Suicide in Mie Prefecture, Japan, since 1990

K Inoue [1], H Tanii[1], S Abe[2], Y Okazaki[1,3], M Nata[4], T Fukunaga[5]

ABSTRACT

The number of suicides in Japan has increased to over 30 000 per year since 1998. Similarly, the number of suicides has been increasing in Mie Prefecture. In the present study, we examined the incidence and the circumstances of all suicidal cases that were reported to the Mie Prefectural Police Headquarters during the thirteen-year period 1990–2002. In Mie Prefecture, the number of suicides per year averaged 363.1. The largest numbers occurred in the spring and early summer months. For men, suicides were most common in the 50–59-year age group; for women, they were most common in the 70–79-year age group. As for the methods of suicide, hanging was the most frequent for both genders. The major causative factors of suicide were described as "suffering from physical illness", "psychiatric disorders" and "economic difficulties". Of these, "psychiatric disorders" was the most important causative factor for the younger groups of both genders. For the middle- aged group of men, the most important causative factor was "economic difficulties". "Suffering from physical illness" was the most serious causative factor for the elderly group of both genders. In order to prevent suicide, urgent strategies for effective medical treatment and social cooperation are required.

El Suicidio en la Prefectura de Mie, Japón, Desde 1990

K Inoue[1], H Tanii[1], S Abe[2], Y Okazaki[1,3], M Nata[4], T Fukunaga[5]

RESUMEN

El número de suicidios en Japón ha aumentado a más de 30 000 por año desde 1998. De modo similar, el número de suicidios ha experimentado un continuo ascenso en la Prefectura de Mie. El presente estudio examina la incidencia y las circunstancias de todos los casos suicidas reportados a las Jefaturas de Policía de la Prefectura de Mie durante un período de trece años – desde 1990 hasta 2002. En la Prefectura de Mie, el número de suicidios por año alcanzó la cifra de 363.1. Las cifras más altas ocurrieron en los meses de primavera y comienzos del verano. Entre los hombres, los suicidios eran más comunes en el grupo de edad de 50 a 59 años; entre las mujeres, los suicidios eran más comunes en el grupo de edad de 70 a 79 años. En cuanto a los métodos de suicidio, el ahorcamiento fue el más frecuente para ambos géneros. Los principales factores descritos como causa de los suicidios fueron "padecimiento de una enfermedad", "trastornos psiquiátricos", y "dificultades económicas". De estos, los "trastornos psiquiátricos" constituyeron el factor causal más importante entre los grupos más jóvenes de ambos sexos. Para el grupo de hombres de mediana edad, el factor causal principal radicaba en "las dificultades económicas". El "padecimiento de enfermedades físicas" fue el principal factor causal entre el grupo de ancianos de ambos géneros. A fin de prevenir los suicidios, se requieren estrategias para un tratamiento médico efectivo y cooperación social.

West Indian Med J 2008; 57 (1): 58

INTRODUCTION

In Japan and the world, important events (break-up of the Union of Soviet Socialist Republic, unification of West Germany and East Germany, the Gulf War in Kuwait and the sarin subway case in Tokyo, Japan) occurred after 1990. In addition, major economic changes such as (economic recession, bankruptcy of the major financial institution, worker redundancy, outsourcing) were noted for the same period.

From: [1]Department of Psychiatry, Mie University Graduate School of Medicine, Tsu 514-8507, [2]Department of Forensic Medicine, The Jikei University School of Medicine, Tokyo, 105-8461, [3]Tokyo Metropolitan Matsuzawa Hospital, Tokyo 156-0057, [4]Department of Forensic Medicine and Sciences, Mie University Graduate School of Medicine, Tsu 514-8507 and [5]Tokyo Medical Examiner's Office, Tokyo Metropolitan Government, Tokyo 112-0012, Japan.

Correspondence: Dr H Tanii, Department of Psychiatry, Mie University Graduate School of Medicine, 2-174, Edobashi, Tsu 514-8507, Japan, Fax: +81-59-231-5208, e-mail: h-tanii@clin.medic.mie-u.ac.jp

Mie Prefecture is located in the centre of Japan. The population is approximately 1 800 000 with a density of approximately 320 per square kilometre. In Japan, the only large scale study of suicide was a report by Yoshioka covering the seven years from 1989 to 1995 (1).

In his report, Yoshioka presented a statistical analysis of the suicides in Mie Prefecture (1). This prefecture showed intermediate levels of suicide relative to Japan as a whole. For both the entire country and Mie Prefecture, there was an especially rapid increase in suicides after 1998. In the present study, we examined the incidence and the circumstances of all suicide cases during the thirteen-year period, 1990–2002.

SUBJECTS AND METHODS

In collaboration with Mie Prefectural Police Headquarters, we investigated all inquest records in Mie Prefecture during the thirteen-year period, 1990–2002. From all cases classified as suicides, data were extracted on age, gender, time of occurrence, methods of suicide and causative factors. The analysis involved the following:

a) The age-adjusted suicide rates were calculated per 100 000 inhabitants per year and were classified by gender and age. Three age groups were established: younger (under 39 years), middle-aged (40 to 64 years) and elderly (65 years or over).
b) The methods of suicide were divided into eight groups: hanging, drowning, poisoning, use of gases, impact with vehicles, jumping, burning and others.
c) Regarding the backgrounds of the cases, the main causative factors were classified into six groups: suffering from physical illness, pessimism, economic difficulties, personal relationships, psychiatric disorders (major depression *etc*) and others.

Among the suicide cases in Mie Prefecture, a specialist in forensic medicine and autopsy doctors estimated the date and time of death which became part of the inquest records at the Mie Prefectural Police Headquarters. A group of psychiatrists, an industrial physician and specialists in forensic medicine reviewed data on the estimated date and time of death, method of suicide and causative factors in suicide. The statistical analysis was performed using both Fisher's exact test and Chi-square analysis. All data after encoding were completely anonymous.

RESULTS

Gender

During the test period, 4721 suicides (3074 males and 1647 females) were reported to Mie Prefectural Police Headquarters (Table 1) giving a male/female ratio of approximately 1.9:1. The average number of suicide per year was 363.1 with a range from 276 in 1990 and 1991 to 501 in 1998. The suicide rates by gender were 26.4 males and 13.4 females per 100 000 (Fisher's exact test: $p < 0.05$).

Table 1: The number of suicide for the years 1990 to 2002

	Total	**Male**	**Female**
1990	276	160	116
1991	276	188	88
1992	300	180	120
1993	288	192	96
1994	299	171	128
1995	334	204	130
1996	326	204	122
1997	319	205	114
1998	501	325	176
1999	461	308	153
2000	425	289	136
2001	456	337	119
2002	460	311	149
Total	**4721**	**3074**	**1647**

Monthly and seasonal distribution

The number of suicides was highest in March, followed by May, June, April and July, while the lowest month was in February (Fig. 1). The most frequent day for suicides was Monday while the least frequent was Sunday (Fig. 2).

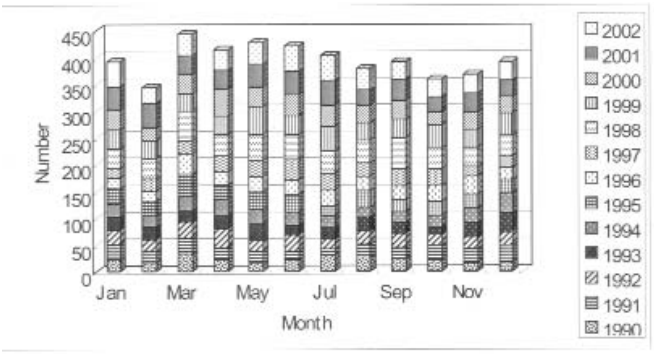


Fig. 1: The number of suicides in each month.

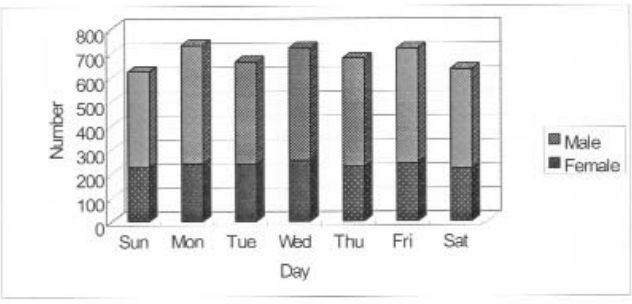


Fig. 2: The number of suicides on each day of the week.

Age distributions for men and women, and yearly changes

The age-specific analysis of suicides for both genders combined found the highest rate to be the 50–59-year age group (1002 cases), followed by the 60–69 years and 40–49-year age groups. Among men, those in the age group 50–59-

years had the highest number of suicides (746 cases) followed by the 40–49-year and 60–69-year age groups (Fig. 3a). The pattern among women was less consistent in terms

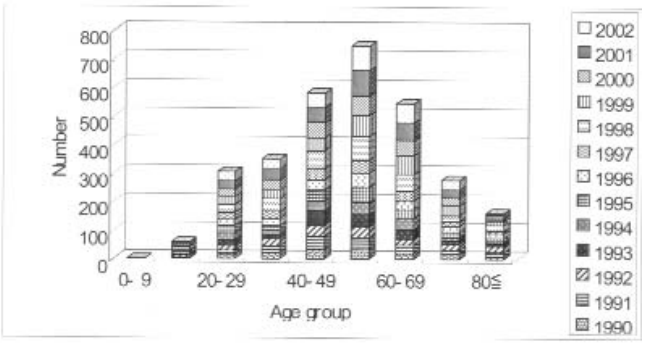


Fig. 3a: Age-specific suicide numbers for men.

of age but generally peaked later than the male pattern; specifically, women age 70–79-years had the highest number of cases (347), followed by the 60–69-year age group and then the over-80-year age group (Fig. 3b). Thus, the age-

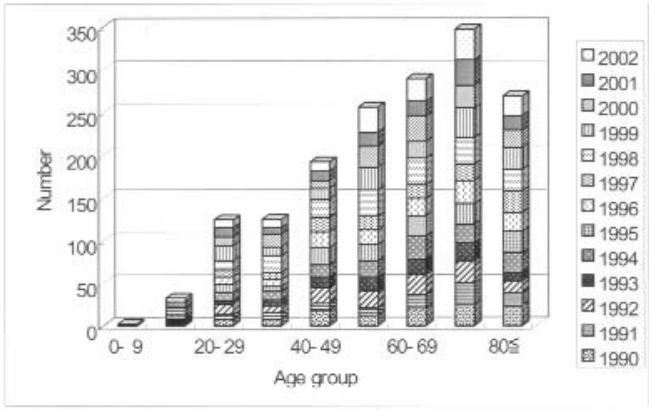
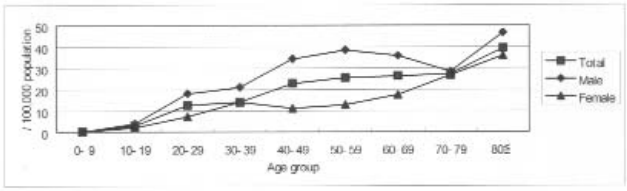


Fig. 3b: Age-specific suicide numbers for women.

specific suicide numbers for males peaked in the middle-aged group while for females they increased progressively with age.

The age-specific suicide rate showed relationships to age similar to those seen before for the unadjusted rates except that the adjusted rate was relatively higher in the very elderly (Fig. 4). The age-specific suicide rate for males peaked in the over-80 year and 50–59-year age groups while it increased progressively for females. Comparative study of the age-specific suicide rate between males and females showed that the rate in males was significantly higher than the rate in females among the 20–29, 40–49, 50–59 and 60–69-year age groups (Chi-square analysis: 20–29 years: $p < 0.05$, 40–49 years and 50–59 years: $p < 0.01$ and 60–69 years: $p = 0.01$).

The yearly-specific suicide rates ranged from 15.3 to 26.9 per 100 000 during the thirteen-year period (the maxi-



Chi-square analysis: 20-29: $p < 0.05$, 40–49 and 50–59: $p < 0.01$ and 60–69: $p = 0.01$

Fig. 4: Age-specific suicide rates for each age group of men and women.

mum was 37.3 for males in 2001 and 18.4 for females in 1998) [Fig. 5].

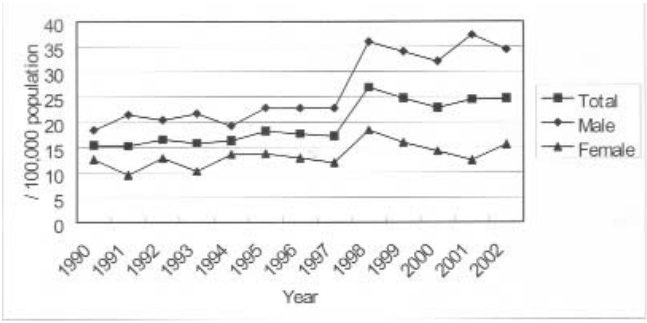


Fig. 5: Yearly-specific suicide rates in Mie Prefecture.

Methods of suicide

Hanging was the most common method of suicide (59.9%) for both genders, followed by drowning (11.4%), jumping (6.4%), the use of gases (5.4%) and poisoning (5.2%) [Table 2]. Hanging was the most common means for all three age categories: for younger people (under 39 years), for the middle-aged (40 to 64 years) and for the elderly (65 years or over). Furthermore, hanging as the means of suicide increased with age for both males and females, and hanging was significantly higher than not hanging as a means of suicide in total and in males for the middle-aged, elderly, and all age groups (Chi-square analysis: total: middle-aged, $p < 0.05$; elderly, $p < 0.01$ and all age groups, $p < 0.05$; males: middle-aged, elderly, and all age groups: $p < 0.01$) and hanging was significantly higher than not hanging as a method of suicide in females for the elderly group (Chi-square analysis: females: elderly groups: $p < 0.05$). Drowning accounted for 18.2% of the suicides in females. Specifically, drowning showed higher rates for middle-aged women (20.3%) and elderly women (19.7%).

Main causative factors

Among the various causative factors (Table 3), "*suffering from physical illness*" was the most serious issue for all age groups accounting for 25.9% of the total cases, followed by "*psychiatric disorders*" (23.1%) and then by "*economic difficulties*" (15.0%). For men alone without regard to age, the most common causative factor was "*suffering from physical illness*" (22.9%). The second and third most com-

Table 2: Methods of suicide

	Total (%)				**Male** (%)				**Female** (%)			
Age group yrs	≦ 39	40–64	65 ≦	All age	≦ 39	40–64	65 ≦	All age	≦ 39	40–64	65 ≦	All age
Method	Younger	Middle	Elderly		Younger	Middle	Elderly		Younger	Middle	Elderly	
Hanging	51.1	60.3*	65.4**	59.9*	55.4	64.9**	70.3**	63.9**	40.3	47.2	61.3*	52.4
Drowning	8.1	11.3	14.3	11.4	7.7	8.1	7.7	7.8	9.0	20.3	19.7	18.2
Poisoning	5.9	4.4	6.1	5.2	4.8	3.3	5.7	4.1	8.6	7.2	6.5	7.1
Gases	8.1	7.0	1.1	5.4	9.1	8.1	2.0	6.9	5.5	4.0	0.3	2.6
Impact with vehicles	5.5	3.1	2.1	3.4	4.3	2.6	2.2	3.1	8.6	4.5	2.1	4.1
Jumping	11.8	5.2	4.6	6.4	9.5	4.8	4.9	5.9	17.6	6.6	4.3	7.4
Burning	4.1	4.1	2.4	3.6	2.9	4.0	2.5	3.4	7.2	4.5	2.3	4.0
Others	5.4	4.5	4.0	4.6	6.3	4.2	4.6	4.8	3.1	5.5	3.5	4.1

($p < 0.05^{*}$, $p < 0.01^{**}$)

Table 3: Main causative factors of suicide

	Total (%)				**Male** (%)				**Female** (%)			
Age group (years)	≦ 39	40–64	65 ≦	All age	≦ 39	40–64	65 ≦	All age	≦ 39	40–64	65 ≦	All age
Factors	Younger	Middle	Elderly		Younger	Middle	Elderly		Younger	Middle	Elderly	
Suffering from physical illness	8.6	22.2	45.4	25.9	8.5	20.8	46.4	22.9	9.0	26.3	44.6	31.6
Pessimism	13.1	10.1	14.2	11.9	14.4	11.4	14.5	12.7	9.6	6.6	13.9	10.5
Economic difficulties	12.0	22.2	5.2	15.0	15.4	27.2	8.2	20.3	3.4	8.4	2.7	4.9
Personal relationships	20.1	9.0	4.0	9.8	19.3	9.2	3.9	10.4	22.2	8.5	4.1	8.8
Psychiatric disorders	30.3	22.5	19.6	23.1	25.1	17.0	13.2	17.9	43.8	38.2	24.9	32.9
Others	15.8	13.9	11.7	14.3	17.2	14.5	13.8	15.8	12.1	11.9	9.8	11.3

mon factors were "*economic difficulties*" (20.3%) and "*psychiatric disorders*" (17.9%). The most common factor for the younger group of men was "*psychiatric disorders*" (25.1%) while "*economic difficulties*" (27.2%) was the most common for the middle-aged group and "*suffering from physical illness*" (46.4%) was the most common for the elderly group among men. The second most common factors were "*personal relationships*" (19.3%) for the younger group of men, "*suffering from physical illness*" (20.8%) for the middle-aged group and "*pessimism*" (14.5%) for the elderly group. By contrast, among the women, the most common causative factor was "*psychiatric disorders*" (32.9%) for all age groups; the second most frequent one was "*suffering from physical illness*" (31.6%). The most common factor for both the younger and middle-aged groups of women was "*psychiatric disorders*" (43.8% and 38.2%, respectively); for the elderly women it was "*suffering from physical illness*" (44.6%). The second most common factors for women were "*personal relationships*" (22.2%) for the younger group, "*suffering from physical illness*" (26.3%) for the middle-aged group and "*psychiatric disorders*" (24.9%) for the elderly women. However, each causative factor for suicide was not statistically significant for any group (*ie* by gender or age) by Chi-square analysis.

DISCUSSION

The number of suicides in Mie Prefecture markedly increased after 1998 in comparison with 1990–1997 (Table 1). This tendency is very similar to the pattern in all of Japan (2).

During the test period, the number of suicides was highest in the spring and early summer months (Fig. 1). Yoshioka concluded that this fact resulted from the personnel displacement that occurs with the movement into a higher school grade and new working place in April when the school term starts in Japan (3).

Among methods of suicide, hanging was the most common means in all three age categories for both genders (Table 2). Yoshioka showed that this was the case because hanging requires no force and can be accomplished easily. In addition, hanging can be accomplished without having to bother another person (3).

Among the main causative factors, "*suffering from physical illness*", "*psychiatric disorders*" and "*economic difficulties*" were the most common during the test period (Table 3). "*Suffering from physical illness*" causes many suicides, especially in the elderly group. Chronic physical illness in the elderly group results in mental depression as well as physical exhaustion which in itself can cause mental depression (3). Therefore, addressing this factor through improvements in the system of home nursing and healthcare would help to reduce suicide. In addition, patients who are "*suffering from physical illness*" should be given other kinds of physical and mental support. "*Psychiatric disorders*" were shown to be a common and critical factor for suicide in both genders and all age groups. Therefore, implementing measures to address this factor can be an important way to reduce the suicide rate. In Japan, clear methods to prevent suicide caused by psychiatric disorders are not yet being undertaken. In the United States of America, England, Sweden and Finland, the suicide rate has decreased as a result of public education on psychiatric disorders and screening for early detection (4–8). These measures should be implemented urgently at the national level in Japan. For both physical illness and psychiatric disorders, early detection and treatment, therefore, are critical factors in the prevention of suicide.

Economic difficulties were also important factors causing suicide especially for men in the middle-aged group. A depressed mental condition is often associated with economic difficulties (9). Psychological healthcare should be considered as including the prevention of suicides in middle-aged males experiencing economic difficulties.

Although many papers regarding suicide have been published (10–13), few have given detailed analyses of the causative factors and prevention. We focused attention in the present paper on the analysis of these factors in order to elucidate the causes of the rapid increase of suicide in Mie Prefecture, Japan.

The limitations of the current study are related to the retrospective nature of the study done from inquest records. In addition, some of the causative factors of suicide were speculative because diagnoses of psychiatric disease were sometimes difficult to determine.

In conclusion, social cooperation as well as physical and psychiatric care are required in order to prevent suicides. Early detection and treatment modalities are important to decrease suicide rates (5, 6, 8, 14).

REFERENCES

1. Yoshioka N. Present status of suicide in Japan, and the preventive application: Report of a Grant-in-Aid for Scientific Research (Ministry of Education, Culture, Sports, Science, and Technology of Japan); 1997.
2. Ishihara A. Suicide in Japan – the analysis of vital statistics. J Mental Health 2003; **49 Suppl:** 13–26.
3. Yoshioka N. Epidemiological study of suicide in Japan- is it possible to reduce committing suicide? -. Jpn J Legal Med 1998; **52:** 286–93.
4. Japanese medical association. Suicide prevention manual. J Jpn Med Association 2004; **131:**14–46.
5. O'Hara MW, Gorman LL, Wright EJ. Description and evaluation of the lowa Depression Awareness, Recognition, and Treatment Program. Am J Psychiatry 1996; **153:** 645–9.
6. Greenfield SF, Reizes JM, Magruder KM, Muenz LR, Kopans B, Jacobs DG. Effectiveness of community-based screening for depression. Am J Psychiatry 1997; **154:** 1391–7.
7. Paykel ES, Hart D, Priest RG. Changes in public attitudes to depression during the Defeat Depression Campaign. Br J Psychiatry 1998; **173:** 519–22.
8. Greenfield SF, Reizes JM, Muenz LR, Kopans B, Kozloff RC, Jacobs DG. Treatment for depression following the 1996 National Depression Screening Day. Am J Psychiatry 2000; **157:** 1867–9.
9. Lindeman SM, Hirvonen JI, Hakko HH, Lonnqvist JK. Use of the national register of medico-legal autopsies in epidemiological suicide research. Int J Legal Med 1995; **107:** 306–9.
10. Neehall J, Beharry N. Demographic and clinical features of adolescent parasuicides. West Indian Med J 1994; **43**: 123–6.
11. Aarons DE. The impact of advanced technology on critical care. Dilemmas in the making. West Indian Med J 1998; **47**: 119–21.
12. Pottinger AM, Milbourn PE, Leiba J. Suicidal behaviour and risk factors in children and adolescents in Jamaica. West Indian Med J 2003; **52:** 127–30.
13. McGovern C, Cusack DA. A study of suicides in Kildare, 1995–2002. J Clin Forensic Med 2004; **11:** 289–98.
14. Inoue K, Tanii H, Fukunaga T, Abe S, Nishimura Y, Kaiya H et al. Analysis of pre-suicide signs: implications for suicide prevention. West Indian Med J 2007; **56:** 312.