

# Health-Related Quality of Life and Recognition of Desertification Among Inhabitants of the Loess Plateau Region of China: Findings for City and Village Communities

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## Abstract

This article elucidates the health-related quality of life (HRQOL) the recognition of desertification among people living in the semi-arid Loess Plateau of China. HRQOL was assessed with a three-dimensional survey of general health perception, vitality, and general mental health based on a 36-item short-form health survey (SF-36). Scores for general health perception were approximately the same in the city and the village communities. Vitality and mental health scores were significantly lower for women in the village communities than for other groups. In the village communities, HRQOL was significantly and positively correlated with income. The inhabitants of the village communities were more satisfied with their life situation than those in the city, in spite of the economic gap between them. Levels of recognition of desertification were lower in the village communities than in the city.

## Introduction

In arid, semi-arid, and dry sub-humid areas, desertification and drought already present a serious threat to the well-being and health of the local populations. Desertification and drought influence malnutrition and famine, dehydration diseases, other infectious diseases, respiratory diseases, and burning injuries (United Nations Convention to Combat Desertification, n.d.). Studies in Saudi Arabia and the city of Lanzhou in China have shown the serious harm that inhalable particulates can cause to human health (Huang, Wang,

& Wang, 2001; Li, Zen, Shao, & Shi, 2002; Nouh, 1989). In the semi-arid Loess Plateau of China, desertification presents a serious threat. Anti-desertification policies, such as the "Grain for Green" project, have been implemented by the government. Desertification also has a bearing on quality of life. The level of recognition of desertification varies among the inhabitants living there. Currently, very few studies have examined this issue (Mu, Kurozawa, Wang, & Kotani, 2006). Our study targeted the health-related quality of life (HRQOL) and recognition of

desertification among people living in city and village communities of the semi-arid Loess Plateau of China.

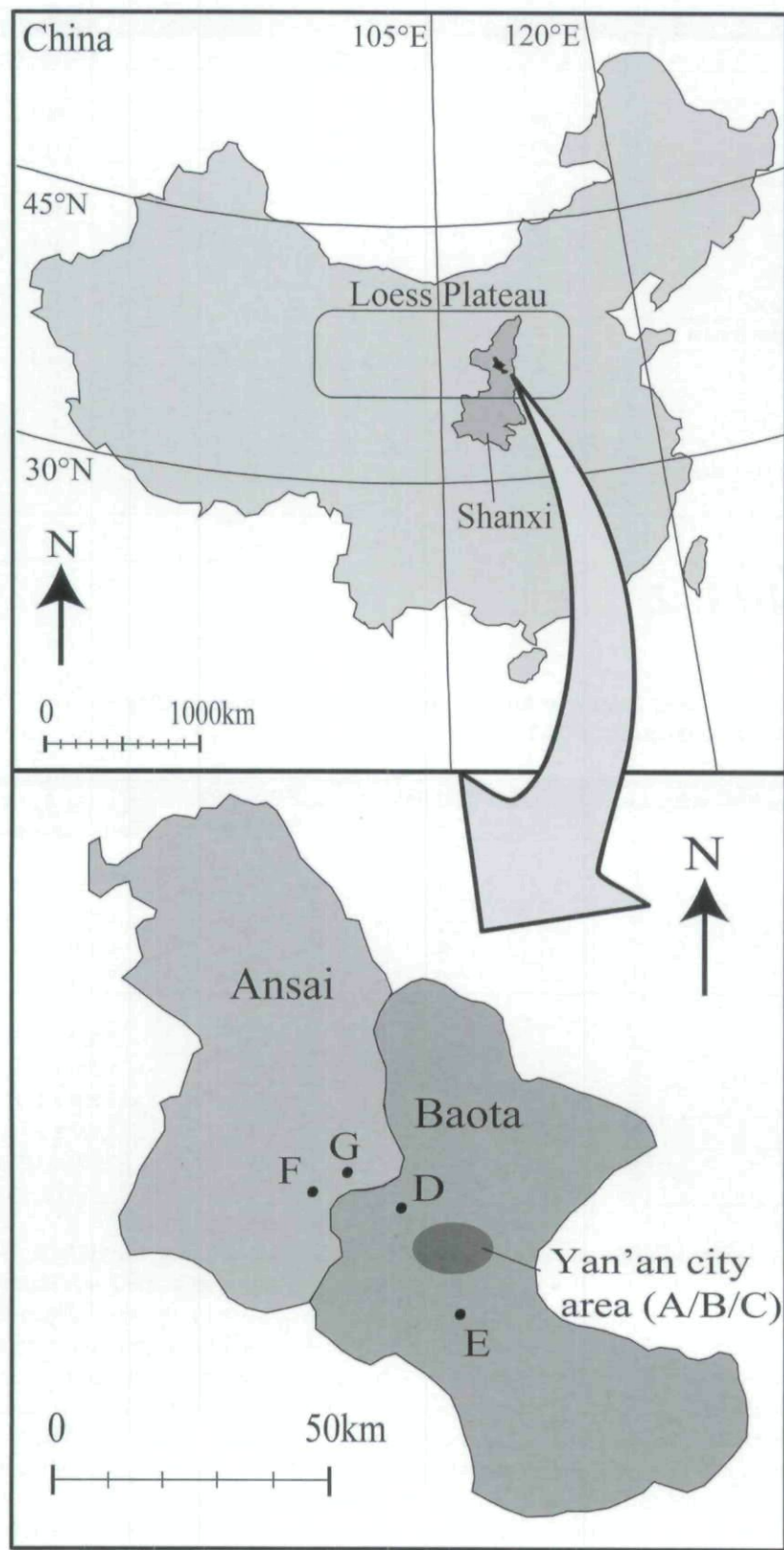
## Methods

In Yan'an City, Shanxi Province, we selected A, B, and C as three city communities in the city area and D, E, F, and G as four suburban farm village communities in Baota District and Ansai County belonging to Yan'an City (Figure 1). These villages are typical from socioeconomic and agricultural-system viewpoints. A survey of HRQOL, recognition of desertification, and economic status was carried out by questionnaire during August and September 2005. The participants were the heads of households or their deputies (if the heads of households could not reply) in the selected communities. In the city communities, the staff distributed self-administered questionnaires to the participants and collected them later. In the village communities, trained staffs interviewed the participants in accordance with the questionnaire because of some difficulties participants had in understanding the questionnaire exactly.

HRQOL was assessed on the basis of a 36-item short-form health survey. The original questionnaire included eight dimensions: bodily pain, general health perception,

# FIGURE 1

Map of the Study Area



A, B, and C indicate three city communities; and D, E, F, and G indicate four suburban farm village communities.

general mental health, physical functioning, social functioning, role-emotional, role-physical, and vitality (Ware, Snow, Kosinski, & Gandek, 1993). Only the three dimensions—general health perception (GH), vitality (VT), and general mental health (MH)—were investigated so that the questionnaire could be kept simple. The scoring of each dimension was performed according to the scoring protocol (Fukuhara & Suzukamo, 2004). Responses for all items were coded by category, numeric scores of the items belonging to the same dimension were added up, and the raw score of the dimension was calculated. For each dimension, the raw scores were converted into numerical scores ranging from 0 to 100. The higher the scores were, the better the outcomes.

The questions related to life satisfaction were worded as follows: "Are you satisfied with your 1) income, 2) housing conditions, 3) groceries for meals, 4) fuels for cooking and heating, and 5) human relationships with friends and neighbors?" The response options were "definitely yes," "mostly yes," "don't know," "mostly not," and "definitely not." They were scored on a scale from 5 (definitely yes) to 1 (definitely no). The total scores for life satisfaction, therefore, ranged from 25 to 5. The question about recognition of desertification was worded as follows: "Do you consider the problem of Chinese desertification to be serious?" The response choices were "not serious," "not so serious," and "serious or very serious."

In addition, for each household taking part in the questionnaire, information on the total household income in 2004 was requested. The annual income per person was calculated as the total household income divided by the number of family members.

The groups were compared by analysis of variance. A Chi-square test was used to assess differences between proportions. Partial correlation coefficients were used for the estimation of correlations, and the test of significant difference depended on an analysis of variance. A  $p$ -value of  $<.05$  was accepted as statistically significant.

## Results

Table 1 gives the characteristics of the study populations. There were a total of 195 responses from participants in the city communities and 248 responses from participants in the village communities. A total of 443 participants were interviewed, with response rates estimated to be 86 percent and 100 percent in

the city and village communities, respectively. Two-thirds of the participants were men. The mean ages of the city and village community groups were 44.8 and 44.2 years, respectively. In addition, educational achievement differed significantly between the two groups.

Table 2 gives the average annual income per person for the seven communities. The average annual incomes of the city communities (A, B, C) ranged from 6,336 to 8,649 Chinese yuans (CNY) (1 CNY = \$0.124), while those of the village communities (D, E, F, G) ranged from 1,720 to 3,907 CNY. Thus, the average annual incomes of the city communities were three times those of the village communities.

Table 3 gives the HRQOL results, including general health perception, vitality, mental health, life satisfaction, and recognition of desertification, by gender and age, for the city and village communities. The scores for general health perception were approximately the same in the city and village communities, with the scores tending to decrease with age. The scores for vitality were significantly lower in the village communities than in the city communities. Vitality and mental health scores were significantly lower among the women in the village communities than in the other groups. The scores for life satisfaction were significantly higher in the village communities than in the city communities. The percentage of people in the village communities who answered "serious or very serious" to the question about the problem of Chinese desertification was significantly lower than in the city communities.

Table 4 gives the correlations of HRQOL, life satisfaction, and recognition of desertification with the characteristics of the study subjects. The scores for general health perception, vitality, and general mental health were significantly correlated with income in the village communities. In the city communities, only the vitality scores were correlated with income. Figure 2 shows the relationship between the average HRQOL scores (GH, VT, MH) and the average annual income per person in the seven communities. The average score for HRQOL was correlated with average annual income in the village communities.

## Discussion

A large number of methods for evaluating health-related quality of life have been developed during the past three decades. The 36-item short-form health survey question-

### TABLE 1

#### Characteristics of Study Population

Characteristic	City		Village	
	<i>n</i>	Percentage	<i>n</i>	Percentage
<b>Gender</b>				
Male	126	64.6	164	66.1
Female	69	35.4	84	33.9
<b>Age (years)</b>				
20-39	84	43.5	89	36.0
40-59	75	38.9	133	53.8
60-80	34	17.6	25	10.1
Mean ± SD	44.76 ± 13.81		44.15 ± 11.71	
<b>Education (years)</b>				
0-8	48	24.9	243	97.9
9+	145	75.1	5	2.1
Mean ± SD	4.81 ± 1.57		1.92 ± 0.92	

SD = standard deviation.

### TABLE 2

#### Population and Average Annual Income per Person in City and Village Groups, 2004

Location	Group	Population		Income (CNY) (Mean ± SD)
		<i>n</i>	Percentage	
<b>City</b>				
	A	50	11.3	7,210 ± 3,161
	B	97	21.9	8,649 ± 3,796
	C	48	10.8	6,336 ± 5,034
	Total	195	44.0	7,735 ± 4,088
<b>Village</b>				
	D	59	13.3	3,092 ± 2,266
	E	59	13.3	1,720 ± 1,180
	F	65	14.7	2,256 ± 1,386
	G	65	14.7	3,907 ± 2,119
	Total	248	56.0	2,760 ± 1,973

naire was designed for use in clinical practice and research, health policy evaluation, and general population surveys (Ware et al., 1993). Furthermore, the 36-item short-form health survey is one of the most frequently used generic measurements of HRQOL (Ohsawa, Ishiba, Oshida, Yamanouchi, & Sato, 2003), and it has been widely used for medical research and health evaluation in China (Liu et al., 2001; Liu, Guo, Au, & Sun, 2006; Shu et al., 2004; Zhang, He, et al., 2001). Generally speaking, the reliability and validity of the questionnaire have been found to be

acceptable. In our study, the HRQOL of the inhabitants of the semi-arid Loess Plateau of China was assessed with a three-dimensional survey of general health perception, vitality, and general mental health. General health perception was approximately the same in the city and village communities. Vitality and mental health scores were significantly lower for women in the village communities than for other groups. The vitality score assesses energy and fatigue. A low score for vitality means that a person feels tired and worn out all the time. The mental health score assesses

**TABLE 3****Health-Related Quality-of-Life Scores by Gender and Age Group in City and Village Communities**

Parameter	Age Group	City		Village		p-Value <sup>a</sup>
		Men	Women	Men	Women	
General health perception (mean ± SD, possible score = 0–100)	20–39	64.02 ± 18.49	60.15 ± 16.87	64.88 ± 15.82	60.30 ± 16.12	.373
	40–59	59.27 ± 17.19	53.13 ± 16.19	57.73 ± 16.71	53.31 ± 14.21	
	60–80	46.00 ± 17.58	48.43 ± 25.12	48.53 ± 18.73	33.67 ± 16.69	
	Total	58.87 ± 18.85	56.23 ± 17.86	58.76 ± 17.30	55.24 ± 6.59	
Vitality (mean ± SD, possible score = 0–100)	20–39	65.76 ± 12.62	61.13 ± 12.67	59.38 ± 15.95	58.59 ± 12.55	<.001
	40–59	60.90 ± 15.06	62.50 ± 14.16	59.47 ± 11.09	51.56 ± 13.80	
	60–80	60.23 ± 11.50	57.14 ± 19.24	57.89 ± 13.15	44.79 ± 17.42	
	Total	62.82 ± 13.59	61.21 ± 13.89	59.26 ± 12.87	54.44 ± 13.93	
Mental health (mean ± SD, possible score = 0–100)	20–39	64.13 ± 12.84	63.59 ± 12.59	60.42 ± 14.69	58.25 ± 0.41	.002
	40–59	58.62 ± 13.94	64.38 ± 13.05	59.42 ± 10.62	53.75 ± 10.91	
	60–80	57.95 ± 17.23	61.43 ± 16.26	60.26 ± 10.47	53.33 ± 9.83	
	Total	60.82 ± 14.35	63.65 ± 12.99	59.81 ± 11.89	55.90 ± 10.65	
Life satisfaction (mean ± SD, possible score = 5–25)	20–39	14.42 ± 3.68	13.30 ± 4.86	15.58 ± 3.51	15.93 ± 3.41	<.001
	40–59	14.13 ± 4.95	15.83 ± 3.85	16.89 ± 2.31	14.86 ± 2.84	
	60–80	15.18 ± 3.85	16.00 ± 3.61	16.74 ± 2.77	15.00 ± 3.69	
	Total	14.45 ± 4.22	14.55 ± 4.51	16.48 ± 2.81	15.34 ± 3.21	
Recognition of desertification (%)	20–39	67.3	74.2	43.5	37.5	<.001
	40–59	68.2	95.8	55.2	38.9	
	60–80	81.8	71.4	36.8	16.7	
	Total	70.4	82.3	49.7	36.6	

<sup>a</sup>Tests of significant difference were performed for men and women in the city and village communities.

**TABLE 4****Correlations of Health-Related Quality of Life with the Characteristics of the Study Participants**

Parameter	Correlation for City Participants				Correlation for Village Participants			
	Gender	Age	Education	Income	Gender	Age	Education	Income
General health perception	-0.159*	-0.216**	0.180*	-0.083	-0.130*	-0.313†	0.005	0.140*
Vitality	-0.078	-0.169*	0.009	0.258**	-0.113	-0.049	0.108	0.168**
Mental health	0.063	-0.183*	-0.096	0.116	-0.110	-0.022	0.067	0.161*
Life satisfaction	0.035	0.114	-0.031	0.196*	-0.137*	0.077	-0.063	0.201**
Recognition of desertification	0.123	0.149	0.166*	0.044	-0.079	0.040	0.074	0.076

\*  $p \leq .05$ .

\*\*  $p \leq .01$ .

†  $p \leq .001$ .

psychological distress and well-being. A low score for mental health means that a person feels nervous and depressed all the time. Xu and co-authors and Mo speculate that the low scores may be related to the social status of women in the village communities (Mo, 2005; Xu et al., 2005). Wang and Yang have concluded that the social status of women and their position in the family are lower because of the lower educational level in the

village communities (Wang & Yang, 2005).

In this study, HRQOL in the village communities was found to be significantly correlated with economic income. Studies of HRQOL were performed in Sichuan province (Li, Liu, Li, & Ren, 2001) and Baotou city (Zhang, Lu, et al., 2001). They reported that the key steps in promoting HRQOL include the improvement of people's income (Li et al.; Zhang, Lu, et al.). We suggest that

the increase in income as a consequence of anti-desertification policies and other socioeconomic factors has improved the HRQOL levels of inhabitants in the village communities of the semi-arid Loess Plateau of China.

The inhabitants of the village communities were more satisfied with their life situation than those of the city, in spite of the economic gap between them. Thus, life satisfaction was not determined by income. Chen has reported

that, although elderly urban people have a higher standard of living than their rural counterparts, they do not feel better than the latter group (Chen, 2003). This finding relates to differences in educational level and life expectancy (Meng & Xiang, 1996).

On the other hand, levels of understanding of desertification were lower in the village communities than in the city communities. There are a great many differences between city and village people with respect to their perceptions of the importance of environmental protection. Education on environmental protection and health (e.g., the harm of air pollution from a sandstorm to human health) usually is carried out in the city. In addition, because education levels are higher in the cities than in the village communities, people in the cities more easily understand the knowledge and behaviors required for environmental protection. For this reason, people living in city communities are ahead of those in village communities in their appreciation of environmental protection issues (Cui & Gao, 1999). We think that a lack of education among people in the village communities cannot be ignored, and that environmental education may be needed in order to improve levels of understanding in the village communities.

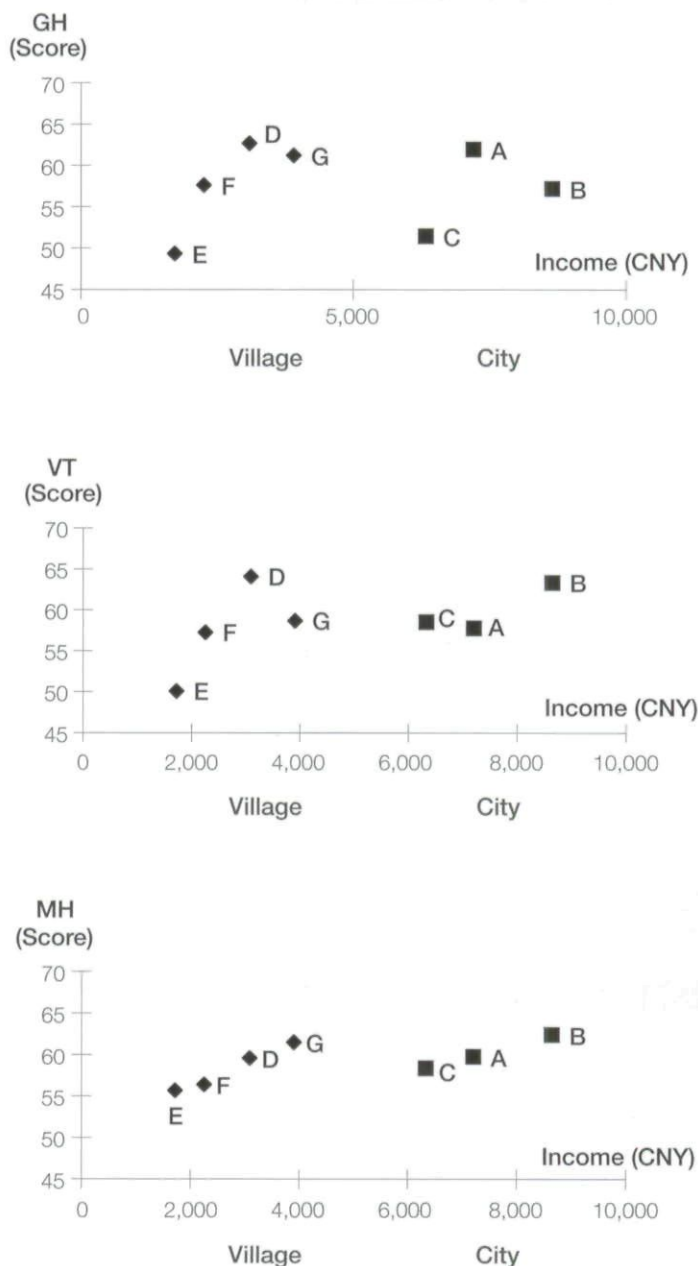
The study reported here had some limitations: Data were collected in personal interviews in the villages, while a questionnaire was used in the cities. This methodological difference may have introduced a bias into the results. Also, the study was limited to participants and communities in the Yan'an regions. It is therefore difficult to extrapolate the findings of the study to the general population of the semi-arid Loess Plateau of China. Further studies in other regions of the Loess Plateau of China are needed.

## Conclusions

We investigated HRQOL and recognition of desertification among people in the semi-arid Loess Plateau of China. HRQOL was assessed with a three-dimensional survey of general health perception, vitality, and general mental health based on a 36-item short-form health survey (SF-36). The HRQOL was significantly lower for women in the village communities than for other groups. In the village communities, HRQOL was significantly correlated to economic income. Levels of recognition of desertification were lower in the village communities than in the city. These results suggest that it is necessary to increase incomes and improve the social status of women in

## FIGURE 2

**Relationship Between Average HRQOL Scores (GH, VT, MH) and Average Annual Income per Person for Seven Communities**



GH = general health perception; VT = vitality; MH = general mental health. A, B, and C indicate three city communities; D, E, F, and G indicate four village communities.

order to promote HRQOL in inhabitants of the Loess Plateau region. 🐾

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