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Completed Suicides and Self-Harm in Malaysia: A Systematic Review

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Abstract

Objective: Most of the research into suicide and self-harm has been conducted in the US and Europe, yet the volume of research does not reflect the distribution of suicide globally, with Asia accounting for up to 60 percent of all suicides. The present study systematically reviews the literature to assess the prevalence and correlates of suicidal acts in Malaysia in South East Asia.

Methods: Five relevant databases were searched from inception up to February 2014 and a narrative synthesis of the results from the included studies was performed. Studies were eligible for inclusion if they were: Correlational survey research and archival/observational research describing self-harm and suicide. Outcomes included completed suicides and self-harm including suicide attempts and self-poisoning, suicide plans and suicidal ideation.

Results: In total, 39 studies met the inclusion criteria. The principal findings were that the prevalence of suicide in Malaysia is approximately 6-8 per 100,000 population per year and that there is an excess of suicide among men, people younger than 40, and the Indian minority group. The past-month prevalence rates of suicidal ideation, plans and attempts are 1.7, 0.9% and 0.5%, respectively whereas the past-year prevalence rates of suicidal ideation range between 6% and 8%.

Conclusions: The present research marks a first step towards understanding the prevalence and correlates of suicide and self-harm in Malaysia. However, the heterogeneity of the included studies was high. Further research into the antecedents, consequences and interventions for suicide and self-harm in the Malaysian context are required.

Key words: Suicide; Self-harm, Malaysia, Prevalence, Correlates

1. Introduction

Most of the research into suicide and self-harm has been conducted in the US and Europe, yet the volume of research does not reflect the distribution of suicide globally, with Asia accounting for up to 60 percent of all suicides [1-3]. In the last decade, the allocation of RM 900 million (262 million US dollars) for the years 2006 to 2010 by Malaysian government under the Ninth Plan has been an important step forward in improving services for mental health problems including suicide and self-harm in Malaysia [4]. As part of this, the National Suicide Registry Malaysia was established in 2007 to monitor suicides. As yet, a self-harm registry has not been established, which is a potentially important omission, given that self-harm is the most powerful predictor of suicide [5].

Despite these efforts by the Malaysian government, however, the research literature into suicide and self-harm in Malaysia has been fragmented because it has tended to focus on certain types of self-harm among specific ethnic groups. This means that the prevalence of suicide and self-harm in Malaysia can only be accurately assessed by cross-checking multiple sources. The first major aim of the present review was, therefore, to try to provide a more accurate estimate of the prevalence of suicide and self-harm in Malaysia by drawing together the published research literature systematically.

The second aim was to identify correlates of suicide and self-harm in Malaysia. In Western countries, one consistent finding is that suicides among men outnumber suicides among women [6-10]. However, in other respects, the pattern of suicide and self-harm appears to differ between developed and developing countries [11]. For example, in developed countries, the suicide rate is high in the age group of 15 to 24 years but it is highest among the elderly, with the divorced/widowed/separated at increased risk of suicide. In contrast, in developing countries like Malaysia, the highest suicide rate is found among the young (below 30 years) [12] and married women are at higher risk [11]. Consistent with this

pattern of findings, in Malaysia (Kuala Lumpur specifically), self-harm is highest among women, people aged 16-24 years and people with an Indian background [12, 13]. However, further research is needed to elucidate the role of demographic correlates including gender and age on suicide rates in Malaysia.

Moreover, the means of suicide and self-harm have been found to differ between developed and developing countries. In developed countries, the drugs with which people choose to overdose are relatively non-toxic drugs such as analgesics, tranquilisers and antidepressants [14]. In contrast, toxic agricultural poisons are more widely available in developing countries and hence are widely employed in suicidal behaviours [15].

The present systematic review seeks to draw together the disparate literature in order to establish the prevalence and correlates of suicide and self-harm in Malaysia.

2. Method

The presentation of this systematic review conforms to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [16].

2.1. Eligibility criteria

Studies were included if they fulfilled three criteria:

(a) data collected in Malaysia

(b) paper written in English or Malay

(c) described episodes of suicide and/or self-harm in Malaysia.

Editorials, reviews and grey literature were excluded.

2.2. Data sources and search strategy

Studies on suicide and self-harm in Malaysia were identified after a comprehensive search of five electronic databases: PsycINFO (1806–February 2013), MEDLINE (1966–

October 2014), CINAHL (1982–October 2014), SCOPUS (1966–October 2014) and Web of Knowledge (1900–October 2014). Key words used in the search were performed in the format: (suicid* OR self-harm* OR parasuicid* OR attempted suicid* OR self-poison* OR self-injur*) AND (Malaysia). The use of generic key words was performed in order to capture as many published papers as possible.

2.3. Study selection and data extraction

The screening of articles was conducted in two stages. The first stage of screening involved reviewing the titles and abstracts of all articles identified from the electronic databases. From these, a list was drawn up of papers for potential inclusion. The second stage of screening involved retrieving the full text of articles that were selected after the first stage of screening. The data from these were extracted directly into tables in four categories: prevalence rates, associated factors, methods of suicide and the reason for the act.

2.4. Appraisal of methodological quality

Methodological quality of the included studies was assessed using criteria adapted from guidance on the assessment of observational studies [17] and the Quality Assessment Tool for Quantitative Studies [18]. Four criteria were deemed essential for assessing the quality of the review. Each study was awarded one point for each criterion met. We did not exclude studies on the basis of their methodological quality [19, 20]. These four key criteria were: (i) methodological design (prospective/case control=1 retrospective/cross-sectional=0), (ii) response rate (70% and over=1, <70% or not reported=0), (iii) screening tool for self-harm (psychometrically validated clinical records/clinical interview/self-report=1; other/not reported=0), and (vi) control for confounding factors in the analysis (controlled=1, not controlled/not reported=0).

2.5. Data synthesis

The large heterogeneity of the studies included in this review precluded the use of formal meta-analysis to pool the results of different studies. Therefore a narrative synthesis was performed. The primary outcome of this review was the prevalence of completed suicides and self-harm in Malaysia. Moreover, in order to obtain a better understanding of the problem of suicide and self-harm in Malaysia, we explored the role of demographic characteristics, risk and protective factors for suicide and self-harm and methods and motives for suicide and self-harm.

3. Results

3.1. Description of the study selection

The initial searches identified 258 studies (see PRISMA flow diagram in Fig.1). These studies were assessed based on the abstract alone and of these, 242 articles were excluded because of the duplication of papers and the setting being other than Malaysia. Of 53 papers retrieved for full text review, 14 full text papers were excluded because the results did not describe prevalence rates or the predictors and types of suicide and self-harm. This process left 39 studies that fulfilled the eligibility criteria, and it was from these that data were extracted.

3.2. Study characteristics

Fourteen studies had retrospective designs, 8/39 were prospective, 3/39 were case-control and 14/39 were cross-sectional studies. The majority of studies were based in hospitals, of which 27/39 used hospital admissions and records, 6/39 were based on the autopsy reports from the forensic department, 4/39 were based on large community surveys

(e.g. National Health and Morbidity Survey) and 2/39 used data drawn from the National Statistics Department and National Suicide Registry (Table 1).

Twenty studies were carried out in Kuala Lumpur, 7/39 in Penang State, 2/39 in Pahang State, 6/39 were national studies and 4/39 were conducted in Sabah, Sarawak and Selangor States. The earliest study was published in 1972 and the latest was in 2012.

The methodological quality of the included studies was generally low. Only half of the included studies (20/39) met at least three of the four quality criteria. We did not observe any major differences between studies with higher quality scores (3-4) and studies with lower quality scores (1-2) in terms of rates and correlates of completed suicides and self-harm.

3.3. Prevalence of suicide and self-harm

Teoh [21] estimated that the rate of suicide in West Malaysia was 6.3 suicides per 100,000 population in 1970 and had remained fairly constant at approximately 7 suicides per 100,000 population between 1965 and 1970 (Table 2). However, the rates differ markedly between the different ethnic groups, from 1.1suicides per 100,000 Malays, 8.1 suicides per 100,000 Chinese, and 23.3 suicides per 100,000 Indians. These figures correspond with Hayati et al. who screened post-mortems at the Forensic Pathology Department of the Kuala Lumpur Hospital between 1st January and 31st December 1999. Hayati et al. [22] found 76 out of 1,249 post-mortems were suicides, a suicide rate of 7.4 per 100,000, with rates of 2.6, 8.6 and 21.1 suicides per 100,000 for Malays, Chinese and Indians respectively.

Maniam [23] reports that, officially, the suicide rate fell from 6.1 suicides per 100,000 in the period 1966-1974 to 1.6 suicides per 100,000 during the period 1975-1990. However, there was a corresponding increase in “deaths due to undetermined violence” and estimated that the corrected rate for West Malaysia was 8-13 suicides per 100,000 since 1982.

The National Suicide Registry Malaysia, established in 2007, estimated a prevalence of 1.3 suicides per 100,000 of the population [5]. More recent estimates of completed suicides for 2009 showed a rate of 1.18 per 100,000 of the population [24]. However, it is worth noting that the National Suicide Registry Malaysia data rely on medically-certified suicides and that approximately 50 per cent of all deaths in Malaysia are not medically certified [23].

Three recent large community surveys examined the prevalence of self-harm in Malaysia. Two of these studies were based on analysing data from the 2006 and 2011 National Health and Morbidity Surveys. Maniam et al. [25] examined the prevalence of suicidal ideation in the past year among Malays aged 16 years; the results showed that the overall prevalence of suicidal ideation was 6.3%. The second study by Maniam et al. [12] focused on the same age group but examined a wider range of suicidal behaviours including suicide attempts, plans and ideation in the past month. The estimated prevalence for suicide ideation, plans and attempts in the past month were 1.7, 0.9% and 0.5%, respectively. The third study was based on adolescents (12-17 years) drawing on data from the 2012 Malaysia Global School-based Student Health Survey. A 7.9% prevalence of past-year suicidal ideation was found among Malay adolescents aged 12-17 years[26].

3.4. Demographic characteristics

Men were more likely than women to die by suicide with young men (15-44 years) at highest risk (Table 2). In contrast, women were more likely than men to self-harm with young women (14-40 years) accounting for the majority of cases.

3.5. Risk factors for suicide and self-harm

Table 3 presents the risk factors for suicide in Malaysia. A consistent picture emerges, namely, that 60-76% of suicides are men and people aged 40 and younger. For

example, Bhupinder and Kumara [27] found that men accounted for 70% of suicide deaths and that suicides tended to occur among younger people (26 to 35 years). Moreover, Nadesan [28] examined cases of suicide in the Kuala Lumpur Hospital from 1995 to 1998 and reported associations between suicide and Indian ethnic origin, being male, aged 21 to 40 years, married, and being diagnosed with a psychiatric illness (Table 3). In contrast with Nadesan [28], however, Bhupinder and Kumara [27] found suicide to be more common among Chinese than Indian people, but when corrected for size of population, the Indian ethnic group has a four times greater suicide risk than the others [9, 24].

Correlates of self-harm are reported in Table 3. Again, a consistent pattern emerges, with self-harm being associated with being female, aged younger than 40, of lower socioeconomic status and of Indian ethnic origin. For example, Orr and Pu [29](18), reported that people admitted to the General Hospital of Kuala Lumpur for self-harm were most commonly women of Indian ethnicity aged 20 to 30 years, with low socioeconomic status, and minimal education. This pattern of findings is also reported in several other studies [24, 30-32].

3.6. Protective factors in suicide and self-harm

Three studies examined factors that protected against self-harm. Kannan et al. [33] carried out a cross-sectional survey of all patients admitted to a major hospital and found that coping skills, religious beliefs and responsibility to the family were stronger in patients who did not self-harm than in those who had a self-harm history. Zuraida and Ahmad [34] examined the relationship between religiosity and suicidal ideation in clinically depressed patients. Respondents higher in religiosity had significantly lower suicide ideation scores compared to those who chose family or health as the most important domain in life. Ahmad et al. examined risk and protective factors for suicidal ideation in a large nationally

representative sample of secondary school students. Students who reported having close friends and married parents were less likely to engage in suicidal ideation [26]. Further research is required to investigate protective factors in self-harm more fully.

3.7. Methods of suicide and self-harm

The majority of studies show that self-poisoning is the most common means by which suicide is attempted (Table 5). The most common agents were agricultural poisons (e.g., insecticide), followed by tranquilisers, hypnotics, detergents, and methyl salicylate liniment. Indian patients had the highest self-poisoning rate compared to other major ethnic groups [35-37]. However, the National Suicide Registry Malaysia (2009) reports a different pattern of findings, which showed that hanging was more frequent than poisoning. This discrepancy might reflect regional variations. For example, hanging was the most common means of suicide in Kuala Lumpur [22], whereas agricultural poisons are more often used in rural regions [38]. Moreover, the construction of high-rise buildings in Kuala Lumpur may have contributed to the increasing number of people committing suicide by jumping from heights, with more recent reports finding that jumping from heights is the most common method, followed by hanging and drowning [39].

3.8. Reported motives for suicide and self-harm

Interpersonal difficulties, such as marital quarrels or other family conflicts, are the most commonly-reported reasons for suicide and self-harm [38], accounting for 33% of the suicides in the University Hospital, Kuala Lumpur[40]. However, these independent studies differ from the National Suicide Registry Malaysia [5], which reports that financial and job problems were the most frequently reported factors among suicidal people. Hamidin and Maniam [41] found the six most commonly reported threatening life events prior to a suicide attempt were: personal illness issues, family illness or bereavement issues, interpersonal

issues, work issues, and other life event issues. Interpersonal issues (e.g., serious problem with a close friend, neighbour or relative, breaking off a steady relationship and a separation due to marital difficulties) were significantly associated with suicide attempts, contributing to 94% of total cases. Self-harm was more closely associated with problems in interpersonal relationships, particularly chronic domestic strife such as marital problems, conflicts with elders or family discord [36, 42-44]. Furthermore, a diagnosis of major depression, anxiety, substance use and epilepsy worsened risk for self-harm[12, 24, 25, 45-48]. Similarly in adolescents, precipitating factors for suicidal ideation included depression, anxiety, stress, substance use, being bullied, and being abused at home, either physically or verbally[26, 49].

4. Discussion

The present systematic review draws together the fragmented literature on prevalence, correlates and reasons for suicide and self-harm in Malaysia. The principal findings were that: (a) the suicide rate in Malaysia is approximately 6-8 suicides per 100,000 per year; (b) suicide and self-harm are associated with being younger than 40, being male and being from the Indian ethnic group; and (c) there seem to be emerging trends in the means of suicide and self-harm that might be related to the move from a rural to an industrial economy. The following discussion focuses on the conceptual and practical issues that have emerged.

The estimated rates of completed suicides reflect the trend across the majority of studies included in this review. It is worth noting that this rate was substantially higher compared to the equivalent rates reported by the National Suicide Registry Malaysia (6-8 as opposed to 1.2 suicides per 100,000, respectively). However, the National Suicide Registry Malaysia has a serious limitation that potentially explains these inconsistent findings. It relies on medically-certified suicides yet approximately 50 per cent of all deaths in Malaysia are not medically certified [23, 24]. Thus, the National Suicide Registry Malaysia fails to

account for a large proportion of completed suicides due to the low rates of medical certification of deaths in Malaysia. Moreover, even the suicide rate reported in the present study would rank Malaysia lower than most other countries for whom the World Health Organization have data including neighbouring countries such as India, China and Australia [50]. Furthermore, we believe that the suicide rate may be an underestimate based on four rationales [13]. First, patients treated at private clinics or private hospitals are not included in the figures [51]. Second, people who make a suicide attempt or who harm themselves do not always seek medical attention. Third, the data may also represent an underestimate due to the classification of potential cases of suicide as "violent death from undetermined cause"[23]. This is particularly important in a country with a Muslim majority for whom attempted suicide is a serious breach of the faith [29]. Fourth, the Muslim faith requires that bodies are buried within 24 hours, which means that the police may have to release the body without post-mortem examination.

Nevertheless, the present pattern of findings corroborates those found in neighbouring (e.g., India, China and Australia) and other developing countries, with a higher suicide rate among men than women (with the exemption of China in which suicide rates for women are higher) [6-10], and a higher suicide rate among the young [11]. Thus the present findings concur with the broader picture of suicide and self-harm among nations described as economically "developing".

Concurrently, though, there was an over-representation of Indians among those who died by suicide and who engaged in self-harm in Malaysia, which is worthy of further investigation[13]. This finding might be mediated by religious and sociocultural factors. For example, given that Indians in Malaysia are largely Hindu, it is plausible that this over-representation might be partly explained by the fact that the Hindu religion has traditionally sanctioned certain forms of suicide [13, 15, 25]. In addition, an increased rate of suicide has

been evidenced in Indian women, which has been mainly attributed to the common practice of arranged marriages, the pressure to sustain abusive marriages and dowry demands [52]. Such stressors may contribute to feelings of entrapment which are established correlates of suicide risk in developed countries [53]. Evidence for the sociocultural factors (such as poor status of Indian women in Malaysia) that might underlie the heightened suicide and self-harm rates in Indian ethic groups of Malaysia is absent [13]. Thus, further research into causes of differences between ethnic groups in the underpinnings of suicide and self-harm is required in Malaysia.

Suicidal behaviour in Malaysia is associated with interpersonal problems. This finding is consistent with the extant literature that suggests that interpersonal conflict is a strong generic predictor of suicide. A review of the psychological autopsy studies found that interpersonal conflict affected the risk for suicide in a dose-response manner [54]. Additionally, a study conducted among an isolated Asian indigenous population also found that interpersonal conflict is an important risk factor for suicide [55]. On these grounds, a valuable direction for future research would be to focus on designing and delivering suicide prevention programmes tailored to resolve interpersonal conflict. Alternatively, the finding that interpersonal conflict is an important risk factor for suicide may be explained in the context of the numerous societal changes driven by the country's aspiration to become a developed country by the year 2020. Urbanisation has led people into a state of 'anomie', which Durkheim [56] refers to as the situation where the accustomed relationship between an individual and their society is suddenly shattered. It would be valuable to monitor trends in suicide and self-harm and to investigate the possible link between increasing urbanisation and suicidal behaviour.

Self-poisoning was the most common method of suicide and self-harm used by Malaysians. In developed countries, the drugs with which people choose to overdose are

relatively non-toxic drugs such as analgesics, tranquilisers and antidepressants [14]. The present research showed that the substances most commonly used for self-poisoning were the more readily available agricultural poisons (e.g., insecticide, weedicide), which again is consistent with findings form other emerging economies, such as India [15]. In terms of methods used by different ethnic groups, hanging has been reported to be the method most frequently employed by the Chinese, jumping by the Malays, and poisoning by the Indians, among the Kuala Lumpur population [22]. Yeoh [37]observed that the use of insecticide and weedicide poisoning was predominant among the Indians. The high frequency of self-poisoning among those from the Indian minority can at least partly be attributed to the fact that Indians are frequently employed on rubber plantations, where arsenic and formic acid are readily available [36].

This review was conducted and reported according to PRISMA guidelines [16] but a number of limitations should be considered whilst interpreting the current findings. First, the heterogeneity of the studies included in the review was large. We endeavoured to account for this limitation by undertaking a narrative synthesis (as opposed to meta-analysis which requires more homogenous outcomes) that focussed not only on the prevalence of suicide and self-harm but also on demographic correlates, risk and protective factors and methods and motives of suicide and self-harm. Second, grey literature was excluded from this review. While this decision may have introduced study selection bias, it was made on the basis of evidence suggesting that the quality of research contained in the grey literature is lower or more difficult to appraise in contrast with research contained in journal articles [57]. Therefore, we are confident that our comprehensive searches have captured all highest quality empirical studies examining completed suicides and self-harm in Malaysia and that the present systematic review is a valid summary of the literature in this research area. A third limitation is that the majority of the studies included in this review have been conducted

in urban settings. Although this is an inherent limitation of the literature on suicide and self-harm in Malaysia, the present findings, particularly concerning the rates of completed suicides and self-harm, might not generalise to rural settings. Fourth, the methodological quality of the included studies was low. Despite this, we observed no differences in the pattern of findings across studies with higher and studies with lower overall ratings of methodological quality. Future studies using sound methodologies are encouraged to compare the rates and correlates of completed suicides and self-harm in urban and rural settings of Malaysia.

In sum, this systematic review is the starting point for further research into suicide and self-harm in Malaysia specifically and Asia more broadly. More extensive studies need to be conducted, using both clinical and non-clinical samples to establish more accurate estimates of suicidal behaviour.

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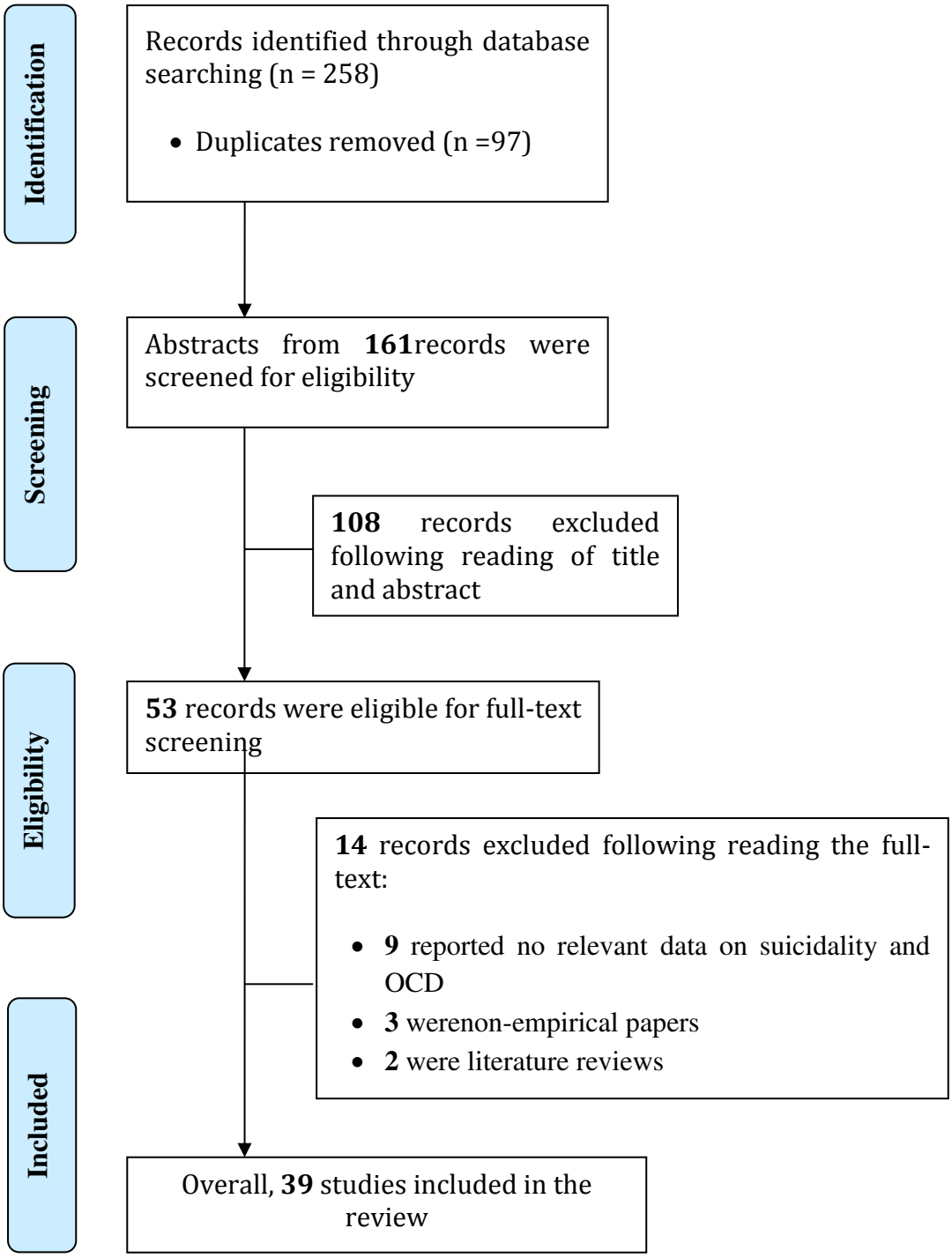

Fig. 1. Flow diagram of the studies in the review.

Highlights

- The literature on prevalence and correlates of suicidal acts in Malaysia in South East Asia is fragmented.
- The present study systematically reviews the relevant literature.
- Databases were searched from inception up to February 2014 and a narrative synthesis of the results from the included studies was performed.
- The prevalence of suicide in Malaysia is approximately 6-8 per 100,000 population per year.
- Further research into the antecedents, consequences and interventions for suicide and self-harm in the Malaysian context is required.

Table 1

Prevalence of Suicide and self-harm

Study	Aims	Methodology	Respondent details	Findings
Teoh[21]	Rates of suicide in Kuala Lumpur	Retrospective. Coroner's files of Kuala Lumpur from 1965 – 1970 were retrieved.	264 cases: 174 males and 90 females.	Rate of suicide in West Malaysia in 1970 was 1.1 per 100,000 for Malays, 8.1 per 100,000 for Chinese and 23.3 per 100,000 for Indians; giving a total rate of 6.3 per 100,000.
Maniam[23]	To validate the rates of suicide in Malaysia.	Retrospective. Data on causes of death and population composition for the years 1966 to 1990 were assessed.	n/r	Suicide rate in Malaysia was 6.1 per 100, 000 between 1966 and 1974 but dropped drastically to 1.6 per 100, 000 between 1975 and 1990. The reduction in suicide rates was due to a systematic misclassification of medically certified suicides as deaths due to

				undetermined violent deaths. Taking the misclassification into account, the corrected suicide rate for West Malaysia is estimated to be 8-13 per 100,000 since 1982.
Hayati et al. [22]	Rate and pattern of completed suicides seen in Kuala Lumpur General Hospital.	Retrospective. Post-mortem cases by the Forensic Department from 1st January until 31st December 1999 were screened.	Of the 1249 cases, 76 cases were identified as suicide cases. Mean age of 43 and 52% were Chinese	The suicide rate in Kuala Lumpur was estimated at 7.4 per 100,000 populations.
National Suicide Registry Malaysia[5]	To capture data on completed suicides.	Retrospective. Data were collected via interviews with family members, significant others or police, and a review of medical reports or other official	Data collected on the 11 states included 290 cases	The registry captured 1.28 suicides per 100, 000 populations of certified deaths for the year.

		documents.		
Sinniah et al. [58]	Rates of suicide in Cameron Highlands.	Retrospective. Data on suicides and para-suicides from the year 1995 to 2005 were collected from Cameron Highlands Hospital record.	n/r	The suicide rate has declined greatly to about 15 per 100,000 compared to 60 per 100,000 in the 1970s and 1980s. There was also a similar drop in attempted suicide cases.
Maniam et al. [25]	To identify high-risk groups for a focused suicide prevention programme in Malaysia	Cross-sectional. A nationally representative sample of adults aged 16 years and above identified as part of a national epidemiological survey of morbidity conducted in 2006	A total of was 20,552 participants stratified by random sampling from the sampling frame provided by the Department of Statistics Malaysia.	The overall prevalence of suicidal ideation in the past year was 6.3%, n = 1288 across 20,552 responders.

Ahmad et al. [26]	To identify the prevalence and risk and protective factors associated with suicidal ideation among Malaysian Adolescents	Cross-sectional using data from the 2012 Malaysia Global School-based Student Health Survey (GSHS).	25,174 adolescents were randomly selected from 234 government secondary schools in Malaysia	The prevalence of suicidal ideation in the past year was 7.9%.
Ali et al. [24]	To estimate the prevalence and predictors of completed suicides in Malaysia	Retrospective. Analysis of National Suicide Registry of Malaysia from January 2009 to December 2009.	n/r	The overall suicide rate for 2009 was 1.18 per 100,000 population (n=328).

Maniam et al. [12]	To determine the prevalence of suicidal behaviour (ideation, plans and attempts) in a nationally representative sample of Malays.	Cross-sectional. A nationally representative sample of adults aged 16 years and above identified as part of a national epidemiological survey of morbidity conducted in 2011	A total of was 19,309 participants stratified by random sampling from the sampling frame provided by the Department of Statistics Malaysia.	The prevalence estimates for suicide ideation, plans and attempts in the past month were 1.7% 0.9% and 0.5%, respectively.

[a]n/r=not reported

Table 2

Characteristics of Studies

Study	Data Collection Period	*N*	Gender		Age Group
			Male	Female	
Suicide					
Teoh[21]					
Maniam[23, 38]	Oct 1973-Sep 1984	100	61.1%	38.9%	< 30
Nadesan[28]	Aug 1995-Jul 1998	114	51.2%	48.8%	21-40
Hayati et al.[22]	Jan 1999-Dec 1999	76	72.4%	27.6%	21-30
Bhupinder& Kumara[27]	1995-2004	635	70.0%	30.0%	15-34
Teo et al.[32]	Jan 2001-Dec 2005	43	81.0%	19.0%	31-40
Murty et al.[59]	2000-2004	251	65.0%	35.0%	21-30
NSRM[5]	2008	290	75.5%	24.5%	20-29
Bhupinder et al.[39]	2007-2009	138	75.0%	25.0%	40-44
Ali et al. [24]	Jan 2009- Dec 2009	328	68%	32%	14-94
Self-Harm					
Simons&Sarbadhikary[60]	Jun 1967-Jan 1969	94	38.0%	62.0%	20-24
Murugesan&Yeoh[42]	Jan 1977-Nov 1977	96	25.0%	75.0%	15-24
Haq&Buhrich[36]	1976	140	26.0%	74.0%	15-31
Yeoh[37]	1981	74	35.0%	65.0%	16-25
Orr &Pu[29, 43]	1982	271	22.1%	77.9%	20-29
Maniam[23, 38]	Oct 1973-Sep 1984	134	39.6%	60.4%	< 30
Habil et al.[30]	1989	306	33.4%	66.6%	20-39
Zuirada[44]	n/r	60	13%	87%	14-65
Chee et al.[31]	1999-2001	137	33.6%	66.4%	16-20

Fathelrahman et al.[61]	Sep 2003-Feb 2004	100	30.0%	70.0%	20-29
Zain[40]	Jan 1967-Dec 1987	41	28.5%	71.5%	16-30
Sorketti&Zuraida[62]	Jan 2000-Feb 2004	77	26.0%	74.0%	n/r
Zuirada[34]	n/r	51	31.0%	69.0%	n/r
Teo et al.[32]	Jan 2001-Dec 2005	189	28.0%	72.0%	14-30
Fathelrahman et al. [35]	2000-2004	320	29.7%	70.3%	< 45
Sinniah et al. [58]	1995-2005	n/r	n/r	n/r	n/r
Kannan et al.[33]	Dec 2006-Apr 2007	42	7.1%	92.9%	21-40
Zyoud et al.[63]	Jan 2006-Dec 2008	177	15.8%	84.2%	20–30
Hamidin&Maniam[41]	2004	50	22.0%	78.0%	17-53
Khan et al. [64]	Jan 2002-Dec 2007	298	57.0%	43.0%	15-84
Chan et al. [65]	May 2007-Oct 2008	75	44.0%	56.0%	18-76
Chan et al. [49]	2008-2009	6786	47.5%	52.5%	17-18
Jeon et al. [45]	2008-2011	547	35.6%	64.4%	18-65
Maniam et al. [25]	2006	20,552	45.9%	54.1%	<16
Yee et al. [48]	Mar 2009- Sept 2010	121	50.4%	49.6%	<18
Ahmad et al. [26]	Feb 2012-Apr 2012	25 174	49.6%	50.4%	12-17
Lim et al. [46]	2008-2011	547	35.6%	64.4%	18-65
Maniam et al. [12]	2011	19309	n/r	n/r	<16
Rani et al. [47]	Feb 2013-Aug 2013	160	51.3%	48.7%	<14

n/r =not reported

Table 3

Risk Factors for Suicide and Self-harm

Study	Aims	Methodology	Respondent details	Findings
Simons &Sarbadhikary[60]	The demographic, psychosocial and hospitalisation-related factors of suicide attempters.	Retrospective. Medical records of patients admitted to the University of Malaya Medical Centre Psychiatric Unit from June 1967 to January 1969 were examined.	94 admissions. Malay (14%), Chinese (52%), Indian (23%). Male (38%), Female	More often female. English educated. Had completed some education but not form VI or had technical education only. Diagnosed with behaviour disorder or neurosis. Readmitted more often than other patients.

			(62%). Mean age 27.8, median 24.	
Murugesan&Yeoh[42]	To describe the characteristics of those who attempted suicide.	Prospective. Cases of attempted suicide admitted to Klang General Hospital from the period of 23rd January to 13th November 1977 were interviewed.	96 attempts, with Indians contributing 66% of the total cases. Female cases are	Being younger, female, of single status and from the lower socio-economic classes were among the factors identified.

			3 times more frequent than male. Age group of 15 to 24 years.	
Orr &Pu[29]	Demographic characteristics of parasuicide cases.	Descriptive. Cases of attempted suicide seen at the Psychiatric Clinic, General Hospital, Kuala Lumpur in 1982.	271 cases recorded.	Age group of 20 to 30 years. From a lower socio-economic class. Minimal education, Indian ethnic group. Self-poisoning was the common method used (92.6%). One half intended to die at the time of the suicide.

Habil et al.[30]	Socio-demographic data on attempted suicide and methods used among attempted suicides in Kuala Lumpur.	Prospective. Cases of attempted suicide admitted to the University Hospital in 1989 were interviewed.	A total of 296 patients identified, with 197 females and 99 males.	Indians predominated, especially common in young persons and females. Majority of cases were below 39 years (84.1%) from low socio-economic groups. Highest among unmarried (49%). Having interpersonal relationship problems.
Nadesan (1999)	To determine	Retrospective. All autopsies conducted at the	A total of 84 cases	Indians constituted 48.8% of all cases.Age group of 21 to 40 years.

	pattern of suicide.	Department of Pathology, University Hospital of Kuala Lumpur over the three-year period from 1 August 1995 to 31 July 1998 were reviewed.	of suicides, comprising 39 females and 45 males, were studied.	
Chee et al. [31]	Demographic characteristics of patients admitted with	Prospective and retrospective. Cases of deliberate self-harm admitted to Sarawak General Hospital from January to December 2001 were interviewed and case notes of patients admitted in 1999 and	137 cases admitted in 2001, 111 and 82 in 1999 and 2000	More females, with a ratio of 2:1. Dominant among Chinese. Young age - less than 30 years old.

	deliberate self-harm to Sarawak General Hospital.	2000 were reviewed.	respectively.	
Bhupinder& Kumara [27]	Demographic characteristics of completed suicides in Penang Hospital for the period 1995 to 2004.	Retrospective. Data from post mortem records in the Department of Forensic Medicine, Penang General Hospital were analysed.	A total of 635 cases were analysed.	Common among males (70%). Age group 15 – 34 years. Chinese contributed the most (55%).

Fathelrahman et al.[61]	Risk factors associated with adult admissions to Penang General hospital (PGH) due to chemical poisoning and/or drug overdose.	A case-control study. Cases of chemical poisoning or drug overdose admitted to the Accident & Emergency Department from September 2003 to February 2004 were matched to control other illness admissions samples.	100 cases identified. 14.5 – 84 years old. Chinese (34%) Indian (34%) Malay (28%) Other (4%)	Chinese & Indian. Self-employed & those working in private sectors. Living in rental house. Higher total family income. Boy/girlfriend relationships problems, marital problems & family problems. Previous histories of psychiatric, parasuicides, self-harm or self-poisoning.
Teo et al.[32]	To determine	Retrospective. Cases of parasuicide	A total of 189 cases of	72% of the parasuicide cases were female, with Indians constituting 64% of the total cases, and the age group of 18-30

	the pattern of parasuicide and suicide.	admissions and suicide cases in Hospital Sungai Bakap from January 2001 to December 2005 were reviewed.	parasuicide and 43 suicide cases were analysed.	years predominant. Suicide cases were associated with being male and Chinese, the peaks being in the age groups of 31-40 years and above 60 years.
Murty et al.[59]	Suicide and ethnicity in the University Malaya Medical Center.	Retrospective. The autopsy records over a5-year period from January 2000 to December 2004 were examined.	A total of 251 suicide cases reported, 164 (65%) male and 87 (35%) female.	Age group of 21 to 30. Chinese ethnic group had the highest representation (47.8%).
National Suicide Registry	To capture data on	Retrospective. Data were collected via	Data collected	In contrast with studies in the West, risk factors for suicide in Malaysia do not include history of previous attempt, family

Malaysia[5]	completed suicides.	interviews with family members, significant others or police and review of medical report or other official documents.	across the 11 states, on 290 cases.	history of suicide or history of mental illness. But there is an association between suicide and history of physical illness, substance use and life events prior to suicide.
Zyoud et al. [63]	To determine the risk factors and life stressors that are prevalent among the acetaminop	Cross-sectional. Data was collected from hospital admissions over a3-year period from 1 January 2006 to 31 December 2008 for the primary diagnosis of acetaminophen overdose.	177 incidences of deliberate self-poisoning, 149 female and 28 male.	The risk factors were more significantly associated with males and direct association between chronic alcohol intake and suicidal behaviour.

	hen deliberate self-poisoning			
Chan et al.[65]	To describe the interactions of clinical and psychosocial risk factors influencing suicide attempts in	Cross-sectional. Psychiatric inpatients aged between 18-76 years, treated for depressive disorder from May 2007-October 2008, were recruited.	75 in-patients with depressive disorders (56% female and 44% male).	The independent predictors were Chinese race, being a newly diagnosed case of a depressive disorder, religion, recent life-event changes, suicidal ideation and alcohol use disorder.

	depressed patients.			
Khan et al. [64]	To highlight the factors associated with suicidal behaviour among patients with depressive disorders.	Retrospective. All registered patients' medical records from January 2002 to December 2007 at the Psychiatric Outpatient Department were reviewed.	A total of 298 cases that had a confirmed diagnosis of depression were included. 99 patients reported having suicidal thoughts.	Chinese females were found at higher risk of suicidal ideation, as were smokers and alcohol users, those aged 50 and over, adolescents and youths aged 15-24 years. Evaluation of the patients' medical records highlighted four possible risk factors for suicidal ideation: co-morbid medical complications, social problems, smoking and alcohol use.

Zuirada[44]	To examine social support and its association with demographics and psychiatric diagnosesamong suicide attempters	Cross-sectional. Conducted among suicide attempters admitted in the University Malaya Medical Centre.	60 patients who hadattempted suicide and were consecutively admittedto the University Malaya Medical Centre	The vast majority of suicide attempters were women (87%) and were more likely to age between 20-25 years. Nearly half of suicide attempters were Indians and were more likely to be Hindus. Among married women, 65% faced marital problems/discord which led them to attempt suicide. Women had less total socialinteraction score compared to the men.

Chan et al. [49]	To examine the association between sexual abuse, substance abuse and socio-demographic factors with suicidal ideation , plans and deliberate	Cross-sectional.Malaysian high-school leavers aged 17-18 years who were randomly selected from a national computerized database	A total of 6786 adolescents in nine camps in Selangor.	Female gender, history of sexual abuse and illicit drugs were associated with suicidal ideation, suicidal plans and deliberate self-harm. Alcohol wasassociated with deliberate self-harm.

	self-harm			
Jeon et al. [45]	To investigate the link between melancholic features and suicidal behaviour in Asian patients with major depressive disorder	Multi-national cross-sectional. Thirteenstudysiteswereestablishedacrosssix Asian countries, includingChina,Korea,Malaysia,Singapore, Taiwan, and Thailand.	A total of 547 outpatients with MDD participated in the study.	Melancholicfeatures andhostilitywerepositivelyassociatedwithmoderatetohighsuicidalityriskin MDDpatients. Ethnicity had a significant impact on the results: suicidalriskwashigherinKoreansand Chinese compared to Thai,Indian,andMalaysia

	(MDD)			
Maniam et al.[25]	To identify high-risk groups for a focused suicide prevention programme in Malaysia	Cross-sectional. A nationally representative sample of adults aged 16 years and above identified as part of a national epidemiological survey of morbidity conducted in 2006	A total of was 20,552 participants stratified by random sampling from the sampling frame provided by the Department of Statistics	Indians (particularly Hindus) and Chinese reported were at higher risk for suicidal ideation. Other predictors of suicidal ideation were being single and, having depression, social dysfunction and anxiety.

		Malaysia.		
Yee et al. [48]	To determine the prevalence of alcohol-use disorder and associated correlates amongst bipolar patients in a university	Cross-sectional. All patients who attended the psychiatric unit (outpatient and inpatient) in a teaching hospital in Kuala Lumpur, Malaysia	130 bipolar inpatients and outpatients of a psychiatric unit recruited by universal sampling	Bipolar patients with alcohol use disorder were significantly more likely to report suicide attempts compared to bipolar patients without alcohol use disorder.

	hospital in Malaysia			
Ahmad et al. [26]	To identify the risk and protective factors associated with suicidal ideation among Malaysian adolescents	Cross-sectional using data from the 2012 Malaysia Global School-based Student Health Survey (GSHS).	25 174 adolescents were randomly selected from 234 government secondary schools in Malaysia	Suicidal ideation was positively associated with depression, anxiety, stress, substance use, being bullied, and being abused athome, either physically or verbally. Suicidal ideation was significantly higher amongfemales and among the Indians and Chinese. Having close friends and married parents werestrongly protective against suicidal ideation.

Ali et al. [24]	To estimate the prevalence and predictors of completed suicides in Malaysia	Retrospective. Analysis of National Suicide Registry of Malaysia from January 2009 to December 2009.	n/r	Suicide cases were likely to be men than women(2.9:1). Indians had the highest suicide rate of 3.67 per 100,000.
Lim et al. [46]	To evaluate the factors associated with suicidality	Cross-sectional multinational. Study sites in six studies were used including China, Malaysia, Singapore, South Korea, Thailand and Taiwan.	547 outpatients with MDD among which 90 were from	Patients with MMD from Malaysia were the least likely to be classified as being in high risk for suicidality (8.9%) compared to all other countries (ranging from 10.7% in Thailand to 42.6% in South Korea).

	in patients with major depressive disorder (MDD) from six Asian countries including		Malaysia (n = 90) recruited from clinical sites in each country.	
Maniam et al. [12]	To determine the prevalence of suicidal behaviour	Cross-sectional. A nationally representative sample of adults aged 16 years and above identified as part of a national epidemiological survey of morbidity conducted	A total of was 19,309 participants stratified by random sampling	Younger people (16–24 years) and Indians had higher risk for suicidal ideation, plans and attempts. Women also reported higher rates of suicidal ideation compared to men. MDD, Generalised Anxiety Dissorder and alcoholism were associated with increased risk for suicidal behaviour.

	(ideation, plans and attempts) and its in a nationally representative sample of Malays.	in 2011	from the sampling frame provided by the Department of Statistics Malaysia.	
Rani et al. [47]	To ascertain theprevalence of suicidal ideation in epilepsy patients .	Case-control. The study was conducted in the UKM MedicalCentre (UKMMC), a tertiary teaching hospital in Kuala Lumpur, Malaysia from February to August 2013.	80 epilepsy patients and 80 controls aged over 14 years.	Epilepsy patients were 9.68 times more likely to have suicidalideation compared to controls) (33.75% vs 5%).

n/r=not reported

Table 4

Means of Suicide and Self-harm

Study	Aims	Methodology	Respondent details	Findings
Murugesan&Yeoh[42]	To describe the characteristics of those who attempted suicide.	Prospective. Cases of attempted suicide admitted to Klang General Hospital from the period of 23rd January to 13th November 1977 were interviewed.	96 attempts. Age group of 15 to 24 years.	99% reported self-poisoning and the commonest agent used was insecticide.
Haq&Buhrich[36]	To determine the reasons and methods chosen for the suicide attempt.	Prospective. Cases of parasuicides admitted to Psychiatry Department in the year 1976.	140 cases identified.	Self-poisoners (86%) are admitted relatively more frequently than patients with self-inflicted injuries and are more common among the Indians.
Yeon[45]	To describe the characteristics of those	Prospective. Patients admitted to the hospital with	74 patients identified.	Self-poisoning was the commonest method used (65%), followed by

	who attempted suicide in Penang General Hospital.	suspected or confirmed suicidal attempts interviewed within 48 hours of their admission.		hanging, wrist or neck slashing, stabbing and jumping from heights.
Maniam[23, 38]	Demographic characteristics, reasons for and methods used for suicide and parasuicide in a Hill Resort in Malaysia.	Retrospective. Data for suicide were taken from the Register of Suicides and Parasuicides in Cameron Highlands Hospital and the Police Register of Sudden Deaths.	95 cases of suicide and 134 of parasuicide that occurred between October 1973 and September 1984 were identified.	About 94% of suicides and 66% of parasuicides were by ingestion of agricultural poisons.
Habil et al. [30]	Socio-demographic data of attempted suicide and methods used for attempted	Prospective. Cases of attempted suicide admitted to the University Hospital in 1989 were interviewed.	197 females, 99 males.	Self-poisoning, either with prescribed drugs or with other chemical agents, was the method most commonly used (86%).

	suicide in Kuala Lumpur.			
Hayati et al. [22]	Investigate the pattern of completed suicides seen in Kuala Lumpur General Hospital.	Retrospective. Post-mortem cases by the Forensic Department from 1st January until 31st December 1999 were screened.	Of the 1249 cases, 76 cases were identified as suicide cases.	The most popular method was poisoning (39%), followed by hanging (34%), and jumping from heights (22%).
Fathelrahman et al. [35]	Factors associated with deliberate self-poisoning.	Prospective. Deliberate self-poisoning cases admitted to Penang General Hospital during the years 2002 – 2004 were studied.	A total of 320 cases of self-poisoning recorded.	Indian patients were more likely to use household products (47.9%), whereas Malay (22.2%) and Chinese (48.5%) patients were more likely to take drug overdoses.
Murty et al. [59]	Rates of suicide in the University of Malaya	Retrospective. The autopsy records over a5-year	A total of 251 suicide cases	Hanging accounted for the highest proportion of cases (43%).

	Medical Center.	period from January 2000 to December 2004 were examined.	reported.	Jumping was the commonest method used by the Chinese (49/120-41%) and hanging was the commonest method amongst the Indians (49/87-7.2%).
National Suicide Registry Malaysia [5]	To capture data on completed suicides.	Retrospective. Data was collected via interviews with family members, significant others or police and review of medical reports or other official documents.	Data collected in 11 states were 290 cases.	The most preferred method was hanging (56.6%), exposure to pesticide (13.4%) and jumping from high places (11.4%).
Fathelrahman et al. [35]	Risk factors associated with adult admissions to Penang General Hospital (PGH) due to	A case-control study. Cases of chemical poisoning or drug overdose admitted to the Accident & Emergency Department from	100 cases identified. 14.5 – 84 years old.	Ingestion involving drugs found in poisoning (62%), household products (26%) and pesticides (6%). The most frequently implicated agents

	chemical poisoning and/or drug overdose.	September 2003 to February 2004 were matched to control other illness admissions samples.		were paracetamol (21%), benzodiazepines (10%) and chlorox(10%).
Bhupinder et al. [39]	Investigation on methods used for completed suicides.	Prospective cohort study. Suicide deaths on autopsy database from 2007 to 2009 were analysed according to the methods used, age groups, ethnicity, nationality, day and month of suicides and location of suicides.	138 suicidal deaths. The age group of 35-39, 40-44 and 55-59 were at high risk.	The common methods were jumping from heights (47.1%), followed by hanging (34.1%), and drowning (10.9%).

Table 5

Reasons for Suicide and Self-Harm

Study	Aims	Methodology	Respondent details	Findings
Murugesan&Yeoh[42]	To describe the characteristics of those who attempted suicide.	Prospective. Cases of attempted suicide admitted to Klang General Hospital were interviewed.	96 attempts. Age group of 15 to 24 years.	The most frequently expressed reason was chronic domestic strife and love affairs.
Haq&Buhrich[36]	To identify ethnic differences between races and determine the reasons and methods chosen for the suicide attempt.	Prospective. Cases of parasuicides admitted to Psychiatry Department in the year 1976.	140 cases identified. Married (38%), Never married (56%), Low income (81%),	Seventy percent (70%) of single females gave the primary reason of having been jilted. Others were having marital problems (25%), family problems (16%) and were psychotic (13%).

Yeoh[37]	To describe the characteristics of those who attempted suicide in Penang General Hospital.	Prospective. Patients admitted to the hospital with suspected or confirmed suicide attempts interviewed within 48 hours of their admission.	74 patients identified, 48 females and 26 males. Age group of 16 to 25	Conflict with elders, health reasons, maritalconflict and love disappointment were among the reasons recorded.
Orr [29]	Examine the primary reasons for attempted suicide.	Prospective. Data were compiled from a questionnaire filled out by the author during patient assessment.	271 patients recorded.	The primary reasons given by single patients were family problems (34.8%) and love problems (30.4%), while amongst the married patients, marital problems contributed the most (55.1%).

Maniam[38]	Demographic characteristics, reasons for and methods used for suicide and parasuicide in a Hill Resort in Malaysia.	Retrospective. Data for suicide were taken from the Register in Cameron Highlands Hospital and the Police Register of Sudden Deaths.	Ninety-five cases of suicide that occurred were Indians. Age group of 20-24 years.	Marital quarrels or other family conflicts constituted the most common factors in suicides (21/48-43.8%) and 67.1% (64/95) for parasuicides. Love problems constituted the next most common factor in both.
Zain[40]	To compare in-patient suicides at two hospitals.	Retrospective. Suicide cases occurring in hospital identified from the register at hospitals' medical record offices	18 and 23 cases identified in the two hospitals respectively. Mainly young Chinese males from the lower social economic	Major interpersonal problems and physical illness were the main reasons recorded.

		in UHKL and HBUK.	group.	
Hamidin&Maniam[41]	To compare the prevalence of life events among parasuicide patients.	Case-control. A convenient sampling method was conducted in Hospital Kuala Lumpur for a period of three and a half months.	50 patients admitted after an episode of parasuicide.	A significant excess of interpersonal problems (94%) that included serious problems with a close friend, neighbour/relative, break-up of a steady relationship, and separation due to marital difficulties.