

# Effects of media reports and the subsequent voluntary withdrawal from sale of suicide-related products on the suicide rate in Japan

Akihito Hagihara · Takeru Abe

Received: 15 September 2011 / Accepted: 22 November 2011 / Published online: 3 December 2011  
© Springer-Verlag 2011

**Abstract** Media reports of suicides have an impact on suicide rates. However, countermeasures to this media effect have not been evaluated. We examined the association between media reports of suicides accomplished with the use of hydrogen sulfide, the voluntary stoppage of sales of suicide-related products, and suicide rates for people in their 20s, 30s, and 40s in Japan. The Box-Jenkins transfer function model was applied to monthly time series data from February 2003 to December 2009 (83 months). In the male suicide time series, media reports of suicide were not related to suicide counts ( $\omega_{(R)} = 8.988$ ,  $P = 0.694$ ). Similarly, stopping the sale of bath salts was not related to the number of suicides ( $\omega_{(S)} = -7.344$ ,  $P = 0.694$ ). However, in the female suicide time series, media reports of suicide were related to the number of suicides ( $\omega_{(R)} = 17.225$ ,  $P = 0.049$ ). Similarly, stopping the sale of bath salts was related to the number of suicides ( $\omega_{(S)} = -18.545$ ,  $P = 0.040$ ). The results suggest that stopping the sale of bath salts might be effective in reducing the number of copycat suicides among the women in their 20s, 30s, and 40s. In practice, stopping the sale of suicide-related products might be a potentially effective countermeasure to prevent copycat suicides triggered by media coverage of suicides.

**Keywords** Suicide · Media coverage · Hydrogen sulfide · Suicide-related products

## Introduction

Numerous studies on the influence of the media on suicide rates have been reported [1–4]. As early as 1999, there were already 293 investigations concerning media news reports and suicides [5]. The overall trend strongly indicates that the media does have an impact on suicide rates [6–12]. Moreover, studies have also shown that the contagion effect is higher when media depictions of suicide include details about the method used, the number of stories about individual suicides increases, a particular death is reported at length or in many stories, the story of an individual death is placed on the front page or at the beginning of a broadcast, the case portrayed is nonfiction rather than fiction, and publicity is greater [5, 13].

In Japan, since 1998, the number of suicide victims has exceeded 30,000 for more than 10 years consecutively. On the basis of previous findings, recommendations for media coverage of suicide have been made [14, 15]. The recommendations for what the media should avoid include the following: (1) romanticizing suicide or idealizing those who take their own lives by portraying suicide as a heroic or romantic act; (2) reporting suicide methods in detail; (3) displaying pictures or detailed descriptions of the profile of a suicide or the location or site of a suicide; and (4) presenting suicide as the inexplicable act of an otherwise healthy or high achieving person. In reality, however, despite the recommendations for media coverage of a suicide, it has reported the cases of suicide in an inappropriate manner. On February 29, 2008, three young people who met for the first time on the Internet committed suicide as a group in a hotel room using hydrogen sulfide [16]. Immediately after the case was first reported, there was a sudden increase in the numbers of media reports concerning the group suicide because the circumstances and

A. Hagihara (✉) · T. Abe  
Department of Health Services, Management and Policy,  
Kyushu University Graduate School of Medicine,  
3-1-1 Maidashi, Higashi-ku, Fukuoka 812-8582, Japan  
e-mail: hagihara@hsmp.med.kyushu-u.ac.jp

method were highly unusual. The number of suicides by hydrogen sulfide between January and November 2008 exceeded 1,000 [17]. In response to a sudden increase in the number of copycat suicides, on May 13, 2008, drug stores affiliated with the Japanese Association of Chain Drug Stores (JACDS) voluntarily decided to stop selling bath salt products containing sulfur [18].

In this study, we analyzed the media coverage of a case in which hydrogen sulfide gas was used in the commission of suicide, as well as a subsequent countermeasure to prevent an increase in the number of copycat suicides. The subjects of the study were men and women in their 20s, 30s, and 40s. Because hydrogen sulfide-related suicide cases have been frequently reported among men and women in their 20s and 30s [17], we clearly needed to include these groups. However, we also included individuals in their 40s because of our understanding of the contagion factors discussed above. On April 21, 2009, Yukiko Shimizu, a 49-year-old actress committed suicide using hydrogen sulfide. She produced hydrogen sulfide gas by mixing a toilet detergent containing hydrochloric acid with bath salts containing sulfur [19]. This case, along with detailed explanations of the circumstances, a picture, and a description of the method were reported by the mass media. In view of previous findings [1–5, 13] and the actress's age, it is possible that the contagion effect of this suicide, and an interaction effect between this suicide and two events occurring in 2008, would be greatest among women in their 40s, even though the actual suicide occurred after the initial hydrogen sulfide suicide case in February 2008 and the subsequent cessation of the sale of suicide-related products in May 2008. Thus, we targeted subjects in their 20s, 30s, and 40s.

The purpose of this study is twofold. Prior studies have indicated that a new method of suicide becomes increasingly popular after a celebrity uses that specific means [20, 21]. However, the relationship between media reports of suicides by ordinary citizens using novel methods (e.g., hydrogen sulfide) and suicide rates has not been examined previously. Thus, the first purpose of the study is to explore whether media reports of suicide using hydrogen sulfide were related to suicide rates for people in their 20s, 30s, and 40s. Second, we explored whether stopping the sale of bath salt products by JACDS-affiliated drugstores was related to suicide rates among people in their 20s, 30s, and 40s. A recent survey about the length of time spent watching TV, performing housework, and working outside the home found a significant difference between men in their 20s, 30s, and 40s and women in their 20s, 30s, and 40s [22]. Men in their 20s, 30s, and 40s spent more time working outside the home than did women in their 20s, 30s, and 40s, whereas women in their 20s, 30s, and 40s devoted more time to housework, which included shopping and cleaning the

bathroom, and watching TV, than did men in their 20s, 30s, and 40s. Thus, we hypothesized that women in their 20s, 30s, and 40s would be more likely than men in these age groups to be influenced by the two events in 2008.

## Methods

### Study period

The study was conducted from February 2003 to December 2009 (83 months). Until the occurrence and subsequent media coverage of the case of suicide by hydrogen sulfide poisoning in February 2008, the suicide rates among men and women had remained at similar levels since 2003. Thus, we targeted the period between these points in time for study.

### Data collection

Monthly suicide statistics for people aged 20–29, 30–39, and 40–49 from February 2003 to December 2009 were obtained from the Vital and Health Statistics summary published by the Statistics and Information Department of the Japanese Ministry of Health, Labor and Welfare [23]. Suicide cases without a residential address in Japan (migrants) are not included. When a person dies, the law requires that a medical doctor or coroner issues a death certificate that includes the time, date, and cause of death. Deaths are classified according to the International Classification of Diseases, 10th Revision (ICD-10) [24], with suicides coded as X60–X84. The information provided by the Vital and Health Statistics summary is based on death certificates.

### Statistical analysis

We used the Box-Jenkins transfer function model to assess the impact of interventions [i.e., media reporting of suicides using hydrogen sulfide in February 2008 ( $x_{1t}$ ), voluntary stopping sales of bath salts in May 2008 ( $x_{2t}$ )] on the time series of suicide counts from February 2003 to December 2009 ( $n = 83$  months) [25–27]. It was assumed that the output variable ( $y_t$ ) was composed of two functions:  $u_t$ , which could be explained in terms of the intervention variables ( $x_{1t}$ ,  $x_{2t}$ ), and  $n_t$ , an error or noise factor that describes the unexplained aspect of  $y_t$ . The explained aspect ( $u_t$ ) is given as a weighted sum of the present and past values of  $x_t$  (i.e.,  $u_t = v_1x_t + v_2x_{t-1} + \dots$ ), whereas  $n_t$  is an autoregressive integrated moving average (ARIMA).

Briefly, the first step in the analysis was to make the series stationary. According to Jenkins [26, 28], a power or logarithmic transformation is recommended to stabilize the variance if it is related to the mean. Additionally, we performed differencing and/or seasonal differencing on the

transformed time series. The stationarity of the time series data was verified by checking plots of the autocorrelation functions (ACF), partial autocorrelation function (PACF), inverse autocorrelation function (IACF), Ljung-Box chi-square statistic and the augmented Dickey–Fuller test [27]. In the second step, the effect of the intervention on the time series is estimated through selection of a transfer function. This is called the intervention model. An ACF, PACF, and IACF were used to assess model parameter appropriateness and seasonality. The model residuals were checked by autocorrelations at various lags using the Ljung-Box chi-square statistic to confirm white noise [25–28]. If these checks show the model to be inadequate, new models are estimated until a statistically appropriate model is found. Specifically, three common transfer functions [i.e., (1)  $\omega_0 I_t$ , (2)  $\frac{\omega_0}{1-\delta_1 B} I_t$ , (3)  $\frac{\omega_0}{1-\delta_1 B} (1-B) I_t$ ] were tested [25–29]. Since an explorative analysis was conducted in the study, all *P* values were two sided. Analyses were conducted using the PROC ARIMA procedures included in SAS (version 8.2, Cary, NC, USA).

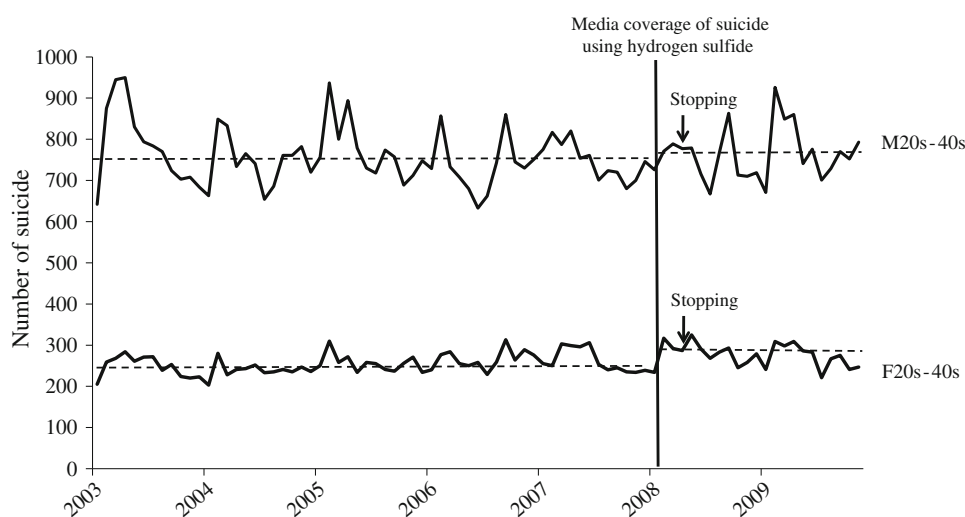
## Results

Table 1 shows the monthly number of suicide cases by period. The entire study was divided into three periods according to the timing of two events (i.e., the hydrogen sulfide suicide and the intensive media coverage of the case

**Table 1** Monthly number of suicide cases by period

	February 2003– January 2008	February 2008– May 2008	June 2008– December 2009
Males	757.80 ± 71.65	762.00 ± 32.45	764.00 ± 67.93
Females	254.63 ± 24.77	281.00 ± 42.58	275.30 ± 26.80

**Fig. 1** Monthly number of suicides for men and women in their 20s, 30s, and 40s during 2003 February and 2009 December (83 months). Dotted lines are mean numbers of suicide cases before and after the media coverage of suicide using hydrogen sulfide



and the voluntary cessation of the sale of suicide-related products). The data showed a significant difference among periods in the suicide rates of women ( $F = 5.77$ ,  $P < 0.01$ ). However, no significant differences among periods were observed in the suicide rates of men.

Figure 1 shows monthly suicide counts for men and women in their 20s, 30s, and 40s, from February 2003 to December 2009. Mean monthly suicide counts for men before and after the media reporting of a suicide using hydrogen sulfide were 757.80 and 763.74, respectively. Mean monthly suicide counts for women before and after media reporting of a suicide using hydrogen sulfide were 254.63 and 276.04, respectively. There was no statistically significant change in suicides among men before and after the media reports, but there was a statistically significant change in suicides among women during the same time period ( $P < 0.01$ ). We found an 8.4% increase in female suicides following media reports of a suicide using hydrogen sulfide.

Table 2 shows the results of Box-Jenkins transfer function model to assess media reporting of suicide and voluntary stopping of the sale of bath salts by JACD in a time series. The first step of the time series analysis is to estimate a noise model that takes into account any systematic variation from unmeasured stochastic processes that could confound the influence of the interventions on the dependent series. The final noise model for men was ARIMA (1, 1, 1) (2, 0, 0)<sub>12</sub>, which means that the male suicide counts time series required the specification of first-order differencing to remove drift, a first-order moving average parameter, and a first order as well as a seasonal second order ( $s = 12$ ) of autoregressive parameters to remove autocorrelation. The Q statistic for the Ljung-Box test statistic, which tests the null hypothesis that the model residuals are distributed as white noise, for men was 27.60 ( $P = 0.733$ ), implying that the model residuals are

**Table 2** Final noise and intervention models for the effects of suicide news reports and stopping the sale of related products on male and female suicide counts in Japan

Noise model	Intervention model
<b>Male suicides</b>	
ARIMA(1,1,1)(2,0,0) <sub>12</sub>	$Y_t = a_t + \omega_{(R)} \text{Report}_t + \omega_{(S)} \text{Stopping sale}_t$
$(1 - B)(1 - \psi_1 B)$ $(1 - \Phi_{24} B^{24})y_t = (1 - \theta_1 B)e_t$	$\text{Report}_t = 0$ for observations 1–60
$\psi_1 = 0.575, P < 0.0001$	$\text{Report}_t = 1$ for observations 61–83
$\Phi_{24} = 0.549, P < 0.0001$	$\text{Stopping sale}_t = 0$ for observations 1–63
$\theta_1 = 0.923, P < 0.0001$	$\text{Stopping sale}_t = 1$ for observations 64–83
$Q = 27.60, df = 33, P = 0.733$	$\omega_{(R)} = 8.988, P = 0.694$ $\omega_{(S)} = -7.344, P = 0.694$ $Q = 27.07, df = 33,$ $P = 0.757$
<b>Female suicides</b>	
ARIMA(0,1,1)(0,0,1) <sub>12</sub>	$Y_t = a_t + \omega_{(R)} \text{Report}_t + \omega_{(S)} \text{Stopping sale}_t$
$(1 - B)y_t = (1 - \theta_1 B)$ $(1 - \Theta_{12} B^{12})e_t$	$\text{Report}_t = 0$ for observations 1–60
$\theta_1 = 0.558, P < 0.0001$	$\text{Report}_t = 1$ for observations 61–83
$\Theta_{12} = -0.262, P = 0.035$	$\text{Stopping sale}_t = 0$ for observations 1–63
$Q = 33.37, df = 34, P = 0.498$	$\text{Stopping sale}_t = 1$ for observations 64–83 $\omega_{(R)} = 17.225, P = 0.049$ $\omega_{(S)} = -18.545, P = 0.040$ $Q = 32.33, df = 34, P = 0.555$

ARIMA, autoregressive integrated moving average;  $\theta$ , moving average parameter;  $B$ , backward shift operator;  $\omega_{(R)}$  and  $\omega_{(S)}$  zero-order input parameter of a transfer function;  $\text{Report}_t$  and  $\text{Stopping sale}_t$  intervention series;  $a_t$ , random shock at  $t$  observation;  $Y_t$ , the  $t$  observation of the times series;  $Q$ , Ljung-Box test statistic

distributed as white noise. The final noise model for women was ARIMA (0, 1, 1) (0, 0, 1)<sub>12</sub>, which means that the female suicide counts time series required the specification of first-order differencing to remove drift, and a first order as well as a seasonal first order ( $s = 12$ ) of moving average parameters to remove autocorrelation. The  $Q$  statistic for the Ljung-Box test statistic for women was 33.37 ( $P = 0.498$ ), implying that the model residuals are distributed as white noise.

In the second step, the possible effect of the interventions (i.e., media reporting of suicide and voluntary stopping of the sale of bath salts) on the time series is estimated through selection of a transfer function. Three types of transfer functions, zero order (i.e.,  $\omega_0 I_t$ ), first order

(i.e.,  $\frac{\omega_0}{1-\delta_1 B} I_t$ ), and pulse models [i.e.,  $\frac{\omega_0}{1-\delta_1 B} (1 - B) I_t$ ], were applied to male and female suicides counts time series. The transfer function that fits best with the male and female suicide series was the zero-order type. As for the male suicide time series, media reports of the suicide were not related to suicides ( $\omega_{(R)} = 8.988, P = 0.694$ ). Stopping the sale of bath salts was also not related to suicides ( $\omega_{(S)} = -7.344, P = 0.694$ ). As for the female suicide time series, media reports of the suicide were related to suicide counts ( $\omega_{(R)} = 17.225, P = 0.049$ ). Stopping the sale of bath salts was also related to suicide counts ( $\omega_{(S)} = -8.545, P = 0.040$ ). Specifically, the intervention model for women shows that the voluntary stopping of sales of bath salts was related to an immediate and permanent decrease of about 19 suicides among women in their 20s, to 40s, per month, or a 7.5% reduction compared with pre-intervention levels. Moreover, compared with the size of the negative effects produced by media reporting of suicides using hydrogen sulfide (i.e., 17.225), the size of the positive effect produced by stopping the sale of bath salts containing sulfur was larger in magnitude (i.e., -18.545).

## Discussion

There are several notable findings in the present study. First, after controlling for the effects of systematic variation from unmeasured stochastic processes, we found that media coverage of a hydrogen sulfide-related suicide that occurred on February 29, 2008 was followed by an immediate and permanent increase in female suicide mortality in Japan (Table 2). Second, after controlling for the effects of systematic variation from unmeasured stochastic processes, we found that stopping the sale of bath salts on May 13, 2008 was followed by an immediate and permanent decrease in female suicide mortality in Japan (Table 2). Third, we found that media coverage of a hydrogen sulfide-related suicide and stopping the sale of bath salts were not related to suicide counts among men in their 20s, 30s, and 40s (Table 2). Our second finding might be the most important. Indeed, it has recently been reported that restricting the sale of charcoal has been effective in reducing the number of suicides using this method [30]. With respect to hydrogen sulfide suicide, however, no one has evaluated the effects of a countermeasure, such as the voluntarily stoppage of the sale of a suicide-related product on the suicide rate, following media coverage of a suicide. Our first finding is consistent with previous findings that the media does have an impact on suicide rates [6–10].

Our study highlights the need to address the differential effect of gender. A population-level association between media coverage of suicide, stopping the sale of

suicide-related products, and suicide mortality was verified among women but not among men. Compared with that of men, the substantially lower female suicide rate usually exhibits little variation from the mean, thus making it difficult to find a statistical association. Therefore, this finding appears uncommon. With respect to the differential effect by gender, we posit three possible reasons. First, it has been reported that women spend more time than men on activities related to housekeeping (i.e., among women and men in their 20s: 2.22 vs. 0.29 h, respectively; among women and men in their 30s: 5.25 vs. 0.45 h, respectively; and among women and men in their 40s: 4.51 vs. 0.28 h, respectively) [22]. Thus, it is probable that women are more familiar than men with bath salts and toilet detergents, which may have contributed to the more frequent occurrence of hydrogen sulfide-related suicides among women. Second, a hydrogen sulfide-related suicide often affects people in surrounding areas, resulting in heavy casualties. It has been reported that there is a gender difference in formal normative belief, in terms of awareness with respect to recommended behavior in society [31, 32]. Compared with women, men are more likely to follow recommended behaviors in Japanese society [32, 33]. Thus, faced with the nature of a hydrogen sulfide-related suicide, it is possible that as compared to women, men are less likely to use hydrogen sulfide gas as a suicide method. Third, women have been found to spend more time than men watching TV (i.e., among women and men in their 20s: 2.33 vs. 1.54 h, respectively; among women and men in their 30s: 2.43 vs. 2.03 h, respectively; and among women and men in their 40s: 3.26 vs. 2.30 h, respectively) [22]. During the study period, following media coverage of a hydrogen sulfide-related suicide on February 29, 2008, a copycat suicide committed by a famous actress spawned numerous media reports [19]. Thus, assuming that the contagion effect is real, we would expect it to be larger among women than among men because of the actress's attributes (i.e., women, in her late 40s) and the greater exposure of women than men to media information.

The present findings contain several practical implications. It was suggested that the countermeasure taken by the JACDS-affiliated drugstores might be effective in reducing suicide mortality among women in their 20s, 30s, and 40s. Although suicide prevention measures by the central and local governments have not included stopping the sale of suicide-related products [34–36], it is relatively easy to do so. We have learned that incidents involving unusual methods of suicide are newsworthy and may be vigorously reported by the mass media. When this occurs, public health officials could attempt to stop the sale of suicide-related products as a potentially effective countermeasure to prevent copycat suicides triggered by media coverage of sensational suicides. Our advocacy of this

approach is accompanied by the following caveats. First, the number of drug stores associated with the Japanese Association of Chain Drug Stores (JACDS) was 14,743 and the affiliated drug stores spread throughout the country. Thus, the participation of nationwide stores in the proposed project may be necessary to effectively stop the sale of suicide-related products in the service of reducing the number of suicides. Second, the efficacy of this suicide prevention measure might be influenced by the attributes of targeted population, such as the gender and age of the target group. In this study, a decrease in the number of male suicides after implementation of the suicide prevention measure was not observed. Two explanations are possible for this finding: (1) male suicide counts were not influenced by media coverage of a hydrogen sulfide-related suicide and (2) stopping the sale of bath salts is not effective in reducing the number of male suicides. However, on the basis of this study, we cannot confirm whether either of these statements provides an explanation for the finding. A third caveat is that although stopping the sale of one targeted product may be easy, we recognize that it might be difficult to stop the sale of related products, especially if they are highly necessary in society.

There are several limitations to the present study that need to be considered when interpreting the results. First, the model used in our study does not consider other possible or known risk factors for suicide, such as increases in alcohol use, drug use, domestic violence, or inadequate mental healthcare. However, in order to evaluate the effects of specific interventions on public health outcomes at the population level, the Box-Jenkins transfer function models (i.e., interrupted time series methods) are well suited for the purpose and provide rigorous tests of association. If future studies based on different models that include other relevant variables report the same findings, our findings will be verified. Second, we have only suicide data for men and women in their 20s, 30s, and 40s, not for suicide victims who were producing hydrogen sulfide gas at the time of death. Obviously, the proportion of hydrogen sulfide-related suicides is a fraction of all suicides in their 20s, 30s, and 40s. If stopping the sale of bath salts was in fact an effective strategy for decreasing hydrogen sulfide-related suicides, we would expect to see a decrease in hydrogen sulfide-related suicides following its implementation. Alternatively, one could analyze suicides in which hydrogen sulfide was not used, for which no reduction would be expected. If further studies provide such findings, the conclusions we have drawn would be strengthened. Third, there is the possibility that the sudden increase in the number of suicides for people in their 20s, 30s, and 40s at the time of the media coverage of hydrogen sulfide-related suicide simply reflects a larger pattern also occurring in other ages or gender groups. However, by examining the



time series data of suicide counts by age and gender, it was revealed that a significant increase in the number of suicides was limited solely to women in their 20s, 30s, and 40s. Thus, we can rule out the third possibility.

In conclusion, the results of the present study show that in Japan: (1) media coverage of a hydrogen sulfide-related suicide case was followed by an immediate and long-term increase in female suicide mortality, (2) the voluntary stoppage of sales of bath salts was followed by an immediate and long-term decrease in female suicide mortality, (3) media coverage of a hydrogen sulfide-related suicide and stopping sales of bath salts were not related to suicide counts among men in their 20s, 30s, and 40s. In practice, when an incident involving an unusual suicide method occurs, it is probable that due to its newsworthiness, the case along with the method will be reported, resulting in an increase in the number of copycat suicides. The voluntary stoppage of sales of suicide-related products might be effective as countermeasure to copycat suicides triggered by media coverage of the incident.

**Conflict of interest** The authors declared there is no conflict of interests.

## References

- Motto JA (1970) Newspaper influences on suicide. *Arch Gen Psychiatry* 23:143–148
- Blumental S, Bergner L (1973) Suicide and newspaper: a replicated study. *Am J Psychiatry* 130:468–477
- Phillips DP (1977) Motor vehicle fatalities increase just after publicized suicide stories. *Science* 196:1464–1465
- Gould MS, Saffer D (1986) The impact of suicide in television movies: evidence of imitation. *N Engl J Med* 315:690–694
- Stack S (1996) The effect of the media on suicide: evidence from Japan, 1955–1985. *Suicide Life Threat Behav* 26:32–142
- Phillips DP (1974) The influence of suggestion on suicide. *Am Sociol Rev* 39:340–354
- Wasserman I (1984) Imitation and suicide: a replication of the Werther effect. *Am Sociol Rev* 49:427–436
- Stack S (1987) Celebrities and suicide: a taxonomy and analysis, 1948–1983. *Am Sociol Rev* 52:401–412
- Stack S (2005) Suicide in the media: a quantitative review of suicides based on non-fictional stories. *Suicide Life Threat Behav* 35:121–133
- Niederkrötenhaler T, Sonneck G (2007) Assessing the impact of media guidelines for reporting on suicides in Austria: interrupted time series analysis. *Aust N Z J Psychiatry* 41:419–428
- Ajdacic-Gross V, Bopp M, Gostynski M, Lauber C, Gutzwiller F, Rossler W (2006) Age-period-cohort analysis of Swiss suicide data, 1881–2000. *Eur Arch Psychiatry Clin Neurosci* 256: 207–214
- Hagihara A, Miyazaki S, Abe T (2011) Internet suicide searches and the incidence of suicide in young people in Japan. *Eur Arch Psychiatry Clin Neurosci*. doi:10.1007/s00406-011-0212-8
- Yoshida K, Mochizuki Y, Fukuyama Y (1989) The effects of media reporting on teenagers' suicide in Hokkaido, Japan. *Nippon Koshu Eisei Zasshi* 36:370–374
- Centers for Disease Control and Prevention, National Institute of Mental Health, Office of the Surgeon General, Substance Abuse and Mental Health Services Administration, American Foundation for Suicide Prevention, American Association of Suicidology, Annenberg Public Policy Center (2003) Recommendations for media coverage of suicide. (<http://www.sprc.org/library/sreporting.pdf>). Accessed 20 August 20, 2010
- Center for Diseases Control (1994) Suicide Contagion and the Reporting of Suicide: Recommendations from a National Workshop. (<http://www.cdc.gov/mmwr/preview/mmwrhtml/00031539.htm>). Accessed on 20 August, 2010
- Asahi Shimbun (2008) Three young people meeting for the first time via the Internet and committing suicide as a group using hydrogen sulfide. *Asahi Shimbun* (newspaper) (Tokyo Head Office), Morning Edition, p 2, February 18, 2008
- Jiji Press Ltd (2008) “The number of suicides by hydrogen sulfide between January and November, 2008 exceeds 1000” (Jiji Press Internet news delivered at 14:34, December 11, 2008) (<http://headlines.yahoo.co.jp/hl?a=20081211-00000099-jij-soci>). Accessed on 11 December 2008
- The New Health. Headline News (2008) JACDS stopped selling bath salts containing sulfur. *The New Health*. Headline News, May 16, 2008. (<http://www.yakuji.co.jp/entry6779.html>) Accessed on 30 August 2010
- Asahi Shimbun (2009) Yukiko Shimizu committed suicide. *Asahi Shimbun* (newspaper) (Nagoya Head Office), Morning edition, November 27, 2009
- Chen YY, Liao SF, Ten PR, Tsai CW, Fan HF, Lee WC, Cheng ATA. (2010). The impact of media reporting of the suicide of a singer on suicide rates in Taiwan. *Soc Psychiatry Psychiatr Epidemiol*. doi:10.1007/s00127-010-0331-y
- Chen YY, Tsai PC, Chen PH, Fan CC, Hung GCL, Cheng ATA (2010) Effect of media reporting of the suicide of a singer in Taiwan: the case of Ivy Li. *Soc Psychiatry Psychiatr Epidemiol* 45:363–369
- NHK Broadcasting Culture Research Institute (2011) Survey report on Japanese daily life and time in 2010. *NHK Broadcasting Culture Research Institute*, pp 9–46
- Statistics and Information Department, Minister's Secretariat, Ministry of Health, Labour and Welfare (2008) Vital Statistics of Japan (Ministry of Health, Labour and Welfare, Tokyo). (<http://www.mhlw.go.jp/toukei/saikin/old/k-jinkou.html>) Accessed on 19 December 2008
- National Center for Health Statistics (2007) International classification of diseases, 10th Revision. National Center for Health Statistics, Hyattsville
- Pindyck RS, Rubinfeld DL (1989) *Econometric models and econometric forecasts*. Irwin/McGraw-Hill, Boston
- SAS Institute Inc. (1993) *SAS/ETS user's guide*. SAS Institute Inc., Cary
- Yaffee R, McGee M (2000) *Introduction to time series analysis and forecasting with applications of SAS and SPSS*. Academic Press, San Diego, pp 425–466
- Box GEP, Jenkins GM, Reinsel GC (1994) *Time series analysis: forecasting and control*, 3rd edn. Prentice Hall, Upper Saddle River
- Parsons LJ, Schultz RL (1976) *Marketing models and econometric research*. Elsevier, New York, pp 167–188
- Yip PS, Law CK, Fy KW, Law YW, Paul WC, Wong PWC, Xu Y (2010) Restricting the means of suicide by charcoal burning. *Br J Psychiatry* 196:241–242
- Reber AS, Reber ES (2001) Social norm. In: Reber AS, Reber ES (eds) *The penguin dictionary of psychology*, 3rd edn. Penguin Books, Suffolk, p 690
- Higuchi M, Nakamura N (2009) Formal and informal beliefs regarding purchasing and using condoms. *Bulletin of the*

- Graduate School of Education, Hiroshima University. Part3, Education and human science/Graduate School of Education. Hiroshima University 58:145–149
33. Sunagawa K, Sasaki J, Fujisawa A, Azami R (2006) Deviant behavior and same in Japanese adolescents: five behavioral standards for public space. *Seishin Stud* 107:58–77
34. McCurry J (2006) Japan promises to curb number of suicides. *Lancet* 367:383
35. Inagawa M (2008) Rethinking suicide prevention in Asian Countries. *Lancet* 372:1630
36. Government of Japan (2010) The comprehensive suicide prevention initiative. Government of Japan, Tokyo