

## TECHNICAL NOTE

### GENERAL

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# Study of an Economic Issue as a Possible Indicator of Suicide Risk: A Discussion of Stock Prices and Suicide

**ABSTRACT:** There were more than 30,000 suicides in 1998 in Japan, and since then, the numbers have remained high. In 2009, the number of suicides per a day was *c.* 90. This phenomenon constitutes a major social problem. One of the major reasons for the rapid increase in the number of suicides appears to be the worsening economic problems. It is therefore necessary to research the relationship between economic issues and suicide. In this study, we examined the relationship between the value of the Nikkei Stock Average and suicide rates in Japan. The value of the Nikkei Stock Average may be related to suicide among men. On the basis of the results, relevant researchers and organizations should understand the factors that relate to suicide to better carry out specific suicide prevention measures.

**KEYWORDS:** forensic science, suicide, stock prices, economy, relationship, social, prevention

In Japan, there were more than 30,000 suicides in 1998 according to the report by the National Police Agency, and the report indicated that the number was *c.* 33,000 in 2009 (1). As such, there were *c.* 90 suicides per day in 2009 in Japan. At present, the suicide problem in Japan is very serious, and effective prevention measures are necessary to decrease the number of suicides. Various researchers (2–4) have indicated that the main reason for the increase in suicide numbers in Japan in recent years is the increase in the number of suicides among middle-aged men. It has been indicated that one of the causative factors of the increase in suicide among middle-aged men is economic problems (2,5,6). In previous reports of the association between suicide and economic problems in the world, socioeconomic factors were found to have a strong impact on suicide in the target group of this study in Hong Kong (7). Kurian (8) has described that while nonrural areas in India have shown economic development, rural areas have become economically depressed, and there has been a major agrarian distress resulting in farmer suicides. One report (9) has described that economic conditions have a strong influence on family matters and that children are particularly influenced by such changes. Almasi et al. (10) have shown the relationships between experiences of individuality since the restructuring of the economy and suicide in Hungary, and have indicated that the unemployment history since 1990 and the present concerns in work outlook were risk factors. In three regions of the United Kingdom and Ireland during the study periods, social factors were found to be fair predictors of suicide rates among men, and their rates were fair predictors of suicide rates among women in England and Wales and in Ireland

(11). Suicide rates are significantly related to unemployment rates in South Korea (12), and further prevention measures regarding these problems are important. Among the elderly in South Korea, “low social economy condition” is one of the items related to depression (13).

In Japan, some researchers (14–16) have reported the possibility of a relationship between unemployment and suicide. It is also, however, important to discuss economic issues other than unemployment that may be related to suicide risk in Japan. Therefore, based on this study, we discuss herein the relationship between stock prices and suicide in Japan.

### Material and Methods

We researched annual suicide rates (per 100,000 population) among both sexes, men, and women over a 25-year period in 1984–2008 in Japan according to a report by vital statistics of the Ministry of Health, Labour and Welfare in the Cabinet Office (17). We also researched the value of the Nikkei Stock Average (last value at the end of the year, in yen) during the same years in the *Journal of Health and Welfare Statistics* (18). We calculated the relationship between the value of the Nikkei Stock Average and suicide rates using single regression analysis in an Excel spreadsheet.

### Results

During the study period, annual suicide rates ranged from a minimum of 16.1 to a maximum of 25.5 among both sexes, from a minimum of 20.4 to a maximum of 38.0 among men, and from a minimum of 10.9 to a maximum of 14.9 among women (per 100,000 population). The value of the Nikkei Stock Average ranged from a minimum of 8579 to a maximum of 38,916 (yen). The correlation coefficient between annual suicide rates and the value

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of the Nikkei Stock Average was  $r = -0.591$  among both sexes,  $r = -0.642$  among men, and  $r = -0.092$  among women. The value of the Nikkei Stock Average was clearly related to the annual suicide rates among both sexes ( $R^2 = 0.3496$ ,  $p = 0.002$ ,  $y = -0.0003x + 25.976$ ) (Fig. 1). The value of the Nikkei Stock Average was also clearly related to the annual suicide rates among men ( $R^2 = 0.4121$ ,  $p < 0.001$ ,  $y = -0.0006x + 39.454$ ) (Fig. 2). The value of the Nikkei Stock Average was not related to the annual suicide rates among women ( $R^2 = 0.0085$ ,  $p = 0.661$ ,  $y = -1.5E-05x + 13.135$ ) (Fig. 3).

## Discussion

These results indicated that the value of the Nikkei Stock Average may be related to suicide rates among men, however,  $R^2 = 0.4121$  among men. The male/female ratio of suicides in

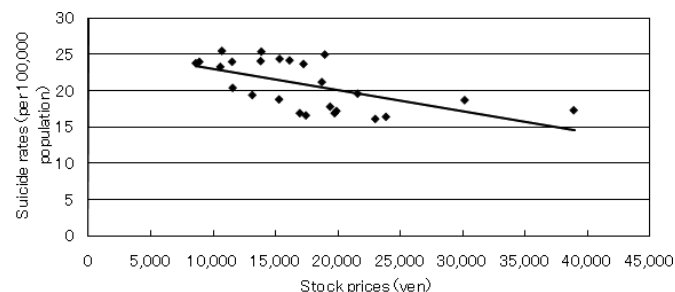


FIG. 1—The relationship between the last value at the end of the year of the Nikkei Stock Average and annual suicide rates among both sexes from 1984 to 2008 in Japan.

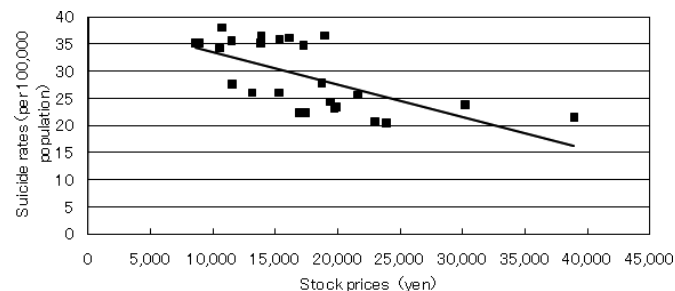


FIG. 2—The relationship between the last value at the end of the year of the Nikkei Stock Average and annual suicide rates among men from 1984 to 2008 in Japan.

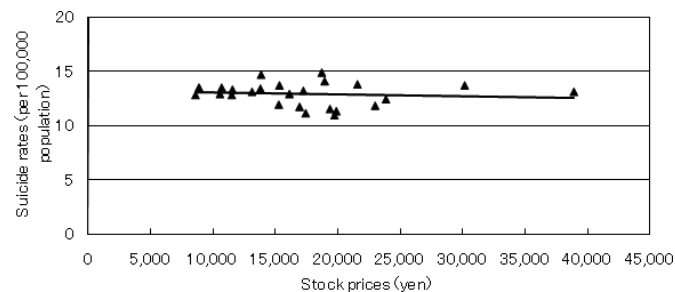


FIG. 3—The relationship between the last value at the end of the year of the Nikkei Stock Average and annual suicide rates among women from 1984 to 2008 in Japan.

Japan during the study period ranged from *c.* 1.6 to 2.8, so the results for the relationships between the value of the Nikkei Stock Average and annual suicide rates among both sexes considerably reflect the trend among men. Discussion in some prefectures in Japan showed that suicides among men were a very serious matter in relation to “economic and life problems” (19,20). Hence, we think that stock prices may be related to suicide rates among men.

A previous report (21) has indicated that recent years have represented a revolutionary period for industry and the economy and that they have also corresponded to an economic depression. As such, recent years have also shown an increase in industrial stress as well as increases in the number of health disorders related to industrial stress. Yamamoto (22) indicated that there has been an increase in the number of suicides in workers of prime working age and that there has been an increased rate of workers with strong anxiety, worry, and stress because of both economic depression and changes in the industrial structure. It has been reported (23) that the decrease in suicide rates from *c.* 1956 to 1967 in Japan was thought as a result of high economic growth. In contrast, when unemployment rates increase, people experience more stress (16), so the opposite tendency for the relation between suicide and unemployment described in the present study could reasonably have been assumed.

We think that it is important to show specific suicide prevention measures based on clear results in Japan. The present results indicate suggest that all fields related to suicide prevention should take account of the trends in stock values for suicide prevention measures, especially among men. In addition, they should be aware of the issues that may be related to suicide risk, including unemployment, depression, and alcohol dependence (16,24,25), and corresponding from various aspects is important for their risk.

We conclude that researchers and people working in the area of suicide prevention should understand the factors related to suicide, including the present result, and use this understanding to carry out continuous suicide prevention measures to decrease suicide.

## Limitations

In the present report, we discuss the relationships between the last value at the end of the year of the Nikkei Stock Average and annual suicide rates. We think that this report is the first step in a discussion of the relationship between stock prices and suicide in Japan. We believe that the present report provides important information for suicide prevention efforts.

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