

Factors Associated with Stigma in Adult Women with Uncomplicated Urinary Tract Infections in China: A Cross-Sectional Study

Yaodi Wei^{1,*}, Hongyuan Liu^{1,*}, Peng Jiang², Shiyu Wang¹, Yu Zhao¹, Zhi Li¹, Siyu Fan¹, Na Zhang¹, Yufan Wu³, Ninghan Feng², Fengping Liu¹

¹Wuxi School of Medicine, Jiangnan University, Wuxi, People's Republic of China; ²Department of Urology, Affiliated Wuxi No. 2 Hospital, Jiangnan University, Wuxi, Jiangsu, People's Republic of China; ³Department of Urology, Kunshan Hospital of Traditional Chinese Medicine, Kunshan, Jiangsu Province, People's Republic of China

*These authors contributed equally to this work

Correspondence: Yufan Wu, Department of Urology, Kunshan Hospital of Traditional Chinese Medicine, Kunshan, People's Republic of China, Email docwuyufan@njum.edu.cn; Fengping Liu, Wuxi School of Medicine, Jiangnan University, Wuxi, People's Republic of China, Email liulaoshiyc@jiangnan.edu.cn

Background: Due to the specific nature of uncomplicated urinary tract infections (uUTIs), female patients are often labelled with stigma. The presence of stigma has a serious impact on their mental health, social functioning and healthcare-seeking behavior, which in turn affects disease recovery.

Purpose: To identify the sense of stigma and its associated influencing factors in female patients with uUTIs.

Patients and Methods: A cross-sectional study was conducted between December 2022 and December 2023, during which samples were collected from 240 adult women with uUTIs from various healthcare facilities in Wuxi, China. General information questionnaires, the Chinese Version of the Social Impact Scale (range 24 to 96), the Multidimensional Perceived Social Support Scale, the Self-Rated Anxiety Scale and the Self-Rated Depression Scale were used. SPSS 27.0 was used to create the database and statistical analysis was performed after data entry by two people.

Results: A total of 240 validated questionnaires were collected in this study, and the patients' stigma score was 2.71 ± 0.37 (at a moderate level of stigma). Internalized stigma was the highest and social isolation the lowest of the four dimensions of stigma. Multiple linear regression analyses showed that the level of stigma was higher in patients with symptoms of urinary frequency, urgency, and hematuria uUTIs. uUTIs with longer duration of symptoms, more frequent episodes, less knowledge about the disease, higher anxiety and depression, and lower levels of perceived social support for the disease had higher levels of stigma.

Conclusion: Studies have shown that female patients with uUTIs have a moderate level of stigma. Nursing administrators should pay attention to the sense of shame in this population and enhance health promotion to reduce their sense of stigma.

Keywords: urinary tract infections, uncomplicated, women, stigma, influencing factors

Introduction

Urinary tract infections (UTIs) represent one of the most prevalent bacterial infections globally, posing a significant health burden and socioeconomic impact.¹ With an estimated 404.6 million cases worldwide in 2019, UTIs have been a widespread concern.² While UTIs can affect both genders, they are particularly prevalent in women.³ It is estimated that approximately 60% of women will experience UTIs in their lifetime⁴ and that 20–40% of women who have had a previous episode are likely to have another, with 25–50% having multiple recurrences.⁵ Uncomplicated Urinary Tract Infections (uUTIs) are the most common type of urinary tract infections, simple urinary tract infections, which are free of complications compared to complex urinary tract infections, and are therefore also known as “uncomplicated urinary tract infections”.⁶ UUTIs are UTIs that occur in the genitourinary tract that are structurally normal, without obstruction,

without a recent history of instrumentation, and with symptoms confined to the lower urinary tract.⁷ Patients usually present with dysuria, dyspareunia, dysuria and/or suprapubic pain. Fever or cribriform angle tenderness suggests upper urinary tract involvement. The global prevalence of uUTIs has drawn attention due to their impact on public health, quality of life, and healthcare costs.⁸

Stigma, defined as the experience of being discredited or labeled as different due to a particular characteristic, condition, or identity, has been recognized as a significant psychosocial factor affecting various health conditions.⁹ The stigma associated with health conditions can manifest in several ways, including discrimination, social isolation, and reduced utilization of healthcare services.¹⁰ Stigmatized individuals may feel compelled to hide their condition or symptoms to avoid negative social consequences, which can lead to delayed treatment and a diminished quality of life.¹¹

In recent years, there has been increasing evidence that recurrent uUTIs can have a negative impact on quality of life and mental health.^{12,13} Eriksson et al conducted a qualitative study in which women with uUTIs described physical and mental health problems, challenges with the illness, limitations in their daily lives, dependence on support, and poor care.¹⁴ Elstad et al's qualitative study on symptoms of uUTIs other than urinary incontinence showed that there is indeed stigma attached to symptoms such as urinary frequency and urgency.¹⁵

Despite the considerable impact of uUTIs on women's mental health and well-being, little research has focused on the stigma surrounding these infections, particularly in the context of uUTIs.¹⁶ China, with its vast and diverse population, presents a unique context in which to study the factors associated with stigma in women with uUTIs. Cultural norms, beliefs, and attitudes regarding health and illness may influence the perception of uUTIs and contribute to stigmatization.¹⁷

Understanding the factors contributing to stigma among adult women with uUTIs is crucial for several reasons. First, acknowledging and addressing the stigma associated with uUTIs can enhance healthcare-seeking behavior and treatment adherence, ultimately improving patient outcomes and reducing the burden on healthcare systems.¹⁸ Second, exploring the factors underlying uUTIs-related stigma can help debunk misconceptions and provide targeted education to the public, dispelling notions that these infections are solely caused by poor hygiene or sexual activity.¹⁹ Third, uncovering the factors influencing stigma in uUTIs can guide the development of interventions to reduce stigma and its negative effects.²⁰

This cross-sectional study seeks to address this research gap by investigating the factors contributing to stigma in adult women diagnosed with uUTIs in China. By identifying these factors, this study aims to inform interventions and strategies that promote a more accurate understanding of uUTIs, mitigate stigma, and improve the overall well-being of women affected by these infections.

Material and Methods

Study Design and Participants

A cross-sectional study was conducted involving a sample of adult women diagnosed with uUTIs in Wuxi, China. Participants were recruited from diverse healthcare settings, including hospitals, clinics, and community health centers. Ethical clearance for this study was obtained from the Research Ethics Committees of Jiangnan University (Approval No. JNU20221201IRB29). Prior to any study procedures, all participants received comprehensive information about the study's objectives and procedures and provided their informed consent.

A targeted sample of 240 Chinese adult women with uUTIs (To ensure the reliability and validity of the Social Impact Scale, the sample size is typically more than 5–10 times the total number of entries. Therefore, for this study, the sample size was determined to be 240 valid participants, which is 10 times the number of 24 items) was recruited between December 2022 and June 2023. The inclusion criteria were as follows: (1) age 18 years or older; and (2) clinical diagnosis of uUTIs using internationally recognized guidelines, diagnosed in symptomatic patients with bacteriuria $>10^3$ cfu/mL.²¹ Symptomatic indicators included urinary frequency, urgency, dysuria, a sensation of incomplete voiding, lower abdominal discomfort, hematuria, and other relevant symptoms; (3) capability to comprehend the study's procedures and research inquiries accurately. Exclusion criteria encompassed the following: (1) individuals with fever exceeding 38°C; (2) pregnant individuals; (3) those with gynecologic tumors, urolithiasis, genitourinary tract anomalies, those undergoing

immunosuppressive therapy, individuals with chronic kidney disease requiring dialysis, and those with chronic urinary retention necessitating urethral catheterization.

Selection of Predictors

Demographic Factors

A review of the literature identified religious belief, age, literacy, marital status, occupation and economic status as high risk factors for stigma. Illiano et al showed that patients aged ≥ 50 years had higher levels of stigma.²² In a survey of female incontinence patients in the community, Yating Wang et al found that literacy and marital status were associated with stigma in incontinence patients, and the more educated and married patients had lower levels of stigma, which may be related to their knowledge of the condition and family support.²³ Overseas it has been shown that patients with religious beliefs are more likely to develop stigma because in religious culture urine is unclean and incontinence is not conducive to their religious activities of bathing and worship, leading to stigma.²⁴ A study by Zhang Yu et al showed that literacy, occupation and monthly household income also affect the level of stigma experienced by patients.²⁵ These variables are symbols of an individual's economic status, and the resulting differences affect the patient's perception of the disease and thus the level of disease-related stigma experienced by the patient.

Disease-Related Factors

Previous studies have shown that the type and severity of urinary incontinence, the level of knowledge about urinary incontinence, and the resulting level of symptom distress are all influential factors in the stigma experienced by female patients with urinary incontinence. The more severe the degree of UTIs, the greater the frequency of toileting and the resulting negative impact on their work and interpersonal interactions, which can lead to feelings of isolation and loneliness. An international study showed that patients with urinary leakage and accidental bowel leakage reported higher levels of stigma,²⁶ which may be related to the internalized stigma resulting from the distress caused by these symptoms.

Social Support and Anxiety and Depression

Social support is defined as the external resources available to an individual, including care received and perceived from family, friends, community and hospitals.²⁷ In the context of health and illness, social support is often cited as one of the variables that can reduce the negative impact of stress on health. Social support has been shown to be negatively correlated with patient stigma,^{28,29} suggesting that greater social support is associated with greater acceptance of illness. Wei Rui's study showed that social support may indirectly influence stigma through self-esteem,^{30,31} in which case it motivated people to give less negative explanations about their UTIs situation. In addition, Szymona et al showed that social support can also indirectly influence stigma through coping styles,³² as patients' illnesses generate their own stress, and patients' awareness of the availability of support in their illness can reduce stigma by making them more willing to cope with conditions such as frequent urination, urgency and painful urination.³³ However, the mechanism by which social support affects stigma in women with UTIs is not well understood. Some studies have shown that anxiety-depression also increases stigma.³⁴⁻³⁷

Data Collection

In this section, the administered questionnaire and various scales used for data collection are described in detail.

The General Information Questionnaire covered two main areas: demographic information and disease-related characteristics. Demographic information encompassed age, marital status, childbirth status, menstrual situation, education level, current employment status, health insurance status, and personal monthly income. Disease-related characteristics included details about the nature of uUTIs, such as first or recurrent occurrences, symptoms of uUTIs, duration of typical symptoms, frequency of uUTIs, sexual activity, and vaginal infectious diseases.

Disease Awareness Questions

Disease Awareness Questions The participants were presented with self-administered questions about their knowledge of the disease, rated on a four-point Likert scale.³⁸ The questions covered common symptoms, causes, preventive measures, and diagnostic and treatment methods related to the disease. Each question's response ranged from 1 (total ignorance) to 4 (more comprehensive knowledge).

Chinese Version of SIS

The SIS was originally developed by Fife et al to assess stigma in patients with HIV/AIDS and cancer³⁹ and was translated by Pan et al.⁴⁰ It consists of four domains (factors): social rejection, financial insecurity, internalized shame, and social isolation. Social rejection pertains to perceived workplace and societal discrimination (9 items), financial insecurity reflects the impact of discrimination on self-perception and relationships (3 items), internalized shame emerges from experiences of rejection and financial insecurity, prompting a desire to conceal the illness (5 items), and social isolation encompasses feelings of loneliness, inferiority, and worthlessness (7 items). Each item is rated on a four-point Likert scale (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree). Total scores range from 24 to 96, mean scores of 1.00–1.99 for low level, 2.00–2.99 for medium level, and 3.00–4.00 for high level, the higher the score,⁴¹ the higher the level of stigma of the patients with higher scores indicating greater perceived stigma. The scale's internal consistency, measured by Cronbach's coefficients, ranged from 0.85 to 0.9, while interdimensional correlations ranged from 0.28 to 0.66.

Multidimensional Perceived Social Support Scale (MPSS)

The MPSS is a 12-item scale assessing perceived social support across three domains: family, friends, and significant others.⁴² Each domain comprises four items addressing practical assistance, emotional support, willingness to discuss problems, and aid in decision-making. The scale's reliability was demonstrated with a Cronbach's alpha coefficient of 0.89 and an intraclass correlation coefficient (ICC) of 0.92 in this study.

Self-Rated Anxiety Scale (SAS) and Self-Rated Depression Scale (SDS)

The SAS is a psychological tool comprising 20 questions that measure anxiety levels and their changes during treatment.⁴³ It contains 15 items assessing increasing anxiety levels and 5 items measuring decreasing anxiety. Respondents evaluate the frequency of symptom occurrences using a Likert-4 scale (ranging from 1 for “no” or “very little time” to 4 for “most or all of the time”). The total score is adjusted for standardized scoring. Scores below 50 indicate “normal” levels, 50–59 suggest “mild” anxiety, 60–69 represent “moderate” anxiety, and scores exceeding 70 indicate ‘severe’ anxiety.⁴⁴ Previous research has shown satisfactory reliability and internal consistency (Cronbach's $\alpha = 0.66$ – 0.8).⁴⁵ The SDS is a 20-item self-report scale designed to measure depressive states. It consists of ten positively worded and ten negatively worded item, with scores ranging from 20 to 80, each item rated on a four-point Likert scale.⁴⁰

Statistical Analysis

SPSS 27.0 was used to create the database, which was statistically analysed after data entry by two persons. Descriptive statistics, including measures such as the mean \pm standard deviation (SD), and frequency, were employed to characterize the sample. The impact of individual characteristics on stigma, as measured by the SIS and its four underlying factors, was assessed using a combination of independent samples t tests, one-way ANOVA tests, and chi-square tests where applicable. For continuous data, Pearson's r correlation was utilized. During the multiple linear regression analyses, categorical variables were converted into dummy variables for inclusion, whereas continuous numerical variables were directly incorporated. Missing data are skipped and deleted during the data processing mentioned above.

In a subsequent phase, we sought to identify potential predictors of stigma among the characteristics that showed significant associations with stigma. We performed multiple linear regression analyses on the variables that exhibited significance ($p < 0.05$) in the univariate analyses. These analyses aimed to establish which variables were independently linked to higher stigma scores. The significance threshold for all tests in the regression models was set at 0.05.

Results

Demographic and Clinical Factors Associated with SIS Scores in Female Patients with uUTIs

Table 1 and Table 2 displays the comparison of average SIS scores among women with uUTIs who had different characteristics. A total of 240 females with uUTIs participated in the survey and were included in the study. Descriptive analysis shows that the mean age of all participants was 51.58 ± 18.28 , ranging from 18 to 92 years. The majority of participants were over the age of 45 (66.25%), had health insurance (66.67%), reported a personal monthly income of

Table 1 Comparison of Stigma Scores in Female Patients with uUTIs with Different Sample Characteristics (n=240)

Variables	Sort	n (%)	SIS (M ± SD)	Statistical value (F/t)	P-value	
Age	20-45 years	81 (33.75%)	2.64 ± 0.40	2.738 ^a	0.067	
	45-65 years	97 (40.42%)	2.77 ± 0.31			
	65 years and older	62 (25.83%)	2.69 ± 0.34			
Education	Elementary and below	75 (31.25%)	2.91 ± 0.26	21.208 ^a	<0.001	
	Junior middle school	57 (23.75%)	2.75 ± 0.29			
	Senior Middle School	33 (13.75%)	2.55 ± 0.28			
	Junior college and above	75 (31.25%)	2.53 ± 0.38			
Health insurance	Yes	160 (66.67%)	2.68 ± 0.35	-1.250 ^b	0.213	
	No	80 (33.33%)	2.74 ± 0.35			
Personal monthly income	< 5000 RMB	151 (62.92%)	2.80 ± 0.30	16.619 ^a	<0.001	
	5000–10,000 RMB [#]	58 (24.17%)	2.58 ± 0.39			
	> 10,000 RMB	31 (12.91%)	2.49 ± 0.36			
Menstrual situation	Normal	99 (41.25%)	2.64 ± 0.38	-2.255 ^b	0.025	
	Postmenopausal	141 (58.75%)	2.75 ± 0.32			
Marital status	Married	212 (88.33%)	2.70 ± 0.34	-0.578 ^b	0.558	
	Unmarried/Divorced/Bereaved	28 (11.67%)	2.74 ± 0.41			
Childbirth situation	Yes	170 (70.83%)	2.72 ± 0.33	1.117 ^b	0.266	
	No	70 (29.17%)	2.66 ± 0.41			
Uncomplicated UTIs frequency (every year)	First episode	54 (22.50%)	2.59 ± 0.36	54.705 ^a	<0.001	
	Non-first episode	< 3 times	58 (24.17%)			2.52 ± 0.30
		3-9 times [#]	59 (24.58%)			2.67 ± 0.21
		9-12 times [#]	37 (15.42%)			2.91 ± 0.14
		≥ 12 times	32 (13.33%)			3.21 ± 0.09
Sexual activity*	Yes	120 (50.00%)	2.71 ± 0.34	0.900 ^b	0.921	
	No	120 (50.00%)	2.70 ± 0.37			
Vaginal infectious	Yes	141 (58.75%)	2.85 ± 0.26	8.140 ^b	<0.001	
	No	99 (41.25%)	2.50 ± 0.36			
Typical duration of symptoms	< 3 days	73 (30.41%)	2.50 ± 0.35	22.998 ^a	<0.001	
	3-7 days [#]	88 (36.67%)	2.68 ± 0.29			
	7-14 days [#]	39 (16.25%)	2.87 ± 0.25			
	≥ 14 days	40 (16.67%)	2.96 ± 0.34			
Spouse/partner with uUTIs	Yes	20 (8.33%)	2.69 ± 0.46	-0.250 ^b	0.805	
	No	190 (79.17%)	2.71 ± 0.34			
	The others ^{**}	30 (12.50%)	0			
Level of knowledge of disease	Total ignorance	125 (52.08%)	2.82 ± 0.29	14.315 ^a	<0.001	
	Little knowledge	83 (34.58%)	2.64 ± 0.31			
	Some knowledge	23 (9.58%)	2.40 ± 0.48			
	More comprehensive knowledge	9 (3.76%)	2.47 ± 0.45			

Notes: In statistical terms, “^a” corresponds to “F for one-way ANOVA”, whereas “^b” corresponds to “t” denoting independent samples t-test. The “[#]” indicates that the part before the “-” is included but not the part after the “-”. For example, in the case of 5000–10,000 RMB, it means that 5000 RMB is included, 10,000 RMB is excluded, and the rest is the same. The “^{*}” denotes that participant had sex in the past week. The “^{**}” indicates that 30 patients in the “Spouse/partner with uUTIs group” had neither a spouse nor a partner.

less than 5000 RMB (62.92%), were experiencing menopause (58.75%), were married (88.33%), and had given birth to a child or children (70.83%). Furthermore, most patients had vaginal infections (58.75%), and half of the participants reported engaging in sexual intercourse in the week before the onset of uUTIs. Approximately 22.50% of the patients reported their first uUTIs, while 53.33% had recurrent UTI. Only a small percentage of participants were knowledgeable about common symptoms, causes, prevention, diagnosis, and treatment of the disease (13.34%). Typical symptoms lasted for less than 3 days in 30.41% of patients, and 8.33% reported having a spouse or sexual partner who also had uUTIs.

Table 2 Assignment of Female uUTIs Patients with Different Characteristics

Variables	Description of the Assignments
Education	"Elementary and below"= 1; "Junior middle school"= 2; "Senior Middle School"= 3; "Junior college and above"= 4
Health insurance	"Yes"= 1; "No"= 0
Personal monthly income	"< 5000元" =1; "000~10,000元" = 2; "≥ 10,000元" = 3
Menstrual situation	"Normal"= 1; "Postmenopausal"= 0
Marital status	"married"=1; "Unmarried/Divorced/Bereaved"=0
Childbirth situation	"Yes"= 1; "No"= 0
Sexual activity	"Yes"= 1; "No"= 0
Vaginal infectious	"Yes"= 1; "No"= 0
Typical duration of symptoms	"< 3"= 1; "3-7"= 2; "7-14" = 3; "≥14"= 4
Uncomplicated UTIs frequency	"First"= 1; "3-9 times"= 2; "9-12 times"= 3; "≥times"= 4
Spouse/partner with uUTIs	"Yes"= 1; "No"= 0
Level of knowledge of disease	"Total ignorance"= 1; "Little knowledge"= 2; "Some knowledge"= 3; "More comprehensive knowledge"= 4

Regarding the stigma scores in Table 1 and Table 2, it is worth noting that nearly all trait scores fall within the range of 2.00 to 2.99, indicating a medium level of stigma.⁴¹

We observed varying mean scores across different age groups, although these differences were not statistically significant. However, education level had a significant impact, with lower levels of education associated with higher SIS scores ($p < 0.001$). Interestingly, factors such as health insurance and marital status did not show a significant impact on SIS scores ($p > 0.05$). Lower monthly income was linked to higher SIS scores ($p < 0.001$), indicating a noteworthy relationship between income and stigma. Postmenopausal patients also exhibited higher SIS scores ($p = 0.025$), suggesting that menopausal status had some influence on stigma perception. Furthermore, the frequency of uUTIs, duration of symptoms, and presence of vaginal infections were significantly associated with higher SIS scores ($p < 0.001$). On the other hand, factors such as sexual activity and childbirth history did not have significant effects on SIS scores. Notably, greater knowledge about the disease was associated with slightly lower stigma scores ($p < 0.001$).

Levels of Stigma, Psychological Measures, and Social Support in Female Patients with uUTIs

Table 3 shows levels of stigma and scores for social support, anxiety and depression in female patients with uUTIs. The mean score of 240 patients' stigma was 64.91 ± 8.44 , and the mean score of the entries was 2.71 ± 0.37 , which belonged to

Table 3 Levels of Stigma, Psychological Measures, and Social Support in Female Patients with uUTIs

Scales and Dimensions	Number of Scales	Patient Score (M ± SD)	Scales Score (M ± SD)
SIS ^a	24	64.91 ± 8.44	2.71 ± 0.37
Social rejection	9	22.39 ± 4.33	2.49 ± 0.48
Financial insecurity	3	9.10 ± 2.00	3.03 ± 0.67
Internalized shame	5	18.19 ± 1.93	3.64 ± 0.39
Social isolation	7	15.24 ± 3.35	2.18 ± 0.48
SAS	20	54.31 ± 10.02	
SDS	20	45.36 ± 10.12	
MPSSS	12	62.12 ± 10.31	

Notes: The "a" indicates that the SIS includes the four subscales of social rejection, financial insecurity, internalized shame and social isolation.

Abbreviations: SIS, Stigma Impact Scale; SAS, Self-Rating Anxiety Scale; SDS, Self-Rating Depression Scale; MPSSS, Multidimensional Scale of Perceived Social Support.

the middle level of shame. The mean score of 1.00–1.99 is low level, 2.00–2.99 is medium level, and 3.00–4.00 is high level, and the higher the score is, the higher the level of patients' sense of shame is.⁴¹ The mean score of social rejection was 2.49 ± 0.48 ; the mean score of financial insecurity was 3.03 ± 0.67 ; the mean score of internalized shame was 3.64 ± 0.39 ; and the mean score of social isolation was 2.18 ± 0.48 , with the highest score of internalized shame and the lowest score of social isolation. The SAS score was 54.31 ± 10.02 , the SDS score was 45.36 ± 10.12 and the MPSSS score was 62.12 ± 10.31 .

Comparisons of uUTIs Symptoms Across Varying Stigma Levels

Table 4 and Table 5 presents a comprehensive comparative analysis of uUTIs symptoms across varying levels of stigma. The table highlights the distinct distribution of symptoms among individuals with low, medium, and high levels of stigma, demonstrating statistically significant differences ($p < 0.001$).

As can be seen in Table 4 and Table 5, there was a significant difference in the level of stigma associated with the various typical symptoms of uUTIs ($\chi^2 = 46.274$, $p < 0.001$). The level of stigma associated with the symptoms of urinary frequency (73.8%), urgency (72.3%), dysuria (70.7%), and incomplete voiding (96.0%) was predominantly moderate, whereas the level of stigma associated with the symptom of hematuria (55.7%) was predominantly high (Tables 4 and 5). (A mean score of 1.00 to 1.99 is considered low, 2.00 to 2.99 is considered moderate, and 3.00 to 4.00 is considered high, and the higher the score, the higher the patient's level of stigma).⁴¹

Correlation Matrix of Components in Female Patients with uUTIs

Table 6 shows the matrix of Pearson's correlation coefficients for each of the study variables in 240 female patients with uUTIs. All variables were selected based on the literature review and included stigma (SIS total score and its sub-dimensions), mental health indicators (anxiety, depression) and perceived social support. Anxiety, depression and perceived social support were measured by the SAS, SDS and MPSS respectively.

The correlation matrix indicates a strong positive correlation between the total SIS score and social rejection ($r = 0.862$, $p < 0.01$). This phenomenon strongly suggests that social exclusion becomes a central driver of shame.

Table 4 Comparison of uUTIs Symptoms at Different Levels of Disease Stigma

Variables	Low Level* (n%)	Medium Level* (n%)	High Level* (n%)	χ^2	p
Urinary frequency	2 (1.05%)	141 (73.82%)	48 (25.13%)	46.274	<0.001
Urgency	3 (1.69%)	128 (72.32%)	46 (25.99%)		
Dysuria	5 (2.99%)	118 (70.66%)	44 (26.35%)		
Hematuria	1 (1.14%)	38 (43.18%)	49 (55.68%)		
Sense of incomplete emptying	1 (4.00%)	24 (96.00%)	0 (0.00%)		

Notes: Fisher-Freeman-Halton exact test were used. The "*" indicates that the mean score of 1.00 to 1.99 is low, 2.00 to 2.99 is medium, and 3.00 to 4.00 is high, and the higher the score, the higher the patient's level of shame.⁴¹

Table 5 Symptom Comparison Assignment of uUTIs at Different Levels of Disease Stigma

Variables	Description of the Assignments
Typical symptoms of uUTIs	"Urinary frequency": Yes = 1, No = 0; "Urgency": Yes = 1, No = 0; "Dysuria": Yes = 1, No = 0; "Hematuria": Yes = 1, No = 0; "Sense of incomplete emptying": Yes = 1, No = 0

Table 6 Correlation Matrix of Components in Female Patients with uUTIs (n = 240)

Components	1	2	3	4	5	6	7	8
1.SIS total	1							
2.Social Rejection	0.862**	1						
3.Financial Insecurity	0.437**	0.163*	1					
4.Internalized Shame	0.584**	0.346**	0.208**	1				
5.Social Isolation	0.812**	0.585**	0.175**	0.326**	1			
6.SAS	0.425**	0.384**	0.121	0.178**	0.402**	1		
7.SDS	0.535**	0.473**	0.171**	0.183**	0.532**	0.585**	1	
8.MPSSS	-0.425**	-0.310**	-0.290**	-0.229**	-0.367**	-0.227**	-0.340**	1

Notes: *p < 0.05; **p < 0.01.

There was a moderate correlation between social rejection and internalized shame ($r=0.346$, $p < 0.01$). This suggests that patients may internalize external discrimination and develop a denial of their own worth. This internalized pain and shame may be an important reason why they feel deeply ashamed of their illness.

In addition, Table 6 uncovers a bidirectional relationship between mental health and stigma. Anxiety was moderately positively correlated with total stigma scores ($r=0.425$, $p < 0.01$), which may be related to anxiety exacerbating feelings of stigma. Depression was highly associated with social isolation ($r=0.532$, $p < 0.01$), which may be due to depression causing social withdrawal, which exacerbates the feeling of stigma.

MPSSS has a moderate negative correlation with SIS total score ($r=-0.425$, $p < 0.01$) and depression ($r=-0.340$, $p < 0.01$), suggesting that social support may alleviate patients' depression while reducing their sense of shame.

Multivariate Regression Modeling for the Predictors of Stigma in Female Patients with uUTIs

Tables 7 and 8 demonstrates the results of the multiple regression model for the total SIS. In this multiple regression model, the factors that were significantly associated with the total SIS were considered potential predictors. From the results of the calculations in Tables 7 and 8, it can be concluded that the model fit is good, with an adjusted R-squared of 0.741, which means that the independent variables involved in this regression analysis have a 74.1% effect on the dependent variable (namely, 74.1% of the change in the dependent variable is due to the above independent variables). In other words, the present regression model is able to better explore the factors influencing the stigma of uUTIs in women. The linear regression model in this study was significant ($F=27.243$, $p < 0.01$), which means that at least one of the above independent variables significantly affects women's stigma toward uUTIs.

In Tables 7 and 8, our research findings revealed that education level, personal monthly income, and menstrual situation did not exhibit any significant associations with SIS levels. Higher education (tertiary and above) showed a borderline significant trend towards lower disease stigma ($\beta=-0.108$, $p=0.122$), but did not reach statistical significance. This finding was not in line with expectations and may be due to the low proportion of highly educated groups in the sample (additional demographic characteristics are needed) or the fact that health literacy measures do not fully capture the knowledge-behavior transformation process. Older age marginally reduced stigma ($\beta=-0.003$), though this effect was eclipsed by stronger predictors like infection frequency. However, the presence of vaginal infection emerged as a robust independent predictor ($\beta=0.206$, $p < 0.001$), even after controlling for uUTIs symptoms and socioeconomic factors. This may reflect societal moralization of genital infections, where patients perceive blame for "poor hygiene" or "sexual misconduct"—a stigma mechanism less prominent in non-reproductive tract infections. A dose-response relationship was observed between uUTIs recurrence frequency and stigma severity. Patients experiencing ≥ 12 episodes annually exhibited the strongest association ($\beta=0.358$, $p < 0.001$), nearly tripling the effect size compared to the 3–9 episodes group ($\beta=0.094$). This suggests that repeated infections amplify internalized stigma, potentially through cumulative psychological distress or social role disruption. Furthermore, an increase in the annual frequency of uUTIs corresponded to higher SIS scores ($p < 0.05$). Distinct patterns were observed when considering the duration of

Table 7 Multivariate Regression Modeling for the Predictors of Stigma in Female Patients with uUTIs (n = 240)

Variables		B	SE	Beta	t	p	VIF		
Independent Variable	Constant		2.115	0.165		12.838	<0.001		
	Education	Age	-0.003	0.001	-0.131	-2.007	0.046	3.907	
		Junior middle school	-0.009	0.036	-0.011	-0.248	0.805	1.787	
		Senior Middle School	-0.011	0.047	-0.011	-0.241	0.81	1.92	
		Junior college and above	-0.082	0.053	-0.108	-1.551	0.122	4.446	
	Personal monthly income	Elementary and below*	0						
		5000–10,000 RMB [#]	-0.023	0.035	-0.029	-0.666	0.506	1.695	
		≥ 10,000 RMB	0.026	0.049	0.025	0.539	0.59	1.988	
	Menstrual situation	< 5000 RMB*	0						
		Postmenopausal	0.013	0.044	0.018	0.286	0.775	3.482	
	Vaginal infectious	Normal*	0						
		Yes	0.147	0.027	0.206	5.445	<0.001	1.321	
	Typical symptoms of uUTIs	No*	0						
		Urinary frequency	0.102	0.036	0.117	2.858	0.005	1.535	
		Urgency	0.082	0.037	0.103	2.249	0.026	1.934	
		Dysuria	-0.02	0.029	-0.026	-0.677	0.499	1.323	
		Hematuria	0.078	0.03	0.1	2.62	0.009	1.344	
	uUTIs frequency (every year)	Sense of incomplete emptying	0.029	0.031	0.033	0.941	0.348	1.132	
		Non-first episode	< 3 times	0.025	0.038	0.031	0.678	0.499	1.936
			3-9 times [#]	0.076	0.039	0.094	1.959	0.031	2.114
			9-12 times [#]	0.232	0.045	0.239	5.184	<0.001	1.95
			≥ 12 times	0.369	0.056	0.358	6.547	<0.001	2.75
	Typical duration of symptoms	First episode*	0						
		3-7 days [#]	0.067	0.031	0.092	2.171	0.031	1.669	
		7-14 days [#]	0.077	0.041	0.081	1.866	0.043	1.718	
		≥ 14 days	0.094	0.046	0.1	2.055	0.041	2.174	
	Level of knowledge of disease	< 3 days*	0						
		Total ignorance	0.14	0.069	0.199	2.027	0.044	8.863	
		Little knowledge	0.076	0.068	0.102	1.111	0.268	7.827	
		Some knowledge	-0.06	0.073	-0.05	-0.813	0.417	3.496	
		More comprehensive knowledge*	0						
		SAS	0.004	0.002	0.125	2.89	0.004	1.726	
		SDS	0.004	0.002	0.125	2.748	0.007	1.91	
MPSSS		-0.003	0.001	-0.09	-2.332	0.021	1.368		
R square					0.769				
Adjusted R square					0.741				
f					27.243				
p					<0.001				

Notes: The “[#]” indicates that the part before the “-” is included but not the part after the “-”. For example, in the case of 5000–10,000 RMB, it means that 5000 RMB is included, 10,000 RMB is excluded, and the rest is the same. The “*” indicates that the variables “elementary and below”, “<5000 RMB”, “no vaginal infection”, and so on were treated as dummy variables and excluded from the multiple linear regression analysis.

symptoms within different subgroups. Specifically, symptom durations of 3–7 days and >14 days exhibited positive associations with higher SIS scores ($p < 0.05$). Conversely, the subgroup experiencing symptoms for 7–14 days did not show any significant association with SIS levels ($p > 0.05$). The level of disease knowledge displayed a variable impact on SIS scores. A complete lack of knowledge demonstrated positive coefficients ($p < 0.05$), whereas higher levels of knowledge, including limited, moderate, and comprehensive knowledge, displayed no notable correlations with SIS scores ($p > 0.05$). Furthermore, psychosocial variables revealed bidirectional dynamics: higher anxiety (SAS, $\beta=0.125$) and depression (SDS, $\beta=0.125$) scores correlated with increased stigma, while perceived social support (MPSSS) exerted

Table 8 Assignment of Different Characteristics of Female uUTIs in Multiple Linear Regression

Variables	Description of the Assignments
Age	Original value
Education	"Elementary and below (dummy variable)" = 0: not included in the multiple linear regression analysis; The variables "Junior middle school", "Senior Middle School", and "Junior college and above" were treated as dichotomous variables: Yes = 1, No = 0.
Personal monthly income	"< 5000 (dummy variable)" = 0: not included in the multiple linear regression analysis; The variables "< 10000" and "≥ 10000" were treated as dichotomous variables: Yes = 1, No = 0.
Menstrual situation	"Normal (dummy variable)" = 0: not included in the multiple linear regression analysis; "Menopause" was treated as a dichotomous variable: Yes = 1, No = 0.
Vaginal infectious	"No (dummy variable)" = 0: not included in multiple linear regression analysis; Treating the presence of gynecological disease as a dichotomous variable: Yes = 1, No = 0.
Typical symptoms of uUTIs	The five variables "Urinary frequency", "Urgency", "Dysuria", "Hematuria" and "Sense of incomplete emptying" were dichotomized: Yes = 1, No = 0.
uUTIs frequency (every year)	"First episode (dummy variable)" = 0: not included in the multiple linear regression analysis; Treat the variables "3–9", "9–12" and "≥ 12" as dichotomous variables: Yes = 1, No = 0.
Typical duration of symptoms	"< 3" (dummy variable) = 0: not included in the multiple linear regression analysis; Dichotomous variables were treated as "3–7", "7–14" and "≥ 14": Yes = 1, No = 0.
Level of knowledge of disease	"More comprehensive knowledge (dummy variable)" = 0: not included in the multiple linear regression analysis; Dichotomized the variables "Total ignorance", "Little knowledge" and "Some knowledge": Yes = 1, No = 0.
SAS	Original value
SDS	Original value
MPSSS	Original value

a protective effect ($\beta=-0.09$). These findings show that stigma exacerbates mental health burdens, which in turn reinforce stigmatized self-perception.

In addition, a diagnostic analysis of collinearity for the above regression model was performed in the [Supplementary information](#) and [Table S1](#), where [Figure S1](#) shows the histogram of residuals for this regression model. The histogram in [Figure S1](#) is utilized to assess whether the residuals conform to a normal distribution.

Discussion

Current Status of Stigma in Women with uUTIs

The majority of female patients with uUTIs in this study exhibited moderate levels of stigma, a finding that is consistent with the level of stigma among patients with urinary incontinence in a study by Wang et al.⁴⁶ Although urinary incontinence and uUTIs are two distinct conditions in urinary tract infections, patients are often subject to similar sociocultural stigmatization. The recurrence of urinary tract infections, especially when accompanied by symptoms such as urinary frequency and urgency, makes patients susceptible to negative emotions related to "sexual health". This cultural and psychological context may be the main cause of stigma.

In this study, we showed that patients with uUTIs showed significant dimensional differences in their sense of shame, with the highest score of internalized shame (3.64 ± 0.39), which may be related to the sensitivity and taboos about women's health issues in traditional Chinese culture. This may be related to the sensitivity and taboos of women's health issues in traditional Chinese culture. Internalized shame not only reflects individuals' negative perceptions of disease, but is also closely related to the social stigmatization of "sexual health" issues. In contrast, social isolation scores were lower (2.18 ± 0.48), which may be due to the fact that patients usually cope with the disease through family and intimate relationships, while the need for public support is relatively low. However, this does not mean that patients are free from stress in social interactions, as they may still face self-concealment and social discrimination. In traditional cultures, discussing diseases related to the genitourinary system is often considered taboo. Women also attribute uUTIs to lifestyle habits and behaviors such as poor hygiene, carelessness, and even "the punishment of growing old".¹⁹ Recurrent uUTIs can cause psychological stress for patients, and recurrent disease episodes, which represent the recurrence of typical

symptoms of uUTIs such as urinary urgency, can also occur. In conclusion, the present study found that the typical symptoms of uUTIs are consistent with the level of disease stigma.

Factors Influencing Stigma in Women with uUTIs

This study found significant differences in the level of stigma associated with various symptoms typical of uUTIs. The level of stigma associated with symptoms such as urinary frequency, urgency, dyspareunia, and incomplete voiding sensation was predominantly at the medium level, whereas the level of stigma associated with hematuria symptoms was predominantly at the high level. This may be due to the fact that hematuria, as a distinct clinical symptom, is usually interpreted by patients as a seriousness of the disease, which may trigger fear and anxiety about their health status. In addition, hematuria also makes patients worry about the social evaluation of their health status, especially in the context of social stigmatization of “sexual health” issues, which further exacerbates the sense of shame. uUTIs are prone to recurrence and associated long-term symptoms with severe economic consequences for the patient, and symptoms such as urinary frequency and urgency affect the patient’s social life, leading to social exclusion and economic disadvantage. Social stigma leading to social exclusion and economic insecurity.^{47,48}

Correlational analyses in this study found that all four SIS dimensions - social rejection, financial insecurity, internalized stigma and social isolation - were significantly and positively correlated with anxiety and depression, but significantly and negatively correlated with perceived social support. In particular, anxiety and depression can have a significant and positive impact on stigma, and they can also influence each other. When individuals experience high levels of anxiety and depression, this often leads to high levels of stigma. Similarly, high levels of illness stigma can exacerbate anxiety and depression.⁴⁸ Perceived social support can negatively influence illness stigma, while low levels of perceived social support can lead to social exclusion and exacerbate stigma. Low levels of perceived social support may also lead to negative health outcomes and worsen the overall well-being of people facing stigma. The lack of a strong support system can exacerbate feelings of social isolation and make it more difficult for individuals to cope with the stigma associated with their condition.

Anxiety, depression, and perceived social support are key contributors to feelings of shame. Specifically, anxiety and depression can have a significant positive impact on feelings of stigma, and they also interact with each other. uUTIs symptoms can be embarrassing and shameful.⁴⁹ Perceived social support plays a crucial role in reducing disease-related stigma. Low levels of perceived social support can lead to social isolation, further reinforcing feelings of shame. In addition, inadequate perceived social support can lead to negative health outcomes and worsen the overall well-being of individuals facing illness-related stigma. The lack of a strong support system can exacerbate feelings of isolation, making it more challenging and stressful for patients to cope with the stigma associated with their illness.

This study is the first cross-sectional analysis of the factors affecting female uUTIs and the level of morbidity and stigma, and it is evident that the results of this study provide a wealth of information for understanding the morbidity and stigma experienced by female patients with uUTIs. Secondly, this study also revealed the relationship between various demographic and clinical factors and the level of morbidity and stigma in female patients with uUTIs. Also, the present study assessed the levels of stigma, anxiety and depression, and perceived social support in this group, and found interactions between the symptoms of uUTIs and the levels of stigma. In addition, correlation and regression analyses in this study revealed a complex array of factors that influence stigma. For example, there was a significant association between elevated levels of stigma and elevated levels of anxiety and depression in women with uUTIs. Finally, this study found that patients with uUTIs had lower levels of perceived social support, higher frequency of uUTIs, longer duration of symptoms, less knowledge about uUTIs, and more frequent symptoms such as urinary frequency and urgency. In conclusion, the findings of this study provide a practical basis for subsequent interventions by others on factors related to uUTIs.

There are several limitations to our study that should be acknowledged. First, we were limited in the factors we examined and did not control for variables such as self-esteem, self-efficacy, and self-avoidance, which may have influenced our results. Second, the results of our study may be specific to the cultural context of traditional Chinese society, so caution should be exercised in generalizing these findings to other populations. It is important to note that this study provides only a preliminary understanding of the stigma experienced by patients with uUTIs, and larger

longitudinal studies are needed to gather more comprehensive information in the future. In addition, our study population may not effectively represent certain stigmatized populations due to their reluctance to seek healthcare. Despite these limitations, to the best of our knowledge, this is the first study to assess the factors associated with female uUTIs patients in China, and the findings suggest that Chinese women with uUTIs may experience a sense of stigma.

Conclusion

In China, women with uUTIs are subject to a certain degree of discrimination, resulting in a sense of stigma. However, current research on the stigma of female patients with uUTIs focuses on qualitative studies, while quantitative studies are relatively scarce. The present cross-sectional study reveals that female patients with uUTIs have a moderate level of pathos stigma and identifies the relevant influencing factors. Factors contributing to this sense of stigma include these symptoms such as urinary frequency, urgency, and hematuria, as well as the frequency and duration of these symptoms. In addition, this study found that factors affecting the patients' sense of stigma also included the level of personal knowledge about the disease, anxiety and depression, and the level of social support perceived by the patients. These findings emphasize that interventions for female patients with uUTIs with regard to their sense of illness and shame can begin with these factors and provide a practical basis for subsequent interventions by others with regard to factors associated with uUTIs.

Data Sharing Statement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Ethical Approval

This study was conducted in accordance with the Helsinki Declaration. Ethical clearance for this study was obtained from the Research Ethics Committees of Jiangnan University (Approval No. JNU20221201IRB29). Participants were informed of the aim of the study, the methods used and how they would participate. Prior to being included at the research, informed consent was obtained in writing. Confidentiality of respondents were respected. Participants were informed about the voluntariness of their participation.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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