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## MATERIAL

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### The life satisfaction, and relating factors, of elderly residents of a remote island in Saga Prefecture

*Kanae Hamano*

*Nagasaki University Graduate School of Biomedical Sciences, Division of Health Sciences, Unit of Nursing, Nagasaki, Japan*

**Abstract** The purpose of this investigation is to examine life satisfaction and relating factors of elderly residents of a remote island in Saga prefecture after entering long-term care insurance. 120 residents of Island A aged 65 or over consented to take part in the investigation. The investigation was conducted from June to December 2005, and conducted in the form of an interview, using a semi-questionnaire instrument. Koyano's Life Satisfaction Index-K (LSI-K : 9 items, possible range 0-9) was adopted as a measure of life satisfaction. The median score of life satisfaction was 4.0 with an interquartile range from 3.0 to 6.0. Upon dividing the respondents into two groups based on their median score of life satisfaction, and examining the relating factors using a  $\chi^2$  test. Furthermore, examining the related factors to a high level life satisfaction using multivariate logistic regression analysis, a marked male, satisfaction with their income, and low level of loneliness. It is the reason for males' high life satisfactions, as island A's main industry is fishing, males work for a long time, and therefore tend to evaluate their health status higher than females do. Results showed that it is very important for the elderly to they have various sorts of incomes in order to have enough to live on. Good health status, independence in terms of ADL, having a job they can do, economic satisfaction, family and relations, contact with neighbors and the resulting lack of loneliness, and social support both physically and spiritually, are shown to increase life satisfaction among elderly people on Island A.

*Key words* : island, elderly, life satisfaction, relating factors,

#### Introduction

In Island A elderly people make up 28.8% of the population, far more than the national average of 19.5%<sup>1)</sup>, and a further increase is predicted. Island A is located in the north seas of Saga Prefecture about 30 minutes from land by boats and its history dates back to the ancient times. The island A is 14 km round in circumference. A characteristic of this island is that

the religions practiced are Buddhism and Christianity. Their ancestors were secret Christians. Buddhists lived on the sea side closely, and Christians lived on the mountain area that is interspersed with houses. Members of each group are generally blood relatives especially among Christians, as this was very important for them to protect their secret religion. There were no marriage between different religious group until 30 years ago. And group members helped each other in daily living. There is an informal support system including exchange of vegetables and fishes and help for ceremonial occasions in both religions. Usually, the elderly people grow vegetables around their house, and are given fishes by relatives and neighbors. The

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elderly Buddhists visit a family tomb almost 2 to 3 times a week, and speak together as friends. The elderly Christians go Mass almost every week. Boats are the only mode of transport to the city, and 4 return trips per day. There are many steep roads in Island A, and boat fee is expensive ; 840 yen one way, so it is difficult for elderly people to go to the city. After retirement, elderly people's incomes come only from pensions.

It is important to consider how elderly resident maintain quality of life (QOL) and how best to build a support system in their areas to ensure satisfaction in their day-to-day lives. The author used life satisfaction index of QOL to study elderly residents. There are studies on life satisfaction, for the subjects living in the city<sup>2-4)</sup>, for the elderly woman living alone<sup>5)</sup>, for the subjects living in the mountain<sup>6)</sup>, and for the subjects living in Tokyo<sup>7)</sup>. But there are few studies for the subjects living in a island<sup>8,9)</sup>.

From many investigations, there were many factors relating to level of life satisfaction : gender<sup>8,10,11)</sup>, health status<sup>3,5-7,12,13)</sup>, independence in terms of activity of daily living (ADL)<sup>4,13)</sup>, family and relatives, whether they had friends and contact with other people<sup>4,13-15)</sup>, spiritual wellbeing<sup>2,6,16)</sup>, satisfaction with their income<sup>5,12,13)</sup>, transportation methods<sup>6)</sup>, whether they had people they could depend on<sup>6,12)</sup>, academic records<sup>8)</sup>, jobs<sup>8)</sup>, fullness of leisure time<sup>12,15)</sup>, whether or not they had things that worried them<sup>12)</sup>, physical environment and the amount of support in their lives<sup>14)</sup>, and their purpose in life<sup>15)</sup>.

In 1999, Hamano, et al.<sup>8)</sup> investigated the elderly's life style on the Island A using almost same questionnaire. The factors relating to life satisfaction on the same island were composition of household, academic record, and whether residents had a job. In 2000, long-term care insurance system was begun by the government. It was hypothesized that: 1) males were more likely to have a high level of life satisfaction than females; 2) Buddhists were more likely to have a high level of life satisfaction than Christians; 3) residents with high satisfaction with their income were more likely to have a high level of life satisfaction than those with low satisfaction with their income; 4) residents with high health status were more likely to have a high level of life

satisfaction than those with low health status; 5) residents with high level of ADL were more likely to have a high level of life satisfaction than those with low level of ADL; 6) residents having friends were more likely to have a high level of life satisfaction than those not having friends.

The objective of this investigation was to determine the factors associated with life satisfaction of elderly people living on Island A after entering the long-term care insurance system.

## Methods

Of the 154 residents of Island A aged 65 or over, 120 consented to take part in the investigation. 34 residents had dementia or rejected the interview. For ethical considerations, the author had a private consent from the headmen of Island A before the investigation. The author explained to the subjects in writing the objective of this investigation, methods, consideration for privacy. Written consent was obtained from all subjects. This investigation was recognized by ethical committee of Nagasaki University Graduate School of Biomedical Sciences.

The investigation was conducted from June to December 2005. It was conducted in the form of an interview, using a semi-questionnaire instrument. The content included their basic profiles, health status, whether they had been ill within the past 5 years, ADL, friends, whether they qualified for or were certified for long-term care insurance needs, whether they were receiving welfare service, life satisfaction, their level of psychological support, changes in emotional support among residents, whether they had emotional support and somebody they could rely on, their level of physical support, and the degree of loneliness they felt. Koyano's Life Satisfaction Index-K (LSI-K : 9 items, possible range 0 - 9)<sup>17,18)</sup> was adopted as a measure of life satisfaction. Scaling of health status involved the use of a five-point Likert-type scale. Responses of 'Extremely good health' was weighted 4, and 'Extremely poor health' was weighted 0. Koyano's Index of Competence<sup>19)</sup> was used as a measure of ADL in a modified

form. Scaling of ADL involved the sum of 14 items (range 0-14). Noguchi's Index of social supports<sup>20)</sup> was used as measure of psychological support and physical support in a modified form. Scaling of psychological support involved the use of a four-point Likert-type scale. Responses of 'Always' was weighted 3, and 'No' was weighted 0. Scores were the sum of 5 items (range 0-15). Scaling of physical support involved the use of a four-point Likert-type scale. Responses of 'Always' was weighted 3, and 'No' was weighted 0. Scores were the sum of 6 items (range 0-18). Russell D's UCLA loneliness scale short form (4 items, possible range 4-16)<sup>21)</sup> was adopted as measure of loneliness. Scaling of satisfaction with their income involved the use of a four-point Likert-type scale. Responses of 'Enough to live on' was weighted 3, and 'Experienced hardship' was weighted 0.

In this investigation, the dependent variable was life satisfaction. Independent variables were gender, age, family component, religion, prayed every day, job, source of income, satisfaction with their income, health status, illness within the past 5 years, certification of long-term care insurance need, welfare service, ADL, friends, psychological support, mutual emotional support among residents, emotional support and somebody they could rely on, physical support, and loneliness.

The median scale scores of independent variables were used instead of the mean values because these data were not normally distributed. The scores were categorized as high or low levels. A high level included scores above the median and median score. A low level included scores below the median. The dependent variable was classified into two categories for analysis: high level and low level with life satisfaction.

Nineteen factors were analyzed for life satisfaction using a  $\chi^2$  test. Differences

with a p value of less than 0.05 were regarded as significant. Crude odds ratio (COR) and 95% confidence interval (CI) showed the magnitude of the associations between the independent and the dependent variables. Furthermore, multivariate logistic regression analysis showed that variables were associated with life satisfaction by adjusted odds ratio (AOR). On independent variables, the raw data were used except for gender.

## Results

### 1. Subjects' profiles (Table 1)

Table 1 Subjects' profiles

	Total n=120		Male n=50		Female n=70	
	n	%	n	%	n	%
Age						
65-69	21	17.5	8	16.0	13	18.6
70-79	62	51.7	28	56.0	34	48.6
80-89	31	25.8	10	20.0	21	30.0
90-	6	5.0	4	8.0	2	2.9
Family component						
With their spouse	38	31.7	19	38.0	19	27.1
With their spouse and children	32	26.7	16	32.0	16	22.9
With their children	28	23.3	10	20.0	18	25.7
Alone	22	18.3	5	10.0	17	24.3
Academic record						
Pre-war elementary school	48	40.0	17	34.0	31	44.3
Pre-war junior high school	25	20.8	15	30.0	10	14.3
Pre-war high school	4	3.3	1	2.0	3	4.3
Post-war elementary school	3	2.5	0	0.0	3	4.3
Post-war junior high school	32	26.7	12	24.0	20	28.6
Post-war high school	4	3.3	3	6.0	1	1.4
Did not attend school	4	3.3	2	4.0	2	2.8
Religion						
Buddhist	58	48.3	25	50.0	33	47.1
Christian	61	50.8	25	50.0	36	51.4
Shinto	1	0.8	0	0.0	1	1.4
Job						
Yes	34	28.3	21	42.0	13	18.6
Fisherman	18	52.9	18	85.7	0	0.0
Store	3	8.8	1	4.8	2	15.4
Food processor <sup>a</sup>	3	8.8	0	0.0	3	23.1
Stockbreeding	2	5.9	1	4.8	1	7.7
Tourist home	2	5.9	0	0.0	2	15.4
Board <sup>a</sup>	2	5.9	0	0.0	2	15.4
Agriculture	2	5.9	0	0.0	2	15.4
Father	1	2.9	1	4.8	0	0.0
Clerk <sup>a</sup>	1	2.9	0	0.0	1	7.7
No	86	71.7	29	58.0	57	81.4
Source of income						
Job and pension	65	54.2	28	56.0	37	52.9
Pension	42	35.0	18	36.0	24	34.3
Pension and remittance	6	5.0	2	4.0	4	5.7
Pension and saving	5	4.2	1	2.0	4	5.7
Job	1	0.8	1	2.0	0	0.0
A livelihood protection allowance	1	0.8	0	0.0	1	1.4

<sup>a</sup> part time

Age ranged from 65 to 97 years, 51.7% were 70-79. 50 of the respondents were male, and 70 were female. In terms of family component, 31.7% lived with their spouse, 26.7% lived with their spouse and children, 23.3% lived with their children, and 18.3% lived alone. 89.9% said that they had contact with children outside the island. In terms of academic record, 40.0% graduated from pre-war elementary schools, 26.7% graduated from post-war junior high schools, 20.8% graduated from pre-war junior high schools, and 3.3% graduated from pre-war high schools and post-war high schools, while 3.3% did not attend school at all. In terms of religion, 48.3% were Buddhist, 50.8% were Christian, and 0.8% were Shinto, and 84.2% prayed every day. 54.2% had emotional support and somebody they could rely on, and 56.9% said that were religious. In regard to livelihoods, 71.7% did not have a job, 28.3% did have a job. The main occupation was fishing. 85.7% of male were fishermen. 23.1% of females were food processors and many females did part time work. 54.2% cited a job and a pension as their source of income, 35.0% received their incomes from pension only, 5.0% received pension and remittance, and 4.2% had a pension and savings. 56.0% of male and 38.6% of female said they were in extremely good health or good health. 8.3% of respondents had certification of long-term care insurance need, 91.7% did not have. 18.3% of respondents received welfare service, 81.7% did not receive any. 49.2% of respondents said that one of the influences of long-term care insurance was the deduction of insurance premium from their pension.

About 70% of the elderly people receive fish from relatives and neighbors. There is an informal support system including exchange of vegetables, fish, and other kinds of help during ceremonial occasions in both religions and among blood relations.

## 2. Median and interquartile range of subjects' profiles (Table 2)

The median age of 120 residents was 75.0 years (range 65-97). The median score of health status was 2.0 with an interquartite range from 1.0 to 3.0. The

Table 2 Median and interquartile range of subjects' profiles

Variables	Median	interquartile range
Life satisfaction	4.0	3.0- 6.0
Age (years)	75.0	71.0-81.0
Health status	2.0	1.0- 3.0
Activity of daily living (ADL)	11.0	8.0-12.0
Satisfaction with their income	2.0	0.0- 2.0
Psychological support	15.0	12.0-15.0
Physical support	16.0	15.0-18.0
Loneliness	4.0	4.0- 6.0

median score of ADL was 11.0 with an interquartite range from 8.0 to 12.0. The median score of satisfaction with their income was 2.0 with an interquartite range from 0.0 to 2.0. The median score of life satisfaction was 4.0 with an interquartite range from 3.0 to 6.0. The median score of psychological support was 15.0 with an interquartite range from 12.0 to 15.0. The median score of physical support was 16.0 with an interquartite range from 15.0 to 18.0. The median score of loneliness was 4.0 with an interquartite range from 4.0 to 6.0.

## 3. Crude odds ratio for life satisfaction (Table 3)

Subjects with a high level life satisfaction were significantly more likely to be male than female (COR 2.76, 95% CI 1.31-5.84). Subjects with a high level of satisfaction with their income were significantly more likely to have a high level of life satisfaction than those with a low level of satisfaction with their income (COR 2.63, 95% CI 1.26-5.52). Subjects with a low level of loneliness were significantly more likely to have a high level of life satisfaction than those with a high level of loneliness (COR 0.31, 95% CI 0.14-0.67). However, religion was not related to a high level life satisfaction (COR 0.77, 95% CI 0.37-1.57). Health status was not related to a high level life satisfaction (COR 1.29, 95% CI 0.63-2.65). ADL was not related to a high level life satisfaction (COR 1.75, 95% CI 0.85-3.62). Friends were not related to a high level life satisfaction (COR 1.64, 95% CI 0.70-3.85). Age, family component, prayed every day, job, source of income, illness within the past 5 years, certification of long-term care insurance need, welfare service, psychological support, mutual emotional support among residents, emotional sup-

Table 3 Crude odds ratio for life satisfaction

Variables	Life satisfaction						
	Low level (0 - 4)		High level (5 - 9)		COR <sup>a</sup> (95% CI <sup>b</sup> )	P Value	
	n	%	n	%			
Gender							
	Male	19	38.0	31	62.0	2.76 (1.31-5.84)	0.012
	Female	44	62.9	26	37.1		
Age							
	High <sup>c</sup>	32	55.2	26	44.8	0.81 (0.40-1.67)	0.701
	Low <sup>d</sup>	31	50.0	31	50.0		
Family component							
	With their family	51	52.0	47	48.0	1.11 (0.44-2.80)	1.000
	Alone	12	54.5	10	45.5		
Religion							
	Buddhist	29	49.2	30	50.8	0.77 (0.37-1.57)	0.590
	Catholic	34	55.7	27	44.3		
Prayed every day							
	Yes	54	53.5	47	46.5	1.28 (0.48-3.41)	0.812
	No	9	47.4	10	52.6		
Job							
	Yes	16	47.1	18	52.9	0.74 (0.33-1.64)	0.584
	No	47	54.7	39	45.3		
Source of income							
	Pension only	20	50.0	20	50.0	0.86 (0.40-1.84)	0.846
	Pension and other	43	53.8	37	46.3		
Satisfaction with their income							
	High <sup>c</sup>	26	41.3	37	58.7	2.63 (1.26-5.52)	0.016
	Low <sup>d</sup>	37	64.9	20	35.1		
Health status							
	High <sup>c</sup>	27	49.1	28	50.9	1.29 (0.63-2.65)	0.614
	Low <sup>d</sup>	36	55.4	29	44.6		
Illness within the past 5 years							
	Severe illness	35	55.6	28	44.4	1.30 (0.63-2.66)	0.602
	No illness	28	49.1	29	50.9		
Certification of long-term care insurance need							
	Yes	7	70.0	3	30.0	2.25 (0.55-9.15)	0.408
	No	56	50.9	54	49.1		
Welfare service							
	Yes	13	59.1	9	40.9	1.39 (0.54-3.54)	0.654
	No	50	51.0	48	49.0		
Activity of daily living (ADL)							
	High <sup>c</sup>	30	46.2	35	53.8	1.75 (0.85-3.62)	0.184
	Low <sup>d</sup>	33	60.0	22	40.0		
Friends							
	Yes	45	50.0	45	50.0	1.64 (0.70-3.85)	0.358
	No	18	62.1	11	37.9		
Psychological support							
	High <sup>c</sup>	29	47.5	32	52.5	1.50 (0.73-3.09)	0.356
	Low <sup>d</sup>	34	57.6	25	42.4		
Mutual emotional support among residents							
	Grown stronger	11	52.4	10	47.6	1.01 (0.39-2.58)	1.000
	Weakened	52	52.5	47	47.5		
Emotional support and somebody they could rely on							
	Yes	37	56.9	28	43.1	1.47 (0.72-3.03)	0.384
	No	26	47.3	29	52.7		
Physical support							
	High <sup>c</sup>	34	55.7	27	44.3	1.30 (0.64-2.67)	0.590
	Low <sup>d</sup>	29	49.2	30	50.8		
Loneliness							
	High <sup>c</sup>	31	70.5	13	29.5	0.31 (0.14-0.67)	0.005
	Low <sup>d</sup>	32	42.1	44	57.9		

<sup>a</sup> Crude odds ratio.<sup>b</sup> Confidence interval<sup>c</sup> Median and above median<sup>d</sup> Below median

port and somebody they could rely on, and physical support were not related to a high level life satisfaction. The COR of each association revealed a similar value.

#### 4. Multivariate logistic regression analysis for variables associated with life satisfaction (Table 4)

Males were more likely to have a high level of life satisfaction than females (AOR 3.38, 95% CI 1.44-7.93). Subjects with high levels of satisfaction with their income were significantly more likely to have a high level life satisfaction than those with low levels of satisfaction with their income (AOR 1.75, 95% CI 1.14-2.69). Subjects with low levels of loneliness were significantly more likely to have a high level of life satisfaction than those with high levels of loneliness (AOR 0.63, 95% CI 0.48-0.83).

Table 4 Multivariate logistic regression analysis for variables associated with life satisfaction (n=120)

Variables	B	AOR <sup>a</sup> (95%CI <sup>b</sup> )	P Value
Male (ref <sup>c</sup> :female)	1.218	3.38(1.44–7.93)	0.005
Age	-0.023	0.98(0.92–1.04)	0.491
Satisfaction with their income	0.558	1.75(1.14–2.69)	0.011
Activity of daily living (ADL)	0.049	1.05(0.92–1.20)	0.473
Loneliness	-0.462	0.63(0.48–0.83)	0.001

<sup>a</sup> Adjusted odds ratio.

<sup>b</sup> Confidence interval

<sup>c</sup> reference

## Discussion

Hamano, et al's<sup>8,9)</sup> 1999 investigation of the same island revealed that 36.5% of respondents had a low level of satisfaction, 52.9% had an average level and 10.6% had a high level. It is clear that, for the most part, those figures have not changed over the past six years. However, on comparing the figures in Hamano, et al's<sup>12,13)</sup> investigation and Tada, et al's<sup>14)</sup> investigation, the ratio of respondents with a high level of satisfaction is low. It is thought that this may be related to the inconvenience of living on a remote island with boats as the only mode of transport because it restricts elderly people's sphere of activity. Sakurai, et al.<sup>6)</sup> said that the transportation method is important for the elderly people. After retirement, elderly people's incomes

come mainly from pensions. A deduction of the insurance premium from their pension will influence the elderly more and more. Because the boat fee is expensive, it is difficult for elderly people to leave Island A, and to enjoy visiting their children's homes, shopping etc.

In this investigation, many of the respondents in the high-satisfaction group were males, with a high level of satisfaction with their income, and a low level of loneliness.

The results of this study supported two hypotheses; males were more likely to have a high level of life satisfaction than females, and residents with high satisfaction with their income were more likely to have a high level of life satisfaction than those with low satisfaction with their income. The other four hypotheses were not supported.

Regarding gender, Hamano, et al's<sup>8)</sup> investigation on the same island revealed that high life satisfaction was a trend towards women, because Sister Groups were included in the high-satisfaction group. But during this investigation, a sister was not in the subjects. Yasuhuku, et al.<sup>10)</sup> and Yamazaki,<sup>11)</sup> report that the level of life satisfaction among males is high, because males tend to evaluate health status higher than females, and females must do housekeeping work even if they are in bad health. This investigation has produced similar results as previous investigations. As island A's main industry is fishing, males work for a long time, and therefore tend to evaluate their health status higher than females do.

Concerning satisfaction with income, this investigation has produced similar results as previous investigations<sup>5,12,13)</sup>. Also this investigation showed that job and source of income were not related to a high level life satisfaction. Results showed that it is very important for the elderly to they have various sorts of income in order to have enough to live on. In island A the occupations were limited. The main occupation was fishing. 85.7% of male were fishermen, but many females worked part time. It was assumed that males had satisfaction with their income. Males and females should have jobs that they can do in accordance with

their abilities. In the future, retired males and elderly people living on island A will have a small pension. Results showed that it is very important for the elderly to maintain an informal support system such as being able to exchange vegetables and fish on the island.

A new result was that the high-satisfaction group had a low level of loneliness. Family and relations, contact with neighbors and contact with children outside the island resulted in a lack of loneliness.

This investigation showed that religion was not related to a high level life satisfaction. The hypotheses that Buddhists were more likely to have a high level of life satisfaction than Christians was not supported. 84.2% prayed every day. 54.2% had emotional support and someone they could rely on, and 56.9% of them said that they were religious. This result showed that a specific religion was not an influence on the level of life satisfaction. But for the residents of Island A religion was very important in their life style.

Also, investigations cite the importance of social support<sup>6, 22-24)</sup> for elderly people. This investigation showed high level of psychological support and high level of physical support. In island A, long-term care insurance had no influence on the informal support system; psychological support, physical support, and exchange of vegetables and fish in both religious groups and among blood relations. Rather, the informal support system complemented welfare services. It is especially important for elderly people on islands to maintain both formal and informal support systems.

On island A where elderly people's activities are restricted, good health status, independence in terms of ADL, having a job, economic satisfaction, family and relations, contact with neighbors and the resulting lack of loneliness, and social support both physically and spiritually, are associated with levels of life satisfaction.

### Conclusion

By examining associated factors using Logistic Regression Analysis, a marked gender, satisfaction with income, and perceptions of loneliness emerged as important variables in life satisfaction. It is especially impor-

tant for elderly people on Island A where their activities are restricted, to have a support system with religion at the centre and blood relations as a foundation.

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