

## Thematic Article

# Okinawa: an exception to the social gradient of life expectancy in Japan

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This paper examines why the social gradient of life expectancy does not apply in Japan when Okinawa is considered. The social gradient thesis links differences in longevity to social rank, with people and populations in higher status hierarchical positions having lower mortality and longer life expectancies than those beneath them in the social scale. Japan has been cited as a major example of this thesis in that Japanese life expectancy improved dramatically as Japan rose to the top echelon of nations in economic rank in the late 20th century. Thus it follows that Japan's most affluent and leading prefectures should be the major catalysts behind the nation's rise in life expectancy as well to the number one position in the world. However, this is not the case as life expectancy in Okinawa, Japan's poorest prefecture, exceeds that of Japan as a whole. We find that the social gradient of life expectancy does not apply at the prefectural level and question its validity for geographical areas. We suggest that healthy lifestyles, especially diet and the social support of family and friends, are more important than sense of hierarchy for longevity in Okinawa.

**Keywords:** life expectancy, lifestyles, Okinawa, social gradient theory.

## Introduction

This paper applies the social gradient theory of life expectancy in Japan, with a special focus on Okinawa as it is Japan's longest lived population. Social gradient theory maintains that the higher an individual's place in a social hierarchy, the longer the person's lifespan. The theory is largely derived from the Marmot *et al.* Whitehall studies in Britain that correlated civil service rank with longevity.<sup>1–3</sup> An intriguing finding of these studies is that the gradient in mortality from high to low across social strata was linked to hierarchy rather than deprivation. Although differences in health between the upper and lower social classes can be explained by wide disparities in diet, material well-being, housing, smoking, leisure-time exercise and other risk behaviors, it is unlikely that these factors account for the difference in mortality between the upper and upper middle classes. Both strata are affluent and well-educated; neither is socially deprived. Yet the upper class has lower mortality than the upper middle class which has lower mortality than the class below it and so on down the social ladder until the bottom of the class structure is reached.

An explanation for this situation has been provided by Evans *et al.* who suggest that the social gradient in health and life expectancy is largely because of stress or the ability to cope with stress.<sup>4</sup> Reviewing studies of social hierarchies among both humans and primates, Evans found that those at the top of a social scale are less affected by stress and have fewer health problems, including much lower rates of coronary heart disease.<sup>5</sup> Greater anxiety, higher-level and more prolonged stress responses, along with poorer overall health and more heart disease were most characteristic of those at the bottom. Other social factors like self-esteem, self-direction

at work, control over the social environment, and sense of social support from family and friends – which decline in strength as one descends the social ladder – were also found to be relevant in buffering and/or coping with stress and its physiological effects on the body.

## The case of Japan

Evans *et al.* cite Japan as an example of the validity of the social gradient in health by noting that as Japan moved upward in the socioeconomic hierarchy of nations in the late 20th century, Japanese life expectancy improved dramatically.<sup>4</sup> Russia, conversely, descended in the same hierarchy and experienced a major decline in life expectancy as well. Japan made the transition from a defeated and occupied nation in 1945 to the very top echelon of the world's economic powers today. At the same time, Japan surpassed the rest of the world in life expectancy, with 1999 figures showing Japanese males living 77.1 years on average and females 84.0 years. This is a vast improvement compared to 1960 when Japanese longevity was well below that of most European countries.<sup>6</sup> According to Evans, Japan has demonstrated that the health status of an entire population can change relatively quickly.<sup>5</sup> He rejects improvements in medical care and home and work environments, along with changes in diet and social structure, as the principal causes of the 30 year

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rise in life expectancy. 'What has changed', states Evans, 'is the hierarchical position of Japanese society as a whole relative to the rest of the world.'<sup>7</sup>

Evans claims that Japan's swift economic growth and success in world trade promoted a strong sense of self-esteem which yielded health benefits.<sup>5</sup> Evans and Stoddard conclude that the 'the consequent rapid growth in prosperity, particularly relative to their leading competitors, has greatly enhanced (already well-developed) national and individual self-esteem which has in turn contributed to a remarkable improvement in health'.<sup>7</sup> The well-documented economic climb and increased longevity would indeed suggest that Japan is a major example of the validity of social gradient theory at the international level. This thesis also has a logical appeal as it links degrees of economic well-being with varying levels of health. Furthermore, a considerable body of scientific research exists in medical sociology correlating health with social class position.<sup>8</sup> This relationship has persisted throughout the 20th century, despite change in the major causes of mortality from acute to chronic diseases and improved access to medical care for the most disadvantaged social classes.

However, while the social gradient perspective has support in research literature when applied to social classes, we contend that its explanatory power weakens significantly when used to account for differences between geographical areas and this is particularly the case for Japan. There are other problems as well, including assertions that the Japanese diet and social structure did not change. The Japanese diet changed perhaps more dramatically than any other nation in the world in the last century. Most importantly, the amount of animal protein in the diet has nearly doubled since the 1960s, while the consumption of animal fat, iron and calcium also increased and eating habits became more westernized.<sup>6,9</sup> Economic prosperity also swelled the ranks of Japan's middle and working classes.<sup>10,11</sup> In fact, Japan experienced more dramatic changes in its class structure in the last two generations than either the USA or the UK. The major change is the huge contraction in the ranks of self-employed farmers and the massive expansion of a new middle and working class associated with the development of modern manufacturing and service sectors.<sup>11</sup> However, the basic problem with the social gradient thesis in relation to Japan is that it does not hold up when patterns of longevity within the country are examined. The theory should predict that Japan's higher status and most affluent prefectures would have the highest life expectancy and therefore serve as the major catalyst for Japan's rise to the number one position in human longevity in the world. However, this is not the case as seen in the example of Okinawa which ranks towards the bottom in the social hierarchy of Japan's 47 prefectures, but first in life expectancy. Consequently, the precise effects of social gradients on life expectancy would appear to be confounded, as it would seem necessary to prove its general validity by showing that social rank affects health in all types of social hierarchies – not just some of them.

#### **Okinawa as an exception to the social gradient thesis**

Okinawa, with a population of 1.34 million people in 2000, is in the southern archipelago of the Ryukyu islands and lies 800 km south of Kyushu – the closest of Japan's four main

islands. Okinawa was a small kingdom of farmers, fishermen and traders in the 14th century with ties to both China and Japan. The language was similar but not identical to Japanese. Feudal warlords from Kyushu conquered Okinawa in 1609 and exercised control over foreign affairs until 1879 when Japan abolished the island's royal government, making it a Japanese prefecture. A poor and economically disadvantaged prefecture, Okinawa paid taxes to the national government in goods rather than money until 1908.<sup>12</sup> Viewing this situation as unacceptable, the Japanese government established schools, improved health care and converted communal landholdings to private property to establish a tax base. The native Okinawan dialect and culture were also suppressed. The Japanese felt a strong sense of superiority toward the Okinawans who were regarded as an 'out-group of second-class, country cousins'.<sup>12</sup> Differences in diet, such as pork (a Chinese influence), speech and dress also set Okinawans apart from other Japanese. Prior to World War II, prejudice and discrimination toward Okinawans was so extreme that Okinawan and Japanese immigrant groups in overseas locales like Hawaii established separate communities and did not intermarry.<sup>13</sup>

Although this prejudice lessened considerably after World War II, Okinawans are still recognized in Japan as members of a minority who are not fully 'Japanese'.<sup>14–16</sup> As Sugimoto, Waswo and Wolferen separately point out, Japan is not as homogeneous or socially egalitarian as it appears on the surface.<sup>16–18</sup> Rather, as Sugimoto explains, it is more diversified, heterogeneous and multicultural than is widely believed.<sup>16</sup> 'The image of multicultural Japan,' states Sugimoto, 'may sit uncomfortably with the relatively homogeneous racial makeup of Japanese society, yet subcultures do proliferate on a number of non-racial dimensions, such as region, gender, age, occupation, education and so forth.'<sup>16</sup> These subcultural entities tend to be rank-ordered with respect to economic privilege, political power and social prestige. Okinawans, Sugimoto notes, rank low in this hierarchy.

As Henshall further explains, people who live in the geographical outer regions of a nation, risk being pushed to the outer regions of its society as well and being treated as marginal persons.<sup>15</sup> Those who live near the capital or other major metropolitan areas tend to rank themselves as at the centre of things and treat their more distant cousins as inferior. Henshall adds that this is indeed the case for Okinawans in Japanese society.<sup>15</sup>

Occupied by the USA between 1945 and 1972 after a devastating World War II campaign, resulting in the death of nearly one-third of its civilian population, Okinawa is now fully integrated into Japan. Tourism to its beaches from the main Japanese islands is the leading source of income, followed by agriculture. As part of one of the richest nations in the world, Okinawa has a relatively high overall standard of living, but it is the poorest of Japan's prefectures and its people have traditionally ranked low in the country's social hierarchy. Okinawa Prefecture also has the highest unemployment in Japan and the lowest per capita income.<sup>9</sup> According to the social gradient thesis, Okinawa should have the worst health and lowest life expectancy in Japan as it ranks at the bottom socioeconomically. Okinawa did have the highest rates of tuberculosis and sexually transmitted diseases in Japan in the 1930s and suffered a devastating epidemic of malaria after World War II. However, once infectious diseases

were under control, life expectancy increased substantially relative to Japan and especially the world.

Table 1 shows the average life expectancy from 1891 to 1999 for Japan and from 1955 to 1995 for Okinawa Prefecture. Table 1 depicts a relatively slow rise in Japanese life expectancy until 1947–55 when longevity surged approximately 13 years for both men and women. Important factors in this increase may have been the addition of greater protein to the Japanese diet and improved health care in both urban and rural areas.<sup>6</sup> Statistics for Okinawa first became available in 1955 under American occupation and are included in the all-Japan figures since 1972, following the islands' return to Japanese administration. As shown in Table 1, both Okinawan males and females have a higher life expectancy than the all-Japan average from 1955 onward. Whereas the longevity of Okinawan males exceeds the all-Japan average by months, females have an approximately three-year advantage.

In comparison to other Japanese prefectures, Okinawa has ranked at the top of life expectancy for women and at or near the top in longevity for men since the mid-1970s. Ranked 47th (out of 47 Prefectures) in per capita income in Japan in 1997 and previous years, Okinawan women were first in life expectancy in 1995 (85.08 years) and males fourth (77.22 years). Japanese life expectancy figures by prefecture for 1975–95 show that Okinawan women have always ranked first in longevity and men were first in the 1980s and very close to it in the early 1990s. Tokyo Prefecture, with the highest per capita income, has traditionally been among the top 20 prefectures in male life expectancy (Tokyo ranked 20th in 1995) and in the top 35 for women (33rd in 1995). Osaka, the second most affluent prefecture, was ranked 46th in 1990 and 45th in 1995 in male life expectancy and 47th and 45th, respectively, for females during the same period. Consequently, per capita incomes for prefectures do not correspond to levels of longevity.

While it might be argued that Okinawa is a special case because of diet and climate, it is important to remember that the social gradient thesis is based on the health advantages and disadvantages associated with a sense of hierarchy. Both the psychological and material advantages of being on top of a social structure are the key to longevity. Okinawa is not only Japan's poorest prefecture, but its inhabitants have been

ranked low historically in Japan's social hierarchy for falling short of being completely Japanese.<sup>14–16</sup> Nevertheless, Okinawans collectively are the longest lived people in the nation with the longest average life expectancy.

### Explanation for the difference

If social gradient theory and its emphasis on the effects of hierarchy on health cannot account for the aberrant case of Okinawa, what has caused this situation? A likely answer is the islands' lifestyle, including diet and the social context within which the lifestyle functions.<sup>19,20</sup> For example, the Tokaido corridor of Honshu delineates a vast megalopolis stretching from Tokyo to Osaka. Here crowded living conditions, stress from overwork, high rates of smoking and heavy alcohol use characterize the lifestyle of many Japanese males, especially the so-called 'salaryman' who dedicates most of his waking hours to his employer.<sup>18</sup> This lifestyle is obviously less healthy than that found in Okinawa where incomes are lower, but so is the cost of living and lifestyles feature a healthy diet and strong kinship networks.

Compared to the traditional Japanese diet, the Okinawan diet has more protein (from boiled pork) and konbu seaweed, while tofu (soybean paste) has less salt content.<sup>21,22</sup> Okinawans consume about 8 g of salt a day compared to 11 g in the Japanese main islands. In fact, research involving Okinawan centenarians show that most never developed a taste for salt, which is partially responsible for their relatively low rates of heart disease and stroke.<sup>20</sup> Also important in the diet are large quantities of fish, soy products, green vegetables containing anti-oxidants, sweet potatoes, watermelon and tomatoes.<sup>20–22</sup> Thus, it appears that diet is an especially healthy component of the Okinawan lifestyle.

Whether there is more physical exercise in Okinawa than elsewhere in Japan, especially during leisure time, which is more beneficial for the cardiovascular system and less stressful than exercise at work, is not known. Nor has it been determined that there is less alcohol and cigarette consumption in Okinawa. However, it is clear that not only is the diet healthier, but also there is less stress in daily living in Okinawa than in the major metropolitan areas of greater Japan.<sup>23</sup> Furthermore, Okinawa shows strong patterns of kinship relations. Especially significant is the emphasis

**Table 1.** Life expectancy in years for Japan and Okinawa Prefecture, 1891–1999

Year	Japan		Okinawa	
	Male	Female	Male	Female
1891–1898	42.80	44.30		
1909–1912	44.25	44.73		
1926–1930	44.82	46.54		
1935–1936	46.92	49.63		
1947	50.06	53.96		
1955	63.60	67.75		
1965	67.74	72.92	68.91	75.64
1975*	71.79	77.01	72.15	78.96
1985	74.95	80.75	76.34	83.70
1990	76.04	82.07	76.67	84.47
1995	76.36	82.84	77.22	85.08
1997	77.19	83.82	N/A	N/A
1999	77.10	83.99	N/A	N/A

Source: Japanese Ministry of Health and Welfare and Okinawa Prefecture Department of Health and Environment.

\*Okinawa included in the national average for Japan beginning in 1975. N/A, not available.

upon ancestor worship, which provides not only a sense of belonging and continuity with the past, but also considerable social support as a family activity. One holiday is *Umachi* (in Okinawan) or *Inaho Matsuri* (in Japanese) which literally means the 'festival when rice sprouts' and consists of family gatherings involving feasting, drinking, and ceremonies honoring ancestors. The most solemn and sacred festival is *Obon* when spirits of the dead return to their ancestral place to dwell 3 days among their kin. It is normal behavior for all living family members to attend these gatherings.

It is also not unusual for Okinawans to trace their ancestors back 400–500 years and claim to know the origin of their family through oral histories and village records. As a result, Okinawans have an especially strong sense of connection to their family, both present and past. While they may have lower social status in Japanese society generally, this is not the case in their own community and they have powerful social support networks. Numerous studies have shown that a strong sense of social support (feelings of being loved, cared for and valued by family and friends) is important in reducing the effects of stress on individuals. There has also been a revival of pride in being Okinawan in recent years, which contains elements of a 'Pacific Islander' identity.<sup>15</sup> Thus, Okinawans do share in some positive components of hierarchy – namely a strong social network of family and friends and increasing ethnic self-esteem. Yet they defy the social gradient proposition that higher rank and status produces greater longevity.

There is a related argument that relative levels of income within a society have more significant effects on mortality than the absolute level of wealth; that is, when it comes to life expectancy and health, the unequal distribution of income within a society is more important than how wealthy a society is overall. Wilkinson suggests, for example, that a relatively level social gradient and egalitarian hierarchy is more important for the health of a population than a steeper hierarchy that promotes health for those at the top significantly more so than those at the bottom.<sup>24</sup> Therefore, hierarchy still matters, but it is the lack of it that is most important. It may be that income inequality is less in Okinawa than elsewhere in Japan. Unfortunately, data on income differences in Okinawa are not available, which prevents us from testing this proposition. However, research on the health effects of relative income inequality is subject to debate. There is evidence that the association between income distribution and variations in health is modest once poverty is excluded and not all studies have found a greater slope in the social gradient when income and mortality differences in a population widen.<sup>25,26</sup>

## Conclusion

The social gradient theory of longevity is either unsuited for explaining mortality in geographical areas or does apply to these entities with Okinawa existing as an anomaly. Data limitations preclude us from fully assessing this issue, but other studies have found areas with relatively low per capita incomes (e.g., Kerala state in India, Costa Rica) have a much higher than expected life expectancy.<sup>27,28</sup> Our findings seriously question the validity of social gradient theory beyond its use as a measure of social class differences in mortality. That is, we suggest that the social gradient thesis

falters when applied to intermediate state units like prefectures, reflecting a diverse array of macrolevel social, cultural and economic variables. Obviously more research is needed. Our results represent an initial effort to provide direction for future research and suggest that the determining factor in the longevity of Okinawans, as compared to mainland Japan, is a difference in lifestyles, with diet and stress-coping mechanisms associated with strong social support of a major importance.

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