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Original Research

Association of secular trends in unemployment with suicide in Taiwan, 1959–2007: A time-series analysis

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SUMMARY

Objective: Despite the wealth of research investigating the association of unemployment with suicide in the West, few studies have investigated the association in non-Western countries. This study aimed to investigate the relationship between secular trends in unemployment and suicide in Taiwan.

Study design: Time-series analysis.

Methods: Overall and age-specific suicide rates (1959–2007) for Taiwanese men and women aged 15 years or above were calculated from national population and mortality statistics. The association of secular trends in unemployment with suicide was investigated graphically and using time-series modelling (Prais-Winsten regression).

Results: Rises in unemployment were associated with an increase in male suicide rates, but evidence for an association in females was limited. In the model controlling for changes in gross domestic product (GDP) per capita, GDP growth, divorce and female labour force participation, for every 1% rise in unemployment, male suicide rates increased by 3.1 (95% confidence interval 1.4–4.8) per 100,000. There is no evidence for a difference in the strength of association between men of different ages.

Conclusion: Trends in suicide, particularly for adult males, appear to be influenced by unemployment. The results have implications for suicide prevention, in particular for societies facing acute rises in unemployment during recessions.

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Introduction

There has been considerable interest in investigating the impact of unemployment on trends in suicide. Most previous studies have found that suicide rates increased when unemployment was rising,¹ but some found no association^{2,3} or that

suicide declined as unemployment increased.⁴ The majority of past studies were conducted in Western societies.¹ The work culture and social support networks differ in many Asian countries compared with the West,⁵ and therefore it is important to investigate the generalizability of these findings. In the few studies conducted in non-Western settings,

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a positive association of unemployment with suicide was found in some^{6,7} but not all investigations.⁸

Taiwan, an East Asian country with a population of 23 million, has experienced rapid industrialization and considerable fluctuations in unemployment and suicide rates during the last five decades. Two early time-trend analyses investigating the relationship between unemployment and suicide in Taiwan present conflicting results; one found no association⁸ and the other suggested a positive association.⁹ Recent studies show diverse patterns regarding differences between genders; one found a positive association in men but not in women,¹⁰ whereas the other found the opposite.¹¹ These inconsistent findings might result from differences in both the time periods studied and the variables controlled for, as well as failure to adjust for changes in the age composition of population over time, since suicide mortality and population age structure have changed considerably over the last 50 years in Taiwan.¹²

Aim of the study

This study aimed to investigate the relationship between secular trends in unemployment and suicide in Taiwan, and whether the associations differ between genders or age groups for the period 1959–2007.

Material and methods

Suicide and population statistics for the Taiwanese population aged 15 years or above were obtained from the Taiwanese Government. Suicides were coded using the following International Classification of Disease (ICD) codes: E970–979 (ICD-6; 1959–1963), E970–979 (ICD-7; 1964–1970), E950–959 (ICD-8; 1971–1980) and E950–959 (ICD-9; 1981–2007). In a series of sensitivity analyses, the authors: (i) investigated the influence of potential under-reporting of suicides on the results by including deaths registered as ‘undetermined intent’ (E980–989 in ICD-8 and ICD-9), accident by pesticide poisoning (E865 in ICD-8 and E863 in ICD-9) and accident by suffocation (E913 in ICD-8 and ICD-9), as previous research indicates that suicides may be misclassified into these categories in Taiwan¹³; (ii) analysed data for hanging suicides only (E974 in ICD-7; E953 in ICD-8 and ICD-9), as changes in the accessibility or lethality of popular suicide methods may influence the national suicide rates more than changes in unemployment rates,¹⁴ and the accessibility or lethality for hanging is unlikely to have varied greatly over the study period; (iii) excluded deaths coded as suicide by poisoning using non-domestic gas (E973 in ICD-7; E952 in both ICD-8 and ICD-9), as these deaths were mostly suicides using a novel method – carbon monoxide poisoning by burning charcoal – and an epidemic of suicides using this method may have contributed to the rise in suicides in Taiwan since 1998¹⁵; and (iv) investigated the possible influence of differences in coding of suicide between different versions of ICD on the results by including a four-level variable (i.e. ICD-6 to ICD-9) in the models.

Age-standardized suicide rates for males, females and both genders combined and gender–age-specific (15–24, 25–44, 45–64 and 65+ years old) suicide rates were calculated based on the world standard population. Unemployment data were extracted from the published Taiwanese Yearbook of Manpower Survey Statistics.¹⁶ The unemployment rate is defined as the percentage of unemployed people amongst those eligible to work (i.e. population over the age of 15 years, including both employed and unemployed people) according to the definition of the International Labour Organization; this definition was applied consistently throughout the study period.¹⁷ Complete, reliable data on gender–age-specific unemployment are only available since 1978, and they are highly correlated with overall unemployment rates for people aged 15–64 years [Spearman correlation coefficients: 0.86–0.99 (all $P < 0.001$)] except amongst those aged 65+ years [Spearman correlation coefficients: 0.37 ($P = 0.063$) for men, 0.11 ($P = 0.67$) for women]. Therefore, overall unemployment rates were used throughout the analyses.

Data on gross domestic product (GDP) per capita, GDP growth, divorce rates per 1000 married people and female labour force participation rates were obtained from Statistical Yearbooks of Interior,¹⁸ Taiwan Demographic Fact Books¹⁹ and Taiwanese Yearbooks of Manpower Survey Statistics¹⁶ to enable assessment of the possible confounding and mediating effects of these variables.^{8,9}

Secular trends in unemployment and suicide were plotted and compared. Linear regression time-series models were fitted to investigate the association of secular trends in unemployment with suicide, using the Prais–Winsten iterative procedure to correct for serial correlated errors²⁰ and the Durbin–Watson statistics to test the assumption of independence of the residuals. Results were compared with and without controlling for GDP per capita, GDP growth, divorce, female labour force participation and calendar year, to assess the extent to which the effects of unemployment on suicide are accounted for by these variables. Whether the association of unemployment with suicide varied between genders or people of different age groups was tested by including an interaction term between unemployment and gender or age group in the models. Log-transformed values for suicide rates and other variables were also used, except those presented as a percentage (unemployment, GDP growth and female labour force participation), to assess the effect of unemployment on the relative changes in suicide rates. Analyses were conducted using Stata Version 10.0.

Results

Fig. 1 shows secular trends in male and female suicide rates for those aged 15+ years in relation to unemployment for the period 1959–2007 in Taiwan. Overall suicide rates varied considerably, with a four-fold difference over the study period (lowest rate 8.6 per 100,000 in 1993; highest rate 34.9 per 100,000 in 1964). The unemployment rate reached its lowest level (1.3%) in 1980 and peaked (5.2%) in 2002.

Suicide rates reached a peak for the years studied in the early 1960s when unemployment rates were high. In the late 1960s and early 1970s, the continuous fall in unemployment

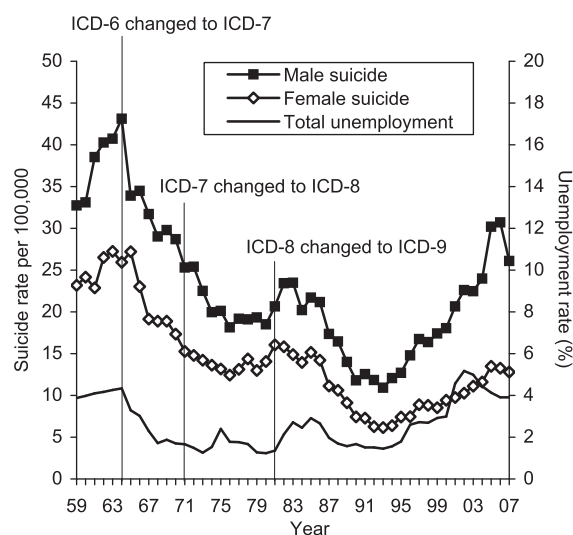


Figure 1 – Secular trends in unemployment and suicide rates in Taiwan, 1959–2007 [years marked when there were changes in the version of International Classification of Disease (ICD) used].

was accompanied by a downward trend in suicide rates. Suicide rates appeared unaffected when unemployment rose slightly in the mid-1970s, but they increased in both men and women when unemployment rose briefly in the 1980s. Suicide rates fell again in the late 1980s, until reaching their lowest levels in 1993 at a time of low unemployment. Year-on-year rises in unemployment from 1993 were accompanied by a rise in male and female suicide rates. Whilst unemployment rates started to decline after 2002, the upward trend in suicide continued until 2006. When charcoal-burning suicides were excluded from the analysis, rises in suicide rates between 1998 and 2006 became much less prominent, declining from a rise of 87% to 21% in men and from 50% to 8% in women.

The results of regression analyses were similar regardless of whether other socio-economic variables were adjusted or not (Table 1). Increases in unemployment were associated with rises in suicide, but the strength of association differed between genders (P for interaction = 0.010, adjusted models). Rises in unemployment were strongly associated with an increase in male suicide rates; there was only weak evidence for an association with female rates, and the estimated magnitude of the association was considerably smaller than that for male rates. Fully adjusted models indicated that a 1% increase in unemployment was associated with a rise in suicide rates of 3.09 [95% confidence interval (CI) 1.40–4.79] per 100,000 men and 0.80 (95% CI –0.28–1.88) per 100,000 women. There is no evidence for a difference in the strength of association between men of different age groups (P for interaction = 0.93).

The results were similar when possible missed suicides (i.e. deaths categorized either as undetermined death, accidental pesticide poisoning or accidental suffocation) were included (Table 1); these missed suicides accounted for 10–35% of combined certified and missed suicides during the period 1971–2007 when data were available. The results were

also similar when charcoal-burning suicides were excluded or data on hanging suicides alone were analysed, although the strength of association was reduced for hanging suicides as they only accounted for 26–55% of all suicides. When controlling for different versions of ICD, the results remained similar; although there appeared to be some evidence for an association between trends in unemployment and female suicide rates, the association was weaker than that in males. The results of analyses based on log-transformed suicide rates showed a similar pattern, although evidence weakened somewhat for a difference in the strength of associations between men and women.

Discussion

In Taiwan, rises in unemployment were associated with an increase in male suicide rates between 1959 and 2007, but the evidence for an association in women was limited. The strength of association was similar in men of all age groups. The results were robust when considering the effects of potential confounding socio-economic variables, the under-reporting of suicides and the recent emerging epidemic of suicides using charcoal burning.

This study has several limitations. First, the unemployment–suicide association was observed at the population level and might not be seen at the individual level. However, past person-based research in Taiwan suggests an adverse effect of unemployment on individual suicide risk. In the only psychological autopsy study ever conducted in Taiwan, the unemployed showed increased suicide risk [odds ratio (OR) 3.5, 95% CI 1.9–6.5].²¹ In another study investigating mortality risk amongst those who received unemployment benefits, a trend towards raised suicide risk within the 2-year follow-up period was found (OR 2.47, 95% CI 0.97–6.30).²² Second, the study was limited by the absence of complete data on gender-age-specific unemployment, and used overall unemployment as a proxy indicator. Available data, however, showed high correlations between overall and gender-age-specific unemployment rates for those aged 15–64 years. Third, although selected socio-economic variables were controlled for in the analysis, it is possible that other factors may have contributed to changes in suicide rates and underlie the association between unemployment and suicide. Such potential confounders may include changes in social class composition of the Taiwanese population over the years studied, as suicide rates may differ between the social classes, although long-term changes in population levels of occupation and education are unlikely to account for the rather rapid rises and falls in unemployment and suicide rates in Taiwan.

These results are in keeping with several recent person-based studies in the West,^{23–25} which found increased suicide risks amongst unemployed individuals, although other studies found that the association was mainly explained by confounding factors, particularly mental disorders.²⁶ The association of trends in unemployment with suicide observed in the present study may be mediated by the impact of unemployment on mental illness; in contrast, it is unlikely that changes in the prevalence of mental illness are responsible for the marked fluctuations in levels of unemployment over time.

Table 1 – Prais-Winsten regression: association between unemployment and suicide rates in Taiwan, 1959–2007.

Population	Unadjusted			Adjusted ^a				
	Coefficients for unemployment ^b		P for interaction	Durbin-Watson statistics ^c	Coefficients for unemployment ^b		P for interaction	Durbin-Watson statistics ^d
	β (95% CI)	P			β (95% CI)	P		
Age-standardized suicide rates (15+ years)								
Total	1.84 (0.89–2.80)	<0.001	0.013 ^e	1.17	1.91 (0.79–3.04)	0.001	0.010 ^e	1.15
Male	2.92 (1.48–4.35)	<0.001		1.63	3.09 (1.40–4.79)	0.001		1.57
Female	0.73 (–0.19–1.64)	0.12		1.85	0.80 (–0.28–1.88)	0.14		1.77
Age-specific suicide rates (years)								
Male								
15–24	2.60 (1.07–4.13)	0.001	0.71 ^f	2.15	3.52 (1.79–5.24)	<0.001	0.93 ^f	2.01
25–44	2.55 (0.79–4.31)	0.005		1.72	2.29 (0.27–4.32)	0.027		1.58
45–64	3.30 (1.41–5.19)	0.001		1.71	3.53 (1.25–5.82)	0.003		1.73
65+	4.48 (–0.63–9.58)	0.084		2.43	3.59 (–1.45–8.63)	0.16		1.91
Female								
15–24	0.64 (–0.70–1.98)	0.34	0.93 ^f	2.27	1.54 (0.01–3.07)	0.049	0.90 ^f	2.02
25–44	0.48 (–0.36–1.32)	0.26		2.02	0.55 (–0.48–1.57)	0.29		2.01
45–64	1.36 (0–2.73)	0.051		2.25	1.63 (0.11–3.16)	0.036		1.97
65+	0.66 (–2.39–3.72)	0.66		2.43	2.80 (–0.02–5.62)	0.051		1.97
Age-standardized rates of certified suicide, undetermined death and accidental death by pesticide poisoning/suffocation (15+ years)								
Male	3.20 (1.83–4.56)	<0.001	0.006 ^e	1.71	3.33 (1.72–4.94)	<0.001	0.003 ^e	1.63
Female	0.81 (–0.04–1.67)	0.063		1.81	0.83 (–0.16–1.82)	0.098		1.76
Age-standardized suicide rates (15+ years), excluding charcoal-burning suicides								
Male	2.75 (1.48–4.02)	<0.001	0.008 ^e	1.88	3.19 (1.72–4.66)	<0.001	0.009 ^e	1.69
Female	0.66 (–0.23–1.56)	0.14		1.93	0.85 (–0.19–1.89)	0.107		1.80
Age-standardized method-specific suicide rates (15+ years) by hanging only ^g								
Male	0.64 (0.19–1.09)	0.006	0.008 ^e	1.84 ^g	0.73 (0.08–1.38)	0.029	0.001 ^e	1.73 ^g
Female	–0.12 (–0.45–0.21)	0.47		2.24 ^g	0.14 (–0.29–0.57)	0.50		1.88 ^g
Age-standardized method-specific suicide rates (15+ years), controlling for different versions of ICD ^h								
Male	2.39 (0.99–3.80)	0.001	0.011 ^e	1.47 ⁱ	2.69 (0.97–4.41)	0.003	0.010 ^e	1.36 ^j
Female	1.05 (0.32–1.78)	0.006		1.96 ⁱ	1.04 (0.23–1.85)	0.014		1.91 ^j
Age-standardized suicide rates (15+ years), with values log-transformed ^k								
Male	11.97 (6.26–17.67) ^k	<0.001	0.11 ^e	1.47	8.43 (0.80–16.07) ^k	0.031	0.082 ^e	1.65
Female	5.15 (–0.98–11.29) ^k	0.098		1.65	0.36 (–7.70–8.42) ^k	0.93		1.85

CI, confidence interval.

a Controlling for gross domestic product (GDP) per capita, GDP growth, female labour force participation rate, divorce rate per 1000 married population and calendar year.

b Coefficients indicate changes in suicide rates per 100,000 when unemployment rates increase by 1%.

c Levels below 1.50 or above 2.50 indicate that significant autocorrelation in the residuals still exists.

d Levels below 1.29 or above 2.71 indicate that significant autocorrelation in the residuals still exists.

e P value for the interaction between unemployment and gender concerning its effect on suicide rates.

f P value for the interaction between unemployment and age group concerning its effect on suicide rates.

g For the period 1967–2007 when method-specific suicide statistics are available. Durbin-Watson statistics below 1.44 or above 2.56 for unadjusted analyses and below 1.18 or above 2.83 for adjusted analyses indicate significant autocorrelation in the residuals still exists.

h Controlling for different versions of International Classification of Disease (ICD-6 to ICD-9) by including a variable of four levels.

i Levels below 1.51 or above 2.49 indicate that significant autocorrelation in the residuals still exists.

j Levels below 1.25 or above 2.75 indicate that significant autocorrelation in the residuals still exists.

k Coefficients indicate percentage changes in suicide rates per 100,000 when unemployment rates increase by 1%.

These results are in accordance with a previous study investigating Taiwanese data in the years 1952–1992,⁹ but not with an earlier study using data for the period 1952–1984.⁸ These conflicting findings might be due to differences in time periods studied and study power. As can be seen in Fig. 1, trends in unemployment and suicide appeared to parallel each other closely, except for the periods 1973–1976 and 2002–2007. During the latter period, a dramatic increase in suicides using charcoal burning was observed when

unemployment rates were declining. A recent study in Hong Kong found that the victims of charcoal-burning suicide were more likely to be economically active before death, compared with victims who used other methods of suicide.²⁷

The finding that rises in unemployment were more strongly associated with increases in male than female suicide rates is consistent with results from other countries.¹ Some,²⁴ but not all,²⁵ person-based studies have also reported

a stronger association in men than women. In Taiwan, throughout the study period, labour force participation rates were higher in men (67–88%) than women (33–49%), and men are usually more likely to be the family 'bread winner'. These might, in part, explain the greater impact of unemployment on suicide rates in men than women in Taiwan.

No evidence was found for a difference in the strength of association between men of different ages, and this is in contrast with studies from England and Wales¹⁴ and Australia,²⁸ where the adverse impact of unemployment was stronger in young people than older people. In Taiwan, the national pension scheme was only implemented in 2008; the elderly tended to be closely dependent on support from their children, and thus might become vulnerable to suicide when recession put strain on their family and social networks.

These results have implications for suicide prevention, in particular for societies facing acute rises in unemployment during recessions. In a time of economic downturn, society's capacity to compensate for adverse social and economic conditions is challenged. For example, when the Asian economic crisis struck in 1997, it is estimated that there were around 10,000 excess suicides in Japan, Hong Kong and South Korea.⁷ In Taiwan, the recent rise in unemployment may have, in part, contributed to increased suicide risks amongst vulnerable individuals, whilst the social and economic policies to tackle the negative effects of unemployment are still underdeveloped. For example, the Taiwanese Government only started to provide unemployment compensation in 1999, with a restriction of no longer than 6 months. Providing a more comprehensive supporting scheme for those who lose jobs and are in acute distress may play an important role in suicide prevention during times of recession.²⁹ Clinical assessment of suicide risk, particularly in men, should include an assessment of an individual's employment and financial status.

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Competing interests

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REFERENCES

- Platt S, Hawton K. Suicidal behaviour and the labour market. In: Hawton K, Van Heeringen K, editors. *The international handbook of suicide and attempted suicide*. Chichester: John Wiley & Sons; 2000. p. 309–84.
- Hintikka J, Saarinen PI, Viinamaki H. Suicide mortality in Finland during an economic cycle, 1985–1995. *Scand J Public Health* 1999;27:85–8.
- Lucey S, Corcoran P, Keeley HS, Brophy J, Arensman E, Perry IJ. Socioeconomic change and suicide: a time-series study from the Republic of Ireland. *Crisis* 2005;26:90–4.
- Neumayer E. Recessions lower (some) mortality rates: evidence from Germany. *Soc Sci Med* 2004;58:1037–47.
- Yip KS, Ng YN. Chinese cultural dynamics of unemployment of male adults with psychiatric disabilities in Hong Kong. *Psychiatr Rehabil J* 2002;26:197–202.
- Yamasaki A, Araki S, Sakai R, Yokoyama K, Voorhees AS. Suicide mortality of young, middle-aged and elderly males and females in Japan for the years 1953–96: time series analysis for the effects of unemployment, female labour force, young and aged population, primary industry and population density. *Ind Health* 2008;46:541–9.
- Chang SS, Gunnell D, Sterne JAC, Lu TH, Cheng ATA. Was the economic crisis 1997–1998 responsible for rising suicide rates in East/Southeast Asia? A time-trend analysis for Japan, Hong Kong, South Korea, Taiwan, Singapore and Thailand. *Soc Sci Med* 2009;68:1322–31.
- Yang B, Lester D, Yang CH. Sociological and economic theories of suicide: a comparison of the U.S.A. and Taiwan. *Soc Sci Med* 1992;34:333–4.
- Chuang HL, Huang WC. A reexamination of sociological and economic theories of suicide: a comparison of the U.S.A. and Taiwan. *Soc Sci Med* 1996;43:421–3.
- Chuang H-L, Huang W- C. A re-examination of the suicide rates in Taiwan. *Soc Ind Res* 2007;83:465–85.
- Chuang H-L, Huang W- C. Economic and social correlates of regional suicide rates: a pooled cross-section and time-series analysis. *J Socio-Econ* 1997;26:277–89.
- Chao A, Law CK, Li PC, Yip SFP. Suicide in Taiwan. In: Yip SFP, editor. *Suicide in Asia: causes and prevention*. Hong Kong: Hong Kong University Press; 2008. p. 61–79.
- Chang SS, Sterne JA, Lu TH, Gunnell D. 'Hidden' suicides amongst deaths certified as undetermined intent, accident by pesticide poisoning and accident by suffocation in Taiwan. *Soc Psychiatry Psychiatr Epidemiol* (in press). DOI: 10.1007/s00127-009-0049-x.
- Gunnell D, Lopatzidis A, Dorling D, Wehner H, Southall H, Frankel S. Suicide and unemployment in young people. Analysis of trends in England and Wales, 1921–1995. *Br J Psychiatry* 1999;175:263–70.
- Lin JJ, Lu TH. Suicide mortality trends by sex, age and method in Taiwan, 1971–2005. *BMC Public Health* 2008;8:6.
- Directorate-General of Budget Accounting and Statistics, Taiwan. Yearbook of Manpower Survey Statistics. Available at: <http://eng.stat.gov.tw/ct.asp?xItem=6679&CtNode=2205>.
- Directorate-General of Budget Accounting and Statistics, Taiwan. An introduction of Taiwanese Manpower Survey. Available at: <http://www.stat.gov.tw/ct.asp?xItem=16954&CtNode=515>.
- Department of Statistics, Ministry of the Interior, Taiwan. Statistical Yearbook of Interior. Available at: <http://www.moi.gov.tw/stat/year.aspx>.
- Ministry of the Interior, Taiwan. Taiwan Demographic Fact Books. Taipei: Ministry of the Interior, Taiwan, 1959–2007.

20. Prais SJ, Winsten CB. Trend estimators and serial correlation. Technical Report 383, Cowles Commission discussion paper series. Chicago: Cowles Foundation; 1954.
21. Cheng ATA, Chen THH, Chen C-C, Jenkins R. Psychosocial and psychiatric risk factors for suicide: case-control psychological autopsy study. *Br J Psychiatry* 2000;**177**:360–5.
22. Tsai SL, Lan CF, Lee CH, Huang N, Chou YJ. Involuntary unemployment and mortality in Taiwan. *J Formos Med Assoc* 2004;**103**:900–7.
23. Kposowa AJ. Unemployment and suicide: a cohort analysis of social factors predicting suicide in the US National Longitudinal Mortality Study. *Psychol Med* 2001;**31**:127–38.
24. Qin P, Agerbo E, Mortensen PB. Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors: a national register-based study of all suicides in Denmark, 1981–1997. *Am J Psychiatry* 2003;**160**:765–72.
25. Blakely TA, Collings SC, Atkinson J. Unemployment and suicide. Evidence for a causal association? *J Epidemiol Community Health* 2003;**57**:594–600.
26. Fergusson DM, Boden JM, Horwood LJ. Unemployment and suicidal behavior in a New Zealand birth cohort: a fixed effects regression analysis. *Crisis* 2007;**28**:95–101.
27. Chan KP, Yip PS, Au J, Lee DT. Charcoal-burning suicide in post-transition Hong Kong. *Br J Psychiatry* 2005;**186**: 67–73.
28. Morrell S, Taylor R, Quine S, Kerr C. Suicide and unemployment in Australia 1907–1990. *Soc Sci Med* 1993;**36**: 749–56.
29. Gunnell D, Platt S, Hawton K. The economic crisis and suicide. *BMJ* 2009;**338**:b1891.