



# Association Between Insomnia and Socioeconomic Status In Disaster Area by the Great East Japan Earthquake

Jimpei Misawa

Faculty of Sociology, Rikkyo University, Japan



j-misawa@umin.net  
http://misawajimpei.com/

## Introduction & Aims

The Great East Japan Earthquake (March 11<sup>th</sup>, 2011) seriously negatively impacted the mental health of residents living in the afflicted area. The effects were severest in the prefectures (Iwate, Miyagi, and Fukushima) hit hardest by the disaster. In order to remedy this problem, it is particularly important to address the key issue of depression. Indeed, recent reports have shown that more than 30% of individuals living in temporary housing have depressive symptoms (Kahoku-Shimpo, 2012) and 12% of Iwate, Miyagi and Fukushima residents are in poor mental health (Miura et al., 2013).

Insomnia has been cited as a major risk factor for depression (Cole et al., 2003). Five months after the earthquake, 40% of residents in the afflicted area were troubled by insomnia (Phizer, 2011). It is generally understood that insomnia can be traced not only to medical issues, but also to socioeconomic status. As the earthquake had an easily observable economic impact, it is important to clarify if this in turn may have provoked insomnia in afflicted residents. However, studies on the association between insomnia and socioeconomic status are scarce.

Therefore, the aim of this study is to reveal the relationship between insomnia and socioeconomic conditions in the disaster area.

## Methods

### Subjects

2,100 residents of Sendai City aged > = 20 were surveyed by self-administered questionnaire in November and December 2012 (eight months after the earthquake). Sendai City consists of five wards ("ku" in Japanese, see Figure 1). As Wakabayashi-ku and Miyagino-ku face the Pacific Ocean, they suffered particularly serious tsunami damage.

The survey, entitled "Consciousness Survey on Disaster Prevention and Life", was conducted by Rikkyo and Tohoku Universities. (Detailed data is accessible online at <http://www2.rikkyo.ac.jp/web/murase/11send.htm>.)

1,532 answers were obtained (a 64% response rate), and 1,375 valid samples were analyzed.

### Variables

#### - Insomnia -

Respondents were asked, "Have you not slept well?" I counted a "yes" answer as a positive report of insomnia.

#### - Socioeconomic Status -

I assessed socioeconomic status from two perspectives: objective (equivalent income) and subjective (subjective social status). Equivalent income was calculated by dividing the median of household income by the square root of number of household members. Subjective social status (SSS) was categorised as high, middle, or low.

### Statistical Analysis

In order to control for respondents' gender, age, and extent of damage experienced (for more information on types of damage, see Table 1), I used a generalised linear model (GLM: logit) to test for an association between insomnia and socioeconomic status. I conducted a similar model to examine these effects by ward.

### References

- Cole, M.G. et al. (2003). "Risk Factors for Depression Among Elderly Community Subjects," *American Journal of Psychiatry*, 160(6), 1147-56.
- Phizer (2011). *Consciousness Survey on Insomnia*.
- Kahoku-shimpo (2012). "60% of individuals in temporary housing have depressive symptoms," *Newspaper*, June 2<sup>nd</sup>, 2012.
- Liu, X. et al. (2000). "Sleep loss and daytime sleepiness in the general adult population of Japan," *Psychiatry Research*, 93(1), 1-11.
- Misawa, J. (2013). "Mental health in disaster areas before and after the great east Japan earthquake," *The Japanese Journal of Health and Medical Sociology*, 24(Suppl.), 59.
- Miura et al. (2013). *Research on the proper use of home care in affected areas*, Tokyo Metropolitan Institute of Gerontology.
- Talala, K.M. et al. (2012). "Socio-economic differences in self-reported insomnia and stress in Finland from 1979 to 2002," *BMC Public Health*, 12, 650.
- Paparrigopoulos, T. et al. (2010). "Insomnia and its correlates in a representative sample of the Greek population," *BMC Public Health*, 10, 531.

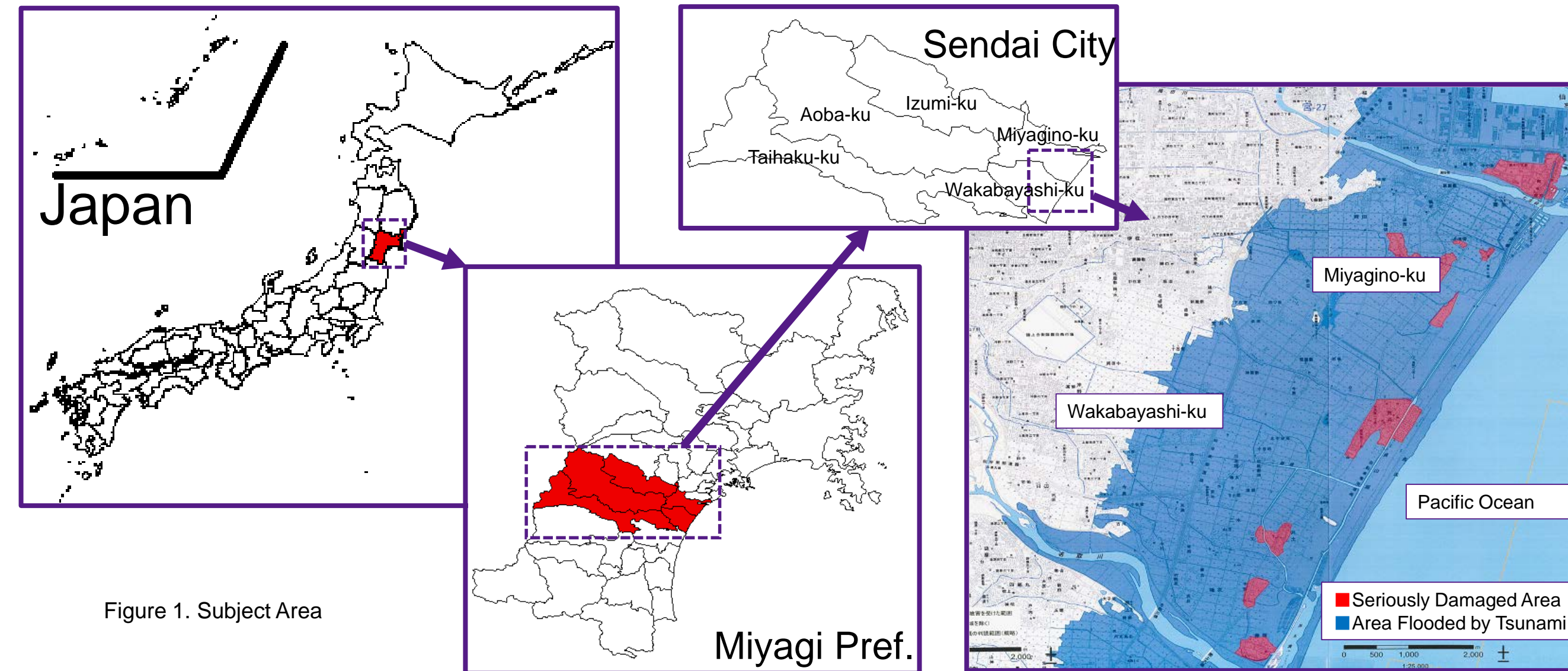


Figure 1. Subject Area

Table 1. Descriptive Statistics

	Normal Sleeping	Insomnia
<b>Gender</b>		
Male	476 ( 68% )	221 ( 32% )
Female	453 ( 67% )	225 ( 33% )
<b>Age (Mean: 51.3 ± 17.4)</b>		
20-34	202 ( 75% )	69 ( 25% )
35-49	263 ( 71% )	107 ( 29% )
50-64	235 ( 63% )	139 ( 37% )
65-74	151 ( 67% )	75 ( 33% )
75+	78 ( 58% )	56 ( 42% )
<b>Equivalent Income (million yen)</b>		
-1.99	133 ( 69% )	60 ( 31% )
2-3.99	335 ( 69% )	154 ( 31% )
4-5.99	185 ( 72% )	71 ( 28% )
6+	104 ( 65% )	55 ( 35% )
Missing	172 ( 62% )	106 ( 38% )
<b>Subjective Social Status (SSS)</b>		
High	208 ( 76% )	66 ( 24% )
Middle	452 ( 67% )	220 ( 33% )
Low	269 ( 63% )	160 ( 37% )
<b>Part or all of home was damaged (Home Damage)</b>		
No	123 ( 71% )	51 ( 29% )
Yes	806 ( 67% )	395 ( 33% )
<b>Part or all of office was damaged (Office Damage)</b>		
No	556 ( 66% )	281 ( 34% )
Yes	373 ( 69% )	165 ( 31% )
<b>Respondents were injured (Myself Injured)</b>		
No	914 ( 68% )	435 ( 32% )
Yes	15 ( 58% )	11 ( 42% )
<b>Relatives and acquaintances were injured (Relatives Injured)</b>		
No	849 ( 68% )	401 ( 32% )
Yes	80 ( 64% )	45 ( 36% )
<b>Relatives and acquaintances died (Relatives Dead)</b>		
No	651 ( 70% )	280 ( 30% )
Yes	278 ( 63% )	166 ( 37% )

Table 2. Results of Logistic Regression Predicting Insomnia<sup>(†)</sup>

	Odds Ratio	[Confidence Intervals]
<b>Gender</b>		
Male	1.00	
Female	1.14	[ 0.90 - 1.45 ]
<b>Age</b>		
20-34	1.00	
35-49	1.23	[ 0.86 - 1.77 ]
50-64	1.80	[ 1.25 - 2.58 ] **
65-74	1.52	[ 1.00 - 2.32 ] †
75+	2.15	[ 1.33 - 3.46 ] **
<b>Equivalent Income</b>		
-1.99	1.00	
2-3.99	1.08	[ 0.75 - 1.57 ]
4-5.99	1.01	[ 0.66 - 1.55 ]
6+	1.61	[ 0.99 - 2.62 ] †
Missing	1.45	[ 0.97 - 2.17 ] †
<b>SSS</b>		
High	1.00	
Middle	1.58	[ 1.13 - 2.21 ] **
Low	1.96	[ 1.36 - 2.84 ] ***
<b>Home Damage</b>		
No	1.00	
Yes	1.12	[ 0.78 - 1.61 ]
<b>Office Damage</b>		
No	1.00	
Yes	1.02	[ 0.79 - 1.33 ]
<b>Myself Injured</b>		
No	1.00	
Yes	1.53	[ 0.68 - 3.45 ]
<b>Relatives Injured</b>		
No	1.00	
Yes	1.11	[ 0.74 - 1.66 ]
<b>Relatives Dead</b>		
No	1.00	
Yes	1.34	[ 1.05 - 1.72 ] **
<b>n</b>		1375
<b>Nagkerke R<sup>2</sup></b>		0.051

<sup>(†)</sup> Controlled by dummy variables on wards; \*\*\*: p<.001; \*\*: p<.01; †: p<.05; ‡: p<.10

Table 3. Statistical Analysis and Logistic Regression by Ward

	Aoba-ku n=352	Miyagino-ku n=249	Wakaba-yashi-ku n=152	Taihaku-ku n=306	Izumi-ku n=316
Insomnia Rate	32%	31%	36%	35%	30%
Female Rate	49%	48%	55%	50%	47%
Mean Age (yrs old)	49.7	49.6	49.3	51.8	54.9
Under 1.99 equivalent income Rate	20%	17%	25%	16%	14%
Low SSS Rate	28%	34%	37%	34%	27%
Home Damage Rate	83%	88%	88%	86%	93%
Office Damage Rate	41%	45%	35%	34%	40%
Myself Injured Rate	2%	3%	3%	1%	1%
Relatives Injured Rate	10%	12%	12%	6%	8%
Relatives Dead Rate	30%	35%	43%	29%	30%
Gini Index (**)	0.354	0.312	0.345	0.317	0.312
Elderly (>=65 yrs) Rate (****)	19%	16%	18%	20%	18%
Unemployment Rate (***)	7%	7%	7%	8%	7%
Primary Industry Rate (****)	1%	1%	2%	1%	1%
Primary Industry Rate (only elderly) (****)	2%	6%	8%	7%	5%

<sup>(\*)</sup> Calculated using household income from Sendai City data; <sup>(\*\*)</sup> Calculated using 2005 Japan National Census

Significant Variables (p < .10) on Logistic Regression Models by Wards

Gender				
Age		✓		✓
Equivalent Income	✓			
SSS	✓			✓
Home Damaged				
Office Damaged				
Myself Injured				
Relatives Injured				
Relatives Dead			✓	✓

## Results & Discussion

Almost one-third of respondents had been troubled by insomnia. Compared to a report that cited 40% of residents experiencing insomnia five months after the earthquake, it appears the incidence of insomnia has decreased over time. However, compared to the general insomnia prevalence rate of 21% (Liu et al., 2000), the insomnia rate in the disaster area is still high.

The results showed that insomnia was associated with subjective social status in the disaster area. Subjective social status had a greater effect on insomnia than did objective social status. Previous research has linked insomnia to objective socioeconomic status factors, such as income, educational levels and employment status (Paparrigopoulos et al., 2010; Talala et al., 2012). In Japan, especially in disaster areas, the subjective assessment of socioeconomic status is crucial in addressing insomnia. These results suggest that 1) subjective social status might be a good predictor of mental health issues like insomnia, and 2) Japanese people might value relative social position more highly than absolute social position.

Additionally, the association between insomnia and socioeconomic status varied among wards. Insomnia in Aoba-ku residents was strongly related to socioeconomic status, suggesting that high income inequalities in this ward might affect the relationship between socioeconomic status and insomnia. On the other hand, in wards like Wakabayashi-ku, the magnitude of earthquake damage might affect insomnia more directly.

Thus, when examining the determinants of insomnia in a disaster area, we must consider not only the direct effects of the earthquake, but also pre-existing economic differences. Indeed, Misawa (2013) showed that economic disparities existing prior to the earthquake were associated with increased insomnia at the district level.

## Conclusion & Implications

*The present study shows the high prevalence of insomnia in the disaster area, as well as its association with socioeconomic status. This association varied by area.*

*In order to address mental health problems such as insomnia, it is important to devise a socioeconomic policy intervention that is tailored to local needs.*

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