Determining Factors of Volunteer Work Participation in Japan

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With the growing awareness of the sustainability concept, society's interest towards the consideration for the wider community and the environment has developed. Local Agenda 21 has supported the voluntary process of local community consultation with the aim to create local policies and programs that work towards achieving sustainable development. This has stimulated the need for community participation through local volunteer participants. This paper will apply prefecture level panel data for Japan to examine the determining factors of volunteer work participation. The main results show that prefectures with higher children and senior citizen population and prefectures with higher usage of the internet and media are more active in the overall participation of volunteer work. On the other hand, prefectures with stronger urbanization are less likely to participate in volunteer work.

INTRODUCTION

With the growing awareness of the sustainability concept, society's interest towards the consideration for the wider community and the environment has developed. Local Agenda 21 has supported the voluntary process of local community consultation with the aim to create local policies and programs that work towards achieving sustainable development. This has stimulated the need for community participation through local volunteer participants. There is also a growing need for volunteers to supplement the local governments' limitations to support current diverse lifestyles (Tanaka, 2011). Volunteer participation is also known to enhance the well-being and sense of accomplishment of the volunteers and provide valuable experience. Experience that bridges individuals with the community is a key competency recommended by the OECD, which volunteer work can provide (Saito, 2010). It is also recognised as a valuable active learning method that helps educate necessary skills for sustainable living. In Japan, there is increasing interest in volunteer work since the frequent natural disasters such as the Great Hanshin Earthquake in 1995 and the Great East Japan Earthquake in 2011. The need for volunteer work is also being recognised to address the increasing aging population in Japan which is dependent on the support of others (Mitani, 2016).

1 REVIEW OF LITERATURE

Concerning past studies on the determinants of volunteer work, Schram and Dunsing (1981) focus on married women's volunteer participation and the determining factors such as their age, education

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and marital satisfaction. Carlin (2001) also studies volunteer work by married women and examines economic variables such as income and number of children. Vaillancourt (1994) examines determinants such as age, education and occupation for volunteer work in Canada and Freeman (1997) and Taniguchi (2006) analyse the impact income level, employment and gender have on the participation of volunteer work in the United States. Burns et al. (2008) also examine gender but focus on young adults. Schady (2001) examines how volunteer work supports the development of social capital in the rural areas of Peru. Cappellari and Turati (2004) observe how extrinsic motivation reduces the volunteer participation in social services and political organizations. Concerning studies on Japan, Yamauchi (1997), Osaka University Center for Nonprofit Research and Information (2005), Nakano (2005) all find that urbanization has a negative impact on volunteer participation. Okuyama (2009) studies the factors of rural regions but was unable to achieve statistically significant results. Tsukamoto et al. (2012) examine whether the network of human relationships in the community affect volunteer participation. Fukushige (1999) finds that higher share of social citizens and youths have a positive impact on volunteer participation in Japan and Okuyama (2009), Moriyama (2007) and Ono (2006) identify that gender impacts participation. Furthermore, Atoda and Fukushige (2000) find that educational attainment in Tokyo, Oita and Nagano has a positive impact on volunteer participation and Ma (2014) also finds a positive impact with educational attainment on elderly volunteer participants. Atoda and Fukushige (2000) identify that wage has a negative impact on volunteer participation in Tokyo. Moriyama (2007) and Ono (2006) also confirm that wage has an impact on volunteer participation. However, none of the previous studies on Japan consider the impact that the availability of information may have on volunteer participation and is not included in the independent variables as a determining factor. It is reasonable to consider that the accessibility to information from the internet, with the penetration of internet for individuals as high as 80.9% in 2017 in Japan (Ministry of Internal Affairs and Communications, 2018), will affect the interest in volunteer work. Studies on volunteer participation in Japan, that examine the different fields of volunteer work are also limited. There is the study by Tsukamoto et al. (2012), which is limited to Fukui prefecture and the study by Okuyama (2009), which focuses on the fields of volunteer community cleaning, recycling, and patrolling.

Learning from the work by Segal and Weisbrod (2002) that identifies the difference in the nature of various volunteer work and the need to analyse the different fields of volunteer work, this paper not only studies overall volunteer work in Japan but analyses the fields of volunteer related to community development, elderly care and the environment. The reason it focuses on the field of community development is that according to the Ministry of Internal Affairs and Communications (2011), it is the most active field of volunteer work with the largest number of volunteer participation and is also an important area for Japan to improve its landscape and regional development. Furthermore, community development supports the Sustainable Development Goals (SDGs) of 'sustainable cities and communities' adopted by the United Nations. Concerning that Japan has the greatest aging population amongst all the developing countries, addressing the aging society is a critical challenge for the present and future (Cabinet Office, 2018). In order to address the aging population in Japan, where there is increasing population that is dependent on the support of others, the need for volunteer work is great (Mitani, 2016), which has led to the adoption of this field. Since the Brundtland Commission where sustainable development has become a global key concept, it has become necessary for Japan to address environmental concerns. The SDGs include the conservation and sustainable use of the oceans, seas and marine resources where volunteers are relied upon to monitor and clean marine litter (Hastings and Potts, 2013). Considering that Japan is surrounded by the sea on all sides, the impact of marine litter on its coasts and islands are great (Takano, 2013). Hence, tackling marine litter is considered a priority action item for Japan and there is growing need for volunteers (Ministry of Foreign Affairs of Japan, 2016). SDGs also calls for the protection, restoration and promotion of sustainable use of terrestrial ecosystems and climate action. However, afforestation and greening require active involvement from the community which requires volunteers (Ueno et al.,

2012). Thus, this paper will focus on the volunteer fields of community development, elderly care and environmental work and examine whether information is a determining factor. Furthermore, it will cover other variables such as population density, income level, educational attainment, share of population of females, social citizens and children to examine their impact. In order to supplement past research, this paper will apply prefecture level data for Japan for the recent fiscal years of 2001, 2006 and 2011 to a panel data analysis to examine the determinants of volunteer work participation.

2 DATA AND METHODS
This section aims to explain the data and methods used in this article.

2.1 Volunteer Work Participation
Volunteer work in this study includes the fields of health/medical care, elderly/disabled/child care, sports/culture/art, community development, environment, safety, disaster prevention, international cooperation, and others. The total volunteer participation rate (*Vol*) is achieved by dividing the total number of volunteer participants over the age of 10 for each prefecture by the populations of over 10 years of age for each prefecture, multiplied by 100. This study further examines three fields of volunteer work. The first is environmental volunteer work which includes soap making from wasted oil; cleaning of beaches; observation and conservation of birds; desert greening; and environmental education. The environmental volunteer participation rate (*EnvVol*) is achieved in the same way by dividing the number of participants over the age of 10 for each prefecture with the populations of over 10 years of age for each prefecture, multiplied by 100. The second field covered is community development volunteer work which includes road-side gardening; urban and rural exchange; developing bicycle parks near train stations; cleaning of roads and parks; and proactive regional and community revitalisation work. The community development volunteer participation rate (*CommVol*) is obtained with the same method as the previous two volunteer participation rates. The final field reviewed is elderly care volunteer work which includes the exchange between senior citizens and children; recreational activities for senior citizens; mental care to improve well-being; communication with senior citizens who live alone; provide companionship to walk or talk; food/care services for senior citizens who are bedridden or live alone; and nursing services. The elderly care volunteer participation rate (*SnrVol*) is obtained with the same method as the other volunteer participation rates.

2.2 Demographic Variables
It has been identified that demographic variables impact human behaviours (Kotler and Keller, 2010). Thus, it will be beneficial to adopt demographic variables as factors which may affect volunteer participation. This article focuses on the difference of gender as a demographic variable since the inherent or acquired influence from gender often impacts behaviour and preference (Kotler and Keller, 2010) and there are numerous past studies on the impact from the differences in gender (e.g. Kurisu and Bortoleto, 2011; Rendon, 2003). Accordingly, this article uses the share of female population (*Fem*) as one of the demographic variables to investigate whether the share of female population by prefecture impacts volunteer participation. This may allow us to observe whether there is a preference by women to participate in volunteer work. The Fem is achieved by dividing the number of female population in each prefecture by the total population of that prefecture multiplied by 100. The second demographic factor observed in this article is the share of children population (*Chd*). Since the behaviours and preferences of children will help shape future society, it will be important to understand how they relate to volunteer work. The analysis aims to understand the children population's preference towards volunteer activities. Here, the children population is defined as population younger than 15 years of age. The *Chd* is the volume of children population for each prefecture divided by the total population of that prefecture multiplied

by 100. The third demographic variable examined is the share of senior citizens population (*Snr*), which is an important demographic to observe for Japan with the challenges brought by the fast aging population. Therefore, this research examines whether prefectures with a larger share of senior citizens have an impact on the participation of volunteer work. As in the previous demographic studies, it will aim to understand the preference by senior citizens towards volunteer work. The senior citizens population is defined as the population of 65 years of age and over. The *Snr* is achieved by dividing the volume of senior citizens population for each prefecture by the total population of each prefecture multiplied by 100. The educational attainment for each prefecture will be reviewed as the fourth demographic variable that affects volunteer participation. Higher educational attainment may influence a stronger interest in social issues such as the environment and community service, which may encourage the participation of volunteer activities. Volunteer participation may also be part of the educational curriculum. The expected impact of educational attainment in this case would be positive. The high school enrollment rate for each prefecture is applied as the indicator for educational attainment (*Ed*).

2.3 Information

The variable that is used to assess the information accessibility is the share of media active users (*Media*), defining active as the volume of users 10 years of age and over, who viewed, listened or read the television/radio /newspaper/magazine for over 15 minutes per day. We can expect that larger number of active users will result in increased opportunity to access information including information on volunteer opportunities. Hence, an increase in participation of volunteer work could be anticipated which would result in a positive sign. The *Media* is obtained by dividing the number of television, radio, newspaper and magazine active users in each prefecture by the total population 10 years of age and over of that prefecture, multiplied by 100. The other variable used for information accessibility is the share of active internet users (*Inet*). Like the media active users, this is believed to impact the information accessibility, but with the information flowing both ways. This is likely to increase the level of communication and have a large influence over human behaviour. With an increase in active internet users, we can assume that the opportunity to access information on volunteer work would increase and encourage participation. This would result in a positive coefficient. The share of active internet users is the number of users of 10 years of age and over that have used the internet over 15 minutes a day for over a year for each prefecture divided by the total population of 10 years of age and over of that prefecture, multiplied by 100.

2.4 Population density

Volunteer participation may be affected by urbanization which will be represented by the independent variable, population density (*PD*). Higher *PD* has been considered to weaken community participation and bonding, resulting in lower volunteer participation. It is considered that higher *PD* increases the demand and supply of goods and services where time can be spent consuming, reducing the time available to participate in volunteer work. High *PD* could also mean that it is physically easier for networks to develop to support volunteer work. In this way, the results of the impact *PD* may have on volunteer participation could be both positive and negative. The variable used to represent *PD* is the total population of each prefecture divided by inhabitable land area of that prefecture.

2.5 Income

Higher income per capita could mean higher opportunity cost to spend time at volunteer work and as a result reduce volunteer participation. On the other hand, as suggested by the Environmental Kuznets Curve, the increase in income places a stronger demand on the quality of the environment and amenities and as a result, stronger regulations are introduced (Grossman and Krueger, 1995; Grossman, 1995; Panayotou, 1993), which may stimulate active volunteer work. Considering these points, the result

of the impact income per capita has on volunteer participation may be positive or negative. Real gross income per capita for each prefecture (*RPIpc*) is used as the indicator.

The panel data applied for the variables are Japan prefecture level data for all 47 prefectures for the fiscal years of 2001, 2006 and 2011. Statistical descriptions for the data are provided in the Appendix 1. The data source for the dependent variables and the independent variables are provided in the Appendix 2.

The basic model on the determining factors impacting volunteer participation is as follows:

$$Vol_{it} \ (or \ CommVol_{it} \ or \ SnrVol_{it} \ or \ EnvVol_{it}) = Fem_{it} + Chd_{it} + Snr_{it} + Ed_{it} + Media_{it} \ (+Inet_{it}) +$$
$$PD_{it} \ (+RPIpc_{it}) + D_t + \delta_i + e_{it}, \tag{1}$$

where: i is prefecture, t refers to fiscal year, δ_i indicates the individual effects of each prefecture, e_{it} denotes the error term. The analysis has taken into consideration and addressed the possibility of heteroscedasticity. Dependent variables and independent variables are translated into the form of natural logarithms. This model includes year dummy D_t in order to control the time specific effects. STATA is used for the analysis of Formula (1). When applying the linear panel regression to Formula (1), the fixed effects model and random effects model were applied to examine the differences by prefecture. The prefecture differences were allowed as intercept values in the fixed effects model. In other words, by including the dummy for each prefecture, prefecture individual effects are taken into consideration. However, there is the possibility of a reduction in the degree of freedom. The random effects model does not capture prefecture individual effects with dummy variables since it represents a lack of knowledge of the true model. Instead, the disturbance term is employed to capture the prefecture individual effects. Compared to the fixed effects model, in the random effects model, the degree of freedom is limited to the one variance for the prefecture individual effects. Hence, the reduction in the degree of freedom is limited and there is less risk of impacting the precision of the estimation of the parameter. The random effects model obtains consistent and efficient estimators by assuming that the regressors and the prefecture individual effects are uncorrelated. If this assumption does not apply, the estimators will be inconsistent. On the other hand, with a fixed effects model, the estimators from the model will be consistent and efficient under the assumption that the regressors and the prefecture individual effects are correlated. Hence, the Hausman test was conducted to examine the null hypothesis (the regressors and the prefecture individual effects are uncorrelated) against the alternative hypothesis (the regressors and the prefecture individual effects are correlated) to determine whether it could be rejected. The following Table 1 to Table 4 which cover the results of the Hausman test find that in most of the models, the random effects models are preferred over the fixed effects models.

Next, an examination is conducted to confirm whether the random effects model will be preferred over the pooled ordinarily least square (OLS) method in Formula (1). The Breusch and Pagan Lagrangian multiplier test (B-P LM test) is conducted to determine whether the variance of the prefecture individual effects is zero. If the null hypothesis is rejected, then the disturbance term covers the prefecture individual effects. Hence, the random effects Generalized Least Squares method is preferred. The results of the B-P LM test, find that the random effects model is preferred over the pooled OLS model. Taking these results into consideration along with the coefficients of the random effects model being similar in most cases with the coefficients of the fixed effects model and it would be easier to compare, this article will limit the explanation to the random effects model.

The explanation concerning the model based on the Formula (1) is provided below. First, a positive correlation between *RPIpc* and *PD* could be considered. In other words, a prefecture with a large *PD* is likely to have greater supply and consumption, hence a greater *RPIpc* can be expected. Furthermore, since it is expected that prefectures with a greater *RPIpc* will have a richer supply of goods and services, further encouraging the population to grow and as a result, a larger *PD*. Therefore, there is the possibility

of multicollinearity if these independent variables are included in the model at the same time. Accordingly, other than the model adopting these variables at the same time, models where one of the variables is excluded are examined. Concerning the *Media* and the *Inet*, there is the possibility of a negative correlation between the two. That is, to viewing or reading the former may reduce the time spent on the internet and the opposite may also apply. Therefore, there is again the possibility of multicollinearity if these independent variables are included in the model at the same time and so the same precautions are taken.

This article will first examine Case 1 that adopts *PD* and only the *Media* as the factor for information accessibility. Case 2 adopts *PD*, but the *Inet* is employed as the factor concerning information. Case 3 adopts *PD* and both the *Media* and the *Inet* as the factors concerning information. Cases 4 to 6 all adopt *RPIpc* and repeats the employment of information factors as in the Cases 1 through 3. Cases 7 through 9 examine both *PD* and *RPIpc* and again repeats the adoption of the factors concerning information in the same order as in the previous cases.

3 RESULTS

First the main results concerning overall volunteer participation are provided.

Table 1 Determinants of Volunteer Participation – Overall

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fem	−0.0609	−0.427	−0.911	0.0765	−1.240	−1.729*	−0.0939	−0.604	−1.101
	(0.928)	(0.869)	(0.948)	(1.073)	(0.933)	(0.946)	(1.030)	(0.882)	(0.933)
Chd	0.663***	1.055***	1.084***	0.632**	1.035***	1.087***	0.660***	1.023***	1.059***
	(0.227)	(0.277)	(0.272)	(0.268)	(0.317)	(0.302)	(0.237)	(0.290)	(0.287)
Snr	0.262**	0.814***	0.897***	0.442***	1.064***	1.121***	0.263**	0.815***	0.905***
	(0.116)	(0.200)	(0.194)	(0.112)	(0.187)	(0.182)	(0.115)	(0.193)	(0.185)
Ed	0.395***	0.132	0.137	0.238**	0.0464	0.0811	0.398***	0.152	0.155
	(0.121)	(0.135)	(0.138)	(0.118)	(0.141)	(0.143)	(0.120)	(0.141)	(0.144)
Media	0.353		0.704**	0.517**		0.973***	0.354		0.707**
	(0.251)		(0.312)	(0.244)		(0.291)	(0.253)		(0.309)
Inet		0.687***	0.682***		0.569***	0.593***		0.680***	0.678***
		(0.192)	(0.176)		(0.176)	(0.158)		(0.190)	(0.174)
PD	−0.110***	−0.106***	−0.0862**				−0.110***	−0.104***	−0.0840**
	(0.0320)	(0.0350)	(0.0357)				(0.0322)	(0.0353)	(0.0360)
RPIpc				−0.0839	−0.164	−0.127	−0.0105	−0.0518	−0.0502
				(0.123)	(0.122)	(0.120)	(0.114)	(0.131)	(0.128)

Table 1									(continuation)
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Constant	2.189	3.337***	0.121	2.255	3.927***	−0.687	2.160	3.178***	−0.0455
	(1.373)	(0.881)	(1.626)	(1.422)	(0.906)	(1.745)	(1.442)	(0.907)	(1.682)
B-P LM test	78.95	20.96	21.77	77.01	21.07	23.83	77.41	20.77	21.54
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test	22.47	7.88	9.85	14.04	16.03	11.38	28.37	10.71	11.84
	0.0041	0.3432	0.2757	0.0807	0.0249	0.181	0.0008	0.2185	0.2225
Observations	141	94	94	141	94	94	141	94	94
R-squared (overall)	0.5164	0.6586	0.6513	0.4398	0.5987	0.6064	0.5157	0.6557	0.6495

Note: Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Own construction

From Table 1, concerning the *Chd*, which is one of demographic variables, the estimated coefficients are positive and significant in all the models. This indicates that prefectures with a higher share of children under the age of 15, participate more actively in overall volunteer work. Children either have a stronger preference for volunteer work and/or it may be part of their school curriculum. Results from the study by Fukushige (1999) on the impact of youths on volunteer participation in Japan were also positive. Next, the estimated coefficients for the *Snr* are also positive and significant in all the models. Again, this implies that volunteer work overall is more active in prefectures with a higher *Snr*. This could be interpreted as senior citizens having a stronger preference towards volunteer participation overall and/or has free time to participate in volunteer activities. The results achieved are consistent with previous studies on the impact of senior citizens volunteer participation in Japan (see e.g. Fukushige, 1999; Nakano, 2005; Tsukamoto et al., 2012) and in the United States (see e.g. Segal and Weisbrod, 2002; Taniguchi, 2006). Results for *Fem* indicate negative estimated coefficients in all except one model and is found to be negative and statistically significant in Model (6). This suggests that prefectures with a higher *Fem* are more passive in participating in volunteer work. However, it should be noted that the results are insignificant in most of the models.

The results for *PD* which represents the independent variable for urbanisation are negative and significant estimated coefficients in all models. This indicates that prefectures with stronger urbanization may be less active in volunteer participation, due to weaker community involvement and/or allocating more time in pursuit of other consumption activities since a more diverse range of goods and services are available. These results are consistent with the studies on Japan by Osaka University Center for Nonprofit Research and Information (2005) and Nakano (2005) which indicate that urbanization has a negative impact on volunteer participation. With respect to the independent variables on information, the coefficients are positive in all the models. Especially the results concerning the *Inet* show positive and significant estimated coefficients in all the models. This may be due to prefectures with a higher penetration of internet users having more access to information concerning volunteer work, leading to a higher participation rate of volunteer activities. The results for the *Media* show positive coefficients and significant in the sign and test for acceptance in Models (3), (6) and (9). This shows that not only the internet, but television, radio and newspaper contribute to promoting the participation of volunteer work and they are in a complementary relationship. As for the estimated coefficients of *RPIpc*, the results are negative in all the models

and insignificant. Concerning the *Ed*, it finds positive estimated coefficients in all the models and significant in Models (1), (4) and (7), although insignificant results for the test for acceptance.

Table 2 Determinants of Volunteer Participation – Community Development

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Fem	0.849	1.657	0.951	1.944	−0.488	−1.395	1.428	0.618	−0.0433
	(1.483)	(1.494)	(1.621)	(1.486)	(1.716)	(1.621)	(1.556)	(1.552)	(1.607)
Chd	1.327***	1.845***	1.900***	1.311**	1.635***	1.797***	1.391***	1.705***	1.777***
	(0.449)	(0.483)	(0.474)	(0.527)	(0.585)	(0.540)	(0.436)	(0.479)	(0.472)
Snr	0.248	0.930**	1.059***	0.609**	1.474***	1.625***	0.220	0.974***	1.108***
	(0.272)	(0.361)	(0.354)	(0.252)	(0.315)	(0.300)	(0.264)	(0.350)	(0.339)
Ed	0.573***	0.361	0.366	0.127	0.194	0.246	0.523**	0.449*	0.449*
	(0.222)	(0.234)	(0.240)	(0.231)	(0.265)	(0.270)	(0.231)	(0.242)	(0.248)
Media	0.931***		0.892*	1.263***		1.488***	0.920***		0.879*
	(0.325)		(0.491)	(0.345)		(0.511)	(0.326)		(0.479)
Inet		1.048***	1.049***		0.754***	0.801***		1.039***	1.041***
		(0.283)	(0.263)		(0.275)	(0.244)		(0.276)	(0.256)
PD	−0.250***	−0.266***	−0.240***				−0.258***	−0.256***	−0.230***
	(0.0497)	(0.0616)	(0.0629)				(0.0503)	(0.0615)	(0.0620)
RPIpc				0.0272	−0.545**	−0.453**	0.176	−0.269	−0.253
				(0.247)	(0.240)	(0.222)	(0.185)	(0.165)	(0.158)
Constant	0.469	3.767**	−0.328	1.383	4.707***	−2.272	0.954	2.907*	−1.068
	(2.472)	(1.510)	(2.630)	(2.422)	(1.651)	(2.935)	(2.501)	(1.500)	(2.641)
B-P LM test	74.12	24.96	25.1	76.11	25.67	28.22	74.18	25.18	25.48
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test	14.2	8.71	10.01	36.68	28.48	13.77	12.44	12.49	12.84
	0.0768	0.2743	0.264	0.000	0.0002	0.0879	0.1894	0.1306	0.1702
Observations	141	94	94	141	94	94	141	94	94
R-squared (overall)	0.6393	0.7138	0.7103	0.522	0.5994	0.6243	0.6381	0.7121	0.7108

Note: Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Own construction

As explained earlier, according to Segal and Weisbrod (2002), since the nature of volunteer work varies depending on the field, it will be necessary to examine the determining factors for each field. The main results for volunteer work in the field of community development will be first reviewed. From Table 2, concerning the *Chd* which is one of the demographic variables, it finds positive and significant estimated coefficients in all models. This shows that, like the case of *Vol*, the prefecture with the high *Chd* is more active in community development volunteer work. This implies that children have a strong preference towards community development volunteer activities or/and participates in community development volunteer activities as part of their school work. Next, with regards to the estimated coefficients for *Snr*, the results are positive in all the models and significant in the sign and in the test for acceptance in Models (11), (12), (17) and (18). This indicates that there is higher *CommVol* in prefectures with a higher *Snr* and suggests that senior citizens have a stronger preference towards community development volunteer activities such as cleaning of roads and parks and community services and/or has more free time to participate in community development volunteer work. These results are consistent with the study of senior citizens' volunteer participation by Tsukamoto (2012) on Japan. Concerning the independent variables for information accessibility, the results confirm positive and statistically significant estimated coefficients in all the models. As well as the results of *Vol*, the results for *CommVol* are significant and positive for both the *Media* and the *Inet*. This may be due to the wide coverage of local activities covered by the extensive regional and local media in Japan. On the other hand, concerning *PD* which represents the independent variable of urbanisation, the results find negative and significant estimated coefficients in all the models which is consistent with the results of *Vol*. This indicates that the prefecture which higher urbanization may be more passive in volunteer participation, due to weaker community involvement and/ or allocating more time in pursuit of other consumption activities. With regards to the *Ed*, the results are positive estimated coefficients in all the models and statistically significant in Models (16), (17) and (18) for both the sign and the model specification test. Models (16), (17) and (18), suggest a higher preference towards community development in prefectures with a higher *Ed* and/or larger number of opportunities for volunteers in the community development work as part of their education. The study by Okuyama (2009) did not achieve statistically significant results on their study of educational attainment in volunteer participation in community cleaning in Japan. The coefficients for *RPIpc* are insignificant for all the models where the model specifications were accepted. This is consistent with the study by Okuyama (2009) on income and volunteer participation in community cleaning in Japan, which did not achieve statistically significant results. Finally, concerning the *Fem*, it shows positive estimated coefficients for the majority of the models but all of them are statistically insignificant. The study on women's volunteer participation by Okuyama (2009) to clean the community were also unable to achieve statistically significant results.

Next, we will describe the main results concerning participation of elderly care volunteer work, a major concern for the aging society of Japan.

Table 3 Determinants of Volunteer Participation – Elderly Care									
	(19)	**(20)**	**(21)**	**(22)**	**(23)**	**(24)**	**(25)**	**(26)**	**(27)**
Fem	0.0487	−0.206	−0.156	−0.319	−1.174	−1.228	0.119	−0.727	−0.686
	(1.451)	(1.270)	(1.301)	(1.672)	(1.331)	(1.378)	(1.693)	(1.336)	(1.389)
Chd	0.721**	1.438***	1.438***	0.747**	1.412***	1.408***	0.729**	1.360***	1.361***
	(0.292)	(0.317)	(0.320)	(0.313)	(0.338)	(0.338)	(0.315)	(0.335)	(0.337)

Table 3 (continuation)

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Snr	0.611***	1.454***	1.444***	0.845***	1.643***	1.647***	0.605***	1.481***	1.473***
	(0.219)	(0.282)	(0.288)	(0.196)	(0.250)	(0.253)	(0.225)	(0.278)	(0.285)
Ed	0.194	−0.216	−0.213	0.0398	−0.228	−0.227	0.188	−0.168	−0.167
	(0.154)	(0.209)	(0.212)	(0.140)	(0.216)	(0.218)	(0.154)	(0.226)	(0.228)
Media	−0.272		−0.0965	−0.0453		0.142	−0.273		−0.0673
	(0.473)		(0.505)	(0.479)		(0.508)	(0.477)		(0.506)
Inet		1.069***	1.064***		1.042***	1.054***		1.069***	1.065***
		(0.348)	(0.354)		(0.337)	(0.345)		(0.342)	(0.349)
PD	−0.0895**	−0.0527	−0.0549				−0.0905**	−0.0471	−0.0487
	(0.0376)	(0.0380)	(0.0393)				(0.0369)	(0.0388)	(0.0401)
RPlpc				−0.0544	−0.187	−0.186	0.0191	−0.143	−0.142
				(0.172)	(0.206)	(0.209)	(0.187)	(0.220)	(0.223)
Constant	4.331*	3.125***	3.575	3.979	3.007***	2.310	4.390*	2.668**	2.986
	(2.392)	(0.987)	(2.491)	(2.602)	(1.025)	(2.760)	(2.569)	(1.120)	(2.648)
B-P LM test	48.96	4.93	4.89	48.81	5.18	5.18	48.87	4.92	4.9
	0.0000	0.0132	0.0135	0.0000	0.0114	0.0114	0.0000	0.0133	0.0134
Hausman test	7.93	10.24	10.00	9.46	10.41	10.11	8.11	12.26	11.98
	0.44	0.1755	0.2649	0.3053	0.1664	0.2575	0.5233	0.14	0.2147
Observations	141	94	94	141	94	94	141	94	94
R-squared (overall)	0.5827	0.6004	0.6008	0.5693	0.5949	0.5951	0.5827	0.6017	0.6019

Note: Robust standard errors in parentheses *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: Own construction

From Table 3, with respect to the *Chd*, the estimated coefficients are positive and significant in all the models. This indicates that the prefecture with a higher *Chd* participate more actively in volunteer work involving elderly care, which is consistent with the results for Vol and *CommVol*. Children are showing a wide interest in volunteer work including supporting senior citizen. Intergenerational activities such as this is being encouraged since there is value to children in their development and for social citizens for their well-being (Murayama, 2009; Sugatani, 2014). Next, the results of the estimated coefficients for *Snr* are also positive and significant in all the models. Again, this implies that volunteer work for elderly care are more active in prefectures with a higher *Snr*. This could be interpreted as senior citizens having a stronger preference towards participating in elderly care volunteer work and/or has more free time

to participate in the volunteer activities. The study by Tsukamoto et al. (2012) also indicates positive impact of senior citizens volunteer participation on elderly care volunteer work. With respect to the independent variables on information, the estimated coefficients are positive and significant in all the models for the *Inet*. However, they are not statistically significant for the *Media*. This suggests that it will be more effective to promote volunteer participation of elderly care through the internet. On the other hand, with regards to *PD* which represents the independent variable of urbanisation, shows negative estimated coefficients in all the models and significant for the sign and model specification in Models (19) and (25). This indicates that the prefecture with higher urbanization may be more passive in volunteer participation of elderly care, which is consistent with the results of *Vol* and *CommVol*. However, considering the social challenges of the increasing elderly urban residents living alone, this result highlights the need to address this challenge. As for the *Fem*, the results for all the models excluding Models (19) and (25) are negative estimated coefficients but not statistically significant. Concerning the *Ed* and *RPIpc*, the results are insignificant in all the models.

At last, we will review the main results concerning the participation of environmental volunteer work.

Table 4 Determinants of Volunteer Participation – Environmental Work

	(28)	**(29)**	**(30)**	**(31)**	**(32)**	**(33)**	**(34)**	**(35)**	**(36)**
Fem	−2.050	−2.387	−3.054	−0.989	−3.043	−3.801*	−1.036	−2.157	−2.785
	(1.859)	(1.674)	(1.860)	(2.229)	(2.103)	(2.073)	(2.106)	(1.812)	(1.915)
Chd	0.715	1.308**	1.371**	0.800	1.312**	1.438**	0.841*	1.329**	1.402***
	(0.453)	(0.530)	(0.536)	(0.491)	(0.598)	(0.590)	(0.437)	(0.531)	(0.540)
Snr	0.424	1.081***	1.214***	0.685**	1.470***	1.594***	0.382	1.062***	1.196***
	(0.278)	(0.377)	(0.389)	(0.274)	(0.391)	(0.388)	(0.282)	(0.385)	(0.390)
Ed	0.366*	0.00768	0.0113	0.0261	−0.202	−0.161	0.279	−0.00767	−0.00912
	(0.199)	(0.206)	(0.211)	(0.182)	(0.217)	(0.223)	(0.197)	(0.212)	(0.218)
Media	0.787*		0.836	1.045**		1.281**	0.764*		0.844
	(0.424)		(0.550)	(0.440)		(0.578)	(0.428)		(0.557)
Inet		1.110***	1.112***		0.912***	0.957***		1.105***	1.110***
		(0.317)	(0.301)		(0.331)	(0.304)		(0.319)	(0.303)
PD	−0.149***	−0.187***	−0.161***				−0.163***	−0.189***	−0.164***
	(0.0478)	(0.0563)	(0.0573)				(0.0443)	(0.0565)	(0.0566)
RPIpc				0.197	−0.150	−0.0795	0.312*	0.0551	0.0688
				(0.213)	(0.188)	(0.177)	(0.186)	(0.189)	(0.180)
Constant	−2.143	0.536	−3.266	−1.290	2.078	−3.949	−1.244	0.711	−3.089
	(2.376)	(1.735)	(3.161)	(2.579)	(1.974)	(3.340)	(2.544)	(1.812)	(3.152)

Table 4 (continuation)

	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)
B-P LM test	72.25	27.13	27.73	71.89	26.46	28.57	69.61	25.97	26.44
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hausman test	20.44	7.27	6.96	12.25	14.41	8.84	23.34	10.78	9.94
	0.0088	0.4011	0.4333	0.1403	0.0444	0.3563	0.0055	0.2145	0.3556
Observations	141	94	94	141	94	94	141	94	94
R-squared (overall)	0.692	0.6081	0.6078	0.6487	0.5228	0.5461	0.7016	0.611	0.6111

Note: Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.
Source: Own construction

The results from Table 4, concerning the *Chd*, are positive estimated coefficients in all the models and statically significant for the sign and significant in the model specification tests for Models (29), (30), (33), (35) and (36). This indicates that prefectures with a higher *Chd*, participate actively in environmental volunteer work which is consistent with the other fields of volunteer work which were studied. The results for the *Snr* are similar to those of the *Chd*. That is, the estimated coefficients are positive in all the models and statically significant for the signs and model specification tests in Models (29), (30), (31), (33), (35) and (36). This represents that environmental volunteer participation as well as the participation in the other fields studied is more active in prefectures with a higher *Snr*. These results were consistent with the results by Okuyama (2009) on the volunteer participation by senior citizens in recycling activities in Japan and by Tsukamoto et al. (2012) on Fukui in Japan. Concerning the other demographic variable, *Fem*, the estimated coefficients are negative in all the models and significant in Models (33). Okuyama (2009) achieved opposite results with positive impact by the participation of women in the field of recycling volunteer participation in Japan. Next, with respect to the independent variables on information, the estimated coefficients are positive in all the models. In particular, the results are significant in all the models concerning the *Inet*, which suggests that the internet is a useful tool to promote environmental volunteer participation as well as the other fields reviewed and for overall volunteer participation. As for the *Media*, the result in Models (31) and (33) are significant for the sign and model specification, which implies that mass media promotion will be effective in encouraging environmental volunteer participation. With respect to *PD* which is a variable of urbanization, the estimated coefficients are negative and significant in all the models which are consistent with the previous results on other fields of volunteer work. Concerning the *Ed* and *RPIpc*, the estimated coefficients show insignificant results in all of the models which are accepted through the model specification tests.

Finally, since we treat both dependent variables and independent variables as natural logarithms, the coefficients obtained represent elasticity. At first, in order to comprehend the characteristics of *Vol* in terms of elasticity, we will refer to each independent variable. When examining the independent variables, we will review the statistical significance and focus on the random effects models which were accepted by the Hausman test. From Table 1, concerning the overall volunteer participation, the elasticities of the *Chd* are the strongest of the positive elasticities in most cases, ranging from 1.023 to 1.087. The elasticities of the *Snr* are next, ranging from 0.814 to 1.121. The elasticities of the *Media* are third, which ranges from 0.704 to 0.973 followed by the elasticities of the *Inet*, ranging from 0.593 to 0.687. On the other hand, concerning the negative elasticities, result of the *Fem* is the strongest, which represents −1.729. Those

of the *PD* come in second, ranging from –0.0840 to –0.106. We will next observe each chosen field of volunteer work. From Table 2, concerning *CommVol*, *Chd* shows the strongest positive elasticities, ranging from 1.391 to 1.900. This is followed by the *Inet*, ranging from 1.039 to 1.049 and *Snr*, ranging from 0.930 to 1.108. *Media* is next, ranging from 0.879 to 0.920 and then *Ed* ranging from 0.449 to 0.523. Concerning negative elasticities, *PD* ranges from –0.230 to –0.266. Results from Table 3 on *SnrVol*, concerning positive elasticities, *Snr* was the strongest in most cases ranging from 0.605 to 1.647 and *Chd* is the next at 0.721 to 1.438. This is followed by *Inet* at 1.042 to 1.069. As for negative elasticities, *PD* shows –0.0895 to –0.0905. Finally, concerning the positive elasticities for *EnvVol*, *Chd* was the strongest in most cases with values of 1.308 to 1.438 followed by *Snr* and *Media* at 0.685 to 1.594 and 1.045 to 1.281, respectively. *Inet* was next at a range of 0.957 to 1.112. Negative elasticities were found with *Fem* at –3.801, followed by *PD* at –0.161 to –0.189. These results identify that the elasticities for *Chd* are relatively the strongest, followed by *Snr* which are the strongest for *SnrVol* and the then the variables representing information. Compared to these variables, the *PD* has a considerably weaker elasticity.

CONCLUSION

With the wide penetration of the concept of sustainable development, society's interest towards the consideration of the wider community, the environment and community participation to support the Local Agenda 21 has grown. Furthermore, it will be difficult for the public sectors alone to support the diverse needs of the community, requiring further local volunteer participation. This research examines the determining factors of volunteer participation, employing panel data at the Japanese prefecture level for the fiscal years 2001, 2006 and 2011.

The main results show that the prefecture with higher share of children population, senior citizen population, internet users and media active users are more active in the overall participation of volunteer work. On the other hand, prefectures with stronger urbanization are less likely to participate in overall volunteer work. The results for volunteer participation in the field of environmental work are also consistent with these overall results. Results for participation in community development work are similar, but they also find that education attainment for each prefecture to have impact on volunteer participation. Concerning participation of elderly care volunteer work, prefectures with a larger share of children population, senior citizens population and internet users and a low rate of urbanization tend to be more active in participation. These results provide the following policy implications. First, the positive impact children have on volunteer participation is a valuable result, considering that children will help shape future social and environmental activities as well as lead future generations. Further study on the factors of the positive impact would be beneficial to understand, such as education on volunteer work or the amount of free time available or if there are other influencing factors that encourage the active participation of children. Secondly, considering the aging population in Japan and the increase in longevity amongst developed countries, the role of volunteers to support elderly care will become increasingly important. It is encouraging to see the positive participation of social citizens in elderly care volunteer work. Arranging social infrastructure so that it is friendlier for social citizens to participate in volunteer work may encourage further participation in this much needed area. Thirdly, considering the effectiveness that information accessibility has on encouraging volunteer participation suggests that further development in information infrastructure as well as support to provide information and promote volunteer work through the media and internet would be beneficial. Finally, learning that strong urbanization reduces volunteer participation, special support and effort may be needed to encourage participation. For example, strong urbanization is usually related to a well-developed information infrastructure that could be used to actively promote volunteer work which may gain further effectiveness by focusing on children and social citizens.

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APPENDIX 1

Table A1 Statistical description

	Unit	Mean	Max	Min	Standard Deviation	Observations
Vol	%	29.27	40.10	19.70	4.40	141
CommVol	%	14.59	24.30	5.70	3.91	141
SnrVol	%	4.84	9.10	2.70	1.19	141
EnvVol	%	7.08	14.00	3.50	2.22	141
Fem	%	51.74	53.31	49.28	1.02	141
Yng	%	13.93	19.74	11.26	1.17	141
Snr	%	22.32	29.67	13.54	3.42	141
Ed	%	47.41	66.40	31.10	7.51	141
Media	%	75.57	84.10	63.40	4.04	141
Inet	%	48.73	70.80	31.50	8.82	94
PD	persons per hectare	13.70	94.80	2.47	16.78	141
RPlpc	millions yen per capita	3.85	6.98	2.70	0.62	141

Note: Unit does not apply to Standard deviation and Observations.
Source: Own construction

APPENDIX 2

Table A2 Data sources

Variable	Sources
Total Volunteer Participation Rate (*Vol*)	Survey on Time Use and Leisure Activities, Ministry of Internal Affairs and Communications

Table A2	(continuation)
Variable	**Sources**
Environmental Volunteer Participation Rate (*EnvVol*)	Survey on Time Use and Leisure Activities, Ministry of Internal Affairs and Communications
Community Development Volunteer Participation Rate (*CommVol*)	Survey on Time Use and Leisure Activities, Ministry of Internal Affairs and Communications
Elderly Care Volunteer Participation Rate (*SnrVol*)	Survey on Time Use and Leisure Activities, Ministry of Internal Affairs and Communications
Share of Children Population (*Chd*)	Population Census, Population Estimates, Ministry of Internal Affairs and Communications
Share of Female Population (*Fem*)	Population Census, Population Estimates, Ministry of Internal Affairs and Communications
Share of Senior Citizen Population (*Snr*)	Population Census, Population Estimates, Ministry of Internal Affairs and Communications
Educational Attainment (*Ed*)	School Basic Survey, Ministry of Education, Culture, Sports, Science and Technology
Share of Media Active Users (*Media*)	Survey on Time Use and Leisure Activities, Ministry of Internal Affairs and Communications
Share of Internet Users (*Inet*)	Survey on Time Use and Leisure Activities, Ministry of Internal Affairs and Communications
Population Density (*PD*)	Population Census, Population Estimates, Ministry of Internal Affairs and Communications
Real Prefectural Income per capita (*RPIpc*)	Real prefecture income per capita: Prefectural Accounts, Cabinet Office; Population: Population Census, Population Estimates, Ministry of Internal Affairs and Communications

Source: Own construction