Emergence of income inequality and its impact on subjective quality of life in an ethnic minority community in Hainan Island, China

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Abstract To understand the complex process underlying the emergence and growth of inequality in a population and its impact on individuals’ subjective quality of life (QOL), the authors conducted fieldwork in 2001 and 2009 in a rural minority community in Hainan Island, China. The tourism industry, which developed in 2001, provided paid jobs for half of the adult men in 2009. Responses on the abbreviated version of the World Health Organization Quality of Life questionnaire (WHOQOL-BREF) indicated that subjective QOL, socioeconomic status, and dietary quality were significantly higher among the individuals with paid jobs. The present case study suggests that Chinese minority communities that have undergone significant economic growth have experienced the emergence and growth of inequality in job opportunities, which has stratified the subjective QOL, dietary quality, and socioeconomic status within the community. These findings suggest that the stages of ‘health transition’ differed among individuals in the community, and that analysis of inter-individual variation in a community may contribute to a better understanding of health in rural Chinese communities.

Key words: Inequality, Economic reform, Ethnic minority, WHOQOL-BREF, Hainan Island, China

Introduction

Inter-individual and inter-population variations in body size and behavior occur naturally, but income inequality among individuals and populations results from the actions of societal, political, and economic forces. Social epidemiologists stress that income inequality is independently associated with population health indicators, just as mean income is (Wilkinson, 1996; Lynch et al., 2000); thus, an evaluation of income inequality is essential to understanding the health of a population.

Health can be assessed using objective health indicators such as blood pressure and body mass index (BMI) and by subjective health indicators such as subjective quality of life (QOL). Objective health indicators have long been used to evaluate health status in medical studies, whereas the importance of QOL as an indicator of health has only been recognized relatively recently (WHO, 1994). Subjective QOL indicators provide a holistic picture of individual well-being and predict physical illness later in life (Burström et al., 2001).

Despite the importance of describing the process underlying the emergence and growth of population income inequality and its impact on individual subjective QOL, investigations have been limited to the study of nations or regions. For example, in a study of 50 states in the United States, Kennedy et al. (1998) found that the self-rated health score of individuals in the states that had the greatest income inequality was lower than that of individuals in the states that had the smallest income inequality, even after adjusting for income level. To understand the emergence and growth of income inequality and its impact on individual subjective QOL, it is necessary to study a small population and collect in-depth ethnographic information. Thus, the authors conducted fieldwork in a rural minority community in China, a country in which inter-individual and inter-region inequality poses a threat to the health of the people.

The Chinese government initiated the change to a market-oriented economy around 1980. This political change brought economic success to China; the gross domestic product (GDP) increased 20-fold from 460000 Chinese yuan in 1980 to 10 million Chinese yuan in 2000, and the proportion of the population living below the poverty line fell from 53% in 1981 to 8% in 2001 (Ravallion and Chen, 2004). However, this economic boost was accompanied by an increase in income inequality (Chen and Fleisher, 1996), as demonstrated by a rise in the Gini index from 0.28 in 1981 to 0.42 in 2004 (IMF, 2007). Income inequality between urban and rural areas was prevalent (Riskin et al., 2001).

In China, minority populations in marginal regions were isolated from the world market until the 1980s. After the change in government policy, various development projects were initiated in these areas. Although some of the projects succeeded in terms of overall economic development, income inequality at all levels, i.e. individual, household or
regional, became observable. Considering that people in rural China have a strong tendency to compare their socioeconomic status with that of their ‘neighbors’ (Knight et al., 2009), this increasing trend in income inequality may have resulted in a lowering of the subjective QOL in rural China. However, the way in which inequality develops in a rural minority community has not been understood, let alone its health consequences, compared to regional inequality, which has been widely studied.

The present study was conducted in a community of Li ethnic minority in Hainan province, China. Hainan province was designated as a Special Economic Zone (SEZ) in 1988 and received large investments from overseas and from mainland China (Liang et al., 2003). A rich variety of fauna and flora existed in the inland regions inhabited by the Li ethnic minority, and tourism was promoted in the region from the late 1990s. The residents have experienced significant changes in their lives, particularly in contrast to the lack of development prior to 1990.

Fieldwork was conducted by M.U. in 2000–2001 (Umezaki and Jiang, 2009) and by Y.I. in 2009. During his four months of field survey, Y.I. reconstructed the longitudinal process of the emergence and growth of inequality in the village community since 2001. Based on these observations, he constructed a hypothetical model linking inequality and subjective QOL. Quantitative data were then collected to test the hypothesis. The final goal was to clarify the process and health consequences (i.e., lowered subjective QOL) of the emergence and growth of inequality as a case study. Specifically, the authors evaluated the QOL of the participants in 2009 and tried to explain its variation by providing background information of the community obtained through the field surveys.

Methods

Research location

Hainan Island is located south of mainland China (Figure 1) and has an area of 32,200 square kilometers. It has a subtropical climate, with an average temperature of 22–26°C and annual precipitation of 1639 mm (Yan, 2008). The population of the province was 8.2 million in 2004, the majority of them Han (83%), followed by ethnic minorities such as Li (16%) and Miao (0.8%). Beautiful sandy beaches on the southern coast attract tourists from mainland China. Tropical fruit cash crops (e.g., coffee, banana, litchi, and longan) were introduced into the villages at the lower altitudes along the main roads (Jiang et al., 2006).

The Shuiman community, where the research was conducted, is located in the northeast quadrant of Wuzhishan City, the home of people who speak Qi, a dialect of the Li ethnic minority. The community is located on the lower slopes of Mt. Wuzhishan. All of the residents (except one Han woman who married a Li man) were Li. The community consisted of 32 households (defined as those whose members were present in the community during the study period of June–October 2009), and the population was 179 (defined as the number of individuals who were members of the

Figure 1. Map of the area.
A German ethnographer, Hans Stübel, visited the people living near Mt. Wuzhishan in 1931 and 1932 (Stübel, 1937). He described that they heavily depended on slash-and-burn cultivation. Wild animals such as monkeys, birds, and deer were hunted, and wild edible plants were collected. Rice cultivation was conducted but only marginally; there was only one rice crop per year.

The mature forest around Mt. Wuzhishan was designated as a nature reserve in 1986 (Li et al., 2001), and the people in Shuiman were prohibited from engaging in subsistence activities in the reserve. At the same time, hybrid cultivars of rice were introduced, together with fertilizers, pesticides, and irrigation systems. Rice production increased drastically from 1,130 kg/ha in 1952 to 3,000–4,500 kg/ha in 2000–2001 (Li et al., 2003). Surplus rice was the only thing which enabled the people to purchase daily goods. Several companies attempted to promote tourism in Shuiman, but their efforts were not successful until 2000.

When M.U. conducted fieldwork in Shuiman in 2000, he did not observe any obvious evidence of inequality among the households: they were equally impoverished (see Umezaki and Jiang, 2009, for the details of the fieldwork). The community was registered as the target of a ‘poverty reduction program,’ from which the people occasionally received subsidies for their livelihood. Several companies attempted to promote tourism in Shuiman, but their efforts were not successful until 2000.

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Construction of the hypothetical model

Y.I. stayed in the community from June 17 to August 13, 2009. Between June 17 and August 13, the author constructed a hypothetical model that linked an emergence of inequality and subjective QOL, and between September 1 and October 29, he collected quantitative data to test the hypothesis. While conducting fieldwork, the author stayed in the house of a former village leader, where he was treated like a young member of the community.

The authors found the following three points crucial for constructing the hypothetical model: (1) one of the tourism companies was able to attract business in 2001, which created job opportunities in the community; (2) the job status of individuals determined behavioral characteristics such as dietary pattern, time allocation, and possession of consumer durables and valuables, and as a result, influenced subjective QOL; and (3) the proportion of married adult men decreased over time, and single men were not satisfied with their situation.

The hypothetical model constructed by the authors is shown in Figure 2. The authors regarded QOL as a latent variable, which was not measured directly, but was estimated in the model from several measured variables, i.e. the four domain scores in this analysis. The detailed information used to construct this model is provided in the Results section.

Collecting quantitative data

The abbreviated version of the World Health Organization Quality of Life questionnaire (WHOQOL-BREF; WHO, 1998) comprises 26 items, all of which are scored using a five-point Likert scale, with higher scores indicating better quality of life. The first two items evaluate overall QOL (question 1) and general health (question 2), and the remaining 24 items are divided into four domains: physical (seven items), psychological (six items), social relationships (three items), and environment (eight items). Each domain score was calculated by averaging the scores on the items in the domain (WHO, 1998). The authors did not ask the question related to “sex life” (question 21, in the social relationships domain) because discussing one’s sex life might not be acceptable to some people.

Y.I. took a census of the population and included all of the male villagers aged 18–50 years who stayed at least one day in the village during the period between September 30 and October 27 in 2009 as a target of the WHOQOL-BREF questionnaire (n = 47). Of these, the author was unable to interview three individuals who lived primarily outside the village and stayed in the community for only a few days, and...
four people were not willing to participate.

Paid workers were defined as men who had a tourism-related job in the village and those who had migratory work and had returned to the village within one month of the interview. Marital status was defined as ‘currently married’ or ‘currently not married,’ and men who were cohabiting prior to marriage were categorized as ‘currently married.’ Education level was categorized into three groups according to years spent in school: less than 9 years (did not graduate junior high school), 9 years (graduated junior high school), and more than 9 years (obtained further education).

The authors hypothesized that job status determined socioeconomic status; thus, household characteristics were examined by job status. The number of cash crops planted, the number of consumer durables owned, BMI, and dietary patterns were compared by job status. The number of consumer durables (television, video CD player, CD player, stereo, fixed line telephone, mobile telephone, electric fan, electric cooker, motorcycle, bicycle, small tractor, rotary tiller, karaoke set, rice cooker, and rice polisher) was counted in each household. The author also counted the number of cash crops (banana, litchi, longan, guava, coconut, mango, jack fruit, pawpaw, tea, betel nut, pepper, rubber, yizhi [medicinal herb], cassava, maize, ginger, sweet potatoes, and upland rice) planted by each household. Finally, the head of each household was asked to give the size of the household’s rice paddy in Chinese units (mu: 1 mu = 667 m²).

Height was measured using a standard anthropometer (DKSH Switzerland, Ltd., Zurich, Switzerland). Weight was measured using a digital scale (HD-654, Tanita Corp., Tokyo, Japan), and BMI was calculated by dividing weight (kg) by height squared (m²).

Dietary surveys were conducted in 10 households: five households that owned more than the average number of consumer durables and five households that owned fewer than the average number. Of the 40 individuals whose subjective QOL scores were evaluated, 17 lived in one of the 10 households surveyed. The author visited each household at least three times a day (at breakfast, lunch, and dinner) every other day for two weeks. In total, 42 visits were made to each household (3 times/day × 7 days × 2 sets of visits). At each visit, side dishes were first identified, and then the food used in each side dish was recorded. The food items were categorized according to whether they were hunted, gathered, harvested in the village, or purchased, and whether they were meat. The total number of food items recorded in each household, the frequency of meat (defined here as the percentage of meat in the total number of food items), and frequency of purchased foods (defined here as the percentage of purchased food in total number of food items) were compared according to the participants’ job status.

Statistical analysis

First, a structural equation model was used to test the relationships among variables in the model (i.e. QOL, education, marital status, job status, and age). The model was evaluated using the ‘sem’ package in the R statistical software package (Fox, 2006). Second, to further understand which aspects of life were different by job status, the number of cash crops planted, the number of consumer durables, BMI, and dietary patterns were compared by job status using an analysis of variance (ANOVA) after adjusting for age. All statistical analyses were carried out using R version 2.10.1 (CRAN, 2009).

Results and Discussion

Reconstruction of the emergence and growth of inequality

During the period of the people’s commune from the late 1950s to the early 1980s, subsistence activities (e.g. rice cultivation in paddy field, slash-and-burn cultivation, and cattle rearing) were collectively managed by the commune and the product was equally shared among the members. This situation more or less continued even after the transformation of the economic system to a market economy and the introduction of the Household Production Responsibility System in the early 1980s. Since paddy area was allocated to each household according to the number of household members, it did not differentiate living standards of the households; there were few variations in other subsistence crops among the households. The cold climate is not suitable for growing cash crops. A nature protection policy prohibited people from hunting and gathering and from slash-and-burn cultivation in the mountains behind the village. Their exclusive subsistence was rice cultivation in paddy fields and growing vegetables in marginal fields.

In 2000, when M.U. conducted his fieldwork, the people were not really interested in purchasing consumer durables such as telephones, tractors, electric cookers, or television sets. Those durables were sold in the towns, but people did not think about purchasing them because the village had no electricity until the late 1990s. Rather, the villagers seemed satisfied with the improvement in rice production that enabled them to purchase meat and fish and to brew as much alcohol (bian) as they liked, as demonstrated by the following quotation: “In the early 1980s, we sometimes lacked daily food because rice production was low. Now we can produce far more rice than before, and our workloads are dramatically reduced because efficient pesticides, herbicides, and fertilizer were introduced. We are satisfied with our lives.”

In contrast, in 2009, the people wanted to purchase consumer durables; most households owned a television and tractor, and some owned a mobile telephone, video CD player, CD player, electric cooker, and a motorbike. The karaoke bar, where the people sang songs and drank beer together, became a popular leisure spot. The people clearly had more opportunities for spending money (e.g. purchasing consumer
Job opportunities provided by tourism also played a role in villagers’ lives. The number of villagers who worked for the tourism company increased from six in 2001 to 21 in 2009. The average monthly wage of these 21 people was 780 yuan. The villagers who did not have access to such opportunities sought them outside the village, e.g. as migratory workers.

A remarkable widening of the gap between what the villagers desired and what they could afford was observed between 2001 and 2009. In 2001, the villagers did essentially everything they desired, such as eat meat or fish every day and produce a sufficient amount of rice. However, in 2009, people who did not have a paid job were not able to do the things they desired to do, such as spending money on karaoke and purchasing consumer durables. The discrepancy was not so remarkable among the men who had a paid job.

The two ways to narrow the discrepancy between the desire for and obtaining goods were cash cropping and finding a paid job. Cash cropping provided limited income to the people in Shuiman because the cool environment where they lived was not botanically suitable for the cultivation of the cash crops, which tended to be cultivated in lower-altitude areas. Thus, finding a job appeared to be the only realistic and acceptable way for the men to narrow the gap between wanting and obtaining desirable items.

The frustration felt by the men without paid jobs could be observed when they were drinking at the karaoke bar and when they were talking about mobile telephones, both of which had been introduced in the last 10 years and were very desirable. In 2001, the people often drank homemade alcohol in the village. M.U. estimated, on the basis of his direct observations, that one household made 10 liters of distilled liquor (25% alcohol) every week on average (Umezaki, 2004). The drinks were consumed daily, and the people seemed to enjoy drinking together. However, in 2009, only the older people in the village preferred to drink homemade alcohol, whereas the younger generation preferred to drink beer at the karaoke bar in town. The people who had paid jobs were able to own mobile telephones, arrange to meet friends in the neighboring villages, and pay for beer (3–5 yuan per bottle) and karaoke (1 yuan per song). The people who did not have paid jobs also owned mobile telephones, but these telephones did not have credit. The men who did not have paid jobs were occasionally invited to the karaoke bar, but because the indigenous custom is that everyone pays an equal share of the food and drink consumed, the men were frustrated because they could not control the amount consumed and could not afford it.

The authors observed that marital status could be a potential determinant of subjective QOL in the community. The proportion of married men 20–49 years of age dropped from 80% in the early 1980s to 50% in 2009; several of the unmarried men were more than 30 years old. They claimed that most of the women had left the village for larger cities and migratory work. In fact, only one unmarried adult woman was living in the village during the survey in 2009. The unmarried men frequently complained about their situation and found it difficult to think of their future in a positive way. This point will be discussed later again.

The authors did not investigate the association between the level of education and subjective QOL. The people in this community appeared to evaluate others in terms of masculinity, housebuilding skills, or knowledge about utilizing resources in the bush rather than by educational attainment. However, level of education was included in the hypothetical model because the association between subjective QOL and education level has been frequently reported in previous studies (e.g. Chou et al., 2007; Zhang et al., 2009).

### General characteristics and QOL scores

The general characteristics of the men who responded to the QOL questionnaire are shown in Table 1. The mean age of the participants was 33.1 years. Of the 21 men who had paid jobs, 17 were employed by the tourism company, and four were migrant workers who had returned to the village one month prior to the interview. Sixty-five percent of the participants had had 9 years of schooling and had graduated from junior high school.

Table 2 summarizes the subjective QOL by domain. On average, the participants scored 2.7 and 3.4 on overall QOL and general health, respectively. The scores for the physical, psychological, social relationships, and environment domains were 13.7, 12.6, 13.3, and 11.1, respectively. The men with paid jobs scored higher in all categories than did those without paid jobs. A WHO validation study of the WHOQOL-BREF questionnaire that focused on the general Chinese population reported average domain scores as follows: physical,15.8; psychological, 14.3; social relationships, 13.7; and environment, 13.2 (Skevington and Lotfi, 2004). Although people with paid jobs scored higher for the social relationships domain, the other scores in the present study were lower than those reported in the WHO study, irrespective of job status.

The authors compared the QOL scores observed in the present study with those reported in previous studies using the WHOQOL-BREF questionnaire. Studies that targeted individuals in clinical settings (e.g. HIV-positive patients or...
individuals diagnosed with mental health disorders) and those composed exclusively of female or elderly participants were excluded. The previous study populations were categorized into two groups: general populations (i.e., populations who represented countries or regions; \( n = 37 \)) and vulnerable populations as defined by the WHO (minorities, indigenous people, migrants, and people affected by conflicts and disasters; \( n = 13 \)). Figure 3 shows the distribution of the four domain scores observed in previous studies among the two populations \( (n = 50) \). Two horizontal lines indicate the QOL scores in the present study; the higher line represents the scores of men with paid jobs, and the lower line represents those without paid jobs.

Generally, the QOL scores in the present study were lower than those reported for general populations, but were comparable to those found in vulnerable populations. Specifically, the mean domain scores for the participants with paid jobs were lower than the 25th percentile scores in the physical, psychological, and environmental domains for general populations, but were equivalent to the mean scores of vulnerable populations. The social relationships domain scores for the participants with paid jobs were equivalent to the mean score for general populations, but were lower than those reported for vulnerable populations. The WHO stated that ethnic minorities are one of the vulnerable groups to which their mental health interventions should be targeted (WHO homepage, 2007). The findings of the present study support the WHO position.

There are several interpretations of the fact that the participants as a whole scored low in QOL terms. First, this really reflected their severe living conditions. Second, this resulted from the social comparisons with people outside of the village. Villagers who regularly have a chance to go to Wuzhishan City might take people living in the city as their reference group. According to social comparison theory (Li and Zhu, 2006), an undesirable difference between a person and his/her ‘reference group’ lowers that person’s subjective QOL. The differences in living standard from theirs might have affected their perceived QOL. Looking at better lifestyles or knowing of new goods and services does not make them feel motivated (known as the demonstration effects) but rather makes them feel devastated.

**Test of the hypothetical model**

Figure 4 shows the results of the structural equation model analyses. Job status was positively correlated with subjective QOL \(( P < 0.01 \)) of the four domains formulated in the model, the psychological domain was the strongest explanatory factor of QOL \(( P < 0.001 \)) followed by the physical domain \(( P < 0.001 \)) and the environmental domain \(( P < 0.001 \)). Marital status and education level were not correlated with QOL, and no significant correlation was found between job status and marital status. Age was negatively correlated with the QOL scores and marital status. In summary, job status was a significant predictor for the QOL. The goodness-of-fit index and the RMSEA index of the model were 0.91 and 0.02, respectively (Kline, 2010).

**Comparison of individual characteristics by job status**

Table 3 shows the results of the age-adjusted analysis of variance performed to examine socioeconomic variables and dietary patterns by job status. Individuals with paid jobs had a greater number of cash crops than did those without paid jobs, whereas the number of consumer durables and rice paddy area were not significantly correlated with job status. The frequency of meat consumption, but not of purchased food consumption, was significantly correlated with job status. Job status had no effect on BMI (data not shown).

**Association of job status and subjective QOL: plausible theoretical scenarios**

Zhu and Luo (2010) observed that the rise in rural inequality since the beginning of the economic reforms in China was largely the result of an increase in nonfarm income. Their reasoning was twofold: the distribution of nonfarm income is not as equal to that of farm income, and members of wealthier households have more opportunities to find local or urban nonfarm income. Thus, households that start out with a relatively higher income are better placed to gain nonfarm income and, as a result, further increase their wealth. Economic reform has widened the income inequality gap by setting this feed-forward process in motion.

In 2000, the per capita income from farming activities was generally equal among all of the households in Shuiman. The people were unaware of and had little opportunity to
find nonfarm work; thus, household income was quite homogeneous. In 2009, in contrast, many villagers were able to gain nonfarm income provided by the tourism company. Social comparison theory (Li and Zhu, 2006) is also useful for examining the association between subjective QOL and job status in the Shuiman community. On average, socioeconomic status improved in nearly all Shuiman households after the tourism company started operating. However, individuals without paid jobs did not increase their income as much as those with paid jobs did. As stated above, an undesirable difference between a person and his/her ‘reference group’ lowers that person’s subjective QOL. The reference group for the individuals without paid jobs was likely to be men in their own community who had paid jobs and could enjoy both the new consumer goods and leisure activities such as karaoke.

This interpretation agrees with observations made by Knight et al. (2009), who investigated the determinants of subjective QOL among households in rural China. They showed that the reported level of subjective well-being was highly sensitive to the respondents’ perception of their household position in the village income distribution and concluded that people in rural China have a strong tendency toward social comparison. Generally speaking, an increase in income inequality has had a negative impact on various aspects of society, such as frequent social conflicts, higher levels of violent crime, and the slowing of economic growth in China (Li and Zhu, 2006).

Figure 3. Comparison of QOL domain scores with those reported in previous studies. (a) Physical domain; (b) psychological domain; (c) social relationships domain; (d) environmental domain. The horizontal lines indicate the QOL scores observed in the present study: (+) QOL scores of participants with paid jobs; (−) scores of participants without paid jobs. Data for the ‘general population’ category were taken from Baumann et al. (2010), Ceyhan and Ceyhan (2007), Chou et al. (2007), Leung et al. (2005), Li et al. (2009), Nasermoaddeli et al. (2003), Nedjat et al. (2008), Ohaeri et al. (2009), Skevington and Lottfi (2004), Stengler-Wenzke et al. (2006), Tokuda et al. (2008), Usefy et al. (2010), Wang et al. (2000), and Wu and Yao (2007). Data for the ‘vulnerable population’ category were taken from Ceyhan and Ceyhan (2007), Edimansyah et al. (2007), Eljedi et al. (2006), Mataria et al. (2009), Wang et al. (2000), Yu et al. (2008), and Zhang et al. (2009). The QOL scores were converted into 4–20 scales for comparisons across the studies. QOL scores for males were used where possible.
The authors' hypothesis that marital status was associated with the subjective QOL score was not supported by the quantitative analysis. It is possible that the sample size was not sufficient to detect this association, or it may be that married men have had an additional economic burden from their children’s education, and this cancelled the positive effect of marriage on subjective QOL. Further investigations are needed to clarify this point.

In summary, the present study described the emergence and growth of income inequality in one minority community in Hainan province in China. The community has experienced the development of tourism since 2001, which had provided job opportunities to half of the adult men by 2009. A questionnaire survey indicated that subjective QOL was higher among the individuals who had paid jobs than among those without paid jobs after adjusting for the confounding effects of age, marital status, and education. Furthermore, socioeconomic status (number of cash crops) and dietary quality (frequency of meat consumption) were better among the individuals with paid jobs compared with those without, whereas BMI did not differ between the two groups. The present case study suggests that Chinese minority communities that have undergone significant economic growth have experienced the emergence and growth of income inequality for the last decade and are likely to be stratified in terms of subjective QOL and dietary quality or socioeconomic status.

The authors speculate that a once-homogeneous rural Chinese community has been divided into two or more subpopulations with differing health attributes. This model may reveal an important aspect of ‘health transition’ in China (Popkin, 2002; Popkin and Gordon-Larsen, 2004). Health transition consists of changes in the determinants of health and their subsequent health consequences, and has been experienced by many populations after the modernization of their lifestyle. For instance, diet changes from food rich in carbohydrate and fiber to food heavy in added sugar, saturated fat, and sodium. Physical activity level decreases as jobs become more sedentary. As a result of these changes, people tend to have chronic diseases.

The findings indicate that the stages of health transition differed among individuals in the community; job status was one of the factors that defined the stage of transition of each individual. Additional studies of inter-individual variation in a community may further elucidate the process of health transition in rural Chinese communities.

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