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Title:
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Date:
2019-10-01

Citation:
Arya, V., Page, A., Gunnell, D., Dandona, R., Mannan, H., Eddleston, M. & Armstrong, G. (2019). Suicide by hanging is a priority for suicide prevention: Method specific suicide in India (200–20). Journal of Affective Disorders, 257, pp.1-9. https://doi.org/10.1016/j.jad.2019.07.005.

Persistent Link:
https://hdl.handle.net/11343/268056

Journal of Affective Disorders 257 (2019) 1–9

Contents lists available at ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research paper

Suicide by hanging is a priority for suicide prevention: method specific suicide in India (2001–2014)

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ARTICLE INFO

Keywords:
Suicide
Hanging
Insecticide poisoning
Pesticide poisoning
India

ABSTRACT

Background: India accounts for over a quarter of the global burden of suicide. One of the most effective population level suicide prevention strategies has been restricting access to suicide means.
Method: Trends in method specific suicide rates (2001–14) were calculated using National Crime Records Bureau data stratified by sex, age-group, and geographical region. Multilevel negative binomial regression models stratified by sex and suicide method were specified to investigate associations between state-level indicators of economic development, education, agricultural pesticide use and religious factors.
Results: Suicide by hanging increased by 56% (from 3.9 to 6.1 per 100,000) among males and by 24% (from 2.1 to 2.6 per 100,000) among females over the study period while incidence of insecticide poisoning decreased by 44% (from 2.7 to 1.5 per 100,000) among males and by 52% (from 1.7 to 0.8 per 100,000) among females. In general, states with higher levels of development, higher agricultural employment and higher literacy had higher rates of suicide for each suicide method. States with higher levels of agricultural pesticide use had higher rates of insecticide poisoning suicides.
Limitation: Reported rates might be an underestimation of the true rates as the official data used for the analysis likely underestimates the actual number of suicide deaths in India.
Conclusion: Responsible reporting of suicide by hanging in the media, and limiting fictional portrayals of this method may be useful areas for prevention. Further restrictions on production and sales of highly hazardous pesticides may also help with further reductions in suicide by pesticide poisoning.

1. Introduction

Suicide is a major public health issue in India (Patel et al., 2012; Dandona et al., 2016; Armstrong and Vijayakumar, 2018; Arya et al., 2018) with an estimated 230,314 suicides in 2016 (Dandona et al., 2018). India accounts for over a quarter of the global burden of suicide (Dandona et al., 2018). Rates in India are higher among males (21 per 100,000) than females (15 per 100,000), and while rates have declined among females, male rates have remained stable for the last 30 years (Dandona et al., 2018). Given the enormous size of the problem, a public health approach to suicide is gaining momentum in India, with calls for the development of national and state-level suicide prevention strategies (Armstrong and Vijayakumar 2018; Dandona et al., 2018). To give further impetus to the development of such strategies and targeted suicide prevention activities, information is urgently needed on trends and regional variation in suicide methods.

The changing availability of lethal suicide methods is an important influence on secular trends and international differences in suicide rates (WHO, 2014), and restricting access to means is recognised as one of the most effective population level suicide prevention strategies to date (Mann et al., 2005). Reduction in both method-specific, and in some cases overall, suicide rates have been reported following the restriction of access to carbon monoxide in domestic gas (Kreitman, 1976) and in motor vehicles following the introduction of catalytic converters

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https://doi.org/10.1016/j.jad.2019.07.005
Received 30 April 2019; Received in revised form 2 July 2019; Accepted 2 July 2019
Available online 03 July 2019
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(Spittal et al., 2012); barbiturate availability (Oliver and Hetzel, 1972); agricultural pesticides (Gunnell et al., 2007) and firearms (Beautrais et al., 2006). Means restriction is most effective when the method is lethal and commonly available, and if substitution of method does occur, it is to a method of lower lethality increasing the chances of survival (Yip et al., 2012; Chen et al., 2016).

Few studies have investigated national and state level trends in method specific suicide rates in India (Patel et al., 2012; Dandona et al., 2016), although a number of studies have reported method-specific suicides for specific geographic catchments. For example, a study from west India found poisoning as the leading method of suicide (Ambade et al., 2007) while another study in south India found hanging as the leading method of suicide (Sauvaget et al., 2009). This study uses national data on method specific suicides in India for the period 2001–14 to: (i) identify national and regional patterns in method-specific suicide rates; and (ii) investigate potential social, demographic and economic correlates of state-level variation in suicide methods in India.

2. Method

2.1. Data

The National Crime Records Bureau (NCRB) is the Indian government organization that reports crime data based on police reports collected from each state and union territory in India. Method specific suicide counts for the period 2001–14 were extracted from the National Crime Records Bureau (NCRB) website, stratified by sex, year, state and age-group (15–29 years, 30–44 years, 45–60 years and > =60 years). The NCRB defines suicide as the deliberate termination of life where the desire to terminate life originates within the individual (NCRB, 2014).

The data provided by the NCRB for 2001–2013 defined age groups as described above. However, in 2014 NCRB reported the additional groups of 14–18 years and 18–29 years, which were aggregated to form a single age group of 14–29 years for 2014 for this analysis. Additionally, in 2014 the state of Andhra Pradesh was split to form two states: Andhra Pradesh and Telangana. Suicide cases from Telangana and Andhra Pradesh were combined for 2014 to ensure consistency with previous years in the analysis. The latest NCRB data from 2015 was not included because it does not provide method specific suicide counts by different age groups. Data on corresponding populations stratified by sex, year, state and age-group were extracted from Census of India website for 2001 (Census of India, 2001) and 2011 (Census of India, 2011) with intercensal years calculated via weighted interpolation.

The NCRB data recorded 16 categories of suicide method (Web Appendix 1). Following initial analysis, the current study reported on the three most common suicide methods (accounting for 58% of the total suicides in males and 63% in females): ‘hanging’, ‘insecticide poisoning’ (this category includes all suicides due to any form of pesticide) and ‘self-immolation’. The remaining suicide methods were categorised as ‘all other methods’.

A series of social and economic factors were also defined including state specific information on literacy, religion, agricultural pesticide use, level of socio-economic development and level of agricultural employment (Vijayakumar et al., 2005; Dandona et al., 2016; Page et al., 2017; Arya et al., 2018). Data on state specific literacy and religious affiliation rates were obtained from the Census of India and Open Government Data Platform of India websites (Literates and Literacy Rates by Sex, 2018; Population by Major Religious Communities; Religion Census, 2011). These rates were available for the years 2001 and 2011 with intervening years estimated via weighted interpolation. State-specific agricultural pesticide use rates (based on total production and imports of different pesticides) between the years 2002–13 (with 2001 and 2014 rates estimated via retrospective projection) were obtained from the Indian Agricultural Statistics Research Institute (IASRI) (IASRI, 2013, 2016).

Indian states were categorised in terms of socio- economic development (‘less' or `more’ developed) and also level of agricultural employment (‘more’ or `less’ agricultural). A detailed description of the rationale and method for these categorisations has been published elsewhere (Dandona et al., 2016; Arya et al., 2018) (see Web Appendix 2).

2.2. Analysis

Age-standardised rates (using the 2011 census population as the standard) for suicide by hanging, insecticide poisoning, self-immolation and all other methods were calculated for each year (2001–2014), stratified by sex and geographic region (less or more economically developed, and more or less agriculturally employed), to investigate trends and differentials over the study period. Age-specific rates stratified by sex were also investigated to ascertain differences in method-specific suicide rates among different age groups. Age standardised suicide rates for males and females for hanging, insecticide poisoning, self-immolation and all other methods for each state were also calculated (Web Appendix 3–6). Total percentage of hanging, insecticide poisoning, self-immolation and all other methods from 2001–2014 were calculated as well.

Associations between socio-demographic factors (literacy, religion, agricultural pesticide use and geographic region) and suicide were investigated by specifying a series of negative binomial regression models of method specific suicide counts (offset by the natural logarithm of the population), and stratified by state, sex, geographic region, and age group. Each of the socio-demographic factors were divided into population tertiles for analyses, resulting in ‘low’, ‘middle’ and ‘high’ categories for each variable. Religion was restricted to proportion Hindu, as high collinearity was observed between proportion Muslim, Christian and Hindu by state. Multivariate models were adjusted for sex, age-group, period, and socio-demographic factors (literacy, religion, agricultural pesticide use, geographic region). Model estimates were exponentiated and expressed as rate ratios (RR) with 95% confidence intervals. Analyses were conducted in Stata 15.1 (Mitchell, 2012).

3. Results

Suicide by hanging showed a general increasing trend with sharp increases during the latter years of the study period (2010–2014), occurring contemporaneously with declines in suicide by insecticide poisoning (Table 1, Fig. 1). Among males, suicide by hanging increased by 56% (from 3.9 to 6.1 per 100,000) while suicide by insecticide poisoning decreased by 44% (from 2.7 to 1.5 per 100,000) between 2001 and 2014. Suicide by self-immolation decreased by 14% (0.7–0.6 per 10,000) and all other methods also decreased by 3% (5.9–5.7 per 100,000) (Fig. 1a). Among females, suicide by hanging also increased by 23% (from 2.1 to 2.6 per 100,000) while insecticide poisoning declined by 52% (from 1.7 to 0.8 per 100,000) between 2001 and 2014. Suicide by self-immolation decreased by 40% (from 1.5 to 0.9 per 100,000) while all other methods also decreased by 20% (3.5–2.8 per 100,000) (Fig. 1a).

Among males, middle age groups (30–59 years) had the highest suicide rates for all methods (Fig. 1b). Among females, suicide rates generally declined with age among the three specific suicide methods, especially for hanging (Fig. 1b).

More economically developed states had two to four times higher suicide rates for all the methods compared to less economically developed states among both sexes (Fig. 2a and b), with a general pattern of increasing suicide by hanging, and declines in suicide by insecticide poisoning. Among more or less agricultural states, there was a similar pattern of suicide methods, with slightly higher rates of suicide by hanging among males in less agricultural states, and suicide by self-immolation among females in more agricultural states (Fig. 3a and b).

More agricultural states also had slightly higher rates of insecticide

Table 1
Percentage of hanging, insecticide poisoning, self-immolation and all other methods among males and females from 2001–14.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
Males															
Hanging %	29.65%	30.68%	31.28%	33.06%	34.00%	33.83%	33.43%	33.90%	33.23%	33.25%	34.91%	39.15%	41.93%	44.21%	35.07%
Cases	19,668	21,276	21,966	24,020	24,786	25,610	26,509	27,332	27,079	28,988	30,667	34,631	37,969	39,410	389,911
Insecticide poisoning %	20.33%	19.78%	21.56%	20.93%	19.90%	20.34%	20.02%	19.55%	21.08%	19.29%	16.52%	14.87%	14.31%	11.00%	18.31%
Cases	13,487	13,716	15,145	15,210	14,516	15,398	15,876	15,766	17,176	16,822	14,512	13,161	12,962	9806	203,553
Self-immolation%	5.28%	5.13%	5.07%	3.85%	3.94%	4.53%	4.35%	4.94%	4.85%	4.74%	4.87%	4.64%	4.05%	3.97%	4.57%
Cases	3507	3560	3567	2804	2874	3434	3452	3982	3959	4137	4279	4112	3672	3545	50,884
All other methods %	44.71%	44.39%	42.07%	42.14%	42.15%	41.29%	42.19%	41.59%	40.82%	42.70%	43.69%	41.32%	39.69%	40.80%	42.03%
Cases	29,652	30,780	29,543	30,617	30,740	31,260	33,458	33,464	33,257	37,233	38,381	36,549	35,940	36,376	467,250
Females															
Hanging %	23.91%	24.60%	26.10%	27.96%	28.71%	30.87%	28.49%	29.08%	28.29%	28.01%	30.05%	32.83%	35.40%	36.75%	29.42%
Cases	10,089	10,109	10,605	11,479	11,773	13,096	12,352	12,936	12,927	13,278	14,348	15,431	15,667	15,631	179,721
Insecticide poisoning%	19.06%	18.73%	19.33%	19.73%	19.02%	17.80%	19.03%	18.27%	19.18%	17.85%	15.27%	14.43%	14.40%	10.66%	17.31%
Cases	8043	7698	7856	8101	7800	7549	8249	8129	8765	8466	7292	6768	6496	4535	105,747
Self-immolation %	17.33%	17.26%	16.80%	14.35%	14.88%	16.05%	16.01%	15.74%	16.83%	16.33%	15.89%	15.42%	15.58%	13.11%	15.74%
Cases	7315	7095	6828	5893	6104	6809	6939	7004	7691	7748	7587	7326	6292	5576	96,207
All other methods %	39.68%	39.38%	37.75%	37.94%	37.37%	35.26%	36.45%	36.88%	35.67%	37.80%	38.78%	37.24%	37.17%	39.47%	37.51%
Cases	16,745	16,183	15,341	15,573	15,321	14,956	15,802	16,404	16,297	17,927	18,519	17,467	15,801	16,787	229,123

poisoning among both sexes (Fig. 3a and b).

States with higher (compared to low) literacy had a higher risk of suicide by hanging, insecticide poisoning, and self-immolation (RR range 2.08–6.41) (Table 2). There was also a strong association (RRs > 2.0) between higher (compared to low) per capita agricultural pesticide use, and among more (compared to less) agricultural regions, and suicide by insecticide poisoning, for males and females (Table 2). Less developed states had lower rates of suicide for all suicide methods (with the exception of female suicide by hanging). States with high (compared to low) proportion Hindu populations had higher rates of suicide by insecticide poisoning and self-immolation, for both males and females (Table 2).

4. Discussion

This study investigated trends and differentials in method-specific suicide in India over the period 2001–14. Suicide by hanging was the most common method in India, followed by suicide by insecticides, and suicide by self-immolation. Suicide by hanging accounted for 35% of all suicides among males and almost 30% of all suicides among females, with rates generally increasing over the study period. In contrast, suicide by insecticide poisoning (accounting for 18% of all suicides in males and 17% of all suicides in females) showed a decreasing trend over the study period. Self-immolation rates were higher among females compared to males (accounting for 5% of all suicides among males, but 16% of all suicides among females) and also showed decreasing trends over the study period.

The current study found higher method-specific suicides among males compared to females (with the exception for suicide by self-immolation), which is consistent with sex differences reported internationally (WHO, 2011). Age specific suicide rates for all methods were generally higher in the middle age groups (30–44 and 45–59 years) among males, while suicide by hanging, insecticide poisoning and self-immolation were highest among the youngest age group (15–29 years) among females. These findings are reflective of age-specific patterns of suicide in previously reported studies of overall suicide rates in India (Patel et al., 2012; Arya et al., 2018; Dandona et al., 2018).

Suicide by hanging is one of most common and lethal methods of suicide in the world (Gunnell et al., 2005; Ajdacic-Gross et al., 2008). Suicide by hanging has historically been a prominent method of suicide in India (Thakur, 1963), with capital punishment in India carried out through hanging, highlighting the prominence of hanging in the Indian culture. The increasing trend in suicide by hanging, occurring contemporaneously with declines in suicide by insecticide poisoning (and with no substantial changes among other methods, and consistent overall suicide rates) (Arya et al., 2018) may suggest a substitution of methods in the Indian population in the latter part of the study period.

Suicide by hanging is known to be difficult to restrict given that ligature material and ligature points are commonly available (Gunnell et al., 2005). However, the identification of commonly used ligature points, such as ceiling fans (Supraja et al., 2016) (particularly prevalent among lower income households) (Letschert et al., 2009) may be a target for current prevention initiatives; if ceiling fans are commonly used as a ligature point, then strategies might be put in place to make them safer. For example, installing spring fitted ceiling fans that would drop if a weight over 20 kg is suspended on them (Mishra et al., 2019). Other prevention strategies may relate to collaborative efforts with the media to reduce the prominent portrayal of hanging as a method of suicide (Gunnell et al., 2005; Biddle et al., 2010). For example, it has been observed that hanging is over-reported in newspaper reports on suicide events, relative to its occurrence in the general population in India, often with a detailed description of how the hanging was enacted (Armstrong et al.). Evidence suggests that sensational, simplistic and graphic reporting of suicides, a style of reporting that has been observed in India (Armstrong et al., 2018), can lead to the stigmatisation of suicidal behaviour and a reduction in help seeking behaviour while also encouraging imitation acts (Gunnell and Lewis, 2005; Pirkis et al., 2006; Patel et al., 2012; Niederkrotenthaler et al., 2014; Zalsman et al., 2016).

As noted above, though suicide by insecticide poisoning declined over the study period, it was still three times higher in more agricultural states compared to less agricultural states (for males and females), likely related to greater accessibility of pesticides in more agricultural regions (Ajdacic-Gross et al., 2008). India has banned some class I pesticides, such as Aldicarb and Calcium Cyanide, which may explain the general reduction in suicide by pesticide poisoning over the study period (Directorate of Plant Protection, Quarantine and Storage, 2018). However, in 2015–16, India used a total of 2254 tonnes of class I pesticides accounting for 29% of total pesticides use in the country (Taneja, 2017). While a recent ban has been imposed on 7 of the 18 class I pesticides allowed in India, heavily used class I pesticides (for example Monocrotophos and Carbofuran) are yet to be banned along with other known lethal pesticides (for example Paraquat) (Directorate of Plant Protection, Quarantine and Storage, 2018). Pesticide self-poisoning is thought to be often impulsive (Eddleston et al., 2006), and bans on highly toxic products, such as WHO Class I pesticides, may lead to further declines in suicide by pesticide poisoning and possibly overall suicides.

Similar to previous studies investigating overall suicide rates in India (Patel et al., 2012; Arya et al., 2018; Dandona et al., 2018), more

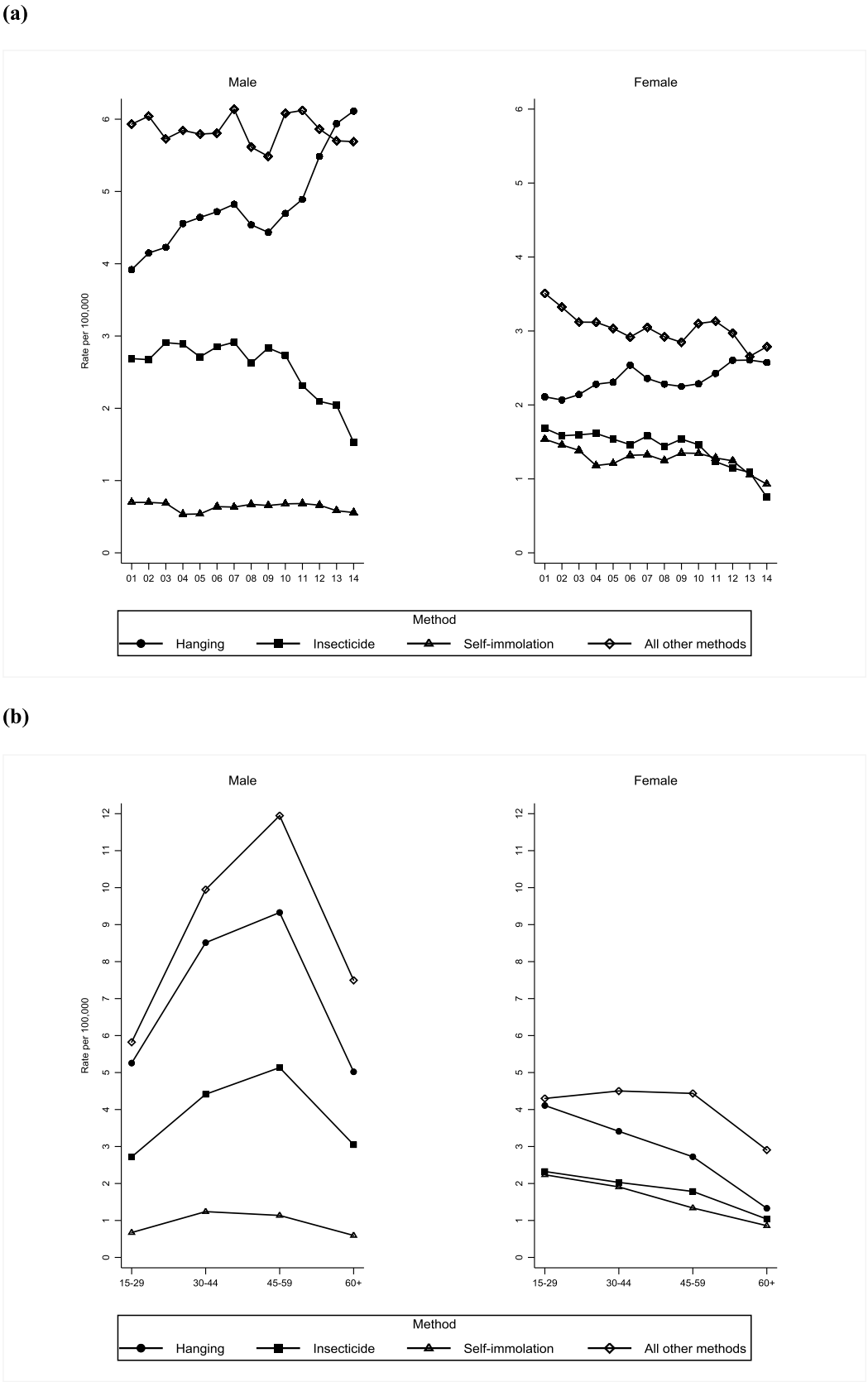


Fig. 1. Male and female method specific suicide rates, India 2001–14. (a) Direct age standardised rates; (b) Age-specific rates.

developed states had higher method specific suicide rates compared to less developed states among both sexes, perhaps associated with rapid modernization and social change in these regions, and an increasing discrepancy between expectations and reality (Mayer, 2011; Patel et al., 2012; Arya et al., 2018; Dandona et al., 2018). Rates for suicide by hanging were higher among less agricultural states compared to more

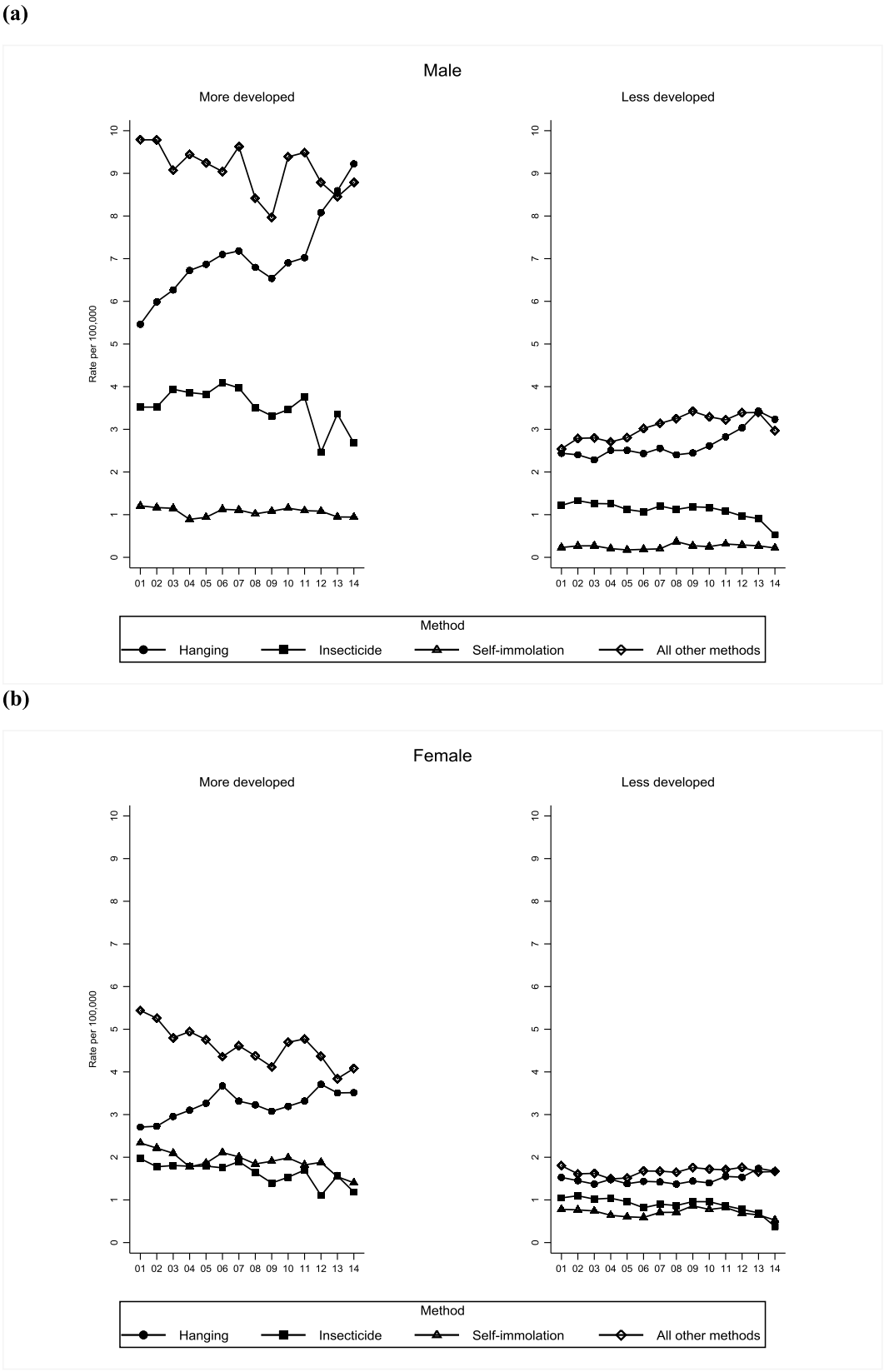
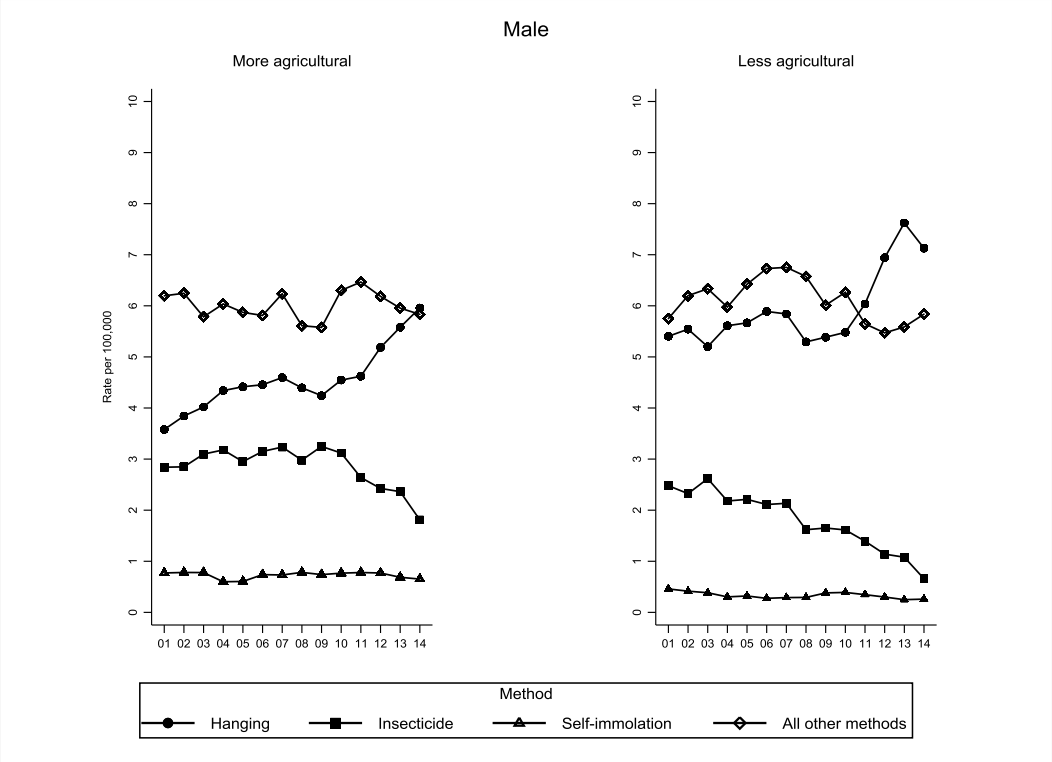


Fig. 2. Direct age-standardised method specific suicide rates by regions of economic development, India 2001–14.

agricultural states among males, while they were similar for females. Higher hanging rates among less agricultural states may be attributed to the lack of availability of other methods, such as lack of availability of pesticides (Ajdacic-Gross et al., 2008). Rates of suicide by self-immolation were also higher among more agricultural states for both sexes, which may reflect the continued use of more traditional methods of cooking including use of kerosene among agricultural regions (Bansal et al., 2013).

(a)



(b)

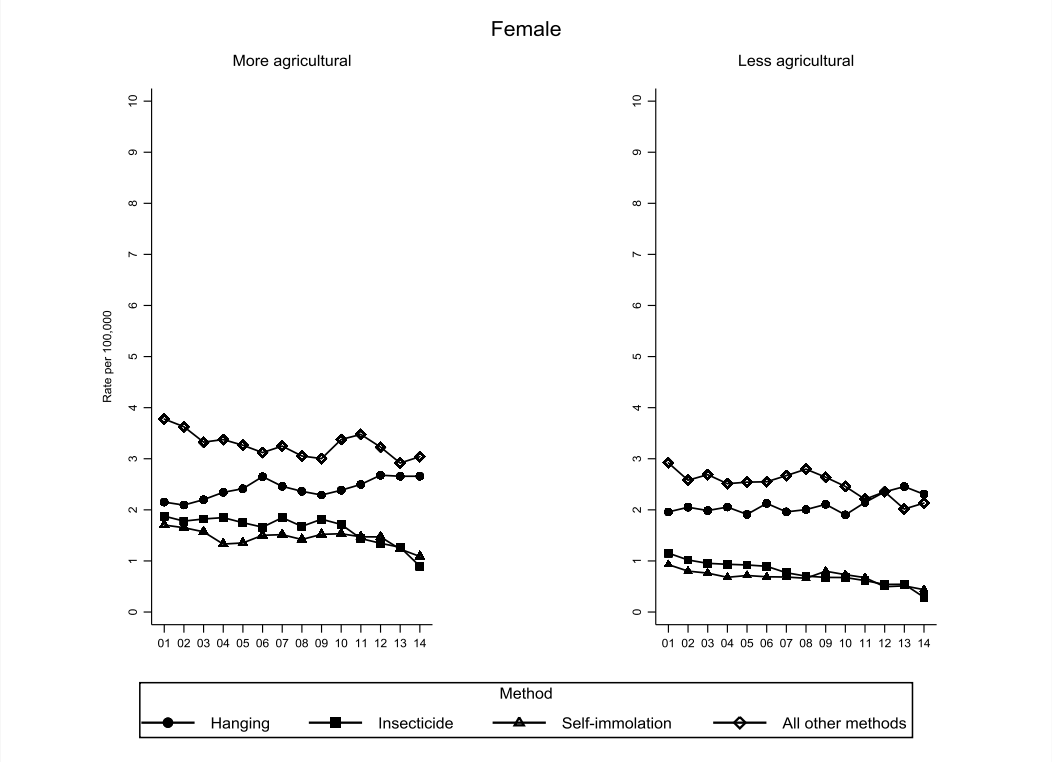


Fig. 3. Direct age-standardised method specific suicide rates by level of agriculture, India 2001–14.

Higher literacy was associated with higher suicide risk across all method categories among both sexes. Suicide rates in general are noted to be higher in populations with a higher level of literacy in India (Arya et al., 2018). For example, southern states, which have the highest literacy rates in India have also recorded the highest suicide rates, while north Indian regions, with the lowest literacy rates in the

Table 2
Socio-demographic factors associated with hanging, insecticide poisoning, self-immolation and all other suicide methods in India (2001–14).

	Hanging		Insecticide poisoning		Self-immolation		All other methods	
	Male RR(95%CI) (a)	Female RR(95%CI)	Male RR(95%CI)	Female RR(95%CI)	Male RR(95%CI)	Female RR(95%CI)	Male RR(95%CI)	Female RR(95%CI)
Level of economic development (b)								
More developed 1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Less developed	0.87 (0.76–1.00)	1.11 (0.97–1.27)	0.46 (0.40–0.54)	0.63 (0.55–0.73)	0.41 (0.36–0.48)	0.49 (0.42–0.57)	0.71 (0.64–0.79)	0.72 (0.65–0.80)
Level of agricultural employment (c)								
Less agricultural employment	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
More agricultural employment	0.83 (0.72–0.96)	1.04 (0.90–1.19)	3.25 (2.78–3.78)	2.81 (2.46–3.21)	2.08 (1.81–2.38)	2.18 (1.83–2.60)	1.52 (1.36–1.70)	1.80 (1.61–2.01)
% Literate								
Low (d)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Middle	1.97 (1.67–2.34)	2.64 (2.19–3.18)	2.36 (1.97–2.83)	1.32 (1.12–1.57)	1.92 (1.61–2.28)	1.42 (1.19–1.68)	1.94 (1.70–2.20)	1.66 (1.44–1.91)
High	4.28 (3.54–5.17)	6.41 (5.17–7.94)	5.24 (4.26–6.46)	2.18 (1.77–2.69)	2.65 (2.15–3.26)	3.30 (2.66–4.10)	1.55 (1.33–1.79)	1.97 (1.66–2.34)
% Agricultural pesticide use								
Low	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Middle	1.52 (1.32–1.76)	1.76 (1.52–2.03)	2.83 (2.44–3.27)	2.73 (2.39–3.12)	1.27 (1.10–1.47)	1.52 (1.33–1.74)	1.44 (1.29–1.61)	1.50 (1.34–1.69)
High	0.69 (0.57–0.82)	0.79 (0.66–0.95)	2.26 (1.83–2.77)	2.09 (1.74–2.51)	0.99 (0.81–1.19)	1.03 (0.85–1.24)	1.30 (1.13–1.51)	1.33 (1.14–1.55)
% Hindu religion								
Low	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Middle	0.74 (0.63–0.87)	0.82 (0.70–0.94)	1.38 (1.18–1.62)	1.15 (1.00–1.33)	1.78 (1.54–2.07)	1.81 (1.58–2.09)	0.82 (0.73–0.92)	0.98 (0.87–1.10)
High	0.92 (0.76–1.10)	1.02 (0.85–1.22)	2.13 (1.75–2.59)	2.23 (1.88–2.65)	1.71 (1.43–2.05)	2.18 (1.83–2.60)	0.68 (0.59–0.78)	0.95 (0.82–1.09)

(a) Relative Risk (RR) adjusted for age group, period, level of economic development, level of agricultural employment,% literate,% pesticide consumption,% Hindu religion.
(b) Less developed areas: Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttar Pradesh, Uttarakhand, Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura.
(c) Areas of higher agricultural employment: Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.
(d) 'Low' is lowest 20% of the population, 'Middle' is middle 60% of the population, 'High' is the highest 20% of the population.

country, have recorded some of the lowest suicide rates among both sexes (Patel et al., 2012; Arya et al., 2018; Dandona et al., 2018). A higher proportion Hindu population was also associated with higher suicide risk for suicide by insecticide poisoning and self-immolation. Self-immolation among Hindus, especially among women, holds cultural significance in India (Vijayakumar, 2009). Suicide by hanging, however, showed no association between suicide risk and the proportion Hindu.

There are some methodological limitations when considering the findings of the current study. Firstly, it is acknowledged that suicide enumerated via the NCRB likely under-estimates total suicide cases in India (Patel et al., 2012; Dandona et al., 2018), given the social stigma, as well as legal ramifications associated with reporting suicidal behaviour (attempted suicide was illegal in India until 2017) (Section 309 in The Indian Penal Code; Vijaykumar, 2007; Behere et al., 2015). Specific suicide methods, such as suicide by poisoning, also may be more likely to be under-enumerated as suicidal intent is more difficult to ascertain in comparison to, for example, suicide by hanging (Gunnell et al., 2013). Furthermore, pesticide poisoning suicides might also be underestimated due to their misclassification as 'other poisoning' suicides in the NCRB data. The NCRB suicide data suggests such misclassification for the year 2015 where 'insecticide poisoning' suicides note a sharp upward trend coinciding with a sharp downward trend in 'other poisoning' suicides (Web Appendix 8). Further investigation of this potentially artefactual misclassification is required when more recent data for years post-2015 become available. However, in general, both, 'insecticide poisoning' and 'other poisoning' note a downward trend from 2001–2014. Secondly, the study derives population and covariate estimates from two census years with inter-censal years interpolated, potentially under-estimating any non-linear trends in the covariates included in analyses. Additionally, the identified socio-demographic factors were specified as ecological variables for each region (that is as a proportion of the corresponding population), which limits the attribution of associations of these characteristics to individuals residing within these regions.

Suicide by hanging is the leading method of suicide in India for both males and females, and has increased substantially in the most recent period. This has occurred in the context of declines in suicide by insecticide poisoning, and stable overall suicide rates in males and females. The prominence of media reports and fictional portrayals of suicide by hanging in India may be areas of priority for suicide prevention initiatives. Suicide by insecticide poisoning also remains an important priority for prevention, especially in more agricultural regions where accessibility to pesticides is more common, and a continuation of restricting access (through sales and import mechanisms) to hazardous pesticides is likely to be an effective prevention strategy. Suicide has emerged as an important public health issue in India, and current study findings indicate that the geographic and socio-demographic heterogeneity of suicide methods will need to be considered in future strategic responses and the prioritisation of suicide prevention activity.

CRediT authorship contribution statement

Vikas Arya: Conceptualization, Data curation, Formal analysis, Writing - original draft, Writing - review & editing. **Andrew Page:** Conceptualization, Writing - review & editing. **David Gunnell:** Writing - review & editing. **Rakhi Dandona:** Writing - review & editing. **Haider Mannan:** Writing - review & editing. **Michael Eddleston:** Writing - review & editing. **Gregory Armstrong:** Writing - review & editing.

Acknowledgements

None.

Funding

This work was supported by Australian Government Research Training Program Scholarship which has been awarded to Vikas Arya as part of his doctoral research.

Conflict of interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2019.07.005.

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