



# ***Active Life Expectancy by Chewing Ability: The Case of Elderly Taiwanese***

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# Purpose of the Study

- To examine effect of chewing ability on health expectancy on the elderly in Taiwan

# Previous Research: ALE by Chewing Ability

## ■ Saito and Nasu (2006)

- Using number of teeth (20+vs19-) and chewing ability (able/unable to chew the list of food from hardest to soft food)
- Data is from the Nihon University Japanese Longitudinal Study of Aging (NUJLSOA), which is conducted in 1999, 2001, 2003 with 5,000 65+ elderly in 1999.
- Results showed that both number of teeth and ability to chew have the effect on the active life expectancy

# Methods - Data & Survey Design

## ■ Data

- Surveys of Health and Living Status of the Middle Aged and Elderly in Taiwan (SHLSE)

## ■ Survey design

- Nationally representative multi-stage probability sampling method
- Population: Age 60 and over in 1989 in Taiwan
- Longitudinal surveys

# Sampling and Response Rates

Content	1 <sup>st</sup> wave	2 <sup>nd</sup> wave	3 <sup>rd</sup> wave	4 <sup>th</sup> wave
Survey year	1989	1993	1996	1999
Interview months	4-11	4-12	4-12	4-12
No. of respondents (Age of respondents)	4049 (60+)	3154 (64+)	2669 (67+)	2310 (70+)
Deceased cases (Cumulate N.)	-	590	470 (1069)	426 (1488)
Response rates (%)	91.8%	91.2%	89.3%	90.8%

# Definition of Health

- **6 activities: Activity of Daily Living (Bathing) and Instrumental Activities of Daily Living (5 activities: Shopping, managing money, using phone, taking public transportation, do heavy house work)**
- **Inactive: At least one activity with a lot of difficulty or unable to perform**
- **Active: otherwise**

# Definition of Chewing ability

## ■ Question (1989)

- How well can you chew (**with denture**)? –self-rated chewing ability

## ■ Levels of chewing ability

chewing ability	n	recode	n
1=very good	500	good	1436
2=good	936		
3=so so	1179	bad	2581
4=bad	863		
5=very bad	102		
6=soft food only	437		
missing	32		

# Distribution of sample person by sex and chewing ability

chewing abilbiy	good	bad	Total
sexes			
male	919	1371	2290
	(40.1%)	(59.9%)	(57.0%)
female	517	1210	1727
	(29.9%)	(70.1%)	(43.0%)
Total	1436	2581	4017
	(35.8%)	(64.3%)	(100%)



# Method of computing ALE

- **The Interpolation Markov Chain (IMaCh)**
  - **Able to deal with different interval lengths between surveys (1989, 1993, 1996, 1999)**
  - **Calculate Total Life Expectancy, Active Life Expectancy and Inactive Life Tables with standard error**



# Chewing Ability – both sex

# LE by chewing ability

Age	GOOD		BAD		Statistical Test
	LE	SE	LE	SE	
60	20.8	0.42	19.2	0.28	ns
65	16.9	0.39	15.4	0.24	ns
70	13.4	0.38	12.1	0.22	ns
75	10.4	0.36	9.4	0.21	ns
80	7.9	0.35	7.2	0.22	ns
85	6.0	0.33	5.5	0.23	ns
90	4.6	0.32	4.2	0.24	ns

\*  $p < .05$  \*\*  $p < .01$

# ALE by chewing ability

Age	GOOD		BAD		Statistical Test
	ALE	SE	ALE	SE	
60	15.2	0.30	12.6	0.24	**
65	11.4	0.27	9.1	0.19	**
70	8.1	0.24	6.2	0.15	**
75	5.4	0.22	3.9	0.13	**
80	3.4	0.19	2.3	0.12	**
85	2.0	0.16	1.3	0.10	**
90	1.1	0.13	0.7	0.07	*

\*  $p < .05$  \*\*  $p < .01$

# IALE by chewing ability

Age	GOOD		BAD		Statistical Test
	IALE	SE	IALE	SE	
60	5.7	0.27	6.5	0.20	ns
65	5.5	0.27	6.3	0.18	ns
70	5.3	0.28	5.9	0.18	ns
75	5.0	0.28	5.5	0.18	ns
80	4.5	0.29	4.9	0.20	ns
85	4.0	0.29	4.2	0.21	ns
90	3.5	0.29	3.6	0.23	ns

\* p<.05 \*\*p<.01



# Chewing Ability – FEMALES

# LE by Chewing Ability: Females

Age	GOOD		BAD		Statistical Test
	LE	SE	LE	SE	
60	23.2	0.69	20.7	0.39	*
65	18.8	0.66	16.5	0.34	*
70	14.7	0.63	12.7	0.31	*
75	11.2	0.59	9.6	0.30	ns
80	8.3	0.55	7.1	0.30	ns
85	6.1	0.50	5.3	0.30	ns
90	4.5	0.45	3.9	0.30	ns

\* p<.05 \*\*p<.01

# ALE by chewing ability: Females

Age	GOOD		BAD		Statistical Test
	ALE	SE	ALE	SE	
60	14.4	0.46	11.5	0.35	**
65	10.4	0.41	7.9	0.26	**
70	7.0	0.35	5.0	0.19	**
75	4.4	0.29	2.9	0.16	**
80	2.5	0.24	1.6	0.13	*
85	1.3	0.18	0.8	0.10	ns
90	0.7	0.12	0.4	0.07	ns

\*  $p < .05$  \*\*  $p < .01$





# Chewing Ability – MALES

# LE by chewing ability: Males

Age	GOOD		BAD		Statistical Test
	LE	SE	LE	SE	
60	19.6	0.52	18.1	0.39	ns
65	16.0	0.49	14.6	0.33	ns
70	12.8	0.47	11.6	0.30	ns
75	10.0	0.46	9.1	0.30	ns
80	7.8	0.46	7.0	0.31	ns
85	6.0	0.45	5.5	0.32	ns
90	4.7	0.44	4.4	0.35	ns

\*  $p < .05$  \*\*  $p < .01$

# ALE by chewing ability: Males

Age	GOOD		BAD		Statistical Test
	ALE	SE	ALE	SE	
60	15.6	0.40	13.5	0.34	**
65	12.0	0.36	10.1	0.27	**
70	8.9	0.34	7.2	0.23	**
75	6.2	0.32	4.9	0.21	**
80	4.2	0.30	3.1	0.19	**
85	2.6	0.27	1.8	0.18	**
90	1.6	0.23	1.0	0.15	*

\*  $p < .05$  \*\*  $p < .01$

# Summary

	<b>Life Expectancy</b>	<b>Active Life Expectancy</b>	<b>Inactive Life Expectancy</b>
<b>Both Sexes</b>	<b>ns</b>	<b>Significant</b>	<b>ns</b>
<b>Females</b>	<b>Significant (60-70)</b>	<b>Significant (60-80)</b>	<b>ns</b>
<b>Males</b>	<b>ns</b>	<b>Significant (all ages)</b>	<b>ns</b>

# Discussions: Both Sexes

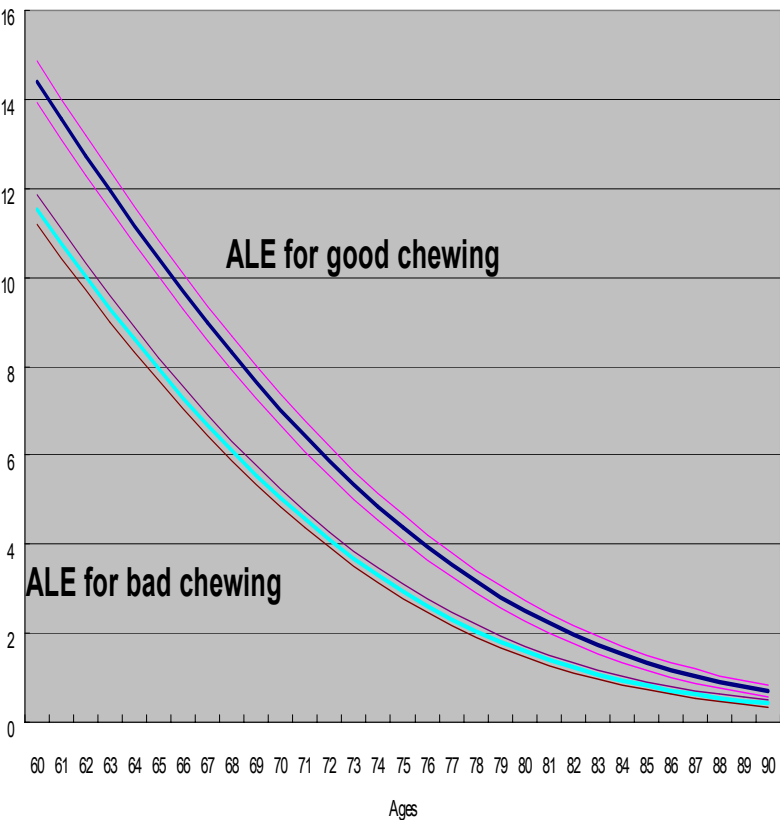
- **Statistically significant effect of chewing ability on active life expectancy for both sexes combined**
  - **Elderly with good chewing ability are expected to have 2 more years of ALE at age 60**
- **But no significant effect of chewing ability on life expectancy and inactive life expectancy**
  - **Although the differences are not statistically significant for those with good chewing ability have 1.6 more years live and about 1 year less inactive life at age 60**

# Discussion: by sex

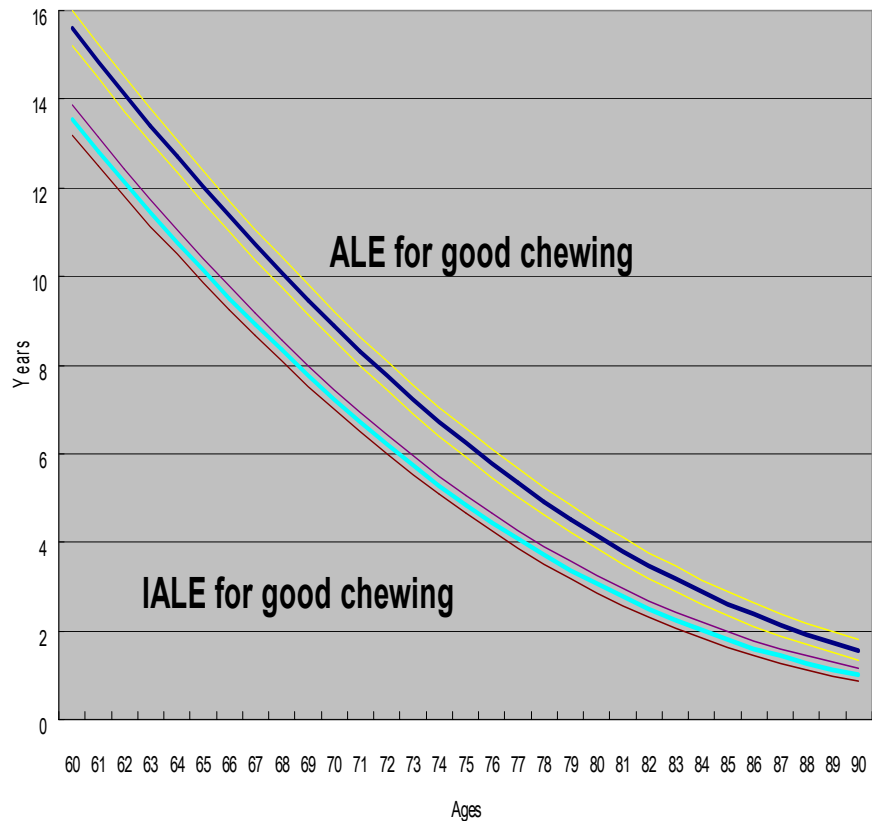
- **For females: Differences in life expectancies and active life expectancies are statistically significant at younger age groups by chewing ability**
  - For those with good chewing ability: 3 more years of active life expectancy
- **For males: Only differences in active life expectancies are significant by chewing ability**
  - For those with good chewing ability: 2 more years of active life expectancy

# ALE by chewing ability for the elderly

## Females



## Males



# Conclusion

- **We found similar results with the Japanese study. Keeping a good chewing ability seems to be good for health of the elderly Taiwanese.**
- **The effect of chewing ability on active life expectancies seems to be larger for females (3 more years vs. 2 more years).**



# Future Study

- **add data from the 5<sup>th</sup> wave of the survey conducted in 2003**

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*♪ Thank You ♪*