misuse $OR = 3.07$ (95% CI 1.39, 6.77), and with her spouse because of his alcohol misuse, $OR = 1.92$ (95% CI 1.07, 3.44); they were also significantly more likely to report being a victim of physical abuse in the prior six months, $OR = 7.02$ (95% CI 2.75, 17.90). Males were significantly more likely to report job loss, $OR = .38$ (95% CI .19, .77), financial problems, $OR = .70$ (95% CI .51, .96) and legal problems, $OR = .04$, (95% CI .01, .32).

Self-reported childhood adversity is shown in Table 4.6. There were no significant differences between the genders for most of the childhood adversity items; however, females were significantly more likely to report parental criticisms $OR = 2.51$ (95% CI 1.40, 4.48), harsh punishments $OR = 2.10$ (95% CI 1.04, 4.26), parental separation $OR = 2.07$ (95% CI 1.21, 3.53) and having had a mother working overseas $OR = 1.70$ (95% CI 1.14, 2.55), during their childhood.

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Table 4.3

Triggers for non-fatal self-poisoning for the total cohort and males and females

Variable	Total sample % (n)	Gender ¹		p value	Odds Ratio	95% CI of OR
		Male	Female			
		% (n)	% (n)			
Argument with spouse	23.4 (222)	23.4 (95)	24.1 (127)	.791	1.04	0.77-1.41
Argument with parent	17.7 (168)	14.5 (59)	20.7 (109)	.015	1.54	1.09-2.18
Argument with child	1.9 (18)	2.2 (9)	1.7 (9)	.578	0.77	0.30-1.95
Problem with romantic relationship	15.4 (146)	20.0 (81)	12.4 (65)	.002	0.57	0.40-0.81
Severe financial difficulties	3.8 (35)	7.9 (32)	0.6 (3)	<.001	0.07	0.02-0.22
¹ Gender is coded as 0 Male 1 Female						

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Table 4.4

Psychiatric morbidity for the total cohort and for males and females

		Total	Gender ¹			Odds	95% CI of OR
		sample				ratio	
Variable*			Male	Female	p value		
PDS							
Depressed	% (n)	52.0 (397)	49.7 (160)	53.7 (237)	.269	1.18	0.88-1.57
PHQ-9							
Moderate/ severe							
depression	% (n)	51.1 (361)	49.8 (152)	52.0 (209)	.570	1.09	0.81-1.47
GAD-7							
Moderate/severe							
anxiety	% (n)	39.4 (284)	35.9 (111)	42.1 (173)	.094	1.30	0.96-1.76

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Variable*	Total sample		Gender ¹		p value	Odds ratio	95% CI of OR
			Male	Female			
	% (n)		% (n)	% (n)			
Had history of prior							
suicide attempts	% (n)	13.5 (127)	10.1% (42)	16.2% (85)	.007	1.72	1.16-2.55
BHS Score	M (SD)	5.64 (5.36)	5.59 (5.40)	5.67 (5.33)	.822	1.00	0.98-1.03
AUDIT Results:							
HZD Drinking	% (n)	9.1% (85)	20.7% (85)	0.0% (0)	na ²	na ²	na ²
AUD	% (n)	3.6% (34)	8.3% (34)	0.0% (0)	na ²	na ²	na ²

¹ Gender is coded as 0 Male 1 Female

² Odds ratio and significance not calculated because no females reported alcohol misuse

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Notes for abbreviations:

PDS: Peradeniya Depression Scale. Scoring: Total score $\geq 10/25$ is a positive screening for depression

PHQ-9: Patient Health Questionnaire-9. Scoring: 10-19 moderate (includes moderate and moderately severe) depression, 20-27 severe depression

GAD-7: 7-item anxiety scale. Scoring: 5-9 Mild, 10-14 Moderate, 15-21 severe anxiety

AUDIT: Alcohol Use Disorders Identification Test. Scoring: ≥ 7 =Hazardous drinking, ≥ 16 =Alcohol use disorder

*Valid data were available for the PDS for 763 participants, for the PHQ-9 for 707 participants, for the GAD-7 for 720 participants, for the AUDIT for 937 participants and for the BHS for 817 participants.

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Table 4.5

Stressors within the six-months prior to non-fatal self-poisoning

Stressors	Gender ¹		p value	Odds Ratio	95% CI of OR
	Male % (n)	Female % (n)			
Suffered a serious injury/ illness	13.3 (54)	11.7 (61)	.481	0.87	0.59-1.29
A close relative had a serious injury/illness	5.9 (24)	8.1 (42)	.199	1.41	0.84-2.36
Death of a parent/ spouse/ child	2.5 (10)	2.7 (14)	.816	1.10	0.49-2.51
Death of a friend or close relative	6.9 (28)	7.9 (41)	.552	1.16	0.76-1.92
Conflict with parents	12.5 (51)	19.8 (103)	.003	1.73	1.20-2.49
Conflict with his/her father because of father's alcohol use	2.0 (8)	5.8 (30)	.005	3.07	1.39-6.77
Conflict with spouse/ partner	29.6 (120)	30.6 (158)	.741	1.05	0.79-1.39
Conflict with spouse because of alcohol use	4.2 (17)	7.8 (40)	.029	1.92	1.07-3.44

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Stressors	Gender ¹		p value	Odds Ratio	95% CI of OR
	Male % (n)	Female % (n)			
Conflict with spouse because of mistrust	6.2 (25)	11.5 (59)	.007	1.97	1.21-3.20
Divorce/ marital separation	4.0 (16)	5.8 (30)	.203	1.50	0.80-2.79
Spouse went overseas for a job	1.5 (6)	1.7 (9)	.758	1.18	0.42-3.34
Conflict with a neighbour/ friend/ relative	3.2 (13)	6.4 (33)	.030	2.07	1.07-3.98
Loss of job	5.4 (24)	2.3 (12)	.007	0.38	0.19-0.77
Significant financial problems	25.8 (105)	19.6 (101)	.024	0.70	0.51-0.96
Court case / legal problems	4.4 (18)	0.2 (1)	.002	0.04	0.01-0.32
Seeing bad dreams	6.9 (28)	13.6 (70)	.001	2.12	1.34-3.36
Physical abuse within the past 6 months	1.3 (5)	8.3 (42)	<.001	7.02	2.75-17.90
Sexual abuse within the past 6 months	0.0 (0)	2.4 (12)	na ²	na ²	na ²

¹ Gender is coded as 0 Male 1 Female

² Odds ratio and significance not calculated because no males reported sexual abuse during the past 6 months

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Table 4.6

History of childhood adversity

	Gender ¹		p value	Odds Ratio	95% CI of OR
	Male	Female			
Reported childhood adversity	% (n)	% (n)			
Grew up with constant parental criticism	4.0 (16)	9.4 (49)	.002	2.51	1.40-4.48
Was severely punished without reason	2.7 (11)	5.6 (29)	.040	2.10	1.04-4.26
Grew up with significant financial problems	33.3 (134)	29.2 (152)	.176	0.82	0.62-1.09
Witnessed family members being abused	0.5 (2)	1.9 (10)	.057	4.34	0.96-19.69
Has been subjected to physical abuse as a child	3.5 (14)	5.0 (26)	.263	1.46	0.75-2.83
Was sexually abused as a child	0.5 (2)	1.3 (7)	.212	2.73	0.56-13.21

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	Gender ¹		p value	Odds Ratio	95% CI of OR
	Male	Female			
Reported childhood adversity	% (n)	% (n)			
Had significant problems due to father's alcohol misuse	18.2 (70)	17.2 (84)	.699	0.93	0.66-1.32
Significant parental conflict during childhood	20.1 (76)	21.6 (106)	.594	1.09	0.79-1.52
Parents divorced/lived separately	5.2 (20)	10.3 (51)	.008	2.07	1.21-3.53
Mother worked abroad during childhood	10.3 (40)	16.4 (82)	.010	1.70	1.14-2.55
Mother died before person reached 16 years	4.5 (16)	2.9 (13)	.217	0.63	0.30-1.32
Father died before person reached 16 years	12.1 (43)	12.8 (58)	.789	1.06	0.70-1.62

4.4.6 Degree of suicidal intent associated with the act of self-poisoning

Males had significantly higher levels of suicidal intent compared to females $OR = .92$ (95% CI .89, .95) (Table 4.7). When the total PSIS score was considered by severity category (high -score 11 or over, medium -score 4-10 or low -score below 4), again there was a significant difference between the genders ($\chi^2(2) = 22.5, p < .001$); post hoc comparisons of proportions indicated that males were significantly more likely to score high on suicidal intent, whereas females were significantly more likely to have medium suicide intent.

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Table 4.7

Degree of suicidal intent - Pierce Suicide Intent Scale (PSIS)

Variable		Total Scores	Gender ¹		p value	Odds Ratio	95% CI of OR
			Male	Female			
Pierce Suicide Intent Scale (PSIS)	M (SD)	10.2 (4.0)	10.9 (4.1)	9.6 (3.83)	<.001	0.92	0.89-0.95
PSIS subsection scores							
Circumstances score	M (SD)	4.6 (1.9)	4.7 (1.9)	4.53 (1.9)	.107	0.94	0.88-1.01
Self report score	M (SD)	4.4 (2.6)	4.8 (2.7)	4.2 (2.6)	<.001	0.91	0.86-0.96
Lethality score	M (SD)	1.2 (1.0)	1.5 (1.1)	1.0 (1.0)	<.001	0.63	0.55-.72
PSIS score by category					<.001		
Low intent (score 0-3)	%(n)	5.4% (51)	5.0% (21)	5.7% (30)	na ²	na	na
Medium intent (score 4-10)	%(n)	45.2% (429)	37.0% (155)	51.7% (274)	.480	1.24	0.69-2.24
High Intent (score ≥11)	%(n)	49.4% (469)	58.0% (243)	42.6% (226)	.151	0.65	0.36-1.17

¹ Gender is coded as 0 Male 1 Female

² Low intent is the reference category

Notes for abbreviations:

PSIS: Pierce Suicide Intent Scale. Total score range: 0-21. Scoring by category: low intent (total score 0-3), medium intent (total score 4-10) and high intent (total score >10).

4.4.7 Predictors of suicidal intent

The results of multiple regression analyses for males and females are shown in Tables 4.8 and 4.9 respectively. Although alcohol use disorders emerged as a significant variable for males, since it was not reported at all for females it could not be included in the final regression models for both genders. The Multiple R for the regression models for males and females were significantly different from zero. The adjusted R^2 value of .35 for males and .28 for females show that approximately one third of variability of suicidal intent associated with the act of non-fatal self-poisoning was predicted by the models. For both genders, the final block, i.e., psychiatric morbidity (presence of depression and hopelessness scores) predicted most of the variability in suicidal intent. For males, the R^2_{Δ} was 23.9%, and for females the R^2_{Δ} was 17.2% (both $p < .001$).

In the final model for males, the degree of suicidal intent was significantly predicted by the following variables: having attempted suicide before ($p = .006$), having expressed suicidal ideas prior to the act ($p = .025$), having visited a doctor in the month prior to the attempt ($p = .015$), seeing bad dreams ($p = .008$), higher levels of hopelessness ($p < .001$) and the presence of depression ($p < .001$). For females, in the final model, age ($p = .015$), a higher score on the BHS ($p = .015$), and the presence of depression ($p < .001$), significantly predicted suicidal intent.

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Table 4.8

Final stepwise multiple regression model results, examining predictors of suicidal intent associated with non-fatal self-poisoning: Males.

Sets	Predictor variables	Unstandardized co-efficient		Standardized co-efficient	t	Sig	Correlations		
		B	Std error	Beta			Zero order	Partial	Part
Socio demographic variables	Age	.049	.026	.142	1.884	.061	.104	.109	.109
	Marital status	-.475	.612	-.058	-.776	.439	.037	-.045	-.045
Childhood adversity	Parental conflict	1.521	.601	.147	2.529	.012	.146	.146	.145
	Mother worked overseas	.156	.744	.012	.210	.834	0.017	.012	.012
Stressors during the prior six months	Financial problems	1.389	.556	.151	2.500	.013	.162	.145	.142
	Legal problems	1.458	1.222	.068	1.194	.234	.079	.070	.068
	Physical/ sexual abuse	-.420	2.358	-.010	-.178	.859	.012	-.010	-.010
	Bad dreams	-1.252	.914	-.080	-1.369	.172	-.041	-.080	-.078

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Sets	Predictor variables	Standardized co-efficient			t	Sig	Correlations		
		Unstandardized co-efficient		Beta			Zero order	Partial	Part
		B	Std error						
Prior help seeking/ suicidal behaviour	Expressed suicidal ideas	-.383	.677	-.032	-.566	.572	-.012	-.033	-.031
	Saw a doctor in prior month	-.748	.566	-.079	1.322	.187	-.000	-.078	-.073
	Has a past history of suicide attempts	3.611	.810	.254	4.457	<.001	.267	.255	.246
Acute triggers	Breakup of romantic relationship	1.500	.605	.154	2.482	.014	.126	.145	.136
Psychiatric morbidity	GAD-7	.025	.057	.033	.438	.662	.401	.026	.020
	PDS	.220	.051	.331	4.281	<.001	.487	.247	.200
	BHS	.220	.042	.296	5.227	<.001	.469	.297	.244

PDS: Peradeniya Depression Scale, GAD-7: 7-item Anxiety Scale, BHS: Beck Hopelessness Scale

*Reference categories: For age: 14-24 year age group, for all other variables: those without relevant event/ behavior/ disorder

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Table 4.9

Final stepwise multiple regression model results, examining predictors of suicidal intent associated with non-fatal self-poisoning: Females.

Sets	Predictor variables*	Standardized			t	Sig	Correlations		
		co-efficient					Zero	Partial	Part
		Unstandardized co-efficient							
		B	Std error	Beta			order		
Socio demographic variables	Age	.105	.028	.215	3.747	<.001	.202	.187	.186
	Marital status	-.191	.445	-.025	-.430	.668	.081	-.023	-.021
Childhood adversity	Parental conflict	1.381	.455	.153	3.037	.003	.154	.153	.149
	Mother worked overseas	.159	.528	.015	.301	.763	.027	.015	.015

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Sets	Predictor variables	Standardized Co-efficient			t	Sig	Correlations		
		Unstandardized co-efficient		Beta			Zero order	Partial	Part
		B	Std error						
Prior help seeking/ prior suicidal behaviour	Expressed suicidal ideas	.776	.594	.064	1.307	.192	.110	.067	.063
	Saw a doctor in prior month	.500	.394	.062	1.270	.205	.108	.065	.061
	Has a past history of suicide attempts	1.494	.525	.142	2.846	.005	.173	.144	.137
Acute triggers	Breakup of romantic relationship	1.434	.572	.126	2.506	.013	.120	.128	.120
Psychiatric morbidity	GAD-7	.083	.045	.132	1.856	.064	.456	.095	.080
	PDS	.192	.044	.309	4.416	<.001	.510	.222	.189
	BHS	.092	.038	.129	2.439	.015	.386	.125	.104

PDS: Peradeniya Depression Scale, GAD-7: 7-item Anxiety Scale, BHS: Beck Hopelessness Scale

*Reference categories: For age: 14-24 year age group, for all other variables: those without relevant event/ behavior/ disorder

4.5 Discussion

Key findings of this study were that a majority of those who presented to hospital due to non-fatal self-poisoning were female, and that males and females differed with respect to demographic characteristics, type of substance ingested, alcohol use disorders and suicidal intent. Psychopathology, especially depression, was the most important predictor of suicide intent in both males and females. Also as hypothesized, suicidal intent was higher in males compared to females; and alcohol use disorder and ingestion of alcohol prior to self-poisoning was reported among males only. Although attempted suicide by non-fatal self-poisoning is common in South Asia and Sri Lanka, these gender differences regarding non-fatal self-poisoning have not been examined previously.

4.5.1 Characteristics of non-fatal self-poisoning

Gender distribution

In this study, a greater number of females (55.8%) than males presented to hospital due to non-fatal self-poisoning. This is similar to findings from other recent Sri Lankan and Asian studies (De Silva & Ratnayake, 2008; De Silva et al., 2012; Senarathna et al., 2012; Shahid et al., 2009; Thanh et al., 2005) and is in accordance with internationally established patterns of higher rates of attempted suicide and self-harm among females (Canetto & Sakinofsky, 1998; Hawton, 2000; Schmidtke et al., 1996). This finding is unlikely to be a reflection of the distribution of males and females in the population, given that the 2001 population census for Sri Lanka reports a male:female gender ratio of 0.99:1. The higher rate of completed suicides among males may also have influenced this finding (Abeyasinghe & Gunnell, 2008). The female predominance in this study is in contrast to several *older* studies from Sri

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Lanka, which have reported higher rates of attempted self-poisoning among males (Eddleston et al., 2005; Jeyaratnam et al., 1982; Manuel et al., 2008; van der Hoek & Flemming, 2006); notably in these studies the most commonly ingested substance was pesticides. Similarly, higher rates of attempted self-poisoning among males with pesticide ingestion have been previously reported in South America, Uganda and India (Adityanjee, 1986; Graafsma et al., 2006; Kinyanda et al., 2004; Kumar et al., 2009; Ramdurg et al., 2012).

The female preponderance was more marked in the younger age groups (below 25 year age group male: female ratio= 0.71: 1), whereas there was a male preponderance amongst those aged 35 years and older (35 years and over, male: female ratio= 2.1: 1). This is similar to international patterns of shifting gender ratios with increasing age (Hawton & Harriss, 2008; Schmidtke et al., 1996), but this Sri Lankan finding is unusual in that in the >35 year age group there are a *greater number* of males than females attempting non-fatal self-poisoning. Alcohol use disorders, which were seen in males only, may have been a possible contributory factor, and associations between alcohol misuse, male gender and increasing age will be explored further in the next chapter.

Substances used for non-fatal self-poisoning

The most frequent source of self-poisoning was medicinal drug overdose, in contrast to older studies conducted more than ten years ago, which reported pesticide ingestion as the most common substances used (Eddleston et al., 2005). This result, however, is similar to findings of other more recent Sri Lankan studies (De Silva & Ratnayake, 2008; Hanwella et al., 2012). This is likely to be a reflection of reduced availability of pesticides, perhaps secondarily to the gradual urbanization of the

country. Indeed, both males and females reported that their reason for choice of substance was accessibility. Possible reasons for the higher rate of pesticide ingestion among males could be that in agricultural areas, pesticides are more easily accessible to males who work in the fields, compared to females. The female preponderance of medicinal overdoses has been noted in previous Sri Lankan studies (Eddleston et al., 2005; Senarathna et al., 2012; van der Hoek & Flemming, 2006). While medicinal overdoses generally carry a lower case fatality compared to agrochemical ingestion, the increasing trend of medicinal overdoses, among males and females, is a matter of concern.

4.5.2 Psychiatric morbidity

Depression

The rates of depression in this study (49.7% of males and 53.7% of females) are much higher than the reported rates for depression internationally (Kessler et al., 2003; Simon et al., 2002), and in the general population. There is only limited data on prevalence rates for depression in the community in Sri Lanka; one study conducted among Sri Lankan adolescents reported that up to 36% were depressed (Rodrigo et al., 2010). Mood disorders are known important risk factors for suicidal behaviours (Kessler, Borges, & Walters, 1999; Nock et al., 2008a). Hawton et al. (1996) in their study of paracetamol overdoses in the United Kingdom reported depression to be present in up to 47% of cases (Hawton et al., 1996). While Asian data are limited, studies on attempted suicide from India have reported depression rates greater than 30% (Jain, Singh, Gupta, & Kumar, 1999; Parkar et al., 2006; Rao, Kulkarni, & Begum, 2013; Sudhir Kumar, Mohan, Ranjith, & Chandrasekaran, 2006). However, the findings of this study are in marked contrast to several previous

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Sri Lankan studies, which have suggested low rates of depression among those who attempt self-poisoning (Hettiarachchi & Kodituwakku, 1989; van der Hoek & Konradsen, 2005). A previous Sri Lankan study reported depression in 18.5% of participants. (S L Seneviratne & H J de Silva, 1999), whereas another study found no significant association between self-poisoning and depression (van der Hoek & Konradsen, 2005). Differences in methodology (for example retrospective analysis of medical records in previous studies versus clinical interviews for depression in the current study) and the limited number of prior research studies in this area may account for these contrasting findings.

Alcohol use disorders

In the hypothesis at the start of this chapter, it was predicted that males would have a higher prevalence of alcohol use disorders compared to females. The data from this study confirmed this hypothesis. The finding of hazardous drinking or alcohol use disorders in over one-third of males in the current study was in striking contrast to the females, who had no history of alcohol misuse, dependency or ingestion prior to the self-poisoning act. Higher rates of alcohol misuse among males who attempt self-poisoning have been reported previously, both in Sri Lanka and internationally (Haw, Houston, Townsend, & Hawton, 2001; Hettiarachchi & Kodituwakku, 1989). The very marked difference in use of alcohol between males and females in this study is most likely a reflection of patterns of alcohol use in the Sri Lankan community (Wilsnack, Wilsnack, Kristjanson, Vogeltanz-Holm, & Gmel, 2009), where female alcohol use is much less than that of males. Similar patterns have been noted in India (Rao et al., 2013; Sudhir Kumar et al., 2006). Reports indicate that the per capita consumption of alcohol in Sri Lanka has increased in recent years, and alcohol misuse and dependency is a major health and social

problem among Sri Lankan males (Jayasinghe & Foster, 2011; Samarasinghe, 2006). Given that alcohol misuse is associated with suicidal behavior (Borges & Loera, 2010; Sher, 2006), it is likely to be an important contributory factor towards the non-fatal self-poisoning behavior among males in Sri Lanka. Ongoing alcohol use disorders may explain why, in the over 35-age group, males in our study outnumbered females with regard to non-fatal self-poisoning. This points to a very important area of intervention for males. Furthermore, Konradsen et al. (2006) have also described how alcohol misuse among males indirectly contributes towards non-fatal self-poisoning among females, by adding to the likelihood of interpersonal conflict that is often associated with these acts. In keeping with this, although females in our study did not use alcohol, they were significantly more likely than their male counterparts to report interpersonal conflict due to alcohol use by a parent or partner as a stressor during the six months prior to the non-fatal self-poisoning act. Given all of this, the reduction of alcohol use disorders is an important albeit challenging primary preventive measure with respect to prevention of non-fatal self-poisoning, and will be discussed further in Chapter 9.

4.5.3 Triggers

Common to both genders in this study was the finding that interpersonal conflict was the most commonly identified trigger prior to the act of non-fatal self-poisoning, which is very similar to previous findings from both Sri Lanka and other Asian countries (Hettiarachchi & Kodituwakku, 1989; Thanh et al., 2005; Wai & Heok, 1998). Previous authors have suggested that non-fatal self-poisoning in females maybe a form of non-verbal dissent, in a hierarchical cultural context where traditionally, overt confrontation or disobedience towards elders is discouraged (Marecek & Senadheera, 2012). In keeping with this, females in this study were

significantly more likely to report conflict with their parents as a trigger preceding the non-fatal self-poisoning, compared to males. This perhaps points to the need for development of communication and problem solving between generations, particularly as Sri Lanka experiences more westernization and urbanization.

4.5.4 Suicidal intent and predictors of suicidal intent

As predicted in the hypothesis, males in this study had a significantly higher suicide intent than females. This is an important finding, since it is well documented that suicidal intent at the index episode is associated with later completed suicide (Harriss et al., 2005). There are no previous studies from Sri Lanka that have compared gender differences in the degree suicidal intent. Previous international studies comparing intent between genders have reported mixed results, with some studies reporting no difference between the genders (Sisask, Kõlves, & Värnik, 2009), while others from the West and South Asia reporting higher intent in males (Harriss et al., 2005; Hawton, 2000; Sudhir Kumar et al., 2006), similar to the findings of our study. The current study is the first to report this association for non-fatal self-poisoning in Sri Lanka.

Despite these gender differences in the characteristics and degree of suicidal intent, the *predictors* of suicidal intent showed more similarities than differences between genders. For both genders, depression and hopelessness were the most important predictors of suicide intent, similar to findings from the West (Beck et al., 1985; Holma et al., 2010; Nock et al., 2008a).

Previous studies have suggested that non-fatal self-poisoning in Sri Lanka are mostly impulsive acts, in the context of interpersonal conflict (Hettiarachchi & Kodituwakku, 1989). It appears that while most acts of non-fatal self-poisoning

among males and females take place in the context of the proximal trigger of interpersonal conflict, a substantial proportion of those attempting poisoning also have associated morbidity such as depression, which predicts a greater suicidal intent both for males and females. Similarly in India, depression has been shown to be associated with more high-risk attempts (Jain et al., 1999; Kar, 2010).

4.6 Limitations

The differences in socio-demographic factors (such as educational level) between genders may reflect population differences in these factors rather than a true gender difference. In the absence of comparison with appropriate controls from the community this cannot be explored further, and is a limitation in the findings. A further limitation of the current study is that although alcohol misuse was associated with non-fatal self-poisoning in males, alcohol use could not be entered into the multiple regression model, since it was not reported at all among females. However, the findings with regard to alcohol use in males are discussed separately. Other limitations, as discussed previously, are that the survey findings were restricted to those who sought hospital admission after non-fatal self-poisoning. And as mentioned in Chapter 3, the fact that 9.1% of the eligible sample refused consent, and a further 19.8% could not be included in the study is also a limitation, and may have influenced the findings.

4.7 Conclusions and clinical implications

This study shows that depression and hopelessness predict suicidal intent in both males and females who attempt self-poisoning. For men, prior attempts, and for females, older age also emerge as key factors associated with higher suicidal intent. Higher suicidal intent is associated with increased risk of completed suicide (Harriss

et al., 2005), and therefore identification of high intent males and females who have recently attempted self-poisoning, and targeted specific management of such high-risk persons emerges as a potential intervention strategy.

Primary prevention at a community level remains a challenge. In this study, females were significantly younger and had a lower suicidal intent, compared to males who were more likely to report an intention to die at the time of the act of self-poisoning. These findings suggest that although interpersonal conflict is a common shared trigger for both genders, the psychological constructs underlying self-poisoning behaviours may be different for males and females. This warrants further exploration, and also suggests the need for gender specific primary care interventions, such as development of interpersonal skills, and reduction of alcohol misuse among males. Further research is needed to determine the efficacy of such measures.

Chapter 5

Non-fatal self-poisoning across age groups, in Sri Lanka

5.1 Introduction

Non-fatal self-poisoning in Sri Lanka is more common among young people (below 30 years) (van der Hoek & Flemming, 2006). Similarly, international studies indicate that the peak age for attempted suicide and self-harm falls within the first half of the life-cycle, whereas the risk of completed suicide increases as a function of age (Diekstra, 1993). Internationally, attempted suicide in older persons (>60 years) is described as being similar to suicide, in terms of suicidal intent (Hawton & Harriss, 2006; Merrill & Owens, 1990). Little is known about age variations of non-fatal self-poisoning in Sri Lanka. Recent data suggests that medicinal drug overdoses are more common than pesticide ingestion, among adolescents and young adults, compared to older people (De Silva & Ratnayake, 2008; Senadheera et al., 2010). Non-fatal self-poisoning in Sri Lanka has been previously described as impulsive, with low suicidal intent and psychiatric morbidity (Hettiarachchi & Kodituwakku, 1989); but associations of these factors across age groups have not been examined.

Thus, the aim of this study was to compare non-fatal self-poisoning across age groups (14-24 years, 25-34 years, and ≥ 35 years), with respect to types of poisons ingested, chronic stressors, prior history of suicidal attempts, psychiatric morbidity (specifically depression and alcohol use disorders), and degree of suicidal intent.

Based on international findings, significant age group differences were anticipated, particularly in terms of suicidal intent and psychiatric morbidity

associated with non-fatal self-poisoning across the life-span. Therefore, the following hypothesis were tested:

- The prevalence of non-fatal self-poisoning will be higher among young people (aged < 25 years) compared to older people (≥ 35 years).
- Older participants will be more likely to attempt self-poisoning by pesticide ingestion, whereas younger participants will be more likely to attempt self-poisoning by medicinal drug overdose.
- Older participants will be more likely than younger participants to have depression, alcohol use disorder, acute alcohol ingestion prior to the attempt, and a higher suicidal intent.

5.2 Methodology

This was a cross-sectional study, carried out at the Toxicology Unit (ward 17) of Teaching Hospital, Peradeniya, Sri Lanka, from February 2012 onwards, over a consecutive 14-month period. The details of the methodology, participants and analysis have been described previously in Chapter 3.

5.2.2 Predictors and outcome measures

Age

Age was examined as a categorical measure, grouped into three age categories, namely 14-24 years, 25-34 years, and ≥ 35 years. The age groups were chosen based on the age distribution of the participants, and also to match age groups of young persons (14-24 years), young adults (25-34 years) and older adults (35 years and above). The older adult group (aged 35 years and above) were not further categorized due to low numbers (for instance, there were only 10 participants in the

age group 65 years and above; hence this age group was not considered separately) (Zhao et al., 2010).

Details of other predictors and outcome measures used have already been described in Chapter 3.

5.2.3 Data Analysis

Age differences in the characteristics of non-fatal self-poisoning were examined using chi-square tests (χ^2) for categorical measures, and one-way analysis of variance (ANOVAs) models for continuous measures. Significant χ^2 results for cross-tabulations greater than a 2x2 table were explored more closely via the IBM[®] SPSS[®] option for pairwise comparison of column proportions using the Bonferroni correction. If the F statistic from the ANOVA was significant, Bonferroni post hoc tests were used to determine which of the three age groups differed significantly.

5.3 Results:

5.3.1 Participation rates

A small proportion (1.4%, $n=14$) of the survey participants ($n=949$) did not provide their dates of birth so were excluded from the study. Therefore, valid data was available for 935 participants.

5.3.2 Socio-demographic details

Of the 935 participants, 410 were male and 525 were female. The mean age of the sample was 25.7 years (median = 22 years, min = 14 years, max = 87 years, SD = 10.9), 61% ($n = 570$) of the participants were below the age of 25 years, and 83% ($n = 782$) were below the age of 35 years (Table 5.1). Of the sample, 61.0%

($n = 570$) were in the 14-24 year age group, 22.7% ($n = 212$) were in the 25-34 year age group, and 16.4% ($n = 153$) were aged 35 years and above. Females were significantly younger than males (median age for females: 20 years, for males: 25 years, $z = -7.87$, $p < 0.001$). There was more variability in age among males ($SD = 12.4$) than females ($SD = 8.9$). The age groups differed significantly with respect to employment ($\chi^2(2) = 102.6$, $p < .001$), marital status ($\chi^2(2) = 327.3$, $p < .001$) and educational qualifications ($\chi^2(4) = 141.9$, $p < .001$). Post-hoc analysis showed that those aged 25-34 years and 35 years and above were significantly more likely to be employed, and to be married, compared to those aged 24 years and below, whereas younger age groups (those aged 14-24 years and 25-24 years) were significantly more likely to have completed Ordinary Level or Advanced Level examinations compared to their older counterparts (Table 5.1).

5.3.3 Substances used for self-poisoning

The three age groups differed with respect to substances ingested ($\chi^2(6) = 91.5$, $p < .001$) (Table 2). Post hoc analyses indicated that those aged below 25 years were significantly more likely to have ingested a medicinal drug overdose, than the older age participants (25-34 years, and ≥ 35 years, $p < .05$), whereas the latter two age groups were significantly more likely to have ingested pesticides than the younger participants (all $p < .05$) (Table 5.2). The place where the substance was obtained ($\chi^2(2) = 11.7$, $p = .003$), and the reasons for the choice of substance ingested also differed significantly between age groups ($\chi^2(2) = 11.7$, $p = .003$). According to post hoc analysis, those aged 25-34 years and those aged ≥ 35 years were significantly more likely to have obtained the poison from the field or garden, rather than from inside the home; and the two younger age groups (aged 14-24 years and

25-34 years) were significantly more likely than their older counterparts (aged 35 years and over) to cite ease of availability as the reason for their choice of poison.

5.3.4 Degree of suicidal intent

Suicide intent differed significantly across the age groups ($F(2, 919) = 8.70$, $p < 0.001$) with participants aged 35 years and over being significantly more likely to score higher on the PSIS, compared to participants in the 14-24 year age group ($p < 0.05$) (Figure 5.1). When the PSIS total score was categorized as low (PSIS score 0-3), medium (PSIS score 4-10) and high intent (PSIS score >10) the significant variation across age groups remained ($\chi^2(4) = 13.0$, $p = .011$), with post hoc analysis indicating that older participants (aged 25-34 years, and 35 years and above) were significantly more likely to have a suicidal intent in comparison to those aged between 15-24 years, who were more likely to have a low intent (all $p < .05$) (Table 5.3).

Non-fatal self-poisoning in Sri Lanka

Table 5.1

Socio-demographic details by age group

Variable	Age group			p value
	<25 years % (n)	25-34 years % (n)	35+ years % (n)	
Living with				
With parents	75.7 (427)	26.2 (55)	7.9 (12)	<.001
With spouse/children	17.9 (101)	69.0 (145)	85.4 (129)	
Marital Status				
Married	19.5 (111)	73.9 (156)	86.2 (131)	<.001
Highest level of education				
Grade 6 to 10	47.7 (270)	55.5 (117)	57.3 (86)	.001
Completed O/L Examination	36.2 (205)	22.3 (47)	12.0 (18)	
Completed A/L Examination	15.2 (86)	16.1 (34)	6.0 (9)	
University/ Postgraduate	0.4 (2)	2.4 (5)	0.7 (1)	
Occupational Status				
Employed	29.2 (164)	64.3 (135)	60.9 (92)	.001

Non-fatal self-poisoning in Sri Lanka

Table 5.2

Details of substances ingested by age group

Variable	Age group			<i>p</i> value
	<25 years	25-34 years	35+ years	
	% (n)	% (n)	% (n)	

Type of poison ingested				
Medicinal drug overdose	68.0 (384)	46.4 (98)	33.3 (50)	
Pesticides	14.3 (81)	32.7 (69)	44.7 (67)	
Other chemicals kept at home	9.9 (56)	9.5 (20)	14.0 (21)	
Plant poisons	7.8 (44)	11.4 (24)	8.0 (12)	.001
How poison was obtained				
Ingested a substance kept at home	62.7 (351)	56.9 (120)	57.8 (85)	.257
Ingested a substance kept in field/garden	10.9 (61)	17.5 (37)	20.4 (30)	.003
Bought substance for purpose of				
ingestion	29.6 (166)	25.1 (53)	21.8 (32)	.116

Non-fatal self-poisoning in Sri Lanka

Variable	Age group			<i>p</i> value
	<25 years	25-34 years	35+ years	
	% (n)	% (n)	% (n)	
Reason for choosing that type of poison				
Easy availability	35.6 (197)	37.0 (77)	19.3 (28)	<.001
It was cheap	7.4 (41)^	6.7 (14)	1.4 (2)	.028
Thought it was not dangerous	15.4 (85)	6.7 (14)	6.9 (10)	.001
Thought it was dangerous	30.9 (171)	37.0 (77)	41.4 (60)	.035
Thought it wouldn't hurt	12.7 (70)	14.4 (30)	17.9 (26)	.256
Thought it would act quickly	2.9 (16)	4.8 (10)	4.8 (7)	.322
Knew a close friend/relative who had				
self-poisoned	18.7 (99)	17.7 (34)	19.9 (28)	.883

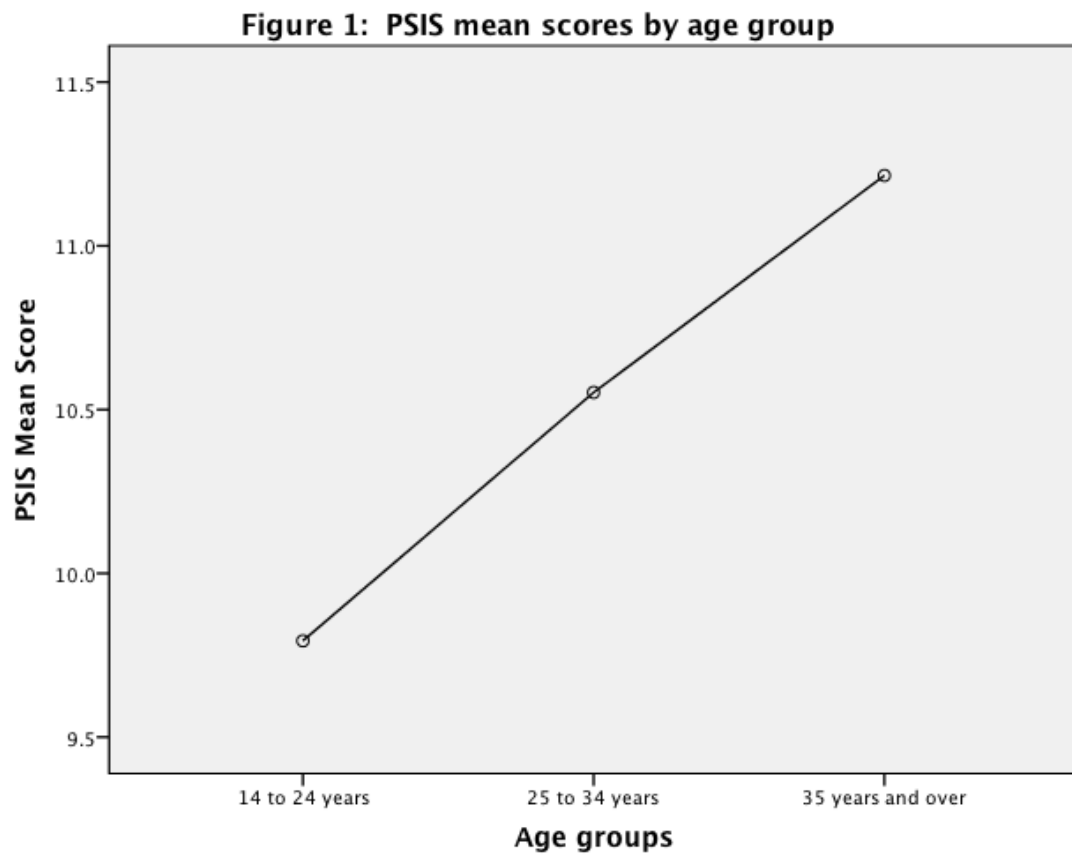


Figure5.1. Suicide intent (as measured by total PSIS score) across age groups

PSIS: Pierce Suicide Intent Scale

Non-fatal self-poisoning in Sri Lanka

Table 5.3

Degree of suicidal intent by age group:

Variable	Age group			p value
	<25 years	25-34 years	35+ years	
	% (n)	% (n)	% (n)	
PSIS* - total score				
Low intent	5.6 (32)	5.7 (12)	3.9 (6)	
Medium intent	49.6 (283)	39.2 (83)	37.9 (58)	
High Intent	44.7 (255)	55.2 (117)	58.2 (89)	.011

*PSIS – Pierce Suicide Intent Scale

5.3.5 Psychiatric Morbidity

Depressive symptoms varied significantly as a function of age ($\chi^2(2) = 8.8$, $p = .012$). Those aged 35 years and over were significantly more likely to screen positive for depression than their younger counterparts aged 14-24 years ($p < .05$) (Table 5.4). Alcohol misuse was reported among males only, and rates significantly increased with age ($\chi^2(2) = 105.7$, $p < .001$). With regard to alcohol use disorder or hazardous drinking, males who were 25-34 years and 35 years and older were significantly more likely to have an alcohol use disorder or hazardous drinking than those in the youngest (14-24 years) age group. Similarly males aged ≥ 35 years were significantly more likely to have higher rates of hazardous drinking and alcohol use disorders compared to younger participants in the 14-25 year and 25-34 year age groups. Males aged 25-34 years and ≥ 35 years were also more likely to ingest alcohol prior to attempting self poisoning ($\chi^2(2) = 83.1$, $p < .001$). There were no significant differences on the Beck Helplessness Scale (BHS) Score ($F(2, 802) = 2.29$, $p = .102$) or in the rate of past suicide attempts across age groups ($\chi^2(2) = .077$, $p = .962$).

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Table 5.4

Psychiatric morbidity by age group:

	Age group			<i>p</i> value
	<25 years	25-34 years	35+ years	
Variable	%(n)	%(n)	%(n)	
Depressed	48.9 (222)	53.2 (92)	63.8 (81)	.012
Hazardous drinking or				
Alcohol use disorder	5.5 (31)	15.0 (31)	36.7 (55)	<.001
Drank alcohol prior to				
self-poisoning attempt	3.4 (19)	18.2 (37)	26.5 (39)	<.001
Has a history of previous				
suicide attempts	13.6 (77)	13.0 (27)	13.9 (21)	.962

5.3.6 Triggers and Stressors

Most participants, irrespective of age, identified the distress associated with a recent interpersonal conflict as the ‘reason’ for attempting suicide by self-poisoning. However older participants (aged 25-34 years and 35 years and above) were significantly more likely to report an argument with a spouse ($\chi^2(2) = 122.2$, $p < .001$), whereas younger participants (aged 14-24 years) were significantly more likely to report an argument with a parent ($\chi^2(2) = 61.2$, $p < .001$) (Table 5.5).

The three age groups differed with respect to certain life stressors ($\chi^2(2) = 21.3$, $p < .001$). In the six months prior to the non-fatal self-poisoning attempt, older participants aged 25-34 years ($p = 0.05$) and ≥ 35 years ($p = 0.05$) were significantly more likely than the younger age group to report significant financial problems (Table 5.6). Conflict with a close family member due to the family member’s alcohol use was reported across age groups, but the family member concerned varied with the age of the participants. Post hoc analysis revealed older participants aged 25-34 years and ≥ 35 years were more likely to report conflicts with a partner/spouse due to the latter’s alcohol misuse ($\chi^2(2) = 37.7$, $p < .001$), whereas younger participants aged 14-24 years were significantly more likely to report conflict with a parent due to their alcohol misuse ($\chi^2(2) = 9.9$, $p = .007$).

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Table 5.5

Triggers associated with the act of non-fatal self-poisoning, by age group:

	Age group			<i>p</i> value
	<25 years	25-34 years	35+ years	
Precipitating Trigger	% (n)	% (n)	% (n)	
Argument with spouse	11.6 (65)	46.0 (97)	39.0 (57)	<.001
Argument with parent	25.6 (144)	9.0 (19)	1.4 (2)	<.001
Argument with child	0.0 (0)	0.9 (2)	10.3 (15)	<.001
Physical assault by husband	1.2 (7)	0.9 (2)	3.4 (5)	.118
Problem with romantic relationship	23.1 (130)	6.2 (13)	2.1 (3)	<.001
Severe financial difficulties	0.9 (5)	6.2 (13)	10.3 (15)	<.001

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Table 5.6

Life events during the 6 months prior to the non-fatal self-poisoning, by age group:

Variable	Age group			p value
	<25 years % (n)	25-34 years % (n)	35+ years % (n)	
Suffered a serious injury/ illness	9.8 (55)	9.3 (19)	27.9 (41)	<.001
A close relative had a serious injury/illness	7.3 (41)	9.3 (19)	4.1 (6)	.178
Death of a parent/ spouse/ child	2.0 (11)	1.0 (2)	7.5 (11)	<.001
Death of a friend or close relative	7.3 (41)	7.3 (15)	8.2 (12)	.938
Conflicts with parents	21.7 (122)	13.2 (27)	1.4 (2)	<.001
Conflicts with father because of his alcohol use	5.5 (31)	2.0 (4)	0.7 (1)	.007
Conflicts with spouse/ partner	30.2 (169)	34.1 (70)	25.3 (37)	.209
Conflicts with spouse because of his alcohol use	2.5 (14)	9.9 (20)	15.1 (22)	<.001
Conflicts with spouse because of mistrust	4.8 (27)	20.7 (42)	9.6 (14)	<.001
Divorce/ marital separation	2.7 (15)	8.4 (17)	9.6 (14)	<.001
Spouse went overseas for a job	0.4 (2)	4.9 (10)	2.1 (3)	<.001
Loss of job	3.8 (21)	3.4 (7)	4.8 (7)	.789
Significant financial problems	17.2 (96)	26.3 (54)	33.6 (49)	<.001
Court case / legal problems	1.4 (8)	2.4 (5)	4.1 (6)	.117
Victim of physical abuse within the past 6 months	5.7 (31)	3.5 (7)	6.3 (9)	.427
Victim of sexual abuse within the past 6 months	1.8 (10)	0.5 (1)	0.7 (1)	.284

5.4 Discussion

A key finding of this study is the young age of the people admitted to hospital following non-fatal self-poisoning – 61% of the participants were below 25 years, and 83% of the entire cohort was below 35 years. Previous local and international studies also report a preponderance of young among those who attempt suicide (Diekstra, 1993; Eddleston et al., 2005), but this effect was particularly evident in the current sample of which only a relatively small percentage (17%) were 35 years or older.

Another important finding was that the 61% of participants aged below 25 years were significantly more likely to ingest a medicinal drug overdose, compared to those aged 25 years and above who were significantly more likely to ingest pesticides. Other recent Sri Lankan studies, have reported increasing medicinal drug overdoses among adolescents and young people (Senadheera et al., 2010). Although medicinal drug overdoses (such as paracetamol overdoses) have a lower case fatality compared to pesticide ingestion (Eddleston et al., 2005), the increasing occurrence of medicinal drug overdoses in recent years in Sri Lanka is a cause for serious concern (Hanwella et al., 2012).

A further finding was that medium or high suicidal intent was significantly more likely among the 39% of participants who were aged 25-34 years and 35 years and over, and that those aged ≥ 35 years had a significantly higher suicidal intent compared to those aged 14-25 years. In keeping with this finding, the occurrence of depression and alcohol use disorder was also significantly higher in the older age groups. This is also consistent with previous data from the West and China, reporting higher suicidal intent and increasing rates of depression, and alcohol use

disorders among the middle aged and older people who attempt suicide (Kreitman, 1976; Merrill & Owens, 1990; Zhao et al., 2010).

Conversely, a shared theme running across all age groups was the triggers associated with the non-fatal self-poisoning. Most participants, irrespective of age, reported distress associated with interpersonal conflict as the trigger immediately associated with the act of non-fatal self-poisoning. Authors from other South Asian countries such as India have identified similar interpersonal triggers associated with self-harm (Parker et al., 2006). The interpersonal disputes reported in this study were usually with a close family member, although the specific family member involved varied with age, with younger participants reporting more conflict with parents, and older participants reporting more conflicts with spouses or children. Interpersonal conflict has been shown to be associated with self-poisoning behavior in Sri Lanka and South Asia (Konradsen et al., 2006; Parker et al., 2006); the findings of our study confirm that it plays an important role in younger as well as older persons who attempt poisoning.

Also common across age groups were stressors in the prior 6 months due to problems with a close relation who abused alcohol. In the younger age groups the problems involved an alcohol-misusing parent, whereas in the older age group it involved an alcohol-misusing male partner. Previous work in Sri Lanka and South Asia has also highlighted the role of alcohol in non-fatal self-poisoning – both directly, in that alcohol misusing males display suicidal behavior, and indirectly, in that alcohol-related problems are associated with self-poisoning behaviour by persons who do not consume alcohol themselves (Konradsen et al., 2006; Parker et al., 2006; van der Hoek & Konradsen, 2005). The findings of this study confirm that

this is a common stressor that plays a role across age groups in non-fatal self-poisoning.

5.5 Limitations

Similar to the findings in Chapter 4, the differences in socio-demographic factors (such as educational level, and marital status) across age may reflect population differences in these factors rather than a true age difference. In the absence of comparison with appropriate controls from the community this cannot be explored further, and is a limitation in the findings. Further limitations of this study include the use of screening tools to identify psychiatric morbidity rather than clinical diagnostic interviews, and the absence of measures of impulse control disorders and personality disorders. And as mentioned in Chapter 3 and 4, the fact that 9.1% of the eligible sample refused consent, and a further 19.8% could not be included in the study is also a limitation, and may have influenced the findings.

5.6 Conclusions

The results suggest that both psychological and social factors play a role in the occurrence of non-fatal self-poisoning in Sri Lanka, and some of these factors vary with age.

As hypothesized at the start of this chapter, although the majority of participants attempting non-fatal self-poisoning were younger than 25, suicidal intent, alcohol use and depression were significantly higher among older persons (aged *over* 25 years), as was the use of the potentially more lethal pesticide ingestion. Higher suicidal intent, depression and alcohol use disorders are known to be independent predictors of completed suicide (Blackmore et al., 2008; Harriss et al., 2005; Waern, 2003). These findings in combination suggest the need for certain age specific

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interventions, particularly to reduce the risk of repetition in these groups. Such interventions might include the screening of those aged 25 years and older who have attempted non-fatal poisoning for risk factors such as depression and alcohol use disorders, together with targeted management of those identified to have such risk factors. There is also a need for increased awareness of the role of psychiatric morbidity in these age groups.

In contrast, distress secondary to interpersonal conflict, and stressors associated with alcohol related-problems were associated with non-fatal self-poisoning across all age groups, and these are likely to be more challenging to address. For South Asian countries such as Sri Lanka, an integrated population-based approach at a primary prevention level, such as school and community youth programs aimed at developing interpersonal and problem solving skills may be a way forward. Particularly for young people this is likely to be more effective and feasible than the identification and management of specific persons at risk of attempting self-poisoning. Such an approach would need to be adapted to the local cultural framework.

Part 2

Associated motives and triggers

Chapter 6

Motivations

6.1 Introduction

The findings of this research program, and previous research (Hettiarachchi & Kodituwakku, 1989; Parkar et al., 2006), indicate that non-fatal self-poisoning in Sri Lanka and South Asia is often associated with recent interpersonal conflict. Thus the triggers or acute precipitants associated with non-fatal self-poisoning in Sri Lanka have been previously described. However, the motives or reasons associated with the act, are less clearly described, and may be more difficult to delineate. A previous study from Sri Lanka (Hettiarachchi & Kodituwakku, 1989) reported that the most common self-reported motivations associated with self-poisoning include a wish to die, to escape, and to change the situation. Self-poisoning in Sri Lanka has also been described as an act of communication, a means to settle an interpersonal impasse, or as a seemingly acceptable response to stressful events (Konradsen et al., 2006; Marecek & Senadheera, 2012). Common motives reported in international studies on self-harm include a wish to die, or to escape (Bancroft, Skrimshire, & Simkin, 1976; McAuliffe, Arensman, Keeley, Corcoran, & Fitzgerald, 2007).

Interventions to reduce suicide and self-poisoning in Sri Lanka have focused primarily on limiting access to lethal pesticides (Gunnell et al., 2007b; Hawton, Ratnayake, Simkin, Harriss, & Scott, 2009); the significant reduction in completed suicide rates since 1995 has been attributed largely to these ongoing measures (Gunnell et al., 2007b). Despite the reduction in completed suicides, rates of non-fatal self-poisoning have been increasing (Hanwella et al., 2012; Senadheera et al., 2010). Broader strategies are now needed, given the growing rates of *non-fatal* self-

poisoning in Sri Lanka (Hanwella et al., 2012). For this, a better understanding of the motives of individuals who self-harm, is likely to be useful. Thus, the aim of this study was to delineate motivations associated with non-fatal self-poisoning, as described by those who have recently carried out an act of non-fatal self-poisoning.

6.2 Methods

6.2.1 Overview of methodology

The motives associated with the act of non-fatal self-poisoning were explored in two different studies.

In the first study (Study 1), 24 persons who had recently survived an act of self-poisoning were invited to participate in semi-structured interviews of a qualitative nature. During these interviews the motivations associated with the acts of self-poisoning were explored in depth. The findings were then used to develop a list of motivations that could be used in the larger, second study.

In the second study (Study 2), participants from the large cross-sectional survey described in Chapters 3 reported on their motivations for their act of self-poisoning. In this quantitative study, participants were asked to peruse a list of motivations derived from the Study 1 findings and to indicate whether these motivations applied to them.

6.2.2 Ethical Approval

Ethical clearance for the studies was obtained from the Faculty of Medicine, University of Peradeniya, Sri Lanka, and the Human Research Ethics Committee of the Australian National University. The relevant information sheets and consent forms are included in Appendix C.

6.2.3 Participants and setting

For both studies, the research was carried out among those who were aged 14 years or older, who had been admitted to the Toxicology Unit, Teaching Hospital Peradeniya, Sri Lanka, for medical management of a recent act of non-fatal self-poisoning. Potential participants were excluded if they could not converse in either Sinhala or English. There was no overlap in the participants for Study 1 and Study 2.

6.2.4 Study 1 – Semi-structured interviews of those who had recently carried out an act of non-fatal self-poisoning

6.2.4.1 Procedure

Persons admitted to the toxicology unit (according to the admission register) on days when the researcher went to the unit, who met inclusion criteria, were invited to participate in the study. Those who gave written informed consent were included in the study. Thus, this was a non-random, non-consecutive sample. Recruitment took place during June-July 2011.

Each participant was interviewed by the researcher, a specialist in psychiatry, in Sinhalese, in a confidential setting, within a week of the non-fatal self-poisoning act, and prior to discharge from hospital. The semi-structured interview explored the following main themes: events leading up to the non-fatal self-poisoning act, and motivations underlying the act, as described by the participant.

At the start of the interview, the participants were encouraged to describe what happened in response to open-ended questions such as “Could you tell me what happened?/What brought you into hospital?” As the interview progressed questions were designed to elicit intentions associated with the self-poisoning act (e.g., “What

were your thoughts when you took the tablets/poison?”) followed by more specific questions if required to delineate the strength and nature of the suicidal ideation and other motivations underlying the act (e.g., Did you intend to die when you took the poison?).

The presence of depression or alcohol use disorders was also ascertained via a clinical interview based on ICD10 diagnostic criteria.

All interviews were audio-taped, and lasted approximately 45-60 minutes. An outline of the semi-structured interview is given in Appendix D.

6.2.4.2 Scoring and categorization

The audiotaped interviews were transcribed and translated from Sinhala into English. The transcripts were then analyzed independently by two assessors, including the author. Statements about the immediate triggers and intentions associated with the self-poisoning attempt were extracted, and then itemized in a data extraction sheet, to ensure uniformity. The extracted data were then analyzed for common themes. The final categorization was based on the consensus findings of both assessors.

6.2.5 Study 2 - Exploration of motives via the cross sectional survey

6.2.5.1 Procedure

Participants were those from the cross sectional survey described in Chapter 3. Most interviews and assessments were conducted in the Sinhala language, except in instances when English was the participant’s preferred choice of communication.

6.2.5.2 Predictors and outcome measures

Motivations were ascertained by a self-administered questionnaire. Participants were invited to peruse a list of possible motivations, and to tick one or more (if any) motivations which they thought were applicable to themselves, at the time that they attempted self-poisoning. The list of motivations was derived from the motives extracted from the thematic analysis of participants in the Study 1 semi-structured interviews, and also incorporated commonly reported motivations in the international literature (McAuliffe et al., 2007). Further details of how the list of motivations was developed is given in the results section below (Appendix E).

6.3 Results

6.3.1 Study 1 – Semi-structured interviews of those who had recently carried out an act of non-fatal self-poisoning

A total of 24 participants were interviewed. At the time of interview, one-third of the participants (33%, $n = 8$) met ICD 10 diagnostic criteria for depression, and almost one third (29%, $n = 7$) had an alcohol use disorder (either dependency or harmful use); all of the latter were males (Table 6.1).

6.3.1.1 Self-reported triggers, and context of the non-fatal self-poisoning act.

The main theme to emerge from the content analysis of statements about the events leading up to the non-fatal self-poisoning act was interpersonal conflict. Over 88% of participants ($n = 21$) identified this conflict as an acute stressor leading to the act. For most participants, the conflict was with a close family member (parent, child, sibling or spouse) or with a partner. There were only two instances where the

conflict was with non-relations (neighbor, school teacher). In almost all participants (92%, $n = 22$), the act of self-poisoning occurred within 24 hours of the interpersonal conflict (Table 6.1). The majority ($n = 16$) denied having had ideas of ingesting poison or ideas of suicide prior to the interpersonal conflict.

6.3.1.2 *Motives and emotions associated with the non-fatal self-poisoning act.*

Most participants reported more than one motive associated with the non-fatal self-poisoning act. Motivations were varied, ranging from an intention to die, to escape, inability to face shame, feelings of sadness, and anger (Figure 6.1). The desire or thoughts to escape or to die, emerged as motivational themes shared by many (Figure 6.1). The intention to escape was articulated in different ways – for example, as the desire to escape apparently unsolvable problems, or alternatively as the desire to obtain relief from distress. The wish to die was stated in varying ways, such as, “I just wanted to die”, “At that time, I thought I wouldn’t live- I would die”, “I felt sad. I wanted to die, but I didn’t die”, and “I felt there was no point in living.” A difficulty tolerating distress (associated with interpersonal conflict) appeared to underlie these motivations to die or to escape.

While 63% ($n = 15$) reported intent to die at the time of ingesting the poison by the time of the interview, most (71%, $n = 17$) reported that they were glad to have survived. Only a minority expressed either regret at surviving the self-poisoning attempt (29%, $n = 7$), or ongoing suicidal ideation (13%, $n = 3$) at the time of the interview.

When other *non-death* or *non-escape* motivations were considered, the common theme that emerged was the emotional reactions associated with

interpersonal conflict – that is, feelings of anger, sadness, or of being rejected.

Previous authors have similarly reported *death* and *non-death* motivations related to inter and intrapersonal conflict (McAuliffe et al., 2007).

Based on the findings from these interviews and the commonly emerging themes, a list of motivations was developed. Thus for example, the thoughts or desires to die, or to escape, were listed as ‘intention to die’, or as ‘intention to escape unbearable situations/ thoughts’ respectively, in the list of motivations that was derived from these interviews. The list also incorporated motivations that were less commonly described by participants in these interviews, but which have been described by similar studies internationally (McAuliffe et al., 2007)– such as thoughts of appeal (e.g., “to change someone’s mind,” or “to get help from someone”). The final list of motivations (Appendix E) was similar to that described by McAuliffe et al., (2007), but with some differences. For example, many of the participants described ingesting poison because of a sense of shame, or because of inability to face others or a given situation due to shame, which has not been commonly described in previous literature from the West.

6.3.2 Study 2 – motivations reported by participants of cross-sectional survey

A total of 949 persons participated in the cross-sectional survey, of whom 921 completed the questionnaire regarding motivations associated with the non-fatal self-poisoning act. Data was not available for 28 participants, who did not complete this part of the survey.

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A mix of motivations for the self-poisoning act was reported (Table 6.2).

The most commonly reported motivations or reasons were, a wish to die, a desire to escape an unbearable situation or unbearable thoughts, and an inability to control himself/herself.

Table 6.1. Study 1 – Semi-structured interviews: participant characteristics and details of the non-fatal self-poisoning act

Variable	Median (min-max)	% (n)
Female		54 (n=13)
Age years	30 (14-85)	
Type of poisons ingested		
• Pharmaceutical drug overdose		42 (n=10)
• Agrochemical		33 (n=8)
• Other		21 (n=5)
Interpersonal conflict reported as acute trigger associated with self-poisoning attempt		88 (n=21)
Premeditation $\leq$ 24 hours		92 (n=22)
Poison obtained from home or garden		67 (n=16)
Those with history of previous suicide attempts		25 (n=6)
Depressed (ICD 10 criteria)		33 (n=8)
Alcohol use disorder (harmful use/dependency – ICD 10 criteria)		29 (n=7)*
Intoxicated at the time of attempted self-poisoning		25 (n=6)**

* All males

**All males who also met criteria for alcohol use disorder

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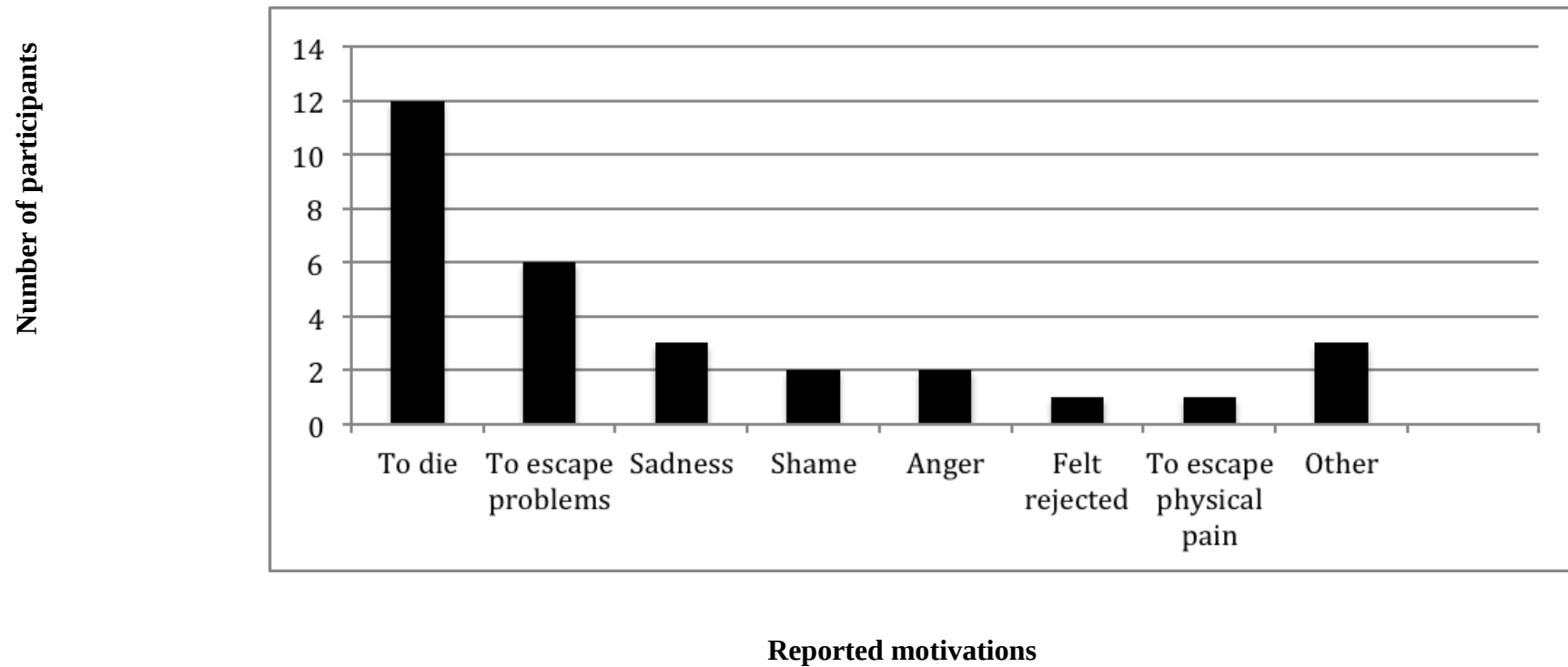


Figure 6.1. Study 1 - Motivations associated with the act of non-fatal self-poisoning, as described by participants in the semi-qualitative interviews ($n = 24$)

**Table 6.2. Study 2 - Motivations associated with the non-fatal self-poisoning act
– findings from the cross-sectional survey (n = 921)**

Motivations associated with act	% (n) of participants
To die	53.3 (506)
To escape unbearable thoughts	36.5 (346)
Unable to control himself/herself	32.5 (308)
To escape an unbearable situation	23.4 (222)
To change someone's mind	14.5 (138)
To make someone sorry	7.4 (70)
Shame - felt unable to face others	6.1 (58)
To show how much I care	2.4 (23)
To show helplessness	1.6 (15)
To find out if anybody cares	1.5 (15)
To sleep for a while	1.4 (13)
To stop being a trouble to others	1.3 (12)
To get help	0.6 (6)
To get revenge	0.6 (6)

6.4 Discussion

Most participants associated the act of non-fatal self-poisoning with a recent interpersonal conflict. This is no surprise – previous studies from Sri Lanka (Chandrasena, 1981; Hettiarachchi & Kodituwakku, 1989) and South Asia (Parker et al., 2006) have linked self-poisoning behavior to interpersonal conflicts as has the current quantitative study (Chapter 3). Interpersonal conflict could be described as a proximal trigger, closely linked to the act of non-fatal self-poisoning and the motivations associated with it.

Despite differences in culture and background, the motives or *intentions* for non-fatal self-poisoning, described by the participants in these two studies are strikingly similar to motives described in the Western literature - namely a desire to escape or a wish to die (Bancroft et al., 1976; McAuliffe et al., 2007).

The findings of this research provide additional insight into the processes involved. In particular, a difficulty *tolerating* distress associated with interpersonal conflict emerged as a key factor driving people towards self-poisoning behaviour. For instance, participants of the semi-structured interviews described in detail the difficulty in *tolerating* emotional pain following interpersonal conflict, for e.g., - “*I felt very hurt*” (after conflict with daughter); and “*I felt very alone*” (after conflict with mother-in-law and perceived lack of support from husband). A theme of acute distress, and inability to cope with this emotional state emerged clearly – one young female articulated this as, “*I couldn’t bear it. There was nothing else I could think of to do (other than taking poison)*” (after conflict with mother)”. In the cross-sectional study, about one third of participants described ‘inability to control himself/herself’ at times of emotional distress, contributing towards this act.

The majority of participants in both our studies indicated an intention to die, at the time of attempting self-poisoning. This finding is consistent with that of a previous Sri Lankan study reported by Hettiarachchi et al. (1989). Again this desire to die was expressed in the context of acute distress associated with interpersonal conflict. In keeping with this, by the time of the interview (within one week of the act of non-fatal self-poisoning), the majority of participants of the semi-structured interviews reported no current suicidal ideation, and were glad to have survived. Likewise, the duration of premeditation associated with the act of non-fatal self-poisoning was short. Most of the acts of non-fatal self-poisoning occurred within 24 hours of the interpersonal conflict, similar to previous Sri Lankan studies (De Silva & Ratnayake, 2008; Eddleston et al., 2006).

While the desire to escape, or to die, emerge as key themes, in reality motivations often appeared mixed and complex. Self-harm as a means of communicating or enacting anger has been reported by previous Sri Lankan studies (Marecek & Senadheera, 2012). While not the most commonly reported motivations, many participants of the cross sectional survey subscribed to motives such as *to change someone's mind, to make someone sorry, to show how much I care, to show helplessness* – which appear to be acts of communication with a significant other. Further, the distressing emotions described by the participants, such as sadness, anger, or shame are also likely to have contributed towards self-poisoning behaviour.

Notably, none of the participants in the semi-structured interviews or the cross-sectional survey identified depression as being associated with the non-fatal self-poisoning act. This was despite the fact that about one third of the interview participants (33%) and about half the cross-sectional survey participants were clinically depressed on interview. This is in contrast to findings from the West

(Sinclair, 2005), where survivors have described their self-harm attempts as being associated with depression. This difference in the way persons interpret their experiences may be partly due to the fact that in Sri Lanka, as in other South Asian cultures, the symptoms of depression are often not conceptualized as a disorder (Kinzie et al., 1982), and indeed there is no colloquial term for depression in the Sinhala language.

6.5 Limitations

The semi-structured interviews were limited by the small sample size, but a strength of the study was the structured detailed nature of the interviews, and that relevant information was extracted systematically by use of audio-taping, transcribing, data extraction sheets and dual coding of the intervention strategies. Further, the qualitative nature of this study added depth and detail to the information gathered through the quantitative survey. The retrospective recall of events by participants in both the interviews and cross-sectional survey is also a limitation, since this method may have led to a recall bias, though efforts were made to minimize this by conducting the interviews within one week of the non-fatal self-poisoning act.

6.6 Conclusions

As expected, most participants revealed mixed motivations and emotions at the time of the non-fatal self-poisoning act. These motivations arose mostly in the context of interpersonal conflict, which was a proximal trigger. The key recurring motives described by the participants were strikingly similar to motives described in the western literature (McAuliffe et al., 2007) - namely a *desire to escape* or a *to die*. *Loss of control* was another common motivational theme.

Overall, difficulty in *tolerating* distress associated with interpersonal conflict appeared to underlie these intentions associated with self-poisoning behaviour.

Interventions could be targeted towards developing interpersonal skills and interpersonal problem solving skills that may be helpful to minimize conflict.

Further, there may be value in developing and evaluating programs that provide training in more adaptive strategies for coping with emotional distress. These and other potential intervention strategies will be discussed further in Chapters 8 and 9.

Part 3

Sequelae at one year

Chapter 7

Repetition at one-year follow-up

7.1 Introduction

Recent non-fatal self-harm is known to be associated with an increased risk of repetition and completed suicide (Owens, 2002). It has been estimated that one in twenty-five self-harm patients will go on to die by suicide in the 10 years after their index presentation (Carroll et al., 2014). Sri Lanka has an increasing rate of non-fatal self-harm by self-poisoning (Hanwella et al., 2012), but data on repetition rates are limited. The SUPRE-MISS longitudinal follow-up study (Bertolote et al., 2010) reported that the repetition rate at 18 months in Sri Lanka was only 4% (treatment as usual group) – substantially lower than the estimated 1 year repetition rate of 16% reported in the West (Carroll et al., 2014; Kapur et al., 2006). In contrast, the rate of *previous* self-harm in those who have died by suicide in Sri Lanka has been reported to be as high as 26% (Abeyasinghe & Gunnell, 2008; Samaraweera et al., 2008). Thus, the aim of this study was to describe the rate of repetition at one-year follow up for the 949 participants who were recruited to the cross sectional survey described in Chapter 3. The objectives were to describe, at one year following their attempt:

- the rate of repeated suicide attempts (by any method) during the one year following the index non-fatal self-poisoning attempt in Sri Lanka; and
- the rates of suicidal ideation at one year follow-up

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For purposes of this study, the term repetition was defined as subsequent attempts of self-harm, by any method, during the one-year following the index act of non-fatal self-poisoning.

7.2 Method

This study involved a telephone follow-up at 12-months after initial assessment, of participants of the cross sectional study reported in Chapter 3. The follow-up involved a semi-structured interview designed to determine the suicidal ideation levels at 12-months, and the number of those who repeated a suicide attempt (by any means) during the 12-months after the index non-fatal poisoning.

7.2.1 Participants

All participants in the cross-sectional study conducted over 14 months (described in Chapter 3) were eligible for inclusion in the 12-month prospective follow-up interview. . All those who had provided telephone numbers for follow-up contact ($n = 664$) were included for follow-up at one year.

7.2.2 Procedure

One year after the baseline assessment (as described in Chapter 3), the participants were contacted via telephone. After the identity of the participant was confirmed as correct (via confirmation of his/her name), all those who gave verbal informed consent for the conversation were interviewed for about 10 minutes on the telephone. The telephone conversation was conducted in the form of a semi-structured interview (Appendix F).

7.2.3 Predictors and outcome measures – prospective follow up at one year

Repeat suicide attempts during the one-year following the index self-poisoning attempt

The participant was asked about the history of any repeat suicide attempts (by any method) during the one-year period following the index self-poisoning attempt. Open-ended queries were used to explore this theme. If there was a history of suicide attempts reported during this period, further details were explored including the number of attempts, the timing of the attempts (relative to the index self poisoning attempt) and the nature of the attempt (Appendix F).

Presence of suicidal ideation at one-year follow up

The presence of suicidal ideation at the time of the telephone interview and up to one week previously was explored via direct query (Appendix F).

If unable to contact participant:

If after several attempts, a participant could not be contacted on the telephone at the one-year end point, the researcher attempted to contact the carer, friend, or relative identified for that participant, during the index assessment. When contacting the friend/ relative, the researcher introduced herself briefly, and inquired for contact details of the participant, while taking care to maintain participant confidentiality regarding the self-poisoning attempt. If the friend/relative was able to give new contact details for the participant, efforts were made to contact the participant again, and if this too failed, it was noted that the participant was lost to contact.

7.2.4. Statistical analysis –Prospective follow up at one year

Descriptive statistics and data analyses were undertaken using IBM® SPSS® Statistics Version 21.0.

7.3 Results

Of the 949 persons who participated in the baseline cross-sectional study, 30.0% ($n = 285$) did not provide telephone contact details and could therefore not be contacted. Among those who gave telephone details ($n = 664$), in 49.5% ($n = 329$) the telephone number given was no longer working or no longer being used by the participant at one year follow up. Thus, a total of 35.3% ($n=335$) of the original cross-sectional study participants were available for follow up at one year.

7.3.1 Comparison of groups

A comparison of the participants who were followed up and the participants who were not available for follow up is shown in Table 7.1. The two groups were similar in most respects (Table 7.1). There were no significant differences between the two groups in terms of age, gender, substances ingested, rates of depression, alcohol use disorders, anxiety, suicidal intent, and past suicide attempts. The two groups differed in one respect – those lost-to-follow up were significantly more likely to have known a friend/ relation who had also self-poisoned ($\chi^2(1)=12.8, p < .001$).

Table 7.1: Comparison of follow-up group and those who were not available for follow up

		Follow-up group	Lost to follow up	p value
Mean age		25.7 years	25.4 years	.690
Proportion of females	%(n)	55.8 (187)	55.9 (343)	.990
Substance ingested				
Medicinal overdose	%(n)	61.0 (202)	55.0 (335)	
Pesticides	%(n)	23.3 (77)	23.5 (143)	.155
Past suicide attempts	%(n)	11.2 (37)	14.8 (90)	.125
Depression (PDS)	%(n)	50.4 (137)	53.0 (260)	.494
Anxiety (GAD-7)				
Moderate	%(n)	23.3 (59)	18.6 (47)	
Severe	%(n)	23.1 (108)	15.0 (70)	.430
AUDIT				
Hazardous drinking	%(n)	8.4 (28)	9.4 (57)	
Alcohol use disorder	%(n)	3.3 (11)	3.8 (23)	.795
Ingested alcohol prior to act of non-fatal self-poisoning	%(n)	9.5 (31)	11.1 (66)	.449
BHS mean score		5.44	5.74	.447
PSIS mean score		10.1	10.2	.680
PSIS score (by category):				
Low intent	%(n)	7.2 (24)	4.4 (27)	
Medium intent	%(n)	43.3 (145)	46.3 (284)	
High intent	%(n)	49.6%(166)	49.3 (303)	.173
Saw a doctor in the previous month	%(n)	30.4 (100)	30.6 (186)	.950
Has a past history of outpatient psychiatric treatment	%(n)	6.7 (22)	6.3 (38)	.811
Has a past history of inpatient psychiatric treatment	%(n)	2.9 (9)	4.2 (22)	.345
Knew a friend/ relation who has self-poisoned in the past	%(n)	12.3 (38)	22.2 (126)	.001

Notes for abbreviations

PDS: Peradeniya Depression Scale. Scoring: Total score $\geq 10/25$ is a positive screening for depression

GAD-7: 7-item anxiety scale. Scoring: 5-9 Mild, 10-14 Moderate, 15-21 severe anxiety

AUDIT: Alcohol Use Disorders Identification Test. Scoring: ≥ 7 =Hazardous drinking (HZD drinking), ≥ 16 =Alcohol use disorder (AUD)

BHS: Beck Hopelessness Scale

PSIS: Pierce Suicide Intent Scale. Total score range: 0-21. Scoring by category: low intent (total score 0-3), medium intent (total score 4-10) and high intent (total score >10).

7.3.2 Repetition rates at one year

The repetition rates and suicidal ideation for participants who were followed up at one year are shown in Table 7.2. Of those who could be contacted, 2.7% ($n = 9$) had repeated an attempt of self-harm at one-year follow up, and 2.5% ($n = 8$) reported suicidal ideation in the week prior to phone contact.

Males and those aged between 25 and 34 years had higher percentage of repetitions, and higher levels of suicidal ideation in the prior week. Due to the small number of repeat suicide attempts and low prevalence of suicidal ideation, it was not appropriate to examine associations between these variables and other factors such as gender and age. There may be a trend towards higher repetition and suicide ideation among males, but limited numbers prevented further analysis.

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Table 7.2. Repetition of suicidal attempts and presence of suicidal ideation, at one-year follow-up

	% (n)	By gender		By age		
	(Total <i>n</i> = 335)	Male	Female	14-24 yrs	25-34 yrs	Over 35 yrs
		(<i>n</i> = 148)	(<i>n</i> = 187)	(<i>n</i> = 205)	(<i>n</i> = 81)	(<i>n</i> = 49)
		%(n)	%(n)	%(n)	%(n)	%(n)
Repetition at one year	2.7 (9)	4.1 (6)	1.6 (3)	2.0 (4)	3.7 (3)	4.1 (2)
Suicidal ideation at one year	2.5 (8)	3.5 (5)	1.7 (3)	2.0 (4)	4.9 (4)	0

7.4 Discussion

The repetition rate of 2.7% ($n = 9$) at one year follow up is much lower than the rates of repetition reported in the West, where the estimated one year repetition rate of non-fatal self-harm has been reported to be 16.3% (Carroll et al., 2014; Hawton & Fagg, 1992; Kapur et al., 2006; Owens, 2002). A limitation of this study is that only 35.3% of the original sample were available for follow-up. Although with one exception, there were no differences at index episode between those who were and were not available for follow-up, the group that was followed up may have been less likely to re-attempt. The fact that the follow-up group had provided a telephone contact, had stable contact details, and were willing to be interviewed may indicate underlying differences from the group that was not available for follow-up, which may have influenced the findings. It is also possible that some of the group lost to follow-up were not available due to a completed suicide. On the other hand, lower rates of repetition in Asian countries compared to the West has been described previously, and it has been suggested that rates of repetition in Asia may be actually be lower than rates reported in the West (Carroll et al., 2014).

If repetition rates in Asian countries such as Sri Lanka are truly lower than rates reported from the West, there is a need to explore why. One explanation might be that there is higher case fatality associated with self-harm in Asian countries such as Sri Lanka, compared to the West, due to the lethality of substances ingested (i.e., pesticides) (Eddleston et al., 2005). As a result those potential repeaters in the West may not survive their first self-harm attempt in Asia. Another possible explanation - that has also been proposed before (Carroll et al., 2014; Mohamed et al., 2010) - is the prolonged hospital stay due to ingestion of

toxic substances in Asian countries such as Sri Lanka, compared to the much shorter hospital stay associated with ingestion of less toxic medicinal overdoses, seen in the West. Since risk of repetition is highest during the early period following self-harm, it has been suggested that this prolonged hospital stay may inhibit further self-harm during this high risk period (Carroll et al., 2014).

Another finding, from this study, was that many of the participants, when asked how they would avoid self-poisoning when distressed in the future, reported that the recollection of the adversities faced due to the index poisoning episode, including the hospital stay and treatment, would serve as a deterrent against further self-poisoning attempts. Thus, the difficulties associated with a hospital stay in a developing country setting may serve as a reminder and an inadvertent but potent preventive against future self-poisoning.

A final possible explanation for a low repetition rate of suicide attempts relates to the *motivations* underlying the initial non-fatal self-poisoning act, especially in young people and females in countries such as Sri Lanka. In this study a significant proportion of the young females reported attempting self-poisoning in order to ‘escape an unbearable situation’ or ‘escape unbearable thoughts’. Marecek et al (Marecek & Senadheera, 2012) in their study of non-fatal self-poisoning among females in Sri Lanka has suggested that the act of self-poisoning among girls may represent a form of non-verbal dissent, in situations of interpersonal conflict where norms of obedience and respect constrain overt responses. If the act of non-fatal self-poisoning resulted in attention being directed to that young female’s dilemma which she was unable to articulate directly, and if this resulted in some sort of a resolution on part of her family, the risk or need for repetition may be low. This theory requires further exploration and evidence.

7.5 Limitations

The main limitation of this study was that only 35.3% ($n = 335$) were available for follow-up contact at one year. As noted above, this may have influenced the findings, and low numbers also limited further analysis of the data. Further, as acknowledged previously in chapters 3, 4 and 5, the fact that 9.1% of the eligible sample refused consent, and a further 19.8% could not be included in the study is also a limitation, and may have influenced the findings. There were no data on how many amongst those not followed-up may have died by suicide; this too may have confounded the findings. Another limitation was that the follow-up interview was conducted over the phone rather than face-to-face, which may have influenced how forthcoming the participants were in their responses. Factors such as the wish to avoid another hospital admission, or stigma, may also have influenced participants to under-report suicidal attempts or suicidal ideation. However every effort was made to conduct the phone interviews in a confidential manner, at a time convenient to the participant, and a semi-structured questionnaire was used to ensure that all interviews were conducted in a uniform manner.

7.6 Conclusions

The rate of repetition at one year in this study is low, similar to other Asian studies, but in contrast to Western data (Carroll et al., 2014). While these findings may have been influenced by the low follow-up rate in this study, if confirmed, the apparent low repetition rate may have important implications for prevention strategies. In particular, the pattern reinforces the importance of implementing strategies at a primary preventive level since the potential impact of secondary prevention techniques may be limited by the low repetition rates.

Part 4

Prevention

Chapter 8

Prevention: A survivor perspective

8.1 Introduction

Prevention or minimization of self-poisoning is a challenging task. Internationally, a range of preventive strategies have shown effectiveness in reducing rates of self-harm, such as limiting access to toxic substances (Gunnell et al., 2007b), psychosocial interventions such as follow-up contact after attempted suicide (Hassanian-Moghaddam, Sarjami, Kolahi, & Carter, 2011) and problem-solving treatments (Townsend et al., 2001) to list a few. Cognitive behavior therapy, interpersonal therapy, dialectical behavior therapy and training of general practitioners have also shown efficacy in reducing self-harm (Brown et al., 2005; Heisel, Duberstein, Talbot, King, & Tu, 2009; McLeavey, Daly, Ludgate, & Murray, 1994). Despite this, a Cochrane Review concluded that there is still considerable uncertainty regarding which forms of psychosocial and pharmacological treatments are most effective in reducing suicidal behavior (Arensman et al., 2001). Given the limitations of the existing knowledge base, the objective of the current study was to explore the perspectives of survivors on strategies that they *themselves* thought might be helpful in preventing future self-poisoning, at times of distress. It was anticipated that input from individuals who have recently survived self-poisoning would have value in directing development of future intervention strategies. To our knowledge this kind of analysis has not been attempted before.

8.2 Overview of Methodology

Potential preventive strategies were explored via two studies, which used different methodologies. Study 1 consisted of semi-structured interviews of a qualitative nature, conducted among 24 persons who had recently survived an act of self-poisoning, as described previously in Chapter 6. Study 2 was a quantitative cross-sectional survey described in Chapter 3. Participants of the cross-sectional survey (Study 2) were asked if the interventions suggested by participants of the semi-structured interviews (Study 1) would be a useful preventive strategy for them or not.

8.2.1 Ethical Approval

Ethical clearance for the studies was obtained from the Faculty of Medicine, University of Peradeniya, Sri Lanka, and the Australian National University. The relevant Information sheets and consent forms are provided in Appendix C.

8.2.2 Participants and setting

As previously described, eligible participants were those aged 14 years and above, conversant in Sinhala and/or English, admitted to the Toxicology Unit, Teaching Hospital Peradeniya, Sri Lanka, for medical management of a recent act of non-fatal self-poisoning. Study 2 (quantitative cross-sectional study) was conducted after Study 1 (semi-structured interviews), hence there was no overlap between participants of Study 1 and 2.

8.3 Procedure

8.3.1 Study 1: Semi-structured interviews of those who recently attempted self-poisoning

Persons admitted to the Toxicology Unit (according to the admission register) on days when the investigator went to the unit, were invited to participate in the study if they met study inclusion criteria. Details of how the study was conducted have been described previously in Chapter 6. A total of 24 participants were interviewed, over a two-month period starting from June 2011. Each interview was audio-taped, and lasted approximately 45-60 minutes.

During the interview, participants were invited to describe strategies, which they believed might help them deal with similar distressing situations in the future without resorting to self-poisoning. The participants' responses were guided by statements such as, "If you became very distressed again in the future, do you think you would attempt to take poison again? ...If not, what do you think you would do to cope?" If the participant experienced difficulty responding to this question they were asked: "Looking back, there may have been times when you felt distressed like this, but did not attempt self-poisoning? What helped you cope then?" (A outline of the semi-structured interview is provided in Appendix G.

8.3.2 Study 2: Exploration of prevention strategies using a cross-sectional survey

This was part of a cross-sectional survey conducted over 14-months, as described previously in Chapter 3.

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Based on the semi-structured interviews of Study 1, and the interventions suggested during these interviews, a list was generated of 15 potential intervention strategies that might prevent those coping with acute distress from resorting to self-poisoning (Appendix H). For example, several participants in the semi-structured interviews stated that they would talk to a close friend if they should become distressed in the future, and that this would help avoid a repetition of an act of self-poisoning. Therefore, this strategy was included in the list as “talking with a friend.” In addition, potential strategies that emerged indirectly during the course of the interviews were also included in the final list. For example, when asked if they would attempt self-poisoning again, many participants said they would not, and when asked why, they replied that they did not want to undergo a similar experience of hospitalization and treatment again. Although not directly suggested by the participants, this was included in the list as a possible preventive strategy (“remembrance of the adverse effects of the previous attempted suicide”). The final ‘intervention list’ was then tabulated and included as part of the cross-sectional survey, conducted over 14-months. Participants of the cross-sectional survey were asked to read the intervention list, and to tick one or more interventions (if any), which in their opinion could be helpful at times of future distress.

8.4 Results

8.4.1 Study 1: Semi-structured interviews of those who recently attempted self-poisoning

8.4.1.2 Scoring and categorization.

The audio-taped semi-structured interviews were transcribed and translated. A data extraction sheet was used in order to ensure that information was obtained from all interview transcripts in a uniform manner. The interview transcripts were perused for preventive strategies described by the participants. All preventive strategies suggested by participants were tabulated and then grouped into categories based on frequency of occurrence and shared themes. For example, all suggested interventions that helped the participant distract themselves at times of distress, were categorized as *distraction* and were listed within this intervention strategy. Likewise all suggested interventions that involved talking to another person for relief were categorized as *emotional ventilation* and listed under this strategy. For validation purposes, a second assessor also examined the interview transcripts and independently categorized the preventive intervention strategies. The final categorization of preventive strategies was based on the consensus of both assessors.

Both assessors identified two similar main categories of preventive interventions – namely *emotional ventilation* and *distraction*. However, the assessors differed in the extent to which they categorized the remaining responses. One assessor had grouped all remaining strategies together in one category as *other*, whereas the second assessor had further subdivided the remaining responses. The most frequently occurring remaining common strategy was the participants' suggestion that they would somehow 'endure' such distressing situations in future,

without resorting to self-poisoning. After consideration of the frequency of occurrence of this strategy, it was decided that this would form a third category labeled *endurance*, and the remaining miscellaneous suggested strategies would be grouped together as a fourth *other* category. Thus, there were four final categories labeled *distraction*, *emotional ventilation*, *endurance* and *other*.

8.4.1.3 Preventive strategies

The majority of participants in the semi-qualitative interviews suggested more than one preventive strategy. Of the total 24 participants, 21 (88%) offered strategies that were classified as *distraction* activities during difficult situations. (see Figure 8.1). Participants who suggested strategies of the distraction type nominated a range of activities within this category such as listening to music, going for a walk, undertaking housework, gardening, working, playing with grandchildren and chopping firewood. Each participant identified at least one *specific activity*, which they thought would be helpful for them. For example, a 17-year old male who had ingested a medication overdose after an argument with his elder brother stated “*at such a time (of distress) I will go to my room, put on the computer and play songs. I could listen to the songs without bothering anyone else.*” A 45-year old female who ingested a pesticide after being in a conflict with her inebriated husband commented, “*my daughter has small children. I like being with them. I will spend time with them.*”

The second strategy, talking to a close friend/ relation at the time of distress was supported by almost half of the participants (46%, $n = 11$) (see Figure 8.1). This was categorized as *emotional ventilation*. Those participants who suggested strategies within the emotional ventilation category also named the *specific*

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person(s) to whom they would talk when distressed. For example, a 38-year old female who ingested insecticide after a conflict with her daughter said, “If I had spoken to my father, this would have not happened. He would have talked to me, made me feel better and sent me home”.

Approximately one fifth of participants (21%, $n = 5$) said that they would be patient and endure problems in the future, rather than attempting self-poisoning again at times of distress. This was categorized as *endurance*. An 18-year old woman who attempted self-poisoning after an argument with her mother-in-law commented, *“I have gained a lot of experience now, after this incident (of self-poisoning). I had to come to hospital. I don’t want to go through this again. If the problems happen again, I will be patient and endure it.”*

Strategies which were suggested only once, by a single participant, and which could not be categorized into a common theme were placed in the fourth miscellaneous group labeled *other*. These included: reduction of alcohol use, remembrance of those who loved her/him, remembrance of the consequences of this act of self-poisoning, avoidance of future conflict situations, and taking medication for pain.

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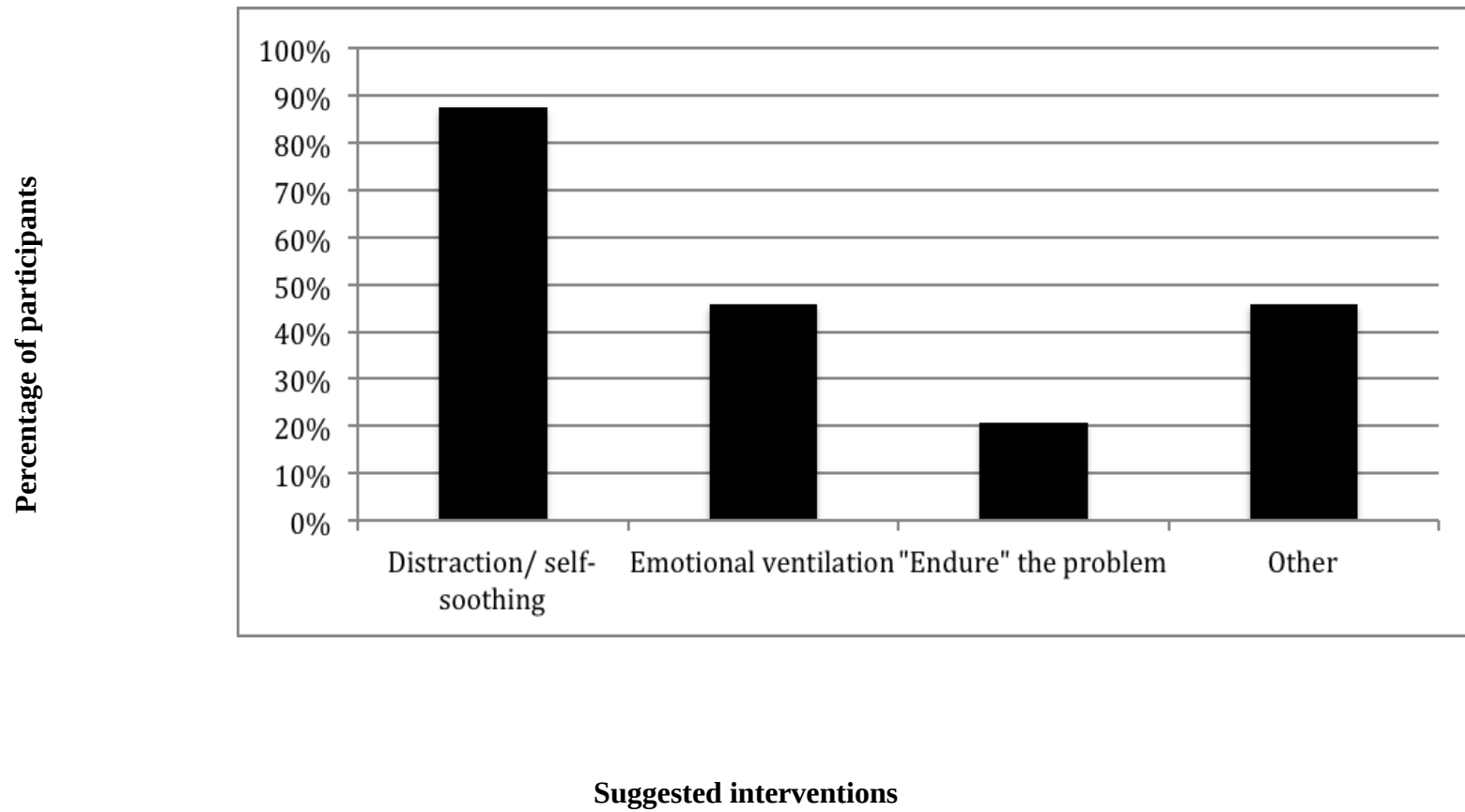


Figure 8.1: Intervention strategies to prevent self-poisoning, as suggested by participants of the semi-structured interviews (Study 1)

8.4.2 Study 2: Results of the cross-sectional survey

A total of 949 participants completed the cross-sectional survey. The percentage of participants endorsing each of the 15 items in the survey is shown in Table 1. The preventive strategy considered useful by the most participants was the remembrance of the adverse effects of the previous attempted suicide (74.8%, $n = 648$); this strategy was the most commonly endorsed item by both genders (Table 8.1).

Talking with a friend was the second most commonly supported strategy, and this strategy was significantly more supported by younger participants (14-24 year group > 25-34 year age group > those aged 35 years and over, $\chi^2(2)=40.2$, $p < .001$), and males ($\chi^2(1)=4.4$, $p = .035$); in contrast females were significantly more likely than males to describe talking to a close family member as being a useful preventive strategy ($\chi^2(1)=11.8$, $p = .001$).

Remembrance of the people close to them was supported as a useful strategy by 59.4% of participants ($n = 509$), significantly more so by females than males ($\chi^2(1)=11.1$, $p = .001$). Remembrance that it is a 'shame' to die by suicide, was also cited as useful by more than half the participants (52.9%, $n = 396$); there were no significant age or gender differences for this variable.

Participants who suggested strategies for distraction such as going for a walk, or listening to music were significantly more likely to be in the younger 14-24 year age group (going for a walk $\chi^2(2)=28.6$, $p < .001$, listening to music $\chi^2(2)=72.8$, $p < .001$, reading a book $\chi^2(2)=44.7$, $p < .001$).

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Table 8.1. Suggested interventions, percentage of participants who thought it would be useful, and comparison by gender and age

(Listed in order of decreasing frequency)

Intervention	Participants who thought this strategy would be useful % (n)	Intervention- by Gender			Intervention - by Age			
		Male % (n)	Female % (n)	p	14- 24 yrs % (n)	25- 34 yrs % (n)	≥35 yr % (n)	p
Remembrance of the adverse effects of the previous attempted suicide	74.8 (648)	71.7 (273)	77.3 (375)	.057	75.1 (393)	74.6 (144)	74.6 (103)	.985
Talking with a friend	62.6 (543)	66.5 (252)	59.5 (291)	.035	69.9 (369)	57.1 (109)	41.6 (57)	<.001
Remembrance of people close to you	59.4 (509)	53.1 (199)	64.3 (310)	.001	60.0 (308)	60.2 (115)	56.0 (79)	.669
Remembering that it is a shame to die by committing suicide	52.9 (396)	46.6 (171)	47.6 (225)	.779	48.5 (245)	47.3 (88)	40.1 (55)	.218
Going to a place of worship (temple)	49.0 (419)	37.9 (141)	57.6 (278)	<.001	55.8 (287)	38.3 (72)	38.0 (54)	<.001

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Intervention	Participants who thought this strategy would be useful % (n)	Intervention- by Gender			Intervention - by Age			
		Male	Female	p	14- 24 yrs	25- 34 yrs	≥35 yr	p
		% (n)	% (n)		% (n)	% (n)	% (n)	
Talking with a close family member (parents or siblings)	44.3 (377)	37.7 (141)	49.5 (236)	.001	45.9 (234)	47.6 (90)	33.6 (47)	.019
Listening to music	40.3 (340)	33.2 (122)	45.8 (218)	<.001	51.5 (261)	26.7 (50)	16.7 (23)	<.001
Going for a walk	39.0 (328)	36.4 (136)	41.4 (192)	.209	46.3 (233)	26.5 (49)	30.5 (98)	<.001
Recall of religious teachings	35.3 (293)	24.6 (88)	43.2 (205)	<.001	40.9 (204)	27.3 (50)	24.6 (34)	<.001
Going for work (job)	24.7 (205)	28.3 (106)	21.8 (99)	.029	25.6 (126)	26.7 (50)	18.8 (26)	.204
Playing with children	24.7 (200)	17.5 (62)	30.2 (138)	<.001	28.0 (136)	26.5 (48)	9.8 (13)	<.001
Reading books	23.7 (198)	14.0 (51)	31.2 (147)	<.001	31.2 (158)	17.7 (32)	5.2 (7)	<.001
Doing other work (e.g., car repair, looking for fire wood, et al)	20.2 (165)	19.0 (69)	21.2 (96)	.209	22.5 (109)	18.1 (33)	14.5 (20)	.086
Doing house work	20.0 (165)	12.2 (44)	26.2 (121)	<.001	23.1 (113)	18.9 (35)	11.6 (16)	.011
Writing poetry	15.6 (128)	7.3 (26)	22.1 (102)	<.001	21.4 (106)	9.6 (17)	2.9 (4)	<.001

8.5 Discussion

Difficulty tolerating emotional distress (associated with interpersonal conflict) contributes greatly towards the act of non-fatal self-poisoning (Hettiarachchi & Kodituwakku, 1989). The focus of the current study was on eliciting information from participants about the strategies they believed would assist them to cope with such emotional distress without resorting to self-poisoning.

A novel finding from the cross-sectional survey (Study 2) was that the most strongly supported deterrent to future self-poisoning was the recollection of the adversities faced (including experience of hospital admission) following the index self-poisoning attempt (74.8%, $n = 648$). While an unexpected finding, this may be a contributory factor towards the relatively low rate of repetition of self-harm reported from available studies in Sri Lanka and some developing countries (Bertolote et al., 2010).

Participants in the semi-structured interviews who suggested emotional ventilation specifically identified the name(s) of the close friend or family member they could choose to talk to in a crisis situation. Participants who suggested distraction strategies in the qualitative study also nominated specific distractions that would be useful for them. This suggests interventions targeting emotional ventilation and distraction should be personalized to the individual. This conclusion is consistent with the findings of Owens et al., (2010) who involved service users in the development of a text-message based intervention for preventing the repetition of self harm. Owens et al., (2010) reported that service users rejected the concept of a generic 'one size fits all' message, choosing instead messages individualized to each participant. The lack of personalisation may explain why the brief

educational intervention conducted by the World Health Organization in low and middle income countries did not have a significant impact on suicide attempt repetition rates (Bertolote et al., 2010). The challenge is to determine how personalized strategies of emotional ventilation and/or distraction could be introduced and researched on a larger scale. The more recent postcard intervention studies show promise in reducing suicidal behaviours (Hassanian-Moghaddam et al., 2011). One approach could be to combine the suggestions made by our participants with a postcard intervention-type study. For example, such an approach might facilitate the individual concerned to suggest a personalized intervention strategy such as talking to a named friend/ family member when distressed, and for this message to be written and given or mailed to the person at the point of hospital discharge or at a specific interval thereafter.

Endurance or tolerating the distress until the distress peaks and abates, was also suggested by participants. This may be a reflection of cultural norms in Sri Lanka, where overt conflict and questioning of accepted hierarchies is often viewed negatively, whereas being patient and ‘putting up with problems’ is more accepted. Again, this finding may serve a basis on which an intervention might be devised to assist people to act less impulsively. Such an intervention may adapt elements from dialectical behavior therapy (Linehan, 1997). Dialectical behavior therapy includes emphasis on self-soothing; similarly participants in this study suggested ways of easing their distress, albeit in individualized ways.

There may be value in exploring whether primary care health professionals (such as doctors and nurses) should be a part of preventive programs aimed at improving distress tolerance. A challenge is that no study participant suggested seeking the help of a counselor or medical professional. This may be a reflection at

least in part of local socio-cultural attitudes – i.e., physical problems are perceived as being dealt with by health and allied health professionals, whereas psychological stressors are often dealt with within the family and/or close community.

Accordingly, it is unlikely that people would seek out and consult a professional counselor/doctor in the context of interpersonal problems. But there is an opportunity for health care professionals to intervene prior to discharge of persons present to hospital after a self-poisoning act. For example, a nurse could briefly discuss distress coping methods such as emotional ventilation or recollection of previous attempts, with emphasis on guiding the individuals to develop their own coping strategies.

8.6 Limitations

In one sense, a limitation of this study is that the findings were dependent on the participants' opinions on what may be useful intervention strategies, rather than on objective evidence. On the other hand, eliciting of participant opinions is also a strength of the two studies reported here, in that the findings can be used to inform future research about strategies that might be both acceptable and effective for persons from a South Asian country such as Sri Lanka.

8.7 Conclusions

In this chapter strategies that may help persons deal with acute distress without resorting to self-poisoning were described. Overall, the most commonly suggested strategies were the recollection of the adversities faced with the past attempt and emotional ventilation.

While not objectively tested within this study, these findings are important because they reflect preventive strategies which have been recommended by those who *themselves* have recently survived an act of non-fatal self-poisoning. The majority of these participants had attempted non-fatal self-poisoning in the context of acute distress associated with interpersonal conflict; after the act, most denied further ideas of suicide or self-harm, and instead suggested these strategies to avoid such eventualities in the future. The low re-attempt rates reported in the one-year follow-up study (Chapter 7) raises the possibility that participants may have applied similar strategies in the period following hospitalization.

Prevention of self-poisoning is a complex task, and focusing on multiple risk factors with multilevel strategies may be the optimal approach to averting suicides (Moscicki, 2001; Wasserman et al., 2012). Based on the current findings one level of prevention could include helping people to develop strategies to cope with emotional distress, or to ‘endure’ the distress, especially when such situations cannot be avoided or solved immediately. Psychosocial interventions such as dialectical behavior therapy have been shown to be effective in reducing suicidal behaviours (Comtois & Linehan, 2005). An important component of dialectical behavior therapy is the development of distress tolerance skills (Linehan, 1997), an approach which is consistent with the theme of distress tolerance strategies suggested by the participants of this study. Further work is needed to test whether the strategies suggested by the participants of this study could be developed into sustainable interventions to help people cope with periods of acute distress. These interventions would ideally need to be personalized as suggested by the participants, and would need to be compatible with the local cultural and economic background. This would also be in keeping with the WHO recommendations that each nation

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should adapt suicide prevention guidelines to suit their own cultural, economic, demographic and social needs (Nordentoft, 2007). Randomized controlled trials to test the efficacy of such interventions would be an appropriate way forwards for Sri Lanka.

Chapter 9

Summary of the main findings

and implications for interventions and research

9.1 The problem of non-fatal self-poisoning in Sri Lanka

Since the mid-1990s, hospital admission rates due to attempted or non-fatal self-poisoning in Sri Lanka have increased, in contrast to the decreasing rates of completed suicides over this period. In the previous chapters, the phenomenon of increasing non-fatal self-poisoning in Sri Lanka has been examined, and several key questions have been addressed; namely, what are the characteristics of, and risk factors associated with non-fatal self-poisoning in Sri Lanka? What are the rates of repetition? And what can be done to prevent intentional self-poisoning? The overall findings and the implications of these findings are discussed below.

9.2 Current status regarding non-fatal self-poisoning in Sri Lanka

Non-fatal self-poisoning in Sri Lanka is changing to resemble Western patterns, with the findings of this thesis research program showing that most who attempted poisoning were young (majority below 25 years), female, and the most commonly ingested substance was medicinal overdoses. While the findings of this research program are based on data from the urban and semi-urban population in the central region of the country, similar changes have been reported from other regions of Sri Lanka, including from more rural agricultural areas (Hanwella et al.,

2012). Nevertheless, pesticide ingestion remains common – one third of males continue to employ this method of self-poisoning. Older persons were also more likely to ingest pesticides, compared to young people.

As described in previous Sri Lankan studies (Hettiarachchi & Kodituwakku, 1989; Khan et al., 1996), in most cases the proximal trigger associated with the act of self-poisoning was an interpersonal conflict, though the nature of the conflict varied by age and gender. The desire to escape, to die, and a sense of loss of control with inability to tolerate interpersonal conflict-related distress, emerged as common motivational themes associated with non-fatal self-poisoning. When participants were asked how they might deal with such distress in the future, without resorting to self-poisoning, a majority endorsed preventive strategies such as talking to a close friend or family member, distraction activities, recollection of loved ones and recollection of the adverse consequences of the index self-poisoning attempt.

A key new finding from this research program was that over half of those who ingested poison were depressed. This rate was markedly higher than rates of depression reported by previous Sri Lankan studies (Hettiarachchi & Kodituwakku, 1989; van der Hoek & Konradsen, 2005) but was closer to rates reported from India and the West (Hawton et al., 1996; Parkar et al., 2006). Further, almost one-third of males had alcohol misuse. Not surprisingly, the presence of psychiatric morbidity, in terms of depression and hopelessness, as well as male gender and prior suicide attempts, were significant predictors of high suicidal intent. An unexpected finding was the low rate of repetition at one year - only 2.7% of the study participants had attempted suicide after the index episode - although recently

low rates have been also been described in Asia compared to the West (Carroll et al., 2014).

9.3 Implications for prevention

There are multiple pathways to prevention. In the following sections, I propose strategies that might be used to prevent non-fatal self-poisoning in Sri Lanka, based on findings from the current research program. To do this, I use two theoretical frameworks: (1) a model which simply divides interventions into two types, namely primary and secondary prevention (Nordentoft, 2007); and (2) a model for suicide prevention developed by Mann (Mann et al., 2005) in an international review of suicide prevention strategies.

In the first model, the prevention of suicide is conceptualized in terms of a ‘disease prevention model’, where interventions are categorized as primary versus secondary (Nordentoft, 2007). With respect to non-fatal self-poisoning, primary prevention includes interventions implemented prior to any act of non-fatal self-poisoning, whereas secondary encompass interventions implemented after an index act of non-fatal self-poisoning, with the aim of preventing further episodes. Given the findings of this research program, and the apparent lower rates of repetition of self-harm in Sri Lanka and Asia (Bertolote et al., 2010; Mann et al., 2005), prevention strategies aimed at a primary level prevention emerge as an important focus of intervention.

Within this broad framework, prevention can also be categorized according to the level at which the population is targeted. In particular, prevention may be implemented at a universal level (aimed at an entire population), or at a selective

level (targeted at an at risk subgroup of the population), or at an indicated level (aimed at individuals with suicidal ideation or previous attempts) (Nordentoft, 2007). It is not possible to predict with certainty, who will attempt non-fatal self-poisoning. Therefore, from a pragmatic point of view, there is an argument to target primary prevention strategies at a universal population level. However, there may also be value in targeting selected sub-groups of the population given the variations of non-fatal self-poisoning across age and gender. Most secondary preventive interventions – after an act of non-fatal self-poisoning - could be targeted at selective and indicated levels. For example, this could include the targeted management of those who have recently attempted self-poisoning, and who also have risk factors for repetition such as depression or an alcohol use disorder (selective intervention).

Mann and his collaborators (Mann et al., 2005) propose a different model to describe prevention activities, which is based on distance from the suicide act. Mann argues that suicidal behavior has multiple causes, which can be broadly divided into proximal stressors or triggers, and predisposition – with psychiatric illness contributing largely to the latter component; thus Mann argues for a stress-diathesis model of suicidal behavior (Mann, 2003). The findings of this research program are also in keeping with this model of suicidal behavior. Based on their systematic review, Mann et al., (2005) recommend a multifaceted approach to suicide prevention, including the following preventive activities: education of physicians and public regarding depression; screening for high risk individuals; pharmacological treatment of depression; non-pharmacological therapies for depression and alcohol use disorder; follow up care of suicide attempts; restriction of access to lethal means and media reporting guidelines for suicide.

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There is value in using both these prevention models to interpret the findings of the current research program, and to make recommendations about prevention activities for Sri Lanka (Figure 9.1). This proposed framework incorporates aspects of the multifaceted preventive approach proposed by Mann (Mann et al., 2005), as well as the primary/secondary level model of prevention. Certain facets described in this preventive framework – namely, education of the general public and primary care physicians about depression and alcohol use disorders, increased treatment of depression by primary care doctors, restriction of access to lethal means and restriction of media glamourization of suicide – are informed by Mann’s model for suicide prevention (Mann et al., 2005). However the focus on development of interpersonal skills and promotion of distress tolerance strategies are specifically informed by findings from my research, albeit that similar strategies have been shown to reduce suicidal behaviors internationally (McLeavey et al., 1994). Further, as mentioned, the primary/ secondary concept of prevention (Nordentoft, 2007) is useful for a framework of prevention of self-poisoning in Sri Lanka. The overall proposed framework of prevention of non-fatal self-poisoning in Sri Lanka is shown in Figure 9.1. For the sake of clarity, the primary and secondary preventive strategies are also depicted separately in Figure 9.2 (corresponding to A through E in Figure 9.1) and 9.3 (corresponding to F through H in Figure 9.1) respectively.

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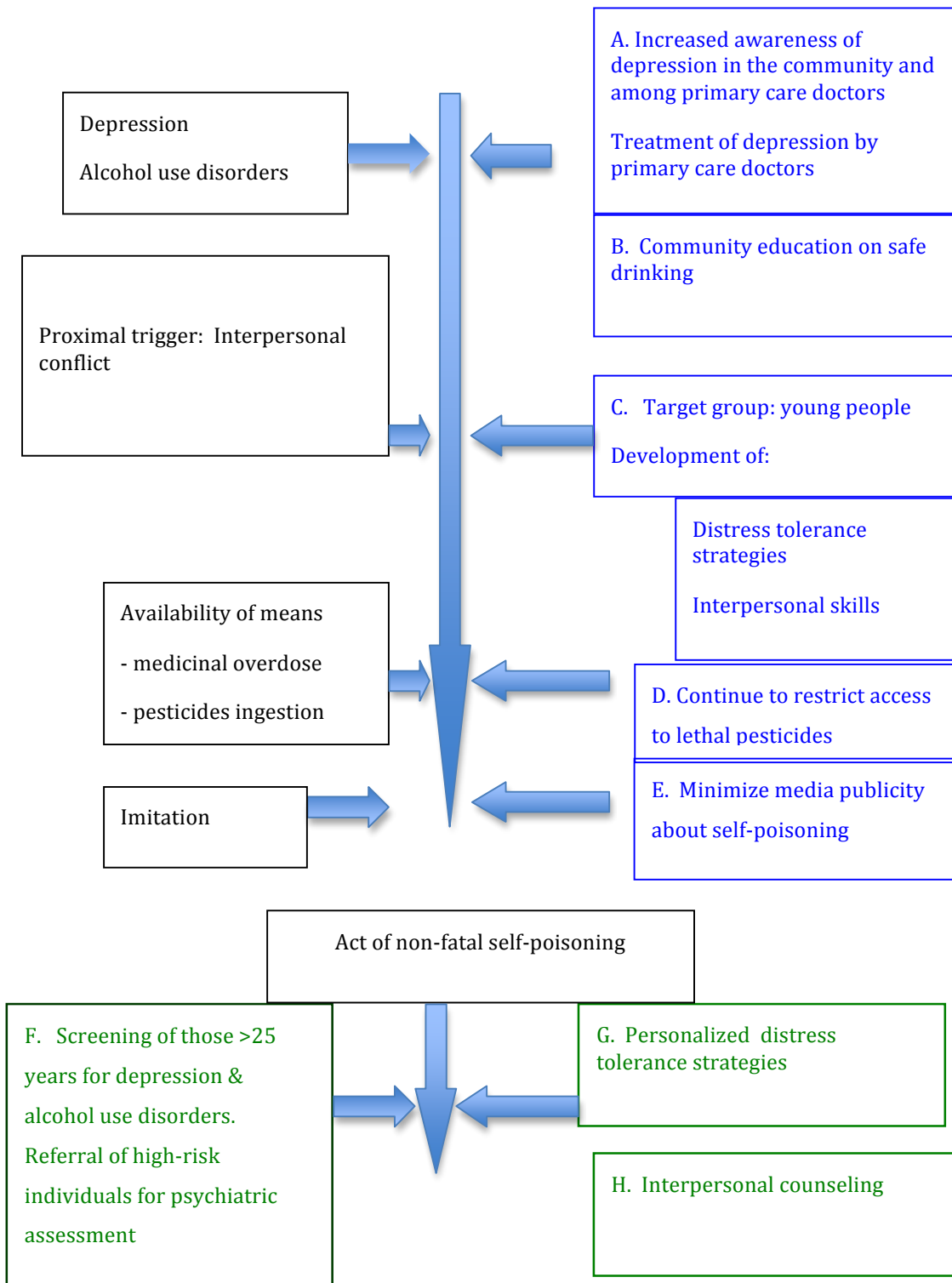


Figure 9.1. Integrated model showing potential strategies for reduction of non-fatal self-poisoning in Sri Lanka. A through E represent primary preventive strategies; F through H represent secondary preventive strategies

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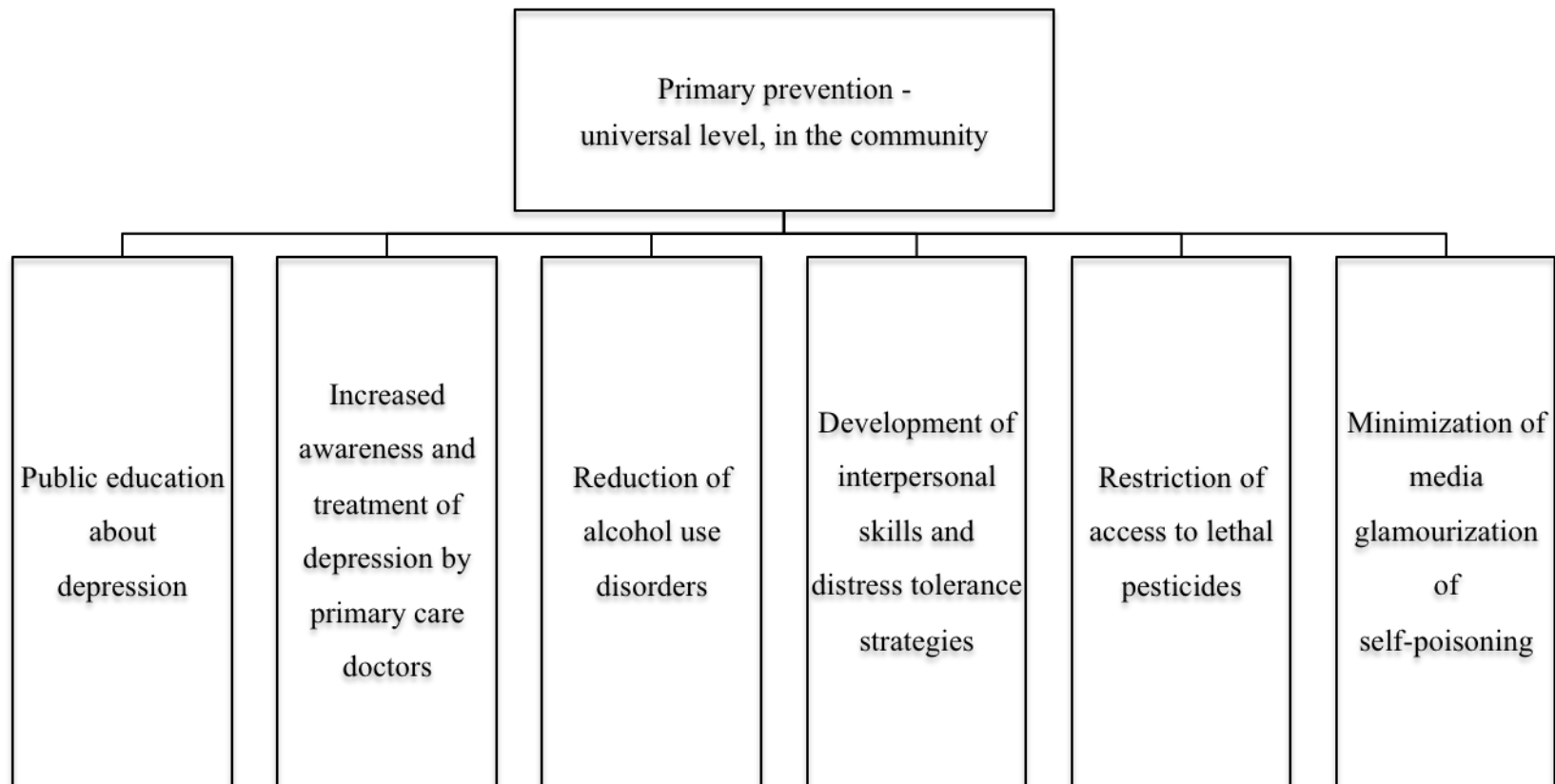


Figure 9.2 Primary prevention strategies for non-fatal self-poisoning in Sri Lanka, at a universal (population) level

9.3.1 Primary Prevention

Non-fatal self-poisoning is a complex phenomenon, and it is unlikely that any single intervention will avert self-poisoning acts. Findings from this research program, as well as from other studies from Asia and Sri Lanka (Bertolote et al., 2010; Mann et al., 2005), show low rates of repetition of self-poisoning; therefore primary level prevention emerges as a key point of intervention. An integrated approach (Mann et al., 2005), which encompasses the varying risk factors associated with non-fatal self-poisoning in Sri Lanka, is more likely to be effective (Figures 9.1 and 9.2).

9.3.1.1. Increased awareness of depression at a community level

There is some evidence from the West to suggest that increased public awareness of depression is associated with decreased rates of attempted suicide (Mann et al., 2005). Depression rates of over 30% have been reported among adolescents in Sri Lanka (Rodrigo et al., 2010), but awareness of depression among the general public remains low. Public health education campaigns to increase awareness of depression in the community are indicated. It is important however, that the general public be educated about how depression may present in the Sri Lankan cultural context. For example, similar to other Asian countries (Chang et al., 2008), direct articulation of psychological and cognitive features of depression appears to be less common than in the West; somatic symptoms, irritability, reduced functioning or alcohol misuse in males, may be more common presentations. Increased public awareness in Sri Lanka is particularly important, because as described in this research program, distressed or depressed persons in

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the community are more likely to seek help from a close friend or family member, than from a professional counselor or doctor.

The question arises as to whether public education programs should also directly address the issues of suicide and self-poisoning in Sri Lanka. This has been attempted in the West, but evidence that such measures are effective in reducing suicide or attempted suicide rates is limited (Mann et al., 2005). An additional danger in Sri Lanka is the risk of *increasing* self-poisoning behaviours, by generating increased attention to and inadvertent glamourization of this issue, especially among adolescents and young adults (Sisask & Värnik, 2012). In the current research program, 17.3% of participants personally knew of a friend or family member who self-poisoned, and previous authors too have suggested that self-poisoning in Sri Lanka maybe seen as an acceptable way of resolving perceived interpersonal impasse (Marecek & Senadheera, 2012). Internationally recommended guidelines on media reporting of suicide caution against describing the means of suicide (Pirkis, Blood, Beautrais, Burgess, & Skehan, 2006). Accordingly, any public education about suicidal behavior in Sri Lanka, should undertaken with caution to avoid inadvertent glamourization of the issue, and there should be no reference to means of self-harm or suicide.

9.3.1.2. Improved physician awareness of depression & mental health literacy.

Up to 50% of those who attempted non-fatal self-poisoning in this research program were depressed and depression predicted higher suicidal intent. Further, international studies indicate that depression is associated with increased risk of suicidal behaviours (Dhossche et al., 2000). Depression in the community is often

unrecognized and untreated at a primary care level in Sri Lanka. Indeed in this study, despite the high rate of persons who screened positive for depression, less than 10% of participants had ever received treatment for any psychiatric disorder. Therefore, increased education among *primary care* doctors about screening for depression, suicidal ideation and suicidal behaviors, as well as treatment of depression at a primary care level, emerge as key primary preventive strategies. Education of general practitioners about depression and suicidal behavior has been associated with reduced suicide attempts in the West, among older people (Almeida et al., 2012).

At a strategic level too, the primary care doctor approach has important public health implications for Sri Lanka. One reason is the fact that specialized outreach community psychiatric services are limited in Sri Lanka, especially in rural areas. Second, stigma related to psychiatric illness, and limited awareness of mental disorders are also barriers preventing people from approaching a psychiatrist, even in areas where psychiatric services are available. People are much more likely to see their local primary care doctor or general practitioner if they feel unwell (Hawton & Blackstock, 1977) and this research found that 30% of our participants had visited a doctor in the month prior to the non-fatal self-poisoning act.

A range of strategies could be used to increase primary care doctors' awareness of depression and suicidal behavior in the community, for example, via nationwide workshops for primary care doctors and general practice trainees, provision of printed educational material (Almeida et al., 2012) and increased focus on this topic in the undergraduate medical curriculum. Clinicians must also be made aware of the local cultural presentations of depression, since in Sri Lanka, as in some other non-Western countries (Chang et al., 2008), people may not directly

articulate psychological symptoms of depression. Given the increasing numbers of hospital admissions for non-fatal self-poisoning in Sri Lanka, these awareness programs need to be implemented without delay. One way to facilitate the process would be to incorporate such awareness programs as part of the ongoing continuing medical education programs, organized by academic bodies such as the Sri Lanka Medical Association. Support at a national policy level, from the Sri Lankan government, the Ministry of Health and the Ministry of Higher Education, would be key factors to ensure that physician education programs are viable and sustainable.

9.3.1.3. Promotion of safe drinking

Prevention or minimization of alcohol use disorders is a vital, but challenging area of primary intervention at a community level. Not only did over 25% of the male participants have an alcohol use disorder, but also previous research shows that over recent years, alcohol consumption rates in Sri Lanka have increased almost in parallel to the increasing rates of non-fatal self-poisoning (Jayasinghe & Foster, 2011). The evidence indicates that early measures aimed at preventing or halting the development of alcohol use disorder are often more effective than late interventions to treat alcohol dependency (Merrill et al., 1992). Accordingly, primary intervention of alcohol use disorders is likely to be more appropriate and cost-effective.

Primary prevention of alcohol misuse is a challenge all over the world. While no one intervention has proven to be effective, the development of culturally focused interventions have been recommended (Foxcroft, Ireland, Lister-Sharp, Lowe, & Breen, 2002). Consistent with this recommendation, a promising community level, novel, educational intervention to promote safe drinking has been

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recently trialed in Sri Lanka, using street drama and posters (Siriwardhana, Dawson, & Abeyasinge, 2012). There is an urgent need to further develop and research such interventions aimed at reducing alcohol misuse in the community. Parallel to this, primary care doctors and where possible nurses could be trained to screen for and provide brief interventions to persons presenting to primary care, who also have alcohol related problems; similar brief intervention programs have shown promise in reducing alcohol use disorders at one year follow-up in South East Asia (Tsai, Tsai, Lin, & Chen, 2009).

Another potential measure at a national policy level is the restriction of the sale of alcohol and an increase of sale prices. However, it is unclear how effective this initiative would prove in practice because much of the alcohol consumed in Sri Lanka involves *illicit* alcohol; restriction of the legal sale of alcohol may result in more people consuming illicit alcohol rather than an overall reduction in alcohol consumption rates (Jayasinghe & Foster, 2011).

9.3.1.4 Development of interpersonal skills and distress tolerance strategies

It was notable in the current research that half of those who attempted non-fatal self-poisoning in this study were *not* depressed. Therefore identification and management of associated psychiatric morbidity is unlikely to provide a complete answer to prevention. On the other hand, the findings from the current research program, as well as previous work (Hettiarachchi & Kodituwakku, 1989), indicates that most who attempt non-fatal self-poisoning do so in the context of the acute distress associated with a recent interpersonal conflict. Gender comparisons in Chapter 3 suggest that, while interpersonal conflict is a common shared trigger for

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both males and females, the psychological constructs underlying self-poisoning behaviours may be different between genders. Females who carried out acts of non-fatal self-poisoning were significantly younger, and had a lower suicidal intent, compared to their male counterparts. Marecek and Senadheera (2012) have suggested that increasing non-fatal self-poisoning in women in particular may be a form of nonverbal dissent, reflecting the clash between the emergent expectations of young women about their education, relationship and employment, and the more traditional ideals of feminine behavior held by their elders. The collectivistic rather than individualistic nature of society in Sri Lanka (Niles, 1998), and the hierarchical framework where overt confrontation is discouraged, may be contributing factors. Although beyond the scope of this study, the themes underlying interpersonal conflicts in both genders, and effective ways in which to help young people deal with such issues, warrant further exploration. There is a need for effective community programs to develop interpersonal skills in young people that are both gender and culturally appropriate. Such interventions may include for example, school and community youth programs aimed at developing interpersonal skills, and such programs have shown promise internationally (Mann et al., 2005; McLeavey et al., 1994). Life skill programs have already been implemented in some schools in Sri Lanka (De Silva, 2003), and this may provide a non-stigmatizing platform to introduce and develop interpersonal and distress tolerance skills in adolescents at a primary care level. Another worthwhile avenue to explore is whether the internet could be used to engage young people – social media such as Facebook is now popular among urban Sri Lankan youth, and online interventions may provide a way of delivering training in interpersonal skills. Online interventions in the West have demonstrated efficacy in reducing symptoms

of depression (Christensen et al., 2004(Griffiths, Farrer, & Christensen, 2010)) and may be a yet unexplored way forward in this country.

Participants in the current research program themselves suggested a range of strategies to help cope at times of interpersonal conflict and related emotional distress. These strategies also warrant exploration. Could brief interventions be developed, based on these suggestions, to help people tolerate emotional distress, in the knowledge that the distress will peak and abate? Dialectical behavior therapy, which has been shown to be effective in reducing suicidal behaviours includes similar ‘self-soothing’ strategies (Linehan, 1997). This is another avenue worth exploring further in Sri Lanka.

9.3.1.5. Restriction of access to methods of self-poisoning

Restriction of access to lethal pesticides has clearly been effective in reducing completed suicide rates, both in Sri Lanka and internationally (Gunnell et al., 2007b; Mann et al., 2005). Restriction of access to toxic pesticides remains an ongoing priority (Gunnell et al., 2007b) in Sri Lanka.

Given that medicinal overdoses are now the most common method of non-fatal self-poisoning in Sri Lanka, it is timely to consider whether restriction of over-the-counter medication sales would be appropriate for Sri Lanka. Data from the West show that restrictions of paracetamol sales may be associated with reduced rates of non-fatal poisoning and suicide (Gunnell et al., 1997). Unfortunately at present, Sri Lanka differs from the West in that alternate more toxic substances

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such as pesticides are still quite widely available, and are still ingested particularly by males, as shown in the current study. Many other types of medications (e.g., antibiotics anti-hypertensives and other similar agents) are also easily accessible and restrictions regarding the sale of medications in general are not stringent. A potential risk of restriction of sale of a single medicinal substance (such as paracetamol) is that this may prompt method substitution, towards self-poisoning with alternate substances with potentially higher lethality, including a return to pesticide ingestion. Thus, restriction of specific medication sales (such as paracetamol) at present may not be useful; any future strategies to control specific medication sales should be carefully considered and planned prior to implementation – tighter control of sale of *all* medications would be required, in order to make such a strategy successful.

9.3.1.6. Minimization of media glamourization of attempted suicide

The role of media in glamourizing the phenomenon of self-poisoning, and the impact of ‘imitation’ was not directly investigated in this study. But non-fatal self-poisoning is common in Sri Lanka, and 17.3% of our participants reported they personally knew somebody who had attempted self-poisoning. It has been suggested that self-poisoning may be perceived by some as an ‘acceptable’ response to stress (Konradsen et al., 2006). Therefore a policy of responsible reporting of suicidal behavior and avoidance of media glamourization of the topic is indicated as a part of primary prevention (Pirkis et al., 2006; Sisask & Värnik, 2012).

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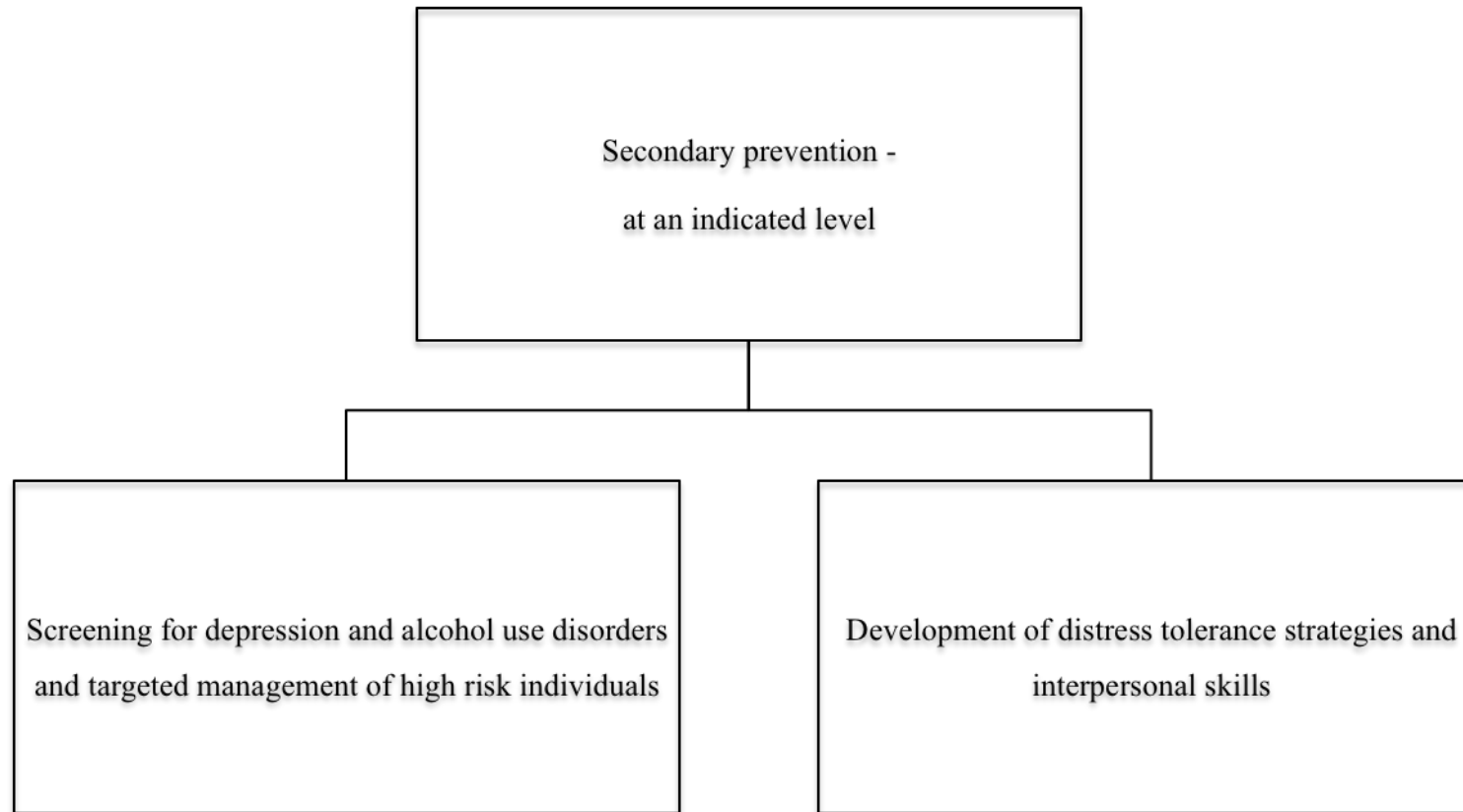


Figure 3: Secondary prevention strategies for non-fatal self-poisoning in Sri Lanka, at an indicated level

9.3.2 Secondary Prevention

While primary preventive measures remain a priority, there are indicators for specific preventive measures that could be implemented after a person presents to hospital due to an act of non-fatal self-poisoning, applicable at a selective or indicated level. They are depicted in separately in Figure 9.3 and described further below.

9.3.2.1. Screening for depression and alcohol use disorders in those who have carried out acts of non-fatal self-poisoning

Depression and alcohol use disorders are known to be associated with suicidal behavior (Dhossche et al., 2000) and these disorders are also associated with higher suicidal intent and greater risk of future completed suicide. Therefore, identification and treatment of depression is important among those who have recently attempted non-fatal self-poisoning. Since the relatively older participants of this study were more likely to be depressed, targeted screening of at least all those aged ≥ 25 years who attempt non-fatal self-poisoning is indicated. Likewise, screening for alcohol use disorders of males who attempt non-fatal self-poisoning is also important. Such screenings could be undertaken routinely following non-fatal self-poisoning, prior to hospital discharge after medical management of the poisoning. Locally validated tools in the local language, such as the Peradeniya Depression Scale (PDS) (Abeyasinghe et al., 2012) or the Patient Health Questionnaire-9 (PHQ-9) (Kroenke et al., 2001) for depression and the Alcohol Use Disorders Identification Test (AUDIT) for alcohol disorders (De Silva et al., 2007), could be used. Such tools are mostly self-administered and easy to use. Those who screen positive could be referred for further psychiatric assessment and care. This

would be a more pragmatic approach than referring everyone who attempts non-fatal self-poisoning for psychiatric assessment – which is not feasible in a resource restricted developing country where the number of psychiatrists are limited, and psychiatry units are available mostly in the larger urban hospitals only.

Challenges to screening and follow-up are likely to include the stigma associated with the diagnosis of a mental illness, and the difficulty engaging such persons for follow up after discharge from hospital. In an ideal scenario there would be community mental health workers, for outpatient follow-up of high-risk persons who have carried out an act of non-fatal self-poisoning. However, in a developing country such as Sri Lanka, such outreach services do not exist. It could be proposed that the mental health care budget be increased at a national level, in order to facilitate development of such mental health services; realistically, such changes are unlikely to occur in the near future. Sri Lanka does however, have a fairly comprehensive grass-root level primary health care system in each district, which caters for general health. There is potential therefore to develop a model involving a system of referral and follow up after discharge in the community, using the non-psychiatric primary health care system already in place. Such a system would require careful record keeping, an organized system of referral and back-referral, and also increased staffing at the primary care medical officer of health (MOH) level, in order to be sustainable and effective. Additionally, since many Sri Lankans live with their family, family members could also be educated and enlisted in the process of monitoring and follow-up of such identified high-risk individuals.

9.3.2.2. *Interpersonal and distress tolerance skills as a secondary prevention measure*

Promotion of interpersonal skills and distress tolerance skills, which was discussed above as a primary prevention method, is also a potential area of secondary intervention (McLeavey et al., 1994). Persons admitted to hospital for non-fatal poisoning could be offered a brief intervention in the form of interpersonal counseling or discussion of distress tolerance, perhaps limited to one session if resources are scarce. As discussed in Chapter 8, for instance a trained primary care nurse could briefly discuss methods to help cope with distress, such as emotional ventilation, prior to discharge from hospital. It should be kept in mind that the WHO randomized control trial of a brief intervention after attempted suicide did *not* show efficacy in reducing repetition rates (Bertolote et al., 2010), and one generic intervention may not be effective (Owens et al., 2010). Nevertheless, there may be value in guiding the person concerned to identify strategies that they may find helpful in the future. Strategies to be considered could include those suggested by participants in the current study as well as any new strategies identified by the person concerned. The therapist (for example, a primary care nurse, or a counselor) would need to receive brief training on the aims and methods of this brief intervention. The ‘one off’ brief discussion could be reinforced with a personalized ‘take-home’ message (strategy) in the form of a postcard / text message, based on the outcome of the discussion.

9.4 Future research

While there is now more evidence on the phenomenon of non-fatal self-poisoning in Sri Lanka, certain gaps in knowledge remain. First, longitudinal follow-up studies of the sequelae of non-fatal self-poisoning in Sri Lanka, and in much of South Asia, are limited. The few studies available in Asia suggest that repetition rates in Asia are lower than in the West, but reasons for this are not known. Future prospective follow-up studies should revisit this phenomenon to explore if repetition rates are truly lower in Asia than in the rest of the world, and if so the reasons why. Most hospitals in Sri Lanka already maintain good records of hospital admissions (including those admitted for non-fatal self-poisoning); with minimal expenditure, this information could be used as a starting point to create a national database of those admitted for non-fatal self-poisoning.

Second, small, in-depth studies, of a qualitative nature, about the psychological constructs and motivations underpinning non-fatal self-poisoning, are required. These should include a comparison across age groups and gender; the findings would enrich knowledge of non-fatal self-poisoning, and help direct preventive strategies.

Third, the proposed preventive strategies discussed in this thesis require further research to determine their feasibility, acceptability and efficacy in Sri Lanka. This is a key area of required research, and very little evidence is available regarding *interventions*, from Sri Lanka at present, and indeed from the rest of the world. To start with, small pilot intervention studies could be trialed. Priority should be given for exploring efficacy of the primary preventive methods discussed in this chapter - such as efficacy and cost-effectiveness of programs to increase

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primary care doctor awareness and treatment of depression. This is particularly important in the Sri Lankan context because depression is often under-diagnosed; internationally such interventions are claimed to significantly lower the risk of suicide as well as associated costs (Knapp, McDaid, & Parsonage, 2011). Another important area to explore is the efficacy and cost-effectiveness of strategies to promote distress tolerance and interpersonal skills in the community and in schools. Research in this area is more likely to be sustainable and acceptable if it involves individuals from the community, such as teachers, school principals, religious leaders and parents and if it uses approaches that are culturally and socially compatible. Using and adapting existing programs – such as the Life Skills Program (D De Silva., 2003) that is already in place in many Sri Lankan schools – will also aid cost-effectiveness. For example, interactive classroom setting sessions on interpersonal skill development could be incorporated into the already existing Life Skills Program (D De Silva., 2003) and trialed as a pilot study. Interventions that are thus piloted, which show promise, could be further examined via appropriately powered randomized controlled trials.

Sri Lanka is a relatively small country with a high non-fatal self-poisoning rate, and a primary healthcare system that reaches grass-root levels in most regions. Therefore it is feasible to undertake critical intervention research, and the findings from which will guide more effective policies to reduce self-poisoning in Sri Lanka.

9.5 Conclusions

Reduction in rates of non-fatal self-poisoning would benefit the individual and family, and also greatly reduce the economic cost to the Sri Lanka, in terms of hospital treatment and loss of productivity. Reduction of rates of non-fatal self-poisoning should be a national priority.

Indeed, the World Health Organization (WHO), in its framework for suicide prevention, recommends national strategies for prevention, in order to highlight the magnitude of the problem and also to organize cohesive national strategies incorporating various aspects of prevention (World Health Organization, 2012). Sri Lanka too would benefit from a national program for prevention of non-fatal self-poisoning.

But prevention of self-poisoning and suicide is complex, and while many strategies are likely to have an effect, no one strategy alone is likely to be completely effective. The choice of which preventive strategies should be implemented must take into consideration effectiveness, as well as cost and the extent to which each action can be effectively implemented in a given health and community system. The WHO recommends that each government should adapt or modify National Strategy Guidelines for suicide prevention, to suit their own cultural, economic, demographic and social needs (Nordentoft, 2007), and the same could be recommended with respect to the prevention of non-fatal self-poisoning in Sri Lanka. Choosing and adapting methods of prevention, which would be effective and sustainable in the local social and cultural context is key. The current research program has identified targeted foci for prevention of non-fatal self-poisoning in Sri Lanka; these are applicable at primary and secondary prevention levels and which

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can be integrated into a multi-level approach. Further, several factors are important to establishing a sustainable and effective national program in Sri Lanka. First, the program must incorporate integration and collaboration between multiple settings and sectors including but not limited to the health sector, the education sector, the media, the community and religious leaders. This is consistent with the WHO recommendations which emphasize the importance of the identification and involvement of relevant local stakeholders (World Health Organization, 2012). Secondly, wherever possible there should be emphasis on maximum utilization and adaptation of already existing services and programs. Third, such a national program should provide *evidence-based* education and empowerment to change attitudes and behaviours related to self-poisoning, at the level of the individual, the family, community, medical health professionals, media and the policy makers. Finally, this national program should incorporate ongoing research, to both improve our understanding of factors that contribute to/ protect from suicidal behaviours, and to assess the effectiveness of intervention programs in Sri Lanka (World Health Organization, 2012).

In conclusion, understanding and focusing on multiple risk factors associated with non-fatal self-poisoning as it presents in Sri Lanka, is essential. It is necessary to use this knowledge to develop and implement integrated, multi-level intervention strategies, which suit the local cultural and socioeconomic background. This should emphasise population level primary preventive strategies as discussed above, aimed at achieving a small shift in behavior. There is also a role for indicated secondary prevention for identified high-risk persons. Using novel methods adapted from the local culture itself may be the most useful, cost-effective and sustainable approach to reducing non-fatal self-poisoning (Conner et al., 2005;

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Conner et al., 2007; Nordentoft, 2007). Effective and sustainable implementation of such preventive strategies would require an overall national program as described above. Although a challenge, such an integrated, multi-level approach has the potential to make a significant public health impact.

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Appendix A

Non-fatal self-poisoning in Sri Lanka

Appendix A

No	Article (title, authors, year)	Methodology & where conducted	Participant details (how recruited etc.) & numbers	Participant gender ratio	Participant ages	Substances ingested (with frequency)	Proximal triggers	Details of psychiatric morbidity	Repetition rates	Other

Appendix B**Part A: (Interviewer administered)**

1. Date of admission to hospital: (day/month/year) [DOA]____/____/____

BHT: [BHT]_____

Date of poisoning: (day/month/year): [DATE SP]____/____/____

Date of discharge: (day/month/yr) : [DOD]____/____/____

2. Socio-demographic details

Item	Options	Coding
Gender	M 1 F 2	[PTSEX] 1, 2
Date of birth Day/month/year	Day/Month/Year	[DOB] ____ / ____ / ____ Unknown 9999
Ethnic background	Sinhala-1, Tamil 2, Moor 3, Burger 4, Other 5	[ETHNICITY] 1, 2, 3, 4, 5
Religion	Buddist-1, Hindu-2, Christian-3, Muslim-4, Other-5	[RELIGION] 1, 2, 3, 4, 5
Main language used for interview	Sinhalese 1/ English 2	[LANG] 1, 2,

Present Marital Status	1 Single 2 married/ living with partner 3 divorced or separated 4 spouse dead	[CIVIL] 1 2 3 4
Living with	1-alone, 2-with spouse and/or with children, 3-with parents 4-with other relations, 5-friends	[LIV] 1 2 3 4 5
Number of children	(Write Number): [KIDS]_____	
Age of youngest child	(Write Age in years): [KIDAGE]_____ years	

Non-fatal self-poisoning in Sri Lanka

Occupational status (consider what is <u>most appropriate</u> for the previous month)	1 -Full time employed 2 -Part time employed 3 -Temporary / casual employment 4. -Self employed 6- Retired 5 -Housewife 7 -Unemployed	[OCCUPST] 1 2 3 4 5 6 7
If employed, occupation (consider what is <u>most appropriate</u> for the previous month)	1- Elementary occupation (e.g. cleaner, labourer, gardener, domestic worker, housemaid) 2- Armed forces (army/navy/air force) or police 3 - Craft or related trades worker or machine operator (e.g. painter, baker, tailor, carpenter, mechanic, cook, driver, tailor) 4- Skilled agricultural or fishery worker (e.g. farmer, fisherman) 5- Service worker (e.g. worker in shop, waiter, cashier, hotel service, garment factory worker) 6 - Technician (e.g. lab assistant, PHI) or clerical worker (e.g. secretary, clerk) 7 Small business holder (e.g. owns a small shop) 8 Big business holder (owns a fairly stable business e.g. transport/shops/ etc) 9-Professional (e.g. science, law, health, art) 10- Manager/ Legislator/ Admin	[JOB] 1 2 3 4 5 6 7 8 9 10
Years of education completed	(Write rough number of years): [EDUCYRS} _____	
Highest level of Education Circle highest completed level- e.g. if failed A/L, circle 'passed O/L'	1-No schooling 2-completed between grades 1-5 3-completed between grades 6-10 3-Passed O/L 4-Passed A/L 5-completed university 6-completed postgraduate qualifications	[EDUC] 1, 2, 3, 4, 5, 6

Non-fatal self-poisoning in Sri Lanka

Pierce Suicide Intent Scale – To be completed by interviewer				
Pierce, D.W. (1977) <i>British Journal of Psychiatry</i> , 130, 377-385				
Circumstances				Code
1	Isolation	0	Someone present	[P1ISO] 0, 1, 2
		1	Someone nearby or on telephone	
		2	No-one nearby	
2	Timing	0	Timed so intervention probable	[P2TIME] 0, 1, 2
		1	Intervention unlikely	
		2	Intervention highly unlikely	
3	Precautions against rescue	0	None	[P3PREC] 0, 1, 2
		1	Passive (e.g. alone in room, door unlocked)	
		2	Active precautions	
4	Acting to gain help	0	Notifies helper of attempt	[P4ACT] 0, 1, 2
		1	Contacts helper, doesn't tell	
		2	No contact with helper	
5	Final acts in anticipation	0	None	[P5FINAL] 0, 1, 2
		1	Partial preparation	
		2	Definite plans (e.g. will, insurance, gifts)	
6	Suicide note	0	None	[P6NOTE] 0, 1, 2
		1	Note torn up	
		2	Presence of note	
Self-report				
7	Lethality	0	Thought would not kill	[P7LETHAL] 0, 1, 2
		1	Unsure if lethal action	
		2	Believed would kill	
8	Stated intent	0	Did not want to die	[P8INTENT] 0, 1, 2
		1	Unsure	
		2	Wanted to die	

Non-fatal self-poisoning in Sri Lanka

9	Premeditation	0	Impulsive	[P9PREM] 0, 1, 2, 3
		1	Considered less than 1 hour	
		2	Considered less than 1 day	
		3	Considered more than 1 day	
10	Reaction to act	0	Glad recovered	[P10REA] 0, 1, 2
		1	Uncertain	
		2	Sorry he/she failed	
Risk				
11	Predictable outcome	0	Survival certain	[P11OUT] 0, 1, 2
		1	Death unlikely	
		2	Death likely or certain	
12	Death without medical treatment	0	No	[P12DTH] 0, 1, 2
		1	Uncertain	
		2	Yes	

Items (1 + 2 + 3 + 4 + 5 + 6) = 'circumstances score' = _____

Items (7 + 8 + 9 + 10) = 'self-report score' = _____

Items (11 + 12) = 'Medical risk score' = _____

Total score: _____ [PIERCETOTAL] _____

Total score 0 – 3 = Low Intent; 4 – 10 = Medium Intent; More than 10 = High Intent

Non-fatal self-poisoning in Sri Lanka

Part B (*self-administered*)

1. Did you tell family/ friends/ other people that you intended to harm yourself?

0-No 1 Yes

[SPTELL] 0, 1,

2. Did you ingest alcohol prior to the self poisoning attempt?

[SPALCOHOL] 0, 1, 2

0- No

1- Ingested sufficient alcohol for deterioration of judicious capacity and responsibility

2- Intentional intake to facilitate and implement self poisoning attempt

3. Type of poison

What did you use /ingest for self-poisoning? [PTYPE] 1, 2, 3, 4, 5

Mark 1 option – or more, if person has ingested >1 type of poison during this episode.

1- Medicinal overdose (Name if known_____)

2- Pesticide ingestion (Name if known_____)

3- Plant poison (Name if know_____)

4- Petroleum based products e.g. kerosene (Name if known:_____)

5- Rat poison (name if known:_____)

6- Other household chemical (Name if known_____)

7- Other (Specify_____)

Non-fatal self-poisoning in Sri Lanka

4. How was the poison obtained?

Where did you get the poison/drug (that you ingested) from?

Where did you get the poison/ drug from?	No / Yes 1 NO 2 YES	Code
It was kept at home (for a different purpose)	1 NO 2 YES	[PWH1]
It was kept in the garden/ field (for a different purpose)	1 NO 2 YES	[PWH3]
I had bought it previously (more than 6 hours prior to the poisoning) with intention of ingesting it.	1 NO 2 YES	[PWH4]
I bought it within 6 hours before the poisoning with the intention of ingesting it.	1 NO 2 YES	[PWH5]
Other: Describe of possible:	1 NO 2 YES	[PWH6]

5. Reason for choice of that poison

Why did you choose this particular drug or poison? (mark YES wherever relevant)

Code	Reason	No 1, Yes 2
[PAVAIL]	It was easily available	1 NO 2 YES
[PCHEAP]	It was cheap	1 NO 2 YES
[PDANG]	I thought it was not dangerous (that I wouldn't die)	1 NO 2 YES
[PDAN2]	I thought it was dangerous (that I would probably die)	1 NO 2 YES
[PEASY]	I thought it would not hurt (an easy way to die)	1 NO 2 YES
[PQUIK]	I thought it would have a quick action	1 NO 2 YES
[PUGLY]	It's not disfiguring	1 NO 2 YES
[PFRIEN]	Close family / friend ingested it recently	1 NO 2 YES
[PNONE]	I didn't think about it/ no reason	1 NO 2 YES
[POTH]	Other (specify):	1 NO 2 YES

Non-fatal self-poisoning in Sri Lanka

6. Immediate trigger associated with non-fatal self-poisoning

Looking at what happened, did something happen that made you take poison? What happened?

What happened – (reason? – <i>external event</i>)	1 No	2 Yes	Coding
Argument with spouse	1 No	2 Yes	EV1
Argument with parent	1 No	2 Yes	EV2
Argument with child	1 No	2 Yes	EV3
Argument with other people (other than those named above)	1 No	2 Yes	EV4
Physically assaulted by spouse	1 No	2 Yes	EV5
Problem with romantic relationship	1 No	2 Yes	EV6
Unwanted pregnancy	1 No	2 Yes	EV7
Severe financial difficulties	1 No	2 Yes	EV8
Other (describe briefly):	1 No	2 Yes	EV9

Part C

8. _What did you think would happen, by taking the poison?

1. It would be completely safe
2. There would be mild, short term effects only
3. There would be significant harmful effects, but this would be short term only
4. There would be permanent harm or damage
5. It could cause death
6. Can't say/ did not think of what would happen

[OUTC] 1, 2, 3, 4, 5, 6

Non-fatal self-poisoning in Sri Lanka

9. Please think about how you have been feeling over the past 2 days (the past 1-2 days, including today – **AFTER attempting self poisoning**).

8.1) During this time, have had you had ideas of killing yourself? Or ideas of doing anything to end your life? **1 No, 2 Yes** **[SUICINOW]**

8.2) During this time, have you had thoughts that it would be better to be dead? Or that there is no point in living **1 No, 2 Yes** **[DEATHWNOW]**

Part D (interviewer-administered)

10. The following questions are about any attempts of suicide prior to this attempt.

10.1) Have you ever tried to kill yourself in the past? **1 No, 2 Yes** **[PASTSA]**

If YES how many times have you tried in the past? (prior to this attempt?)

Record number of previous attempts, e.g. 0 / 1 / 2.....

[PASTSANO] Number _____

(If no previous suicide attempts, record 0)

10.2) If you have attempted suicide prior to this episode, when was the last attempt?

[WHENSA] _____ / _____ (month/ year) 9999-can't remember/ not applicable

10.3) If yes, what methods have you used in the past? (circle as many as appropriate):

Methods: [PASTMETH]: 1, 2, 3, 4, 5, 6, 7

1-self poisoning, 2-hanging, 3-jumping in front of a vehicle/ train, 4-jumping in a well, 5-attempted drowning, 6-other, 7-can't say

(Record as many methods as reported)

9.4) Has a friend/ family member/ somebody you personally know committed suicide within the past year? **[COPYSA] 1 - No, 2 - Yes**

Part E (self-administered)

11.1) Have you gone to see a doctor or an arylurvedic physician, during the past one month?

[DOCVISIT] 1 – No, 2 - Yes,

11.2) If YES, what were your symptoms when you saw the doctor/ arylurvedic physician?

(Choose best answer based on patient's description of symptoms)

[DOCSYMP] 1-physical, 2-Psychological, 3-Both 999-Not applicable

11.3) When you last saw the doctor (aryurvedic or western), did you have thoughts of poisoning or killing yourself?

[SIDOC] 1- No, 2- Yes, 9999 – Not applicable/ Can't remember

Part F (self-administered)

The next few questions are about any treatment you may have had for a psychiatric illness in the past.

12.1) Have you ever received treatment for a psychiatric illness from a government clinic or private doctor (*outpatient treatment*)?

[PSYCLINC] 1 - No, 2 – Yes (*If No, go to Part G*)

12.3) If yes, what were you treated for? (*diagnosis- if known*)

1-depression, 2-bipolar affective disorder or Mania, 4-Schizophrenia, 5-Delusional Disorder, 6- Alcohol use disorder, 7-Anxiety disorder, 8-Mental retardation, 9-Other

_____ [OUTPTDIAG] 9999 : not known/Not applicable

Part G (self-administered)

12.4) Have you ever been admitted and treated in hospital, in a psychiatric ward?

1 - No, 2 – Yes [PSYCHINPT] (If No, go to Part F)

12.6) If yes, during this past psychiatric admissions what were you treated for? (*if known*)

1-depression, 2-bipolar affective disorder or Mania, 4-Schizophrenia, 5-Delusional Disorder, 6- Alcohol use disorder, 7-Anxiety disorder, 8-Mental retardation, 9-Other

_____ **[INPTDIAG] 9999 Not known**

Part H (self-administered)

These are some questions about your life during the past 6 months.

Have you experienced any of the following difficulties during the past 6 months?

Please circle Yes or No.

If YES, please state how much this problem effected you, by circling 1 (not at all), 2 (a little) or 3 (a lot).

Statement	During past 6 months	If Yes – could you say how much did this problem effected you 1-not at all, 2-a little, 3-a lot,
You yourself suffered a serious illness, injury or assault	Yes/ No	1, 2, 3,
A serious illness, injury or assault happened to a close relative	Yes/ No	1, 2, 3,
Your parent, spouse or child died	Yes/ No	1, 2, 3,
A close family friend or another relative (aunt, cousin, grandparent) died	Yes/ No	1, 2, 3,
You had serious problems (conflicts) with your parent / your child	Yes/ No	1, 2, 3,
You had serious problems (conflicts) with your father related to his alcohol misuse	Yes/ No	1, 2, 3,
You had a separation due to marital difficulties	Yes/ No	1, 2, 3,
You were separated from your spouse due to other reasons (e.g. due to spouse going abroad to work etc.)	Yes/ No	1, 2, 3,
A steady (romantic) relationship that you were in got broken	Yes/ No	1, 2, 3,
You had serious problems with your spouse or (romantic) partner	Yes/ No	1, 2, 3,
You had serious problems with your spouse/ partner related to his (or her) alcohol misuse	Yes/ No	1, 2, 3,
You had serious problems with your spouse /partner because he/she was suspicious of your fidelity	Yes/ No	1, 2, 3,
You had serious problems (conflicts) with a close friend/neighbour /inlaws	Yes/ No	1, 2, 3,
You became unemployed or you were seeking work unsuccessfully	Yes/ No	1, 2, 3,

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Statement	During past 6 months	If Yes – could you say how much did this problem effected you 1-not at all, 2-a little, 3-a lot,
You lost your job	Yes/ No	1, 2, 3,
You had a major financial crisis	Yes/ No	1, 2, 3,
You had problems with the police/ had a court appearance	Yes/ No	1, 2, 3,
Something you valued was lost or stolen	Yes/ No	1, 2, 3,
You were troubled by nightmares / bad dreams	Yes/ No	1, 2, 3,
Other (specify):	Yes/ No	

Have you been a victim of physical abuse within the past 6 months?

1 No 2 Yes

If yes, by whom was the abuse perpetrated?

1 Spouse / Partner 2 Parent 3 Child 4 Other

Have you been a victim of sexual abuse within the past 6 months?

1 No 2 Yes

If yes, by whom was the abuse perpetrated?

1 Spouse / Partner 2 Parent 3 Child 4 Other

The next questions are about your childhood, upto the age of 16 years.

1. How affectionate was your father towards you? [DADAFF] 1,2,3,4,5

1-A lot 2-Somewhat 3-A little 4-Not at all 5-No father/ father figure

If 'no father/ father figure' goto Q 4

2. Did you father suffer from depression or mental illness?

1-No 2-Yes [DADILL] 1,2

3. Did your father have problems due to alcohol misuse?

1-No 2-Yes [DADALC] 1,2

4. How affectionate was your mother towards you? [MOMAFF] 1,2,3,4,5

1-A lot 2-Somewhat 3-A little 4-Not at all 5-No mother/ mother figure

If 'no mother/ mother figure' goto Q 5

4. Did your mother suffer from a mental illness or depression?

1-No 2-Yes [MOMILL] 1,2

5. Was there a lot of conflict or tension (e.g. parental arguments/ fights) in your household when you were growing up? [HMCNFCT] 1,2,3,4

1-No 2-Yes

6. Did your parents live together when you were growing up?

1. No 2. Yes [LIVTOG] 1,2

6. Did your parents divorce or permanently separate when you were a child?

1-No 2-Yes [PADIV] 1,2

7. Did your mother go overseas to work, when you were a child?

1 No 2 Yes [MOMDEP] 1,2

8. Which of the following is true regarding your childhood (upto 16 years of age)?

Code	Statement	Yes	No	Can't Say
[ABHAP]	I had a happy childhood			
[ABPG]	My parents did their best for me			
[ABNEG]	I was neglected			
[ABSTR]	I had a strict, authoritarian or regimented upbringing			
[ABHUM]	I suffered humiliation, ridicule, bullying or mental cruelty from a parent			
[ABFIN]	I grew up in poverty or financial hardship			
[ABWIT]	I witnessed physical or sexual abuse of others in my family			
[ABPHY]	I was physically abused (e.g. punched, kicked, hit or beaten with an object, or needed medical treatment)			
[ABPHP]	I was physically abused by a parent (e.g. punched, kicked, hit or beaten with an object, or needed medical treatment)			
[ABPUN]	I received too much physical punishment – e.g. hitting, smacking			
[ABSEX]	I was sexually abused			
[ABSEXP]	I was sexually abused by a parent			
[ABNOR]	I had a normal upbringing			

Patient Health Questionnaire (PHQ-9)

Over the <i>last 2 weeks</i> , how often have you been bothered by any of the following problems? (circle your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself- or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite- being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself in some way	0	1	2	3

Peradeniya Depression Scale (PDS)

Please read each statement. Please consider how you have been feeling over the past two weeks, and for each statement, circle the answer that is most correct for you.

Do you often suffer from burning pain of the body?	Yes / No
Do you often have difficulty in sleeping at night?	Yes / No
Have you lost weight, with no diagnosed illness?	Yes / No
Do you have loss of appetite?	Yes / No
Do you suffer from any of the following?	
Headache or heaviness of the head	Yes / No
Chest aches	Yes / No
Aching pains of the limbs	Yes / No
Body aches	Yes / No
Abdominal fullness	Yes / No
Feeling faintish	Yes / No
During the past two weeks, have you been troubled by the following:	
Loneliness	Yes / No
Burning discomfort of the abdomen	Yes / No
Increased anger	Yes / No
Sadness	Yes / No
Do you often feel there is no point living any more?	Yes / No
Are you fearful about yourself and your family's future?	Yes / No
Have you lost confidence lately?	Yes / No
Do you often experience suspiciousness?	Yes / No
Do you think your current problems are due to any of the following reasons?	
A past sin you may have done	Yes / No
A bad time	Yes / No
Evil charms (done by others)	Yes / No
Do you have difficulty attending to your day-to-day activities?	Yes / No
Do you have difficulty attending to your job?	Yes / No

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Have you been avoiding people lately?	Yes / No
Have you been seeking treatment for an illness that could not be diagnosed?	Yes / No

Note: Given above is the English translation of the original Sinhalese scale. Some of the original terms were colloquial and are translated as best possible.

Generalized Anxiety Disorder 7 (GAD-7)

Over the last 2 weeks, how often have you been bothered by any of the following problems? (circle the best answer)	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

Alcohol Use Disorders Identification Test (AUDIT) Screening Instrument

Sri Lankan version (English translation)

Instructions: Please read the following questions, and examine the accompanying diagrams. Please circle the most appropriate answer for each question.

1. During the past 12 months, how often did you take alcohol at least once per day?

- (4) 4 times a week or more
- (3) 2 or 3 times per week
- (2) Between 2 to 4 times per month
- (1) Once a month or less
- (0) Never - *goto question 9*

2. During the past 12 months, how often did you take the alcohol that you most commonly drank? (Please circle the appropriate answer)

	Arrack	Whiskey	Kasippu	Beer	Strong beer	Toddy
4	> 1/2 bottle	> ¼ bottle	>1 bottle	> 4 bottles	> 2 bottles	> 3 bottles
3	1/4- 1/2 bottle	2 glasses (100ml each)	> ½ bottle	3-4 bottles	2 bottles	2-3 bottles
2	1/4 bottle	3 glasses (50ml each)	1/4-1/2 bottle	2-3 bottles	1 bottle	1-2 bottles
1	1-2 glasses (100ml each)	2 glasses (50ml each)	2-3 glasses	1-2 bottles	2 glasses (250ml each)	2 glasses (500ml each)
0	1-2 glasses (50 ml each)	1 glass (50ml each)	1 glass	2 glasses (250ml each)	1 glass (250ml each)	1 glass (500ml each)

**3. During the past 12 months, how often did you take alcohol in excess?
(please answer in relation to the type of alcohol you most frequently take)**

- (4) Daily or almost daily
- (3) Once a week
- (2) Once a month
- (1) Less than once a month
- (0) Never

**4. During the past 12 months, on how many days were you unable to stop
taking alcohol, after starting to drink?**

- (4) Daily or almost daily
- (3) Once a week
- (2) Once a month
- (1) Less than once a month
- (0) Never

**5. During the past 12 months, on how many days were you unable to attend to
your day-to-day activities because of alcohol use?**

- (4) Daily or almost daily
- (3) Once a week
- (2) Once a month
- (1) Less than once a month
- (0) Never

6. During the past 12 months, on how many days did you have to drink at least a glass of alcohol in the morning, in order to be able to do your day to day work?

- (4) Daily or almost daily
- (3) Once a week
- (2) Once a month
- (1) Less than once a month
- (0) Never

7. During the past 12 months, on how many days did you think that your alcohol use was a problem, or regret your alcohol use?

- (4) Daily or almost daily
- (3) Once a week
- (2) Once a month
- (1) Less than once a month
- (0) Never

8. During the past 12 months, on how many days were you unable to remember the previous days activities, due to alcohol use?

- (4) Daily or almost daily
- (3) Once a week
- (2) Once a month
- (1) Less than once a month
- (0) Never

9. During the past 12 months, have you or anyone else been hurt as a result of your alcohol use?

- (4) Yes, during the past year
- (2) Yes, but not during the last year
- (0) No

10. Have your friends, relations or a doctor repeatedly advised you to reduce your alcohol intake?

- (4) Yes, during the past year
- (2) Yes, but not during the past year
- (0) No

Beck Hopelessness Scale (BHS)

The questionnaire consists of 20 statements. Please read the statements carefully one by one. If the statement describes your attitude for the **past week including today**, circle the “T” indicating TRUE in the column next to the statement. If the statement does not describe your attitude, circle the “F” indicating FALSE in the column next to this statement. Please be sure to read each statement carefully.

1. I look forward to the future with hope and enthusiasm.	T	F
2. I might as well give up because there is nothing I can do about making things better for myself.	T	F
3. When things are going badly, I am helped by knowing that they cannot stay that way forever.	T	F
4. I can't imagine what life would be like in ten years.	T	F
5. I have enough time to accomplish the things I want to do.	T	F
6. In the future, I expect to succeed in what concerns me most.	T	F
7. My future seems dark to me.	T	F
8. I happen to be particularly lucky, and I expect to get more of the good things in life than the average person.	T	F
9. I just can't get the breaks, and there is no reason I will in the future.	T	F
10. My past experiences have prepared me well for the future.	T	F
11. All I can see ahead of me is unpleasantness rather than pleasantness.	T	F
12. I don't expect to get what I really want.	T	F

Non-fatal self-poisoning in Sri Lanka

13. When I look ahead to the future, I expect that I will be happier than I am now.	T	F
14. Things just don't work out the way I want them to.	T	F
15. I have great faith in the future.	T	F
16. I never get what I want, so it's foolish to want anything.	T	F
17. It's very unlikely that I will get any real satisfaction in the future.	T	F
18. The future seems vague and uncertain to me.	T	F
19. I can look forward to more good times than bad times.	T	F
20. There's no use in really trying to get anything I want because I probably won't get it.	T	F

Appendix C

Appendix C

Semi-qualitative interviews – information sheet for participants

Sri Lanka has a high rate of non-fatal self-poisoning. Suicide and attempted suicide causes distress to the person concerned and their families. But we do not know much about why people attempt to harm themselves by self-poisoning in Sri Lanka. Factors associated with non-fatal self-poisoning, such as the presence of significant stressors, or psychiatric illness, has not been studied much in this country.

By doing this research, we aim to describe the characteristics and factors associated with non-fatal self-poisoning in Sri Lanka. We believe this will lead to better methods to prevent non-fatal self-poisoning, and help support people in this situation.

This research project is being conducted by Dr Thilini Rajapakse, in association with the Australian National University, Australia, and the Dept of Psychiatry, Faculty of Medicine, University of Peradeniya, Sri Lanka.

This information sheet aims to provide you with enough information to let you decide whether you will take part in this research project.

What does it involve? A researcher will talk to you for about half an hour. She will ask you about the circumstances related to your self poisoning attempt, and the strategies you think could have helped you avoid harming yourself. An audio recording will be made of the conversation so that the researcher can listen to your words and write them down. The recording will then be erased.

Non-fatal self-poisoning in Sri Lanka

How confidential is the information? All information will be kept strictly confidential – the written data will not have your name attached to it, only an ID number. A list of the number and the name will be stored separately from your interview in a locked cabinet in the Department of Psychiatry, Peradeniya. The data will be used for research purposes only, and all data will be destroyed after 7 years.

Are there any risks attached to the research? The research only involves talking to you and recording down what you say. There is a chance that talking about the attempted self poisoning may cause you some distress. Every effort will be made to try minimize this, and to pace the conversation at a rate comfortable for you. You can at any time during or after the study, withdraw from the study by contacting me, Dr Thilini Rajapakse on 0777386232. Withdrawing from the study or not agreeing to be part of the study will in no way affect the treatment you receive from our hospital. It is up to you, as to whether you want to participate. If you should withdraw from the study, the usual practice is for us to retain the data you have already provided to us.

Listed below is the name and contact details of the researcher (in Sri Lanka) who is conducting this project. You are also welcome to contact the researcher if you have any queries or concerns.

Dr Thilini Rajapakse- Department of Psychiatry, Faculty of Medicine, Peradeniya

Tel: 0777386232

Non-fatal self-poisoning in Sri Lanka

Semi-qualitative interviews - consent form

- 1) I (please print) consent to take part in the study about those who attempt suicide by self poisoning in Sri Lanka. I have read the information sheet and understand it's contents. I understand the purpose of this research and my role in it, and give my consent freely.
- 2) I understand that if I agree to participate in the study, that I will be asked to take part in an interview for about half an hour, and the interview will include a discussion about my self -poisoning attempt and the circumstances that led up to it.
- 3) I understand that my interview will be audio taped, and that this information will be used for academic purposes only. I understand that though information provided by me during this research maybe published in academic journals or books, my name and personal information will not be used in relation to this.
- 4) I understand that the researcher will keep my personal information confidential as far as the law allows. My information will only be accessible to the researcher, and will be kept in a locked cabinet in the Department of Psychiatry, Faculty of Medicine, Peradeniya, Sri Lanka.
- 5) I understand that I may withdraw from the study at any stage, without giving a reason, and that this will not have any negative consequence to me, and will not affect my medical treatment or follow up in any way.

Signed.....

Date.....

Information Sheet – for cross-sectional survey and one-year follow-up

Sri Lanka has a high rate of non-fatal self-poisoning. Suicide and attempted suicide causes distress to the person concerned and their families. But we do not know much about why people attempt to harm themselves by self-poisoning in Sri Lanka. Factors associated with non-fatal self-poisoning, such as the presence of significant stressors, or psychiatric illness, has not been studied much in this country.

By doing this research, we aim to describe the characteristics and factors associated with non-fatal self-poisoning in Sri Lanka. We believe this will lead to better methods to prevent non-fatal self-poisoning, and help support people in this situation.

This research project is being conducted by Dr. Thilini Rajapakse, in association with the Australian National University, Australia, and the Department of Psychiatry, Faculty of Medicine, University of Peradeniya, Sri Lanka. This information sheet aims to provide you with enough information to let you decide whether you will take part in this research project.

What does it involve? You will be asked to participate in a survey, where the researcher will ask you some general questions about yourself (such as what you do and whom you live with). She also will talk to you about the circumstances around your self-poisoning attempt and will ask you to complete some brief questionnaires. These questionnaires will explore how you have been feeling in recent weeks, and whether you've had significant stressful events in your life.

Non-fatal self-poisoning in Sri Lanka

Subsequently, one year from now, the researcher will attempt to contact you again for a brief telephone conversation, and she will ask you how you've been doing in the previous year.

How confidential is the information? All information will be kept strictly confidential – the written data will not have your name attached to it, only an ID number. A list of the number and the name will be stored separately from your interview in a locked cabinet in the Department of Psychiatry, Peradeniya. The data will be used for research purposes only, and all data will be destroyed after 7 years.

Are there any risks attached to the research? The research only involves talking to you and recording down what you say. There is a chance that talking about the attempted self-poisoning may cause you some distress. Every effort will be made to try minimize this, and to pace the conversation at a rate comfortable for you. You can at any time during or after the study, withdraw from the study by contacting me, Dr Thilini Rajapakse on 0777386232.

Withdrawing from the study or not agreeing to be part of the study will in no way affect the treatment you receive from our hospital. It is up to you, as to whether you want to participate. If you should withdraw from the study, the usual practice is for us to retain the data you have already provided to us.

Listed below is the name and contact details of the researcher (in Sri Lanka) who is conducting this project. You are welcome to contact the researcher if you have any queries or concerns.

Dr Thilini Rajapakse- Department of Psychiatry, Faculty of Medicine, Peradeniya

Tel: 0777386232

Cross-sectional survey and one-year follow-up study: consent form

- 1) I (please print) consent to take part in the study about those who attempt suicide by self poisoning in Sri Lanka. I have read the information sheet and understand its contents. I understand the purpose of this research and my role in it, and give my consent freely.
- 2) I understand that if I agree to participate in the study, I will be asked to take part in a survey, where a researcher will interview me, and I will be asked to complete some questionnaires, about my self-poisoning attempt.
- 3) I also understand that the researcher will contact me one year from now, by telephone, and talk to me for about 10 minutes about how I have been doing during the previous year.
- 4) I understand that though information provided by me during this research maybe published in academic journals or books, my name and personal information will not be used in relation to this.
- 5) I understand that the researcher will keep my personal information confidential as far as the law allows. My information will only be accessible to the researcher, and will be kept in a locked cabinet in the Department of Psychiatry, Faculty of Medicine, Peradeniya, Sri Lanka.
- 6) I understand that I may withdraw from the study at any stage, without giving a reason, and that this will not have any negative consequence to me, and will not affect my medical treatment or follow up in any way.

Signed.....

Date.....

One-year follow-up study: information sheet (for telephone interview)

You may remember that you participated in a survey, one year ago, when you were in hospital after attempting self-poisoning. The aim of the research project was to describe non-fatal self-poisoning in Sri Lanka, and the factors associated with it. This is the last part of that study.

This research is being conducted by Dr. Thilini Rajapakse, in association with the Australian National University, Australia, and the Dept of Psychiatry, Faculty of Medicine, University of Peradeniya, Sri Lanka.

What does it involve? The researcher will talk to you over the phone for about 10 minutes. She will talk to you about how you've been doing in the past year, and whether you've had thoughts of attempting suicide recently, or whether you've made plans/ attempts to hurt yourself again within the past year.

How confidential is the information? All information will be kept strictly confidential – the written data will not have your name attached to it, only an ID number. A list of the number and the name will be stored separately from your interview in a locked cabinet in the Department of Psychiatry, Peradeniya. The data will be used for research purposes only, and all data will be destroyed after 7 years.

Non-fatal self-poisoning in Sri Lanka

Are there any risks attached to the research? The research only involves talking to you and recording down what you say. There is a chance that talking about your past attempted self-poisoning may cause you some distress. Every effort will be made to try minimize this, and to pace the conversation at a rate comfortable for you.

You can at any time during or after the study, withdraw from the study by contacting me, Dr Thilini Rajapakse on 0777386232. Withdrawing from the study or not agreeing to be part of the study will in no way affect any treatment or follow up you receive from our hospital. It is up to you, as to whether you want to participate. If you should withdraw from the study, the usual practice is for us to retain the data you have already provided to us.

Listed below is the name and contact details of the researcher (in Sri Lanka) who is conducting this project. You are welcome to contact the researcher if you have any queries or concerns.

Dr Thilini Rajapakse - Department of Psychiatry, Faculty of Medicine, Peradeniya

Tel: 0777386232

Appendix D

Appendix D

Motivations associated with non-fatal self-poisoning act: Format for semi-qualitative interviews

The interview should be conducted in a confidential setting, between the participant and the researcher. The researcher should start the interview with a brief introduction of herself and the format of the interview, and thereafter encourage the participant to discuss the recent non-fatal self-poisoning attempt. This discussion should be conducted at the participant's pace and follow the cues given by the participant; but it should necessarily include exploration of the following statements or questions (listed below). The participants should be encouraged to volunteer their answers to these questions, and to enlarge further upon their answers as relevant.

A.

Could you tell me about what led up to this (incident of self-poisoning)? /

What led to your being hospitalized? / What happened?

Why did you attempt to take poison (or relevant substance)?

(Note to researcher: Objectives of these queries: To explore what factors or events may have triggered this act. And to explore the participant's intentions at the time of ingesting poison)

Non-fatal self-poisoning in Sri Lanka

B.

Why did you choose this poison? Why this method?

(Note to researcher: Objectives of these queries: to explore reasons for choosing this type of poison)

C.

How do you feel about surviving now?/ about what you did?

At present do you have ideas that it would be better to be dead?

(Note to researcher: Objectives of these queries: to explore participant's reaction to surviving the act of self-poisoning).

Appendix E

Appendix E

Motivations associated with the non-fatal self-poisoning act - derived from results of the semi-qualitative interviews (Appendix D) and data from international literature.

Note: Participants of the cross-sectional survey were invited to peruse the list and mark whether they thought these motivations were applicable to themselves.

When you drank the poison, what were your underlying reasons? (underlying thoughts?) There are no right or wrong answers. This is just to help us understand your experience. Please circle the answer most appropriate for you, for each statement.

(self-administered)

Reasons	1 No 2 Yes	Code
Could no longer endure unbearable thoughts	1 NO 2 YES	RE1
Only alternative in unbearable situation / To escape an unbearable situation	1 NO 2 YES	RE2
To make things easier for others	1 NO 2 YES	RE3
To die	1 NO 2 YES	RE4
Lost control of myself	1 NO 2 YES	RI1
To get away (temporarily) from an unacceptable situation	1 NO 2 YES	RI2
To sleep for a while	1 NO 2 YES	RI3
To get help from someone	1 NO 2 YES	RA1

Non-fatal self-poisoning in Sri Lanka

To change someone's mind	1 NO 2 YES	RA2
To change a situation	1 NO 2 YES	RA3
To show someone how much I loved them	1 NO 2 YES	RA4
To know if someone really cared about me	1 NO 2 YES	RA5
To let others know how desperate I felt	1 NO 2 YES	RA6
To make someone feel guilty	1 NO 2 YES	RR1
To make others pay for how they treated me	1 NO 2 YES	RR2
Shame (e.g. couldn't face others / felt very ashamed)	1 NO 2 YES	RS1

Appendix F

Appendix F

Follow-up at one-year after index self-poisoning attempt: Format for telephone interview

After confirming the identity of the participant, the researcher should start by introducing herself and the purpose of the interview, as described in the information sheet for participants of the telephone interview (Appendix D). If the participant gives informed consent over the telephone to participate in the interview, the researcher should continue. The main objectives of the interview are to explore whether the participant has repeated an attempt(s) of self-harm during the one year following the index self-poisoning interview, and also whether the participant has recent suicidal ideation (within the past one week). The researcher should start the interview with general open ended queries regarding the how the participant has been doing since discharge from hospital one year ago; and as the interview progresses, the following queries/ statements should be made (see below). The participant should be encouraged to volunteer their answers and to elaborate as needed.

A

I will be asking you some questions about the past one year. (i.e. the year following your discharge from hospital after being treated for self-poisoning).

During the past one year did you make any attempts to end your life? Did you attempt suicide during the past 1 year?

If yes - what method(s) did you use? When was the last attempt (if you remember?)

If no – go to question B

B

The next few questions are about the past one week. Please think about how you have been feeling over the past one week (past 7 days, including today).

Over the past week, have had you had ideas of killing yourself? Or had ideas of doing anything to end your life?

Over the past week, have you had thoughts that it would be better to be dead? Or that there is no point in living?

It is expected that the telephone interview may last for about 10 minutes. At the end of the interview, the researcher should ask the participant if they wish to contact psychiatric services (via an appointment with a doctor, at the psychiatry clinic at Teaching Hospital Peradeniya) and if yes, should make the relevant arrangements. The researcher should also use her discretion and encourage the participant to contact medical services if relevant (e.g., if participant appears depressed or has current suicidal ideation).

Appendix G

Appendix G

Potential preventive strategies, described by those who have survived a recent act of non-fatal self-poisoning: Format for semi-qualitative interviews

The interview should be conducted in a confidential setting, between the participant and the researcher. The first part of the interview consists mainly of exploration of the triggers and motivations associated with the act of non-fatal self-poisoning (as described in Appendix D). This, second part of the interview should focus whatever strategies the participants may volunteer as potential preventive strategies for non-fatal self-poisoning. This discussion should be conducted at the participant's pace and follow the cues given by the participant; but it should necessarily include the following statements or questions (listed below). The participants should be encouraged to volunteer their own answers to these questions, and to enlarge further upon their answers as relevant.

A

Looking back at what happened, do you think you could have done anything to avoid the act of self-poisoning?

Could you have done anything else (instead of drinking poison)? (please describe)

OR

Non-fatal self-poisoning in Sri Lanka

Have there been times in the past, where you have had ideas of ending your life?/ideas of suicide? *If YES:*

What stopped you from acting then? / Did anything stop you from acting then? (please describe)

((Note to researcher: Objectives of these queries: To explore the participants' opinion on potential preventive strategies. The participants should be encouraged to describe and enlarge upon these suggestions in their own words))

OR if the participant has difficulty understanding/ responding to the above queries, rephrase as follows:

C

Imagine – if you have a close friend or relation, who is facing a similar distressing situation as you did, and is going to drink poison; can you think of anything you would suggest to help them cope in a different way, and to thereby prevent the act of self-poisoning?

Please describe.

Appendix H

Appendix H

List of preventive strategies, as suggested by participants of the semi-qualitative interviews (Appendix G), to avoid non-fatal self-poisoning at times of distress

Note: Participants of the cross-sectional survey were invited to peruse the list and mark whether they thought these strategies would be useful to themselves, at times of distress.

Intervention List

Given below is a list of activities and distractions. Please read each item. **Do you think engaging in these activities or strategies at a time of distress, could prevent you from re-attempting suicide?**

There are no right or wrong answers. We just want to know what seems appropriate and helpful for you. Depending on what you think, please tick 'yes' / 'no' / 'can't say' in front of each item.

Non-fatal self-poisoning in Sri Lanka

	<i>Would doing this probably prevent you from re-attempting suicide at a time of distress?</i>		
1. Talking to a close friend.	Yes	No	Can't Say
2. Talking to your parents or your brother or sister.	Yes	No	Can't Say
3. Thinking about the people you care about most	Yes	No	Can't Say
4. Remembering what happened the last time you took an overdose	Yes	No	Can't Say
5. Remembering that it is a shame to die by suicide	Yes	No	Can't Say
6. Going for a walk	Yes	No	Can't Say
7. Listening to music	Yes	No	Can't Say
8. Going to the temple	Yes	No	Can't Say
9. Remembering religious teachings	Yes	No	Can't Say
10. Doing housework – like cooking	Yes	No	Can't Say
11. Doing some work – like repairing a vehicle	Yes	No	Can't Say
12. Going out to look for firewood	Yes	No	Can't Say
13. Going to work	Yes	No	Can't Say
14. Reading a book	Yes	No	Can't Say
15. Writing poetry	Yes	No	Can't Say
16. Playing with young children	Yes	No	Can't Say

Appendix I

Publication: Characteristics of non-fatal self-poisoning in Sri Lanka: a systematic review.

RESEARCH ARTICLE

Open Access

Characteristics of non-fatal self-poisoning in Sri Lanka: a systematic review

Thilini Rajapakse^{1*}, Kathleen Margaret Griffiths² and Helen Christensen³

Abstract

Background: The rate of non-fatal self-poisoning in Sri Lanka has increased in recent years, with associated morbidity and economic cost to the country. This review examines the published literature for the characteristics and factors associated with non-fatal self-poisoning in Sri Lanka.

Methods: Electronic searches were conducted in Psychinfo, Proquest, Medline and Cochrane databases from inception to October 2011.

Results: 26 publications (representing 23 studies) were eligible to be included in the review. A majority of studies reported non-fatal self-poisoning to be more common among males, with a peak age range of 10–30 years. Pesticide ingestion was the most commonly used method of non-fatal self-poisoning. However three studies conducted within the last ten years, in urban areas of the country, reported non-fatal self-poisoning by medicinal overdose to be more common, and also reported non-fatal self-poisoning to be more common among females. Interpersonal conflict was the most commonly reported short-term stressor associated with self-poisoning. Alcohol misuse was reported among males who self-poisoned, and data regarding other psychiatric morbidity was limited.

Conclusions: The findings indicate that pesticide ingestion is the commonest method of non-fatal self-poisoning in Sri Lanka, and it is more common among young males, similar to other Asian countries. However there appears to be an emerging pattern of increasing medicinal overdoses, paralleled by a gender shift towards increased female non-fatal self-poisoning in urban areas.

Many non-fatal self-poisoning attempts appear to occur in the context of acute interpersonal stress, with short premeditation, and associated with alcohol misuse in males. Similar to other Asian countries, strategies to reduce non-fatal self-poisoning in Sri Lanka require integrated intervention programs with several key aspects, including culturally appropriate interventions to develop interpersonal skills in young people, community based programs to reduce alcohol misuse, and screening for and specific management of those at high risk of repetition following an attempt of self-poisoning.

Background

Sri Lanka has a high rate of suicide, which reached a peak in 1995, at 47 per 100,000 population [1,2]. Vijayakumar et al., in their review of suicide in developing countries reported that the average annual suicide rate for the 1990s in Sri Lanka was 21.6/100,000, a level that was high compared to rates in neighbouring India (9.7/100,000) and China (16.1/100,000) [3]. Pesticide poisoning, estimated to account for up to one-third of the world's suicides [4], is the most common method of

suicide in Sri Lanka, and in other South Asian countries [5-7]. Since 1995 the suicide rate in Sri Lanka has declined to 23 per 100,000 population (2006), a reduction that has been attributed to a drop in case fatality following reduction in toxicity of accessible pesticides [1]. Despite the drop in rate of completed suicide, the rates of non-fatal self-poisoning continues to be high [8,9]. The rate for non-fatal self-poisoning for males, as reported by a regional study in South Sri Lanka in 2002 was 330/100,000 [8] which is comparable to the highest average age standardized attempted suicide rates for males reported by the WHO/EURO para-suicide study of 314/100,000 [10]. Non-fatal self-poisoning is also associated with significant morbidity and economic cost to the country – for

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example, the cost of treating patients after self-poisoning in all of Sri Lanka in 2004 was estimated to be US\$ 866,304 [11].

Over the past 40 years, several studies have investigated the incidence rates and factors associated with non-fatal self-poisoning in Sri Lanka [7,9,12]. The findings from these studies suggest that non-fatal self-poisoning is a phenomenon of young people and that it is commonly seen in both genders [7,9,12]. The studies also suggest that factors associated with non-fatal self-poisoning in Sri Lanka may differ from those which operate in Western countries. In particular, the repetition rates (i.e., the suicide reattempt rates) appear low, and there are lower reported rates of associated psychiatric morbidity [13,14]. However, the heterogeneity of these Sri Lankan studies makes overall conclusions difficult. For example, most studies have been conducted in different regions of the country, some based in the community, and others based on hospital admission data. The studies are of varying sample size, design and duration, and the nature of the poisoning also varies. For example some studies examined pesticide self-poisoning only, some examined all types of self-poisoning, and some did not differentiate between intentional and accidental self-poisoning. To date there has been no overall synthesis of available evidence regarding attempted self-poisoning in Sri Lanka.

The main aim of this systematic review is to examine relevant published literature, in order to describe the rates, socio-demographic characteristics, risk factors such as psychiatric morbidity and previous self-harm associated with non-fatal self-poisoning in Sri Lanka. Based on the findings of this review, we also discuss non-fatal self-poisoning in Sri Lanka in the context of non-fatal self-poisoning patterns internationally, with particular reference to cross national World Health Organization studies relevant to attempted suicide [13,15]. Finally, based on the findings of this review, we also aim to discuss potential interventions to reduce non-fatal self-poisoning rates in Sri Lanka – including both first attempts, and repetitions. It is anticipated that a review of the literature from Sri Lanka will suggest directions for the development of effective intervention programs for reducing non-fatal self-poisoning rates in this country. Strategies to reduce mortality due to medical causes following non-fatal self-poisoning is beyond the scope of this review, and hence is not discussed.

Method

Search strategy for identification of studies

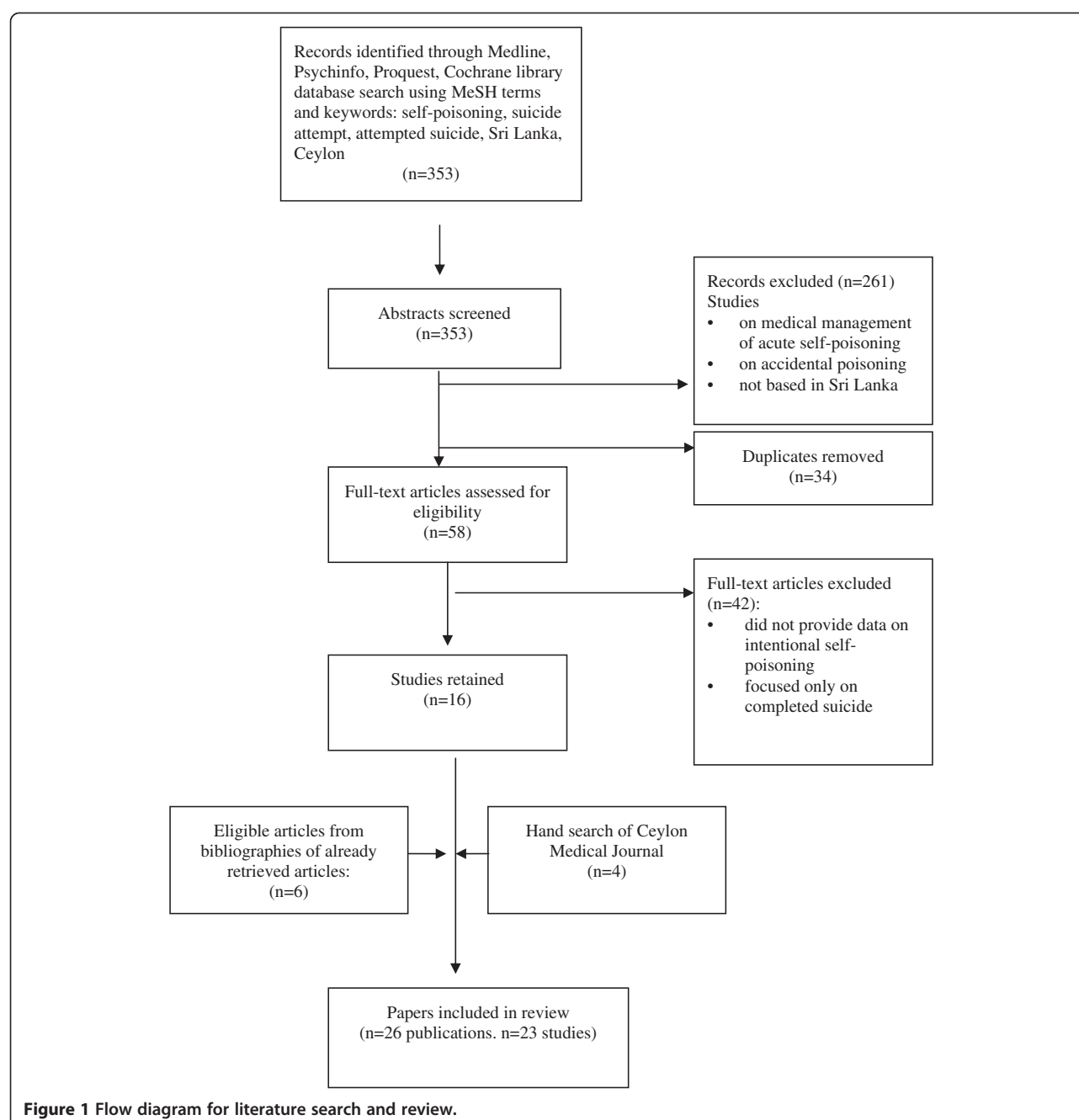
Electronic searches were conducted across bibliographic databases, namely Psychinfo, ProQuest Central, Medline and the Cochrane library from inception to 31st October 2011. Eligible studies published in indexed journals in the English language were located using combinations of

the following MeSH terms and keywords: self-poisoning, suicide attempt, attempted suicide, Sri Lanka, Ceylon (Figure 1). English is the medium used for scientific publication in Sri Lanka, and hence the search was conducted in English. The title and abstracts of all articles were perused initially, and those that clearly did not meet inclusion criteria were excluded. The full text of all remaining articles was retrieved and examined for eligibility to be included in the review, and the final decision to include an article was based on perusal of the full report. In addition, bibliographies of retrieved articles were also examined for relevant studies, and potentially relevant papers were then retrieved and reviewed using the above selection criteria. Print issues of the Ceylon Medical Journal were also hand-searched from its inception in 1954 onwards, for relevant papers, and print issues of The Journal of the Ceylon Branch of the British Medical Association, which is the forerunner of the Ceylon Medical Journal was also hand-searched as far as possible (wherever print records were available, from its inception in 1887 onwards); however there was no search of the grey literature.

Inclusion criteria

For the purposes of this review, the term 'non-fatal self-poisoning' is defined as self-poisoning attempts that were carried out intentionally, but with a non-fatal outcome. Thus, studies focusing on intentional, non-fatal self-poisoning in Sri Lanka, published in indexed journals, were eligible for inclusion in this review. Studies were also included if they reported on both accidental and intentional poisoning, provided that the intentional self-poisoning group could be clearly delineated for separate examination. Given the limited number of studies available, and to be as inclusive as possible, studies were included which exclusively considered survivors of intentional self-poisoning attempts, as well as those which considered participants who attempted intentional self-poisoning irrespective of outcome (i.e., which included those who survived as well as those who later died). No study was excluded on methodological grounds alone, and the search strategy included all types of study designs, including clinical trials, cross sectional descriptive studies and retrospective surveys.

The terminology used to describe suicidal behaviour and self-poisoning in Sri Lankan literature (as in the rest of the world) tends to vary considerably. Terms such as suicidal attempt, self-harm and self-poisoning are often used interchangeably and without accompanying definitions, and in many articles the degree of suicidal intent underlying the act is implied rather than described. In order to be as inclusive as possible, this review considered for inclusion all studies that focused on intentional, non-fatal self-poisoning in Sri Lanka, regardless of the terminology used to describe the behaviour. This



included studies in which suicidal intent associated with self-poisoning was overtly stated, as well as studies in which suicidal intent was implied, based on the behaviour of the participants concerned.

Exclusion criteria

Studies were excluded from the review if they were not conducted in Sri Lanka, if they were not written in English or if they exclusively reported data or outcomes which focused only on the medical management of acute self-poisoning. Since the aim of this review is to examine factors

associated with non-fatal intentional self-poisoning in Sri Lanka, studies which focused solely on accidental poisoning, as well as those which focused solely on fatal self-poisoning or completed suicides in Sri Lanka were also excluded.

Analysis strategy

A data extraction sheet was created, in order to code relevant information from each study included in the review, in a consistent manner. Outcomes of interest included study design, nature and size of sample, gender and age distribution, rates of self-poisoning, types of poison ingested and

where available, degree of suicidal intent associated with the act, and factors associated with self-poisoning, such as triggers, psychiatric morbidity and alcohol use disorders. The method of assessment of outcomes such as psychiatric morbidity and alcohol use disorders was also noted for each study. Each included publication was scrutinized by one author (TR) initially, and relevant data was extracted and tabulated for each study, using the data extraction sheet. Subsequently the data extraction and articles were reviewed by all three authors, and areas of contention were discussed and decided upon jointly by all three authors.

Results

As described above (Figure 1), after the initial database search, 353 abstracts were screened, of which 261 were excluded because the studies were either not based in Sri Lanka, focused only on accidental poisoning, or focused only on the medical management of acute self-poisoning. After removal of duplicates, full text publications of the remainder ($n = 58$) were retrieved and evaluated. Publications that did not provide data on non-fatal self-poisoning, and those that focused only on completed suicide were excluded ($n = 42$). 16 publications were retained after this full text screen, 6 more were added after the examination of bibliographies of the already retrieved publications and 4 were added after hand-searches of print issues of the Ceylon Medical Journal. Therefore in total 26 publications (representing 23 studies) were included in this review. Of the 23 studies included in the review, 3 studies were represented by 2 publications each, since these articles gave differing objectives and results. The 23 studies included in the review were of varying size and design. 18 were either cross sectional descriptive studies or retrospective studies based on medical case records (Table 1). One study included an intervention (brief intervention and contact following attempted self-harm) and was a randomized controlled trial [16]. In all except two studies, participants were inpatients admitted to hospital for medical treatment of acute self-poisoning. The remaining two studies were based in the community. When considered overall, 4 of the included studies were more robust in design, particularly with regards to methodology and study size [7,9,12,17]. Of these studies, one was a randomized nation-wide survey [12], two were large prospective studies (including >1000 participants each) [7,9], and the fourth comprehensively reviewed a described geographical area [17].

Rates of self-poisoning and repetition

Seven studies reported rates of self-poisoning (Tables 2 and 3). In all but one study [14], the data was derived from medical records of admissions to hospitals in the study area. The reported rates of non-fatal self-

poisoning, either by pesticide ingestion, or by ingestion of any type of poison, increased in the three decades leading up to the turn of the century. In 1971–2 the reported rate of non-fatal self-poisoning (by any poison) was 26.2 per 100,000 (Kandy region)[18], whereas in 2002 it was 315 per 100,000 (Galle region) (Table 3) [8]. However except for one study [12], all reported self-poisoning rates were for specific regions in Sri Lanka rather than for the population of the country as a whole. The single island-wide survey conducted in 1981 [12] examined a random sample of clinical records of patients discharged during 1979 from all 10 general hospitals, and 5 of the 14 base hospitals, that provided inpatient care within the government health sector in Sri Lanka at that time. This study reported the rate of pesticide poisoning in Sri Lanka to be 79/100,000 population in 1979 (of which 73% was due to non-fatal self-poisoning), and also reported a clear variation in the rate of poisoning in different parts of the country, the highest rate being in the North and Northeast areas (Jaffna and Batticaloa regions) [12].

The WHO SUPRE-MISS Study [16] prospectively examined repetition rates, where repetition was described as one or more suicide attempts following the baseline attempt of suicide (of which >90% was by self-poisoning), and reported that among the 'treatment-as-usual' group in Sri Lanka, 4% had repeated a suicide attempt by 18 months follow up. There were no other prospective studies on repetition rates following non-fatal self-poisoning. However two studies retrospectively examined rates of previous self harm (by any method) in those presenting to hospital with non-fatal self-poisoning, and reported previous self harm rates of 20% [14], and 8% [19].

Substances used for self-poisoning

All except two studies [8,20] included in this review provided details on the types of poisons ingested by those who non-fatal self-poisoning. Six studies included only those who attempted poisoning by pesticide ingestion [12,14,21–24], and one study included only attempted poisoning by oleander ingestion [25]. The remaining 14 studies included in this review considered non-fatal self-poisoning in general. Among these 14 studies, in all but three [13,26,27], the most commonly ingested poison (by both sexes) was pesticides, with rates varying from 45.2% [28] to 77% [29]. Other ingested substances included pharmaceutical drugs, household chemicals – e.g., petroleum derivatives such as kerosene oil – and plant poisons, such as oleander. Non-fatal self-poisoning by pharmaceutical drug overdoses was reported in all 14 studies, but in most (11 studies) pharmaceutical overdoses occurred less frequently than pesticide ingestion. Of the three exceptions, two studies were conducted relatively recently (i.e., within the last 10 years) in urban

Table 1 Sri Lankan studies on attempted self-poisoning included in this review

Randomized Controlled Trials (RCT):				
No	Study	Study Design	N	Outcomes examined
1	Fleischmann et al. 2005 [13]	RCT of brief intervention following attempted suicide	1067	Demographic features, methods used and outcomes
2	Bertolote et al. 2010 [16]	Same study as above	TAU: 149 BIC: 151	Rate of repetition of attempted suicide at 18 months
Case control:				
No	Study	Study Design	N	Outcomes examined
3	Seneviratne et al. 1999 [37]	Case control	168 cases	Demographic features, psychiatric morbidity
4	Van Der Hoek et al. 2005 [14]	Case control	253 cases**of which 84% was intentional	Demographic features, types of poisons, risk factors
Cross sectional descriptive:				
No	Study	Subjects	Number of subjects	Outcomes examined
5	Fernando [35]	Subjects: patients hospitalized after poisoning	101	Demographic characteristics, poisons used
6	Chandrasena 1981 [29]	Subjects: patients hospitalized after poisoning	64	Demographic characteristics, poisons used, psychiatric morbidity
7	Jeyaratnam et al. 1987 [21]	Residents in the study area who had a history of hospital admission for poisoning + farmers in agricultural communities in 4 South Asian countries	94 (in Sri Lanka)**of which 36.2% was intentional	Types of pesticides used ingested, awareness among consumers of health hazards of pesticides
8	Hettiarachchi et al. 1989 [30]	Patients hospitalized due to self-poisoning in South Sri Lanka.	97	Demographic features, types of poisons, reasons for choice of poison and where obtained
9	Hettiarachchi et al. 1989 [33]	Same study as above	97	Intent, triggers, psychiatric morbidity
Cross sectional descriptive continued:				
No	Study	Subjects	Number of subjects	Outcomes examined
10	Eddleston et al. 2005 [7]	Patients hospitalized after self-poisoning, in a rural agricultural area, over one year	2189	Demographic characteristics, type of poisons ingested
11	Eddleston et al. 2006 [32]	Subjects: patients hospitalized after self-poisoning (opportunistic sample)	268	Reasons for choice of poison, outcome, expected outcome, premeditation
12	De Silva et al. 2008 [26]	Inpatients after self-poisoning (Colombo region)	191	Demographic characteristics, types of poisons ingested
13	Fahim et al. 2010 [19]	Inpatients after self poisoning (Polonnaruwa & Peradeniya regions)	816	Rate of previous self-harm
14	Dawson et al. 2010 [24]	Patients admitted to two rural hospitals after deliberate ingestion of a single pesticide, from 2002 to 2008.	9302	Demographic features, type of pesticide ingested
Retrospective survey of medical records:				
No	Study	Type of records surveyed	Number of records	Outcomes examined
15	Senewiratne et al. 1974 [18]	Records of all inpatients treated at Kandy Hospital for acute poisoning, in 1970 and 1971	472* *of which 82% was intentional	Rates of attempted poisoning, demographic features, types of poisons ingested
16	Dissanayake et al. 1974 [20]	Police records 1970–72, of the Police Post, General Hospital, Colombo region + Case notes of admissions for poisoning to Colombo Hospital 1970–72	270**of which 49% was intentional104 (non-random sample)	Demographic features (age and gender)
17	Jeyaratnam et al. 1982 [12]	Randomly selected hospital records of patients discharged with a diagnosis of pesticide poisoning, from hospitals throughout Sri Lanka	1000	Rates of poisoning, demographic features, types of poisons ingested
18	Senanayake et al. 1986 [36]	Hospital admissions for acute poisonings in hospitals in selected areas of Sri Lanka (Peradeniya, Colombo, Galle and Jaffna regions)	Peradeniya-179 Galle-100 Colombo- 101 Jaffna- 446	Demographic features, types of poisons ingested, associated illness
19	Hettiarachchi et al. 1989 [17]	Records of patients hospitalized due to non-fatal poisoning over a 1 year (1986–7) (South Sri Lanka)	669**of which 73% was intentional	Prevalence rates, demographic features, types of poisons, case fatality.

Table 1 Sri Lankan studies on attempted self-poisoning included in this review (Continued)

Retrospective survey of medical records continued:				
No	Study	Type of records surveyed	Number of records	Outcomes examined
20	Eddleston et al. 1999 [25]	Hospital records of patients treated for self ingestion of oleander plant (1995–96) + Assessment of inpatients after oleander ingestion	415 79	Demographic features, triggers for self-poisoning
21	De Silva et al. 2000 [34]	Hospital records of patients hospitalized due to parasuicide in Kandy, Peradeniya, Kurunegala and Matale regions during 1993–94.	5036* *of which >80% was intentional	Demographic features, type of poisons ingested
22	Van Der Hoek et al. 2006 [9]	Hospital records of patients hospitalized due to poisoning, in South Sri Lanka, from 1990–2002.	8110**of which 64% was intentional	Demographic features, rates of poisoning, type of poisons ingested
23	Manuel et al. 2008 [8]	Hospital records of patients admitted due to self-poisoning in rural south Sri Lanka + selected economic indices of that area	844	Rates of attempted poisoning, associations with socioeconomic indices
24	Senadheera et al. 2010 [27]	Hospital records of children & adolescents admitted to Hospital in South Sri Lanka (Karapitiya region), due to deliberate self-harm	827**of which 99% was due to attempted self-poisoning	Demographic features, types of substances ingested, change of substances ingested with time
Qualitative:				
No	Study	Study Design	N	Outcomes examined
25	Van Der Hoek et al. 1998 [23]	Mixed methods-Retrospective analysis of hospital records for information on occurrence of pesticide poisoning in the area + Qualitative interviews of families living in a village in a rural agricultural area	526**of which 68% was intentional	<u>Quantitative</u> : Socio-demographic features, types of pesticides ingested. <u>Qualitative</u> : Exploration of daily use, practices and storage regarding pesticides
26	Konradsen et al. 2006 [22]	Qualitative interviews with those who have attempted intentional self-poisoning, key workers in the area and focus group discussions with those from that community.	159	Exploration of factors and triggers associated with attempted self-poisoning (particularly sociological aspects).

Colombo – in one study pharmaceutical drug overdoses was the most common type of poison used by both sexes [26], and in the other it was the most common method of non-fatal self-poisoning in females [13]. The third such study examined non-fatal self-poisoning in adolescents (below 19 years), and here too pharmaceutical drug overdoses were the most common method used by females [27].

When considering patterns of substances ingested over time, studies published up to the turn of the century reported pesticides to be the most commonly ingested substance, irrespective of gender or region where the study was conducted (Table 4). Five studies included in this review were carried out after 2001, and of these, the studies conducted in urban areas reported an increasing frequency of medicinal overdoses over time (Table 4) [13,26].

Overall pesticide ingestion occurred more commonly among males than females, whereas medicinal overdoses, and the ingestion of plant poisons and petroleum derivatives was more common among females [9,13,17,25,30,31]. A study included in this review which examined trends of attempted self-poisoning among children and adolescents (aged 9–18 years), reported that overall a majority of girls took medicinal overdoses, whereas a majority of the boys ingested other poisons (such as washing powder, pesticides and kerosene oil) [27].

Three studies directly examined reasons for choice of poison in those who attempted poisoning, and in all three studies, the most commonly cited reason for choice was easy availability [26,30,32]. Of the three studies which reported on where the poison was obtained from, two studies reported that most persons (50–75%) obtained the

Table 2 Rates of self-poisoning (per 100,000 population) – pesticides only

Authors	Period of study (Year)	Area studied	Rates of self-poisoning by ingestion of pesticides
Jeyaratnam et al. 1982 [12]	1979	Sri Lanka (nationwide)	79/100,000**of which 73% was due to intentional self-poisoning
Van Der Hoek et al. 1998 [23]	1991–94	North-Central Province	260/100,000 per year to 290/100,000 per year**of which 68% was due to intentional self-poisoning
Van Der Hoek et al. 2005 [14]	1999	Uda Walawe region	163/100,000**of which 84% was due to intentional self-poisoning

Table 3 Rates for intentional self-poisoning (per 100,000 population) – for any type of substances including pesticides

Authors	Period of study (Year)	Area studied	Rates of self-poisoning by ingestion of any type of substance
Senewiratne et al. 1974 [18]	1971-2	Kandy region	26.2 /100,000**of which 82% due to intentional self-poisoning.
Hettiarachchi et al. 1989 [17]	1986-87	Galle region	54.7/100,000 (all due to intentional self-poisoning)
Van Der Hoek et al. 2006 [9]	1990-2002 Rate for year 2002	Southern Sri Lanka	318 per 100,000*of which 64% were due to intentional self-poisoning 350/100,000**of which 64% were due to intentional self-poisoning
Manuel et al. 2008 [8]	2002	Southern Sri Lanka	315/100,000 (all due to intentional self-poisoning).

poison from their own homes or gardens [30,32]. In both these studies pesticides were the most commonly ingested type of poison. However, the study in Colombo which reported medicinal overdose as the most self-poisoning was medicinal overdose reported that a majority obtained the drugs from pharmacies, purchased over the counter [26].

Socio-demographic factors

Age distribution Of the studies included in this review, 19 described the age distribution of those who carried out non-fatal self-poisoning. Four studies reported a peak age range of 15–24 years [26,29,33,34]. Another five

Table 4 Types of poison ingested by males and females (studies listed in order of the year in which study was carried out, oldest first)

Study	Year(s) and Place where study was conducted	First most commonly ingested poison type		Second most commonly ingested poison type	
		Among Males	Among Females	Among Males	Among Females
Senewiratne et al. 1974 [18]	1970-1971 Kandy region	Pesticides	Pesticides	Medicinal overdose	Medicinal overdose
Chandrasena et al. 1981 [29]	1976 Kandy region	Pesticides	Pesticides	Medicinal overdose	Medicinal overdose
Fernando et al. 1977 [35]	1976 Colombo region	Pesticides (for both genders)		Medicinal overdose (for both genders)	
Senanayake et al. 1986 [36]	1984 Peradeniya, Colombo, Galle, Jaffna regions	Pesticides	Pesticides	Medicinal overdose	Medicinal overdose
Hettiarachchi et al. 1989 [17]	1986-1987 Galle region	Pesticides	Pesticides	Kerosene	Kerosene
Hettiarachchi et al. 1989 [30]	1989 Galle region	Pesticides	Pesticides	Medicinal overdose	Medicinal overdose
De Silva 2000 [34]	1987-1991 Central Sri Lanka	Pesticides (for both genders)		-	-
Senewiratne et al. 1999 [37]	1996-1997 Ragama region	Pesticides (for both genders)		Medicinal overdose (for both genders)	
Van Der Hoek et al. 2006 [9]	1990-2002 Ratnapura, Monaragala, Hambanthota regions	Pesticides	Household products (mostly kerosene derivatives)	Pesticides	Household products (mostly kerosene derivatives)
Eddleston et al. 2005 [7]	2002-2003 Anuradhapura, Polonnaruwa regions	Pesticides	Pesticides	Oleander (plant)	Oleander (plant)
Fleischmann et al. 2005 [13]	2002- 2004 Colombo region	Pesticides	Medicinal overdose	Medicinal overdose	Pesticides
Senadheera et al. 2010 [27]	2001-2007 Galle region	Pesticides and other poisons (e.g. kerosene, household poisons)	Medicinal overdoses		
Study	Year(s) and Place where study was conducted	First most commonly ingested poison type		Second most commonly ingested poison type	
		Among Males	Among Females	Among Males	Among Females
Fahim et al. 2010 [19]	2005-2007 Peradeniya & Polonnaruwa regions	Pesticides	Oleander (plant)	Pesticides	Oleander (plant)
De Silva et al. 2008 [26]	2007 Colombo region	Medicinal overdose	Medicinal overdoses	Pesticides	Pesticides

studies described slightly broader, similar peak age ranges between 10–30 years [8,12,17,28,35], and most remaining studies described mean or median ages of below 30 years [7,9,13,14,20,24,25,32,36,37].

Gender distribution All but one study [21] included in this review reported the gender distribution of those who carried out non-fatal self-poisoning. Most (16 studies) reported higher rates of non-fatal self-poisoning among males. In these studies the percentage of males ranged from 51.5% [30] to 72% [12]. Of the remaining studies, in one the ratio between the sexes was almost equal [19], and in five the rate was higher among females [14,25–27,37]. In three of the studies which reported a female preponderance of non-fatal self-poisoning, the type of poison most frequently ingested was medicinal overdoses and plant poisons rather than pesticides [25–27]. Gender distribution of non-fatal self-poisoning in urban areas, within the last 10 years, was reported in three studies only [13,26,27], and all three reported a higher prevalence of poisoning among females.

Rural versus urban No studies made direct comparisons between non-fatal self-poisoning in rural versus urban areas. Most studies (11 of the 23) were conducted in rural agricultural areas of the country. In the rurally-based studies, the rate of non-fatal self-poisoning was higher in males than females, and the most frequently ingested substance was pesticide. Of the remaining studies, five reported results from urban areas prior to 20 years ago (1985, 1976, 1971 & 1977), and the results of these studies were similar—pesticide ingestion was the most common mode of non-fatal self-poisoning [20,28,29,35,36], and rates of non-fatal self-poisoning were higher in males. In contrast, as noted above, two of the studies conducted in urban areas within the past 10 years (2007 & 2004) [13,26] among adults, reported a higher rate of non-fatal self-poisoning among females. In these latter two studies, pharmaceutical drug overdose was the most commonly used method by females in one study [13], with paracetamol being the most commonly ingested poison by both sexes in the second study [26]. Another study, conducted in both urban and rural areas during 2005–2006, reported that overall, the most commonly ingested substance was pesticides [19].

Psychiatric morbidity Nine of the twenty-three studies in this review reported psychiatric morbidity and alcohol use among those with non-fatal self-poisoning (Table 5) [14,22,25,29,33–37]. With regards to the method of psychiatric assessment, one study included assessment of each participant by a specialist psychiatrist [37], and another had used a questionnaire based on the Composite

International Diagnostic Interview Short Form (CIDI-SF) [14]. The remaining studies were either interview based or based on perusal of medical records, and did not give details of the nature of the psychiatric assessment. Four studies reported rates of depression, and four studies investigated the presence of alcohol use disorders (Table 5). None of the studies investigated possible associations between non-fatal self-poisoning and other psychiatric conditions, such as anxiety disorders, impulse control disorders, or bipolar disorder. Of the four studies that examined for depression, one reported psychiatric illness in 13.4% of participants, of which depression was seen in 77% [33], one reported depression in 31 participants (18.5%) [37], whereas in contrast, one study found no significant association between self-poisoning and depression [14]. Three studies reported rates of alcoholism ranging from 2% to 10% [29,33,37]. Up to 50% of males with non-fatal self-poisoning were reported to be intoxicated at the time of the attempt [14,22,25].

Premeditation, triggering factors and suicidal intent

Four (of the twenty-three) studies reported the duration of premeditation prior to the self-poisoning act [25,26,32,33]. These studies found little premeditation. In one study 74% of the self-poisoning acts occurred within 4 hours of making the decision to ingest poison [33], and in another, more than half of the participants reported ingesting the poison within 30 minutes of an interpersonal conflict (argument) [25]. In addition, a study from urban Colombo reported that of those who purchased medication for the purpose of overdose, about 80% made the purchase within one hour of ingestion [26].

Six studies identified triggers that precipitated the non-fatal self-poisoning act [22,25,29,32,33,35]. Of these, five studies reported that the commonest precipitant (in >50% of those who self-poisoned) was interpersonal conflict. Common examples included domestic disputes and romantic relationship problems, leading to arguments with family members [33]. Konradsen et al. [22] described alcohol misuse as a significant factor in non-fatal self-poisoning among Sri Lankan males. This study also described ways in which alcohol misuse (among males) led to domestic violence and interpersonal conflict within the home, thereby indirectly contributing to increased risk of self-poisoning in the misuser as well as his wife and children.

Intent to die (at the time of the attempt) was directly reported in only two studies. One of these studies which reported on participants after non-fatal self-poisoning by ingestion of any substance, found that 55.7% wished to die (and 27% retained that wish after surviving the act) [33]. The other study [25] which examined only non-fatal self-poisoning by ingestion of oleander seed (a plant poison) reported that most who attempted did not want to die.

Table 5 Rates of psychiatric illness and alcohol use in those who have attempted self-poisoning

Study	Method of Psychiatric Assessment	Rates of psychiatric illness and alcohol use among study participants (and details where available)
Fernando 1977 [35]	Participants interviewed as part of the study. Further details of psychiatric assessment not available.	• Psychiatric illness: 15.9% (this included schizophrenia, depression and mental retardation)
Chandrasena 1981 [29]	Participants interviewed as part of the study. Further details of psychiatric assessment not available.	• Psychiatric illness – 13% • Alcoholism – 2%
Senanayake et al. 1986 [36]	Information based on administrative records.	• Psychiatric illness - 5% (in Jaffna region) & 2.3% (in Peradeniya region) • Alcohol consumption at time of poisoning: 4% (in Peradeniya region)
Hettiarachchi et al. 1989 [33]	Participants interviewed as part of the study. Further details of psychiatric assessment not available.	• Psychiatric illness – 13.4% (Depression and schizophrenia present in equal numbers, in 77% of psychiatric illness) • Alcoholism – 7%
Seneviratne et al. 1999 [37]	A psychiatric assessment of each participant was conducted by a specialist psychiatrist.	• Depression – 18.5% • Schizophrenia – 1.2% • Alcoholism – 10.7%
Eddleston et al. 1999 [25]	Participants interviewed as part of the study. No formal psychiatric assessment.	• Alcohol intoxicated at the time of self-poisoning: 50% of male participants
De Silva et al. 2000 [34]	Data obtained from hospital records.	• Use of alcohol before/during self-poisoning: 6%
Van Der Hoek et al. 2005 [14]	A small subsample of the study population was assessed using a questionnaire based on the Composite Diagnostic Interview Short Form (CIDI-SF).	• Alcohol dependence is significantly associated with increased risk of self-poisoning. • No significant association between depression and self-poisoning (sub sample) • Alcohol intoxicated at time of self-poisoning: 36%
Konradsen et al. 2006 [22]	Based on interviews and focus group discussions.	• Life threatening illness or disability or mental illness– 8% • Alcohol intoxicated at time of self-poisoning: 32% (all males)

Discussion

Rates, and types of poisons used

Despite the reported drop in completed suicide rates in Sri Lanka after 1995 [1], the rates of non-fatal self-poisoning in this country have increased in the three decades leading up to the turn of this century [8,9,12,18,19] (Tables 2 and 3), and this trend is seen both for non-fatal self-poisoning by pesticide ingestion, as well as for poisoning by ingestion of any other substance. This is supported by the more recent findings of De Silva et al. [38], who reported that the rate of hospital admissions for any type of poisoning in Sri Lanka has increased from 204.8 admissions per 100,000 population in 1995, to 321.2 per 100,000 in 2007 – this despite a clear drop in the rate of completed suicides during the same period. The reported non-fatal self-poisoning rates for Sri Lanka are also high when compared with rates of self-poisoning in other developing countries, including Turkey (145 per 100,000) [39] and Suriname, South America (284 per 100,000) [40]. In Europe, the WHO/Euro multicentre study reported the highest average male-standardized attempted suicide rate to be 314/

100,000 in Helsinki, Finland [10], a rate not dissimilar to the rate of non-fatal self-poisoning reported for males in Galle, Sri Lanka in 2002 (330/100,000) [8] (Table 3).

Direct country comparisons between rates of non-fatal self-poisoning require carefully interpretation. First, in the Sri Lankan studies, most rates are based on regional samples, and are not necessarily generalizable to the entire country. Data from 1979 showed hospital admission rates for pesticide poisoning to be highest in the North of the country [12]. Second, an important confounder is that most of the available rates are derived from studies based on hospital admissions. Thus, factors influencing the rates of admission to hospital following non-fatal self-poisoning – such as improvement in transport services and increased numbers of peripheral hospitals – could impact on study findings over time. The toxicity of ingested substances may also influence hospital admission rates – prior to the restriction of the sale of toxic pesticides such as WHO Class I toxicity pesticides in Sri Lanka [1], many who ingested pesticides may have died prior to admission to hospital.

As expected, when considered overall, the most commonly ingested substance with regards to non-fatal self-poisoning in Sri Lanka was pesticides (Table 4), similar to neighbouring countries such as India [41]. However, two studies carried out after 2001 in urban areas of the country, report medicinal overdoses to be the most common substance used, for both genders in one study [26], and among females in the other study [14] (Table 4). Interestingly, two studies included in this review reported on changes in types of poisons ingested over time [9,27], of which the more recent study by Senadheera et al. [27] of young people aged less than 19 years in urban Galle reported a dramatic increase of medicinal overdoses from 2001 to 2007. This included a five-fold increase of paracetamol overdose from 2001 to 2007. The findings of this review suggest that there has been an increasing rate of pharmaceutical drug overdoses rather than pesticide self-poisoning during the last decade in more urbanized areas of the country. The recent review by De Silva et al. reported similar findings for Sri Lanka, i.e., increased hospital admissions for poisoning by medicinal and biological substances, and decreased admissions due to pesticide ingestion since 2003 [38]. Interestingly, a recent study published in 2012 reports that while the highest rates of non-fatal self-poisoning are seen in agricultural areas (e.g., Anuradhapura, Polonnaruwa, Hambanthota), even in these areas there is a rapid increase in self-poisoning with medicinal overdoses and other biological substances [42]. The reason for these changes has not been directly investigated. However, given that the most common reason for choice of poison is easy availability [26,30,32], the finding may reflect the increasing accessibility of medicines relative to pesticides, particularly with urbanization. This trend has important implications, for future health policy in Sri Lanka. It suggests that policy makers should consider introducing preventive strategies such as restriction of the quantity of paracetamol available as a single purchase, in order to reduce risk of medical complications associated with self-poisoning due to overdoses [43].

Demographic factors of those who attempt self-poisoning

There are both similarities and differences in the patterns of demographic characteristics among non-fatal self-poisoning in Sri Lanka and other countries. In Sri Lanka non-fatal self-poisoning is seen predominantly among young adults aged between 15 and 30 years. This is similar to self-poisoning patterns described elsewhere, in both the developed and developing world [6,10,40,44-47].

By contrast, the gender distribution of non-fatal self-poisoning in Sri Lanka differs from that in Western countries. In the majority (14) of the studies included in the review, the rate of non-fatal self-poisoning in Sri Lanka was greater in males than females. This is the reverse of the findings from Western countries [10,44,46].

For instance, in the WHO/EURO multicentre parasuicide study, in all except one centre (Helsinki) the suicide attempt rate (a majority by non-fatal self-poisoning) was higher for females, the average male: female ratio being 1:1.5 [10]. However, gender distribution patterns similar to Sri Lanka have been reported from elsewhere in Asia [47-49].

The reason for the higher rate of non-fatal self-poisoning among males in Sri Lanka is not clear. One possible influencing factor is the pattern of alcohol consumption in this country. Sri Lanka is reported to have a high level of alcohol consumption, as indicated by an increase in alcohol related health problems in recent years [50], and culturally, alcohol use is much more common among men compared to women in this country. Alcohol use disorders are known to be associated with suicidal behaviours [51], and in keeping with this, Sri Lankan studies have reported that up to 50% of men were under the influence of alcohol at the time of the self-poisoning act [14,22,32].

When examining the gender ratios according to region, Sri Lankan evidence indicates that the rates of non-fatal self-poisoning in males are higher than females primarily in rural agricultural areas of the country. Again the reasons for this are unclear. One hypothesis is that men living and working in rural agricultural areas have easy access to pesticides stored in the fields or gardens. Previous work has also suggested that continued exposure to pesticides itself may increase suicidal ideation [52], but this remains an area for future research.

In contrast to the findings from the rural agricultural areas, two studies conducted relatively recently in urban areas of Sri Lanka [13,26] have reported a higher rate of non-fatal self-poisoning for females, and in one study the most common substance used for non-fatal self-poisoning was pharmaceutical drug overdose rather than pesticide ingestion [26]. This appears to signify a trend that has been emerging in the last decade, of an increasing ratio of non-fatal self-poisoning among females compared to males in urban areas, paralleled by an increase of pharmaceutical drug overdoses rather than pesticide self-poisoning in these areas. Other developing countries too have shown similar gender differences of non-fatal self-poisoning in rural compared to urban areas [45,53]. For example, a study undertaken in Hanoi, Vietnam [45] reported a higher female-to-male ratio of non-fatal self-poisoning in urban areas where medicinal overdose is more common, compared to rural areas where pesticides ingestion is more common. Notably, non-fatal self-poisoning by medication is higher among females than males in Western countries [10].

Premeditation and precipitating factors

The most common associated or precipitating trigger for non-fatal self-poisoning in Sri Lanka was interpersonal

conflict, most commonly with a close family member. In contrast, reportedly less than 5% of self poisoning was precipitated by financial difficulties [22] similarly Hanwella et al. [42] found no clear association between poverty rates and non-fatal self-poisoning rates among the different districts in Sri Lanka. Interpersonal conflict has been reported to be the acute trigger associated with more than 60% of self poisonings in Pakistan and India [6,54] as well. Previous authors have suggested that self-poisoning in Sri Lanka may be considered by some as an acceptable way of coping with stress and conflict [55,56], and that those who self poison often know of others who have done the same [32]. Marecek et al. have suggested that increasing non-fatal self-poisoning in women in particular maybe a reflection of the clash between the emergent expectations of young women about their education, relationship and employment, and the more traditional ideals of feminine behavior held by their elders, occurring against a background of development and modernization [57]. The collectivistic rather than individualistic nature of society in this country [58], the hierarchical framework where overt confrontation is discouraged, and the strong sense of shame which is associated with loss of face [59], may all be causes of self-poisoning in response to interpersonal conflict.

The available evidence suggests that non-fatal self-poisoning in Sri Lanka is associated with brief premeditation. The two studies in this review, which examined suicidal intent associated with the non-fatal self-poisoning, reported conflicting result [25,33]. One study which examined self-poisoning by ingestion of any poison reported suicidal intent in up to 55.7% of those who attempted [33], whereas the other study which examined self-poisoning by oleander seed ingestion reported that most did not wish to die [25]. One possible explanation for the discrepancy in the findings may be the differences in substances ingested in the two studies concerned. Oleander seed is a plant poison available in the garden, and may be more associated with impulsive attempts of self-poisoning. Differences in the methods used in the two studies for assessing suicidal intent may also have influenced the findings.

Risk of repetition and psychiatric morbidity

Prospective follow up data from South Asia on suicide attempts following an index suicide attempt is limited. The only prospective study of non-fatal self-poisoning in Sri Lanka, found that the repetition rate of 4% following an index episode of non-fatal self poisoning in Sri Lanka, which is comparable to repetition rates reported for Yungcheng in China and Chennai, India [16]. This is consistent with the findings from a prospective study of 140 persons admitted to a Sri Lankan hospital following attempted suicide by *any* methods which found no subsequent suicide attempts during the follow up two year period- although it is a limitation of the study that only

61% of the participants could be reviewed at the end of the two years [34]. In contrast to these low rates in Sri Lanka, prospective follow up studies conducted in the West have reported repetition rates of 15% and above [10,60,61]. The reason for this difference is not clear. One possibility might be that results in Sri Lanka are confounded by a high case fatality - those who would be potential repeaters in the West may be dying in the first attempt in Sri Lanka. The paucity of prospective studies in Sri Lanka is another limitation, and precluded an exploration of the factors associated with repetition of self-poisoning. However, evidence from retrospective studies highlights the importance of understanding such factors. Whereas repetition rates reported in those following *non-fatal* self-poisoning is low, the rate of prior suicidal behaviours in those who have *completed* suicide (mostly by poisoning) in Sri Lanka is 26% [62,63]. Identifying this high risk group from among those who attempt suicide is an important challenge for future research.

The evidence available suggests that rates for depression in those who self-poison in Sri Lanka are low [14,33], in contrast to those in the west, where rates of over 40% have been reported [44]. The low levels of depression reported among those who attempted self-poisoning in Sri Lanka may reflect true levels; alternatively the presence of depression may have been overlooked, and evidence from India suggests that the risk factors for suicide in Asia are similar to those described elsewhere in the world [64]. It is difficult to differentiate these possibilities given that only four studies have reported rates of depression in this population, and neither provided detailed descriptions of the methods employed to assess psychiatric morbidity. Furthermore depression in men may have been concealed by reported alcohol dependency or alcohol use disorder [65].

Alcohol use disorders have been reported to be associated with self-poisoning behavior in Sri Lanka [14,37], which is similar to findings internationally [15]. There is no evidence regarding the rates of impulse control disorders or anxiety disorders in those who attempt self-poisoning in Sri Lanka, although Nock et al. [15] have reported that impulse control disorders and anxiety to be predictive of suicidal behavior in the developing world. There is also no evidence available regarding non-fatal self-poisoning in Sri Lanka and factors such as chronic stressors, hopelessness, and family history of suicide. Family history of suicide and chronic long term stressors have been shown to increase the risk of completed suicide in other Asian countries such as China, with the presence of multiple risk factors are associated with increased risk [66-68].

Implications for future interventions

Several key aspects emerge from this review. First, the findings from several studies suggest that non-fatal self-

poisoning in Sri Lanka is associated with brief premeditation in the context of acute interpersonal stress, albeit that no study investigated concurrent long term stressors or other vulnerability factors which might have increased the risk of non-fatal self-poisoning in the context of interpersonal stress. This finding suggests that one potential area of intervention to reduce rates of non-fatal self-poisoning in Sri Lanka is at a primary preventive level, through community programs aimed at developing interpersonal skills and skills for coping with interpersonal stress. Given the young age group most at risk and the apparently low rate of repetition, a prevention approach that targets older teenagers in schools and young adults in the community is indicated. Similar preventive strategies have been suggested previously for Sri Lanka [56] as well as other Asian countries such as Vietnam [45]. Particular care would need to be taken to tailor the intervention in a culturally appropriate and acceptable manner, and further research would be needed to determine the feasibility and effectiveness of such methods.

Second, alcohol use disorders are known to be associated with suicidal behaviours [51], and Sri Lanka is no exception, especially with respect to self-poisoning among males. Community and national level strategies to reduce alcohol misuse is an essential, albeit challenging, area of intervention to reduce rates of attempted self-poisoning. Culturally compatible interventions, such as the community based educational program to reduce alcohol misuse reported by Siriwardhana et al. [69], should be considered in this regard.

Third, there is a paucity of information available regarding psychiatric morbidity associated with non-fatal self-poisoning in Sri Lanka, although studies from countries such as China have reported that high-intent suicide attempts are associated with depression and chronic stress [70]. Prospective follow up studies of psychiatric morbidity, family history, and chronic stressors of non-fatal self-poisoning in Sri Lanka, are needed to inform future interventions and to assist in identifying risk factors for future repetition. Those presenting to services following non-fatal self-poisoning could then be screened for factors associated with a higher risk of repetition, and persons thus identified referred for further specialized assessment and care. This would be a potentially cost effective intervention at a secondary prevention level.

Finally, it should be noted that the factors associated with non-fatal self-poisoning are complex and multiple, and an integrated, multifactorial approach towards reducing the rate of non-fatal self-poisoning is likely to be more effective than focusing on single risk factors. Phillips et al. [68] have suggested a similar multifactorial approach towards suicide prevention in China. Similarly, a broad based integrated approach, which combines multiple components, such as community based programs

to develop interpersonal skills in young people, community interventions to reduce alcohol misuse, and the identification and specific management of those who are at higher risk of repetition of attempted suicide, are likely to be the most effective in reducing self-poisoning rates in Sri Lanka in the long term. Such interventions must also be responsive to the rapidly evolving role shifts and increasing urbanization occurring in Sri Lanka. Safe storage of pesticides has already been suggested as a method of reducing the burden of non-fatal self-poisoning in this country [71]. Furthermore, the emerging shift from pesticide ingestion to medicinal overdoses indicates that it is also timely to consider restricting over-the-counter sale of pharmaceutical items such as paracetamol, as has been suggested for the West [72]. Similar integrated preventive measures have been proposed for other Asian countries [73,74], and further research is required to explore the effectiveness of such approaches.

Limitations

A primary limitation of this review is that it is based on publications in indexed peer reviewed journals, and thus findings may be limited by publication bias. Studies and abstracts presented at conferences, in non-indexed journals, as well as other unpublished literature were not incorporated. As far as possible, attempts were made to ensure the search was as inclusive as possible, by searching multiple electronic databases, and by examining bibliographies of already selected articles for any further publications of relevance. A hand search was also conducted of the archives of the Ceylon Medical Journal, which is the oldest indexed medical journal in Sri Lanka. The search was conducted in the English language, but since the language used for scientific and medical publications and conferences in Sri Lanka is English, a language bias is unlikely.

Other limitations include the fact that the search included publications up to 31st October 2011 only, and 5 potentially eligible articles published since October 2011 could not be included. The mixed nature of the study types, which makes comparison between studies challenging, and the limited details available on certain aspects of self-poisoning in Sri Lanka such as psychiatric morbidity are also limitations. The variation in the year in which the studies were conducted, which ranged from 1974 to 2011, may also have influenced relevance of findings to current preventive strategies. Many of the findings reported in this review are based on cross-sectional data, which provide limited information about rates of change and factors associated with attempted self-poisoning. Furthermore, as mentioned previously, the aim of this review was to examine factors associated with non-fatal self-poisoning in Sri Lanka. However, due to the nature and paucity of the studies available, the review included studies which focus on intentional self-

poisoning where the outcome (i.e., survival or death) was not differentiated. This is a limitation of the review. Another possible limitation is that during data extraction, equal weight was given to all studies, irrespective of study quality. However the overall findings were largely supported when higher quality studies were examined individually [7,9,12,17].

Conclusion

The rates of non-fatal self-poisoning in Sri Lanka have increased in recent years, despite a clear decrease in the rate of completed suicides since 1995. With respect to features such as gender ratio, methods used and rates of self-poisoning, Sri Lanka shares similarities with other Asian countries rather than the West. However intriguing recent evidence indicates that medicinal overdoses are becoming more common, and this has been paralleled by a gender shift towards increased female self-poisoning in urban areas - an apparent change towards non-fatal self-poisoning patterns as seen in the West.

Non-fatal self-poisoning in Sri Lanka is reported to be associated with interpersonal conflict, with short premeditation, and also to be associated with alcohol misuse among males. There is a dearth of information about potential associations with other factors such as psychiatric morbidity and chronic stressors. Reduction of attempted suicide rates needs to be a national priority, and available evidence suggests the need for integrated intervention strategies which encompass several broad aspects, namely community based development of interpersonal skills among young people, community based programs to reduce alcohol misuse, plus screening for and specific management of those at high risk of repetition following non-fatal self-poisoning. This remains a challenging area, which requires further research to explore the effectiveness of such an approach, and findings for Sri Lanka may have implications for similar intervention programs in other South Asian countries as well.

Competing interests

No financial or non-financial competing interests.

Authors' contributions

Authors (TR), (HC) and (KMG) were involved in the conceptualization and planning of the study. TR did the preliminary literature searches, which was rechecked and modified by HC and KMG. All three authors were actively involved in writing and revising the article, and all three have seen and approved the final version submitted for publication. All authors read and approved the final manuscript.

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Appendix J

**Publication: A comparison of non-fatal self-poisoning among males and females,
in Sri Lanka.**

RESEARCH ARTICLE

Open Access

A comparison of non-fatal self-poisoning among males and females, in Sri Lanka

Thilini Rajapakse^{1,2*}, Kathleen Margaret Griffiths², Helen Christensen³ and Sue Cotton⁴

Abstract

Background: In the recent past Sri Lanka has had a high rate of attempted suicide by pesticide ingestion, among both males and females. Recent evidence suggests that these trends in self-poisoning may be changing, with increasing medicinal overdoses and changing gender ratios. In the past, attempted suicide in Sri Lanka has been described as impulsive acts, but research regarding aspects such as suicidal intent is limited, and there has been no comparison between genders. The objective of this study was to describe gender differences in non-fatal self-poisoning in Sri Lanka with respect to substances ingested, triggers, stressors, suicidal intent and psychiatric morbidity.

Methods: Persons admitted to Teaching Hospital Peradeniya, Sri Lanka, for medical management of non-fatal self-poisoning over a consecutive 14-month period were eligible for the study. Participants were interviewed within one week of admission, with regard to demographic details, poison type ingested, triggers, psychiatric morbidity and suicidal intent. 949 participants were included in the study, of whom 44.2% were males, with a median age of 22 years.

Results: Males were significantly more likely to ingest agrochemicals, whereas females were more likely to overdose on pharmaceutical drugs. Interpersonal conflict was a common trigger associated with non-fatal self-poisoning for both males and females. Alcohol use disorders and high suicidal intent were significantly more likely in males. There was no difference in rates of depression between the genders. Multiple regression for both genders separately showed that the presence of depression and higher levels of hopelessness was the strongest predictor of suicidal intent, for both genders.

Conclusions: Patterns of non-fatal self-poisoning in Sri Lanka appear to be changing to resemble Western patterns, with females having a greater rate of self-poisoning and more medicinal overdoses than males. Alcohol use disorder is a gender specific risk factor associated with non-fatal self-poisoning among males, indicating a need for specific intervention. However there are also many common risk factors that are common to both genders, particularly associations with interpersonal conflict as an acute trigger, and psychiatric morbidity such as depression and hopelessness being related to increased suicidal intent.

Background

Non-fatal self-poisoning is a challenging problem facing Sri Lanka, as well as other South Asian countries [1,2]. The annual cost of treating self-poisoning patients in Sri Lanka in 2004 was estimated to be as high as \$866,304 [3]. Previously, the commonest method of self-poisoning in Sri Lanka was by ingestion of pesticides, and rates were equal or higher in males compared to females [4,5].

This gender ratio contrasted with international studies which report higher rates of attempted suicide by drug overdoses among females [6], but was consistent with the reports from other developing countries where the gender ratio for non-fatal self-poisoning by pesticide ingestion is roughly 50/50 [7-12]. However, this gender pattern now appears to be changing in Sri Lanka, with more women being admitted to hospital as a result of the ingestions of medicines and other substances [13,14]. Similar patterns of change have been reported in other countries in the Asian regions such as Pakistan and Vietnam [15,16]. With increasing urbanization, patterns of non-fatal self-poisoning in Sri Lanka and other South Asian countries may be changing to resemble that of

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developed countries, accompanied by an increasing proportion of attempted suicides among females [13-16].

Rates of non-fatal self-poisoning appear to be increasing in Sri Lanka [1], with changing patterns in recent years as described above. Despite this, there is little information about the suicidal intent, and risk factors associated with self-poisoning attempts, among men and women in Sri Lanka. In the West, greater suicide intent has been reported in men than women, and this may partly account for the greater proportion of attempts relative to completions in women [17,18]. International studies have reported age, childhood adversity, recent life events and psychiatric morbidity such as depression, hopelessness and alcohol misuse, to be associated with increased risk of suicidal attempts among men and women [19-25]. International studies also indicate that violent methods of self-harm, alcohol use disorders and economic stressors are associated with suicide attempts in males, whereas a history of sexual trauma and anxiety disorders are commonly associated with suicide attempts among females [17,26,27]. Available evidence suggests that non-fatal self-poisonings in Sri Lanka are impulsive acts [28], but these findings are limited by the lack of formal assessment of suicidal intent. There has been no comparison between genders with regard to non-fatal self-poisoning in Sri Lanka.

Thus, the overall objective of this study was to describe gender differences in non-fatal self-poisoning in Sri Lanka, especially given the changing gender patterns in recent years. We anticipate that a better understanding of the factors such as psychiatric morbidity, suicidal intent, and life stressors associated with non-fatal self-poisoning in men and women separately, would point the direction for gender specific intervention strategies, applicable for Sri Lanka and perhaps other South Asian countries as well.

For the purposes of this study, non-fatal self-poisoning was defined as an act where a person deliberately ingested a poisonous substance, or ingested a medicinal drug in excess of prescribed dosage, with a non-fatal outcome. Our first analysis involved the examination of whether there were any gender differences in the characteristics of non-fatal self-poisoning in terms of substances ingested, triggers, psychiatric morbidity and suicidal intent associated with the act. The second analysis examined factors that predicted suicidal intent in males and females.

Methods

Participants and setting

The study was carried out at the toxicology unit (ward 17) of Teaching Hospital, Peradeniya, Sri Lanka, from February 2012 onwards, over a consecutive 14-month period. Teaching Hospital Peradeniya is a tertiary care hospital, situated in the second largest city in the Central

Province of the country. All persons who present to Teaching Hospital Peradeniya for medical management of acute self-poisoning (who do not need intensive unit (ICU) care), are admitted to the toxicology unit, and those admitted directly to the ICU are subsequently transferred after recovery to the toxicology unit. This includes persons residing in urban and semi-urban areas around Peradeniya, as well as persons transferred from hospitals in rural agricultural areas in the central and north-central areas of the country, since the toxicology unit at Peradeniya Hospital serves as a referral unit for other hospitals in these areas.

All persons admitted to this unit, due to non-fatal self-poisoning, aged 14 years and above, who were conversant in Sinhalese or/and English, were eligible for this study. Potential participants were approached by the researcher and informed about the study within one week of admission to hospital. Those who gave informed written consent were enrolled. Exclusion criteria were inability to speak either Sinhala or English, and being too medically unwell to participate in the interview while in hospital. Ethical clearance for the study was obtained from the Faculty of Medicine, University of Peradeniya, Sri Lanka, and the Australian National University.

Tools and outcome measures

Details of the non-fatal self-poisoning act, nature of substances ingested and socio-demographic details were assessed by the use of an interviewer administered questionnaire. Certain parts of the survey, such as the section on socio-demographic details were similar to those used in the World Health Organization (WHO) Supre-Miss study [29].

Suicidal intent associated with the act was assessed based on the total score of the Pierce Suicide Intent Scale (PSIS). The PSIS is an interviewer administered standardized tool [30] which has been used previously in Sri Lanka [31]. The PSIS comprises three sections, namely: a section on *circumstances* related to the suicide attempt which includes six items regarding aspects such as planning of the act and precautions against being found out (each scored as 0,1,2); a section for *self-report* which includes four items about the person's self-report regarding intention, understanding of lethality and premeditation; and a section on *risk*, which consists of two items regarding the medical lethality of the act [30]. The total score is obtained by summing scores from all three sections. Total scores on the PSIS range from 0 to 21, and the total scale score can also be categorized as follows: low (total score 0-3), medium (total score 4-10) and high (total score >10) suicidal intent [30].

Depression was assessed using two self-report screening tools, namely the Peradeniya Depression Scale (PDS) and the Patient Health Questionnaire (PHQ-9) [32,33].

The PDS has been created and validated for screening of depression in a Sinhala-speaking Sri Lankan population [33]. The PHQ-9 was used because it is an internationally validated screening tool, although at the time of conducting this study, the PHQ-9 had not been validated for use in Sri Lanka [32]; therefore it was translated from English into Sinhala and back-translated prior to use. A total score of $\geq 10/25$ was considered positive for the screening of depression by the PDS [33], and a score of ≥ 10 was considered positive for the screening of moderate or severe depression by the PHQ-9 [32]. The Generalized Anxiety Disorder Screener (GAD-7) [34] was used to screen for anxiety. This measure was translated into Sinhala and back translated prior to use.

Alcohol misuse was assessed by using the Alcohol Use Disorders Identification Test (AUDIT), which has been validated in Sinhala for a Sri Lankan population [35,36]. The AUDIT screens for hazardous drinking (score ≥ 7) defined as ingestion of 60 g or more of alcohol per occasion, and for alcohol use disorder (score ≥ 16) which includes harmful use and alcohol dependency (according to the ICD-10 Classification system) [35].

Significant life events in the six months prior to the act of non-fatal self-poisoning was examined using a questionnaire derived from the Bughra Life Threatening Events Questionnaire [37]. The Beck Hopelessness Scale (BHS) was used to assess the degree of hopelessness [23]. Both the BHS and the Bughra Life Threatening Events Questionnaire were translated into Sinhala and back translated prior to use. In most cases these questionnaires were self-administered, and the participant was given time to complete them without the interviewer being present. However if the participant was unable to read the questionnaire, the interviewer read out each statement aloud and ticked the relevant response as directed by the participant.

Procedure

In most cases, participants were interviewed within one week of admission to hospital. The interview was carried out in two 40-minute sessions and comprised several questionnaires administered by the researcher and several self-administered screening tools. Most interviews and assessments were conducted in the Sinhala language, except in instances when English was the participant's preferred choice of communication.

Statistical analysis

Data analyses were undertaken using IBM® SPSS® Statistics Version 21.0. Data screening was undertaken to check for outliers and for assumption testing (e.g., deviations from a normal Gaussian distribution and violations to heterogeneity to variance). Data screening entailed examination of descriptive statistics (e.g., skewness and

kurtosis) and inspection of histograms and boxplots. Appropriate measures such as transformations or adoption of non-parametric statistics (e.g., Mann–Whitney U test) were undertaken as needed.

To determine the relationship between gender and characteristics of non-fatal self-poisoning, logistic regressions were used to determine the odds ratio (OR) and the 95% confidence interval of the OR. The significance of the associations was determined using the Wald statistic. When required, additional analyses were conducted using chi-square test (χ^2) for categorical self-poisoning measures and independent t-tests for continuous self-report measures. Significant χ^2 results for cross-tabulations greater than a 2×2 table were explored more closely with post hoc pairwise comparison of column proportions using the Bonferroni correction. For the sake of clarity in reporting, with regards to gender differences of categorical variables with more than two levels, chi-square and tests of differences in proportions have been reported in the text, while the odds ratios are given in the tables.

Hierarchical multiple regression was used to determine predictors of suicide intent (PSIS). Separate models were examined for males and females. Examination of bivariate correlations and tolerances (1-SMC) indicated that there were no problems of collinearity or multicollinearity amongst predictors. As discussed earlier, factors known to be associated with attempted suicide from previous international studies [19-25], were entered into the model in a thematic hierarchical manner. Two regression models were developed, one each for males and females. The final regression model included the following sets of independent variables, entered in a thematic hierarchical manner, in the following order: socio-demographic details (age, marital status), childhood adversity (2 items), stressors in the prior six months (4 items), prior help seeking behavior or suicidal behavior (3 items), acute triggers (1 item) and psychiatric morbidity (presence of anxiety, depression and BHS scores). From these models, it was possible to ascertain the overall amount of variability explained in suicidal intent by the model, which sets of variables added significantly to the prediction of suicidal intent as well as the relative importance of individual predictors. Given the exploratory nature of the study, alpha (α) was set at .05 for all analyses. No adjustments were made for multiple comparisons because they can result in a higher type II rate, reduced power, and increased likelihood of missing important findings [38].

Results

Sample characteristics

A total of 1334 persons met eligibility criteria to be included in the study, of whom 9.1% ($n = 121$) refused consent, and 19.8% ($n = 264$) could not be included because they either left hospital before the interviews could

be conducted, or they were in hospital but were too physically unwell to participate. A total of 949 participants took part in the study, of which 44.2% ($n = 419$) were males. The median age was 22 years, and 61.0% ($n = 570$) of the participants were below the age of 25 years. Females were significantly younger than males (median age for females: 20 years, for males: 25 years, Mann–Whitney U $z = -7.87, p < .001$).

There were no significant gender differences with regard to marital status or with whom the participant resided (Table 1). Females had a higher overall level of education, but were significantly less likely to be employed compared to males, OR 0.09 (95% CI .07, .12) (Table 1). The Population and Housing Census of 2001 for Sri Lanka reports that more males complete up to grade 10, but more females complete the G.C.E. (O/L) and G.C.E. (A/L), whilst males are more likely to be employed than females in all age groups (percentage employed in amongst those aged ≥ 10 years: males 65.5%, females 28.1%).

Substances used for non-fatal self-poisoning

The details of substances used for non-fatal self-poisoning are shown in Table 2. The substance most commonly ingested for non-fatal self-poisoning was a pharmaceutical drug (57.1%, $n = 537$). There were significant gender differences in type of substance used ($\chi^2(1) = 122.7, p < .001$). Post hoc comparisons of proportions indicated that females were significantly more likely to have ingested a pharmaceutical drug, and significantly less likely than males to have ingested an agrochemical such as an insecticide or pesticide.

Females were significantly more likely than males to ingest a substance that was already available in the home,

OR 4.33 (95% CI 3.27 5.72), while males were more likely than females to ingest a substance kept in the field or garden, OR .33 (95% CI .22, .48) or to purchase the substance with the intention of self-poisoning, OR .37 (95% CI .28, .50). Females were also significantly more likely than males to cite ease of availability as a reason for the choice of type of substance ingested, OR 1.45 (95% CI 1.10, 1.92).

Triggers associated with the non-fatal self-poisoning act

Interpersonal conflict was the most common precipitant or immediate trigger prior to the act of non-fatal self-poisoning – for example, arguments (with spouse/ parent/ other) or problems within a romantic relationship (Table 3). This was reported by both genders. Females were more likely to report a conflict with parents, OR 1.54 (95% CI 1.09, 2.18). Only 3.8% ($n = 35$) of all those who attempted non-fatal self-poisoning reported severe financial difficulties as the precipitant, but of those who did, males were significantly more likely to identify financial difficulties compared to females, OR .07 (95% CI .02, .22).

Psychiatric morbidity

There was no significant gender difference in depression rates as determined by the PDS and the PHQ-9 (Table 4). More than half of the females (53.7%, $n = 237$) and 49.7% ($n = 160$) of males who had attempted self-poisoning screened positive for depression via the PDS; the PHQ-9 gave comparable results, with 52.0% ($n = 209$) of females and 49.8% ($n = 152$) of males scoring positive for moderate/severe depression. For the subsequent analyses we considered the results for depression as measured by the PDS, since at the time of the conducting the study, the PHQ-9 was not validated for a Sri Lankan population [33].

Table 1 Socio-demographic characteristics of the total cohort and for males and females

Variable	Total sample ($n = 949$) % (n)	Gender ¹		p value	Odds ratio	95% CI of OR
		Male ($n = 419$)	Female ($n = 530$)			
Living with:				.345		
Parents	52.5% (498)	50.5% (209)	55.0% (289)	na ²	na	na
Spouse/children	40.3% (382)	42.5% (176)	39.2% (206)	.224	0.85	0.65-1.11
Other	6.2% (59)	7.0% (29)	5.7% (30)	.293	0.75	0.44-1.28
Married	42.9% (406)	44.7% (187)	41.4% (219)	.303	0.87	0.67-1.13
Highest level of education:				<.001		
No schooling/up to grade 5	5.5% (52)	9.4% (39)	2.5% (13)	na ²	na	na
Grade 6 to 10	50.2% (476)	58.0% (240)	44.9% (236)	.001	2.95	1.54-5.67
Completed O/L Exam	28.9% (274)	25.1% (104)	32.3% (170)	<.001	4.90	2.50-9.62
Completed A/L Exam	13.7% (130)	7.2% (30)	19.0% (100)	<.001	10.00	4.73-21.14
University/Postgraduate	0.8% (8)	0.2% (1)	1.3% (7)	<.001	21.00	2.36-187.13
Occupational status						
Employed	41.9% (398)	72.3% (298)	19.1% (100)	<.001	0.09	0.07-0.12

¹Gender is coded as 0 Male 1 Female.

²Not applicable as reference category.

Table 2 Substances ingested in non-fatal self-poisoning attempt for the total cohort and for males and females

Variable	Total sample	Gender ¹		p value	Odds ratio	95% CI of OR
		Male	Female			
Type of overdose:				<.001		
Pharmaceutical drug overdose	55.6% (537)	38.1% (157)	72.0% (380)	na ²	na	na
Agrochemical	23.2% (220)	38.1% (157)	11.9% (63)	<.001	0.17	0.12-0.23
Other chemical kept at home	10.6% (101)	12.1% (50)	9.7% (51)	<.001	0.42	0.27-0.65
Plant poison	8.6% (82)	11.7% (48)	6.4% (34)	<.001	0.29	0.18-.047
Source of substance:						
Ingested a substance kept at home	59.4% (564)	41.6% (172)	75.5% (392)	<.001	4.33	3.27-5.72
Ingested a substance kept in field/garden	13.7% (130)	21.3% (88)	8.1% (42)	<.001	0.33	0.22-0.48
Bought substance for purpose of ingestion	26.9% (255)	38.3% (158)	18.7% (98)	<.001	0.37	0.28-0.50
Reason for choice³						
Easy availability	32.3% (307)	28.8% (117)	37.0% (190)	.009	1.45	1.10-1.92
It was cheap	6.4% (61)	6.4% (26)	6.8% (35)	.806	1.07	0.63-1.81
Thought it was not dangerous	11.7% (111)	10.8% (44)	13.0% (67)	.310	1.23	0.82-1.85
Thought it was dangerous	33.1% (314)	37.2% (151)	31.7% (163)	.082	0.78	0.60-1.03
Thought it wouldn't hurt	13.3% (126)	13.3% (54)	14.0% (72)	.757	1.06	0.73-1.55
Thought it would act quickly	3.6% (34)	5.2% (21)	2.5% (13)	.035	0.48	0.24-0.96

¹Gender is coded as 0 Male 1 Female.

²Not applicable as reference category.

³Multiple responses were possible.

There was no significant difference in the extent of anxiety between males and females, as measured by the GAD-7, and similarly there was no significant difference in hopelessness scores between the genders, as measured by the BHS.

Hazardous drinking and alcohol use disorder was seen among 20.7% ($n = 85$) and 8.3% ($n = 34$) of males respectively, and 24.1% ($n = 97$) of males had ingested alcohol prior to the act of self-poisoning. There were no alcohol use disorders or alcohol ingestion reported among the females. Females (16.2%, $n = 85$) were significantly more likely to have a history of prior suicide attempts compared to males (10.1%, $n = 42$), OR 1.72 (95% CI 1.16, 2.55).

Stressors in the prior six months and childhood adversity

Stressors occurring within the six months prior to the non-fatal self-poisoning are shown in Table 5. Females

were more likely to report a history of interpersonal conflict with parents, OR 1.73 (95% CI 1.20, 2.49), with her father due to his alcohol misuse OR 3.07 (95% CI 1.39, 6.77), and with her spouse because of his alcohol misuse, OR 1.92 (95% CI 1.07, 3.44); they were also significantly more likely to report being a victim of physical abuse in the prior six months, OR 7.02 (95% CI 2.75, 17.90). Males were significantly more likely to report job loss, OR .38 (95% CI .19, .77), financial problems, OR .70 (95% CI .51, .96) and legal problems, OR .04, (95% CI .01, .32).

Self-reported childhood adversity is shown in Table 6. There were no significant differences between the genders for most of the items examined under childhood adversity; however, females were significantly more likely to report parental criticisms OR 2.51 (95% CI 1.40, 4.48), harsh punishments OR 2.10 (95% CI 1.04, 4.26), parental separation OR 2.07 (95% CI 1.21, 3.53) and having had a mother working overseas OR 1.70 (95% CI 1.14, 2.55), during their childhood.

Table 3 Triggers for non-fatal self-poisoning for the total cohort and males and females

Variable	Total sample	Gender ¹		p value	Odds ratio	95% CI of OR
		Male	Female			
Argument with spouse	23.4% (222)	23.4% (95)	24.1% (127)	.791	1.04	0.77-1.41
Argument with parent	17.7% (168)	14.5% (59)	20.7% (109)	.015	1.54	1.09-2.18
Argument with child	1.9% (18)	2.2% (9)	1.7% (9)	.578	0.77	0.30-1.95
Problem with romantic relationship	15.4% (146)	20.0% (81)	12.4% (65)	.002	0.57	0.40-0.81
Severe financial difficulties	3.8% (35)	7.9% (32)	0.6% (3)	<.001	0.07	0.02-0.22

¹Gender is coded as 0 Male 1 Female.

Table 4 Psychiatric morbidity for the total cohort and for males and females

Variable*	Total sample % (n)	Gender ¹		p value	Odds ratio	95% CI of OR
		Male	Female			
PDS						
Depressed	52.0% (397)	49.7% (160)	53.7% (237)	.269	1.18	0.88-1.57
PHQ-9						
Moderate/severe depression	51.1% (361)	49.8% (152)	52.0% (209)	.570	1.09	0.81-1.47
GAD-7						
Moderate/severe anxiety	39.4% (284)	35.9% (111)	42.1% (173)	.094	1.30	0.96-1.76
Had history of prior suicide attempts	13.5% (127)	10.1% (42)	16.2% (85)	.007	1.72	1.16-2.55
BHS M(SD)	5.64 (5.36)	5.59 (5.40)	5.67 (5.33)	.822	1.00	0.98-1.03
AUDIT results:						
HZD drinking	9.1% (85)	20.7% (85)	0.0% (0)	na ²	na ²	na ²
AUD	3.6% (34)	8.3% (34)	0.0% (0)	na ²	na ²	na ²

¹Gender is coded as 0 Male 1 Female.

²Odds ratio and significance not calculated because no females reported alcohol misuse.

Notes for abbreviations PDS: Peradeniya Depression Scale. Scoring: Total score $\geq 10/25$ is a positive screening for depression.

PHQ-9: Patient Health Questionnaire-9. Scoring: 10–19 moderate (includes moderate and moderately severe) depression, 20–27 severe depression.

GAD-7: 7-item anxiety scale. Scoring: 5–9 Mild, 10–14 Moderate, 15–21 severe anxiety.

AUDIT: Alcohol Use Disorders Identification Test. Scoring: ≥ 7 = Hazardous drinking, ≥ 16 = Alcohol use disorder.

*Valid data were available for the PDS for 763 participants, for the PHQ-9 for 707 participants, for the GAD-7 for 720 participants, for the AUDIT for 937 participants and for the BHS for 817 participants.

Table 5 Stressors within the six-months prior to non-fatal self-poisoning

Stressors	Total sample	Gender ¹		p value	Odds ratio	95% CI of OR
		Male	Female			
Suffered a serious injury/illness	12.4% (115)	13.3% (54)	11.7% (61)	.481	0.87	0.59-1.29
A close relative had a serious injury/illness	7.1% (66)	5.9% (24)	8.1% (42)	.199	1.41	0.84-2.36
Death of a parent/spouse/child	2.6% (24)	2.5% (10)	2.7% (14)	.816	1.10	0.49-2.51
Death of a friend or close relative	7.5% (69)	6.9% (28)	7.9% (41)	.552	1.16	0.76-1.92
Conflict with parents	16.6% (154)	12.5% (51)	19.8% (103)	.003	1.73	1.20-2.49
Conflict with his/her father because of father's alcohol use	4.1% (38)	2.0% (8)	5.8% (30)	.005	3.07	1.39-6.77
Conflict with spouse/partner	30.1% (278)	29.6% (120)	30.6% (158)	.741	1.05	0.79-1.39
Conflict with spouse because of alcohol use	6.2% (57)	4.2% (17)	7.8% (40)	.029	1.92	1.07-3.44
Conflict with spouse because of mistrust	9.1% (84)	6.2% (25)	11.5% (59)	.007	1.97	1.21-3.20
Divorce/marital separation	5.0% (46)	4.0% (16)	5.8% (30)	.203	1.50	0.80-2.79
Spouse went overseas for a job	1.6% (15)	1.5% (6)	1.7% (9)	.758	1.18	0.42-3.34
Conflict with a neighbour/friend/relative	5.0% (46)	3.2% (13)	6.4% (33)	.030	2.07	1.07-3.98
Loss of job	3.9% (36)	5.4% (24)	2.3% (12)	.007	0.38	0.19-0.77
Significant financial problems	22.3% (206)	25.8% (105)	19.6% (101)	.024	0.70	0.51-0.96
Court case/legal problems	2.1% (19)	4.4% (18)	0.2% (1)	.002	0.04	0.01-0.32
Seeing bad dreams	10.6% (98)	6.9% (28)	13.6% (70)	.001	2.12	1.34-3.36
Physical abuse within the past 6 months	5.2% (47)	1.3% (5)	8.3% (42)	<.001	7.02	2.75-17.90
Sexual abuse within the past 6 months	1.3% (12)	0.0% (0)	2.4% (12)	na ²	na ²	na ²

¹Gender is coded as 0 Male 1 Female.

²Odds ratio and significance not calculated because no males reported sexual abuse during the past 6 months.

Table 6 History of childhood adversity

Reported childhood adversity	Total sample	Gender ¹		p value	Odds ratio	95% CI of OR
		Male	Female			
Grew up with constant parental criticism	7.1% (65)	4.0% (16)	9.4% (49)	.002	2.51	1.40-4.48
Was severely punished without reason	4.3% (40)	2.7% (11)	5.6% (29)	.040	2.10	1.04-4.26
Grew up with significant financial problems	31.0% (286)	33.3% (134)	29.2% (152)	.176	0.82	0.62-1.09
Witnessed family members being abused	1.3% (12)	0.5% (2)	1.9% (10)	.057	4.34	0.96-19.69
Has been subjected to physical abuse as a child	4.3% (40)	3.5% (14)	5.0% (26)	.263	1.46	0.75-2.83
Was sexually abused as a child	1.0% (9)	0.5% (2)	1.3% (7)	.212	2.73	0.56-13.21
Had significant problems due to father's alcohol misuse	17.6% (154)	18.2% (70)	17.2% (84)	.699	0.93	0.66-1.32
Significant parental conflict during childhood	20.9% (182)	20.1% (76)	21.6% (106)	.594	1.09	0.79-1.52
Parents divorced/lived separately	8.1% (71)	5.2% (20)	10.3% (51)	.008	2.07	1.21-3.53
Mother worked abroad during childhood	13.7% (122)	10.3% (40)	16.4% (82)	.010	1.70	1.14-2.55
Mother died before person reached 16 years	3.6% (29)	4.5% (16)	2.9% (13)	.217	0.63	0.30-1.32
Father died before person reached 16 years	12.5% (101)	12.1% (43)	12.8% (58)	.789	1.06	0.70-1.62

¹Gender is coded as 0 Male 1 Female.

Degree of suicidal intent associated with the act of self-poisoning

Males had significantly higher levels of suicidal intent compared to females OR .92 (95% CI .89, .95) (Table 7). When the total PSIS score was considered by severity category (high -score 11 or over, medium -score 4–10 or low -score below 4), again there was a significant difference between the genders ($\chi^2(2) = 22.5$, $p < .001$); post hoc comparisons of proportions indicated that males were significantly more likely to score high on suicidal intent, whereas females were significantly more likely to have a medium suicide intent.

Predictors of suicidal intent

The results of multiple regression analysis for males and females are shown in Tables 8 and 9 respectively. Although alcohol use disorders emerged as a significant variable for

males, since it was not reported at all for females it could not be included in the final regression models for both genders. The Multiple R for the regression models for males and females were significantly different from zero. The adjusted R^2 value of .35 for males and .28 for females show that approximately one third of variability of suicidal intent associated with the act of non-fatal self-poisoning was predicted by the models. For both genders, the final block, i.e., psychiatric morbidity (presence of depression and hopelessness scores) contributed most towards the R^2_{Δ} . For males, this contributed 23.9% of the R^2_{Δ} , and for females it contributed 17.2% of the R^2_{Δ} ($p < .001$).

In the final model for males, the degree of suicidal intent was significantly predicted by the following variables: having attempted suicide before ($p = .006$), having expressed suicidal ideas prior to the act ($p = .025$), having visited a doctor in the month prior to the attempt ($p = .015$), seeing

Table 7 Degree of suicidal intent - Pierce Suicide Intent Scale (PSIS)

Variable	Total scores	Gender ¹		p value	Odds ratio	95% CI of OR
		Male	Female			
Pierce Suicide Intent Scale (PSIS) M(SD)	10.2 (4.0)	10.9 (4.1)	9.6 (3.83)	<.001	0.92	0.89-0.95
PSIS subsection scores						
Circumstances score M(SD)	4.6 (1.9)	4.7 (1.9)	4.53 (1.9)	.107	0.94	0.88-1.01
Self report score M(SD)	4.4 (2.6)	4.8 (2.7)	4.2 (2.6)	<.001	0.91	0.86-0.96
Lethality score M(SD)	1.2 (1.0)	1.5 (1.1)	1.0 (1.0)	<.001	0.63	0.55-0.72
PSIS score by category				<.001		
Low intent (score 0–3)% (n)	5.4% (51)	5.0% (21)	5.7% (30)	na ²	na	na
Medium intent (score 4–10)% (n)	45.2% (429)	37.0% (155)	51.7% (274)	.480	1.24	0.69-2.24
High Intent (score ≥ 11)% (n)	49.4% (469)	58.0% (243)	42.6% (226)	.151	0.65	0.36-1.17

¹Gender is coded as 0 Male 1 Female.

²Low intent is the reference category.

Notes for abbreviations: PSIS: Pierce Suicide Intent Scale. Total score range: 0–21. Scoring by category: low intent (total score 0–3), medium intent (total score 4–10) and high intent (total score >10).

Table 8 Final stepwise multiple regression model results, examining predictors of suicidal intent associated with non-fatal self-poisoning: males

Sets	Predictor variables	Unstandardized co-efficient		Standardized co-efficient	t	Sig	Correlations		
		B	St error				Zero order	Partial	Part
Socio demographic variables	Age	.049	.026	.142	1.884	.061	.104	.109	.109
	Marital status	-.475	.612	-.058	-.776	.439	.037	-.045	-.045
Childhood adversity	Parental conflict	1.521	.601	.147	2.529	0.012	.146	.146	.145
	Mother worked overseas	.156	.744	.012	.210	.834	0.017	.012	.012
Stressors during the prior six months	Financial problems	1.389	.556	.151	2.500	.013	.162	.145	.142
	Legal problems	1.458	1.222	.068	1.194	.234	.079	.070	.068
	Physical/sexual abuse	-.420	2.358	-.010	-.178	.859	.012	-.010	-.010
	Bad dreams	-1.252	.914	-.080	1.369	.172	-.041	-.080	-.078
Prior help seeking/suicidal behaviour	Expressed suicidal ideas	-.383	.677	-.032	-.566	.572	-.012	-.033	-.031
	Saw a doctor in prior month	-.748	.566	-.079	1.322	.187	-.000	-.078	-.073
	Has a past history of suicide attempts	3.611	.810	.254	4.457	.000	.267	.255	.246
Acute triggers	Breakup of romantic relationship	1.500	.605	.154	2.482	.014	.126	.145	.136
Psychiatric morbidity	GAD-7	.025	.057	.033	.438	.662	.401	.026	.020
	PDS	.220	.051	.331	4.281	.000	.487	.247	.200
	BHS	.220	.042	.296	5.227	.000	.469	.297	.244

PDS: Peradeniya Depression Scale, GAD-7: 7 item Anxiety Scale, BHS: Beck Hopelessness Scale.

Table 9 Final stepwise multiple regression model results, examining predictors of suicidal intent associated with non-fatal self-poisoning: females

Sets	Predictor variables	Unstandardized co-efficient		Standardized co-efficient	t	Sig	Correlations		
		B	St error				Zero order	Partial	Part
Socio demographic variables	Age	.105	.028	.215	3.747	.000	.202	.187	.186
	Marital status	-.191	.445	-.025	-.430	.668	.081	-.023	-.021
Childhood adversity	Parental conflict	1.381	.455	.153	3.037	.003	.154	.153	.149
	Mother worked overseas	.159	.528	.015	.301	.763	.027	.015	.015
Stressors during the prior six months	Financial problems	.831	.511	.084	1.624	.105	.140	.083	.079
	Legal problems	-.653	3.720	-.009	-.176	.861	.021	-.009	-.009
	Physical/sexual abuse	1.821	.671	.136	2.712	.007	.078	.042	.040
	Bad dreams	.443	.538	.041	.823	.411	.153	.137	.132
Prior help seeking/prior suicidal behaviour	Expressed suicidal ideas	.776	.594	.064	1.307	.192	.110	.067	.063
	Saw a doctor in prior month	.500	.394	.062	1.270	.205	.108	.065	.061
	Has a past history of suicide attempts	1.494	.525	.142	2.846	.005	.173	.144	.137
Acute triggers	Breakup of romantic relationship	1.434	.572	.126	2.506	.013	.120	.128	.120
Psychiatric morbidity	GAD-7	.083	.045	.132	1.856	.064	.456	.095	.080
	PDS	.192	.044	.309	4.416	.000	.510	.222	.189
	BHS	.092	.038	.129	2.439	.015	.386	.125	.104

PDS: Peradeniya Depression Scale, GAD-7: 7 item Anxiety Scale, BHS: Beck Hopelessness Scale.

bad dreams ($p = .008$), a higher score on the Beck Hopelessness Scale ($p < .001$) and the presence of depression ($p < .001$). For females, in the final model, age ($p = .015$), a higher score on the BHS ($p = .015$), and the presence of depression ($p < .001$), significantly predicted suicidal intent.

Discussion

Although attempted suicide by non-fatal self-poisoning is common in South Asia and Sri Lanka, little is known about the factors - such as suicidal intent - that are associated with non-fatal self-poisoning in these regions. Our study is the first to explore gender differences in factors associated with higher suicidal intent in non-fatal self-poisoning attempts in Sri Lanka.

Key findings of this study are that a majority of those who present to hospital due to non-fatal self-poisoning are female, and that males and females differ with respect to demographic characteristics, type of substance ingested, alcohol use disorders and suicidal intent. Psychopathology, especially depression, was the most important predictor of suicide intent in both males and females.

Characteristics of non-fatal self-poisoning

Gender distribution

In this study, a greater proportion of females (55.8%) than males presented to hospital due to non-fatal self-poisoning. This is similar to findings from other recent Sri Lankan and Asian studies [13-16,39] and is in accordance with internationally established patterns of higher rates of attempted suicide and self-harm among females [6,17,40]. This finding is unlikely to be a reflection of the distribution of males and females in the population, given that the 2001 population census for Sri Lanka reports a male:female gender ratio of 0.99:1. The higher rate of completed suicides among males may also have influenced this finding [41]. The female predominance in this study is in contrast to several older studies from Sri Lanka, which have reported higher rates of attempted self-poisoning among males [4,5,42,43], and notably in these studies the most commonly ingested substance was pesticides. Similarly, higher rates of attempted self-poisoning among males with regards to pesticide ingestion have been reported in the past by several other regions such as South America, Uganda and India [7,10-12,44].

The female preponderance was more marked in the younger age groups (below 25 year age group male: female ratio = 0.71: 1), whereas there was a male preponderance amongst those aged 35 years and older (35 years and over, male: female ratio = 2.1: 1). This is similar to international patterns [6,45], but our findings are marked in that in the >35 year age group there are more males than females attempting non-fatal self-poisoning.

Substances used for non-fatal self-poisoning

The most frequent source of self-poisoning was medicinal overdose, in contrast to older studies which report pesticide ingestion as the most common substances used [5], but similar to findings of other more recent Sri Lankan studies [1,14]. This is likely to be a reflection of reduced availability of pesticides, perhaps secondarily to the gradual urbanization of the country. Indeed, both males and females reported that their reason for choice of substance was accessibility. Possible reasons for the higher rate of pesticide ingestion among males could be that in agricultural areas, pesticides are more easily accessible to males who work in the fields, compared to females. The female preponderance of medicinal overdoses has been noted in previous Sri Lankan studies [4,5,39].

While medicinal overdoses generally carry a lower case fatality compared to agrochemical ingestion, the increasing trend of medicinal overdoses, among males and females, is a matter of concern. The question arises as to whether it is timely to consider restriction of sale of over the counter medications (for e.g. paracetamol) in Sri Lanka, similar to the West [46]. However at present Sri Lanka differs from the West in that alternate more toxic substances such as agrochemicals are still fairly widely available, and are still ingested particularly by males, as shown in this study. Furthermore many other types of medications (for e.g., antibiotics, antihypertensives and other similar agents) are also easily available and restrictions regarding the sale of medications in general are not stringent. Therefore a potential risk of restriction of sale of a single medicinal substance (such as paracetamol) is that this may prompt a shift towards self-poisoning with alternate substances with potentially higher lethality, including agrochemical ingestion. Therefore, if restricting availability of medicinal substances, it should be carefully thought out and not randomly implemented. Restriction of the availability of toxic agrochemicals remains a priority given the ongoing agrochemical ingestion, particularly by males [47].

Psychiatric morbidity

Depression

The rates of depression in this study (49.7% of males and 53.7% of females) are much higher than the reported rates for depression in the general population internationally [48,49]. Mood disorders are known important risk factor for suicidal behaviours [50,51] and Hawton et al., in their study of paracetamol overdoses in the UK reported depression to be present in up to 47% of cases [52]. While Asian data is more limited, studies on attempted suicide from India have reported depression rates greater than 30% [2,53-55]. However our findings are in marked contrast to several previous Sri Lankan studies, which have suggested low rates of depression among those who attempt self-poisoning [56,57]. Differences in methodology

and the limited number of prior research studies in this area may account for these contrasting findings.

Alcohol use disorders

The finding of hazardous drinking or alcohol use disorders in over one-third of males in the current study was in striking contrast to the females, who had no history of alcohol misuse, dependency or ingestion prior to the act. Higher rates of alcohol misuse among males who attempt self-poisoning have been reported previously, both in Sri Lanka and internationally [57,58]. The very marked difference in use of alcohol between males and females in this study is most likely a reflection of alcohol use in the Sri Lankan community [59], where female alcohol use is much less than that of males. Similar patterns have been noted in India as well [54,55]. Reports indicate that the per capita consumption of alcohol in Sri Lanka has increased in recent years, and alcohol misuse and dependency is a major health and social problem among Sri Lankan males [60,61]. Given that alcohol misuse is associated with suicidal behavior [62,63], it is likely to be an important contributory factor towards the non-fatal self-poisoning behavior among males in Sri Lanka. Ongoing alcohol use disorders may be an explanation of why, in the over 35-age group, males in our study outnumbered females with regard to non-fatal self-poisoning. This points to a very important area of intervention for males. Furthermore, Hoek et al. [64] have also described how alcohol misuse among males indirectly contributes towards non-fatal self-poisoning among females, by adding to the likelihood of interpersonal conflict that is often associated with these acts. In keeping with this, although females in our study did not use alcohol, they were significantly more likely than their male counterparts to report interpersonal conflict due to alcohol use by a parent or partner as a stressor during the six months prior to the non-fatal self-poisoning act. Given all of this, the reduction of alcohol use disorders is an important albeit challenging primary preventive measure with regards to prevention of non-fatal self-poisoning. Culturally appropriate interventions to reduce harmful patterns of alcohol within communities maybe a way forwards – for example, via community based education programs [65].

Triggers Common to both genders in this study was the finding that interpersonal conflict was the most commonly identified trigger prior to the act of non-fatal self-poisoning, which is very similar to previous findings from both Sri Lanka and other Asian countries [15,57,66].

Suicidal intent and predictors of suicidal intent

The males in our study had significantly higher suicide intent than females and it is well documented that suicidal intent at the index episode is associated with later

completed suicide [18]. No previous studies from Sri Lanka have compared the degree of gender difference in suicidal intent. Previous international studies comparing intent between genders has reported mixed results, with some studies reporting no difference between the genders [67], while others from the West and South Asia have reported higher intent in males [17,18,54], similar to the findings of our study. However, this is the first time this association has been reported for non-fatal self-poisoning in Sri Lanka.

Despite these gender differences in the characteristics and degree of suicidal intent, the *predictors* of suicidal intent showed more similarities than differences between genders. For both genders, depression and hopelessness were the most important predictors of suicide intent, which is similar to international findings [23,50,68].

Previous studies have suggested that non-fatal self-poisoning in Sri Lanka are mostly impulsive acts, in the context of interpersonal conflict [57]. Based on our findings, we suggest that while most acts of non-fatal self-poisoning do take place in the context of an interpersonal conflict which appear to act as 'triggers', a substantial proportion of those attempting poisoning also have associated morbidity such as depression which predicts a greater suicidal intent both for males and females. Similarly in India, depression has been shown to be associated with more high-risk attempts [53,69].

The finding from the current study that the depression is present in 50% of males and over 50% of females and that it is associated with higher suicide intent has important implications given that higher suicidal intent is known to be associated with subsequent completed suicide [18]. In particular it suggests the need for targeted interventions and appropriate management of those who attempt self-poisoning who have psychiatric morbidity. This points to the need for improving mental health literacy in the community and in educating primary care physicians about depression and the role it may play in influencing self-poisoning behaviours.

Limitations

The findings of this study are based on a cross sectional survey of those admitted to hospital following non-fatal self-poisoning. As a result, those who did not seek hospital care following such an attempt were not included in the analysis. Also, those persons who were not able to speak either Sinhala or English could not be included in the study; this comprised a minority who were only conversant in Tamil, and thus could not be included in the study. A further limitation is that although alcohol misuse was a factor associated in non-fatal self-poisoning in males, alcohol use could not be entered into the multiple regression model, since it was not reported at all among females. However, we have discussed the findings with

regard to alcohol use in males separately. Finally certain conditions, such as impulse control disorders and personality disorders were not assessed, and the assessment of psychiatric morbidity was undertaken via screening tools rather than clinician-based diagnostic interviews. However we have attempted to minimize false positives by the use of locally validated screening tools wherever possible.

Conclusions

The prevention or even minimization of attempted self-poisoning is a complex and challenging task. Understanding and focusing on multiple risk factors, and the interactions between these is likely to be the most useful and cost effective approach to reducing self-poisoning [70,71]. Our findings show that depression and hopelessness predict suicidal intent in both males and females who attempt self-poisoning. For men, prior attempts, and for females, older age also emerge as key factors associated with higher suicidal intent. Since higher suicidal intent is associated with higher risk of completed suicide [18], identification of high intent males and females who have recently attempted self-poisoning, and targeted specific management of such high risk persons maybe an useful intervention at a secondary prevention level.

However primary prevention at a community level remains a challenge. Our data show that although psychiatric morbidity is associated with self-poisoning, about half of those who attempt self-poisoning are *not* depressed; therefore, addressing psychiatric morbidity alone is unlikely to be the answer. This study, as well as previous work, clearly demonstrates interpersonal conflict to be the most common proximal trigger associated with the act of non-fatal self-poisoning, for both males and females. However the females were significantly younger and had a lower suicidal intent, compared to males who were more likely to report an intention to die at the time of the act of self-poisoning. These findings have two implications: first, that interpersonal conflict is a common shared trigger for both genders, but that second, the psychological constructs underlying self-poisoning behaviours may be different for males and females. Marecek et al. [72] in their study of non-fatal self-poisoning among females in Sri Lanka suggested that the act of self-poisoning among girls may represent a form of non-verbal dissent, in situations of interpersonal conflict where norms of obedience and respect constrain overt responses. While beyond the scope of this study, the themes underlying interpersonal conflicts in both genders, and effective ways in which to help young people deal with such interpersonal issues in the community, are areas worth exploring further. There is a need for effective community programs for early development of

interpersonal skills in young people, which are both gender and culturally appropriate.

Other population level primary preventive strategies include measures to reduce alcohol misuse and dependency, for e.g., via culturally acceptable community programs to reduce alcohol misuse in males, and increased physician awareness and treatment of primary care depression [65,73]. An integrated, culturally suitable approach is indicated and further research is needed to determine the efficacy of such measures. While our study is based in Sri Lanka, we believe that our findings may have implications for other neighbouring Asian countries which share similar changing patterns non-fatal self-poisoning in recent years.

Competing interests

The authors declare they have no competing interests.

Authors' contributions

All authors were involved in the conceptualization and organization of the study. TR and SC were involved in the statistical analysis, and all authors were involved in writing and revising of the article. All authors have seen and approved the final version submitted for publication.

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