

Article

Analysing the Impacts of Financial Expenditure of Prefectures on Methods of Suicide Completion in Japan

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Abstract: Recently, several studies reported that the governmental financial expenditures play important roles in the prevention of increasing suicide mortalities; however, the specific regional policies, designed dependent on regional cultural, economic, education and welfare backgrounds, affect suicide mortality by a specific suicidal means. Therefore, the present study determined the impacts of the regional governmental expenditure of six major divisions, “public health”, “public works”, “police”, “ambulance/fire services”, “welfare” and “education” on suicide mortalities by five major suicidal means, “hanging”, “poisoning”, “charcoal burning”, “jumping” and “throwing”, across the 47 prefectures in Japan during 2009–2018 using fixed-effect analysis of hierarchical linear regression with robust standard error. The expenditures of “ambulance/fire services” and “education” indicated the negative relation to suicide mortalities by wide-spectrum suicidal means, whereas expenditures of “public works” did not affect suicide mortalities. In the education subdivisions, expenditure of “kindergarten” and “elementary school” indicated the impacts of reduction of suicide mortalities, whereas the expenditures of “special school” for individuals with disabilities unexpectedly contribute to increasing suicide mortalities by poisoning, charcoal burning and throwing of females. Regarding subdivisions of welfare, expenditure of “child welfare” and “social welfare” contributed to a reduction in suicide mortalities, but expenditure of “elderly welfare” surprisingly contributed to increasing suicide mortalities. Furthermore, expenditures of welfare subdivision abolished the negative impacts of the expenditures of educational subdivisions, kindergarten and elementary school, but the positive impact of expenditure of special school on female suicide mortalities was not affected. These results suggest that most Japanese people are struggling to care for children even in the situation of an increasing elderly population with a decreasing birthrate. Therefore, it is important to enhance the investment welfare policy for the future to improve the childcare environment. The results demonstrated by this study suggest that the scientifically evidence-based redistributions of welfare expenditure in regional government, at least partially, provide improvement of Japanese society and welfare systems, under the continuous severe Japanese social concerns associated with increasing elderly population with a decreasing birthrate.

Keywords: suicide mortality; Japan; governmental expenditure; welfare; education



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1. Introduction

Suicide is considered to be a phenomenon composed of a complex of various factors, such as psychotic disorders (psychosis, anxiety and mood disorders), religion/morals, wellbeing/hopelessness, genetics and various exogenous factor including socioeconomic and psychosocial situations, and strategies for suicide prevention including, not only risk factors, but also protective factors are considered to be important for reducing suicide mortality [1,2]. Although suicide mortality (standard mortality ratio: SMR) in Japan had remained in the twenties per 100,000 populations during 1978 to 1997, whereas suicide mortality drastically increased from 18.8 to 25.4 in 1998 [3–5]. This drastically increasing suicide mortality synchronised with the 1998 Asian Economic Crisis that persisted until

2009. The Japanese people demanded governmental political/financial support for enhancement of the national suicide prevention programme [4–7]. Against Japanese public health crisis, the Japanese government commenced to contribute ‘Emergency Fund to Enhance Community-Based Suicide Countermeasure’ (EFECBSC) in 2009 to regional governments (prefectures and municipalities) for development of regional suicide prevention programmes [5,6,8–10]. In particular, in spite of deterioration of various macroeconomic indicators induced by the 2008 global financial crisis, this persistent reduction of suicide mortality between 2009 and 2019 in Japan is a notable historical fact [3,5,9,10]. The historical context in Japan suggests that governmental financial expenditures can contribute to reduction of suicide mortality [9–12].

Contrary to Japan, in several countries in EU, such as UK, Greece, Ireland, Portugal and Spain, which implemented austerity after the 2008 global financial crisis, the suicide mortalities increased after the 2008 global financial crisis [13–24]. The relationship between austerity policies of UK government and increasing suicide mortality after the 2008 global financial crisis has been reported in several studies [22,23]. The coalition government in UK implemented austerity and welfare reform policies to improve public deficits due to the 2008 global financial crisis during 2010–2012 [20]. The austerity and welfare reform policies immediately improved various macroeconomic indicators in 2011, whereas the severe cuts regional governmental expenditures adversely affected various regional welfare services, especially to disabilities and lower income households, resulting in persistent increasing suicide mortality even after economic recovery in UK [22–24]. These different fluctuations of suicide mortalities between Japan and UK suggest that the governmental expenditures for regional welfare probably have important roles in the prevention of increasing suicide mortality [11].

We have reported that the governmental financial expenditures for enhancement regional suicide prevention programmes, such as EFECBSC, played fundamental roles as a trigger for the reduction of suicide mortality in Japan, which had remained to be at a high level for more a decade [9,10,12,25]; however, the mechanism by which a stable and sustained reduction of suicide mortality in Japan between 2009 and 2019 has not been clarified. Recently, we reported that the conversion of governmental welfare policy, shifted from emphasis on elderly welfare to emphasis on childcare welfare against the declining birthrate in 2015 (‘Outline of Measures for Society with Decreasing Birth Rate’ adopted by the Cabinet [26]) probably contributed to decreasing suicide mortality as a fortunate unintentional by-product [11]. Similar to Japan, several studies also reported that increasing governmental financial support possibly played important roles in the reduction or prevention of increasing suicide mortalities in Asian and European countries and the USA. Indeed, the increasing governmental expenditures to public health, welfare, education and employment was related to the reduction of suicide mortality in India [27]. The enhancement of governmental support to the social welfare facilities for the elderly people was effective for reduction of suicide mortality in the regions with higher proportion of elderly residents at risk of suicide, in South Korea [28]. The vocational rehabilitation programmes contributed to decreasing suicide mortality due to the suppression of social isolation by unemployment, supporting individuals to continue to integrate to society in Italy [29,30]. Financial contribution to Medicaid was related to facilitating access to health care, resulting in decreasing suicide mortality in the USA [31]. An enhancement in participating states to supplemental nutrition-assistance programmes (supports individuals with low/no incomes) to purchase food also contributed to decreasing suicide mortality in the USA [24].

The increase in annual suicide mortality in 2020 gave impacted a number of specialists associated with suicide prevention programmes in Japan [32]. The male suicide mortality in Japan also decreased in 2020 compared to 2019, from 14,078 to 13,943, but that of females increased from 6091 to 6976 [3]. The analysis of gender-related suicide mortality indicated the incomprehensible results more than our expectations [32–38] that the suicide mortality of males has been decreasing, but that of females increased 4% [32,34,35,37,38]. Moreover,

the increase in suicide by hanging seemed to contribute to increase in the suicide mortality of females [3,32]. It is well known that the most dominant place and tools of hanging suicide, which is the most frequent suicidal means in Japan [5,25], were the living places of individuals, and daily necessities, such as belts, electric flex, rafters/beams, bannisters, hooks, doorknobs and trees, respectively [25,39]. Means restriction is established the one of the most cost-effective suicide prevention methods against several means, such as poisoning, jumping, throwing, charcoal and gun [39–48]. Comprehensive suicide prevention programmes in Japan have enhanced welfare and safety nets systems in regional community, rather than means restriction [6,8–10]. The strategy of Japanese suicide prevention programmes is based on the fact that the most frequent suicide method was hanging in Japan [3,25]. Hanging suicide has been well known to be hardly regulated by means restriction [3,39], due to its characteristics that can be easily carried out in daily life place with daily necessities [25]. Indeed, EFECBSC cost-effectiveness analysis demonstrated that the enhancement of gatekeeper development and enlightenment programmes contributed to the reduction of hanging suicide mortality of males, whereas hanging suicide mortality of females was decreased by personal consultation programmes [25].

During the COVID-19 pandemic, the regional suicide programmes, except for telephone consultation programme, are stagnated by governmental stay-home orders to prevent COVID-19 pandemic. Therefore, it is not possibly unrelated that the suppression of gatekeeper development, enlightenment and personal consultation programmes increased hanging suicide under the COVID-19 pandemic. Recently, Japanese government provided various public support for people in need of living means such as “support for independence of people in need of living”, “special loan such as emergency small-lot funds”, “benefit for securing housing” and “extraordinary special benefits for child-rearing households” [49,50]. These government life support systems can be expected to suppress increasing suicide mortality induced by need of livelihood supports due to the pandemic. Recently, we reported that expenditures of child welfare contributed to reducing suicide mortalities of both males and females in a wide-age spectrum, but increasing expenditures for elderly welfare increased suicide mortality [11]. Therefore, understanding the characteristics of governmental expenditures on suicide mortalities disaggregated by suicide means can provide a higher cost-effective concept against increasing hanging suicide during the pandemic in situations that suppress both gatekeeper development and enlightenment programmes and expanding regional governmental expenditures. Based on the background, the present study determined the relationship between regional governmental expenditures and suicide mortalities disaggregated by suicide means between 2009 and 2018 using hierarchical linear regression with robust standard error.

2. Materials and Methods

2.1. Independent Variables

Financial expenditures of regional governments (prefectures and municipalities) were acquired from the ‘Survey of Local Public Finance Settlement’ (SLPFS) from ‘System of Social and Demographic Statistics of the Statistics Bureau of the Ministry of Internal Affairs and Communications’ (SBMIAC) [51,52]. In SLPFS, the regional governmental expenditure for regional residents’ services are divided into six major divisions, such as “public health”, “public works”, “police”, “ambulance/fire services”, “welfare” and “education” [51,52]. The present study analysed the expenditure per capita of six divisions and the expenditure rates per the total amount of the regional governmental expenditure as independent variables [52]. SLPFS published the expenditure per capita of six divisions.

In the subdivision of welfare, the expenditures per capita of social welfare and social education were calculated by dividing their expenditure by the prefectural population (denominator). Expenditure per capita of the elderly welfare, child welfare, and livelihood welfare were calculated by dividing expenditure by populations (denominator) of individuals older than 65 years old, younger than 18 years old and assisted by livelihood protection, respectively. Expenditure per capita of kindergarten, elementary, junior high,

and senior high schools were calculated by dividing expenditure by the number of students in schools [52].

The expenditure of public health in prefectures/municipalities is composed of mainly two types of supports, medical/health (enlightenment for mental health and mental medical planning) and maintenance of regional hygiene environmental (collecting and disposing of general waste) [52].

The expenditure of public works in prefectures/municipalities comprises the new public facility constructions and the maintenance existing works, including roads, bridges, parks and sewers [52].

The expenditure of police is mainly prefectural spending. Police expenditures is composed of the salaries of police officers, police construction, projects, and traffic signals, in order to maintenance of regional public peace, safety, and protect the lives and property of individuals (prevention of crime and ensure traffic safety) [52]. The expenditure of ambulance/fire services of municipalities comprises the salaries of fire-station officers, ambulance attendants, station construction and fire trucks and ambulances, in order to protect individuals from disasters, for emergency cases, and sudden deterioration of health [52].

The education expenditure of prefectures and municipalities is composed of the construction of new facilities and improvement of existing educational facilities, and the salaries of educational staff. Especially, SLPFS published the subdivided expenditures of social education (facilities for social-education, such as public halls, libraries, and museums), elementary-school education, junior-high-school education, senior-high-school education, special-school education (schools for the education of special-needs individuals of prefectures), and kindergarten-school education [52].

The expenditure of welfare in prefectures/municipalities is composed of subdivisions of social welfare, elderly welfare (65 years old and over), child welfare (younger than 17 years old), livelihood welfare (for livelihood-protection individuals) to enhance the social welfare system [51,52]. Social welfare includes welfare for individuals with disabilities and welfare assistance for unclassifiable subjects.

2.2. Dependent Variables

The annual numbers of suicide victims of each prefecture in Japan between 2009 and 2018 were obtained from the 'Basic Data on Suicide in the Region' (BDSR) in the national database of the 'Ministry of Health, Labour and Welfare' (MHLW) [3]. BDSR published the numbers of annual suicide victims on the basis of the categorised groups caused by mainly five types of suicidal means, which was classified by police: hanging, charcoal burning, jumping from high places (jumping), poisoning, and jumping/lying before moving object (throwing) suicide [3]. Annual prefectural suicide mortalities caused by suicide means are calculated by dividing the number of suicide victims per prefectural population (denominator) of the same years. Prefectural population was obtained from the 'Regional Statistics Database' of SBMIAC [53]. To eliminate the artefacts induced by small prefectural population, prefectural suicide mortality was calculated by using the empirical Bayes standardised mobile ratio method by using the empirical Bayes estimator for the Poisson/gamma model (ver 2.1) (National Institute of Public Health, Wako, Japan) (https://www.niph.go.jp/soshiki/gijutsu/download/ebpoig/index_j.html (accessed on 17 December 2021)) [9,11,12,25,54,55]. Annual standardised death rates for the suicide mortality (SDR) of males, females, and both genders (males plus females) were calculated on the basis of the Japanese age-dependent population composition in 2009 for males and females [9,11,12,25,55].

2.3. Statistical Analysis

The present study analysed the effects of expenditure of six major divisions and the subdivisions of welfare and education on suicide mortality, disaggregated by genders and suicidal means in Japan by fixed effects for prefectures using a hierarchical linear regression

with robust standard error (HLM7, Scientific Software International, Skokie, IL, USA). Additionally, the present study adopted robust standard errors clustered by prefectures to prevent heteroscedasticity and autocorrelation [55].

A four-step strategy was implemented for data analyses. The first step, the financial expenditure ratios of prefectures/municipalities and suicide mortalities disaggregated by suicidal means was analysed by hierarchical linear regression model with robust standard errors clustered at the prefectural level using HLM7 (Model-1) [11,55]. The second step, the regional financial expenditure per capita of six divisions and suicide mortalities disaggregated by caused by suicidal means was analysed (Model-2). The third step, the regional financial expenditure per capita of divisions with education subdivisions and suicide mortalities disaggregated by suicidal means was analysed (Model-3). The fourth step, the regional financial expenditure per capita of divisions with subdivisions of education and welfare and suicide mortalities disaggregated by suicidal means was analysed (Model-4).

It is well known that suicidal means exhibit specific characteristics depending on the living environment (urban or industrial structure) [56–59]. Poisoning is the predominant suicidal means in agricultural area, whereas both jumping and throwing are dependent on the urban structures, such as high-rise building and public transports, respectively [41,56–59]. Therefore, the trends of suicide mortalities by the major 5 suicidal means disaggregated by region and gender factors were linear mixed-effect model (LMM) and analysis of co-variance (ANCOVA) using BellCurve for Excel v.3.2 (Social Survey Research Information Co., Ltd., Tokyo, Japan) [11,25,60,61]. In the present study, among the metropolitan regions defined by the Ministry of Internal Affairs and Communications, nine prefectures included in the metropolitan regions with a population of more than 5 million populations were designated as metropolitan regions [52].

3. Results

3.1. *Effects of Ratio of the Expenditure of Six Divisions per Total Amount of the Regional Governmental Expenditure on Suicide Mortalities Disaggregated by Major Five Means (Model-1)*

The hierarchical linear-regression model detected positive or negative effects of ratio of the expenditure of six divisions (public health, public works, police, ambulance/fire, welfare and education) per the total amount of the regional governmental expenditure on the suicide mortalities disaggregated by five major suicide means (hanging, poisoning, charcoal burning, jumping and throwing suicide) of both genders (male + female), males and females (Figure 1). Expenditures of public health and police service were negatively related to wide-ranged suicide mortalities (Figure 1). Expenditure of public health contributed to decreasing suicide mortalities of males disaggregated by hanging, poisoning and charcoal burning, and those of females by all five means (Figure 1). Expenditures of police service contributed to decreasing suicide mortalities of males disaggregated by hanging, poisoning, charcoal burning and throwing, and those of females by poisoning, charcoal burning and jumping (Figure 1). In contrast, expenditures of public works and fire/ambulance service were positively related to several types of suicide mortalities (Figure 1). Expenditure of public works contributed to increasing suicide mortalities of males by hanging, and those of females by hanging, charcoal burning and throwing (Figure 1).

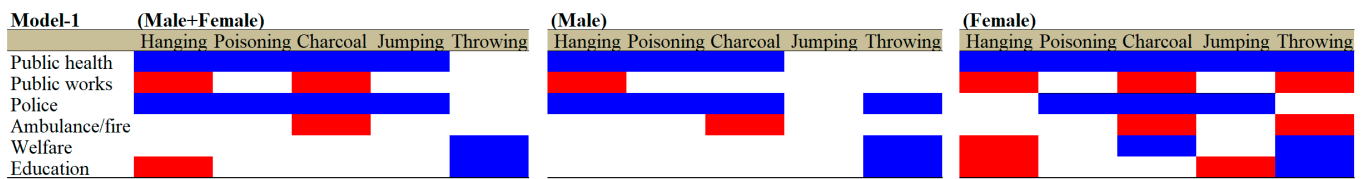


Figure 1. Impacts of total amount of the financial expenditure of six divisions (public health, public works, police, ambulance/fire, welfare and education) prefectures/municipalities on suicide mortalities by five major suicide means (hanging, poisoning, charcoal burning, jumping and throwing suicide) of both gender (males plus females), males and females between 2009 and 2018 using fixed-effect model analyses of hierarchal linear regression with robust standard error. Blue and red columns, significant factors for decreasing and increasing suicide mortalities, respectively.

3.2. Effects of Regional Expenditure of Six Divisions per Capita on Suicide Mortalities Disaggregated by Major Five Means (Model-2)

The hierarchical linear-regression model detected positive or negative effects of expenditure of six divisions (public health, public works, police, ambulance/fire, welfare and education) per capita on the suicide mortalities by five major suicide means (hanging, poisoning, charcoal burning, jumping and throwing suicide) of both genders (males + females), males and females (Figure 2).

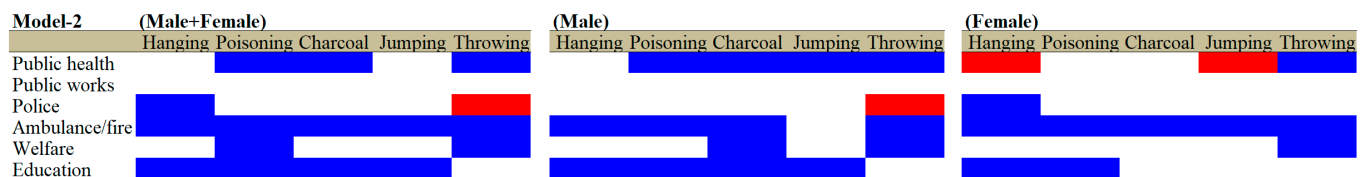


Figure 2. Impacts of expenditure of six divisions per capita (public health, public works, police, ambulance/fire, welfare and education) prefectures/municipalities on suicide mortalities by five major suicide means (hanging, poisoning, charcoal burning, jumping and throwing suicide) of both gender (males plus females), males and females between 2009 and 2018 using fixed- or random-effect analyses of hierarchal linear regression with robust standard error. Blue and red columns, significant factors for decreasing and increasing suicide mortalities.

Expenditures of public health, ambulance/fire service and education per capita were negatively related to wide-ranged suicide mortalities of males, whereas expenditure of police service per capita was positively related to throwing suicide mortality of males (Figure 2). Expenditure of ambulance/fire service and education per capita were also negatively related to wide-ranged suicide mortalities of females, whereas expenditure of public health per capita was positively related to both hanging and jumping suicide mortalities of females (Figure 2).

Notably, the impacts of expenditures of public health and education on hanging suicide mortality of females were reversed between Model-1 and Model-2 (Figures 1 and 2). Ratio of expenditures of public health per total regional amounts of expenditures decreased hanging suicide mortality of females in Model-1 (Figure 3(B1)), but expenditures of public health per capita increased in Model-2 (Figure 3(B2)). Expenditures of education per total amount of regional financial expenditures increased hanging suicide mortality of females in Model-1 (Figure 3(D1)), but expenditure of education per capita decreased in Model-2 (Figure 3(D2)). The impact of expenditures of public health per capita on hanging suicide mortality of males was not observed in Model-2 (Figure 3(A2)), but ratio of expenditures of public health per total regional amounts of expenditures decreased hanging suicide mortality of males in Model-1 (Figure 3(A1)). The impact of expenditures of education per total amounts regional governmental expenditures on hanging suicide mortality of

males was not observed in Model-1 (Figure 3(C1)), but expenditures of education per capita decreased hanging suicide mortality of males in Model-2 (Figure 3(C2)).

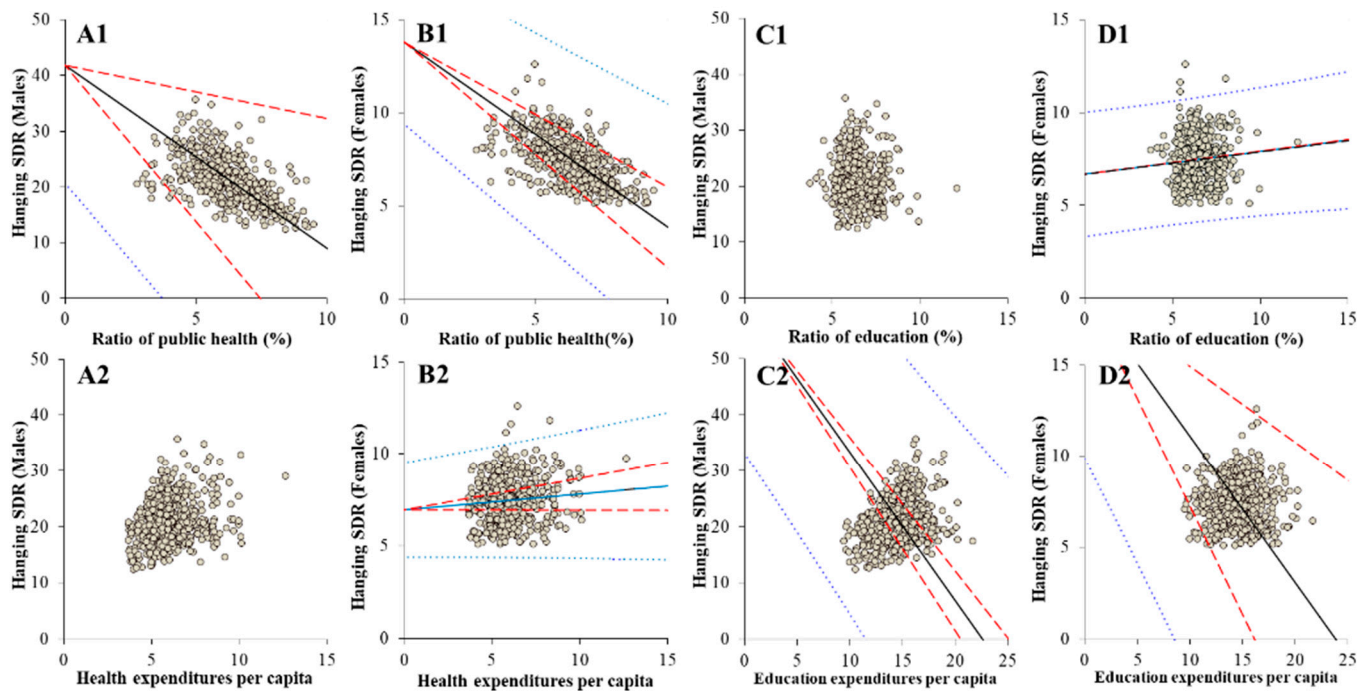


Figure 3. Correlation between expenditures of public health and education of ratio per total amount regional financial expenditure (upper panels: (A1–D1)) and per capita (lower panes: (A2–D2)), and suicide mortality of males and during 2009–2018 using fixed- or random-effect analysis of hierarchal linear regression with robust standard error. Ordinates indicate death rates for suicide mortality based on Japanese age-dependent population composition in 2009 (SDR) of males and females per 100,000 population. Abscissas in upper panels (A1–D1) indicate the ration of amounts of financial expenditures of public health (A1,B1) and education (C1,D1) per total amount of regional governmental expenditures (%). Abscissas in lower panels (A2–D2) indicate the expenditures of public health (A2,B2) and education (C2,D2) per capita (JPY 10,000). Black, red and blue lines indicate the significant slope of fixed effects, standard deviation of fixed effects and fixed effects with random effects, respectively.

These discrepancies of impacts of between expenditures ratio per total amounts regional governmental expenditures and expenditures per capita on suicide mortality were observed in the analysing the impacts of expenditures of suicide mortalities disaggregated by age and gender factors, but the impacts of the expenditure per capita on the kinetics of suicide mortalities is more reflect the actual result than those of total expenditures [11]. Therefore, the present study analysed the expenditures per capita as independent variables in Model-3 and Model-4.

3.3. Effects of Expenditure per Capita of Divisions and Subdivision of Education on Suicide Mortalities by Five Major Means (Model-3)

The SLPFS makes available expenditure of six subdivisions of education per capita, including elementary school, junior high school, senior high school, special school, kindergarten school and social education [51,52]. Therefore, in Model-3, the replacement of education expenditure with expenditures of six education subdivision analysed the impacts of regional financial expenditures on the suicide mortality, in order to understand the impacts of expenditure of these six subdivisions of education on suicide mortality.

As a result of analysing that education expenditures were replaced to six subdivisions, the impacts of expenditures of 5 divisions except for education on suicide mortalities

by means displayed only slight limited changes. In particular, the significant negative impacts of expenditures of public health on suicide hanging mortality of males and welfare on charcoal burning suicide mortality of males were abolished in Model-3 (Figure 4). The expenditures of welfare decreased charcoal burning suicide mortality of females in Model-3 which was not detected in Model-3 (Figure 4).

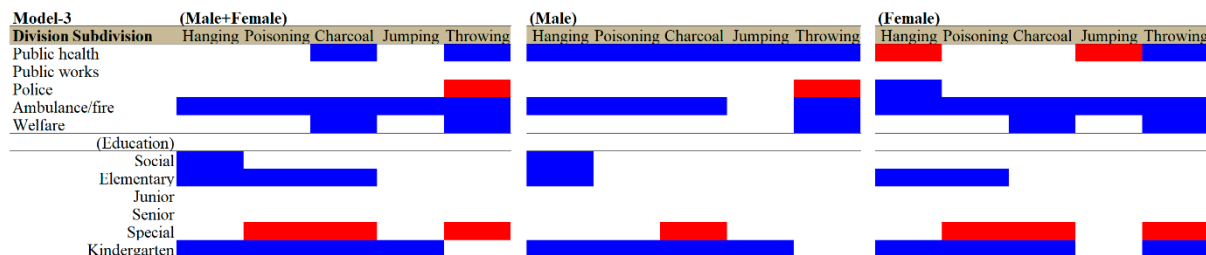


Figure 4. Impacts of expenditure of five major divisions (public health, public works, police, ambulance/fire and welfare) and education subdivisions per capita on suicide mortalities by five major suicide means (hanging, poisoning, charcoal burning, jumping and throwing suicide) of both gender (males plus females), males and females between 2009 and 2018 using fixed- or random-effect analyses of hierarchal linear regression with robust standard error. Blue and red columns, significant factors for decreasing and increasing suicide mortalities.

Regarding expenditures of education subdivisions, expenditures of kindergarten school per capita were negatively related to wide-ranged suicide mortalities of males (hanging, poisoning, charcoal burning and jumping) and suicide mortalities of females (hanging, poisoning, charcoal burning and throwing) (Figure 4). Contrary, expenditure of special school education was negatively related to suicide mortalities of females by poisoning, charcoal burning and throwing without affecting any suicide mortalities of males (Figure 4).

3.4. Effects of Expenditure per Capita of Divisions and Subdivision of Education and Welfare on Suicide Mortalities by Five Major Means (Model-4)

The SLPFS makes available also expenditure of four subdivisions of welfare per capita, including social welfare, elderly welfare, children welfare and livelihood [51,52]. In Model-4, the replacement of welfare expenditure with expenditures of four welfare subdivisions analysed the effect of regional financial expenditures on the suicide mortality, in order to understand the impacts of expenditure of these four subdivisions of welfare on suicide mortality.

The replacement of welfare expenditure with expenditures of four welfare subdivisions abolished the significant negative relations of expenditures of public health on several suicide mortalities of males in Model-3, including hanging, poisoning and jumping, but abolished the significant negative relations of expenditures of ambulance/fire service on hanging suicide mortality of females in Model-3 (Figure 5). The significant relations of expenditures of education subdivisions on suicide mortalities of males and females were affected by the replacement of welfare expenditure with expenditures of four welfare sub-divisions. The impacts of social education on suicide mortalities of males and females were tended to be positive induced by the replacement to welfare subdivisions (Figure 5). The negative impacts of kindergarten school education on wide spectrums of suicide mortalities of males and females in Model-3 were also abolished in Model-4 (Figure 5). The negative impacts of elementary school education on wide spectrums of suicide mortalities of females in Model-3 were abolished in Model-4 (Figure 5).

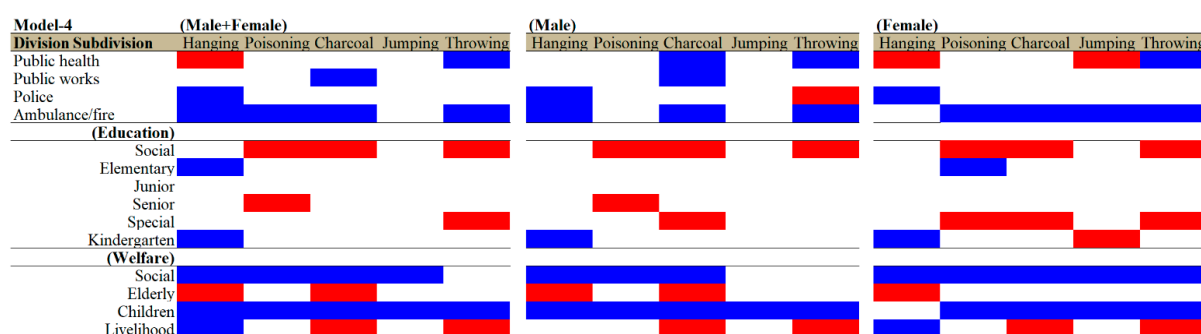


Figure 5. Impacts of expenditure of four major divisions (public health, public works, police and ambulance/fire) and subdivisions of education and welfare per capita on suicide mortalities by five major suicide means (hanging, poisoning, charcoal burning, jumping and throwing suicide) of both gender (males plus females), males and females between 2009 and 2018 using fixed- or random-effect analyses of hierarchical linear regression with robust standard error. Blue and red columns, significant factors for decreasing and increasing suicide mortalities.

Regarding expenditures of welfare subdivisions, expenditures of social welfare per capita were negatively related to wide-ranged suicide mortalities of males (hanging, poisoning and charcoal burning) and all suicide mortalities of females (hanging, poisoning, charcoal burning and throwing) (Figure 5). Expenditures of children welfare per capita were also negatively related to all suicide mortalities of males and suicide mortalities of females (poisoning, charcoal burning, jumping and throwing) (Figure 5).

3.5. Trends of Suicide Mortalities Disaggregated by Regional, Gender and Means Factors during 2009–2018 in Japan

LMM analyses detected the regional and gender factors-dependent features of suicide mortalities by suicidal means (Figure 6). The suicide mortalities by hanging, poisoning and charcoal burning of males + females and males in rural prefectures were higher than those in urban prefectures, whereas the differences of the suicide mortalities by hanging, poisoning and charcoal burning of females between rural and urban prefectures were not observed (Figure 6(A1–C3)). Contrary, the suicide mortalities by jumping and throwing of males + females, males and females in urban prefectures were higher than those in rural prefectures (Figure 6(D1–E3)).

ANCOVA analyses also detected the features of time-dependent trends of suicide mortalities by suicidal means between rural and urban prefectures (Figure 6). The differences of the trends of suicide mortalities by hanging, poisoning and throwing of males + females, males and females between rural and urban prefectures were not observed (Figure 6(A1–B3)). The negative trends of suicide mortalities by jumping of males + females [$F_{\text{region} \times \text{year}}(1,466) = 7.8$ ($p < 0.01$)], males [$F_{\text{region} \times \text{year}}(1,466) = 6.3$ ($p < 0.05$)] and females [$F_{\text{region} \times \text{year}}(1,466) = 8.4$ ($p < 0.01$)] in urban prefectures were larger than those of rural prefectures (Figure 6(D1–D3)). The negative trends of suicide mortalities by charcoal burning of males + females [$F_{\text{region} \times \text{year}}(1,466) = 4.5$ ($p < 0.05$)] and males [$F_{\text{region} \times \text{year}}(1,466) = 3.9$ ($p < 0.05$)] in rural prefectures were larger than those of urban prefectures, but that of females was almost equal (Figure 6(C1–C3)).

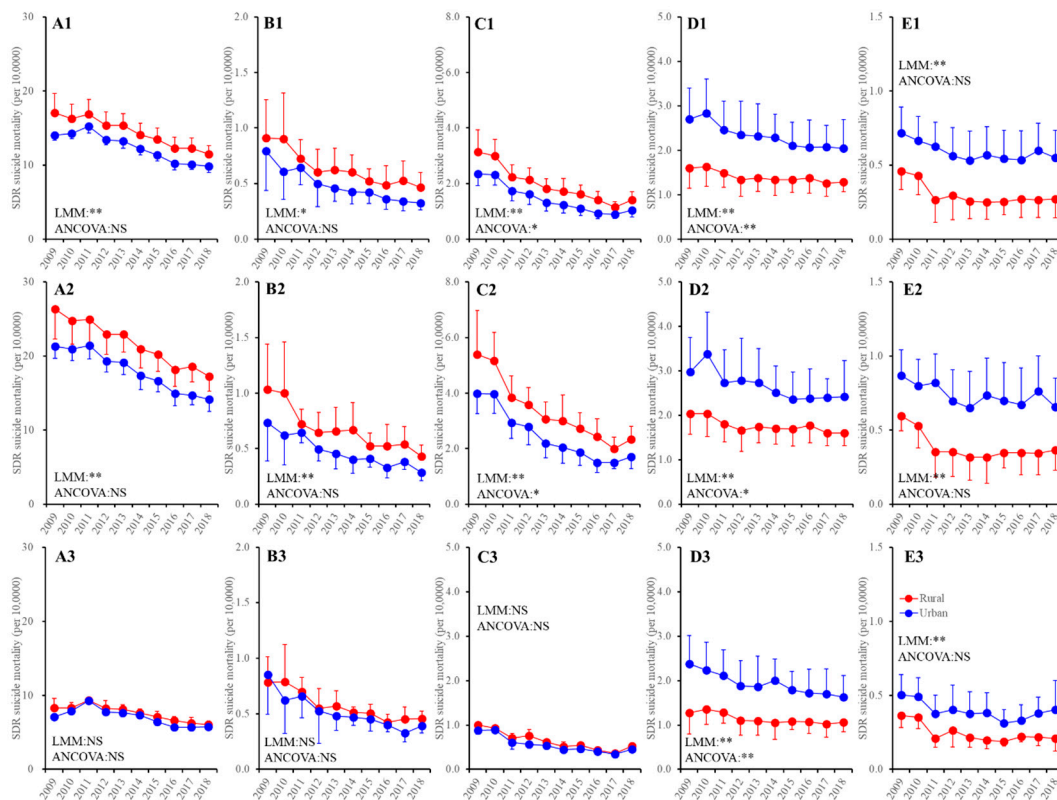


Figure 6. Trends of suicide mortalities by hanging (A1–A3), poisoning (B1–B3), charcoal burning (C1–C3), jumping (D1–D3) and throwing (E1–E3) disaggregated by gender factor, males + females (A1–E1), males (A2–E2) and females (A3–E3) during 2009–2018. Ordinates indicate mean \pm SD of SDR suicide mortality rate (per 10,000), and abscissas indicate year. * p 0.05, ** p 0.01 indicate the statistically significant differences between rural (red circles) and urban (blue circles) prefectures of suicide mortality by linear mixed-effect model (LMM) with Scheffe’s multiple comparison and analysis of co-variant (ANCOVA).

4. Discussion

It has been well known that suicide methods are affected by characteristics dependent on the social/cultural backgrounds of each country [47,62,63]. A correspondence analysis study reported that the features of suicide methods between males and females were more similar rather than those between countries, suggesting that suicide methods are probably dependent on the country than gender [62]. In the same study, a notable exception was that male firearms suicide in EU replaced female poisoning [62]. It has been considered that jumping is not common suicide method in Europe [48], but was common suicidal methods in East countries [64–66]. Furthermore, a recent study reported that males did suicide attempts with high lethality compared with that of female in China, India and Malay [67]. In particular, frequency of hanging suicide in Asian countries, such as Japan, South Korea and Taiwan are higher than those in European countries, since the most predominant suicidal method in Japan was hanging (more than 60%) [3,39,68,69]. Therefore, Japanese features of suicidal methods are quite different from those in Europe, but the suicidal methods between male and female are not identical in Japan. Indeed, during 2009–2018, charcoal-burning suicide was common suicidal method of Japanese male with ranking second, whereas female charcoal-burning suicide was relatively lower with ranking third (almost equal to the counts of poisoning at fourth rank). During 2009–2018, jumping was the most common methods for suicide at the third rank of male, and at second rank of female. Additionally, the present study indicated that the suicide mortalities by particular suicidal means were possibly dependent on the live environmental structures, since the

mortalities of jumping and throwing suicide, which were carried out using urban structures, in urban prefectures were larger than those in rural prefectures. The jumping and throwing suicide mortalities of both males and females in rural prefectures did not decrease since 2012, whereas the jumping and throwing suicide mortalities in urban prefectures have been decreasing. This result can provide to the planning for suicide means restriction in the urban regions [25]. However, the present study cannot achieve the major purpose of identification of the specific relationships between regional governmental expenditure and suicide mortality by a particular suicidal means.

In the analyses about the effects of ratio of expenditures of six divisions (Model-1), the expenditures of public health, public works and police displayed affecting suicide mortalities by the wide-spectrum means. Both expenditures ratio of public health and police negatively related to suicide mortality, whereas the ratio of expenditure of public works positively related. Contrary to ratio, in the analyses about the effects of expenditures per capita of six divisions (Model-2), the expenditures per capita of ambulance/fire and education displayed negative relationship with suicide mortalities by wide-spectrum means (Model-2). In Model 3, which subdivided education expenditures, the expenditure per capita of kindergarten pre-dominantly reduced suicide mortalities compared to expenditures of other division and education subdivision (Model-3). In Model-2 and Model-3, the effects of expenditures of welfare were limited, since the significant negative impacts of welfare expenditure on suicide mortality by throwing in males + females, males and females were consistent. Contrary to Model-2 and Model-3, in Model-4, which subdivided welfare expenditures, the expenditure per capita of children care and social welfares predominantly reduced suicide mortalities by wide-spectrum means. Surprisingly, the dominant negative impact of kindergarten school expenditures in Model-3 was abolished in Model-4, whereas the other dominant negative impact of ambulance/fore service expenditures in both Model-2 and Model-3 remained to be observed in Model-4. Therefore, these results indicate the possibility that each welfare subdivision probably affects/compensates specific suicide motives resulting in prevention of suicidal behaviours.

The declining birth rate and ageing population is one of the most fundamental Japanese socioeconomic issues. The total amount of expenditure of elderly welfare is increasing according to the increasing elderly population, whereas the elderly population is predominantly increasing compared to the increasing expenditure of elderly welfare resulting in the relatively decreasing expenditure of elderly welfare per capita during 2009–2018. In contrast, the expenditure of children welfare was increased by the revision of the Child Welfare Act in 2010 (to strengthen the cooperation between children welfare and education) and Outline of Measures for Society with Decreasing Birth Rate in 2015 [26]. Recent study reported that children welfare expenditure contributed to wide-ranged decreasing suicide mortalities, and caused by problems of health, economy and romance-related motives, whereas elderly welfare expenditure positively related to suicide mortalities of working-age populations and caused by family, health and economy-related motives [11,70].

Long-term care assurance contributes to reduction of the suicide mortality of elderly females, and of both males and females caused by health-related motives (health-related problem is most dominant suicidal motive in Japan) [55]. The discrepancy between the impacts of long-term care assurance and elderly welfare expenditures on suicide mortality indicates the possibility that governmental elderly supports require professional staffs and life place to provide lives supports rather than financial supports. Elderly populations are considered to be economically disadvantage situation due to lost a stable income via retirement, whereas in facts, the economic situation of the elderly is wealthier than the working-age populations. Indeed, the average savings and liability per household were 18 million JPY and 5 million JPY, respectively; however, the average savings and liability per elderly household were 23 million JPY and 1 million JPY, respectively [71]. The special account of medical care for the elderly and the operating spending of welfare centres for the elderly are more than 80% in elderly welfare expenditure in many prefectures [51,52]. Thus, increasing financial support for the elderly is not only ineffective, but also insufficient

for individuals who need financial supports. The results in the present study suggest that working-age populations need financial support for maintaining their lives, especially childcare. The average savings and liability per household of populations younger than 40 years olds were 6 million JPY and 11 million JPY, respectively [71]. The expenditures of kindergarten/elementary schools and children welfare predominantly reduced suicide mortality by wide-spectrum means. Especially, the predominant impacts of financial supports for childcare (children welfare expenditures) on reduced suicide mortality than expenditures of kindergarten/elementary schools indicate that the financial support is more suitable for selecting various childcare support according to the lifestyle of working-aged individuals rather than improving school facilities. Other results in the present study also display that financial support, allowing individual discretion, is more effective than developing/improving facilities. In model-3, social education expenditure (for social-education facilities including public halls, libraries, and museums) contributed to reduction of male hanging suicide mortality, but social education expenditure provided increasing suicide mortality by poisoning, charcoal burning and throwing of males and females in model-4.

The expenditures of special school (for individuals with disabilities) were consistently related to increasing suicide mortalities in both model-3 and model-4. The number of students in special schools in Japan have continued to increase due to enhancement of enlightenment of the importance and usefulness of education for individuals with disabilities [72]. Professional education in special schools contributes to the efficient acquisition of communication and working skills necessary for social independence after the educational ages through a stable environment (emotional education) according to disabilities. In response to social demands, recently, the addition of medical technology to special schools has been promoted [72]. Therefore, even authors engaged in medical care for patients with disabilities are unacceptable for this unexpected result associated with special school expenditures. The functional cooperation between the Board of Education and the welfare department, and between the special school and the private outpatient support centres for individuals with disabilities has remained to be sufficient [72]. Therefore, the insufficiency of the support system for individuals with disabilities (attending special school means and reception places after school) cannot contribute to improving the socio-economic burden on caregivers. In Japan, females had taken responsibility for childcare caused by the insufficient childcare support system [10,12].

A population-base study reported that female suicide caused by “Exhaustion from support for family member” was statistically larger than that of male (20% vs. 5%), and “Exhaustion from support for family member” comprised “caring for infirm family member(s)” (12%) and “raising children” (8%) [73]. Considering with these previous findings, the development of special school must be socially important, but the expenditures of special school are probably expected to meet the needs for females who support individuals with disabilities. It is the basis of our hypothesis that the suppressive impacts of the expenditures of social child welfares on the female suicide mortality and the increasing impacts of the expenditures of special school affected independently.

The major purpose of this study was to clarify whether a particular regional governmental expenditure affected suicide mortality by a particular suicidal means, but we could not identify any specific relationships. The expenditures of ambulance/fire, social and child welfares non-specifically contributed to the reduction of suicide mortality but did not affect any suicide mortalities by particular means. Therefore, the present study indirectly seems that the analysing the effects of governmental financial supports on suicide mortalities disaggregated by suicidal means can provide useful findings for the regional suicide prevention programmes but cannot fully provide the useful data for the planning of general regional governmental expenditures which support daily life of individuals. However, increasing hanging suicide mortality was one of the specific features in 2020 (during pandemic) [32]. In the present study, hanging suicide mortality was negatively related to expenditures of subdivision of education (elementary and kindergarten school)

and welfare (social, children and livelihood welfares) in Model-4. Therefore, based on these the results during prior to COVID-19 pandemic (increasing expenditures of elementary school, kindergarten school, social welfare, children welfare and livelihood welfare probably decreased hanging suicide mortality between 2009 and 2018), the several special supports systems provided by the government, such as “support for independence of people in need of living”, “special loan such as emergency small-lot funds”, “benefit for securing housing” and “extraordinary special benefits for child-rearing households” [49,50], are expected to suppress hanging suicide mortality. To develop the more cost-effective and detailed/actual protective model regarding the impacts of regional governmental financial expenditures on suicide mortality, the further analysing the kinetics of the short-term increasing hanging suicide mortality during pandemic with the addition of other predictors (risk and protective factors) should be needed, since it has been well known that suicide is induced by complex of social and individual various factors [1,2].

The present study demonstrated the effects of regional financial expenditures on suicide mortalities by suicidal means in Japan, there are several limitations. This study analysed the effects of expenditure of the major divisions depending on public finance law on suicide mortality. The demonstrated results indicate the non-specific relationships between expenditures and suicide mortalities, but a particular relationship could not be identified. Although the lack of sensitivity of suicide mortalities by suicidal means provide the interesting findings, target regional financial expenditure probably composes the impact on suicide mortality disaggregated by gender, age and reason factors. Indeed, the present study could not detect the consistent impact of public health expenditures; however, the public health includes medical/health and maintenance of regional hygiene environmental. Therefore, to clarify the sociopsychological pathomechanisms of suicide, the impact on suicide mortality disaggregated by gender and ages should be analysed using more detail restructured regional financial expenditures.

5. Conclusions

The present study analysed the impacts of regional financial expenditure on suicide mortality by five major suicidal methods (hanging, poisoning, charcoal burning, jumping and throwing) during 2009–2018 in Japan, using fixed-effect analysis of hierarchical linear regression with robust standard error. The ambulance/fire services and education expenditures played an important role in a decrease in suicide mortalities by wide-spectrum suicidal means; however, the expenditure of public works displayed no impact on any suicide mortalities. In the expenditure of education subdivisions, the expenditures of kindergarten and elementary school contributed to reduction in suicide mortalities, but surprisingly the expenditure of special school contributed to increasing females suicide mortalities by hanging, charcoal boning and throwing. In the expenditure of welfare subdivisions, children and social welfare expenditure provided a reduction in suicide mortality, but elderly welfare expenditure contributed to increasing suicide mortality. Furthermore, the expenditures of welfare subdivisions abolished the negative impacts of expenditures of kindergarten and elementary school on suicide mortalities, but the positive impacts of expenditure of special school was not affected by expenditures of welfare subdivisions. Drastic improvement of expenditure structures in regional government is hard, since any regional financial expenditures primarily maintain and operate social welfare systems. However, even if the support targets are identical, the welfare policies that take into account the discretionary of the recipient, probably achieve more cost-effective supports to regional individuals, since in the present study, increasing expenditures of children and elderly welfares decreases and increases suicide mortality, respectively. Increasing total amount of expenditure for elderly welfare and decreasing expenditures for child welfare are unavoidable due to the declining birth rate and ageing population in Japan, we must clarify the rational redistribution of welfare expenditure based on psychosocial and socioeconomic evidence.

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Data Availability Statement: All data relevant to the study are included in the article or uploaded as supplementary information. All raw data are available to any persons from Japanese National databases in the Statistics Bureau of the Ministry of Internal Affairs and Communications (SBMIAC), Cabinet Office (CAO) and Ministry of Health, Labour and Welfare (MHLW).

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References

- Orsolini, L.; Latini, R.; Pompili, M.; Serafini, G.; Volpe, U.; Vellante, F.; Fornaro, M.; Valchera, A.; Tomasetti, C.; Fraticelli, S.; et al. Understanding the complex of suicide in depression: From research to clinics. *Psychiatry Investig.* **2020**, *17*, 207–221. [CrossRef] [PubMed]
- De Berardis, D.; Olivieri, L.; Rapini, G.; Serroni, N.; Fornaro, M.; Valchera, A.; Carano, A.; Vellante, F.; Bustini, M.; Serafini, G.; et al. Religious coping, hopelessness, and suicide ideation in subjects with first-episode major depression: An exploratory study in the real world clinical practice. *Brain Sci.* **2020**, *10*, 912. [CrossRef]
- Ministry of Health, Labour and Welfare. Basic Data on Suicide in the Region. Available online: <https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000140901.html> (accessed on 1 September 2021).
- Ministry of Health, Labour and Welfare. 2019 White Paper on Suicide Prevention. Available online: <https://www.mhlw.go.jp/wp/hakusyo/jisatsu/19/index.html> (accessed on 14 November 2020).
- Ministry of Health, Labour and Welfare. 2020 White Paper on Suicide Prevention. Available online: https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/hukushi_kaigo/seikatsuhogo/jisatsu/jisatsuhakusyo2020.html (accessed on 1 June 2021).
- Ministry of Health, Labour and Welfare. Regional Suicide Countermeasures Emergency Enhancement Fund. Available online: https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/hukushi_kaigo/seikatsuhogo/jisatsu/kyoukakikin.html (accessed on 18 November 2021).
- Ministry of Health, Labour and Welfare. Grant for Enhance Community-Based Suicide Countermeasures. Available online: https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/hukushi_kaigo/seikatsuhogo/jisatsu/tiikijisatsutaisakukyokazigyo.html (accessed on 1 June 2021).
- Ministry of Health, Labour and Welfare. National Plan for Prevention of Suicide. Available online: <https://www.mhlw.go.jp/kokoro/nation/about.html> (accessed on 18 November 2021).
- Okada, M.; Hasegawa, T.; Kato, R.; Shiroyama, T. Analysing regional unemployment rates, GDP per capita and financial support for regional suicide prevention programme on suicide mortality in Japan using governmental statistical data. *BMJ Open* **2020**, *10*, e037537. [CrossRef]
- Kato, R.; Okada, M. Can financial support reduce suicide mortality rates? *Int. J. Environ. Res. Public Health* **2019**, *16*, 4797. [CrossRef]
- Shiroyama, T.; Fukuyama, K.; Okada, M. Effects of financial expenditure of prefectures/municipalities on regional suicide mortality in Japan. *Int. J. Environ. Res. Public Health* **2021**, *18*, 8639. [CrossRef]
- Nakano, T.; Hasegawa, T.; Okada, M. Analysing the impacts of financial support for regional suicide prevention programmes on suicide mortality caused by major suicide motives in Japan using statistical government data. *Int. J. Environ. Res. Public Health* **2021**, *18*, 3414. [CrossRef] [PubMed]
- Antonakakis, N.; Collins, A. The impact of fiscal austerity on suicide: On the empirics of a modern Greek tragedy. *Soc. Sci. Med.* **2014**, *112*, 39–50. [CrossRef] [PubMed]
- Antonakakis, N.; Collins, A. The impact of fiscal austerity on suicide mortality: Evidence across the ‘Eurozone periphery’. *Soc. Sci. Med.* **2015**, *145*, 63–78. [CrossRef]
- Branas, C.C.; Kastanaki, A.E.; Michalodimitrakakis, M.; Tzougas, J.; Kranioti, E.F.; Theodorakis, P.N.; Carr, B.G.; Wiebe, D.J. The impact of economic austerity and prosperity events on suicide in Greece: A 30-year interrupted time-series analysis. *BMJ Open* **2015**, *5*, e005619. [CrossRef] [PubMed]
- Karanikolos, M.; Mladovsky, P.; Cylus, J.; Thomson, S.; Basu, S.; Stuckler, D.; Mackenbach, J.P.; McKee, M. Financial crisis, austerity, and health in Europe. *Lancet* **2013**, *381*, 1323–1331. [CrossRef]

17. Rachiotis, G.; Stuckler, D.; McKee, M.; Hadjichristodoulou, C. What has happened to suicides during the Greek economic crisis? Findings from an ecological study of suicides and their determinants (2003–2012). *BMJ Open* **2015**, *5*, e007295. [CrossRef]
18. Simou, E.; Koutsogeorgou, E. Effects of the economic crisis on health and healthcare in Greece in the literature from 2009 to 2013: A systematic review. *Health Policy* **2014**, *115*, 111–119. [CrossRef] [PubMed]
19. Tapia Granados, J.A.; Rodriguez, J.M. Health, economic crisis, and austerity: A comparison of Greece, Finland and Iceland. *Health Policy* **2015**, *119*, 941–953. [CrossRef]
20. Reeves, A.; Basu, S.; McKee, M.; Marmot, M.; Stuckler, D. Austere or not? UK coalition government budgets and health inequalities. *J. R. Soc. Med.* **2013**, *106*, 432–436. [CrossRef]
21. Toffolutti, V.; Suhrcke, M. Does austerity really kill? *Econ. Hum. Biol.* **2019**, *33*, 211–223. [CrossRef] [PubMed]
22. Barr, B.; Kinderman, P.; Whitehead, M. Trends in mental health inequalities in England during a period of recession, austerity and welfare reform 2004 to 2013. *Soc. Sci. Med.* **2015**, *147*, 324–331. [CrossRef]
23. Barr, B.; Taylor-Robinson, D.; Scott-Samuel, A.; McKee, M.; Stuckler, D. Suicides associated with the 2008–10 economic recession in England: Time trend analysis. *BMJ* **2012**, *345*, e5142. [CrossRef]
24. Rambotti, S. Is there a relationship between welfare-state policies and suicide rates? Evidence from the US States, 2000–2015. *Soc. Sci. Med.* **2020**, *246*, 112778. [CrossRef]
25. Hasegawa, T.; Matsumoto, R.; Yamamoto, Y.; Okada, M. Analysing effects of financial support for regional suicide prevention programmes on methods of suicide completion in Japan between 2009 and 2018 using governmental statistical data. *BMJ Open* **2021**, *11*, e049538. [PubMed]
26. Cabinet Office. Outline of Measures for Society with Decreasing Birthrate. Available online: <https://www8.cao.go.jp/shoushi/shoushika/law/taikou2.html> (accessed on 1 June 2021).
27. Swain, P.K.; Tripathy, M.R.; Priyadarshini, S.; Acharya, S.K. Forecasting suicide rates in India: An empirical exposition. *PLoS ONE* **2021**, *16*, e0255342. [CrossRef]
28. You, B.S.; Jeong, K.H.; Cho, H.J. Regional suicide rate change patterns in Korea. *Int. J. Environ. Res. Public Health* **2020**, *17*, 6973. [CrossRef] [PubMed]
29. Mattei, G.; Pistoiresi, B. Unemployment and suicide in Italy: Evidence of a long-run association mitigated by public unemployment spending. *Eur. J. Health Econ.* **2019**, *20*, 569–577. [CrossRef]
30. Mattei, G.; Pistoiresi, B.; De Vogli, R. Impact of the economic crises on suicide in Italy: The moderating role of active labor market programs. *Soc. Psychiatry Psychiatr. Epidemiol.* **2019**, *54*, 201–208. [CrossRef] [PubMed]
31. Robinson, R.J.; Palka, J.M.; Brown, E.S. The relationship between state mental health agency and medicaid spending with outcomes. *Community Ment. Health J.* **2021**, *57*, 307–314. [CrossRef]
32. Matsumoto, R.M.E.; Fukuyama, K.; Shiroyama, T.; Okada, M. Determining what changed Japanese suicide mortality in 2020 Using Governmental Database. *J. Clin. Med.* **2021**, *10*, 5199. [CrossRef]
33. Fushimi, M. The importance of studying the increase in suicides and gender differences during the COVID-19 pandemic. *QJM* **2021**, hcab130. [CrossRef]
34. Sakamoto, H.; Ishikane, M.; Ghaznavi, C.; Ueda, P. Assessment of suicide in Japan during the COVID-19 pandemic vs previous years. *JAMA Netw. Open* **2021**, *4*, e2037378. [CrossRef] [PubMed]
35. Nomura, S.; Kawashima, T.; Harada, N.; Yoneoka, D.; Tanoue, Y.; Eguchi, A.; Gilmour, S.; Kawamura, Y.; Hashizume, M. Trends in suicide in Japan by gender during the COVID-19 pandemic, through December 2020. *Psychiatry Res.* **2021**, *300*, e113913. [CrossRef]
36. Seposo, X.T. COVID-19 threatens decade-long suicide initiatives in Japan. *Asian J. Psychiatry* **2021**, *60*, 102660. [CrossRef]
37. Eguchi, A.; Nomura, S.; Gilmour, S.; Harada, N.; Sakamoto, H.; Ueda, P.; Yoneoka, D.; Tanoue, Y.; Kawashima, T.; Hayashi, T.I.; et al. Suicide by gender and 10-year age groups during the COVID-19 pandemic vs previous five years in Japan: An analysis of national vital statistics. *Psychiatry Res.* **2021**, *305*, 114173. [CrossRef]
38. Tanaka, T.; Okamoto, S. Increase in suicide following an initial decline during the COVID-19 pandemic in Japan. *Nat. Hum. Behav.* **2021**, *5*, 229–238. [CrossRef] [PubMed]
39. Gunnell, D.; Bennewith, O.; Hawton, K.; Simkin, S.; Kapur, N. The epidemiology and prevention of suicide by hanging: A systematic review. *Int. J. Epidemiol.* **2005**, *34*, 433–442. [CrossRef] [PubMed]
40. Chapman, S.; Alpers, P.; Agho, K.; Jones, M. Australia's 1996 gun law reforms: Faster falls in firearm deaths, firearm suicides, and a decade without mass shootings. *Inj. Prev.* **2006**, *12*, 365–372. [CrossRef]
41. Havarneanu, G.M.; Burkhardt, J.M.; Paran, F. A systematic review of the literature on safety measures to prevent railway suicides and trespassing accidents. *Accid. Anal. Prev.* **2015**, *81*, 30–50. [CrossRef]
42. Chang, S.S.; Chen, Y.Y.; Yip, P.S.; Lee, W.J.; Hagihara, A.; Gunnell, D. Regional changes in charcoal-burning suicide rates in East/Southeast Asia from 1995 to 2011: A time trend analysis. *PLoS Med.* **2014**, *11*, e1001622. [CrossRef] [PubMed]
43. Miller, M.; Hemenway, D. Guns and suicide in the United States. *N. Engl. J. Med.* **2008**, *359*, 989–991. [CrossRef] [PubMed]
44. Yamasawa, K.; Nishimukai, H.; Ohbora, Y.; Inoue, K. A statistical study of suicides through intoxication. *Acta Med. Leg. Soc. (Liege)* **1980**, *30*, 187–192.
45. Yip, P.S.; Lee, D.T. Charcoal-burning suicides and strategies for prevention. *Crisis* **2007**, *28* (Suppl. S1), 21–27. [CrossRef]
46. Yoshioka, E.; Saijo, Y.; Kawachi, I. Spatial and temporal evolution of the epidemic of charcoal-burning suicide in Japan. *Soc. Psychiatry Psychiatr. Epidemiol.* **2016**, *51*, 857–868. [CrossRef]

47. Yip, P.S.; Caine, E.; Yousuf, S.; Chang, S.S.; Wu, K.C.; Chen, Y.Y. Means restriction for suicide prevention. *Lancet* **2012**, *379*, 2393–2399. [CrossRef]
48. Okolie, C.; Wood, S.; Hawton, K.; Kandalama, U.; Glendenning, A.C.; Dennis, M.; Price, S.F.; Lloyd, K.; John, A. Means restriction for the prevention of suicide by jumping. *Cochrane Database Syst. Rev.* **2020**, *2*, CD013543. [CrossRef] [PubMed]
49. Ministry of Health, Labour and Welfare. Special Homepage of Life Support during Pandemic. Available online: https://www.mhlw.go.jp/stf/newpage_22325.html (accessed on 12 December 2021).
50. Cabinet Office. Extraordinary Special Benefits for Child-Rearing Households. Available online: <https://www5.cao.go.jp/keizai1/kosodateasetaikyufu/index.html> (accessed on 12 December 2021).
51. Statistics Bureau of Ministry of Internal Affairs and Communications. White Paper on Local Public Finance. Available online: https://www.soumu.go.jp/menu_seisaku/hakusyo/chihou/r03data/index.html (accessed on 1 May 2021).
52. Statistics Bureau of Ministry of Internal Affairs and Communications. Survey on Local Public Finance. Available online: <https://www.e-stat.go.jp/en/statistics/00200251> (accessed on 1 May 2021).
53. Statistics Bureau of Ministry of Internal Affairs and Communications. Surveys of Population, Population Change and the Number of Households Based on the Basic Resident Registration. Available online: <https://www.e-stat.go.jp/stat-search/files?page=1toukei=00200241tstat=000001039591> (accessed on 1 September 2021).
54. Kawaguchi, H.; Koike, S. Association between the density of physicians and suicide rates in Japan: Nationwide ecological study using a spatial bayesian model. *PLoS ONE* **2016**, *11*, e0148288. [CrossRef] [PubMed]
55. Nakamoto, M.; Nakagawa, T.; Murata, M.; Okada, M. Impacts of dual-income household rate on suicide mortalities in Japan. *Int. J. Environ. Res. Public Health* **2021**, *18*, 5670. [CrossRef]
56. WHO. Preventing suicide: A Resource for Pesticide Registrars and Regulators. Available online: <https://www.who.int/publications/i/item/9789241516389> (accessed on 18 November 2020).
57. WHO. Preventing Suicide: A Global Imperative. Available online: <https://www.who.int/publications/i/item/preventing-suicide-a-global-imperative> (accessed on 18 November 2021).
58. WHO. Preventing Suicide: A Resource for Filmmakers and Others Working on Stage and Screen. Available online: <https://www.who.int/publications/i/item/preventing-suicide-a-resource-for-filmmakers-and-others-working-on-stage-and-screen> (accessed on 18 November 2020).
59. WHO. Suicide in the World. Available online: <https://apps.who.int/iris/bitstream/handle/10665/326948/WHO-MSD-MER-19.3-eng.pdf> (accessed on 18 November 2020).
60. Okada, M.; Matsumoto, R.; Yamamoto, Y.; Fukuyama, K. Effects of subchronic administrations of vortioxetine, lurasidone, and escitalopram on thalamocortical glutamatergic transmission associated with serotonin 5-HT₇ receptor. *Int. J. Mol. Sci.* **2021**, *22*, 1351. [CrossRef] [PubMed]
61. Nakano, T.; Hasegawa, T.; Suzuki, D.; Motomura, E.; Okada, M. Amantadine combines astroglial system xc⁻ activation with glutamate/nmda receptor inhibition. *Biomolecules* **2019**, *9*, 191. [CrossRef]
62. Ajdacic-Gross, V.; Weiss, M.G.; Ring, M.; Hepp, U.; Bopp, M.; Gutzwiller, F.; Rossler, W. Methods of suicide: International suicide patterns derived from the who mortality database. *Bull. World Health Organ.* **2008**, *86*, 726–732. [CrossRef]
63. WHO. Suicide: One Person Dies Every 40 Seconds. Available online: <https://www.who.int/news/item/09-09-2019-suicide-one-person-dies-every-40-seconds> (accessed on 18 November 2020).
64. Wong, P.W.; Chan, W.S.; Lau, T.K.; Morgan, P.R.; Yip, P.S. Suicides by jumping from iconic bridges in Hong Kong. *Crisis* **2009**, *30*, 79–84. [CrossRef] [PubMed]
65. Park, S.; Lee, H.B.; Lee, S.Y.; Lee, G.E.; Ahn, M.H.; Yi, K.K.; Hong, J.P. Trends in suicide methods and rates among older adults in South Korea: A comparison with Japan. *Psychiatry Investig.* **2016**, *13*, 184–189. [CrossRef]
66. Yoshioka, E.; Hanley, S.J.; Kawanishi, Y.; Saijo, Y. Time trends in method-specific suicide rates in Japan, 1990–2011. *Epidemiol. Psychiatr. Sci.* **2016**, *25*, 58–68. [CrossRef] [PubMed]
67. Choo, C.C.; Harris, K.M.; Ho, R.C. Prediction of lethality in suicide attempts: Gender matters. *Omega J. Death Dying* **2019**, *80*, 87–103. [CrossRef] [PubMed]
68. Morovatdar, N.; Moradi-Lakeh, M.; Malakouti, S.K.; Nojomi, M. Most common methods of suicide in eastern mediterranean region of who: A systematic review and meta-analysis. *Arch. Suicide Res.* **2013**, *17*, 335–344. [CrossRef] [PubMed]
69. Hedegaard, H.; Curtin, S.C.; Warner, M. Quickstats: Age-adjusted suicide rates* for females and males, by method(dagger)—national vital statistics system, United States, 2000 and 2014. *Morb. Mortal. Wkly. Rep. (MMRW)* **2016**, *65*, 503.
70. Hasegawa, T.; Fukuyama, K.; Okada, M. Relationships between Expenditure of Regional Governments and Suicide Mortalities Caused by Six Major Motives in Japan. *Int. J. Environ. Res. Public Health* **2022**, *19*, 84.
71. Statistics Bureau of the Ministry of Internal Affairs and Communications. Family Income and Expenditure Survey. Available online: <https://www.e-stat.go.jp/en/stat-search/files?page=1layout=normaltoukei=00200561> (accessed on 1 May 2021).
72. Cabinet Office. Annual Report on Government Measures for Persons with Disabilities (Summary) 2020. Available online: <https://www8.cao.go.jp/shougai/english/annualreport/2020/index-pdf.html> (accessed on 1 May 2021).
73. Shiratori, Y.; Tachikawa, H.; Nemoto, K.; Endo, G.; Aiba, M.; Matsui, Y.; Asada, T. Network analysis for motives in suicide cases: A cross-sectional study. *Psychiatry Clin. Neurosci.* **2014**, *68*, 299–307. [CrossRef] [PubMed]