WHY WOMEN ATTEMPT SUICIDE: THE ROLE OF MENTAL ILLNESS AND SOCIAL DISADVANTAGE IN A COMMUNITY COHORT STUDY IN INDIA

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ABSTRACT

The goal of this study was to describe the risk for attempted suicide in women associated with social disadvantage and mental disorder. The data is based on a cohort study of 2318 women in Goa, India. Information was collected at baseline on socioeconomic adversity, gender disadvantage, physical and common mental disorders (CMD). The main outcome was self-report attempted suicide (AS) over the 12-month study period and the main method of analysis was exact logistic regression. Gender based violence (OR=5.04, 95%CI: 1.69-15.45), CMD (OR=3.50, 95%CI: 1.04-10.90) and indebtedness (OR=2.89, 95%CI: 1.02-8.89) were the strongest independent predictors of incident AS cases. Experiencing both gender-based violence and CMD increases the risk of AS 25 fold when compared with women who have experienced neither risk factor. Strategies to reduce gender-based violence and discrimination, provide debt relief and improve the recognition and treatment of common mental disorders may reduce the population burden of attempted suicide.

INTRODUCTION

Attempted suicide is a leading cause of morbidity in women, especially in young women in the reproductive age group in developing countries[1-3]. In addition to being one of the strongest predictors of a future completed suicide, self-inflicted injuries often lead to disability in their own right[4]. Furthermore, in Asia, where preferred methods such as poisonings are especially lethal[5], suicide is a leading cause of mortality in young women[6,7].

Both mental illness, particularly depressive disorders, and social and economic adversities are considered to be strong risk factors for attempted and completed suicide in women, but opinions are divided whether mental illness, or factors such as poverty and domestic violence, is the more important factor[8-10]. Furthermore, there has been growing concern regarding poverty and gender disadvantage related to oppressive attitudes towards women in Asia as being major contributors to the risk for suicide[11-13]. Thus, some researchers have suggested that a history of mental illness is not as important a risk factor for suicide in persons from developing countries, where social and economic stressors may be more relevant[8,14,15]. The relative importance of social vs. mental health risk factors in suicide is extremely important for shaping both population level prevention strategies as well as estimating the need for psychiatric interventions.

Due to the relative infrequency of both completed and attempted suicides in the general population, researchers interested in risk factors have relied on case-control control studies (psychological or verbal autopsies) where risk factors for suicide are identified retrospectively. These studies have found high rates of mental illness in suicides, reaching as high as 100%[9,16-19]. While providing very useful information in many domains, retrospective reporting by family

members of the deceased may be prone to recall bias: relatives may be less likely to report social adversities (particularly factors related to gender disadvantage/violence) and more likely to overestimate the features of psychological distress (particularly depression). Prospective studies of attempted suicide where information on mental health and social factors can be collected before a suicide attempt may be especially informative in disentangling the contribution of social, economic, and health factors to the risk of attempted or completed suicide.

In this article we report the findings of the first longitudinal study of risk factors for attempted suicide in a population based cohort of women in a developing country. We hypothesized that social and economic factors, and mental and physical illness would be independent risk factors for attempted suicide.

METHOD

Sample: The study population was selected from a register of all women living in the catchment area covered by the Aldona Primary Health Centre (a geographic administrative unit) in north Goa. The sampling frame consisted of 8595 registered women, 18-45 years old (reproductive age) who were expected to reside in the area for the next 12 months; spoke one of study languages; and were not pregnant. Recruitment took place between November 2001 and June 2003. Prior to recruitment, an awareness campaign about the project was conducted in the area, involving the *panchayat* (village council) councilors, community health workers, women's groups and religious leaders. 3000 women were randomly selected and 2494 consented to participate in the study (83.1%). There were three rounds of data collection: recruitment/baseline, 6 and 12-months (reviews). Further details of recruitment and data

4

collection procedures are available elsewhere[20,21]. After complete description of the study to the subjects, written or verbal consent was obtained. The study received approval from the ethics review board of the London School of Hygiene & Tropical Medicine, and the Independent Ethics Commission, Mumbai (India). Interviewers were trained in basic counseling methods, and provided advice on sources of help for those who were facing social difficulties such as violence.

Risk Factors: Risk factors were assessed at recruitment/baseline during the first home visit using a semi-structured interview. Items were derived from existing interviews used in other studies of reproductive and mental health in Goa[22-24].

Demographic and Socioeconomic Factors: Information on the participant's age, education, religion (Hindu, Christian, Muslim), ethnicity (Goan vs. migrant), and marital status was collected. Economic risk factors were measured through questions on current indebtedness (Are you or your family in debt at present?), experience of hunger in the previous three months (Have you ever been hungry because you could not afford to buy food in the past 3 months?), household per-capita income, and the perception of difficulty managing financially (How well do you feel you are managing financially these days? Difficult, very difficult to make ends meet vs. living comfortable, doing alright, just about getting by.)

Social/Gender Disadvantage Factors: Several factors related to social and/or gender disadvantage were assessed. We defined marriage during adolescence (under the age of 19 years) as 'young age of marriage'. A general question on gender based violence was asked of all women (Have you ever been beaten or mistreated physically by any person?). In addition, three questions on

verbal, physical, and sexual violence were asked of women who were currently

married/cohabitating (Has your husband/partner ever spoken to you using language which is

threatening (for e.g. that he is going to hit you) or abusive (called you names, accused you of

having relations with other males, etc)?; Has your husband/partner ever hit you?; Has your

husband/partner ever forced you to have sex with him (i.e. made you have sex against your

wishes)?) We created an aggregate variable representing exposure to any violence among all the

women (whether partner violence or other). Social/family support was assessed by questions on

received support/having someone to go to in 5 situations: when receiving good news, for

personal problem, if needed to borrow a small amount of money, when feeling low, or when ill

(such as: family members; neighbors/relatives, friends, no one). Affirmative responses were

summed (range 0 to 5) and family support was classified as low (score of 0 or 1), moderate

(score of 2, 3, or 4) and high (score of 5). Autonomy referred to a woman's ability to make

decisions regarding visiting her mother's or friend's home, seeing a doctor, keeping money aside

for personal use, and having time to do things for herself. Affirmative responses were summed to

generate an autonomy score (also tertiled: high/moderate/low). Social integration was assessed

through questions on the woman's level of engagement, in the past three months, with four

activities, viz. religious activities, participation in community/voluntary group, social outings to

meet friends/relatives, and having friends/relatives visit. Affirmative responses were summed to

generate a Social Integration Score which was tertiled (high/moderate/low). Women who said

they could neither read nor write were counted as illiterate.

Mental and physical health: To assess the presence of mental illness we used the Revised

Clinical Interview Schedule (CISR), a structured interview for the measurement and diagnosis of

common mental disorders (CMD) such as depressive and anxiety disorders in community and primary care settings[25]. The Konkani language version of the CISR used in the present study had been previously used in Goa[22]. The interview consists of 14 sections, each covering specific symptoms such as anxiety, depression, irritability, fatigue, obsessions, compulsions and panic which are used to generate ICD-10 diagnostic categories, based on the PROQSY program. Additionally, the report of a 'long-standing illness or disability' was used as a measure of her overall physical health. Women who reported an illness were asked about the type of illness.

Outcome Measures: The primary outcome was attempted or completed suicide at either the 6-month or 12-month interviews. Attempted suicide (AS) was assessed through the question, "Have you ever made an attempt to take your life, for example by taking an overdose of tablets or in some other way?"; if the respondent said 'yes', the interviewer explored timing of the attempt. Suicide attempts that occurred since the previous interview were recorded as incident cases. One woman who was reported to have completed suicide by her family at follow-up was also counted as a case.

Statistical Analysis: Because of the small number of women with an AS outcome (n=19), exact logistic regression modeling was used to examine the association between the independent variables and AS, which was treated as a binary variable[26]. All analyses were conducted using SAS v.9.1. First, the association of each potential risk factor with AS was estimated in bivariate exact logistic regression models. Determinants whose Odds Ratios were greater than 3.0 and/or whose association was statistically significant at below p=0.05 (two-tailed) were retained and included in subsequent analyses. Next, we built a series of models that included CMD plus each

7

of the retained variables in predicting the odds of AS. These models were meant to examine to what extent CMD and various social disadvantage factors would remain independently associated with AS. The final multivariate model includes CMD plus all of the statistically significant variables from the prior analyses.

RESULTS

The final sample size for the current analysis is 2318 (all participants who completed at least one review assessment, plus one participant who completed suicide before the first review). There was no difference between participants for whom we had complete data and those who were lost to follow-up at either 6 or 12-month review on the following characteristics: education; household family income; CISR score. However, younger, unmarried participants were more likely to be lost to follow-up, because they had moved away from home for occupational, educational or marital reasons (i.e. gotten married). Migrants who were non-Konkani speakers also had lower follow-up at both rounds, mainly because they had left the community. Follow-up at 12-months was lower among illiterate participants.

The mean age at baseline was 32.5 years (SD=8.1), most participants were Hindu (75.0%) and 21.7% were Christian. 14.1% of participants were unable to read and write. The average household income per-month was Rs 4574 (approximately 100 US$). A third of households (34.5%) were currently in debt, but severe economic difficulties as reflected by the experience of hunger in the recent three months, were uncommon (5.3%). The prevalence of CMD was 6.5 % (n=151; 95% CI 5.5%-7.6%); 142 participants (94%) had a depressive disorder, with or without comorbid anxiety. The remainder had a pure anxiety disorder. 274 reported a chronic illness; the

most common was cardiovascular diseases (n=90). A total of 15.5% (n=359/2318) of all women experienced violence and, among married women, 16% (n=270/1653) reported verbal (n=240), physical (n=156), or sexual (n=58) violence from their husband.

Risk factors for attempted suicide: During the one year follow-up period, 18 women attempted suicide and 1 completed suicide. Thus, in total 19 women experienced the outcome (0.8% incidence, 95% confidence interval 0.5% - 1.3%). Several baseline socioeconomic/demographic factors were independently associated with a higher risk of AS over the follow-up period (Table 1). Experiencing hunger was associated with almost over a 6-fold increase in the odds of attempting suicide (OR=6.59, 95% CI: 1.83-19.77) and being a migrant or the family being in debt were linked with over a 3 and 4-fold increase in the odds of AS, respectively. Factors such as baseline income, education, occupation, religion, or age were not associated with increased risk of AS. Out of the social/gender disadvantage risk factors (Table 2), young age at marriage increased the odds of AS 6-fold (OR=6.46, 95% CI:1.99-18.53) while the presence of gender based violence was associated with over a 7-fold increase (OR=7.70, 95% CI:2.80-22.21). None of the measures of social integration, family support or autonomy were linked to increased risk of AS over the follow-up period.

Presence of CMD at baseline was significantly associated with AS (OR=8.71, 95% CI: 2.86-24.43). In total, 37% (N=7) of the women who attempted suicide over the follow-up period met CMD criteria at baseline. None had moderate/severe depression at baseline: 2 of the women were diagnosed with mild depressive disorder, 4 with mixed anxiety/depression, and 1 with

social/agoraphobia. Finally, the presence of a chronic physical illness was significantly associated with AS over the follow-up period (OR=3.48, 95% CI: 1.08-9.91).

We next turned to multivariate analyses combining baseline CMD (Model 1, table 3) with the significant social disadvantage risk factors for AS (models 2- 7: hunger, debt, migrant ethnicity, early marriage, gender based violence and physical illness). Two main patterns emerge. First, most of the social disadvantage factors remained significant predictors of AS, above and beyond the presence of CMD. The association with the largest magnitude was for the experience of gender based violence (model 6), with almost a 5-fold increase in the odds of AS (OR: 4.98, 95% CI:1.64-15.54). Gender based violence is associated with CMD (18% of women who have experienced violence met criteria for CMD compared to 4% of those with no history of violence, p<0.001), but each appears to independently add to the risk of AS. Young age at marriage was similarly associated with increased risk of AS with an OR of 4.29 (95% CI: 1.14-14.37), as was migrant ethnicity (OR=3.61, 95%CI: 1.09-10.57). Second, while the presence of CMD remained a strong predictor of AS over the follow-up period, the magnitude of this association was attenuated after adjusting for the social disadvantage factors. Again, this drop was most pronounced in model 6, where the odds ratio for CMD decreased to 4.53 (95% CI: 1.37-13.95) resulting in odds ratios for CMD and gender based violence that were of similar magnitude. Furthermore, while the incidence rate of AS among women with neither of these risk factors was 0.3%, women who reported gender based violence and who met criteria for CMD had an AS rate of 7.6%, a 25-fold difference. This suggests a multiplicative association between CMD, gender based violence and AS.

Finally, table 4 presents results from a combined model, confirming the independent contribution of CMD and multiple social disadvantage factors in risk of AS.

DISCUSSION

To our knowledge, this is the first population-based study to prospectively describe the social, economic, and health risk factors for attempted suicide among women. The one-year incidence was 0.8% (19/2318). Given the especially lethal methods used (such as pesticides in South Asia) and limited emergency medical services, it is not surprising that suicide is reported as one of the leading causes of death in young women in Asia[5,6,11]. If we extrapolate our findings to the population of Goa, we would expect over 22000 new events of attempted suicide each year in women aged 18 to 50 years, a staggering number for a state of 1.4 million people. Thus, our study confirms the public health importance of attempted suicide in women in this region.

The rate of CMD among women who attempted suicide in this cohort (37%) was lower than those reported in most case-control studies of both attempted and completed suicide[9,16,17] but similar to at least one study in China that found a 38% CMD rate among completed suicides[27]. Baseline CMD and social disadvantage factors were independently associated with AS over the 12-month follow-up. Many studies have linked social and economic disadvantage with a higher risk of attempted or completed suicide[19,28-30]. Women are especially vulnerable to these factors and the economic and social problems described here are fairly prevalent in South Asia[31,32]. For example, gender based violence is experienced by as much as a third of married women in India[33,34]. However, while gender based violence was one of the strongest risk factors for AS, this effect was independent of the risk of CMD associated with violence. Additionally, young

11

age at marriage, being a migrant, and being in debt- all of which reflect socioeconomic disadvantage- were independently risk factors for AS, while income was not. It is possible that income itself may not be a good marker of women's economic well-being, or that it is not reported accurately, but other researchers have also found null associations between income and suicide risk[16].

Thus, our findings suggests that key factors leading up to an AS event are recurring, long-term social problems, such as gender based violence, social exclusion (as reflected by migrant status) and acute economic adversities, in addition to common mental disorders. In China, where the suicide rate is among the highest in the world, Phillips et al have noted the lack of a strong link between CMD and suicide. This is partially explained by the fact that rates of CMD in China are fairly low[8]. The rate of current CMD in the present study at baseline was 6.5% which is also relatively low (compared, for example, to the US where CMD prevalence rates are estimated at 20-24%)[35,36]. Another explanation for a lower contribution of CMD to the risk for AS in our cohort study is that the psychological autopsy method may over-estimate the importance of CMD[3,8], while the importance of psychosocial and other individual factors remain under-estimated[17]. Family members search for causes of their loved one's suicide and desire to assign meaning to the event as part of their bereavement process[17]; they are unlikely to report socioeconomic disadvantage (particular factors such as violence). Coroners also expect to see depression to be associated with suicide and are more likely to identify an ambiguous death as a suicide if they learn of the victim's history of depression[17], and researchers may infer a clinical diagnosis even if not all symptoms are present, but a depressive illness seems very likely[37].

On the other hand, our prospective study has its own limitations. Due to the short duration of follow-up, small baseline sample and the resulting low number of attempted or completed suicides we were not able to explore other sub-group variations or add more statistical controls due to power limitations. This also partially explains the relatively large confidence intervals for the odds ratios, resulting in less precise estimates. However, the exact logistic regression method is especially designed for small or unbalanced samples. The focus of this study was on attempted suicides (only 1 out of the 19 cases was a completed suicide) so our findings may not be generalizable to completed suicides. The restriction of the sample to only female participants of reproductive age also limits the generalizability of these findings to men, or to women outside the reproductive age range.

In conclusion, we found that both common mental disorders and socio-economic disadvantage were independent risk factors for AS in women in the reproductive age group. There also appears to be a multiplicative impact of gender based violence and mental illness on the risk of AS. Our evidence supports the contention of authors who argue that single cause models of suicide (social vs. illness) fail to adequately describe the complex etiology of suicide and hence do not provide the useful information needed to design effective prevention strategies[8]. Given that social and economic disadvantage is experienced simultaneously by many women in developing countries, all of these factors need to be taken into consideration when designing preventive strategies. Ultimately, a combination of strategies which reduce gender based violence, provide debt relief and strengthen the health system approaches to the detection and treatment of common mental disorders will together contribute to the reduction of the population burden of suicide in women.

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Table 1. Baseline demographic and socioeconomic risk factors for AS in a community cohort study of women in Goa, India. (N=2318)

	N (% of sample)	AS cases (n=19) N (% of group)	Odds Ratio (95% CI)	*p-value*
Age (years)				
18-24	458 (19.8)	3 (0.7)	1	
25-29	410 (17.7)	5 (1.2)	1.87 (0.36-12.12)	0.61
30-34	474 (20.5)	3 (0.6)	0.97 (0.13-7.25)	1.0
35-39	449 (19.4)	5 (1.1)	1.71 (0.33-11.06)	0.70
40-50	527 (22.7)	3 (0.5)	0.87 (0.12-6.52)	1.0
Religion				
Hindu	1739 (75.0)	12 (0.7)	1	
Christian	504 (21.7)	6 (1.2)	1.73 (0.53-5.02)	0.40
Muslim	75 (3.2)	1 (1.3)	1.94 (0.05-13.47)	0.85
Marital Status				
Currently unmarried	665 (28.7)	4 (0.6)	1	
Currently married	1653 (71.3)	15 (0.9)	1.51 (0.48-6.29)	0.65
Hunger in the previous 3 months				
No	2195 (94.7)	14 (0.6)	1	
Yes	123 (5.3)	5 (4.1)	6.59 (1.83-19.77)	0.005
Family currently in debt				
No	1489 (65.5)	7 (0.5)	1	
Yes	783 (34.5)	12 (1.5)	3.29 (1.19-9.92)	0.02
Experiencing current financial difficulties				
No	1578 (68.1)	9 (0.6)	1	
Yes	740 (31.9)	10 (1.4)	2.39 (0.87-6.67)	0.10
Ethnicity				

Goan	2098 (94.7)	13 (0.6)	1	
Migrant	220 (9.5)	6 (2.7)	4.49 (1.39-12.82)	0.01
Per capita income (monthly rupees)				
<2000	800 (34.5)	7 (0.9)	1	
2000-2999	401 (17.3)	6 (1.5)	1.72 (0.47-6.02)	0.48
3000-4999	568 (24.5)	3 (0.5)	0.60 (0.10-2.65)	0.69
5000-9999	370 (16.0)	2 (0.5)	0.62 (0.06-3.26)	0.84
>=10000	177 (7.6)	1 (0.6)	0.64 (0.01-5.06)	1.0
Education				
None	228 (9.8)	3 (1.3)	1	
1-9	920 (39.7)	9 (1.0)	1.56 (0.39-8.98)	0.74
10-14	922 (39.8)	7 (0.8)	1.21 (0.27-7.26)	1.0
15-23	248 (10.7)	0	--	--
Occupation				
Homemaker	1550 (66.9)	11 (0.7)	1	
Employed	485 (20.9)	6 (1.2)	1.75 (0.53-5.20)	0.40
Other	283 (12.2)	2 (0.7)	1.00 (0.11-4.60)	1.0

Table 2. Social disadvantage risk factors for AS in a community cohort study of women in

Goa, India (n=2318)

	N (% of sample)	AS cases N (% of group)	Odds Ratio (95% CI)	p-value
Social disadvantage factors				
Literate	1992 (85.9)	13 (0.7)	1	
Illiterate	326 (14.1)	6 (1.8)	2.85 (0.88-8.11)	0.08
Legal age at marriage	2159 (93.1)	13 (0.6)	1	
Young age at marriage (under 18)	159 (6.9)	6 (3.8)	6.46 (1.99-18.53)	0.002
Autonomy in decision making				
High	778 (33.6)	5 (0.6)	1	
Moderate	985 (42.5)	8 (0.8)	1.27 (0.36-4.94)	0.90
Low	555 (23.9)	6 (1.1)	1.69 (0.43-7.03)	0.57
Family support				
High	1,222 (52.7)	6 (0.5)	1	
Moderate	654 (28.2)	7 (1.1)	2.19 (0.63-7.93)	0.25
Low	442 (19.1)	6 (1.4)	2.79 (0.74-10.49)	0.14
Social integration				
High	741 (32.0)	5 (0.7)	1	
Moderate	763 (32.9)	7 (0.9)	1.36 (0.37-5.47)	0.81
Low	814 (35.1)	7 (0.9)	1.28 (0.35-5.12)	0.90
Lifetime verbal, physical, or sexual violence				
No	1959 (84.5)	8 (0.4)	1	
Yes	359 (15.5)	11 (3.1)	7.70 (2.80-22.21)	<0.001
Physical and Mental illness factors				
Baseline Common Mental Disorder				
No	2167 (93.5)	12 (0.6)	1	

Yes	151 (6.5)	7 (4.6)	8.71 (2.86-24.43)	<0.001
Baseline chronic physical illness				
No	2035 (88.1)	13 (0.6)	1	
Yes	274 (11.9)	6 (2.2)	3.48 (1.08-9.91)	0.04

Table 3) Bivariate exact Logistic regression of risk factors for AS over 1 year period in a community cohort study of women in Goa, India

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
CMD	8.71 (2.86-24.43)	6.41 (1.95-19.25)	7.77 (2.53-22.02)	7.51 (2.43-21.41)	6.79 (2.15-19.69)	4.53 (1.37-13.95)	6.56 (2.06-19.19)
SES variables							
Hunger in last 3 months		3.87 (0.99-12.74)					
Family in debt			2.85 (1.02-8.66)				
Migrant ethnicity				3.61 (1.09-10.57)			
Gender related factors							
Young age at marriage					4.29 (1.14-14.37)		
Gender based violence						4.98 (1.64-15.54)	
Other factors							
Physical illness							2.55 (0.76-7.50)

Table 4) Multivariate exact Logistic regression of risk factors for AS over 1 year period in a community cohort study of women in Goa, India

Baseline Risk Factor	OR (95%CI)
CMD	3.50 (1.04-10.90)
Family in debt	2.89 (1.02-8.89)
Migrant ethnicity	2.18 (0.57-7.36)
Young age at marriage	3.31 (0.86-11.28)
Gender based violence	5.04 (1.69-15.45)