

Chapter 7

Health and Medical Issues and Longevity in the Amami Island Region

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1. Introduction

Health conditions and medical services have transformed dramatically over the past several decades in Japan, and such changes contribute to the evolving nature of diseases and lifespan in for people living in Japan. In particular, the Amami Island region (henceforth Amami), located in the south part of the Kagoshima Prefecture, Japan, shares some of these same issues but also has its own unique background regarding health and medical issues. Amami's population has a relatively higher proportion of people with marked longevity, yet the male life span is notably shorter than that of general Japanese population. The health of the people of Amami may vary with such factors as suitable natural and social environments and lifestyles, limited medical services, and the chronological change in these factors. This chapter introduces the condition of the health and medical background of the residents of Amami and considers the related factors related to them.

2. Longevity and life span

A relatively higher proportion of Amami's population is known for its longevity, as compared with the whole population of Japan. The prevalence of persons aged 100 years or more in 2010 was 9.5, 13.4, and 26.5 per 100,000 in the males of Japan, Kagoshima Prefecture and

Amami, and 58.2, 97.6 and 221.9 in females, respectively (Ministry of Internal Affairs and Communications 2010) (Table 1). The Amami rates are 2.8 and 3.8 times for males and females than the Japanese average, and those for females also 6.1 and 8.4 times higher than those for males in Amami and the rest of Japan, respectively. The prefecture with the highest rate of longevity in 2010 was Nagano (71.8/100,000), followed by Kochi (63.6/100,000), Okinawa (62.6/100,000), and Kagoshima (57.7/100,000), among 47 prefectures of Japan (Ministry of Internal Affairs and Communications 2010). The longevity rate in Amami (128.3/100,000) is much higher than these prefectural rates. Since Amami is a remote region, the proportion of its aged population is also higher than that for urban regions. The authors, therefore, compared the prevalence of longevity among the aged population, that is, persons aged 65 years or more. Amami men and women still had longevity rates 2.3 and 2.9 times higher than those of Japan as a whole, respectively.

In contrast, the life spans of people in the city and towns of Amami are 1-3 years shorter than the Japanese average for males in 2005, and varied within ± 1 years in females (Statistics Bureau, Ministry of Internal Affairs and Communications 2010).

Table 1. Prevalence of longevity population in Japan, Kagoshima Prefecture and Amami island region in 2010

	Population		Prevalence of longevity (≥ 100 years old)			
			/100,000 among the total population aged ≥ 0 years		/100,000 among the population aged ≥ 65 years	
	Males	Females	Males	Females	Males	Females
Japan	62,327,737	65,729,615	9.5	58.2	4.7	22.7
Kagoshima Prefecture	791,738	901,576	13.4	97.6	5.9	32.6
Amami island region	56,695	61,750	26.5	221.9	10.9	65.7

3. Mortality rates

The discrepancy between the higher proportion of the population with longer and shorter life spans suggests different mortality rates by age group and perhaps birth cohort in Amami. As the distribution of the population by age varies by region and period, and the mortality rates of most diseases are higher in the older population, age-adjustment is required to perform an accurate geographical and chronological comparison of these mortality rates. Otherwise, differences in distribution of the population by age could lead to over- or underestimation of the crude mortality rate (*i.e.*, without age-adjustment). Age-adjusted mortality rate (AMR) refers to an actual rate calculated by adjusting for the distribution of the population by age-group, using the standard population (Japanese standard population in 1980 was used in this analysis); the standardized mortality ratio (SMR) refers to a ratio obtained through a comparison the mortality in the overall Japanese population, with SMR as 100, after age-adjustment.

AMR was calculated after dividing the Amami region into two competent public health centers (PHC), Naze and Tokunoshima, and comparing them to another PHC, Aira of Kagoshima main-

land as control. As the population size is limited, the mortality data from 1987 to 2007 were obtained from the Ministry of Health, Labour and Welfare through the prefectural government, and the means of the first half (1987-1997) and second half (1998-2007) were used for mortality rates (TAKEZAKI 2012).

AMR in males of all ages decreased between the first and second half in Naze and Aira PHCs, but slightly increased in Tokunoshima PHC (Table 2). The highest AMR was observed in the first half of Naze, and the lowest was in the second half of Aira.

SMR in the younger male population (0-39 years old) was higher than 100 (Japanese mean value) in the three PHCs for the first half, and decreased in the Aira PHC for the second half. SMR in Naze slightly decreased to 113, but was still higher than 100. The Tokunoshima PHC did not show a significant chronological change (112 and 110).

SMRs in the middle-aged male population (40-64 years old) in Naze and Tokunoshima PHCs of the second half were 1.5 times higher (153 and 154) than the Japanese standard rate. A chronological change was not apparent in the Naze PHC, but the Tokunoshima PHC showed an increasing trend. Interestingly, the SMR in the Aira PHC de-

Table 2. Age-adjusted mortality rate (AMR) and standardized mortality ratio (SMR) in two competent public health centers (PHCs) of Amami and Aira PHC of the Kagoshima mainland

	Amami island region				Kagoshima mainland	
	Naze PHC		Tokunoshima PHC		Aira PHC	
	1987-1997	1998-2007	1987-1997	1998-2007	1987-1997	1998-2007
Males						
Number of population ^a	41,346	38,571	25,657	23,933	95,507	103,208
Number of deaths ^b	434.3	488.8	273.0	330.6	935.7	1,037.4
AMR (/100,000)	822.3	757.3	755.4	765.4	774.2	651.5
SMR (0-19 years old)	124 **	113 **	112	110	122 **	103
SMR (40-64 years old)	148 **	153 **	129 *	154 **	116 *	102
SMR (≥65 years old)	113 *	103	103	99	123 **	103
Females						
Number of population ^a	47,584	44,038	28,225	25,443	103,217	111,081
Number of deaths ^b	424.3	427.0	275.5	287.4	858.8	949.2
AMR (/100,000)	407.3	315.9	385.8	352.5	434.5	331.4
SMR (0-19 years old)	121 **	93	118 **	96	135 **	102
SMR (40-64 years old)	126	104	111	132	124 *	104
SMR (≥65 years old)	119 **	91	117 *	92	137 **	102

* p<0.05, ** p<0.01

a) The number of population in 1990 and 2000 were used, respectively.

b) Mean number of deaths in 1987-1997 and 1998-2007, respectively.

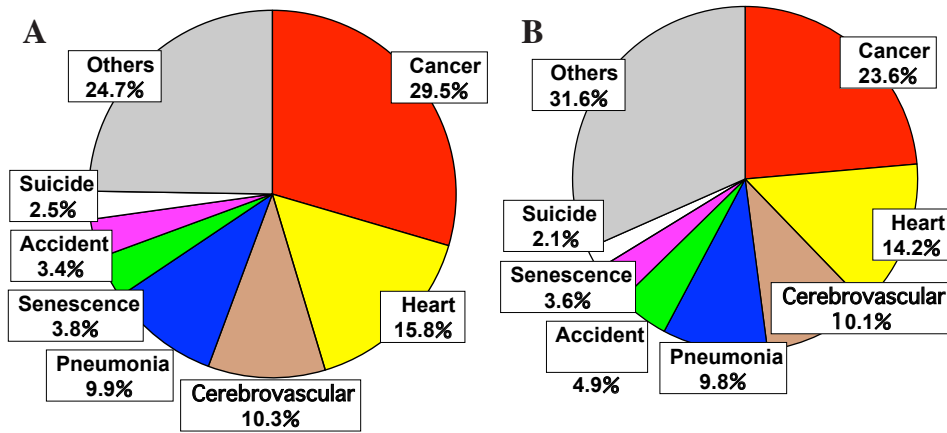


Fig. 1. Distribution of the number of deaths among males and females in Japan (A; n=1,197,012) as a whole, and in Amami (B; n=1,736), in 2010.

creased to 102, which was almost similar to the Japanese standard rate.

SMRs in the older male population (≥ 65 years old) for the second half were similar to the Japanese standard rate in three PHCs, with decreasing trends in Naze and Aira PHCs.

AMRs in females of three PHCs showed decreasing trends between the first and second half, but an increase in SMR (111 to 132) was observed in the middle-aged population of Tokunoshima. Female SMRs in the Naze and Tokunoshima PHCs of the younger and older populations were lower than the Japanese standard. This suggests that the higher proportion of longevity in Amami's population is due to low death rate in its older population and a higher rate in its middle-aged population.

4. Causes of death

The discrepancy between the high proportion of persons with both longer and shorter life spans can be explained by the higher mortality rate in the middle-aged population and lower mortality rate in the older population. This situation leads to the question of what factors contribute to this phenomenon.

The first leading cause of deaths in Japan in 2010 was cancer, followed by heart diseases, cerebrovascular diseases, pneumonia, senescence, accident, suicide, and others (Ministry of Health, Labour and Welfare 2010) (Fig. 1). This order is

the same in Amami, except that accidents account for a higher proportion than in Japan (Kagoshima Prefecture 2010). The most common site of cancer is the lung in both Japan and Amami, although the proportion of cancer-related deaths in Amami is relatively smaller than that of Japan.

Death rates above the Japanese standard mortality rates in middle-aged males of Amami were observed for accidents, heart diseases, cancer, liver diseases, pneumonia, and cerebrovascular diseases in the Naze PHC, and for accidents, cerebrovascular diseases, suicide, liver diseases, heart diseases, and pneumonia in the Tokunoshima PHC (TAKEZAKI 2012) (data are not shown in Table). These numbers suggest that high death rates may not be due to specific diseases, but rather influenced by some general background factor pertaining to lifestyle.

5. Lifestyles, and health and medical issues in the general population

Japanese lifestyles have changed remarkably in recent decades. Dietary habits have altered in addition to decreased intake of carbohydrates, fiber, salt, and fish, as well as increased intake of animal protein and fat. However, the current intake level of fat is still lower, and that of salt and fish is higher than in Western countries. The duration and intensity of daily exercise has decreased because of an increase in sedentary work and motorization.

Amami is a remote island region where tradi-

tional lifestyles are more prevalent than in the Japanese mainland. However, the lifestyles in Amami are changing more rapidly than those in the mainland in recent years, due in part to socioeconomic development, especially that related to transportation. This change is reflected in the serum cholesterol levels in the general population. The proportion of males in Amami's general population with high serum cholesterol levels was 0.5 times lower than in Aira in 1987, but their proportion increased by 1.5 times in Aira and 4 times in Amami in 2007. Increased serum cholesterol levels are a result of increased intake of animal fat. This quick change in lifestyles is observed among the middle-aged population in Amami, while the older generation is still preserving their lifestyles with small changes. This variation in lifestyles between generations may partially contribute to different mortality rates. Of note, Westernization in the middle-aged population increases the risk for lifestyle-related diseases. Another important characteristic of lifestyle is alcohol consumption in Amami males, for which the intake amount is much higher than the Japanese mean (TAKEZAKI 2012).

The authors have been conducting a genome-cohort study in Amami since 2005 (HAMAJIMA and J-MICC Study Group 2007). We also found the distribution of risk factors for atherosclerosis to be similar or more prevalent in Amami's general population than in the mainland population (HIRASADA *et al.* 2012). However, the prevalence of atherosclerosis is lower in Amami, especially in females. We speculate that either a birth-cohort effect of previous lifestyles or genetic background may influence this difference.

In addition to these factors, Amami has immense potential for providing the appropriate environment, food, and social aspects contributing to longevity. For instance, the annual average temperature is 21.6 °C, and the lowest monthly temperature is 12.0 °C. The Kagoshima prefectural government conducted an ecological survey to investigate the factors for longevity in Amami in 2003-2004 (Kagoshima Prefecture 2010). Suggested factors were living near the sea; eating breakfast every day; sleeping well; frequent exercise; not drinking every day; never smoking;

frequent intake of potatoes, dark unrefined sugar, beans, pork, sesame and peanut oil, fish, seaweed, and some vegetables; high intake of calcium, niacin, and vitamin B₆; low intake of salt; having something or someone to live for, such as a child or grandchild, their growth, transmission of traditional culture, or friends; having a positive attitude toward life and living, shown by meeting or connecting with friends, as well as helping or doing things for others. Further scientific studies will be expected to confirm these factors.

Genetic factors may be also a potential contributor to longevity. Geographical variation of genetic factors in Japan has been investigated, using a single nucleotide polymorphism (SNP) (YAMAGUCHI-KABATA *et al.* 2008, NISHIYAMA *et al.* 2012). Such research suggests that some SNPs are more prevalent in Amami and the Ryukyu region, where Amami is also included. However, major differences in SNP distribution were related to morphogenic factors, not functional ones that may be related to longevity. As multiple factors may be related to longevity, comprehensive studies may offer clarification of those factors in the future.

In Japan, medical service is provided to everyone, regardless of socioeconomic background, since the country has universal health insurance. Residents of Amami can have a CT scan and surgical operations on the island, although medical resources are limited as compared with the mainland. Patients with emerging severe diseases are transported to the secondary or tertiary hospitals of Okinawa, Amami-Oshima Is., or Kagoshima on the mainland by helicopter. It takes more time to reach the hospital than the mainland, although prefectural and local governments are managing this system such that no additional payment is required for patients. Some advanced, non-emergency cases are also require more advanced examination and treatment at the above hospitals, but financial support for such traffic and accommodation is very limited. These limitations may partly contribute to the higher mortality rates in younger and middle-aged populations in Amami. However, along these lines, what remains surprising is the low mortality rate in the older population.

7. Summary

As compared to the Japanese mainland, Amami has a higher proportion of longevity as well as shorter life span in its population, with the former more commonly observed in females, and the latter in males. The SMR in Amami is 1.5 times higher than the national average in middle-aged males, and lower in older females. The relatively fast change in lifestyle may have increased the mortality rate in middle-aged males of Amami. On the other hand, the lifestyles in the older population are relatively preserved by way of appropriate environment and social background. As the lifestyles in this island population differ with respect to socioeconomic status, the prevention of lifestyle-related diseases for younger and middle-aged populations is in need of more attention. This may contribute to maintaining the longevity of Amami's people wherever there exist the necessary potential background factors for longevity.

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