

EFFECTS OF SOCIOECONOMIC FACTORS ON SECULAR TRENDS IN SUICIDE IN JAPAN, 1953–86

Y. MOTOHASHI

*Department of Hygiene and Chronomedicine, Faculty of Medicine,
Tokyo Medical and Dental University, Japan*

Summary. The effects of socioeconomic factors on secular trends in suicide rates in Japan for the periods 1953–72 and 1973–86 were investigated using twelve socioeconomic indicators. Multiple regression analysis showed that the socioeconomic indicators affecting suicide rates were not identical in the two periods. The rates in both sexes in 1953–72 were closely related to unemployment rate and the labour force but between 1973 and 1986, divorce rate and the proportion in tertiary industry were most influential. The changes reflect the socioeconomic changes in industrial structure in Japan in transition from an industrial to a service economy.

Introduction

Suicide rates in Japan since World War II have not been constant and there have been two marked elevations; one occurred between 1955 and 1958 and the other was a gradual increase between 1970 and 1983. The 1955–58 rise corresponded with one business cycle of prosperity and recession after the chaotic post-war period, and the increase in suicide rates was particularly noticeable among young men and women aged 15–34 years (Araki & Murata, 1984, 1986, 1987; Ueda, 1988). The other period corresponded to a long economic depression following the first oil crisis in 1973 and the increase was mainly among 40–59-year-olds (Araki & Murata, 1986, 1987). The suicide rates in women tended to decrease in all age categories from 1970 to 1983. Although a relationship between suicide rates and economic depression in Japan has been suggested (Araki & Murata, 1984, 1986, 1987), it was unclear why the high risk groups differed in the two periods, and why the rates in women decreased from 1970 to 1983. The economic crisis in 1973 seemed to be a turning point in secular trends in suicide rates in Japan, because it brought about a broad reconstruction of the socioeconomic structure in Japan (Kurosaka, 1988; Kanamori & Kousai, 1989; Fukutake, 1989) and it is likely that the changes in socioeconomic structure influenced the epidemiologic characteristics of suicide rates.

This study examines the changing socioeconomic trends before and after the first oil crisis and relates twelve socioeconomic indicators to the changing pattern of suicide rates.

Materials and methods

The study used annual age-adjusted suicide rates in men and women (per 100,000 persons) provided by the Ministry of Health and Welfare (Japan Ministry of Health and Welfare, 1955–88) for the period 1953–86.

Twelve socioeconomic indicators (Table 1) were selected from various annually collected vital statistics and other national accounts (Japan Economic Planning Agency, 1987; Japan Ministry of Labour, 1987; Japan Ministry of Health and Welfare, 1955–88). Because the first oil crisis in 1973 apparently affected secular trends in suicide rates, data were analysed separately for the periods 1953–72 and 1973–86 in men and women.

Table 1. Socioeconomic indicators analysed

1	Unemployment rate (%)
2	Change in real gross national product (GNP) (%)
3	Change in plant and equipment investment in private sector (%)
4	Ratio of national current account surplus (to nominal GNP)
5	Change in wholesale price index (%)
6	Change in consumer price index (%)
7	% employed in primary industry
8	% employed in secondary industry
9	% employed in tertiary industry
10	Rate of labour force participation for men (%)
11	Rate of labour force participation for women (%)
12	Divorce rate (per 1000 persons)

Factor analysis was used for clarifying differences in socioeconomic conditions between the two periods, and a stepwise multiple regression analysis selected socioeconomic indicators significantly related to suicide rates.

Results

Factor analysis of socioeconomic indicators

The results of factor analysis of twelve socioeconomic indicators during the periods 1953–72 and 1973–86 are shown in Fig. 1 and Table 2. For 1953–72, four factors were extracted: (1) unemployment and proportion in primary industry (proportion of employed in primary industry); (2) growth of the national economy; (3) price level; (4) divorce rate. Eigen values were 6.6, 2.1, 1.3 and 0.8 for the four factors, respectively, and cumulative proportions were 0.55, 0.73, 0.83 and 0.90.

Four factors were also extracted for the 1973–86 period: (1) unemployment, proportion in tertiary industry and divorce rate; (2) labour force; (3) growth of the national economy; (4) price level. Eigen values for the four factors were 5.8, 3.2, 1.2 and 1.0, respectively, and cumulative proportions were 0.49, 0.75, 0.85 and 0.93.

Although the first factor was the same in 1953–72 and 1973–86 there were at least three differences between the two periods. First, the unemployment rate was positively correlated with the proportion in primary industry and negatively

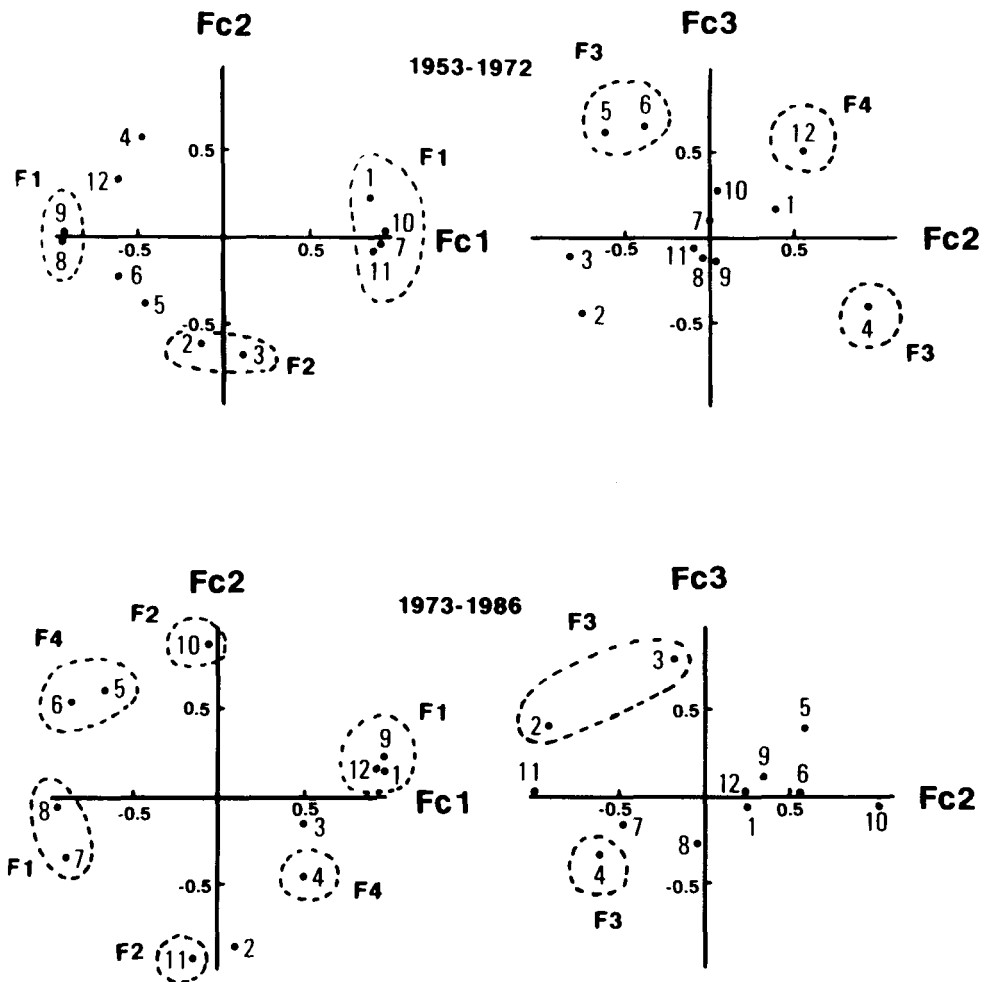


Fig. 1. Results of factor analysis of twelve socioeconomic indicators, 1953-72 and 1973-86. Factor loadings of each indicator were plotted. Four factors were extracted for each period. The numbers correspond to the socioeconomic indicators in Table 1.

correlated with the proportion in tertiary industry for 1953-72, while unemployment rate was positively correlated with the proportion in tertiary industry for 1973-86. Secondly, the divorce rate, which was the fourth factor for 1953-72, was included in the first factor for 1973-86. Thirdly, labour force, which was included in the factor of unemployment and proportion in primary industry for 1953-72, was independent of the factor of unemployment and proportion in tertiary industry for 1973-86.

Multiple regression analysis of socioeconomic indicators and suicide rates

Table 3 shows the results of separate multiple regression analyses of the twelve socioeconomic indicators for each period. For men, unemployment rate and labour force were the two variables selected for 1953-72, while divorce rate, followed by the

Table 2. Socioeconomic indicators classified by factor analysis during 1953–72 and 1973–86

Factor number	Socioeconomic indicators*
1953–1972	
F1	Unemployment and proportion of primary industry (1, 7, 10, 11, <u>8</u> , <u>9</u>)
F2	Growth of national economy (<u>2</u> , <u>3</u>)
F3	Price level (5, 6, <u>4</u>)
F4	Divorce rate (12)
1973–1986	
F1	Unemployment, proportion of tertiary industry and rate of divorce (1, 9, 12, <u>7</u> , <u>8</u>)
F2	Labour force (10, <u>11</u>)
F3	Growth of national economy (2, 3)
F4	Price level (5, 6, <u>4</u>)

* As Table 1. No. of socioeconomic indicators in each factor are shown in parentheses; for the underlined numbers, the partial regression coefficient was negative.

Table 3. Socioeconomic indicators affecting suicide rates in 1953–72 and 1973–86, by stepwise multiple regression analysis

	Selected indicators*	β †	t-value	R‡	DW
1953–72					
Men	1	0.572	6.49	0.981	1.554
	10	0.446	5.01		
Women	10	0.755	5.47	0.979	2.054
	9	4.454	4.45		
	7	1.857	3.34		
	11	0.428	2.57		
1973–86					
Men	12	18.109	3.98	0.845	2.061
	7	2.286	2.94		
Women	9	–1.564	3.97	0.928	1.823

* As in Table 1 (factor 1).

† Standardized regression coefficient.

‡ Multiple correlation coefficient.

DW = Durbin-Watson test.

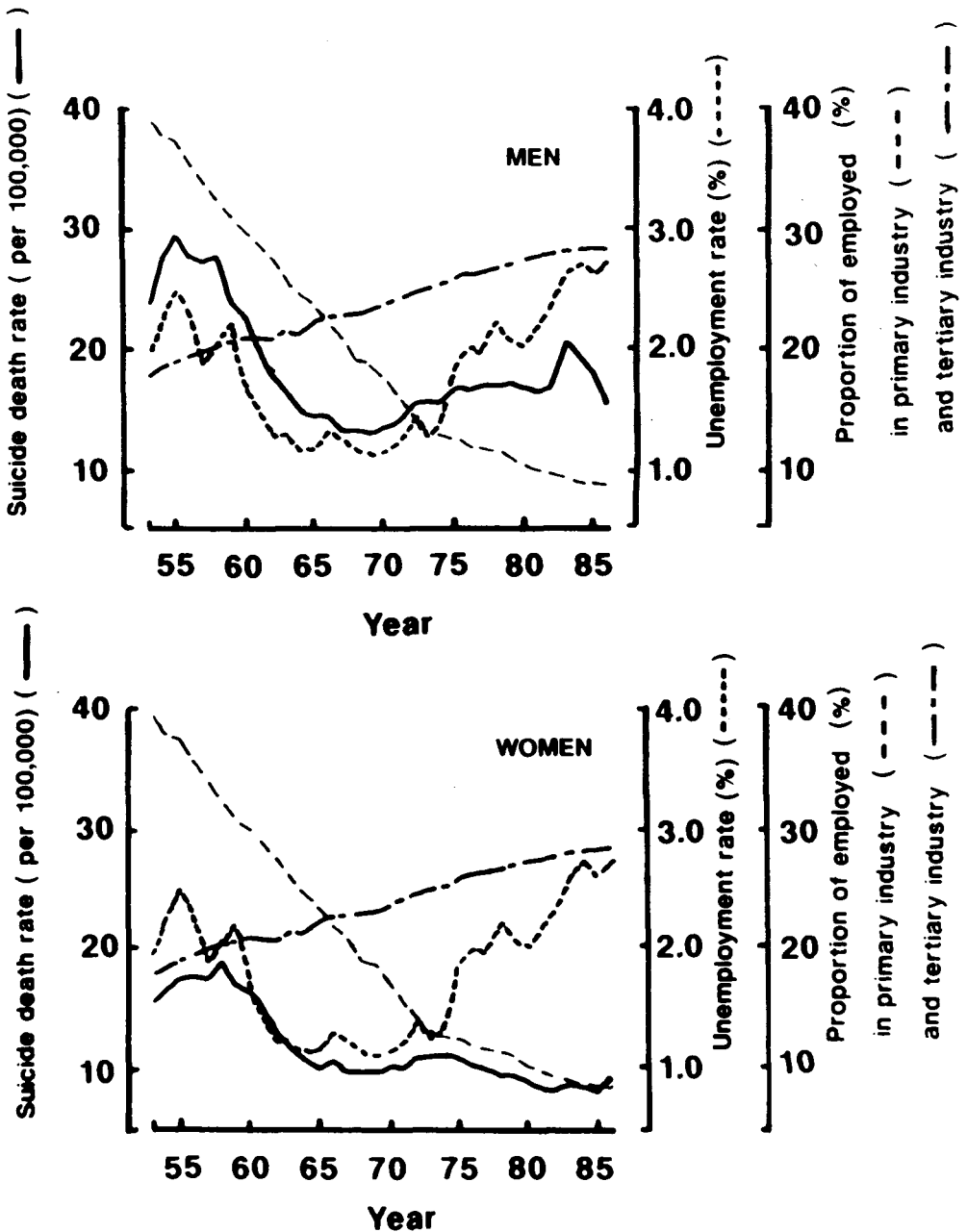


Fig. 2. Secular trends in suicide rate (men and women), unemployment, and proportions employed in primary and tertiary industry, 1953–72 and 1973–86.

proportion in primary industry, were the primary variables in 1973–86. In women, labour force and proportion in primary and tertiary industries were selected for 1953–72 and the proportion in tertiary industry for 1973–86. All selected indicators belonged to the first socioeconomic factor. Figure 2 shows the relationships between suicide rates, unemployment rate and proportion in tertiary industry. The parallels between suicide rates and unemployment rate observed for the period 1953–72 were weakened in men and reversed in women after the first oil crisis.

Discussion

The results suggest that there are secular trends in yearly suicide rates which are closely associated with socioeconomic indicators in both the periods examined. The parallelism between suicide rates and unemployment rate was evident for the period 1953–72 in both men and women (Fig. 2), which is in keeping with other findings (Vigderhous & Fishman, 1978; Boor, 1980; Kreitman & Platt, 1984; Platt, 1984; Platt & Kreitman, 1984; Wasserman, 1984; Cormier & Klerman, 1985). However, the correlation between suicide rates and unemployment rate weakened in men and became negative in women for the period 1973–86. This result suggests that the socioeconomic factors affecting suicide rates changed after the first oil crisis in 1973.

The increase in suicide rates between 1955 and 1958 was mainly due to the increased rate in young men and women aged 15–34 years (Ueda, 1988). This period corresponded to a business cycle of prosperity and recession, and unemployment rates were relatively high because of an excess supply of labour in primary industry (Kurosaka, 1988). Most of the unemployed people were young unskilled workers. Since the proportion of young workers in the labour force was relatively high and their incomes were low in this period (Japan Ministry of Labour, 1987; Kurosaka, 1988), it is likely that they were most vulnerable to socioeconomic fluctuations. This socioeconomic background seems to explain the high suicide rates among young people during this period.

In the 1960s, Japan underwent dramatic economic growth and the excess supply of labour disappeared, decreasing unemployment rates (Kurosaka, 1988). Parallel to the decline in unemployment rates, suicide rates decreased in both men and women. Thus, the major socioeconomic indicators affecting suicide rates during 1953–72 were thought to be mainly the unemployment rate and labour force in both men and women.

The socioeconomic indicators affecting suicide rates were shown to change for the period 1973–86 (Araki & Murata, 1986, 1987). The observations that middle-aged men became a high risk group, and that suicide rates in women continued to decrease, could be explained by changes in socioeconomic trends, as well as by the aging of the Japanese population (Fukutake, 1989).

Acknowledgment

The author gratefully acknowledges the assistance of Miss S. Yoshida in the preparation of the manuscript.

References

- ARAKI, S. & MURATA, K. (1984) Suicide mortality in Japan: changes during the past 15 years and the effects of social and demographic factors (in Japanese, English summary). *Jap. J. publ. Hlth*, **31**, 651.
- ARAKI, S. & MURATA, K. (1986) Suicide mortality in Japan: analysis of the unusual secular trends. *Tohoku J. exp. Med.* **149**, 205.
- ARAKI, S. & MURATA, K. (1987) Suicide in Japan: socioeconomic effects on its secular and seasonal trends. *Suicide Life-Threat. Behav.* **17**, 64.
- BOOR, M. (1980) Relationship between unemployment rates and suicide rates in eight countries, 1962–1976. *Psychol. Rep.* **47**, 1095.
- CORMIER, H. J. & KLERMAN, G. L. (1985) Unemployment and male–female labor force participation as determinants of changing suicide rates of males and females in Quebec. *Social Psychiat.* **20**, 109.
- FUKUTAKE, T. (1989) *The Japanese Social Structure*. University of Tokyo Press, Tokyo.
- JAPAN ECONOMIC PLANNING AGENCY (1987) *Annual Report on National Accounts* (in Japanese). Ministry of Finance Printing Office, Tokyo.
- JAPAN MINISTRY OF HEALTH AND WELFARE (1955–88) *Vital Statistics 1953–1986, Japan* (in Japanese). Kousei Toukei Kyokai, Tokyo.
- JAPAN MINISTRY OF LABOUR (1987) *Annual Report on Labour Economics* (in Japanese). Nippon Roudou Kyoukai, Tokyo.
- KANAMORI, H. & KOUSAI, Y. (1989) *Nippon Keizai Tokuhon* (in Japanese), *Introduction to Economic Trends in Japan*, pp. 141–166. Toyo Keizai Shinpo Shya, Tokyo.
- KREITMAN, N. & PLATT, S. (1984) Suicide, unemployment, and domestic gas detoxification in Britain. *J. Epidemiol. commun. Hlth*, **38**, 1.
- KUROSAKA, Y. (1988) *Macro-economic and Labour Market in Japan: Analysis from Supply-side Economics* (in Japanese). Toyo Keizai Shinpo Shya, Tokyo.
- PLATT, S. (1984) Unemployment and suicidal behaviour: a review of the literature. *Social Sci. Med.* **19**, 93.
- PLATT, S. & KREITMAN, N. (1984) Trends in parasuicide and unemployment among men in Edinburgh, 1968–82. *Br. med. J.* **289**, 1029.
- STACK, S. (1981) Divorce and suicide: a time series analysis, 1933–1970. *J. fam. Issues* **2**, 77.
- UEDA, F. (1988) *Epidemiology of Suicide in Japan* (in Japanese), pp. 20–51. Kanehara Shuppan, Tokyo.
- VIGDERHOUS, G. & FISHMAN, G. (1978) The impact of unemployment and familial integration on changing suicide rates in the U.S.A., 1920–1969. *Social Psychiat.* **13**, 239.
- WASSERMAN, I. M. (1984) The influence of economic business cycles on United States suicide rates. *Suicide Life-Threat. Behav.* **14**, 143.

Received 5th April 1990