

Long-term Effect of Telecare Intervention on Patients with Chronic Diseases

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OUTLINE

1. Telecare (tele-monitoring) of research site
2. Survey data
3. Econometric analysis
4. Recent development of Japanese
telemedicine: online clinic
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Research Site

Nishi-aizu Town, Fukushima

Prefecture, Japan

Population: 8,838

(2,949 households)

Elderly ratio: 38.23 %

18 years implementation
of the telecare system

Nishiaizu Town, Fukushima Prefecture



Health Situation of Nishi-aizu in 1985 (before the implementation)

1. SMR (Death ratio of strokes)

176.7 (national average: 100)

2. Life expectancy (1983-87)

Male 73.1 (national 74.8) 88th

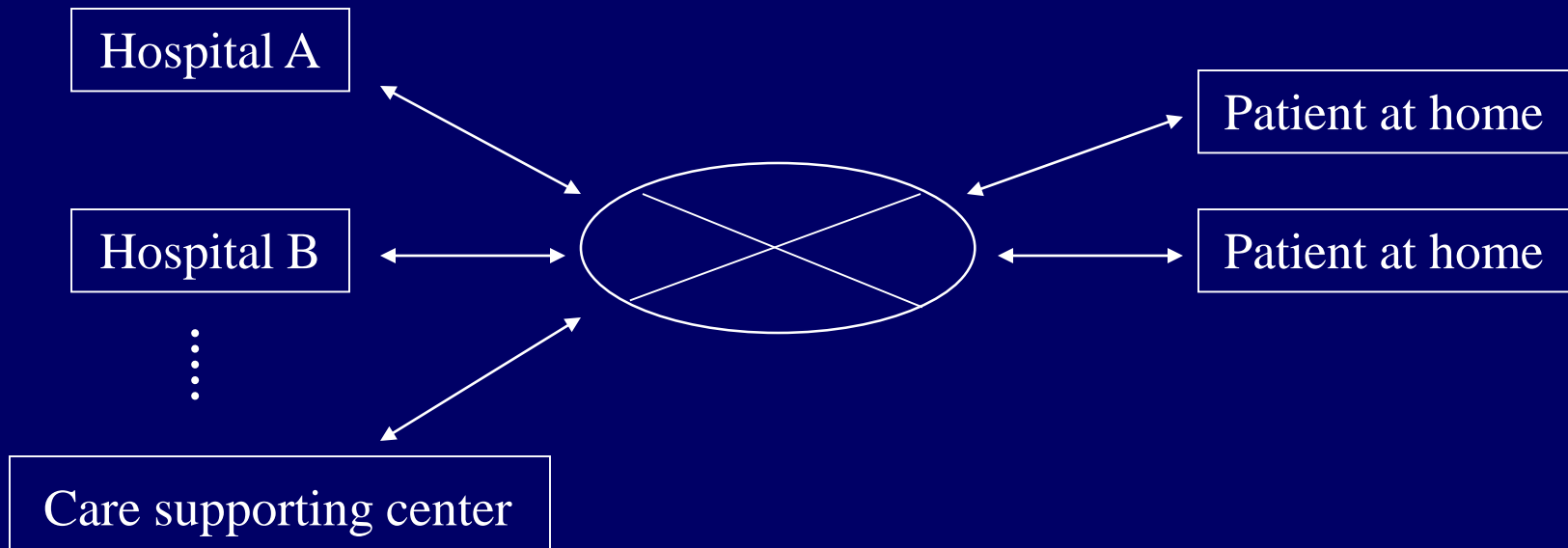
Female 80.0 (national 80.5) 69th

Burden of paying medical insurance fees

49,363 yen (380 euro)

(national average: 43,357yen)

E-Health System



Terminals at hospitals



Network



Terminals at home



Peripheral Device



The peripheral device is equipped with memory, an electronic sphygmomanometer, electrocardiograph, electronic signboard, and buttons for answering questions.

How Much can eHealth Systems Save Medical Expenditures?

Data

Making Database I

- **User and Non-user groups**
 - Select users from the list of town office
 - Select non-users from list of National Health Insurance
- **Send them questionnaires**
 - Characteristics: age, sex, chronic diseases, Income, assets, education, number of family living together, **years of using eHealth system, etc.**

Making Database II

- Check receipts issued by medical institutions for more than 400 residents.
- Town office keeps receipts for five years: 2002-06.
- There are 160,000 receipts! It took 8 days to find theirs by 20 students.

Making Database III

- Name
- Birth date
- Outpatient treatment or hospitalized patient treatment
- Name(s) of major disease(s)
- Date of initial treatment
- Number of days needed for treatment
- Amount of medical expenditures

How Much can eHealth Systems Save Medical Expenditures?

Part II: Analysis

Two Surveys: Obtain users' characteristics



This research covers receipt data of 9 years

Number of Samples

	No. of questionnaire sent	No. of valid response (2007-2010)	No. of valid response (2002-2010)
Users	565	272	91
Non-users	1035	247	118
Total	1600	519	209

Age Distribution

	User	Non-user	Total
under 50	0	0	0
51 - 60	5	3	8
61 - 70	20	32	52
71 - 80	38	51	89
81 - 90	27	24	51
over 90	1	8	9
Total	91	118	209
Average age	75.67	75.76	

Gender

	User		Non-user		Total	
	N	%	N	%	N	%
Male	39	42.9	46	39.0	85	40.7
Female	52	57.1	72	61.0	124	59.3
Total	91		118		209	

Major Diseases Treated

	Users		Non-users		Total	
	2002– 2006	2007– 2010	2002– 2006	2007– 2010	2002– 2006	2007– 2010
Heart failure	19	19	15	15	34	34
Hypertension	49	51	40	57	89	108
Diabetes	8	11	9	14	17	25
Stroke	5	8	7	9	12	17

Years Using Telecare

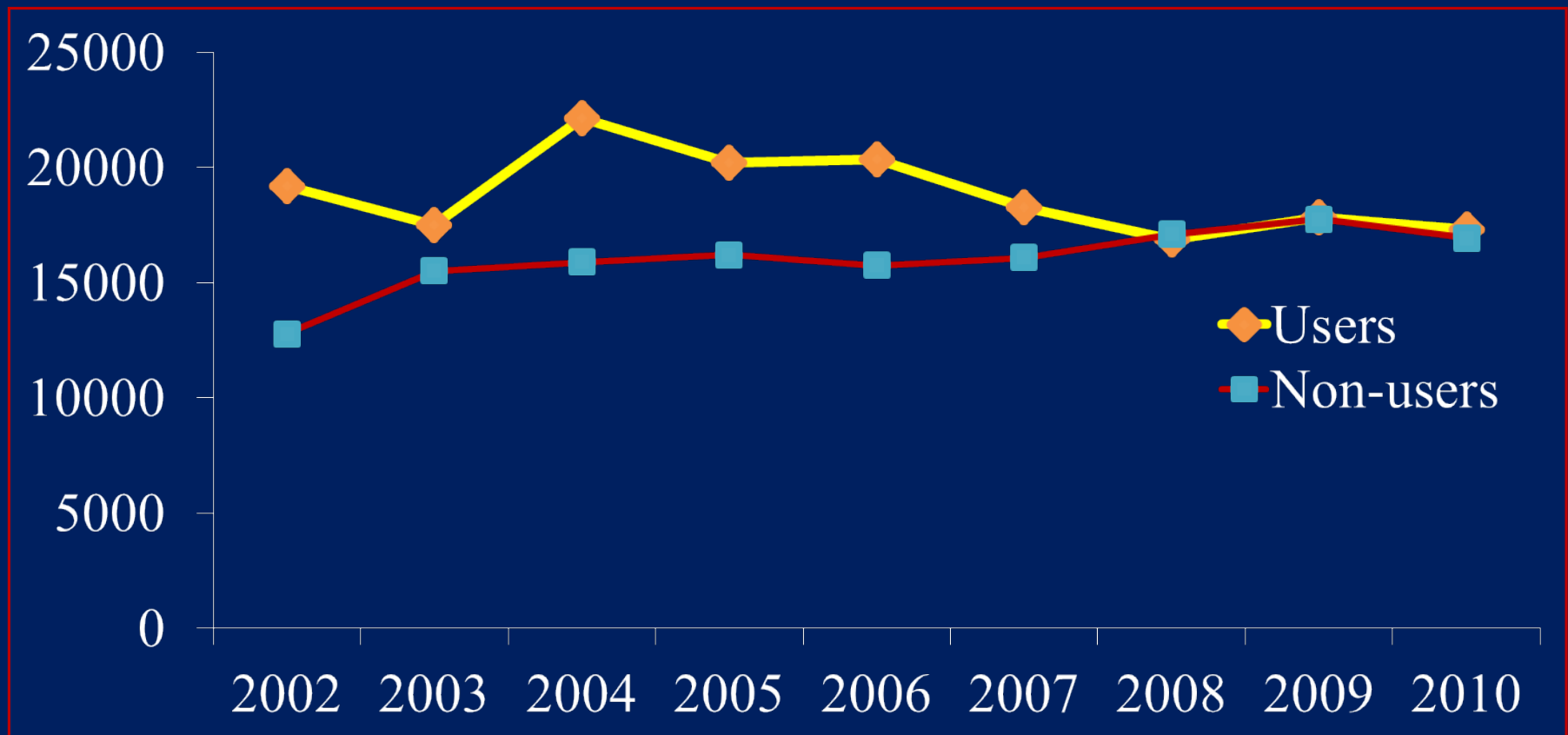
	2002 2006	2006 2009
1–3 years	38	8
3–5 years	45	8
5–7 years	35	11
7–10 years	39	13
>10 years	36	23
Do not use		27
Total		90

Frequency of Use

	2002-2006	2006-2009
Almost every day	76	27
3 – 4 times a week	47	15
1 – 2 times a week	20	7
1 – 2 times a month	23	7
Rarely use	25	24
Total	199	80

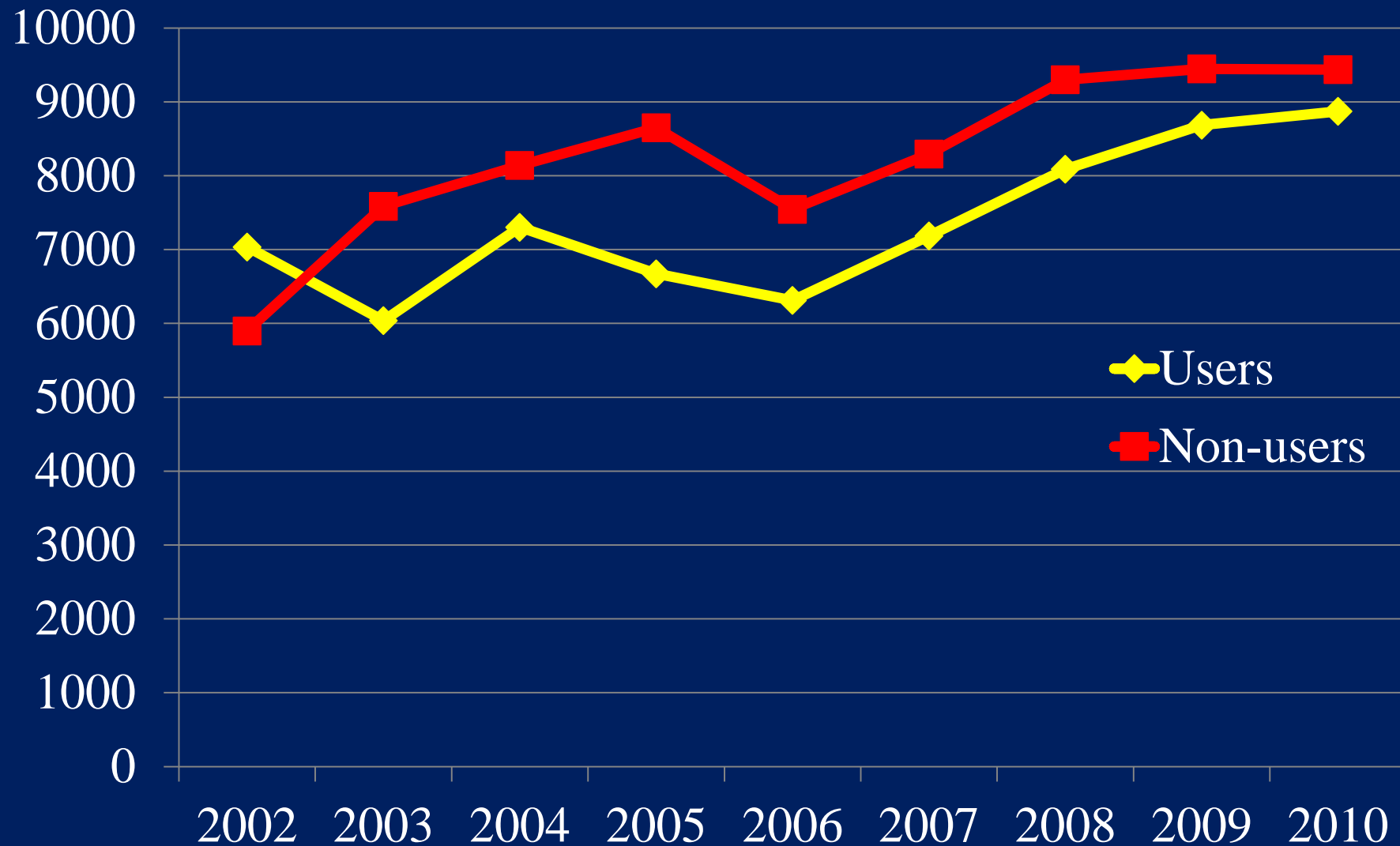
Medical Expenditure, All Diseases

Medical expenditures (unit: 1 point = JPY 10)



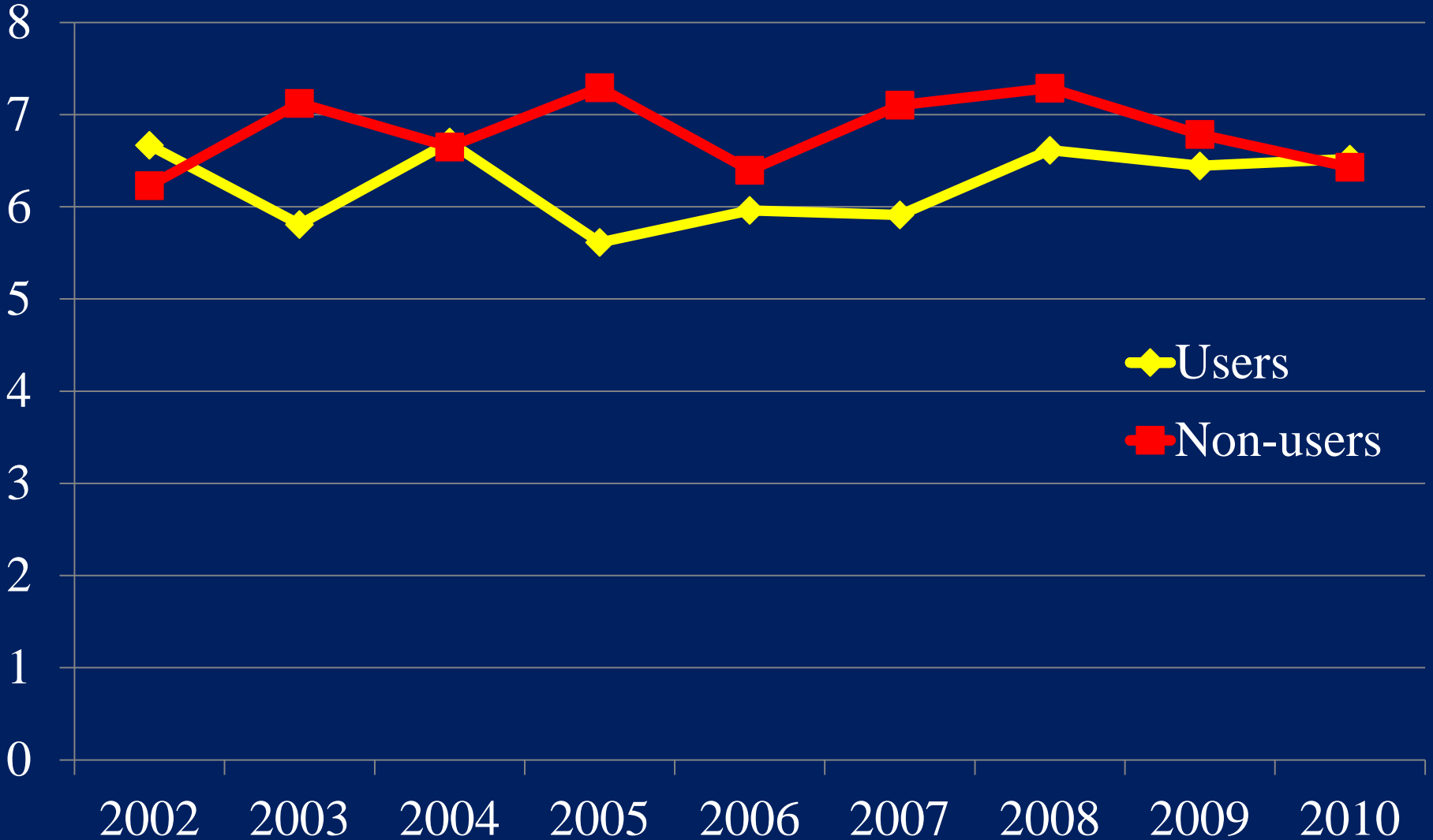
Medical Expenditure, Chronic Diseases

Medical expenditures (unit: 1point = JPY 10)



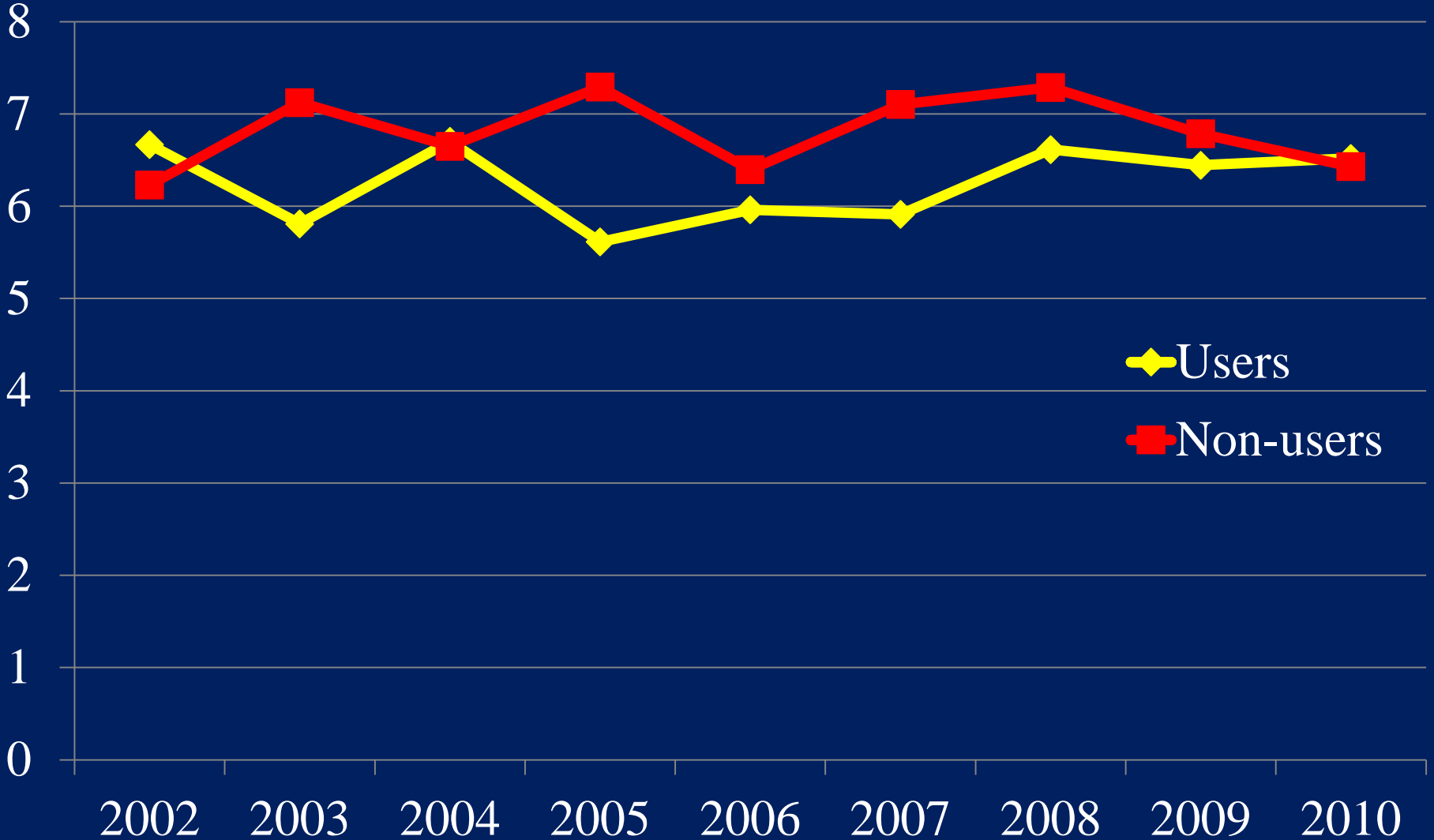
Treatment Days, Chronic Diseases

Days for treatment



Treatment Days, Chronic Diseases

Days for treatment



Econometric Analysis:
Panel Data Analysis
with IV (instrumental variables)

Estimation Result I:

Medical Expenditures of Chronic Diseases

N =1820

	Coefficient	SD	t value	p value
Telecare use	-6494.41	3215.58	-2.02	0.043**
Age	70.83	19.37	3.66	0***
Income	-3.11	8.25	-0.38	0.707
Heart failure	6885.39	4903.83	1.4	0.16
Hypertension	9714.75	1466.91	6.62	0***
Diabetes	5606.42	4452.8	1.26	0.208
Stroke	-6857.28	6447.9	-1.06	0.288

**Telecare reduces medical expenditure by JPY
65,000 (504 Euro)**

Estimation Result II:

Days of Treatment

N = 1820

	Coefficient	SD	t value	p value
Telecare use	-4.223	1.957	-2.16	0.031**
Age	0.053	0.012	4.5	0***
Income	0.002	0.004	0.47	0.637
Heart failure	1.761	3.873	0.45	0.649
Hypertension	9.061	1.111	8.16	0***
Diabetes	3.37	2.471	1.36	0.173
Stroke	-3.856	4.621	-0.83	0.404

Telecare reduces days of treatment by 4.2 days

Estimation Result III:

Users with Chronic Diseases

Medical expenditures	Heart failure		High blood pressure		Diabetes		Stroke	
Disease	8610.97	***	9354.41	***	5717.53	***	4381.90	**
	(1440.063)		(631.155)		(951.022)		(1783.30)	
User * Disease	-5876.75	***	-2127.28	**	-94.50		-681.01	
	(1939.30)		(953.00)		(1655.31)		(2382.87)	

Treatment Days

Days for treatment	Heart failure		High blood pressure		Diabetes		Stroke	
Disease	8.664	***	9.133	***	5.708	***	4.173	***
	(1.143)		(0.477)		(0.755)		(1.421)	
User * Disease	-6.607	***	-2.042	***	-1.199		0.541	
	(1.540)		(0.722)		(1.313)		(1.898)	

Summaries of Results

- (1) eHealth (telemonitoring) reduces medical expenditure by JPY 65,000 (USD650)
- (2) eHealth (telemonitoring) reduces days of treatment by 4.2 days
- (3) eHealth (telemonitoring) has more effect to users with chronic diseases, in particular to those with heart failure, JPY 58,768 (USD 588) and 6.7 days.

Cost Benefit Analysis

	Nishiaizu (yen)	Sangawa (yen)
Total Benefits (6 years)	107,700,000	106,500,000
Total costs (6 years)	184,170,869	174,330,000
Initial investment	136,720,000	133,459,500
Salaries & others	980,000	7,500,000
B/C ratio	0.58	0.61
No. of users, devices	700 518	224 551
WTP	3,177	2,955
B/C ratio with subsidies	2.31	2.60

Conclusions

Our Previous Results of Five-year Data

	Shot-run effect			Long-run effect
	OLS1	System GMM2	PSM3	9 year data
Medical expenditure	JPY 15,302 (USD 153)	---	JPY 25,538– 39,936 (USD 255–400)	65,000 (USD650)
Days of treatment	1.6 days	2.0 days	2.6–4.0 days	4.2 days

Note 1: ¹Akematsu and Tsuji (2009).

Note 2: ²Minetaki, Akematsu, and Tsuji (2011).

Note 3: ³Akematsu and Tsuji (2012).

Conclusion

- Nine year data analysis has larger effects.
- The longer it is used, the larger effects are expected.

eHealth (telemonitoring) has the largest effect to users with heart failure

Towards a Broader Implementation of the e-Health System I

- Low B/C ratio
- Conditions of Further implementation
 - (1) Public subsidies
 - (2) Application of medical insurance
- Creation of new business models
 - private businesses in health care

Towards a Broader Implementation of the e-Health System II

- The strongest obstacle is conventional system
- Reimbursement from medical insurance

Recent new development of online clinic

- Online clinic and its reimbursement from public medical insurance was firstly admitted in Feb. 2018.
70 point (JPY700: 3.1Euro) per month
- Online clinic management fee
100 point (JPY1,000: 7.75Euro) per month
- Guideline for online clinic was also decided in March 2018.

Thank you for listening



Beautiful Nishi-aizu Town