

## Executive Summary

This study was designed to investigate elderly suicides in terms of regional differences and risk factors at regional-level. To this end, risk factors that affect elderly suicide were investigated at regional-level, and characteristics of risk factors in the regions with high and low standardized mortality rates(SMRs) were analyzed using the number of elderly suicides from 2006 to 2010 as well as mid-year population in 2008.

To select the risk factors that affect elderly suicide, key words including 'elderly', 'suicide', and 'risk factor' were searched from reviews or systemic reviews in the search database PubMed. Based on the final selected literatures, risk factors that appeared to affect elderly suicide were classified into psychiatric/psychological factors, biomedical factors, life experiences, socio-environmental factors, and demographic characteristics. Among those risk factors identified, final risk factors were selected based on the availability of the city/town/district level data and advices from the experts. The final selected risk factors included the followings: depression, insomnia, stress, suicidal ideation, and suicidal attempt as psychiatric/psychological factors; chronic disease, cancer, and physical activity status as biomedical factors; social activity status, family relationship, employment status, economic independence status, health care service usage level, urbanization rate, elderly welfare, population density, population movement, regional economic level, quality of life, health care service accessibility, and comprehensive measures for suicide prevention as socio-environmental factors; regional suicide history as life experiences; and gender, age, religion, marital status, smoking, drinking, and educational attainment as demographic characteristics. The source of data for risk factors

included regional Community Health Survey, Population and Housing Census, National Statistical Office's e-regional index, statistical data for current medical institution status provided by the Health Insurance Review & Assessment Service, and '2012 guidance for mental health services' issued by the Ministry of Health and Welfare.

From the cause of death data between 2006 and 2010, 18,748 elderly people at the age of 65 or above whose disease and cause of death was coded as intentional self-harm were selected for analysis ([ICD-10] codes X60-X84). Suicide rate per 100,000 persons by age, based on the mid-year population as of 2008, showed that the suicide rate per 100,000 persons increased with age; while the suicide rate per 100,000 persons was 144.7 persons at the overall age, it was 306.3 persons at the age of 65 to 74, 490.8 persons at the age of 75 to 84, and 649.4 persons at the age of 85 or above. This indicates notably higher suicide rate per 100,000 persons in elderly population at the age of 65 or above. As for the characteristics of those who committed suicide, the majority at the age of 65 or above was engaged in agriculture, forestry, or fishery, 40.2% were bereaved, and 71.6% were uneducated or graduated elementary school. Cause of death was pesticide in 20.8% for the overall age and 37.9% for the age of 65 or above, while hanging, strangulation, and suffocation accounted for a relatively lower percentage of 39.3%.

Based on the number of suicides and mid-year population by district for 248 districts as of 2007, the SMRs ranged 0.15 to 2.4. Based on the SMRs calculated, characteristics of 25 regions each of higher/lower rates were examined. As for the characteristics of elderly suicides, there were significant differences between regions with high and low rates in terms of occupation, marital status, and educational attainment, and place and cause of death also showed significant differences. Notably, in terms of place of death, the majority was medical institutions in

46% among the 25 regions with the highest rates. In terms of cause of death, the majority was hanging, strangulation, and suffocation in 39.4% among the 25 regions with the lowest rate regions, whereas pesticide was the most frequent cause of death in 56.2% among the 25 regions with the highest rate. As for the regional characteristics of risk factors, the following risk factors indicated significant differences between the high and low rate regions: sleep time as a psychiatric/psychological factor; chronic disease and physical activities as biomedical factors; employment/occupation and health care service usage level as socio-environmental factors; educational attainment, smoking, living alone, religion, urbanization rate, welfare budget level, welfare benefit recipient status, population density, number of medical institutions, and population movement as demographic characteristics.

By considering spatial correlations, Conditional AutoRegressive (CAR) model, one of the Bayesian spatial models, was used to find out significant regional characteristics for elderly suicide. When the CAR model was applied by using risk factors, excluding the factor with the greatest correlations with other risk factors, the risk factors assumed to affect elderly suicide included physical activities, smoking rate, percentage of people who attempted suicide, mean educational attainment, quality of life, and percentage of the elderly who live alone. Of those, physical activities, educational attainment, and percentage of the elderly who live alone had negative relationship with the SMRs whereas smoking rate, percentage of people who attempted suicide, and quality of life indicated positive relationship.

For future development of policies to prevent elderly suicide at the regional level, it is deemed necessary to establish measures to prevent elderly suicide based on these study results.