

# Lifestyle characteristics and 3-year total mortality of Japanese with self-reported diabetes

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## Background

The total global number with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030 worldwide.

(Wild S., et al. (2004). *Diabetes Care* 27, 1047-1053.)

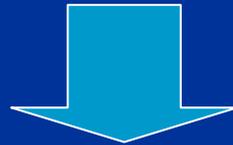
The proportion of people with Japanese diabetes or suspected diabetes was 6.5% for women and 12.8% for men in a national survey conducted in 2002.

(Japanese Ministry of Health, Labour and Welfare 2003 )

People with chronic diseases often share common lifestyle characteristics or behaviors, including lack of exercise, poor diet, smoking, alcohol consumption and obesity.

Reeves M.J. & Rafferty A.P. (2005) Healthy lifestyle characteristics among adults in the United States, 2000. *Archives of Internal Medicine* **165**, 854-857.

Tsubono Y., *et al.* (2004) Health practices and mortality in Japan: combined effects of smoking, drinking, walking and body mass index in the Miyagi Cohort Study. *Journal of Epidemiology* **14** Suppl 1: S39-45.



Despite the significant adverse health consequences of diabetes, data on lifestyle characteristics and mortality among Japanese people with diabetes are

limited.

## Objective

Our objective was to investigate the lifestyles of Japanese community residents with self-reported diabetes and their 3-year total mortality.

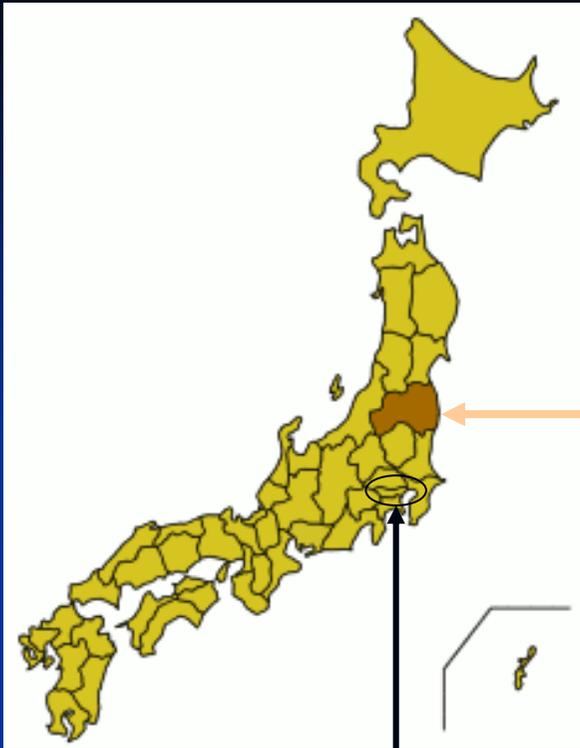
Methods

Research

Design  
Prospective Cohort Study

Survey site

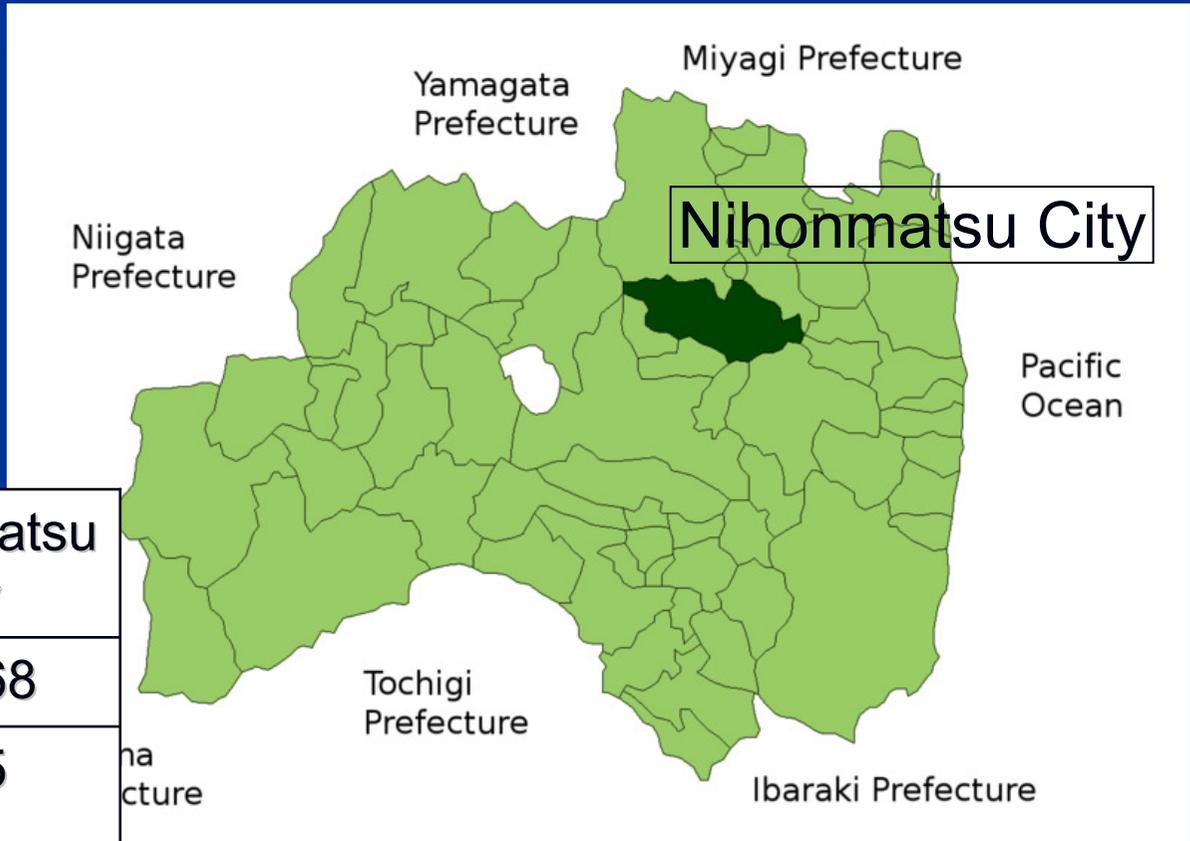
Nihonmatsu City, Fukushima prefecture,  
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Tokyo



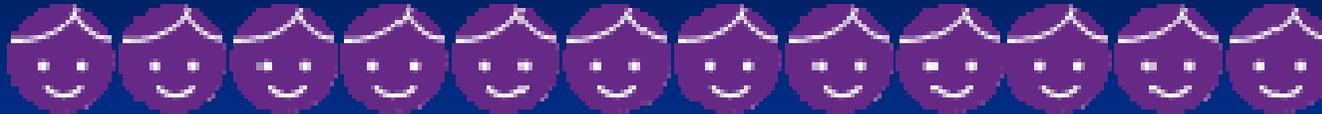
# Fukushima Prefecture



	Nihonmatsu City
Population	62,968
Proportion of age 65 or over	24.5

(%)

# Procedure to select subjects



Estimated 22,000 residents aged 30-79 years recorded in the residence registry as of November, 2002.



7,178 were randomly selected (sampling ratio; one-third) and asked to fill questionnaires by mail.



The total number of respondents in the baseline was 5,187.

(Male proportion; 48.0%, Response rate; 72.3%)

## Procedure to follow-up

The occurrence of death was monitored by the city office every month from January 2003 to December 2005 using death certificates.

# Research variables in baseline

survey

Basic characteristics  
(Age & Gender)

Health related  
co-morbidities

Diabetes

Hyperlipidemia  
Hypertension  
Stroke

Cardiovascular  
disease  
Liver disease  
Cancer

**3-year  
mortality**

Healthy lifestyle  
characteristics  
(Breslow)

Smoking

Drinking behavior

Exercise frequency

Body Mass Index  
(18.5-24.9)

Sleep hours  
(6-9)

Breakfast

Subjective

Participation in  
community activity

Systolic and  
diastolic blood  
pressure



# Statistics

Factors associated with total mortality

Logistic regression analysis for each  
item

(controlling ~~age~~ and gender)

Conventional stepwise estimation  
(Final model)

Survival curves for diabetic and non-diabetic

groups  
Kaplan-Meier method

(Statistical significance; Cox proportional hazard  
model)

Age and gender-specific comparison for

lifestyles

Chi-square test or Fisher's exact test

# Result

Table 1-1 . Selected characteristics of respondents

	Mean (SD) or N (%)		
	Women	Men (N=2490)	
Age	56.1(10.5) (N=2697)	55.4(13.3)	
Three-year total mortality	38(1.4)	76(3.1)	**
Self-reported co-morbidities			
Diabetes	103(4.2)	178(7.9)	**
Hyperlipidemia	229(9.5)	161(7.3)	**
Hypertension	556(22.1)	495(21.6)	
Stroke	38(1.6)	55(2.5)	*
Cardiovascular diseases	104(4.3)	105(4.7)	
Liver disease	84(3.5)	137(6.1)	**
Malignant cancer	64(2.6)	86(3.9)	*
Psychological disorders	126(5.2)	87(3.9)	*

T-test was used for age and Chi-square test for other items. \*\*p<0.01, \*p<0.05

## Table 1-2 . Selected characteristics of respondents

	Mean (SD) or N (%)		
	Women (N=2697)	Men (N=2490)	
<b>Healthy lifestyle characteristics</b>			
Smoking behavior (non-smoker)	220 (85.2)	684 (28.0)	**
Drinking behavior (non-drinker)	158 <sup>7</sup> (60.6)	433 (17.7)	**
Exercise frequency (everyday)	439 <sup>8</sup> (16.7)	405 (16.5)	
Body Mass Index (18.5-24.9)	182 (69.7)	168 (69.0)	
Sleep hours (6-9)	208 <sup>3</sup> (77.6)	204 <sup>4</sup> (82.0)	**
Breakfast (every morning)	244 <sup>4</sup> (92.5)	217 <sup>1</sup> (87.7)	**
Snack between meals (no)	114 <sup>7</sup> (43.7)	163 <sup>2</sup> (67.5)	**
<b><u>Total number (6-7)</u></b>	<b>444<sup>0</sup> (18.7)</b>	<b>98<sup>8</sup> (4.2)</b>	<b>**</b>
Systolic blood pressure ( $\geq 140$ mmHg)	493 (20.5)	602 (27.3)	**
Diastolic blood pressure ( $\geq 90$ mmHg)	291 (12.3)	446 (20.3)	**
Subjective health (fair or poor)	528 (20.7)	542 (22.8)	
Participation in community activities (infrequent)	233 (87.7) 1	197 (80.4) 9	**

Table 2. Selected characteristics of subjects with and without self-reported diabetes by age and gender

	Age under 65 [N(%)]		Age 65 or over [N(%)]	
	With diabetes (N=136)	Without diabetes (N=3345)	With diabetes (N=145)	Without diabetes (N=1066)
Self-reported co-morbidities (present)	57(50.4)	719(22.0) **	61(70.9)	461(48.1) **
Systolic blood pressure ( $\geq 140$ mmHg)	42(34.7)	464(15.7) **	61(45.9)	360(36.5) *
	Women [N(%)]		Men [N(%)]	
	(N=103)	(N=2336)	(N=178)	(N=2075)
Self-reported co-morbidities (present)	74(71.8)	727(31.1) **	126(70.8)	634(30.6) **
Systolic blood pressure ( $\geq 140$ mmHg)	36(36.4)	370(17.7) **	67(43.2)	454(24.6) **

Chi-square or Fisher's exact test was used.

\*\*p<0.01, \*p<0.05

Table 3 . Factors associated with 3-year total mortality (final model)

	Deaths (N=103)	Outcome confirmed (N=5,073)	Odds Ratio	95% Confidenc e Interval
Fair or poor subjective health	5 (54.1) 3	1009 (20.9)	3.1	(1.7-5.5)
Self-reported diabetes	1 (17.9) 5	264 (5.7)	2.3	(1.1-4.9)

The final model was developed using a stepwise estimation.

Figure 1. Three-year survival curves of subjects with and without diabetes

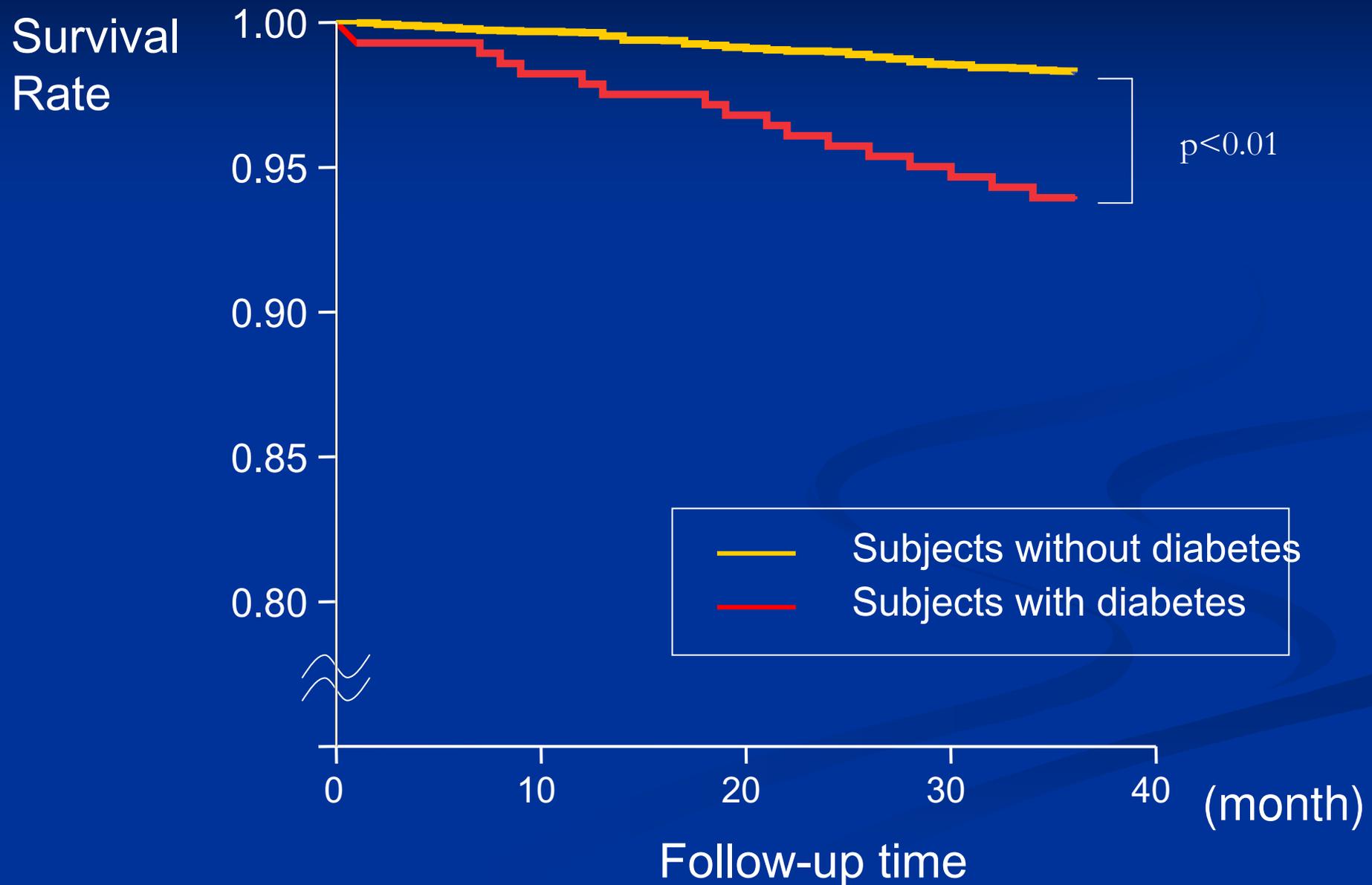


Table 4-1 . Gender-specific survival analysis of 3-year mortality

Gender	Diabetes	Deaths [N(%)] (N=92)	Survivors [(%)] (N=4600)	Unadjusted hazard ratio (95 % CI)	Adjusted hazard ratio (95 % CI)
Women	Without diabetes	27(90.0)	2309(95.8)	1.0	1.0
	With diabetes	3(10.0)	100(4.2)	2.6 (0.8-8.4)	1.4 (0.4-4.8)
Men	Without diabetes	48(77.4)	2027(92.5)	1.0	1.0
	With diabetes	14(22.6)	164(7.5)	3.5 (1.9-6.3)	2.5 (1.4-4.5)

Table 4-2. Total number of healthy lifestyles of subjects with

and without self-reported diabetes by gender

	Women [N( %)]		Men [N( %)]	
	With diabetes (N=103)	Without diabetes (N=2336)	With diabetes (N=178)	Without diabetes (N=2075)
Total number of healthy lifestyles (6-7)	30(34.5)	377(17.6)	7(4.4)	81(4.1)

\*\*p<0.01

Table 5-1 . Age-specific survival analysis of 3-year mortality

Age	Diabetes	Deaths [N(%)] (N=92)	Survivors [(%)] (N=4600)	Unadjusted hazard ratio (95 % CI)	Adjusted hazard ratio (95 % CI)
Under 65	Without diabetes	27(79.4)	3318(96.3)	1.0	1.0
	With diabetes	7(20.6)	129(3.7)	6.5 (2.9-15.0)	5.6 (2.4-13.1)
65 or over	Without diabetes	(82.8)	1018(88.3)	1.0	1.0
	With diabetes	48 <sup>10</sup> (17.2)	135(11.7)	1.6 (0.8-3.1)	1.5 (0.7-2.9)

Table 5-2. Total number of healthy lifestyles of subjects with

and without self-reported diabetes by age

	Age under 65 [N( %)]		Age 65 or over [N(%)]	
	With diabetes (N=136)	Without diabetes (N=3345)	With diabetes (N=145)	Without diabetes (N=1066)
Total number of healthy lifestyles (6-7)	18(13.6)	271(8.5)	19(16.8)	187(20.3)

\*p<0.05

# Interpretations

1. Only a small proportion of the study cohort followed healthy lifestyles recommended by Breslow's seven health practices.
2. Co-morbidities were more frequent and mortality risk was higher for people with diabetes regardless of age and gender. The mortality difference between those with and without diabetes continued to increase during the 3-year follow-up.

3. There were age and gender-specific differences in mortality and lifestyles.

1) Women with diabetes may modify their lifestyles after diagnosis, which prevents an excess mortality among them.

2) Those aged under 65 years modify their lifestyles at a moderate level, but the change seems to be not sufficient to prevent mortality.

3) Premature deaths among diabetic patients under

## Conclusion

Community-based primary prevention measures is needed to improve the lifestyles of residents.

Secondary prevention approaches are needed to monitor those with diabetes for complications and to give them lifestyle instructions.

# Acknowledgement

We thank staffs of Nihonmatsu City Office to conduct this study and provide the data.

The study was conducted as part of a city's healthy lifestyle support project in Nihonmatsu City.

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