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Disparity in emergency medical services across Japan¹

Taro Takimoto², Kazuya Sakata³, Kazunori Nakajima⁴, Masaki Narukawa⁵, Naoki Sakamoto⁶

Abstract

By using a prospective, nation-wide, population-based out-of-hospital cardiac arrest (OHCA) database (All-Japan Utstein Registry, January 1, 2005 to December 31, 2012), we examined the disparity in emergency medical services across Japan and found significant disparities among prefectures. By dividing Japan into seven parts, Hasegawa et al. (2013) analysed regional variability in survival outcomes of OHCA and found a two-fold regional difference in neurologically favourable survival after OHCA. However, seven regions are constructed of North, Northeast, East, Central, Midwest, West, South, and Japan has 47 prefectures. Each prefecture grouped in the same region would be different from others in many aspects. To identify regional disparities more in prehospital care and in-hospital post-resuscitation care, we investigated survival outcomes of OHCA in prefecture levels. As the budgets of central and local governments are not unrestrained but restricted all over the world, the findings in the paper would be beneficial to consider optimal level of regional emergency medical services.

Keywords: Emergency Medical Service, Out-of-Hospital Cardiac Arrest, Disparity among Prefectures, One-Month Survival Rate, Health Economics

JEL Classifications: I14, C25, C55

1. Introduction

A mortality rate of cardiac arrest is quite high and it is a major public health problem in the world. To improve the rate of survival after out-of-hospital cardiac arrest (OHCA), regional characteristics would be beneficial. Japan is 378,000 km² in area, and long and narrow country richly endowed with nature. The paper investigates whether an idiosyncratic effect of each prefecture affects the rates of one month survival and neurological favourable outcome.

By dividing Japan into seven parts, Hasegawa et al. (2013) analysed regional variability in survival

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outcomes of OHCA and found a two-fold regional difference in neurologically favourable survival after OHCA. However, seven regions are constructed of North, Northeast, East, Central, Midwest, West, South, and Japan has 47 prefectures. Each prefecture grouped in the same region would be different from others in many aspects; road conditions, the number and quality of emergency life guards, the number and locations of hospitals, characteristics of local residents, and so on. To identify regional disparities more in prehospital care and in-hospital post-resuscitation care, we investigated survival outcomes of OHCA in prefecture levels. As the budgets of central and local governments are not unrestrained but restricted all over the world, the findings in the paper would be beneficial to consider optimal level of regional emergency medical services.

This paper is organized as follows. Section 2 describes statistical methods and the dataset, and in Section 3 the disparity of one month survival and favourable neurological outcome across Japan are investigated. Conclusions are given in Section 4.

2. Methods and data

2.1. Study design and data source

By using a prospective, nation-wide, population-based OHCA database (All-Japan Utstein Registry of the Fire and Disaster Management Agency (FDMA), January 1, 2005 to December 31, 2012), we examined the disparity in emergency medical services (EMS) across Japan and found significant disparities among prefectures. We investigated this data set with the permission of the FDMA. Although the number of observations in this period is 871,721, 159,921 samples were excluded because of remained errors in the data set. For example, an undefined option is chosen, any of options is not selected, there is a contradiction between queries or between time intervals, and so on. Furthermore, cardiac arrests with external causes were excluded as in Hasegawa et al. (2013).

All-Japan Utstein Registry of the FDMA were analysed by Kitamura et al. (2010) and Akahane et al. (2011), for example. Kitamura et al. (2010) studied the use of automated external defibrillator (AED) in public places and Akahane et al. (2011) examined the effects of sex on OHCA outcomes.

2.2 EMS system in Japan

FDMA explains on the web page that emergency medical technicians are nationally certified members of emergency response teams able to provide medical treatment and other life-saving techniques to patients who are suffering cardiac arrest. Training of emergency medical technicians has progressed steadily since the introduction of the system in 1991, and these personnel are active throughout the various emergency situations. The FDMA has continued to train emergency medical technicians with the aim of providing each and every emergency response team throughout the country with at least one emergency medical technician.

All EMS providers performed cardiopulmonary resuscitation (CPR) according to Japanese CPR guidelines. As EMS providers are not allowed to terminate resuscitation out-of-hospital in Japan, EMS personnel transport patients with an OHCA to hospitals and record them in the database.

2.3. Data collection

Data were collected prospectively based on the Utstein-style guidelines for reporting out-of-hospital cardiac arrests; sex, age, the initial cardiac rhythm, the time course of resuscitation, bystander's witness status, first documented cardiac rhythm, presence and type of cardiopulmonary resuscitation by bystander, use of a public-access automated external defibrillators, an emergency lifesaving technician in ambulance, administration of adrenaline by EMS personnel, technique of airway management, return of spontaneous circulation prior to hospital arrival, and survival and neurologic status one-month after the event.

2.4. Study endpoints

The primary end point was survival at one month, and the secondary endpoint was favourable neurological outcome one month after cardiac arrest with minimal neurologic impairment, which was defined as Glasgow-Pittsburg cerebral performance (5 categories) category 1 (good performance) or category 2 (moderate disability).

2.5. Statistical analysis

To identify regional disparities more in prehospital care and in-hospital post-resuscitation care, we investigated survival and neurological outcomes one month after OHCA in prefecture levels. First, by setting one month survival after cardiac arrest or favourable neurological outcome as the dependent variable, a logistic regression is conducted to estimate the coefficient of each prefecture dummy variable. Tokyo is set as a reference prefecture. Estimates of dummy variables indicate the extent to which one month survival or favourable neurological outcome is superior or inferior to in Tokyo. Second, by controlling effects of sex, age, cardiogenic, ventricular fibrillation (VF), pulseless ventricular tachycardia (VT), pulseless electrical activity (PEA), asystole, CPR by bystanders, AED by bystanders, medicine, the use of instrument, the presence of emergency medical technician in ambulance, the idiosyncratic effect of each prefecture is re-estimated. To check the robustness of results, we divide the data set into two parts; arrests with noncardiogenic and with cardiogenic. We estimate coefficients of prefecture dummies by using these two data sets. Furthermore, we focus on witnessed arrests with cardiogenic and VFVT, since these samples are seemed to have a high probability of one month survival.

All statistical analyses were performed with the use of NLOGIT statistical software with the version 5. All tests were two-tailed, and $P < 0.05$ was regarded as statistically significant.

3. Results

3.1. Basic statistics of out-of-hospital cardiac arrests

Figure 1 shows a participant selection in the present study. During the periods of January 1, 2005 to December 31, 2012, 871,721 OHCA were occurred in Japan. All of them have been recorded based on the Utstein style. As there remain some errors in the data set which is provided by FDMA, 159,921 patients are excluded in the study. For example, an undefined option is chosen. Although one of options should be selected, any of them is not chosen. There is a contradiction between queries or between time intervals which are recorded by EMS system. Furthermore, arrests with external causes are excluded as Hasegawa et al. (2013). Finally, 711,800 arrests are eligible for the analysis in the paper.

Checking the robustness of results, following four sets of data set are used;

1. all samples (711,800),
2. noncardiogenic arrests (228,477),
3. cardiogenic arrests (483,323),
4. witnessed cardiogenic arrests with VF/pulseless VT (36,909).

Table 1 reports basic statistics for 4 sets of data set. About 30% of witnessed cardiogenic arrests with VFVT survive after OHCA, and it is quite higher than ones of other data sets. The cases that AED was performed by bystanders are very rare, and at most it was 2.44%. Median age of witnessed cardiogenic arrests with VFVT is 10 years younger than median ages in other 3 sets of data.

3.2. Variation of OHCA outcomes across Japan

Table 2 shows the variation of OHCA outcomes across Japan. As Tokyo is the largest city in Japan, later it is set as a reference in regression analyses. In all sets of data set, it is observed that rates of one month survival after OHCA and favourable neurological outcome in Tokyo are below average values. Table 3 divides Japan into 7 regions, which is given by Hasegawa et al. (2013).

Table 4 reports one month survival rates which are grouped in the same region for all samples and witnessed cardiogenic arrests with VFVT are not similar, and it implies that these exists the variation of OHCA outcomes in each region. For the case of all samples, in East region one month survival in Saitama is larger than Ibaraki, Tochigi, and Tokyo. In Central region one month survivals in Aichi and Ishikawa are more than twice in Shizuoka and Mie. The maximum rate of one month survival is more than twice as much as the minimum one in other regions. Focusing on the case of witnessed cardiogenic arrests with VFVT, the variation of one month survival in each region is observed. We investigate whether this variation is robust or not by adopting a logit model.

3.3. Regression results

By using a logit model, differences of OHCA outcome across Japan are examined. One month survival and favourable neurological outcome are set as a dependent variable in the model. Male sex variable takes 1 if an arrest is male and 0 otherwise. Cardiogenic variable takes 1 if an arrest is cardiac and 0 otherwise. VF, Pulseless VT, PEA, and Asystole are dummy variables, which take 1 or 0, and a reference is given by the case that others is selected as the initial cardiac rhythm. Witnessed, CPR by bystanders, AED by bystanders, Medicine, Instrum, Emergency medical services are dummy variables take 1 or 0; witnessed or not, CPR is performed or not, AED is used or not, medicine are provided or not, instrument is used or not, EMS ride in ambulance or not. Furthermore, prefecture and year dummies are included in the model by setting Tokyo and 2005 as references.

Table 5 shows that one month survival rates in Iwate, Fukushima, Tochigi, Fukui and Tokushima are not statistically different from the one in Tokyo. All other prefecture dummies are significantly positive. It confirms that the rate of one month survival in Tokyo is the lowest level across Japan.

3.4 Sensitivity analyses

Focusing on cases of noncardiogenic, cardiogenic, and witnessed cardiogenic with VFVT, Tables 6 to

8 show the similar results to Table 5. Almost all the prefecture dummy variables are significantly positive. It is observed that in the region there exist the disparity of one month survival and neurological favourable outcome. Especially, in prefectures close to Tokyo, that is, Chiba, Saitama, and Kanagawa, outcomes of OHCA are superior to in Tokyo significantly.

4. Conclusions

The findings in this paper are shown below.

- 1) Disparity across Japan: The averages of one-month survival after OHCA grouped in the same region by Hasegawa et al. (2013) are not similar at all. This suggests that we need to investigate outcomes of OHCA based on finer regions than seven parts.
- 2) Controlling sex, age, witness status, and the time course from the receipt of an emergency call by the EMS through the initial contact with the patient and so on, an idiosyncratic effect to one-month survival and neurological favourable outcome in Tokyo is the lowest level in Japan.

To examine reasons of the disparity in emergency medical services should be the future research.

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Figure 1 Participant selection

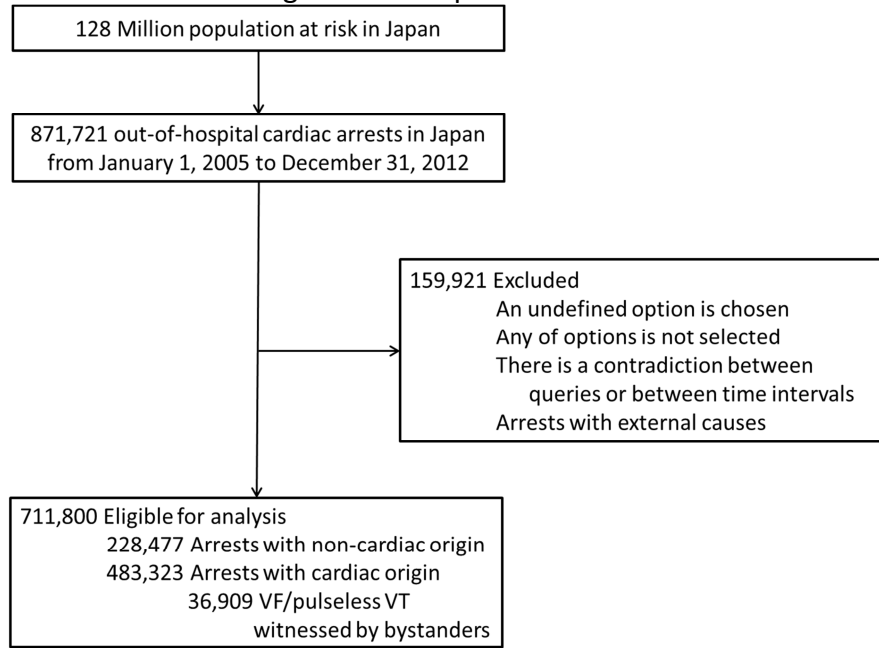


Table 1 Basic statistics

| All samples (711,800) | | | Noncardiogenic (228,477) | | | | Cardiogenic (483,323) | | | Witnessed cardiogenic with VFVT (36,909) | | | |
|--|---------|-------|--------------------------|-------|-------|---------|-----------------------|-------|--------|--|-------|--------|--|
| | No | % | No | % | | No | % | | No | % | | | |
| One month survival | 30,983 | 4.35 | 7,644 | 3.35 | | 23,339 | 4.83 | | 10,724 | 29.06 | | | |
| Favourable neurological outcome | 16,777 | 2.36 | 2,773 | 1.21 | | 14,004 | 2.90 | | 7,536 | 20.42 | | | |
| Male sex | 303,143 | 42.59 | 97,305 | 42.59 | | 205,838 | 42.59 | | 7,736 | 20.96 | | | |
| Cardiogenic | 483,323 | 67.90 | | | | | | | | | | | |
| Definite | 137,351 | 19.30 | | | | 137,351 | 28.42 | | 19,113 | 51.78 | | | |
| By exclusion | 345,972 | 48.61 | | | | 345,972 | 71.58 | | 17,796 | 48.22 | | | |
| Noncardiogenic | 228,477 | 32.10 | | | | | | | | | | | |
| Cerebrovascular | 38,509 | 5.41 | 38,509 | 16.85 | | | | | | | | | |
| Pulmonary | 50,883 | 7.15 | 50,883 | 22.27 | | | | | | | | | |
| Cancer | 29,525 | 4.15 | 29,525 | 12.92 | | | | | | | | | |
| Others | 109,560 | 15.39 | 109,560 | 47.95 | | | | | | | | | |
| Initially identified cardiac rhythm | | | | | | | | | | | | | |
| Ventricular fibrillation (VF) | 55,395 | 7.78 | 5,774 | 2.53 | | 49,621 | 10.27 | | | | | | |
| Pulseless ventricular tachycardia (VT) | 1,727 | 0.24 | 449 | 0.20 | | 1,278 | 0.26 | | | | | | |
| Pulseless electrical activity (PEA) | 149,466 | 21.00 | 53,867 | 23.58 | | 95,599 | 19.78 | | | | | | |
| Asystole | 475,978 | 66.87 | 156,735 | 68.60 | | 319,243 | 66.05 | | | | | | |
| Others | 29,234 | 4.11 | 11,652 | 5.10 | | 17,582 | 3.64 | | | | | | |
| Witnessed cases | 288,067 | 40.47 | 97,643 | 42.74 | | 190,424 | 39.40 | | | | | | |
| Cardiopulmonary resuscitation (CPR) by bystanders | 294,155 | 41.33 | 90,321 | 39.53 | | 203,834 | 42.17 | | 17,640 | 47.79 | | | |
| Automated external defibrillator (AED) by bystanders | 5,055 | 0.71 | 932 | 0.41 | | 4,123 | 0.85 | | 901 | 2.44 | | | |
| Medicine | 59,581 | 8.37 | 16,343 | 7.15 | | 43,238 | 8.95 | | 5,694 | 15.43 | | | |
| Instrument | 305,785 | 42.96 | 88,772 | 38.85 | | 217,013 | 44.90 | | 15,970 | 43.27 | | | |
| Emergency medical technician | 624,151 | 87.69 | 200,345 | 87.69 | | 423,806 | 87.69 | | 32,963 | 89.31 | | | |
| | Mean | SD | Median | Mean | SD | Median | Mean | SD | Median | Mean | SD | Median | |
| AGE | 74.51 | 16.33 | 78 | 73.11 | 17.86 | 77 | 75.17 | 15.52 | 78 | 64.80 | 15.84 | 66 | |
| Call to CPR by Emergency medical service (EMS) | 10.08 | 9.07 | 9 | 10.42 | 10.24 | 9 | 9.92 | 8.46 | 9 | 9.38 | 6.79 | 8 | |
| CPR by EMS to hospital arrival | 22.58 | 14.85 | 21 | 22.43 | 14.08 | 21 | 22.65 | 15.20 | 21 | 23.44 | 15.51 | 21 | |

Table 2 Variation of OHCA outcomes across Japan

| | All samples (711,800) | | Noncardiogenic (228,477) | | | Cardiogenic (483,323) | | | Witnessed cardiogenic with VFVT (36,909) | | | |
|-----------|-----------------------|--------------------|---------------------------------|--------|--------------------|---------------------------------|--------|--------------------|--|-------|--------------------|---------------------------------|
| | No | One month survival | Favourable neurological outcome | No | One month survival | Favourable neurological outcome | No | One month survival | Favourable neurological outcome | No | One month survival | Favourable neurological outcome |
| Hokkaido | 30,437 | 0.06 | 0.03 | 9,973 | 0.04 | 0.02 | 20,464 | 0.06 | 0.04 | 1,832 | 0.32 | 0.21 |
| Aomori | 9,983 | 0.04 | 0.02 | 2,950 | 0.03 | 0.01 | 7,033 | 0.04 | 0.02 | 519 | 0.28 | 0.19 |
| Iwate | 9,852 | 0.03 | 0.01 | 2,934 | 0.02 | 0.01 | 6,918 | 0.03 | 0.02 | 465 | 0.23 | 0.15 |
| Miyagi | 14,477 | 0.04 | 0.02 | 4,126 | 0.03 | 0.01 | 10,351 | 0.04 | 0.03 | 743 | 0.25 | 0.18 |
| Akita | 8,289 | 0.04 | 0.02 | 2,509 | 0.03 | 0.01 | 5,780 | 0.04 | 0.03 | 416 | 0.24 | 0.23 |
| Yamagata | 8,836 | 0.03 | 0.02 | 2,808 | 0.02 | 0.01 | 6,028 | 0.04 | 0.02 | 426 | 0.24 | 0.16 |
| Fukushima | 18,804 | 0.03 | 0.02 | 2,769 | 0.03 | 0.01 | 11,035 | 0.04 | 0.02 | 727 | 0.23 | 0.17 |
| Ibaraki | 18,019 | 0.03 | 0.02 | 6,021 | 0.03 | 0.01 | 11,998 | 0.03 | 0.02 | 856 | 0.23 | 0.17 |
| Tochigi | 12,985 | 0.03 | 0.02 | 3,568 | 0.02 | 0.01 | 9,417 | 0.04 | 0.02 | 739 | 0.23 | 0.17 |
| Gunma | 12,584 | 0.04 | 0.02 | 4,378 | 0.03 | 0.01 | 8,206 | 0.04 | 0.03 | 607 | 0.27 | 0.20 |
| Saitama | 36,339 | 0.05 | 0.03 | 10,739 | 0.03 | 0.01 | 25,600 | 0.05 | 0.03 | 2,138 | 0.28 | 0.19 |
| Chiba | 32,210 | 0.04 | 0.02 | 10,500 | 0.03 | 0.01 | 21,710 | 0.04 | 0.03 | 1,635 | 0.27 | 0.18 |
| Tokyo | 77,916 | 0.03 | 0.02 | 27,784 | 0.02 | 0.01 | 50,132 | 0.03 | 0.02 | 3,095 | 0.20 | 0.14 |
| Kanagawa | 48,691 | 0.04 | 0.02 | 15,094 | 0.03 | 0.01 | 33,597 | 0.05 | 0.03 | 2,365 | 0.29 | 0.20 |
| Niigata | 15,939 | 0.04 | 0.02 | 6,280 | 0.03 | 0.01 | 9,659 | 0.04 | 0.03 | 849 | 0.29 | 0.22 |
| Toyama | 6,239 | 0.05 | 0.03 | 2,654 | 0.04 | 0.02 | 3,585 | 0.06 | 0.04 | 346 | 0.29 | 0.22 |
| Ishikawa | 5,669 | 0.06 | 0.04 | 2,097 | 0.04 | 0.02 | 3,572 | 0.07 | 0.05 | 385 | 0.35 | 0.25 |
| Fukui | 3,869 | 0.03 | 0.02 | 1,466 | 0.02 | 0.01 | 2,403 | 0.03 | 0.02 | 183 | 0.26 | 0.20 |
| Yamanashi | 5,544 | 0.03 | 0.02 | 1,568 | 0.03 | 0.01 | 3,976 | 0.04 | 0.03 | 256 | 0.28 | 0.23 |
| Nagano | 14,854 | 0.03 | 0.02 | 6,334 | 0.03 | 0.01 | 8,520 | 0.04 | 0.02 | 676 | 0.25 | 0.18 |
| Gifu | 13,564 | 0.04 | 0.02 | 3,317 | 0.04 | 0.01 | 10,247 | 0.04 | 0.03 | 592 | 0.31 | 0.24 |
| Shizuoka | 24,008 | 0.03 | 0.02 | 10,285 | 0.02 | 0.01 | 13,723 | 0.04 | 0.02 | 1,173 | 0.37 | 0.16 |
| Aichi | 37,154 | 0.06 | 0.03 | 9,626 | 0.05 | 0.02 | 27,528 | 0.06 | 0.04 | 2,272 | 0.27 | 0.27 |
| Mie | 12,394 | 0.03 | 0.02 | 3,878 | 0.03 | 0.01 | 8,516 | 0.04 | 0.02 | 581 | 0.18 | 0.18 |
| Shiga | 6,991 | 0.05 | 0.03 | 2,373 | 0.04 | 0.02 | 4,618 | 0.06 | 0.03 | 357 | 0.31 | 0.22 |
| Kyoto | 13,707 | 0.05 | 0.03 | 3,412 | 0.05 | 0.02 | 10,295 | 0.06 | 0.03 | 860 | 0.33 | 0.21 |
| Osaka | 43,083 | 0.07 | 0.04 | 8,326 | 0.05 | 0.02 | 34,754 | 0.07 | 0.04 | 2,660 | 0.26 | 0.26 |
| Hyogo | 27,536 | 0.06 | 0.03 | 8,809 | 0.05 | 0.02 | 18,727 | 0.06 | 0.03 | 1,524 | 0.33 | 0.22 |
| Nara | 6,791 | 0.03 | 0.02 | 1,109 | 0.03 | 0.01 | 5,682 | 0.04 | 0.02 | 368 | 0.24 | 0.17 |
| Wakayama | 6,272 | 0.04 | 0.02 | 2,491 | 0.04 | 0.01 | 3,781 | 0.05 | 0.03 | 313 | 0.30 | 0.20 |
| Tottori | 3,854 | 0.05 | 0.03 | 767 | 0.04 | 0.01 | 3,087 | 0.05 | 0.03 | 193 | 0.32 | 0.24 |
| Shimane | 5,057 | 0.05 | 0.03 | 1,372 | 0.06 | 0.01 | 3,685 | 0.05 | 0.03 | 230 | 0.40 | 0.27 |
| Okayama | 10,572 | 0.05 | 0.02 | 3,750 | 0.04 | 0.02 | 6,822 | 0.05 | 0.03 | 508 | 0.27 | 0.19 |
| Hiroshima | 12,859 | 0.04 | 0.02 | 4,800 | 0.03 | 0.01 | 8,059 | 0.05 | 0.03 | 773 | 0.30 | 0.22 |
| Yamaguchi | 7,987 | 0.04 | 0.02 | 2,612 | 0.04 | 0.01 | 5,375 | 0.04 | 0.03 | 391 | 0.27 | 0.19 |
| Tokushima | 3,845 | 0.03 | 0.02 | 1,474 | 0.03 | 0.01 | 2,371 | 0.04 | 0.03 | 239 | 0.20 | 0.15 |
| Kagawa | 5,272 | 0.04 | 0.02 | 1,703 | 0.04 | 0.01 | 3,569 | 0.04 | 0.03 | 234 | 0.24 | 0.19 |
| Ehime | 8,691 | 0.03 | 0.02 | 2,189 | 0.04 | 0.01 | 6,502 | 0.03 | 0.02 | 374 | 0.26 | 0.20 |
| Kochi | 4,424 | 0.06 | 0.03 | 1,678 | 0.05 | 0.02 | 2,746 | 0.06 | 0.03 | 196 | 0.39 | 0.22 |
| Fukuoka | 23,034 | 0.06 | 0.04 | 11,208 | 0.05 | 0.02 | 11,826 | 0.08 | 0.05 | 1,249 | 0.37 | 0.28 |
| Saga | 4,349 | 0.04 | 0.03 | 1,924 | 0.03 | 0.01 | 2,425 | 0.05 | 0.04 | 225 | 0.29 | 0.21 |
| Nagasaki | 6,962 | 0.04 | 0.02 | 2,576 | 0.03 | 0.01 | 4,386 | 0.04 | 0.03 | 387 | 0.25 | 0.18 |
| Kumamoto | 9,580 | 0.05 | 0.02 | 2,945 | 0.04 | 0.02 | 6,635 | 0.05 | 0.03 | 501 | 0.25 | 0.17 |
| Oita | 5,859 | 0.04 | 0.02 | 2,028 | 0.03 | 0.01 | 3,831 | 0.05 | 0.03 | 346 | 0.27 | 0.18 |
| Miyazaki | 5,925 | 0.04 | 0.02 | 2,232 | 0.03 | 0.01 | 3,693 | 0.05 | 0.03 | 299 | 0.30 | 0.20 |
| Kagoshima | 9,202 | 0.04 | 0.02 | 2,944 | 0.03 | 0.01 | 6,258 | 0.05 | 0.03 | 430 | 0.31 | 0.24 |
| Okinawa | 6,292 | 0.07 | 0.03 | 2,094 | 0.06 | 0.02 | 4,198 | 0.08 | 0.04 | 366 | 0.38 | 0.25 |

Table 3 Seven regions in Hasegawa et al. (2013)

| | |
|-----------|--|
| North | Hokkaido |
| Northeast | Fukushima, Aomori, Iwate, Miyagi, Akita, Yamagata |
| East | Tokyo, Ibaraki, Tochigi, Gunma, Saitam, Chiba, Kanagawa, Niigata, Yamanashi, Nagano |
| Central | Toyama, Ishikawa, Gifu, Shizuoka, Aichi, Mie |
| Midwest | Kyoto, Osaka, Fukui, Shiga, Hyogo, Nara, Wakayama |
| West | Hiroshima, Tottori, Shimane, Okayama, Yamaguchi, Tokushima, Kagawa, Ehime, Kochi |
| South | Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa |

Table 4 Variation of OHCA outcomes in regions

| All samples (711,800) | | | Witnessed cardiogenic with VFVT (36,909) | | |
|-----------------------|------------|--------------------|--|------------|--------------------|
| Region | Prefecture | One month survival | Region | Prefecture | One month survival |
| East | Saitama | 0.05 | Northeast | Akita | 0.32 |
| | Ibaraki | 0.03 | | Iwate | 0.23 |
| | Tochigi | 0.03 | | Fukushima | 0.23 |
| | Tokyo | 0.03 | | East | Kanagawa |
| Central | Aichi | 0.06 | | Niigata | 0.29 |
| | Ishikawa | 0.06 | | Ibaraki | 0.23 |
| | Shizuoka | 0.03 | | Tochigi | 0.23 |
| | Mie | 0.03 | | Tokyo | 0.2 |
| Midwest | Osaka | 0.07 | Central | Aichi | 0.37 |
| | Nara | 0.03 | | Ishikawa | 0.35 |
| | Fukui | 0.03 | | Shizuoka | 0.24 |
| West | Kouchi | 0.06 | | Mie | 0.24 |
| | Tokushima | 0.03 | Midwest | Osaka | 0.38 |
| | Ehime | 0.03 | | Nara | 0.24 |
| South | Okinawa | 0.07 | West | Shimane | 0.4 |
| | Saga | 0.03 | | Kouchi | 0.39 |
| | Nagasaki | 0.03 | | Tokushima | 0.2 |
| | Oita | 0.03 | South | Okinawa | 0.38 |
| | Miyazaki | 0.03 | | Fukuoka | 0.37 |
| | Kagoshima | 0.03 | | Nagasaki | 0.25 |
| | | | | Kumamoto | 0.25 |

Table 5 Regression results for all samples

| All samples (711,800) | | | | | | | | | | | | |
|--------------------------------|--------------------|---------|----------------|----------|--------------------|---------|----------------|-------|---------------------------------|---------|----------------|---------|
| Dependent | One month survival | | | | One month survival | | | | Favourable neurological outcome | | | |
| | Coefficient | P-value | 95% confidence | | Coefficient | P-value | 95% confidence | | Coefficient | P-value | 95% confidence | |
| Constant | -3.75050*** | 0.02859 | -3.80654 | -3.69445 | -.54233*** | 0.08 | -0.69 | -0.39 | -4.47085*** | 0.03947 | -4.5482 | -4.3935 |
| Male sex | | | | | -.01871 | 0.01 | -0.05 | 0.01 | | | | |
| Age | | | | | -.02158*** | 0.00 | -0.02 | -0.02 | | | | |
| Cardiogenic | | | | | .07735*** | 0.02 | 0.05 | 0.11 | | | | |
| VF | | | | | .36691*** | 0.02 | 0.32 | 0.41 | | | | |
| Pulseless VT | | | | | .41563*** | 0.06 | 0.29 | 0.54 | | | | |
| PEA | | | | | -1.07733*** | 0.02 | -1.12 | -1.03 | | | | |
| Asystole | | | | | -2.56353*** | 0.03 | -2.61 | -2.51 | | | | |
| Witnessed | | | | | .92045*** | 0.02 | 0.89 | 0.95 | | | | |
| CPR by bystanders | | | | | -.03110** | 0.01 | -0.06 | 0.00 | | | | |
| AED by bystanders | | | | | .97094*** | 0.04 | 0.89 | 1.06 | | | | |
| Medicine | | | | | -.34510*** | 0.02 | -0.39 | -0.30 | | | | |
| Instrument | | | | | -.62878*** | 0.02 | -0.66 | -0.60 | | | | |
| Emergency medical services | | | | | .29391*** | 0.03 | 0.24 | 0.34 | | | | |
| Call to CPE by EMS | | | | | -.47436*** | 0.02 | -0.50 | -0.44 | | | | |
| CPR by EMS to hospital arrival | | | | | -.03765*** | 0.01 | -0.06 | -0.01 | | | | |
| Hokkaido | .74124*** | 0.03 | 0.68 | 0.81 | .88634*** | 0.04 | 0.82 | 0.96 | .60307*** | 0.04 | 0.52 | 0.69 |
| Aomori | .29099*** | 0.06 | 0.18 | 0.40 | .38439*** | 0.06 | 0.26 | 0.50 | 0.12427 | 0.08 | -0.03 | 0.28 |
| Iwate | -.08171 | 0.07 | -0.21 | 0.05 | 0.09748 | 0.07 | -0.04 | 0.24 | -0.10381 | 0.09 | -0.28 | 0.07 |
| Miyagi | .26518*** | 0.05 | 0.17 | 0.36 | .28043*** | 0.05 | 0.18 | 0.38 | .25019*** | 0.06 | 0.12 | 0.38 |
| Akita | .32252*** | 0.06 | 0.20 | 0.44 | .28978*** | 0.07 | 0.16 | 0.42 | .37084*** | 0.08 | 0.22 | 0.52 |
| Yamagata | 0.09265 | 0.06 | -0.03 | 0.22 | .13271* | 0.07 | 0.00 | 0.27 | 0.03725 | 0.09 | -0.13 | 0.21 |
| Fukushima | 0.05758 | 0.05 | -0.05 | 0.16 | 0.08036 | 0.06 | -0.03 | 0.19 | 0.06352 | 0.07 | -0.08 | 0.20 |
| Ibaraki | .09642** | 0.05 | 0.00 | 0.19 | .17989*** | 0.05 | 0.08 | 0.28 | 0.0435 | 0.06 | -0.08 | 0.17 |
| Tochigi | .11918** | 0.05 | 0.01 | 0.23 | -.01339 | 0.06 | -0.13 | 0.10 | .18144*** | 0.07 | 0.05 | 0.32 |
| Gunma | .35634*** | 0.05 | 0.26 | 0.45 | .28055*** | 0.05 | 0.17 | 0.39 | .27856*** | 0.07 | 0.15 | 0.41 |
| Saitama | .48154*** | 0.03 | 0.42 | 0.55 | .62191*** | 0.04 | 0.55 | 0.69 | .44454*** | 0.04 | 0.36 | 0.53 |
| Chiba | .31350*** | 0.04 | 0.24 | 0.38 | .34085*** | 0.04 | 0.26 | 0.42 | .20536*** | 0.05 | 0.11 | 0.30 |
| Kanagawa | .40548*** | 0.03 | 0.34 | 0.47 | .60245*** | 0.03 | 0.54 | 0.67 | .25753*** | 0.04 | 0.17 | 0.34 |
| Niigata | .25787*** | 0.05 | 0.17 | 0.35 | .48417*** | 0.05 | 0.38 | 0.58 | .33637*** | 0.06 | 0.22 | 0.45 |
| Toyama | .55518*** | 0.06 | 0.43 | 0.68 | .54519*** | 0.07 | 0.41 | 0.68 | .55048*** | 0.08 | 0.39 | 0.71 |
| Ishikawa | .75629*** | 0.06 | 0.64 | 0.87 | .75492*** | 0.07 | 0.62 | 0.89 | .82290*** | 0.08 | 0.67 | 0.97 |
| Fukui | 0.06202 | 0.10 | -0.13 | 0.25 | 0.10911 | 0.10 | -0.09 | 0.31 | 0.04543 | 0.13 | -0.20 | 0.30 |
| Yamanashi | .17289** | 0.08 | 0.02 | 0.33 | .62258*** | 0.08 | 0.46 | 0.79 | .27726*** | 0.10 | 0.09 | 0.47 |
| Nagano | .12836** | 0.05 | 0.03 | 0.23 | .27572*** | 0.05 | 0.17 | 0.38 | 0.02855 | 0.07 | -0.11 | 0.17 |
| Gifu | .38270*** | 0.05 | 0.29 | 0.48 | .71132*** | 0.05 | 0.61 | 0.81 | .33087*** | 0.06 | 0.20 | 0.46 |
| Shizuoka | .15163*** | 0.04 | 0.07 | 0.23 | .29564*** | 0.05 | 0.21 | 0.38 | .10387* | 0.06 | -0.01 | 0.21 |
| Aichi | .72530*** | 0.03 | 0.66 | 0.79 | .90297*** | 0.03 | 0.84 | 0.97 | .66471*** | 0.04 | 0.58 | 0.75 |
| Mie | .20734*** | 0.05 | 0.10 | 0.31 | .36937*** | 0.06 | 0.26 | 0.48 | 0.06149 | 0.07 | -0.08 | 0.21 |
| Shiga | .57831*** | 0.06 | 0.46 | 0.69 | .71415*** | 0.06 | 0.59 | 0.84 | .49546*** | 0.08 | 0.34 | 0.65 |
| Kyoto | .66388*** | 0.04 | 0.58 | 0.75 | .74859*** | 0.05 | 0.65 | 0.84 | .52755*** | 0.06 | 0.41 | 0.64 |
| Osaka | .91602*** | 0.03 | 0.86 | 0.97 | .94259*** | 0.03 | 0.88 | 1.01 | .87826*** | 0.04 | 0.80 | 0.95 |
| Hyogo | .71658*** | 0.03 | 0.65 | 0.78 | .90119*** | 0.04 | 0.83 | 0.97 | .51187*** | 0.05 | 0.42 | 0.60 |
| Nara | .19986*** | 0.07 | 0.06 | 0.34 | .37433*** | 0.07 | 0.23 | 0.52 | .22998** | 0.09 | 0.05 | 0.41 |
| Wakayama | .45927*** | 0.06 | 0.33 | 0.59 | .75813*** | 0.07 | 0.62 | 0.90 | .33672*** | 0.09 | 0.16 | 0.51 |
| Tottori | .48286*** | 0.08 | 0.33 | 0.64 | .80783*** | 0.09 | 0.64 | 0.98 | .46152*** | 0.11 | 0.25 | 0.67 |
| Shimane | .59997*** | 0.07 | 0.47 | 0.73 | 1.03867*** | 0.07 | 0.89 | 1.18 | .59392*** | 0.09 | 0.42 | 0.77 |
| Okayama | .48440*** | 0.05 | 0.38 | 0.59 | .70904*** | 0.06 | 0.60 | 0.82 | .31609*** | 0.07 | 0.18 | 0.46 |
| Hiroshima | .38846*** | 0.05 | 0.29 | 0.48 | .31030*** | 0.05 | 0.21 | 0.41 | .31976*** | 0.07 | 0.19 | 0.45 |
| Yamaguchi | .37181*** | 0.06 | 0.25 | 0.49 | .47381*** | 0.07 | 0.35 | 0.60 | .22771*** | 0.08 | 0.06 | 0.39 |
| Tokushima | .19826** | 0.09 | 0.02 | 0.38 | -.01215 | 0.10 | -0.20 | 0.18 | .25670** | 0.12 | 0.03 | 0.48 |
| Kagawa | .24660*** | 0.08 | 0.10 | 0.40 | .52322*** | 0.08 | 0.36 | 0.69 | .22087** | 0.10 | 0.02 | 0.42 |
| Ehime | .14031** | 0.06 | 0.01 | 0.27 | .35644*** | 0.07 | 0.22 | 0.49 | 0.10215 | 0.09 | -0.06 | 0.27 |
| Kouchi | .72284*** | 0.07 | 0.59 | 0.86 | .78559*** | 0.08 | 0.64 | 0.93 | .44835*** | 0.10 | 0.25 | 0.64 |
| Fukuoka | .83279*** | 0.03 | 0.76 | 0.90 | .86237*** | 0.04 | 0.79 | 0.94 | .82097*** | 0.05 | 0.73 | 0.91 |
| Saga | .42788*** | 0.08 | 0.28 | 0.58 | .39964*** | 0.08 | 0.23 | 0.57 | .47697*** | 0.10 | 0.28 | 0.67 |
| Nagasaki | .31217*** | 0.07 | 0.18 | 0.44 | .29613*** | 0.07 | 0.16 | 0.43 | .30545*** | 0.09 | 0.14 | 0.47 |
| Kumamoto | .49928*** | 0.05 | 0.39 | 0.60 | .53103*** | 0.06 | 0.42 | 0.64 | .34622*** | 0.07 | 0.20 | 0.49 |
| Oita | .41755*** | 0.07 | 0.28 | 0.55 | .35422*** | 0.07 | 0.21 | 0.50 | .21428** | 0.10 | 0.02 | 0.40 |
| Miyazaki | .34862*** | 0.07 | 0.21 | 0.49 | .31223*** | 0.08 | 0.16 | 0.46 | .32833*** | 0.09 | 0.15 | 0.51 |
| Kagoshima | .39002*** | 0.06 | 0.28 | 0.50 | .51707*** | 0.06 | 0.40 | 0.64 | .29764*** | 0.08 | 0.15 | 0.45 |
| Okinawa | .93475*** | 0.05 | 0.83 | 1.04 | .97999*** | 0.06 | 0.86 | 1.10 | .69414*** | 0.08 | 0.54 | 0.84 |
| Year2006 | 0.03692 | 0.03 | -0.02 | 0.09 | 0.02778 | 0.03 | -0.03 | 0.09 | 0.05036 | 0.04 | -0.03 | 0.13 |
| Year2007 | .20564*** | 0.03 | 0.15 | 0.26 | .21446*** | 0.03 | 0.16 | 0.27 | .35561*** | 0.04 | 0.28 | 0.43 |
| Year2008 | .21622*** | 0.03 | 0.17 | 0.27 | .21437*** | 0.03 | 0.16 | 0.27 | .36991*** | 0.04 | 0.30 | 0.44 |
| Year2009 | .27406*** | 0.03 | 0.22 | 0.32 | .50570*** | 0.03 | 0.45 | 0.57 | .46009*** | 0.04 | 0.39 | 0.53 |
| Year2010 | .30923*** | 0.03 | 0.26 | 0.36 | .38877*** | 0.03 | 0.34 | 0.44 | .49541*** | 0.04 | 0.43 | 0.56 |
| Year2011 | .30692*** | 0.02 | 0.26 | 0.36 | .41913*** | 0.03 | 0.37 | 0.47 | .51610*** | 0.03 | 0.45 | 0.58 |
| Year2012 | .31870*** | 0.02 | 0.27 | 0.37 | .45639*** | 0.03 | 0.40 | 0.51 | .51135*** | 0.03 | 0.44 | 0.58 |
| Chi-square statistics | | | 2778.03 | | 66106.08 | | | | 1732.17 | | | |
| DF | | | 58 | | 68 | | | | 53 | | | |
| P-value | | | 0 | | 0 | | | | 0 | | | |
| McFadden pseude R ² | | | 0.01 | | 0.26 | | | | 0.01 | | | |

Table 7 Regression results for cardiogenic arrests

| Cardiogenic (483,323) | | | | | | | | | | | | |
|--------------------------------|--------------------|---------|----------------|----------------|--------------------|---------|----------------|----------------|---------------------------------|---------|----------------|----------------|
| Dependent | One month survival | | | | One month survival | | | | Favourable neurological outcome | | | |
| | Coefficient | P-value | 95% confidence | 95% confidence | Coefficient | P-value | 95% confidence | 95% confidence | Coefficient | P-value | 95% confidence | 95% confidence |
| Constant | -3.60584*** | 0.03316 | -3.67084 | -3.54084 | -.65269*** | 0.09 | -0.83 | -0.48 | -4.22969*** | 0.04365 | -4.31523 | -4.14414 |
| Male sex | | | | | -.03675** | 0.02 | -0.07 | 0.00 | | | | |
| Age | | | | | -.02289*** | 0.00 | -0.02 | -0.02 | | | | |
| Definite | | | | | .63177*** | 0.02 | 0.60 | 0.66 | | | | |
| VF | | | | | .30730*** | 0.03 | 0.25 | 0.36 | | | | |
| Pulseless VT | | | | | .46723*** | 0.07 | 0.33 | 0.61 | | | | |
| PEA | | | | | -1.19087*** | 0.03 | -1.25 | -1.14 | | | | |
| Asystole | | | | | -2.67323*** | 0.03 | -2.74 | -2.61 | | | | |
| Witnessed | | | | | .88297*** | 0.02 | 0.85 | 0.92 | | | | |
| CPR by bystanders | | | | | -.05521*** | 0.02 | -0.09 | -0.02 | | | | |
| AED by bystanders | | | | | .95859*** | 0.05 | 0.87 | 1.05 | | | | |
| Medicine | | | | | -.40632*** | 0.03 | -0.46 | -0.35 | | | | |
| Instrum | | | | | -.69291*** | 0.02 | -0.73 | -0.66 | | | | |
| Emergency medical services | | | | | .30526*** | 0.03 | 0.25 | 0.37 | | | | |
| Call to CPE by EMS | | | | | -.43377*** | 0.02 | -0.47 | -0.40 | | | | |
| CPR by EMS to hospital arrival | | | | | -.03698** | 0.02 | -0.07 | -0.01 | | | | |
| Hokkaido | .66745*** | 0.04 | 0.59 | 0.74 | .74276*** | 0.04 | 0.66 | 0.83 | .55731*** | 0.05 | 0.46 | 0.65 |
| Aomori | .21629*** | 0.06 | 0.09 | 0.34 | .29480*** | 0.07 | 0.15 | 0.44 | .04783 | 0.09 | -0.12 | 0.22 |
| Iwate | -.16436** | 0.08 | -0.31 | -0.02 | .01292 | 0.08 | -0.15 | 0.17 | -.19818** | 0.10 | -0.39 | -0.01 |
| Miyagi | .19989*** | 0.06 | 0.09 | 0.31 | .26359*** | 0.06 | 0.14 | 0.38 | .16925** | 0.07 | 0.03 | 0.31 |
| Akita | .20675*** | 0.07 | 0.07 | 0.34 | .09452 | 0.08 | -0.06 | 0.25 | .28687*** | 0.09 | 0.12 | 0.45 |
| Yamagata | .03491 | 0.07 | -0.11 | 0.18 | .00147 | 0.08 | -0.16 | 0.16 | .03463 | 0.09 | -0.15 | 0.22 |
| Fukushima | -.11486* | 0.06 | -0.23 | 0.00 | .05296 | 0.07 | -0.08 | 0.18 | -.08798 | 0.08 | -0.24 | 0.06 |
| Ibaraki | -.0324 | 0.06 | -0.14 | 0.08 | .02246 | 0.06 | -0.10 | 0.14 | -.03582 | 0.07 | -0.18 | 0.10 |
| Tochigi | .06299 | 0.06 | -0.06 | 0.18 | -.13041** | 0.07 | -0.26 | 0.00 | .13607* | 0.07 | -0.01 | 0.28 |
| Gunma | .27257*** | 0.06 | 0.16 | 0.39 | .18106*** | 0.06 | 0.05 | 0.31 | .17680** | 0.08 | 0.03 | 0.33 |
| Saitama | .42791*** | 0.04 | 0.35 | 0.50 | .66996*** | 0.04 | 0.59 | 0.75 | .37997*** | 0.05 | 0.29 | 0.47 |
| Chiba | .25853*** | 0.04 | 0.18 | 0.34 | .27160*** | 0.05 | 0.18 | 0.36 | .16202*** | 0.05 | 0.06 | 0.27 |
| Kanagawa | .33454*** | 0.04 | 0.26 | 0.40 | .63650*** | 0.04 | 0.56 | 0.72 | .23676*** | 0.05 | 0.15 | 0.33 |
| Niigata | .25879*** | 0.06 | 0.15 | 0.37 | .35056*** | 0.06 | 0.23 | 0.47 | .37240*** | 0.07 | 0.24 | 0.50 |
| Toyama | .50877*** | 0.08 | 0.36 | 0.66 | .37681*** | 0.09 | 0.21 | 0.55 | .57830*** | 0.09 | 0.40 | 0.76 |
| Ishikawa | .76290*** | 0.07 | 0.63 | 0.90 | .47750*** | 0.08 | 0.32 | 0.63 | .84285*** | 0.08 | 0.68 | 1.01 |
| Fukui | .025 | 0.11 | -0.20 | 0.25 | -.1296 | 0.12 | -0.37 | 0.11 | .0431 | 0.14 | -0.24 | 0.32 |
| Yamanashi | .04941 | 0.09 | -0.12 | 0.22 | .62219*** | 0.10 | 0.43 | 0.82 | .017063 | 0.11 | -0.04 | 0.38 |
| Nagano | .05344 | 0.06 | -0.07 | 0.18 | .07504 | 0.07 | -0.06 | 0.21 | .04477 | 0.08 | -0.11 | 0.20 |
| Gifu | .21759*** | 0.05 | 0.11 | 0.33 | .67660*** | 0.06 | 0.56 | 0.80 | .19905*** | 0.07 | 0.06 | 0.34 |
| Shizuoka | .14836*** | 0.05 | 0.05 | 0.25 | .23702*** | 0.06 | 0.13 | 0.35 | .15789** | 0.06 | 0.03 | 0.28 |
| Aichi | .61819*** | 0.04 | 0.55 | 0.69 | .78686*** | 0.04 | 0.71 | 0.87 | .57948*** | 0.04 | 0.49 | 0.67 |
| Mie | .04896 | 0.06 | -0.07 | 0.17 | .13119* | 0.07 | -0.01 | 0.27 | -.07162 | 0.08 | -0.24 | 0.09 |
| Shiga | .44177*** | 0.07 | 0.30 | 0.58 | .58287*** | 0.08 | 0.43 | 0.74 | .40348*** | 0.09 | 0.23 | 0.58 |
| Kyoto | .50041*** | 0.05 | 0.40 | 0.60 | .65293*** | 0.06 | 0.54 | 0.76 | .36464*** | 0.07 | 0.24 | 0.49 |
| Osaka | .77915*** | 0.03 | 0.72 | 0.84 | .86279*** | 0.04 | 0.79 | 0.94 | .71030*** | 0.04 | 0.63 | 0.79 |
| Hyogo | .58693*** | 0.04 | 0.51 | 0.66 | .83415*** | 0.04 | 0.75 | 0.92 | .43961*** | 0.05 | 0.34 | 0.54 |
| Nara | .06037 | 0.07 | -0.09 | 0.21 | .34769*** | 0.08 | 0.19 | 0.51 | .03893 | 0.10 | -0.15 | 0.23 |
| Wakayama | .36933*** | 0.08 | 0.21 | 0.53 | .49811*** | 0.09 | 0.32 | 0.67 | .33527*** | 0.10 | 0.14 | 0.53 |
| Tottori | .31121*** | 0.09 | 0.14 | 0.49 | .80167*** | 0.10 | 0.60 | 1.00 | .30781*** | 0.11 | 0.09 | 0.53 |
| Shimane | .35145*** | 0.08 | 0.19 | 0.51 | .88893*** | 0.09 | 0.71 | 1.07 | .29866*** | 0.10 | 0.10 | 0.50 |
| Okayama | .32363*** | 0.06 | 0.20 | 0.45 | .47896*** | 0.07 | 0.34 | 0.62 | .21304*** | 0.08 | 0.05 | 0.37 |
| Hiroshima | .36846*** | 0.06 | 0.26 | 0.48 | .09247 | 0.06 | -0.03 | 0.22 | .37075*** | 0.07 | 0.23 | 0.51 |
| Yamaguchi | .23998*** | 0.07 | 0.10 | 0.38 | .36460*** | 0.08 | 0.21 | 0.52 | .19959** | 0.09 | 0.02 | 0.38 |
| Tokushima | .013107 | 0.11 | -0.08 | 0.35 | -.24042** | 0.12 | -0.47 | -0.01 | .24718* | 0.13 | -0.01 | 0.50 |
| Kagawa | .05241 | 0.09 | -0.13 | 0.23 | .35164*** | 0.10 | 0.15 | 0.55 | .017011 | 0.11 | -0.05 | 0.39 |
| Ehime | -.09066 | 0.08 | -0.24 | 0.06 | .23562*** | 0.08 | 0.07 | 0.40 | -.0619 | 0.09 | -0.25 | 0.12 |
| Kouchi | .65609*** | 0.08 | 0.50 | 0.82 | .65881*** | 0.09 | 0.48 | 0.84 | .41313*** | 0.11 | 0.19 | 0.64 |
| Fukuoka | .84011*** | 0.04 | 0.76 | 0.92 | .69328*** | 0.05 | 0.60 | 0.79 | .91269*** | 0.05 | 0.81 | 1.01 |
| Saga | .47240*** | 0.09 | 0.29 | 0.66 | .31559*** | 0.11 | 0.11 | 0.52 | .56782*** | 0.11 | 0.35 | 0.79 |
| Nagasaki | .24461*** | 0.08 | 0.09 | 0.40 | .01183 | 0.09 | -0.05 | 0.29 | .29303*** | 0.10 | 0.10 | 0.48 |
| Kumamoto | .38349*** | 0.06 | 0.26 | 0.50 | .40906*** | 0.07 | 0.27 | 0.54 | .21081** | 0.08 | 0.05 | 0.37 |
| Oita | .33208*** | 0.08 | 0.18 | 0.49 | .013883 | 0.09 | -0.04 | 0.31 | .21571** | 0.11 | 0.01 | 0.42 |
| Miyazaki | .34145*** | 0.08 | 0.18 | 0.50 | .25629*** | 0.09 | 0.08 | 0.43 | .37856*** | 0.10 | 0.18 | 0.57 |
| Kagoshima | .28309*** | 0.07 | 0.15 | 0.41 | .36004*** | 0.07 | 0.22 | 0.50 | .28884*** | 0.08 | 0.13 | 0.45 |
| Okinawa | .84089*** | 0.06 | 0.72 | 0.96 | .96661*** | 0.07 | 0.82 | 1.11 | .64207*** | 0.08 | 0.48 | 0.81 |
| Year2006 | .0511 | 0.03 | -0.01 | 0.11 | .06335* | 0.04 | -0.01 | 0.13 | .04111 | 0.04 | -0.05 | 0.13 |
| Year2007 | .27215*** | 0.03 | 0.21 | 0.33 | .32093*** | 0.03 | 0.25 | 0.39 | .39867*** | 0.04 | 0.32 | 0.48 |
| Year2008 | .25736*** | 0.03 | 0.20 | 0.32 | .32056*** | 0.03 | 0.25 | 0.39 | .40318*** | 0.04 | 0.32 | 0.48 |
| Year2009 | .34022*** | 0.03 | 0.28 | 0.40 | .66015*** | 0.04 | 0.59 | 0.73 | .48625*** | 0.04 | 0.41 | 0.56 |
| Year2010 | .35880*** | 0.03 | 0.30 | 0.42 | .51613*** | 0.03 | 0.45 | 0.58 | .52166*** | 0.04 | 0.44 | 0.60 |
| Year2011 | .35864*** | 0.03 | 0.30 | 0.42 | .57758*** | 0.03 | 0.51 | 0.64 | .54288*** | 0.04 | 0.47 | 0.62 |
| Year2012 | .34773*** | 0.03 | 0.29 | 0.40 | .58826*** | 0.03 | 0.52 | 0.65 | .53176*** | 0.04 | 0.46 | 0.61 |
| Chi-square statistics | | | 2021.57 | | 57654.05 | | | | 1396.13 | | | |
| DF | | | 53 | | 68 | | | | 53 | | | |
| P-value | | | 0 | | 0 | | | | 0 | | | |
| McFadden pseude R ² | | | 0.01 | | 0.31 | | | | 0.01 | | | |

