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Prevalence of suicidal ideation and suicide attempts in the general population of China: A meta-Analysis

XIAO-LAN CAO, MD^{1,2,#}, BAO-LIANG ZHONG, MD, PhD^{1,#}, YU-TAO XIANG, MD, PhD^{3,*}, GABOR S. UNGVARI, MD, PhD^{4,5}, KELLY Y. C. LAI, MRCPsych¹, HELEN F. K. CHIU, FRCPsych¹, and ERIC D. CAINE, MD⁶

¹Department of Psychiatry, Chinese University of Hong Kong, Hong Kong SAR, China

²Shenzhen Kangning Hospital, Shenzhen, Guangdong province, China

³Faculty of Health Sciences, University of Macau, Macao SAR, China

⁴School of Psychiatry and Clinical Neurosciences, University of Western Australia, Perth, Australia

⁵The University of Notre Dame Australia / Marian Centre, Perth, Australia

⁶Injury Control Research Center for Suicide Prevention, Department of Psychiatry, University of Rochester Medical Center, Rochester, NY, USA

Abstract

Objective—The objective of this meta-analysis is to estimate the pooled prevalence of suicidal ideation and suicide attempts in the general population of Mainland China.

Methods—A systematic literature search was conducted via the following databases: PubMed, PsycINFO, MEDLINE, China Journals Full-Text Databases, Chongqing VIP database for Chinese Technical Periodicals and Wan Fang Data. Statistical analysis used the Comprehensive Meta-Analysis program.

Results—Eight studies met the inclusion criteria for the analysis; five reported on the prevalence of suicidal ideation and seven on that of suicide attempts. The estimated lifetime prevalence figures of suicidal ideation and suicide attempts were 3.9% (95% Confidence interval [CI]: 2.5%–6.0%) and 0.8% (95% CI: 0.7%–0.9%), respectively. The estimated female-male ratio for lifetime prevalence of suicidal ideation and suicide attempts was 1.7 and 2.2, respectively. Only the difference of suicide attempts between the two genders was statistically significant.

Conclusion—This was the first meta-analysis of the prevalence of suicidal ideation and suicide attempts in the general population of Mainland China. The pooled lifetime prevalence of both suicidal ideation and suicide attempts are relatively low; however, caution is required when assessing these self-report data. Women had a modestly higher prevalence for suicide attempts

*Address correspondence to: Dr. Yu-Tao Xiang, 3/F, Building E12, Faculty of Health Sciences, University of Macau, Avenida da Universidade, Taipa, Macau SAR, China. Fax: +853-2288-2314; Phone: +853-8822-4223; xyutly@gmail.com.

#These authors contributed equally to the work.

Conflict of Interest

None.

than men. The frequency for suicidal ideation and suicide attempts in urban regions was similar to those in rural areas.

Keywords

Suicide attempts; suicidal ideation; prevalence; meta-analysis; China

Introduction

Suicide has been a major public health challenge for many years in China. It is estimated that during the period of 1995–1999 the annual suicide rate was 23/10,000 and there were 287,000 suicide deaths/year in China [1]. Suicide is the fifth most common cause of death in China [2] accounting for 43.6% of all suicide cases worldwide [3]. Even as suicide rates have apparently decreased substantially during the past few years [4], numbers alone underscore China's heavy contribution to the world's overall suicide burden, especially for women.

Suicidal thoughts and plans (ideation; SI) and suicide attempts (SA) often may be the prodrome for later suicide [5–8], and by themselves indicate great personal distress and psychological burden. It is crucial to understand the patterns of SI/SA for implementing effective suicide prevention measures. In developed countries the lifetime prevalence of SI/SA are approximately 3.0–15.9% and 0.5–5%, respectively with women at higher risk than men [9]. These findings may not be applicable to the Chinese population due to the different political, economic and socio-cultural contexts.

Several studies have examined the patterns of SI/SA in China. The figures varied considerably across studies. The estimated lifetime prevalence of SI and SA ranged between 2.3% [10] and 23.6% [11] and between 0.5% [12] and 1.0% [10], respectively.

A systematic review on the prevalence of suicidality in Chinese aging population has been published [13]; the lifetime prevalence of SI among community-dwelling older adults ranged between 2.2% and 16.7% and that of SA among older adults with psychiatric disorders was between 25% and 60%. However, there has been no systematic review on this subject in the general adult population of China. This paper is a systematic, quantitative meta-analysis that targeted the prevalence of SI and SA in the general adult population in China.

Methods

Search strategy

Studies on the prevalence of SI and SA in general Chinese population were retrieved through a search of major electronic databases. Comprehensive literature search was conducted in the following databases: PubMed (1979–2013), Medline (1946–2013), PsycINFO (1806–2013), China Journals Full-Text Databases (1915–2013), Chongqing VIP database for Chinese Technical Periodicals (1989–2013) and WanFang Data using the terms 'suicide', 'suicidality', 'suicide attempts', 'suicidal idea', 'suicidal ideation', 'self-destruction', 'self-harm', 'self-inflicted death', 'suicide morbidity', 'prevalence',

‘epidemiology’, ‘cross-sectional survey’ and ‘China’, ‘Chinese’ and ‘Chinese general population’. Duplicates were removed using Endnote X5. Two authors (CXL and ZBL) independently screened the papers by reviewing titles and abstracts. Then full texts of potentially relevant papers were downloaded for a second round of screening. Papers eligible for inclusion were identified according to pre-defined inclusion and exclusion criteria detailed below. A third author (XYT) was consulted when the two authors disagreed about the inclusion of a paper and a consensus decision was made after a discussion.

Inclusion and exclusion criteria

Studies included were: (i) cross-sectional surveys on prevalence of SI and SA in community-dwelling general populations in mainland China, either lifetime or one-year prevalence; (ii) the age of subjects was 15 years or above; (iii) employing clear definitions of SI and SA; (iv) having information on prevalence rates and sample size; and (v) full texts either written in English or Chinese. Studies focused on subjects with a limited age range (e.g., youth or elderly) or in special settings (e.g., hospitals or schools), were excluded.

Data extraction

Data extraction was independently conducted by two of the authors (CXL and ZBL). Relevant variables from eligible studies included the name of first author, the year of publication, region of the studies, sampling methods, sample size, number of cases and the lifetime and one-year prevalence of SI and SA for the whole sample and different demographic subgroups.

Following the methodology in earlier studies [14, 15], we evaluated the quality of reports in this review with the 22-item Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) [16]. This form consists of 22 criteria addressing key elements of methods, presentation and interpretation of the results. One point is given for each item. Studies with a score of 11 or less were classified as ‘poor quality’ [14].

Statistical analysis

The data were analyzed using the Comprehensive Meta Analysis software, Version 2 (Biosta, Inc. USA). Rates were logit transformed before pooling [17]. Forest plots were drawn to visualize the combined prevalence and extent of heterogeneity of studies. The I^2 statistic was used to assess the heterogeneity across studies. When I^2 statistic was less than 50% and the p-value for the test of heterogeneity was ≥ 0.1 , studies were considered homogenous and a fixed effects meta-analysis was used to estimate the overall prevalence. Otherwise, a random effects meta-analysis was used [18]. When heterogeneity was present, sensitivity analysis and subgroup analysis were used to explore the potential reasons for heterogeneity.

Results

Studies identified

As shown in Figure 1, the literature search has identified 2,574 potential papers including duplicates; 456 duplicates were removed using Endnote X5. Having reviewed the titles and

abstracts, further 2,088 papers were excluded and 30 papers were identified for detailed examination. Finally, 8 papers were included in the meta-analysis [10–12, 19–23]. Five papers reported the prevalence of SI and seven studies reported that of SA. Details of the studies are shown in Table 1.

Evaluation of the quality of the studies

The mean \pm standard deviation score for the papers based on the STROBE items was 19.1 ± 1.6 (range: 17 to 22). Common problems were inadequate description of the sample size estimation (5 reports) and that of potential sources of bias (6 reports).

Pooled prevalence of suicidal behaviors and the heterogeneity of studies Suicidal ideation

As shown in Table 1, five studies reported the lifetime prevalence of SI. Four of them [10, 19, 20, 23] used the same question on SI [24] (“Have you ever seriously thought about committing suicide?”) with the prevalence being between 2.3% and 6.0%. Using a broader question (“Have you ever thought of terminating your life?”) the lifetime prevalence of SI was 23.6% (Feng, 2004). Given the different nature of the questions on SI and the outlier result of Feng, we excluded it in further analyses for the pooled prevalence estimates of SI.

There was wide variation in lifetime prevalence of SI (Figure 2). The heterogeneity was large ($I^2=97.5\%$), therefore a random effect model was used to pool rates of the four studies. The lifetime prevalence of SI in the pooled sample of 20,949 was 3.9% (95% CI, 2.5%–6.0%).

Suicide attempts

The heterogeneity in lifetime prevalence estimates of SA was less than that in SI ($I^2=60.9\%$). As shown in Figure 3, using the random effect model, the pooled lifetime prevalence of SA was 0.8% (95% CI: 0.7%–0.9%). Four studies reported the one-year prevalence of SA and the variation between these studies was also wide ($I^2=95.8\%$). However, sensitivity analysis could not identify factors that could exclude any study. Results of the studies were pooled using the random effect model: the one-year prevalence of SA was 0.2% (95% CI: 0.1%–0.6%) (Figure 4).

Subgroup analysis

The lifetime prevalence of SI in women was 1.7-fold the prevalence in men (4.9% vs. 2.8%), although this apparent difference was not statistically significant in light of the large degree of variability among the studies. The lifetime prevalence of SA in women was significantly greater than that in men (1.1% vs. 0.5%), approximately 2.2 times the rates in men ($p<0.05$) (table 2).

The lifetime prevalence of SI among rural populations was 1.3 fold that of their urban counterparts (4.3% vs. 3.3%). The lifetime prevalence of SA in rural populations was homogeneous ($I^2=30.9\%$). The result was pooled using fixed effect model resulting a prevalence of 0.9% in rural population, which was higher than that reported from urban areas (0.7%). The differences in terms of lifetime prevalence of SI and SA were not statistically significant between rural and urban areas.

Discussion

Eight studies were eligible for inclusion in a meta-analysis on the prevalence of SI and SA in the Chinese general population; five focused on prevalence of SI and seven on SA. These data should be helpful for policy makers who are responsible for suicide prevention in China.

The pooled lifetime prevalence of SI and SA was 3.9% and 0.8%, respectively. These figures are within the range of SI and SA in general populations of other Asian countries (SI: 1.7%–15.2%; SA: 0.4%–4.2%) [25–29], but lower than those reported from Western countries (SI: 10%–20%; SA: 2%–8%) [30–33]. A systematic review examining suicide between 1997 and 2007 showed that the lifetime prevalence of SI among adults varied from 3.1% to 56.0% and that of SA was between 0.9% and 19.5% [34], indicating the prevalence of SI and SA in China are at a low level.

In traditional Chinese culture, suicide is heavily stigmatized; thus it is shameful to report suicide behaviors, which may explain the low prevalence found in China [10]. Thus, while these are the most rigorous studies, to date, caution must be exercised when considering these results. They likely serve as a floor rather than a ceiling for judging rates of SI and SA in China. At the same time, the included studies were conducted during the past decade, when China's GDP increased from 10.9 trillion to 40.1 trillion Chinese Yuan [35]. These rapid socioeconomic changes are substantially improving living conditions across China, including many rural regions, which in turn may influence the context in which suicidal distress occurs. Better economic circumstances may have lessened financial distress in families; however, the impact of high levels of internal migration could have served to exacerbate other stressors. Given the large population of China, prevalence figures for SI and SA of 3.9% and 0.8%, respectively, indicate approximately 50 million and 10 million people suffer a level of distress that involves thought and actions to kill oneself. Despite any welcome reductions in the suicide rates in China, these figures underscore that preventing suicide behaviors remains a major public health challenge.

In our analyses, rural dwellers were not more likely to have SI and SA than urban ones. Phillips and colleagues [1, 2] have suggested that the the relatively low income and living standards, and limited access to social and health services in rural areas may contribute to the oft noted greater prevalence of suicide in rural regions. However, given the results of these community surveys, difference in fatal outcomes from attempts may more likely reflect the more common use of highly toxic pesticides when making an attempt. That is, the case fatality percent (or rate) of rural attempts is higher than urban counterparts because of readily accessible methods. It is highly plausible that the falling suicide described by Wang et al [4] reflects relatively recent efforts to decrease the availability of first generation organophosphate pesticides, rather than a specific decrease in attempts (Caine 2013). Determining whether this premise is correct will require future study.

Another factor potentially contributing to declining suicide rate in China involves its rapid urbanization. The proportion of the Chinese rural population has decreased from 79.4% to 69.7% [1, 35] during the past decade, with access to better work, education, and often,

health services. Moreover, internal migrant workers in China also number beyond 200 million; while they retain their rural *hukou* and residence, with many of their family members left behind, they pump substantial income from cities to support their home communities. Throughout the world, urban areas generally experience lower suicide rates than rural regions in the same countries.

The ratio of estimated suicide rates in rural and urban areas varied between 1.5 and 2.5 in China [4]. However, in our meta-analysis, the corresponding ratios of SI and SA were both 1.3. In addition to the impact of means selection on the case fatality percent, another explanation for the relatively low ratio of pooled SI and SA rates between rural and urban areas in the meta-analysis may be selection bias; rural areas in the majority of the studies were in the immediate vicinity of major cities like Beijing, Guangdong and Xiamen, and as such are probably far more affluent than most of rural China. This may have the effect of lowering the prevalence of suicide-related behaviors in the study regions.

Subgroup analysis revealed that the prevalence of SI in women was higher than that in men although the difference did not reach significant level, which is in line with most [30, 36, 37] but not all studies (Hintikka et al., 2001; Renberg, 2001). We also found that women's lifetime prevalence of SA was significantly higher than that of men's, which is consistent with earlier findings on suicide patterns in China [1]. Of note, the report from Wang et al [4] suggests that men now exceed women in their suicide rates. Women around the world have more frequent attempts than men; it is uncertain whether women have more frequent attempts than men in China for specific cultural reasons, or whether we are seeing common gender-specific behaviors across culture.

There are several limitations of the study, beyond others previously noted. The number of the included studies was small; five for SI and seven for SA. Moreover, no studies reported the one-year prevalence of SI by sub-groups, thus subgroup analysis of SI could not be conducted. In addition, there is a potential measurement bias in the pooled prevalence of SI due to inconsistent SI definitions in the included studies. One SI definition - "ever seriously thought about committing suicide", is more stringent than the other one - "ever thought of ending your life", which may underestimate the pooled SI prevalence. Publication bias was not assessed as a minimum of 10 studies are required for such analysis [14].

Conclusions

This is the first meta-analysis of the prevalence of SI and SA in Chinese general population. The lifetime prevalence figures of SI and SA are lower than those reported from Western countries. Prevalence of SA in women was higher than that in men, but the risk for SI and SA was similar between urban and rural areas.

Acknowledgments

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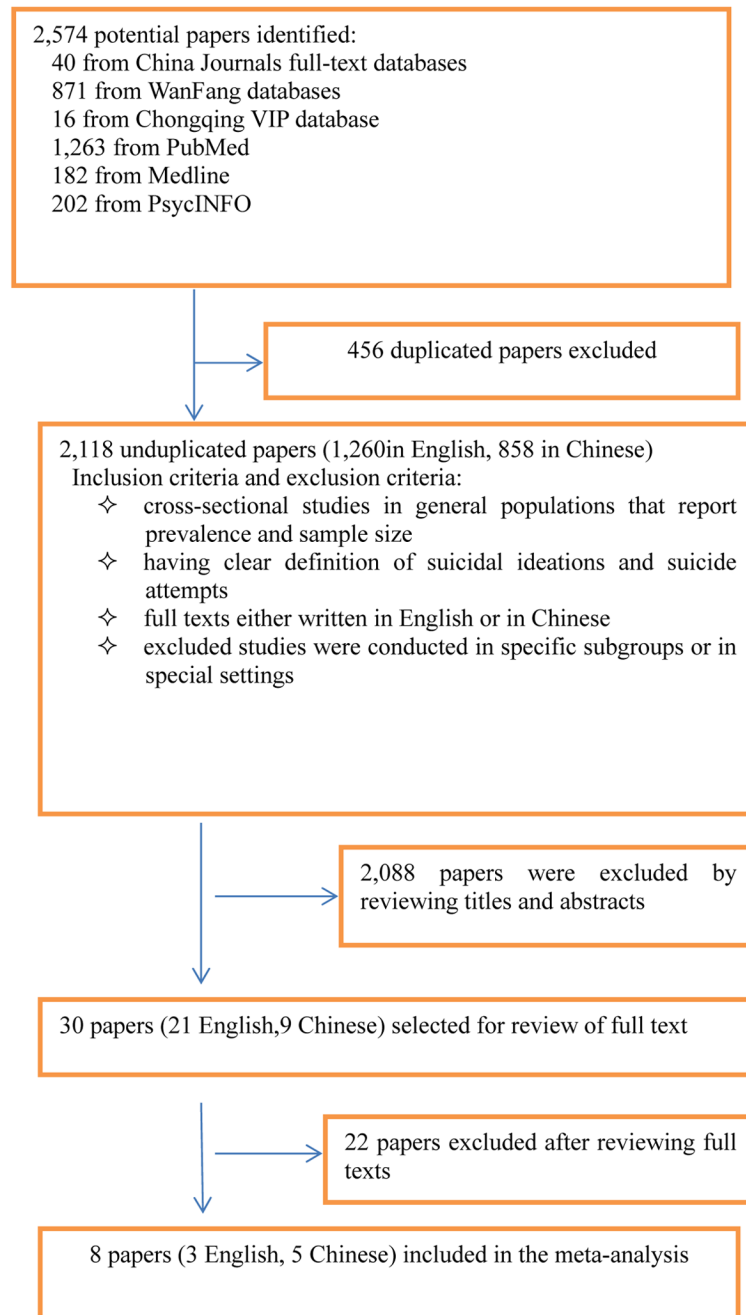


FIGURE 1.
Flowchart for the Selection of Studies

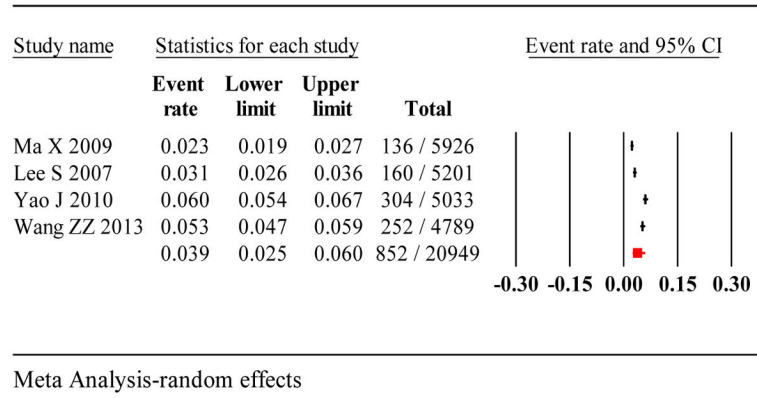


FIGURE 2.
Forest plot of lifetime prevalence of suicidal ideation

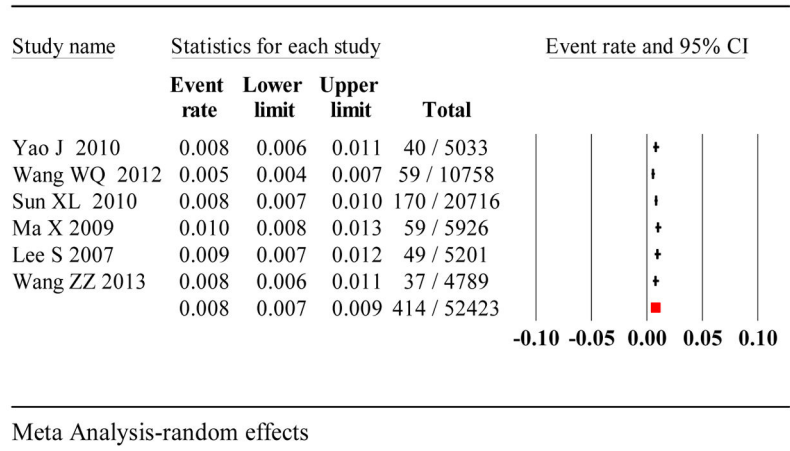


FIGURE 3.
Forest plot of lifetime prevalence of suicide attempts

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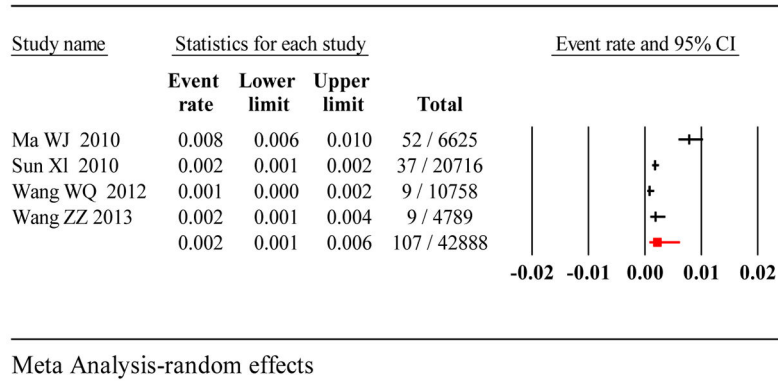


FIGURE 4.
Forest plot of one-year prevalence of suicide attempts

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TABLE 1

Summary of selected studies on suicidal ideations and suicide attempts

Study	Region	Years study conducted	Sampling method	Age (years)	Sample size	Response rate (%)	Cases with suicidal behavior	
							Lifetime	One year
Ma WJ 2010	mixed	2007	PPS	16 above	6670	99.3	-	SA ^a : 52
Sun XL 2010	mixed	2004–2005	M, C	18 above	24000	86.3	SA ^a : 170	SA ^a : 37
Yao J 2010	Mixed	2005–2006	PPS	15 above	5060	99.5	SI ^b : 304; SA: 40	-
Feng SS 2004	rural	2003	S, R	18 above	946	90.2	SI ^c : 201	SI ^c : 114
Wang WQ 2012	Mixed	2010	M, C	18 above	12051	89.2	SA ^a : 59	SA ^a : 9
Lee S 2007	urban	2001–2002	M, C	18 above	5201	74.6	SI ^b : 160; SA ^a : 49	-
Ma X 2009	mixed	2003	M, S	15 above	6251	94.8	SI ^b : 136; SA ^a : 59	-
Wang ZZ 2013	Mixed	2011–2012	PPS	18 above	5526	86.7	SI ^b : 252; SA ^a : 37	SI ^b : 94; SA ^a : 9

Sample method: M: multistage sampling; C: cluster sampling; S: stratified sampling, R: random sampling; PPS: sampling with probability proportional to size. SI: suicidal ideation, SA: suicide attempt.

^a Respondents answering “yes” to “have you ever attempted suicide?”.

^b Respondents answering “yes” to “have you ever seriously thought about committing suicide?”.

^c Respondents answering “yes” to “have you ever thought of ending your life?”.

TABLE 2

Overall and subgroup prevalence of suicidal ideations and suicide attempt

Subgroup	Number of studies	Number of cases	Sample size	Prevalence (%)	95%CI	I ² (P value)	Q value (p value)
Lifetime prevalence of suicidal ideation							
Female	4	582	11415	4.9	3.2–7.5	96.8 (<0.001)	3.3 (0.06)
Male	4	285	9859	2.8	1.8–4.3	90.7 (<0.001)	
Urban	4	432	12114	3.3	2.0–5.7	97.6 (<0.001)	0.3 (0.5)
rural	3	415	8835	4.3	2.3–7.8	93.6 (<0.001)	
Lifetime prevalence of suicide attempts							
Female	5	275	24775	1.1	0.8–1.5	81.4 (<0.001)	12.9 (0.0001)
Male	5	115	23184	0.5	0.4–0.7	58.2 (0.003)	
Urban	5	152	22067	0.7	0.5–0.9	74.5 (0.003)	2.3 (0.1)
rural	4	234	25567	0.9	0.8–1.0	30.9 (0.2)*	

CI: confidence interval, I²: heterogeneity coefficient.

* the pooled prevalence was computed using fixed-effect model. Other prevalence was computed using random-effect model.