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# Health Anxiety and Related Factors Among the Rural Population: A Cross-Sectional Study in China

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## Abstract

This study investigated the prevalence and correlates of health anxiety among rural populations in China, due to the unique socio-economic challenges in these areas, such as limited healthcare access. A sample of rural residents (N=909) was analyzed to identify key predictors of health anxiety, such as age, education level, living type, anxiety sensitivity, and perceived information overload. Results indicated that older individuals and those with lower educational levels exhibited significantly higher levels of health anxiety. Furthermore, living alone was associated with increased health anxiety, while anxiety sensitivity and perceived information overload were found to exacerbate anxiety levels. These findings highlight the critical need for tailored interventions aimed at mitigating health anxiety in rural areas, thereby contributing to improved mental health outcomes and overall well-being.

## Keywords

health anxiety; rural population; related factor; perceived information overload

## Introduction

Anxiety represents a multifaceted adaptive psychological response, serving to focus attention and stimulate necessary actions in response to perceived threats (Fu, 2018). When an individual's excessive attention to the body manifests as severe neurotic anxiety, it will evolve into health anxiety (Marcus et al., 2008). People have a certain level of concern about their health, but this sometimes turns into a constant, excessive fear of serious illness (Al-Amad and Hussein, 2021). Health anxiety manifests as excessive attention to specific bodily symptoms or excessive worry about the possibility of suffering from a severe disease (Bajcar and Babiak, 2019). When health anxiety levels are excessive, health anxiety can become a problem (Lee et al., 2015a). People with health anxiety often have misconceptions about their feelings or symptoms and worry about their current and future physical condition, even in the absence of physiological or pathological symptoms (Abramowitz et al., 2007b). The effects of mild health anxiety are minor and not socially detrimental, but severe health anxiety may affect the patient's normal life (Ferguson, 2009). Individuals with severe health anxiety may suffer a diminished quality of life, and their continuous medical treatment behavior will also increase the burden on the medical system (Lee et al., 2015b).

Health anxiety is caused by a variety of complex factors, including cognitive beliefs (Rachor and

Penney, 2020), living habits (Coulthard et al., 2021), and information behavior (Dattilo et al., 2021). For example, immunocompromised people and those with chronic diseases are prone to fear and anxiety during infectious disease epidemics such as COVID-19 (Carmassi et al., 2022). Low self-esteem (Bajcar and Babiak, 2019), anxiety temperament (Oniszczenko, 2021), and fear of self-infection (Yalcin et al., 2022) are important predictors of health anxiety. Based on the health belief model, cognitive load theory, and protection motivation theory, Laato & al (2020) verified that perceived trust in online information, perceived susceptibility, and perceived severity led to health anxiety.

Numerous studies have demonstrated a link between socioeconomic status and health. In general, rural populations experience poorer health and higher morbidity and mortality rates compared to urban populations (Mackenbach, 2019). Rural residents also face higher rates of disease and greater health burdens (Moreno-Peral et al., 2014). Some studies have found that socially deprived individuals exhibit increased health anxiety (Huang and Shi, 2016; Creed and Barsky, 2004). Previous studies have found that health anxiety is more prevalent and severe in rural areas compared to urban areas (Wang and Pan, 2021). However, existing research has yet to thoroughly explore the causes of health anxiety in rural populations.

This study focuses on health anxiety within a Chinese rural population, a demographic that has been historically underrepresented in health research. Rural areas in China encompass various settings such as villages, small towns, and agricultural regions, each with its own socio-economic dynamics. This definition highlights that rurality is not merely the absence of urban characteristics but encompasses unique lifestyles, cultural beliefs, and community structures that influence health-related behaviors and attitudes. However, the status and related factors of health anxiety in rural areas are still unclear. Exploring the related factors of health anxiety in rural areas is beneficial for understanding the formation mechanism of health anxiety. Research findings could also offer recommendations for alleviating health anxiety levels.

The perceived information overload is one of the important factors affecting health anxiety (Mathes et al., 2018). Individuals tend to experience heightened concern when health information sources are ambiguous (Starcevic and Berle, 2013). The abundance of information can act as a trigger for health anxiety. The uncertainty inherent in health information can exacerbate health anxiety (Taylor et al., 2007). Individuals experiencing worry tend to seek out multiple sources of information in an attempt to alleviate symptoms of health anxiety (Lagoe and Atkin, 2015). Eastin (2006) also found that ambiguity in health information can exacerbate degree of health anxiety. Baumgartner & al (2022) study elucidated that discrepancies within health information can evoke heightened anxiety among individuals already predisposed to health anxiety. Therefore, this study hypothesized that perceived information overload impacted health anxiety among rural population.

Catastrophic misconceptions refer to individuals' misconceptions and assumptions regarding their physical symptoms, often involving an exaggerated perception of their severity or potential consequences (Baerg and Bruchmann, 2022). An individual's personality and psychology can significantly influence their cognitive processes, which in turn play a key role in the development of health anxiety (Carleton et al., 2007). Catastrophic misconceptions represent one of the potential influences of health anxiety, often

arising unconsciously when individuals lack knowledge about health-related matters. This deficiency in understanding can subsequently contribute to the development of health anxiety. A positive correlation between catastrophic misinterpretation and health anxiety was revealed in (Bailey and Wells, 2015; Bailey and Wells, 2016). In their study investigating the relationship between paranoid uncertainty moderating health anxiety and positive thinking, Kraemer et al. (2026) proposed that health anxiety is characterized by catastrophic misinterpretations of somatic symptoms. These misinterpretations contribute to health-related concerns and an increased utilization of healthcare resources. Researchers studying health anxiety have described its causes as stemming from catastrophic misinterpretation (Thorgaard et al., 2017).

Sensitivity comes from the cognitive process through which individuals acquire knowledge about the objective world (Fergus and Russell, 2016). Anxiety sensitivity arises from an individual's apprehension regarding the adverse outcomes of anxiety, which is believed to be a contributing factor to the onset of panic (Tanis et al., 2016). Anxiety sensitivity is a cognitive and interpersonal psychological factor that predisposes individuals to develop various mental illnesses. In terms of the impact of anxiety sensitivity on health anxiety (Berrocal et al., 2007), it is considered a relatively stable indicator of anxiety, as individuals perceive anxiety as detrimental to their psychological, physical, and social well-being, leading to heightened worry and panic (Taylor et al., 1998). In a study examining anxiety sensitivity and health anxiety, Abramowitz et al. (2007a) concluded that anxiety sensitivity exerted a significant positive influence on health anxiety. In a study on unwarranted phobias using the catastrophic misunderstanding model, Cox and Therapy (1996) found that patients with high anxiety sensitivity experienced more catastrophic misunderstandings than those with low anxiety. Therefore, we hypothesize that anxiety sensitivity has a significant impact on health anxiety.

Scholars have also studied the development and improvement of health anxiety-related measurement tools. The Whiteley Index (WI) is the first widely used health anxiety measurement tool for research and clinical use (Pilowsky, 1967). This scale consists of 14 items to measure the three components of health anxiety: illness belief, body concern, and disease-related fear (Asmundson et al., 2008). Warwick developed a scale for measuring the full range of health anxiety (HAI) based on cognitive theories of health anxiety and hypochondria, which can distinguish between hypochondriacs and non-clinical users (Warwick and Salkovskis, 1989). Lucock developed the Health Anxiety Questionnaire (HAQ) (Lucock and Morley, 1996). The design of the HAQ is based on the cognitive-behavioral model of health anxiety. The primary purpose of the HAQ is to identify individuals highly concerned about their health. Based on HAI, Salkovskis developed the Short Health Anxiety Inventory Scale (SHAI) to assess health anxiety (Salkovskis et al., 2002). Since its establishment, the scale has been widely used in various research scenarios and has proven to be the most effective measurement tool for health anxiety (Alberts et al., 2011).

Zhang (Zhang et al., 2015) translated the Chinese version of the SHAI scale for measuring health anxiety in the Chinese population, which was the Chinese-version Short Health Anxiety Inventory (CSHAI). It has been widely utilized to assess health anxiety in various populations (Ke et al., 2023; Chen et al., 2019; Li et al., 2020; Zhang et al., 2018). It is considered an effective tool for studying health

anxiety in the Chinese population (Liu et al., 2020), and was used to measure the degree of health anxiety among participants in our study. The evaluation of the scale takes a short time and has high accuracy. The scale includes two core factors: the possibility of diseases and the negative consequences of diseases. The validation results show that the Chinese version of the scale has good validity and reliability (Zhang et al., 2015). The Chinese version of the scale is easy to understand and more suitable for the rural people in this study. A health anxiety scale score exceeding 15 points was classified as indicative of the health anxiety group, while a score surpassing 30 points denoted the serious health anxiety group (Zhang et al., 2015).

## Methods

### Data collection

**Data collection approach.** The data utilized in this study were collected using a structured questionnaire in January and February 2023. The questionnaire included sections for informed consent, demographic characteristics, the CSHAI, and related factors. The questionnaires were collected from 30 provinces, municipalities, and autonomous regions in China. Informed consent was obtained from all participants.

The inclusion criteria for the sample were: (1) living in a rural area for more than ten years; (2) currently living in a rural area; (3) being willing to provide informed consent and participate in this study; (4) able to express themselves clearly. We used non-probability sampling methods, including convenience sampling and snowball sampling.

. Students conducted face-to-face interviews of residents around them when they returned home to rural areas during the holidays. Before sending the students to conduct interviews, we introduced the purpose, process, and questionnaire-filling requirements of the survey to the students from rural areas in the class we taught.

**Sample size.** A total of 930 questionnaires were collected, of which 909 were valid, with an effective rate of 97.74%, meeting the standard of valid return rate for questionnaire surveys. The exclusion criteria for the sample were: (i) all questions were answered with the same option; (ii) the response time was less than 180 seconds; (iii) participants were under 18 years old.

**Sample characteristics.** Table 1 displays the demographic information of participants. Clearly over half of the participants were female (69.31%). The majority of participants were between 50-65 years old (66.56%). The educational level of the participants was evenly distributed. Most participants reported an annual income of less than 17,000 yuan (41.8%). 66.34% of participants reported being in good health recently, while 50.39% reported not being in good health recently. In terms of living type, 39.38% of participants lived alone. Additionally, 41.69% of participants stated that they usually sought health-related information through online searches or consultations, while 58.31% preferred to consult relatives, friends, or medical doctors. This suggests that in rural areas, seeking opinions from opinion leaders or consulting with professional doctors remains the most common method of obtaining health information.

Table 1. Demographic information of the participants (N = 909).

		N	%
gender	male	279	30.69%
	female	630	69.31%

age	18-33	105	11.55%
	34-49	199	21.89%
	>49	605	66.56%
education	primary school	175	19.25%
	secondary school	264	29.04%
	technical secondary school	161	17.71%
	high school	145	15.95%
	junior college	95	10.45%
	university	49	5.39%
	master's degree and above	20	2.20%
annual income	<17,000	380	41.80%
	17,000-33,600	240	26.40%
	33,600-50,400	148	16.28%
	50,400-67,200	96	10.56%
	>67,200	45	4.95%
self-rated health	healthy	603	66.34%
	unhealthy	306	33.66%
family self-rated health	healthy	458	50.39%
	family member is unhealthy	451	49.61%
living type	alone	358	39.38%
	with others	551	60.62%
information seeking tendency (most frequently)	access to health information through the Internet	379	41.69%
	get health information from your friends, relatives, or doctors	530	58.31%

## Measures

**Healthy anxiety.** Eighteen items were used to measure health anxiety. The first 14 items primarily assess participants' psychological state concerning health matters, covering their perspectives on health, illness, physical changes, psychological adjustment, and attitudes. The final four items assess potential adverse outcomes and whether participants perceive their health status as declining, encompassing their attitudes toward life, beliefs, and self-esteem. Through these 18 items, individuals with health anxiety can be effectively distinguished from those without. The index utilized a 4-point Likert scale, with scores ranging from 0 to 3, representing levels from mild to severe, respectively. Response options included "never/completely disagree", "occasionally/disagree", "general/agree", and "often/very much agree", scored as 0, 1, 2, and 3, respectively.

**Perceived information overload.** Four items were used to measure the perceived information overload of rural population (Misra et al., 2012). For example: "I receive numerous health messages and am uncertain about how to handle them", "I don't know where to go for health-related information when I or a family member or friend is unwell", and "The health information I receive, the health information my family and friends provide, and the doctor's advice may not be consistent". A 5-point Likert scale was employed, with responses ranging from 1 (never) to 5 (always). A greater score signifies a more severe level of information overload. In this study, the Cronbach's alpha coefficient for the scale was measured at 0.873.

**Catastrophic misinterpretation.** We primarily utilized Rief et al.'s (1998) questionnaire to measure catastrophic misinterpretation. The questionnaire demonstrated good overall internal consistency ( $\alpha = 0.90$ ) and high reliability specifically for the section on catastrophic misconceptions ( $\alpha = 0.88$ ). This scale contains four items: "When I am not feeling well, I often assume that I must be suffering from some disease", "I feel sad, anxious, or fearful because I don't know exactly what disease I have", "When I or a family member or friend has a medical condition, I imagine it to be serious and

feel anxious.”, and “When the doctor recommended further tests, it must have been because they suspected a serious illness.” The options were rated on a five-point Likert scale, ranging from “never” to “always.” In this study, the Cronbach’s alpha coefficient for the scale was 0.826.

**Anxiety sensitivity.** Following Taylor et al. (2007), in this study we measured anxiety sensitivity in three components: physical, cognitive, and social concerns. The scale has good reliability and has been widely validated, so this study follows the scale and measures anxiety sensitivity by subdividing it into concerns about the body, cognitive concerns, and social concerns. Three items were used to measure anxiety sensitivity: “When I am not feeling well, I am afraid that I may suffer from a serious disease.”, “I feel afraid when I can’t concentrate on my work.”, and “I worry that other people will notice my anxiety.” The anxiety sensitivity subscale also uses a five-point Likert scale. In this study, the Cronbach’s alpha coefficient for the scale was 0.85.

**Demographic information.** The survey included eight items, asking participants about their (1) age, (2) gender, (3) education level, (4) annual income, (5) health status, (6) family health status, (7) lifestyle, and (8) information-seeking tendencies. All participants were required to answer these questions.

### Ethical approval

The study protocols were approved by the Ethics Committee of the School of Information Management, Central China Normal University. Written informed consent was obtained from all participants included in the study.

### Results

Table 2 presents the health anxiety scores of the participants. Statistical analysis revealed that out of the 909 participants studied, 699 (76.9%) exhibited health anxiety, with 12.21% scoring 30 points or higher.

Table 2. Health anxiety scores of participants.

Score	Anxiety level	N	%
<15	marginal anxiety	210	23.10%
15≤CSHAI<30	low anxiety	588	64.69%
≥30	high anxiety	111	12.21%

Statistical data analysis was conducted to analyze the factors affecting health anxiety in rural areas using binary logistic regression. Table 3 reveals that the older people in remote areas are, the more likely they are to reporting health anxiety (95% CI: 0.531-0.99). The age of the people in rural areas was found to be significantly associated with their anxiety level ( $p=0.043$ ). People in rural areas with lower educational level are more likely to reporting health anxiety than those with higher educational level ( $p=0.000$ ). People who lived alone suffered 0.6 times more from anxiety (95% CI: 0.406-0.888) than those who lived with others. People in rural areas who prefer to seek information offline were 3.079 times (95% CI: 1.998-4.747) more likely to have a high anxiety disorder than people who prefer to seek information online. Anxiety sensitivity and the perceived information overload also contribute to the emergence of health anxiety in people in rural areas. However, the data analysis revealed that the p-values for gender, annual income, health status, family health status, and catastrophic misconceptions were  $>0.05$ , indicating that these factors did not correlate with health anxiety. In this study, these factors were also not statistically associated with health anxiety among people in rural areas.

Table 3. Related factors for health anxiety.

	B	SE	Wald $\chi^2$	p-value	OR (95% CI)
gender	0.318	0.228	1.955	0.162	1.375 (0.88-2.148)
age	0.322	0.159	4.106	0.043*	0.725 (0.531-0.99)
education	-0.291	0.061	22.621	<0.001*	1.338 (1.187-1.508)
annual income	0.037	0.076	0.231	0.631	1.037 (0.894-1.204)
self-rated health	0.036	0.226	0.026	0.873	1.037 (0.665-1.615)
family self-rated health	-0.350	0.210	2.771	0.096	0.705 (0.467-1.064)
living type	0.510	0.200	6.520	0.011*	0.6 (0.406-0.888)
information seeking tendency	-1.125	0.221	25.942	<0.001*	3.079 (1.998-4.747)
catastrophic misinterpretation	0.202	0.125	2.590	0.108	1.224 (0.957-1.565)
anxiety sensitivity	1.217	0.205	35.403	<0.001*	3.377 (2.262-5.042)
perceived information overload	0.426	0.126	11.455	0.001*	1.531 (1.196-1.959)

Note: N = 909. \* p < 0.05.

According to the scores on the health anxiety scale, individuals with health anxiety are categorized into two groups: those with severe health anxiety and those with mild health anxiety. Another binary logistic regression was conducted based on the related factors of health anxiety to further identify the factors affecting the level of health anxiety and to systematically analyze the related factors at each stage of health anxiety. As observed from Table 4, among the health anxiety population, factors such as age, education, living type, anxiety sensitivity, and perceived information overload influence the level of health anxiety among people in rural areas. As individuals in rural areas age, they often experience challenges in adapting to changes in life. Their capacity to embrace new knowledge and experiences tends to decline, and they may have reduced contact with relatives, contributing to feelings of loneliness and depression. Additionally, individuals residing alone in remote areas exhibited a 2.769 times higher incidence of severe health anxiety compared to those living with others. Anxiety sensitivity and the perceived information overload were also closely related to the health anxiety of rural residents.

Table 4. Related factors for the level of health anxiety.

	B	SE	Wald $\chi^2$	p-value	OR (95% CI)
age	1.778	0.322	30.466	<0.001*	5.915(3.147-11.12)
education	-0.161	0.074	4.752	0.029*	0.852(0.737-0.984)
living type	1.018	0.291	12.279	<0.001*	2.769(1.566-4.895)
information seeking tendency	-0.294	0.282	1.09	0.296	0.745(0.429-1.295)
anxiety sensitivity	0.86	0.188	20.816	<0.001*	2.363(1.633-3.419)
perceived information overload	0.763	0.185	16.989	<0.001*	2.145(1.492-3.084)

Note: N = 699. \* p < 0.05.

## Discussion

Health anxiety is influenced by various factors during its development. This study utilized a dataset collected from rural areas to investigate the impact of age, gender, perceived information overload, anxiety sensitivity, and other factors on health anxiety among individuals among rural population. Specifically, using the Chinese-version Short Health Anxiety Inventory (CSHAI) proposed by Zhang et al. (2015), we examined the related factors at different stages of health anxiety.

The analysis of data revealed that demographic characteristics such as age, education, and living type significantly influenced the level of health anxiety. Older individuals are more likely to experience health anxiety, which aligns with the findings of Bourgault-Fagnou et al (Bourgault-Fagnou et al., 2009). Previous studies have indicated that two demographic factors, gender and age, influence the intensity of health anxiety groups' search for health information and their cognitive bias towards health-related

terminology (Reiser et al., 2019). Compared to males, females experiencing health anxiety demonstrate a greater propensity for seeking health information and initiating searches. However, in our study, no significant difference in health anxiety levels was found between men and women. Consistent with previous studies, individuals with lower education levels were more likely to experience health anxiety (Bleichhardt and Hiller, 2007). When intervening with health anxiety in remote areas, the focus should be on older adults and those with low levels of education.

Consistent with our results, previous studies have also examined the relationship between living alone and anxiety. Yu et al. found that individuals living alone face a significantly higher risk of health anxiety compared to those living with family members (Yu et al., 2020). Research has found that people who live alone are more likely to report health anxiety (Chen et al., 2022), and therefore people who live alone are also a priority group to focus on. Stahl et al. found that people who live alone have higher levels of depressive symptoms than those who live with family members (Stahl et al., 2017).

The perceived information overload is a factor that affects health anxiety in rural areas. Information overload is the psychological feeling of information-poor groups who perceive that they are exposed to more information than they can process. More than 70% of participants said they get distracted by too much health information found when searching on the Internet. Individuals experiencing health anxiety often seek information through the Internet (McManus et al., 2014). However, the abundance of health-related information can exacerbate their level of health anxiety, with health anxiety stemming from information overload becoming increasingly pronounced. Due to their limited knowledge, rural individuals are more prone to experiencing heightened health anxiety when confronted with overload information (Gibson et al., 2016).

From the survey results, it is possible that due to the differences in the levels of information literacy and health literacy of users, the professional information provided by health information websites exceeds the range of users' understanding and cannot guide users. While both rural and non-rural populations utilize the internet, the unique factors in rural areas, such as limited access to accurate health information and greater reliance on non-verified sources, could exacerbate anxiety levels.

In rural China, individuals may have less access to formal healthcare resources, potentially increasing their dependency on the internet for health-related information. This could amplify health anxiety, as online sources often present conflicting or alarmist content. While both rural and non-rural populations utilize the internet, unique factors in rural areas—such as limited access to accurate health information and a greater reliance on unverified sources—could exacerbate anxiety levels. In rural areas, individuals may have reduced access to formal healthcare resources, potentially increasing their dependence on the internet for health-related information.

Anxiety sensitivity predisposes both older and younger adults to health anxiety and predicts the likelihood of its occurrence in these age groups (Gerolimatos and Edelstein, 2012). Individuals with high anxiety sensitivity tend to gravitate towards negative interpretations of health-related issues, and these traits can exacerbate the development of health anxiety. Participants reported that health anxiety arises when they, a family member, or a friend are not feeling well, or when uncertainty surrounds the nature of the illness. Our statistical analysis revealed that individuals with high anxiety sensitivity were more

inclined to suspect that they were suffering from a particular disease and were more proactive in seeking information. In the process of seeking information, individuals with high anxiety sensitivity tend to over-assess the severity of their own or their family members' illnesses, thereby exacerbating their health anxiety.

Our survey found that rural individuals often seek information about disease symptoms from traditional media sources or online advertisements. Due to their relatively low level of information literacy and the influence of the perceived information overload, they might be unable to objectively assess their actual health situation and suspect that they are suffering from one or even more diseases. Due to the influence of education level and social environment, people in rural areas have might have substandard cognition and be unable to make objective enough judgments about diseases, so they are more prone to anxiety (Hong et al., 2022). The dissemination of health knowledge to rural people should be further strengthened to decrease anxiety sensitivity.

There are still some limitations to this study: 1. There are many factors affecting health anxiety, the factors selected in this study only encompass some of them, and more factors should be selected for research in the future; 2. The sample selected in this study is relatively small and should be further expanded in the future; 3. The present study is a cross-sectional study, and there is no deeper tracking study on health anxiety in rural areas, so it is challenging to explore many issues in depth, and longitudinal studies should be conducted in the future.

## **Conclusion**

This study examined the level of health anxiety and explored the factors influencing it in rural areas. The findings highlight the impact of various factors on health anxiety, providing a foundation for the development of effective intervention and improvement strategies.

### **Declaration of conflicting interests**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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### **Data Availability Statement**

The data presented in this study are available from the corresponding author. Ethics approval, participant permissions, and all other relevant approvals were granted for this data sharing.

### **Ethical approval and patient consent**

The study protocols were approved by the Ethics Committee of the School of Information Management, Central China Normal University. Written informed consent was obtained from all participants included in the study.

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