Nutrition Transition in Post-War Okinawa
Exploring the Link Between Diet, Obesity and Longevity

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Geographic Location of Okinawa
# Low Mortality Rates in Several Long-Lived Areas vs the U.S.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Location</th>
<th>LE</th>
<th>CHD</th>
<th>Cancer</th>
<th>Stroke</th>
<th>All Causes</th>
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<tbody>
<tr>
<td>1</td>
<td>Okinawa</td>
<td>81.2</td>
<td>18</td>
<td>91</td>
<td>35</td>
<td>335</td>
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<tr>
<td>2</td>
<td>Japan</td>
<td>79.9</td>
<td>22</td>
<td>106</td>
<td>45</td>
<td>364</td>
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<td>3</td>
<td>Hong Kong</td>
<td>79.1</td>
<td>40</td>
<td>126</td>
<td>40</td>
<td>393</td>
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<td>4</td>
<td>Sweden</td>
<td>79.0</td>
<td>102</td>
<td>108</td>
<td>38</td>
<td>435</td>
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<td>8</td>
<td>Italy</td>
<td>78.3</td>
<td>55</td>
<td>135</td>
<td>49</td>
<td>459</td>
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<tr>
<td>10</td>
<td>Greece</td>
<td>78.1</td>
<td>55</td>
<td>109</td>
<td>70</td>
<td>449</td>
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<td>76.8</td>
<td>100</td>
<td>132</td>
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</tbody>
</table>

1. Average life expectancy
2. Coronary heart disease


“Okinawans’ emergence as Japan’s fattest people.”
Okinawan Pre- and Post-War Group

Pre War group (Longevity group)

Post War group (Non-longevity group)

past

present

near future

WW II

Okinawan culture

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American culture

Japanese culture
Longevity of Okinawa

- Life expectancy ranking in Japan
  - male: 4th place  →  26th place
  - female: 1st place (20 years or more)

- Prevalence rate of centenarians in Japan: 1st place (about twice as many as the 2nd place prefecture-Kochi)
Okinawans elderly is supporting longevity.

The comparison of mortality rate between young and elderly generation (male: 1973–1992)

- Okinawans younger generation is higher than its Japan
- Okinawans elderly generation is lower than its Japan

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Socio-cultural Influences on Traditional Okinawan Diet under the Three Different Administrations

Pre-War 1879-1945
Traditional Food Culture of Okinawa

Post-War 1945-1972
Okinawa U.S. Food Culture
Japanese Food Culture

Present
Okinawa
U.S. Food Culture
Japanese Food Culture

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School Lunch in Okinawa around 1960: Bread and Milk, Western Style
Yearly Trends of Body Weight

Male

Female

B.W. (kg)

Japan

Okinawa

12 y/o

12 y/o

9 y/o

9 y/o

6 y/o

6 y/o


Yearly Trends of Height

**Male**

- Japan
- Okinawa
- 12 y/o
- 9 y/o
- 6 y/o

**Female**

- Japan
- Okinawa
- 12 y/o
- 9 y/o
- 6 y/o
Hokkaido+Tohoku

Cross cohort of difference of weight of school child (comparison with the whole country) according to the provinces (1946-1980)


Overlapped with the ‘Nutrition transition era’.

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Yearly changes of energy density of staple foods (rice, sweet potato, and bread)

コメと甘藷の年次別摂取量推移（エネルギー密度換算）
Kelp (at a public market in Naha)
Yearly change of kelp consumption

Okinawans’ traditional food culture is changing.
Nutrition Transition

- Starvation → satiation → optimum level
- Developing countries follow the same nutritional transition as developed countries.
- Putting conceptual model-making into empirical case study
- The change over the short term.
- The transition has been influenced by socioeconomic factors.
- The transition is a global phenomenon.
- The same concept: Demographic transition, epidemiologic transition, and health transition.

Popkin BM, Cababello B: The Nutrition Transition 2002
Nutrition Transition: Annual Change of Fat Intake in Okinawa and Japan

The increase in fat intake occurs earlier in Okinawa than in Japan.
Yearly trend of imported processed meat products (e.g. spam) and local production of meat in Okinawa

- Imported amount of prepared meat products (kg/person)
- Production of pork in Okinawa (kg/person)
- Production of beef in Okinawa (kg/person)
- Total amount of meat (kg/person)
Canned Pork Luncheon Meat
Import Amount: Okinawa as No.1 in Japan
The relationship between nutrition transition (fat intake) and body weight of school children in postwar, Okinawa

Nutrition transition of fat intake between Okinawa and Japan

Annual transition of children’s weight difference of birth cohort group in nationwide Okinawa

Transition generation

1954 Food assistance by the PL 480 Food for Peace Programs
1960 School Lunch Program (SLP) started
1960 Law of SLP
1962 Achieved the full implementation of SLP

Monetary structure

B-Yen US dollar Japanese Yen
Age Adjusted Mortality Ratio
For Men in Okinawa vs. in Japan 1960-1970 (upper), 1990-2000 (lower)

The younger Okinawan birth cohort groups (who were in the nutrition transition during their childhood) show an increase in its mortality and a decrease in its longevity vs. other Japanese.
Model of Nutrition Transition and its Effects on Okinawan Children

- School lunch program started
- Reversion of Okinawa US to Japan
- 1960 → 1972
- Controlled Trade
- Free Trade
- Income increases rapidly
- 1972
- Rise in Amount of Imported Meat
- Rise in Fat Intake in Okinawan Children
- Rise in Body Weight (BMI) in Okinawan Children

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Factors of Rise and Fall of the Ranking of Okinawan Life Expectancy

**Factor of Rise**
- Decrease of infant mortality
- Decrease of infectious disease, advantage from public health

**Factor of Fall**
- Nutrition transition in post war
- Increase lifestyle-related disease (lung cancer, diabetes, stroke)

Important factor: 27 year U.S. Administration Reversion to Japan
Relationship between obesity and socioeconomic status

Developed societies

Global + Obesity = Globesity
new ‘malnutrition’ (WHO)

Developing societies

Low

High

Socioeconomic Status


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Conclusions

1) Descriptive statistical data indicate a correlation between children’s body weight and body fat. These nutrition transitions occurred under the influence of socio-economic policy interventions of the US and later Japan.

2) Such nutrition and body weight/BMI changes are likely to have long-term consequences for the future health and longevity of these cohorts, already evident in cohort mortality data.
Okinawan Nutrition Transition

1) Cause and effect relationship of nutrition transition between political factors and economical ones

2) Drastic increase in body weight of young generation may promotes the risk of life style related disease

3) Birth cohort group (who were in the nutrition transition during their childhood) shows the increase in its mortality and the decrease in its longevity.
The birthday of an Okinawan Issei (first generation immigrant in Canada). On the left is his son in Okinawan’s future?
Thank you very much