

Taking Stock – What Is Known About Suicide in Sri Lanka

A Systematic Review of Diverse Literature

Melissa Pearson¹, Anthony B. Zwi², Amanda K. Rouse³, Ravindra Fernando⁴,
Nicholas A. Buckley⁵, and Duncan McDuie-Ra⁶

¹University of New South Wales & South Asian Clinical Toxicology Research Collaboration, Sydney, Australia, ²Global Health and Development, School of Social Sciences, Faculty of Arts and Social Sciences, University of New South Wales, Sydney, Australia,

³South Asian Clinical Toxicology Research Collaboration, Peradeniya, Sri Lanka,

⁴Department of Forensic Medicine, University of Colombo, Sri Lanka,

⁵Prince of Wales Hospital Clinical School, University of New South Wales, Sydney, Australia,

⁶Department of International Studies, School of Social Sciences, Faculty of Arts and Social Sciences, University of New South Wales, Sydney, Australia

Abstract. *Background:* Suicide is and has been a major public health problem in Sri Lanka and has generated a wide range of literature. *Aims:* This review aimed to systematically appraise what is known about suicide in Sri Lanka. The patterns and content of articles were examined and recommendations for further research proposed. *Method:* The paper describes the systematic search, retrieval, and quality assessment of studies. Thematic analysis techniques were applied to the full text of the articles to explore the range and extent of issues covered. *Results:* Local authors generated a large body of evidence of the problem in early studies. The importance of the method of suicide, suicidal intention, and the high incidence of suicide were identified as key foci for publications. Neglected areas have been policy and health service research, gender analysis, and contextual issues. *Conclusion:* The literature reviewed has produced a broad understanding of the clinical factors, size of the problem, and social aspects. However, there remains limited evidence of prevention, risk factors, health services, and policy. A wide range of solutions have been proposed, but only regulation of pesticides and improved medical management proved to be effective to date.

Keywords: suicide, self-poisoning, systematic review, suicide prevention

Background

Suicide is a multifaceted problem reflecting the complex interplay of biological, psychological, and sociocultural factors (Maris, 2002). In 2004 the World Health Organization (WHO) estimated that almost 1 million people each year commit suicide (WHO, 2004) and 60% of these deaths occur in Asia (Beautrais, 2006; Bertolote & Fleischmann, 2002; Hendin et al., 2008; Mann et al., 2005). However, over 90% of the literature on suicide has been based on studies undertaken in industrialized country contexts (Phillips, 2004; Saraceno & Saxena, 2004). Of the evidence that exists on the problem in lower- and middle-income countries (LMIC), many authors have highlighted the different context of suicide in settings especially in Asia (Khan, 2002; Phillips, 2004; Vijayakumar, John, Pirkis, & Whiteford, 2005; Vijayakumar, Nagaraj, Pirkis, & Whiteford, 2005).

In Sri Lanka, suicide emerged as a major public health problem in the 1990s as the annual incidence rates increased from 19.1 per 100,000 in 1970 to a peak of 46.94 in 1995 (Gunnell et al., 2007; Maris, 2002). Sri Lanka is one of a few LMIC in which there exists a diverse literature on suicide, much of it written in the past 15 years. The issue has been analyzed from a wide range of disciplinary perspectives including medical, sociological, cultural, historical, as well as a range of sectoral perspectives comprising health, agriculture, and development.

Systematic Reviews

The systematic review of the literature has become an important tool for locating, appraising, and synthesizing available evidence of “what works” (Waters & Doyle, 2002). The dominance of clinical systematic reviews has

been contested by social scientists and policy makers where the broad context of problems is more diffuse and the answers are less definitive. Critics have argued that reliance on the randomized controlled trial (RCT) is not as applicable and that issues of relevance in policy-making fields such as plausibility, politics, and timeliness are overlooked (Attree & Milton, 2006; Baxter, Killoran, Kelly, & Goyder, 2010; Denyer & Tranfield, 2006; Dixon-Woods, Agarwal, Young, Jones, & Sutton, 2004; Dixon-Woods et al., 2006; Goldsmith, Bankhead, & Austoker, 2007; Hammersley, 2002; Lomas, 2005; Ogilvie, Hamilton, Egan, & Petticrew, 2005; Petticrew & Roberts, 2003).

As interest has grown in the inclusion of diverse literature in systematic reviews, there has also been debate about appropriate review methods. There is little consensus on the appropriate methodology to use when aggregating data from mixed-methods studies (Dixon-Woods, Agarwal, Jones, Young, & Sutton, 2005; Lomas, 2005; Ogilvie et al., 2005). There are inherent challenges in aggregating data from multiple study types and across different methods, theoretical perspectives, and approaches to data analysis. There have also been questions about the feasibility and legitimacy of the methodology (Harden & Thomas, 2005; Popay & Roberts, 2006). However, reviews in which diverse literature is aggregated can play a valuable role in supporting knowledge generation by mapping the terrain, identifying gaps, and exposing areas of controversy (Pope, Mays, & Popay, 2007).

One approach to synthesis has been to use thematic analysis; this involves identifying recurrent or prominent themes and summarizing the findings under these thematic headings (Thomas & Harden, 2008). This is a useful method for summarizing findings and aggregating data across multiple sources and research methods (Dixon-Woods et al., 2005; Thomas & Harden, 2008). In this part of the review, we aimed to aggregate all that is known about suicide in Sri Lanka and reveal insights into a complex social problem.

Aims

This study aimed to provide a comprehensive overview of what is known about suicide in Sri Lanka from the different perspectives outlined earlier. The review of the literature sought to “take stock” and to ask the questions: “What do we know about suicide in Sri Lanka?”, and “Where should further studies be directed?”

The specific objectives of this review of the published literature on suicide in Sri Lanka were to:

1. Describe the overall patterning of the literature
2. Analyze the content, research methods, and proposed solutions
3. Make recommendations for future research

Method

Protocol

The search strategy as depicted in Figure 1 was developed by a local study team (MP, RF, AR). Changes to the protocol were discussed by the review team and an audit trail of decisions recorded.

Eligibility

The review systematically identified relevant literature from 1970 to June 2008. These dates were selected to coincide with rising suicide rates and an increasing rate of publications addressing this issue. The selection of terms to include suicide and deliberate self-harm was intended to ensure that a broad range of views were included. The selection of hard-copy and electronic materials, as well

Search Terms:

Suicid* OR Parasuicid* OR (Self harm) OR (Delib* Or Intent* AND injur* OR Poison* OR hanging OR drowning OR burning)

AND Sri Lanka

NOT Terror* OR Bomb*

Inclusion Criteria

- Database(s)
- Published in English
- Full article accessible
- Considers aspects of suicide
- Considers factors in Sri Lanka
- 1970–2008

Exclusion Criteria

- Terrorism related suicide
- Magazine articles
- Newspaper articles

Figure 1. Search strategy.

as peer-reviewed and gray literature, was considered important so that a wide range of opinions and knowledge about suicide could be included. The search was limited to English-language publications and to material published in medical and social science journals, conferences, academic sessions, books, and presentations at formal meetings. Media articles were excluded from this aspect of the review owing to limitations of time and resources.

Suicide-related terrorism, although prevalent in Sri Lanka, was excluded, as Grimland et al. have suggested that suicide in this context relates to the political context and not the more common understanding of psychopathology related to suicide (Grimland, Apter, & Kerkhof, 2006). The inclusion of particular search terms focused on pesticides and poisoning reflected the main methods of suicide and therefore the need for additional attention in the search.

Information Sources

Three processes were utilized to identify relevant articles: electronic search, hand search, and identification of additional texts from key informants. Articles were initially identified by searching electronic databases, including Internet-based searches of gray literature using Google and Google Scholar. Databases searched were PubMed, Social Sciences Citations Index, Sociological Abstracts, and Scopus. Hand searches of the *Ceylon Medical Journal* from 1970 were undertaken. In addition, key informants knowledgeable in the field were asked to confirm the breadth of studies and identify any additional materials.

Search

The following is an example of the search string entered into PubMed Central (PMC) and can be accessed through <http://www.ncbi.nlm.nih.gov/sites/myncbi/searches/view/10111196/>: suicid* OR parasuicid* OR (self harm) OR (deliberate OR intentional) AND (injury OR injuries OR Poisoning OR Hanging OR drowning OR burns) AND Sri Lanka NOT (suicide bomb*) (“1970/01/01”[PDat]: “2008/12/31”[PDat]). Searching for gray literature included the terms “suicide Sri Lanka” and “deliberate self-harm Sri Lanka.”

Study Selection

Studies were selected for inclusion according to the criteria outlined in Figure 1. Two reviewers (MP, AR) independently completed a checklist based on the inclusion criteria to screen and assess all the identified articles for inclusion. In addition to bibliographic details, studies were also categorized by study design and origin of author. The origin of each author was decided by their institutional affiliation and their residence at the time of publication of the article. The papers selected are published in a bibliographic format at <http://www.sactrc.org>.

Appraisal of Individual Studies

The quality appraisal was designed to provide an indication of the strengths and weaknesses of each study or paper. Each study was assessed for methodological quality by two reviewers independently using established checklists. Quantitative studies were reviewed by MP, AZ, and AR using the Critical Appraisal Skills Programme (CASP) checklists (CASP, 2001) for the appropriate study design and qualitative studies were reviewed by MP and SS using the CASP format. Additional tools were used to rate the quality of nonexperimental designs such as opinion, reviews, reports, and guidelines (Pearson et al., 2004). After these checklists were completed, reviewers made an assessment of the overall methodological quality of each study and assigned ratings based on the system used by Goldsmith et al. (Goldsmith et al., 2007). This system rated studies in terms of quality as high, medium, or low and an explicit criterion for assessment was added to quantify the rating.

Synthesis of Results

The thematic synthesis was undertaken in two phases, coding and organizing into descriptive themes. The initial stage involved coding the data to identify prominent or recurrent themes in the full text of all the articles. The articles were free coded line by line and then organized into descriptive themes. Nvivo 8 software (QSR, 2008) was used to code and organize the data to identify trends, patterns, and conflicting findings. Findings are presented as a summary of the main themes with references specified where they are particularly illustrative of the issue. More general statements, common to many publications, are presented without specifying references.

Additional Analyses

Recent work by the Grading of Recommendations Assessment and Development of Evaluation (GRADE) committee on systematic reviews has highlighted the need to appraise the evidence not just in terms of bias but also on the strength of recommendations (Atkins et al., 2004; Guyatt et al., 2008). As the discussion, conclusions, and recommendations of each paper were to be used for further analysis, reviewers rated the studies according to the credibility of recommendations using a method adapted from the Joanna Briggs Institute described in Table 1 (Joanna Briggs Institute, 2008).

Table 1. Ratings of the degree of credibility of recommendations in published literature (Joanna Briggs Institute, 2008)**Unequivocal (U):**

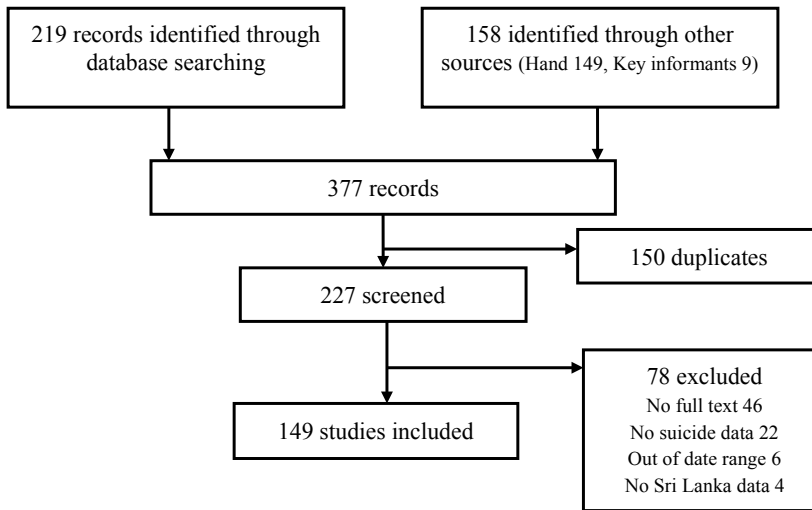
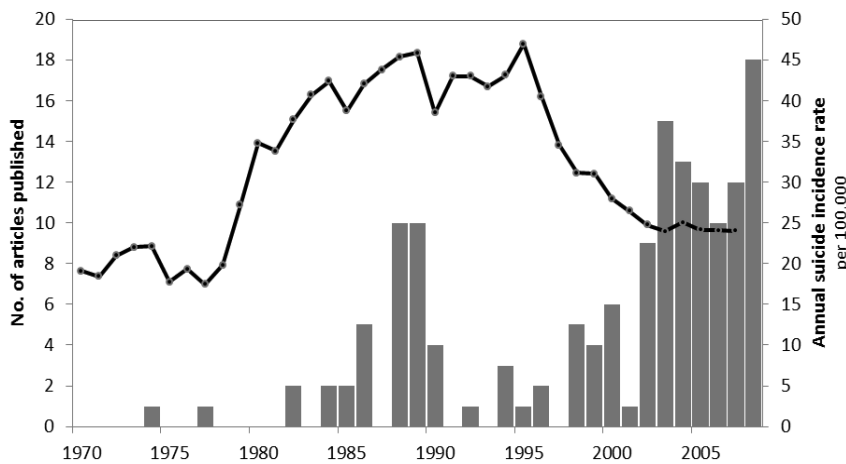
Evidence beyond reasonable doubt which may include findings that are matter of fact, directly reported/observed and not open to challenge;

Credible (C):

Evidence that is, albeit an interpretation, plausible in light of the data and theoretical framework. The interpretations can be logically inferred from the data but, because the findings are essentially interpretive, they can be challenged;

Unsupported (S):

When none of the other level descriptors apply and when, most notably, findings are not supported by the data.

**Figure 2.** Literature on suicide in Sri Lanka (1970–2008): study flowchart.**Figure 3.** Literature on suicide in Sri Lanka (1970–2008): number of studies per year and annual incidence of suicide.

Results

Study Selection

The electronic and the hand searches yielded 219 references. These 219 references were circulated to key informants and an additional nine references were added, resulting in 227 articles. These articles were screened and 78 excluded (no full text available, 46; date, 6; no specific data on Sri Lanka, 4; no specific data on suicide, 22). In all, 149 articles were eligible for further analysis – critical appraisal and thematic analysis. A breakdown of the studies selected is presented in Figure 2.

Study Characteristics – Patterning of the Literature

The number of studies published has a bimodal pattern in the 40 years; a smaller cluster of studies in the late 1980s and a significantly increasing number of published studies since 2000. As seen in Figure 3, since 2002 there have been over 10 studies per year. A comparison of the trends in the number of articles and the annual suicide incidence rates shows that since 1995 the rates have been falling at the same time as the number of annual publications has continued to increase.

Table 2. Literature on suicide in Sri Lanka (1970–2008): breakdown of study types

Study type	<i>n</i>	%	Local	Overseas	Local/OS
Experimental	16	(10.7)	3	3	10
Systematic review	3		0	2	1
RCT	6		1	0	5
Case control	5		2	1	2
Cohort	2		0	0	2
Descriptive	56	37.6	18	11	27
Qualitative	16	10.7	4	4	8
Expert opinion	61	41.0	10	24	27
Total	149				

Notes: RCT = randomized controlled trial. OS = overseas.

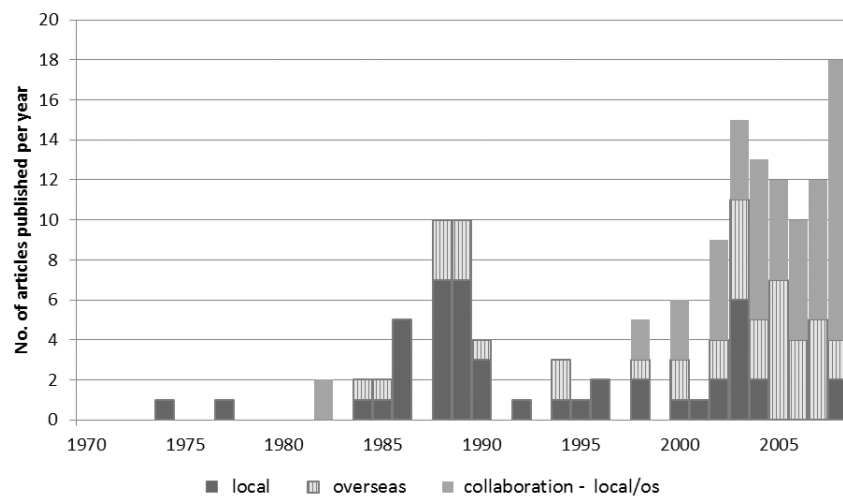


Figure 4. Literature on suicide in Sri Lanka (1970–2008): patterns in the origin of authors.

Note: os = overseas.

A wide range of study methodologies were reported (Table 2). Analytic studies accounted for 11% of all studies, descriptive studies for 37%, qualitative studies for 11%, and opinion for 41%. The majority of articles focused on poisoning (59%) and this reflects the predominant means of self-harm during the period under study. In addition, there were 38% related to any method of suicide or self-harm.

The mean number of authors was 3.65 (range 1–14) and the majority of studies had authors who were Sri Lankan, either publishing alone or with international collaborators ($n = 107$; 72%), although exclusively overseas authors and collaborations were also prominent ($n = 42$; 28%). The pattern of authorship in terms of number and origin, presented in Figure 4, showed local authors produced more literature up until the mid-1990s with a mean number of authors of 2.17 per publication. Studies conducted by only overseas investigators were fewer in number and spread throughout the time period. Collaborations between local and international authors became widespread from the late 1990s until the present, often involving a higher number of authors (mean 6.09).

Risk of Bias Within Studies

Of the 149 articles assessed, the majority of studies were rated as high-quality (59%) within their own design (medium 33% and low 8%), and of the lower-quality studies three were published between 1986 and 1990 and eight since 1999. There was no significant difference between the type of study and the overall quality rating.

The majority of studies had recommendations and conclusions (as described in Table 1) that were credible ($n = 105$) with roughly equal numbers of unequivocal ($n = 21$) and unsupported ($n = 17$). The credibility of the recommendations made by authors mirrors the quality rating undertaken through the critical appraisal phase.

Synthesis of Results

Analysis of Content – What Was Said?

The main issues that emerged from the broad thematic analysis are organized into six themes. The themes pre-

sented in Table 3 cover the context of suicide in Sri Lanka, debates within the literature, studies where there were contested findings, comparisons with the international context, medical management, and health systems aspects. The themes are connected and often appear interwoven between papers.

Sri Lankan Context

The most frequently cited contextual feature was the difference between the patterns of suicide in Sri Lanka and that of high-income countries. This is particularly related to the high incidence rates and the high case fatality associated with the methods of suicide chosen, primarily self-poisoning (Berger, 1988; van der Hoek & Konradsen, 2006). Another feature is the importance attached by authors to what is perceived to be a lack of planned intention (Hettiarachchi, Kodithuwakku, & Chandrasiri, 1988; Konradsen, Hoek, & Peiris, 2006). There is great emphasis in the literature on the significance of alcohol misuse and its links to self-harm attempts. A significant body of literature is also devoted to the regulation of pesticides and the impact the bans have had on reducing the incidence rate (Gunnell et al., 2007; Roberts et al., 2003).

The role of gender is raised by a number of authors as being a potentially important dimension, especially given the high rates of suicide in young women. However, this remains a relatively underexplored issue; only 11 of 149 studies discussed the gender implications of their findings. The primary focus of reporting was on gender disaggregated data. There was very limited social sciences research

exploring the sociological, psychological, and other underlying dimensions related to gender.

Debates

There are a number of debates that are reflected in the literature. One concerns the role of intention in self-harm and suicide. Suicide or attempts at self-harm are often described as “impulsive” and often considered to be a response to “trivial” concerns. Some of the sociological literature seeks to illuminate the meaning attached to self-harm attempts and considers that the act can be seen as entwined in social relations and that attempts of self-harm are meant to convey messages to families and the community (Marecek, 1998). The normalization of suicide within the society as a legitimate response to stress has been highlighted as a worrying feature of the Sri Lankan pattern (de Silva, 2003; van der Hoek, Konradsen, Athukorala, & Wanigadewa, 1998). In addition there is evidence that knowledge of toxicity has not acted as a protective factor and this highlights other issues such as the role of knowledge in preventing self-harm (Eddleston, 2000).

A dominant concern (as mentioned earlier) is the difference between the problem in Sri Lanka and high-income countries. Many of the authors consider the application of prevention activities based on evidence from high-income countries to have limited relevance (Eddleston & Konradsen, 2007). The positive impact of regulating pesticides is debated as a long-term strategy since there are concerns raised about method substitution (Eddleston, Buckley, Gunnell, Dawson, & Konradsen, 2006; Ganesvaran, Subramaniam, & Mahadevan, 1984).

Table 3. Literature on suicide in Sri Lanka (1970–2008): coding of the emerging themes from the literature

Themes	Main issues
Sri Lankan context	Differences from international patterns High incidence and case fatality related to method of suicide Intention Alcohol misuse and its links to suicide Regulation of pesticides and the success in reducing mortality Gender
Debates	How intent is conceived and the role it plays in self-harm Impulsivity of attempts Normalization of suicide as a response to stress Knowledge of toxicity not protective Effectiveness of prevention by restricting means
Contentious issues	Mental illness and depression and its role in suicide in Sri Lanka Effects of war
International issues	Significance of differences from Western literature Lack of support from international agencies and donors Tensions between disciplines and sectors, primarily health and agriculture
Health systems	Health systems constraints: training, capacity, human resources Communication Logistics and supplies Access to treatment
Treatment	Method and mortality Case fatality ratios Limited evidence of human toxicity Evidence used to generate treatment approaches / diagnostic methods etc.

Contentious Issues

The most fiercely debated issue was the role of mental illness and (serious) depression in suicide and self-harm. Some authors contend that the links to mental illness are derived from a Western context where mental health, depression, and suicide are linked (de Silva et al., 2000; Fernandopulle, Thalagala, & Barraclough, 2002; Marecek, 1989; Vijayakumar, 2005) and that the situation is very different in Sri Lanka. One author argues that “we should stop universalizing the suicide–depression connection” (Marecek, 2006). By contrast, some authors consider that the lack of psychiatric capacity within the country to identify and diagnose mental health problems contributes to the underreporting (Abeyasinghe & Gunnell, 2008; Thalagala & Fernando, 2003). Both schools draw on epidemiological research to further their claims.

An apparent gap in the literature relates to the effects of war and violence on the rates of suicide, aside from the literature on suicide bombing that is not covered by this study. Sri Lanka was deeply affected by civil conflict and communal violence for more than 35 years. The conflict resulted in large-scale displacement and death. There are surprisingly only five articles that specifically address these issues and only two studies were based on primary data to examine the relationship between conflict and suicide (Gunnell et al., 2007; Somasundaram & Rajadurai, 1995). One study based in a conflict area found rates of suicide dropped during times of conflict and the other study did not find any correlation between suicide rates and the conflict. Two articles addressed broader discussions about the “conflict culture” and relationships to mental health challenges (Bolz, 2002; Fernandopulle et al., 2002). One study was undertaken in an area affected by the conflict and suggested that high rates of suicide among youth could be related to civil unrest (Ganesvaran et al., 1984). There was no overall consensus through the literature on the role of the conflict.

Treatment Aspects

The largest number of articles ($n = 52$, 35%) were devoted to clinical aspects of suicide in Sri Lanka, with a strong emphasis on identification when presenting to the health services and on diagnostic and treatment issues. Intentional poisoning with pesticides, plants, and other toxic agents is seen to pose significant challenges to the hospital system in Sri Lanka.

The method of suicide remains a significant concern to clinicians. Choice of method has been clearly linked with high mortality, provoking authors to argue that the burden is unacceptably high. Authors contend that the lack of evidence on intentional ingestion of poison results from the absence of the problem in high-income countries from where many of the toxicological textbooks originate. They believe that this lack of evidence on human toxicity is severely hampering efforts to improve outcomes. In response to this lack of evidence or the ability to provide definitive answers, a considerable amount of the clinical literature

comprises case reports and expert opinions devoted to providing guidance to clinicians about treatment and management of specific poisons.

International Context

The pattern of suicide in Sri Lanka is seen to have similarities with a number of its Asian neighbors that mark it as different to other internationally observed rates. Most notable are similarities to China and India in terms of methods, impulsivity, gender rates, and high burden in rural areas (Abeyasinghe & Gunnell, 2008; Hendin et al., 2008; Vijayakumar, 2005). Thus it is contended that lessons learnt in Sri Lanka would have regional significance.

The role of international agencies specifically the WHO, the Food and Agriculture Organization (FAO), and chemical safety initiatives such as the International Program on Chemical Safety (IPCS) are criticized by many of the authors, as there is a perceived lack of support or donor interest in this pressing public health concern. Many authors contend that the WHO has “put greater emphasis on psychiatric and social models of self-harm aetiology” (Gunnell & Eddleston, 2003, p. 907) rather than highlighting the role of access to means. Some authors discussed the tension between the public health, agricultural, and industry interests, noting that inactivity on this issue may be related to tensions between the perceived benefits of pesticides in increasing crop yields and public health impacts of pesticide use (Gunnell & Eddleston, 2003). More recent efforts by the WHO have highlighted the role of pesticides in suicide and self-harm (Bertolote, Fleischmann, Eddleston, & Gunnell, 2006).

Health Systems

Health system issues identified were mostly linked to local context and challenges in LMIC. Issues relating to training, capacity, human resources, communication, logistics, and supplies have all been identified as barriers to effective responses. Since the majority of suicides are recorded in rural districts, access to medical treatment is highlighted as a key constraint in providing prompt, effective, and affordable treatment.

What Methods or Approaches Were Taken?

The literature was categorized by the approach that was taken to the study, as seen in Table 4. The majority of studies sought to address issues concerning the magnitude and clinical features of the problem of suicide. Two peaks in the number of articles on these approaches can be observed in the late 1980s and a rising number since the late 1990s, as seen in Figure 5. Other categories of studies included commentaries, social sciences research, prevention, risk factors, health systems, and policy.

Table 4. Literature on suicide in Sri Lanka (1970–2008): frames of the problem

Frames of the problem	No. of studies	Quality appraisal	Quality of recommendations*	Disciplinary influences	Definition and scope	Key concepts
Clinical features	52	High – 30 Med – 17 Low – 4	Unequivocal – 6 Credible – 41 Unsupported – 4	Psychiatry, psychology, toxicology, pharmacology,	Discussion of diagnostic, treatment, and management issues related primarily to poisoning, effectiveness of interventions, the role of depression and mental health, clinical factors associated with mortality and unusual cases	Diagnosis, treatment, clinical guidance, method, severity, comorbidity
Size of problem	27	High – 17 Med – 7 Low – 2	Unequivocal – 5 Credible – 18 Unsupported – 3	Epidemiology, public health, sociology	Discussion of the pattern of poisoning in relation to incidence rate, geographical features, sociodemographic features, extent, causes, mortality, and methods used. Comparisons are made nationally, regionally, and globally	Patterns, incidence, mortality, methods used
Broad overviews	17	High – 30 Med – 17 Low – 4	Unequivocal – 0 Credible – 14 Unsupported – 3	Public health, toxicology	Discussion of issues mainly in response to previous articles, new initiatives, and forthcoming conferences, proposal of new ideas, editorials, personal account, and review	Opinion, letters, editorials, debates
Social aspects	16	High – 9 Med – 3 Low – 0	Unequivocal – 3 Credible – 11 Unsupported – 0	Anthropology, sociology, development studies	Discussion of sociological theories, and the sociocultural context including norms and practices, civil conflict, gender, youth, media, and community perceptions	Sociological theory, causes, motive, understanding
Prevention	12	High – 8 Med – 4 Low – 0	Unequivocal – 3 Credible – 8 Unsupported – 1	Public health, sociology, development studies	Discussion of options, policies, and interventions and their impact	Interventions, policy, methods used
Risk factors	11	High – 3 Med – 4 Low – 1	Unequivocal – 2 Credible – 3 Unsupported – 3	Public health, epidemiology, sociology	Discussion of patient characteristics, demographics, social context	Determinants, perpetuating factors, precipitating factors
Health services	10	High – 3 Med – 6 Low – 1	Unequivocal – 1 Credible – 8 Unsupported – 1	Public health, health systems, human resources, development studies	Discussion of health service issues, service linkages, hospital management, professional development, information, and human resource issues	Health systems, professional development
Policy	6	High – 4 Med – 1 Low – 1	Unequivocal – 2 Credible – 2 Unsupported – 2	Politics, public health, development studies, agriculture, rural development	Discussion of past and present policies and their impact in the context of a developing country. Political issues surrounding choice of health issues	Interventions, policy, context

Note: * The credibility of recommendations made in each paper were graded according to a scale adapted and presented in Table 1.

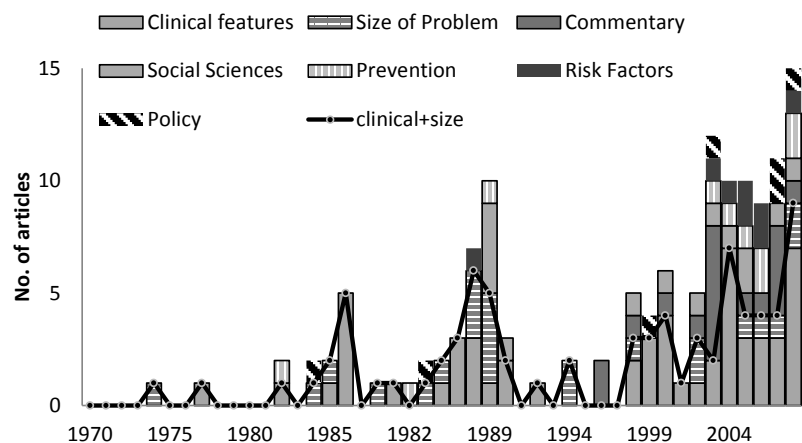


Figure 5. Emergence of research frames in studies on suicide in Sri Lanka between 1970 and 2008.

Table 5. Literature on suicide in Sri Lanka (1970–2008): recommendations for prevention targeted at individuals and credibility of the recommendations

Individual strategies	No. of sources ^a	No. of references ^b	Unequivocal	Credible	Unsupported
Medical management (poisoning, burns, depression, alcohol)	49 (73.1%)	68	11	33	5
Interventions targeted at individuals within “high-risk groups”	14 (20.9)	14	2	9	3
Aftercare	4 (6.0)	4	1	2	1
Total	67 (44.9%)	86	12	44	9

Notes: ^a = Number of sources refers to the number of manuscripts where a recommendation was made for a specific prevention strategy. ^b = Number of references highlights where a manuscript made several references to a recommended strategy.

Table 6. Literature on suicide in Sri Lanka (1970–2008): recommendations for prevention targeted at populations and credibility of the recommendations

Population	No. of sources ^a	No. of references ^b	Unequivocal	Credible	Unsupported
Restricting access to means	39 (72.2%)	78	9	27	3
Mass media	10 (18.5%)	20	0	8	2
Community interventions	24 (44.4%)	46	5	16	3
Research	10 (18.5%)	16	2	8	0
Total	54 (36.2%)	160	9	38	7

Notes: ^a = Number of sources refers to the number of manuscripts where a recommendation was made for a specific prevention strategy. ^b = Number of references highlights where a manuscript made several references to a recommended strategy.

What Solutions Are Proposed?

A wide range of solutions were proposed and can be categorized by their target toward populations or individuals, as seen in Tables 4 and 5. While many of the solutions proposed overlap, the main solutions proposed for individuals (Table 5) included improved medical management, targeting programs to high-risk individuals, and providing aftercare to suicide survivors.

The main solutions proposed at population health level (Table 6) included restriction of access to means through a

range of strategies, interventions based on mass media to improve both reporting and raising awareness, and a wide range of community interventions.

The strongest support in terms of both number of authors and strength of the recommendations was for improving medical management and restricting access to lethal means. However, there is also acknowledgment that longer-term strategies that consider the underlying causes of why people attempt suicide are needed, although strong evidence of effective interventions does not yet exist.

Discussion

Summary of Evidence

The large body of literature on suicide in Sri Lanka highlights how the problem was approached from different perspectives. Patterning and quality varied over time, by the origin of author and discipline. The increasing number of local and overseas collaborations is likely to represent international collaborative research efforts being directed toward the problem. The quality of the literature reviewed was high and most likely reflects the large number of peer-reviewed articles from biomedical journals. The literature did provide an important avenue for debate with ideas being contested and flagged for further discussion and resolution.

The dominant narrative reflected in the literature is related to the use of pesticide for self-harm attempts and the role (or perceived lack thereof) of intention. The importance of depression is highlighted as different from patterns seen in Western countries. The link between concepts of hopelessness and helplessness and suicide in the international literature suggests possibilities for interventions with high-risk individuals and has directed research and intervention in these directions (Mann et al., 2005; Maris, 2002). In areas where “helplessness and hopelessness” is a less pronounced feature, such as in Sri Lanka, there is far less clarity about directing resources to individual prevention activities.

While production of evidence is important to answer research questions there is also interest in ensuring that evidence informs policy (Bowen & Zwi, 2005; Lomas, 2005). The findings from this study in relation to the patterns in the literature are reflected in policy-making across the same period. The size and the scope of the problem were highlighted in early studies predominantly by local authors. This local ownership of the problem became a very important aspect of policy (Pearson et al., 2010). The generation of evidence in Sri Lanka helped to raise awareness of the magnitude of the problem and unique pattern of incidence in Sri Lanka. Thus the literature had an important “agenda-setting” role that contributed to important policy changes. The large number of studies undertaken since 2000 corresponds with a period of policy making in which there is significant collaboration between evidence generation and policy makers and is indicative of evidence-informed approaches (Bowen & Zwi, 2005; Oxman, Lavis, Lewin, & Fretheim, 2009; Pearson et al., 2010).

The major gaps identified through this systematic review include the limited attention to policy issues and health service research, the role of factors such as gender and the Sri Lankan conflict as contributory factors, and the limited evidence of effective interventions beyond the restriction of means. While there has been some literature devoted to sociocultural aspects of suicide, there are still gaps in understanding the underlying causes that could help direct future prevention efforts.

The literature demonstrated the effectiveness of the regulation of pesticides and the contribution of improved

medical management to reducing mortality. However, there remains little evidence of other effective interventions to prevent suicide or self-harm and particularly interventions focused on addressing the significant proximal and distal factors associated with alcohol misuse in rural communities.

Limitations

Much of the published literature is not readily available within the local context. The research team had access to resources not normally available to clinicians and policy-makers in LMIC. Even with these resources, there were still 46 articles that could not be retrieved owing to inaccessibility, copyright, and journal permissions. The difficulties experienced in accessing literature based in LMIC reinforced the importance of making appropriate literature more freely available for use in the developing world. While the promotion of open access publication will help address these concerns, the costs placed on authors to make a publication open access remains a considerable barrier.

The indexes used to search were primarily biomedical as the review to some extent focused on health and social policy aspects. A subsequent search of EMBASE to ensure breadth of literature found no additional papers that would be considered eligible. The focus reflects both the predominance of method-specific issues in Sri Lanka and the source of the identification of the problem. The primary method of suicide in Sri Lanka over this period was self-poisoning with pesticides and therefore the majority of articles were focused on the manifestation and complications related to the toxicological effects of ingesting pesticides.

A further limitation of our study was that more nuanced or unpublished local ideas are not represented within this review. In an attempt to ensure we captured the fullest possible range of literature, both gray literature and other publication sites, we contacted several social scientists and they contributed additional resources to the study. This helped to ensure the range of literature analyzed was reflective of the entire body of literature on suicide. Further in-depth analyses using meta-narrative synthesis techniques (Greenhalgh et al., 2005) are currently underway in order to explore how the different disciplinary perspectives may have influenced both the identification of causes and determining the solutions proposed.

Conclusions

Understanding the context of suicide in Sri Lanka is important so as to contextualize the etiological factors and prevention strategies. Suicide in Sri Lanka has been studied from a diverse range of disciplines and this has created a broad understanding of the clinical factors, size of the problem, overviews, and social aspects. However, there remains limited evidence of prevention, risk factors, health services, and policy. A wide range of solutions have been pro-

posed but only regulation of pesticides (including import bans, sales restrictions, and reformulation) and improved medical management have been shown to be effective to date. The patterns of the literature also highlight important aspects for policy in relation to the local generation of evidence and the ownership to drive policy responses.

Acknowledgments

SACTRC provided the funding through a Wellcome Trust/NHMRC International Collaborative Research Grant GR-071669MA.

References

- Abeyasinghe, R., & Gunnell, D. (2008). Psychological autopsy study of suicide in three rural and semi-rural districts of Sri Lanka. *Social Psychiatry and Psychiatric Epidemiology*, 43(4), 280–285.
- Atkins, D., Eccles, M., Flottorp, S., Guyatt, G. H., Henry, D., Hill, S., ... Williams, J. W., Jr. (2004). Systems for grading the quality of evidence and the strength of recommendations I: Critical appraisal of existing approaches. The GRADE Working Group. *BMC Health Services Research*, 4(1), 38.
- Attree, P., & Milton, B. (2006). Critically appraising qualitative research for systematic reviews: Defusing the methodological cluster bombs. *Evidence & Policy: A Journal of Research, Debate and Practice*, 2(1), 109–126.
- Baxter, S., Killoran, A., Kelly, M., & Goyder, E. (2010). Synthesizing diverse evidence: The use of primary qualitative data analysis methods and logic models in public health reviews. *Public Health*, 124(2), 99–106.
- Beautrais, A. L. (2006). Suicide in Asia. *Crisis*, 27(2), 55–57.
- Berger, L. R. (1988). Suicides and pesticides in Sri Lanka. *American Journal of Public Health*, 78(7), 826–828.
- Bertolote, J. M., & Fleischmann, A. (2002). A global perspective in the epidemiology of suicide. *Suicidologi*, 7(2), 6–7.
- Bertolote, J. M., Fleischmann, A., Eddleston, M., & Gunnell, D. (2006). Deaths from pesticide poisoning: A global response. *British Journal of Psychiatry*, 189, 201–203.
- Bolz, W. (2002). Psychological analysis of the Sri Lankan conflict culture with special reference to the high suicide rate. *Crisis*, 23(4), 167–170.
- Bowen, S., & Zwi, A. B. (2005). Pathways to “evidence-informed” policy and practice: A framework for action. *PLOS Medicine*, 2(7), 600.
- CASP. (2001). Critical appraisal skills programme [website]. Retrieved from <http://www.casp-uk.net/>
- de Silva, D. (2003). Suicide prevention strategies in Sri Lanka: The role of socio-cultural factors and health services. *Ceylon Medical Journal*, 48(3), 68–70.
- de Silva, H. J., Kasturiratchi, N., Seneviratne, S. L., Senaratne, D. C., Molagoda, A., & Ellawala, N. S. (2000). Suicide in Sri Lanka: Points to ponder. *Ceylon Medical Journal*, 45(1), 17–24.
- Denyer, D., & Tranfield, D. (2006). Using qualitative research synthesis to build an actionable knowledge base. *Management Decision*, 44(2), 213–227.
- Dixon-Woods, M., Agarwal, S., Jones, D., Young, B., & Sutton, A. (2005). Synthesising qualitative and quantitative evidence: A review of possible methods. *Journal of Health Services Research & Policy*, 10(1), 45.
- Dixon-Woods, M., Agarwal, S., Young, B., Jones, D., & Sutton, A. (2004). *Integrative approaches to qualitative and quantitative evidence* (Report). London, UK: Health Development Agency.
- Dixon-Woods, M., Bonas, S., Booth, A., Jones, D., Miller, T., Sutton, A., ... Young, B. (2006). How can systematic reviews incorporate qualitative research? A critical perspective. *Qualitative Research*, 6(1), 27.
- Eddleston, M. (2000). Patterns and problems of deliberate self-poisoning in the developing world. *QJM*, 93(11), 715.
- Eddleston, M., Buckley, N. A., Gunnell, D., Dawson, A. H., & Konradsen, F. (2006). Identification of strategies to prevent death after pesticide self-poisoning using a Haddon matrix. *Injury Prevention*, 12(5), 333–337.
- Eddleston, M., & Konradsen, F. (2007). Commentary: Time for a re-assessment of the incidence of intentional and unintentional injury in India and South East Asia. *International Journal of Epidemiology*, 36(1), 208–211.
- Fernandopulle, S., Thalagala, N., & Barraclough, S. (2002). Mental health in Sri Lanka: Challenges for primary health care. *Australian Journal of Primary Health*, 8(2), 31–38.
- Ganesvaran, T., Subramaniam, S., & Mahadevan, K. (1984). Suicide in a northern town of Sri Lanka. *Acta Psychiatrica Scandinavica*, 69(5), 420–425.
- Goldsmith, M. R., Bankhead, C. R., & Austoker, J. (2007). Synthesising quantitative and qualitative research in evidence-based patient information. *Journal of Epidemiology and Community Health*, 61(3), 262–270.
- Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., Kyriakidou, O., & Peacock, R. (2005). Storylines of research in diffusion of innovation: A meta-narrative approach to systematic review. *Social Science & Medicine*, 61(2), 417–430.
- Grimland, M., Apter, A., & Kerkhof, A. (2006). The phenomenon of suicide bombing. *Crisis*, 27(3), 107–118.
- Gunnell, D., & Eddleston, M. (2003). Suicide by intentional ingestion of pesticides: A continuing tragedy in developing countries. *International Journal of Epidemiology*, 32(6), 902.
- Gunnell, D., Fernando, R., Hewagama, M., Priyangika, W. D., Konradsen, F., & Eddleston, M. (2007). The impact of pesticide regulations on suicide in Sri Lanka. *International Journal of Epidemiology*, 36(6), 1235–1242.
- Guyatt, G., Oxman, A., Vist, G., Kunz, R., Falck-Ytter, Y., Alonso-Coello, P., & Schunemann, H. (2008). GRADE: An emerging consensus on rating quality of evidence and strength of recommendations. *British Medical Journal*, 336(7650), 924.
- Hammersley, M. (2002, October). *Systematic or unsystematic, is that the question? Some reflections on the science, art, and politics of reviewing research evidence*. Presentation given at the Public Health Evidence Steering Group of the Health Development Agency, London, UK.
- Harden, A., & Thomas, J. (2005). Methodological issues in combining diverse study types in systematic reviews. *International Journal of Social Research Methodology*, 8(3), 257–271.
- Hendin, H., Phillips, M. R., Vijayakumar, L., Pirkis, J., Wang, H., Yip, P., ... Fleischmann, A. (2008). *Suicide and suicide prevention in Asia*. Geneva, Switzerland: World Health Organization.
- Hettiarachchi, J., Kodithuwakku, G. C., & Chandrasiri, N. (1988). Suicide in southern Sri Lanka. *Medicine, Science and the Law*, 28(3), 248–251.
- Joanna Briggs Institute. (2008). *Reviewer's manual*. Adelaide, Australia: Author.
- Khan, M. M. (2002). Suicide on the Indian subcontinent. *Crisis*, 23(3), 104–107.
- Konradsen, F., Hoek, W., & Peiris, P. (2006). Reaching for the bottle of pesticide – a cry for help. Self-inflicted poisonings in Sri Lanka. *Social Science & Medicine*, 62(7), 1710–1719.
- Lomas, J. (2005). Using research to inform healthcare managers' and policy makers' questions: From summative to interpretive synthesis. *Healthcare Policy*, 1(1), 55–71.
- Mann, J. J., Apter, A., Bertolote, J., Beautrais, A., Currier, D., Haas, A., ... Marusic, A. (2005). Suicide prevention strategies: A systematic review. *JAMA*, 294(16), 2064–2074.

- Marecek, J. (1989). Psychological approaches to understanding suicide. In P. de Silva (Ed.), *Suicide in Sri Lanka* (pp. 16–24). Kandy, Sri Lanka: Institute of Fundamental Studies.
- Marecek, J. (1998). Culture, gender, and suicidal behavior in Sri Lanka. *Suicide and Life-Threatening Behavior*, 28(1), 69–81.
- Marecek, J. (2006). Young women's suicides in Sri Lanka: Cultural, ecological and psychological factors. *Asian Journal of Counselling*, 13(1), 63–92.
- Maris, R. (2002). Suicide. *The Lancet*, 360(9329), 319–326.
- Ogilvie, D., Hamilton, V., Egan, M., & Petticrew, M. (2005). Systematic reviews of health effects of social interventions: 1. Finding the evidence: How far should you go? *Journal of Epidemiology and Community Health*, 59(9), 804–808.
- Oxman, A., Lavis, J., Lewin, S., & Fretheim, A. (2009). SUPPORT Tools for evidence-informed health Policymaking (STP) 1: What is evidence-informed policymaking? *Health Research Policy and Systems*, 7(Suppl 1), S1.
- Pearson, A., Porritt, K., Drummond, C., Walker, H., Watkins, F., & McIntosh, H. (2004). *Development of an evidence base to underpin palliative care in South Australia: A comprehensive review of the key learnings from the National Palliative Care Program* (Interim Report). Adelaide, Australia: SA Department of Health and Human Services and Joanna Briggs Institute.
- Pearson, M., Zwi, A. B., & Buckley, N. A. (2010). Prospective policy analysis: How an epistemic community informed policymaking on intentional self poisoning in Sri Lanka. *Health Research Policy and Systems*, 8, 19.
- Petticrew, M., & Roberts, H. (2003). Evidence, hierarchies, and typologies: Horses for courses. *Journal of Epidemiology and Community Health*, 57(7), 527–529.
- Phillips, M. (2004). Suicide prevention in developing countries: Where should we start? *World Psychiatry*, 3(3), 156.
- Popay, J., & Roberts, H. (2006). *Moving beyond effectiveness in evidence synthesis: Methodological issues in the synthesis of diverse sources of evidence*. London, UK: National Institute of Health and Clinical Excellence.
- Pope, C., Mays, N., & Popay, J. (2007). *Synthesizing qualitative and quantitative health evidence: A guide to methods*. Maidenhead, UK: Open University Press.
- QSR. (2008). Nvivo 8 [Computer software]. Melbourne, Australia: QSR International. Retrieved from http://www.qsrinternational.com/products_nvivo.aspx
- Roberts, D. M., Karunarathna, A., Buckley, N. A., Manuweera, G., Sheriff, M. H. R., & Eddleston, M. (2003). Influence of pesticide regulation on acute poisoning deaths in Sri Lanka. *Bulletin of the World Health Organization*, 81, 789–798.
- Saraceno, B., & Saxena, S. (2004). Bridging the mental health research gap in low-and middle-income countries. *Acta Psychiatrica Scandinavica*, 110(1), 1–3.
- Somasundaram, D. J., & Rajadurai, S. (1995). War and suicide in northern Sri Lanka. *Acta Psychiatrica Scandinavica*, 91(1), 1–4.
- Thalagala, N., & Fernando, D. N. (2003). Attempted suicides in Kurunegala District: Circumstances and risk factors. *College of Community Physicians of Sri Lanka*, 8, 38–45.
- Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8(1), 45.
- van der Hoek, W., & Konradsen, F. (2006). Analysis of 8000 hospital admissions for acute poisoning in a rural area of Sri Lanka. *Clinical Toxicology (Philadelphia, PA)*, 44(3), 225–231.
- van der Hoek, W., Konradsen, F., Athukorala, K., & Wanigadewa, T. (1998). Pesticide poisoning: A major health problem in Sri Lanka. *Social Science & Medicine*, 46(4-5), 495–504.
- Vijayakumar, L. (2005). Suicide and mental disorders in Asia. *International Review of Psychiatry*, 17(2), 109–114.
- Vijayakumar, L., John, S., Pirkis, J., & Whiteford, H. (2005). Suicide in developing countries (2): Risk factors. *Crisis*, 26, 112–119.
- Vijayakumar, L., Nagaraj, K., Pirkis, J., & Whiteford, H. (2005). Suicide in developing countries (1): Frequency, distribution, and association with socioeconomic indicators. *Crisis*, 26(3), 104–111.
- Waters, E., & Doyle, J. (2002). Evidence-based public health practice: Improving the quality and quantity of the evidence. *Journal of Public Health*, 24(3), 227–229.
- World Health Organization. (2004). *Suicide huge but preventable problem says WHO* [Press release]. Retrieved from <http://www.who.int/mediacentre/news/releases/2004/pr61/en/>

Received March 5, 2013

Revision received October 15, 2013

Accepted November 12, 2013

Published online February 7, 2014

About the authors

Melissa Pearson is a postgraduate student at the School of Social Sciences, University of New South Wales, and the South Asian Clinical Toxicology Research Collaboration and is supervised by AZ, NB, and DM. She is currently research manager for the University of Edinburgh on the safer storage of agrochemicals cluster randomized control trial.

Anthony Zwi is Professor of Global Health and Development at The University of New South Wales. He is primary supervisor of MP's PhD work. He is particularly interested in the interface of research with policy and practice and has a longstanding interest in countries emerging from conflict.

Amanda Rouse is a medical doctor who trained in public health in developing countries at the London School of Hygiene and Tropical Medicine. She has extensive experience of working in Sri Lanka and the Asia Pacific region.

Professor Ravindra Fernando is Senior Professor of Forensic Medicine and Toxicology of the University of Colombo. He has worked as a senior lecturer in the universities of London and Glasgow. He is a past president of the Ceylon College of Physicians and the Asia-Pacific Association of Medical Toxicology.

Nicholas Buckley is Professor in Medicine, Clinical Pharmacology, and Toxicology at the Prince of Wales Clinical School of the University of NSW, a consultant clinical toxicologist and President Elect of The Asia Pacific Association of Medical Toxicology. His main interest relates to applied research on toxicological issues in the developing world. He is a cosupervisor of MP's PhD work.

Duncan McDuie-Ra is Associate Professor in Development Studies at the University of New South Wales. His research is based on local development issues in South Asia. His most recent book is *Northeast migrants in Delhi: Race, refuge and retail* (Leiden/Amsterdam: Amsterdam University Press, 2012). He is a cosupervisor of MP's PhD work.

Melissa Pearson

University of New South Wales & South Asian Clinical Toxicology Research Collaboration
School of Social Sciences
Sydney, NSW 2052
Australia
Tel. +61 2 6247-5630
E-mail melissa@sactrc.org