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EMPIRICAL RESEARCH QUANTITATIVE

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Factors related to the disaster preparedness of patients on haemodialysis from Sichuan, China, during COVID-19: A cross-sectional study

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Abstract

Aim: This study aimed to investigate personal preparedness among patients on haemodialysis (HD) and to examine the relationship among sociodemographic characteristics, attitudes toward disaster preparedness and personal preparedness behaviours during natural disaster incidents.

Design: A cross-sectional survey was conducted.

Methods: A convenience sampling method was used. A total of 446 participants from six areas of Sichuan province completed the online questionnaire study from February 27 to March 13, 2022. Sociodemographic characteristics, attitudes toward disaster preparedness and personal preparedness behaviours were measured. Descriptive statistics were used to analyse sociodemographic characteristics and attitudes toward disaster preparedness. The relationship among sociodemographic characteristics, attitudes toward disaster preparedness and personal preparedness behaviours were assessed using ordinal regression. Statistical significance was defined as $p < 0.05$.

Results: A total of 446 participants completed the survey. Of these, 42.15% ($N = 188$) were poorly prepared, 26.23% ($N = 117$) were moderately prepared and 31.61% ($N = 141$) were highly prepared. Ordinal regression showed that knowing about disaster preparedness (Odds Ratio (OR) = 1.691, 95% Confidence Interval (CI) = 1.081–2.644, $p = 0.021$), participating in disaster evacuation exercises (OR = 2.519, 95% CI = 1.595–3.977, $p < 0.001$) and learning about disaster preparedness (OR = 2.421, 95% CI = 1.542–3.802, $p < 0.001$) were associated with high preparedness. Compared to patients with a university degree or higher, patients with a junior high school education or lower (OR = 3.491, 95% CI = 1.760–6.925, $p < 0.001$) and senior high school degree (OR = 2.052, 95% CI = 1.038–4.057, $p = 0.039$) were associated with high preparedness. Patients who felt very confident and could deal with all their needs (OR = 3.878, 95% CI = 2.904–7.181, $p < 0.001$) or patients who felt confident and could meet some of their needs (OR = 1.949, 95% CI = 1.124–3.379, $p = 0.017$) had higher

Linfang Zhu and Yang Liu contributed equally as the first author to this work.

preparedness than those who felt less confident and were not well prepared to take care of their needs.

Patient or Public Contribution: After obtaining each participant's consent, they filled out the online questionnaire using their own or a relative's cell phone while undergoing HD.

Implication for Practice: It is essential that patients should be educated not only on medical specialty topics, but also on general disaster preparedness. Medical institutions should improve and reinforce preparation training among targeted populations. The low level of preparedness is partly due to the lack of participation of patients in disaster preparedness programs. Dialysis center managers should be urged to implement such programs at their centers.

KEYWORDS
disaster preparedness, haemodialysis, natural disasters, Sichuan

1 | INTRODUCTION

From 2018 to 2019, the prevalence of chronic kidney disease (CKD) in China was 8.2%, according to a study with 176,874 participants (Wang et al., 2023). It is projected to rise to 11.7% by 2029 (Li et al., 2023). From 2017 to 2019, the number of CKD patients in China increased from 132.3 million to 150.5 million cases, which was nearly one-fifth of the world's CKD patients (GBD Chronic Kidney Disease Collaboration, 2020; Li et al., 2023). The progression of CKD to end-stage renal disease (ESRD) was increasing by 120 thousand cases each year (Zou et al., 2019) and there were approximately 1 million ESRD cases in China (Yang et al., 2020). Haemodialysis (HD) was the primary treatment modality for ESRD patients, accounting for approximately 86% (Yang et al., 2021). According to a report on the China Kidney Network 2016 annual data, 578,000 patients entered end-stage renal diseases and received HD treatment (Zhang et al., 2020). At the end of 2021, there were 749,000 patients on HD (CNRDS, 2022). HD remains the primary treatment option for patients in Sichuan province (Zou et al., 2019).

Natural disasters negatively impact the ability to provide continuous care for patients on HD (Chang et al., 2021), and those on HD are at the risk of losing maintenance dialysis (Gray et al., 2015). Evidence demonstrates that earthquakes can cause issues with utilities and hospitals, and aftershocks can cause further damage (Yoo et al., 2019). The storms of 2005 demonstrated that emergency response plans were inadequate in providing continuity of care for patients on HD, and this disaster had particularly large impact on a socially and medically vulnerable population (Kopp et al., 2007).

Because patients on HD are vulnerable due to the above adverse effects, many scholars have focused on disaster preparedness among this populations. Disaster preparedness is an important part of the disaster management cycle, and preparedness behaviours are important measures for disaster prevention and mitigation (UNDRR, 2015). Questionnaire-based studies evaluating preparedness in patients on HD have mainly been conducted in the US or Japan. Evidence revealed that the explanation regarding disaster preparedness for patients undergoing HD was inadequate (Murakami et al., 2015; Nihonyanagi et al., 2022; Sugisawa et al., 2017). Patients on HD in North Carolina were poorly prepared to shelter in place or to evacuate. Age, gender, education and socioeconomic status did not affect disaster preparedness. Few patients carried a unique bracelet to identify themselves as individuals with HD needs (Foster et al., 2011). In Japan, few people carried the identifier named the 'disaster patient card' in the face of the Great East Japan Earthquake. Disaster preparedness among patients undergoing HD in Japan remained inadequate (Nihonyanagi et al., 2022). The sociodemographic predictors of not being prepared included being employed, not being aware of disaster information acquisition methods and believing that their family away from home would not be concerned about them (Nihonyanagi et al., 2022). Although previous studies proved that the preparedness among patients on HD was inadequate, there was a major evidence gap in understanding how patients on HD prepare for disasters in China. Their level of preparedness and whether sociodemographic factors and attitudes toward disaster preparedness influenced their preparedness were unknown. Therefore, we conducted a cross-sectional study to survey the level of preparedness behaviour among patients on HD and examined the relationship among sociodemographic characteristics, attitudes toward disaster preparedness and personal preparedness behaviours. Although four cases of COVID-19-infected patients were reported and there was no outbreak of COVID-19 in the dialysis center until March 3, 2020 (Zou et al., 2021), there were scattered COVID-19-infected patients in Sichuan Province throughout the data collection period (Health Commission of Sichuan Province, 2022). Therefore, we also wonder to observe whether COVID-19 has any effects on disaster preparedness in patients on HD.

2 | METHODS

2.1 | Design

A descriptive cross-sectional study with analytical components was conducted. This study was conducted from February 27 to March 13, 2022, and was in compliance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.

2.2 | Setting and participants

Sichuan Province in China is located in a North–South seismic zone and is known for its high risk of natural disasters, such as earthquakes and flooding. To conduct this study, participants were invited from six HD centers located in six areas in Sichuan Province (see Table S1). The inclusion criteria for this study were patients on HD who had received treatment for more than 3 months and were willing to complete the online questionnaire. Those who had auditory, language or cognitive problems were excluded.

2.3 | Data collection and procedures

An online letter survey was conducted with the following procedure for obtaining informed consent. Nurse managers at six hospital dialysis facilities were trained to provide candidates with an overview of the study, explain the purpose, methods and ethical considerations and ask them to complete the survey form after signing the online informed consent form. A QR code was provided for candidates to scan via WeChat, authorized by the Wenjuanxing platform, to submit the completed survey results. To avoid receiving duplicate survey results, each IP address was linked to one unique survey form. Each participant was given up to 15 min to complete the survey. The investigation was conducted at their dialysis centers when they were receiving HD. The nurse managers read the questionnaire contents and helped the participant complete the survey form based on their responses when they were unable to fill in the questionnaire due to their fistula being in their dominant, writing arm during the dialysis session. For patients who were unable to read, the nurse manager would read each item on the questionnaire and complete the online questionnaire on behalf of the patient using their own or alternate smartphone.

2.4 | Measures

The questionnaire consisted of three major sections and 19 items (see Supplementary Material—Table S1). They covered sociodemographic characteristics, attitudes toward disaster preparedness and personal preparedness behaviour for patients on HD.

Sociodemographic characteristics included six items: age, gender, level of education, place of residence, living situation and marital status.

Attitudes toward disaster preparedness were developed based on literature reviews (Jiang & Li, 2018; Kohn et al., 2012; Sharief et al., 2018; Tracy et al., 2016; Zhou, 2020). They contained six items: (1) knowledge regarding disaster preparedness, (2) the need for disaster preparation-related knowledge, (3) the importance of personal preparedness for disaster response, (4) studying disaster preparedness, (5) participating in a disaster evacuation exercise and (6) confidence in personal readiness to meet one's own needs when a disaster occurred. To clarify the process, we identified key attitudes repeatedly emphasized across various disaster preparedness research. We then designed statement items aimed at capturing these attitudes. The specific wording and phrases were developed through an iterative process involving expert review by nurses with disaster response experience to evaluate the statements.

Personal preparedness behaviours involved seven self-reported questions based on the Disaster Preparedness Questionnaire developed by Sharief and colleagues (Sharief et al., 2018), for which permission was obtained. The English version was translated and adapted to the local situation after discussion with experts in the field of both HD and disaster nursing.

The seven self-reported questions were:

- If it is difficult to prescribe dialysis medications after a disaster, is your normal supply of medications on hand enough to last 2 weeks?
- Do you carry with you a medication list, noting the name and dose? (e.g. on a card or paper where rescuers can find it)?
- Do you prepare a medical ID bracelet that identifies you as a HD patient?
- If phone lines were working, do you prepare (not just by memory) a card or paper with your supervising physician's number in case you need it (e.g. on a card or paper where a rescue worker can find them)?
- If phone lines were working, do you prepare (not just by memory) a card or paper written regular HD center's number in case you need it (e.g. on a card or paper where a rescue worker can find them)?
- Do you have a disaster kit at home in case of a major disaster? (e.g. a disaster kit could include extra clothes and blankets, a supply of food and water, a battery-operated radio, a flashlight and a first aid kit, all together in one place)
- Do you and your loved ones have a designated 'meeting place' (a location to meet outside your home) for an evacuation plan in case of an emergency?

Each question had a binary response of Yes or No, with Yes responses scored as 1 point and No responses scored as 0 points. The total possible score ranged from 0 to 7 points, indicating different levels of preparedness: 0–2 as low, 3–4 as medium and 5–7 as high.

In this study, the internal reliability of personal preparedness behaviours showed an acceptable value with a Cronbach's α coefficient of 0.803.

2.5 | Ethical considerations

The study was approved by the biomedical ethics committee of West China Hospital of Sichuan University (IRB NO.2022-933). All participants provided informed consent prior to the commencement of the study.

2.6 | Statistical analysis

All statistical analyses were conducted in IBM SPSS 25.0 for Windows. Normality was tested using the Kolmogorov–Smirnov test, which was used for $n \geq 50$. The Kolmogorov–Smirnov test was the most widely used method to test the normality of data. Normality tests could be conducted in statistical software (Mishra et al., 2019). A descriptive analysis was carried out to understand the sociodemographic characteristics, attitudes toward disaster preparedness and personal preparedness behaviours. Mann–Whitney *U* tests were used to determine the differences in personal preparedness behaviours scores against age groups. The multiple samples Kruskal–Wallis test was used to compare the differences in personal preparedness behaviours scores against level of education, the need for disaster preparation-related knowledge, the importance of personal preparedness for disaster response and confidence in readiness to meet needs after a disaster. Chi-squared tests or Fisher's exact tests were used to examine gender, place of residence, living situation, marital status, understanding of knowledge regarding disaster preparedness, studying disaster preparedness and participating in disaster evacuation differences. To determine whether sociodemographic characteristics and attitudes toward disaster preparedness were significantly associated with the level of personal preparedness, ordinal regression was performed. The statistical significance was set at $p < 0.05$.

3 | RESULTS

A total of 450 patients on HD from six HD centers in Sichuan were recruited, and 446 patients returned valid questionnaires, yielding a response rate of 99.1%. The number of participants from each hospital was 172 (38.6%), 27 (6.1%), 104 (23.3%), 56 (12.6%),14 (3.1%),73 (16.4%). (Table S1).

3.1 | Preparedness level of participants

Among 446 patients on HD, 42.15% ($n = 188$) were poorly prepared (scores of 0–2), 26.23% ($n = 117$) were moderately prepared (scores of 3–4) and 31.61% ($n = 141$) were highly prepared (scores of 5–7) (Figure 1). Table 1 showed the contents of the seven personal preparedness questions. Of these, more than half of the patients had 2 weeks of medications available, had the card of their supervising physician's number and carried the HD center's number written on a card or paper. However, only 33.63% of the patients had their disaster kits prepared and ready to go. Additionally, 37.2% of patients prepared a list of medications, 42.83% had a medical ID bracelet ready and 35.20% had a designated 'meeting place' for evacuation planning (Table 1).

3.2 | Univariate analysis of sociodemographic characteristics, attitudes toward disaster preparedness and personal preparedness behaviours

The number of participants with different sociodemographic characteristics and attitudes toward disaster preparedness at each level of personal preparedness behaviours was listed in Table 2. Education, place of residence, knowledge of disaster preparedness, needs to know about disaster preparedness, learning about disaster preparedness, participating in disaster drills and confidence in personal readiness to meet one's own needs when a disaster occurred were all associated with preparedness ($p < 0.05$). However, age, gender, living situation, marital status and the importance of personal preparedness for disaster response were not associated with preparedness ($p > 0.05$) (Table 2).

3.3 | Ordinal logistic regression analysis for personal preparedness behaviour scores against sociodemographic data and attitudes toward disaster preparedness

Ordinal logistic regression analysis showed that knowing about disaster preparedness (OR = 1.691, 95% CI = 1.081–2.644, $p = 0.021$), participating in disaster drills (OR = 2.519, 95% CI = 1.595–3.977, $p < 0.001$) and learning about disaster preparedness (OR = 2.421, 95% CI = 1.542–3.802, $p < 0.001$) were associated with a high level of preparedness. Compared to patients with a university degree or higher, those with a junior high school education or lower (OR = 3.491, 95% CI = 1.760–6.925, $p < 0.001$) and senior high school education (OR = 2.052, 95% CI = 1.038–4.067, $p = 0.039$) were associated with high levels of preparedness. Patients who felt very confident and could deal with all their needs (OR = 3.878, 95% CI = 2.904–7.181, $p < 0.001$) or those who felt confident and could meet some of their needs (OR = 1.949, 95% CI = 1.124–3.379, $p = 0.017$) had high levels of preparedness compared to those who felt less confident and could not deal with all their needs (Table 3).

4 | DISCUSSION

In our survey, it was noted that about 42% of participants were poorly prepared for disaster response and recovery. The status of

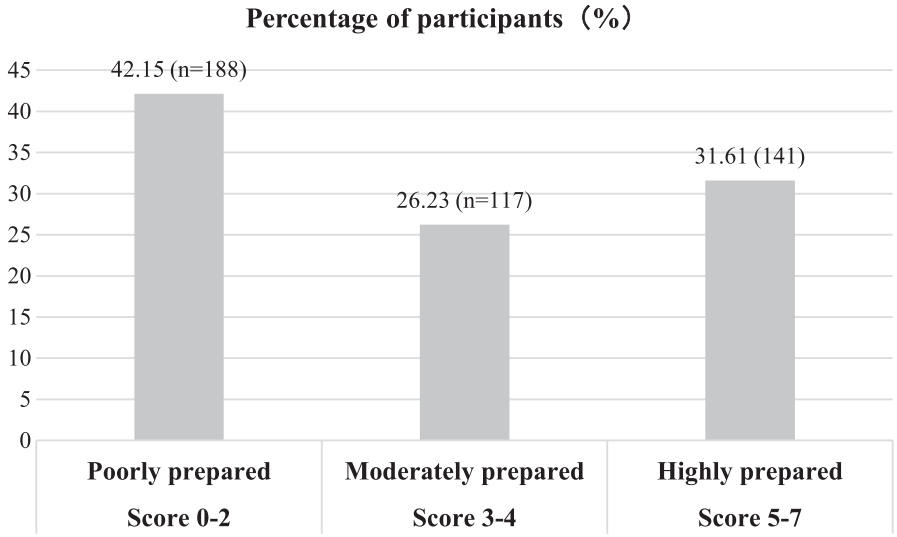

FIGURE 1 Distribution of preparedness scores among haemodialysis patients ($n=446$).

TABLE 1 Results of general preparedness behaviours ($n=446$).

Questions	Yes: prepared	No: not prepared	Percentage of preparedness(%)
If it is difficult to prescribe dialysis medications after a disaster, is your normal supply of medications on hand enough to last 2 weeks?	296	150	66.38
Do you carry with you a medication list, noting the name and dose?	166	280	37.22
Do you prepare a medical ID bracelet that identifies you as a HD patient?	191	255	42.83
If phone lines were working, do you prepare a card or paper with your supervising physician number if you need it?	250	196	56.05
If phone lines were working, do you prepare a card or paper written regular haemodialysis center number in case you need it?	266	180	59.64
Do you have a disaster kit at home in case of a major disaster?	150	296	33.63
Do you and your loved ones make a designated 'meeting place' for an evacuation plan in case of an emergency?	157	289	35.20

personal preparedness and factors related to the level of preparedness were discussed in detail in the following sessions.

4.1 | The status of personal preparedness among patients on HD

To our knowledge, this was the first study on emergency preparedness among patients on HD in China. Our results indicated that disaster preparedness among patients on HD remained inadequate, consistent with findings from studies conducted in Japan and other Western countries (Murakami et al., 2015; Nihonyanagi et al., 2022). Previous studies have suggested that those with kidney problems, particularly maintenance dialysis patients, may experience more difficulty in sustaining the continuity of their regular dialysis, medication, or medical care when a sudden onset of a disaster strikes. (Abir et al., 2013; Cary & Schroeder, 2008; Nishikawa et al., 2018; Vanholder et al., 2021). Such patients include those who were unaware of the dialysis center evacuation plan, those who had 38 or fewer billed dialysis sessions in the 3 months prior to the hurricane, those who lived alone before the storm (Anderson et al., 2009), those who lived at a distance from the dialysis facility (Abir et al., 2013), those whose houses were destroyed (Murakami et al., 2015) and those who received inadequate medical care at home (Mellgard et al., 2019). Interestingly, There were two

TABLE 2 Relationships among sociodemographic characteristics, attitudes toward disaster preparedness and personal preparedness behaviours ($n=446$).

Items	Groups	Preparedness categories			Statistic[a]	p
		Poor ($n=188$)	Moderate (n=117)	High ($n=141$)		
Sociodemographic characteristics						
Age	<60	162	95	118	$Z=-0.720$	0.472
	≥60	26	22	23		
Gender	Male	108	71	73	$\chi^2=2.184$	0.336
	Female	80	46	68		
Education	Junior high school or lower	87	62	91	$H=15.169$	0.001**
	Senior high school	66	45	40		
	University or higher	35	10	10		
Living place	Urban area	109	70	61	$\chi^2=13.981$	0.007**
	Town	46	26	57		
	Rural area	33	21	23		
Who to live with	Living alone	25	13	8	Fisher	0.062
	Living with family	160	104	129		
	Living with others	3	0	4		
Marital status	Unmarried	17	14	7	$\chi^2=9.803$	0.155
	Married	147	92	125		
	Divorced	19	7	6		
	Widowed	5	4	3		
Attitudes toward disaster preparedness						
Knowledge of disaster preparedness	Knowing about disaster preparedness	81	73	117	$\chi^2=53.961$	0.000**
	No knowledge of disaster preparedness	107	44	24		
Self-assessment of the need to know about disaster preparedness	Not at all	2	5	14	$H=17.749$	0.001
	No need	7	10	7		
	Uncertainty	28	10	23		
	Need	116	67	85		
	Totally need	35	25	12		
The importance of personal preparedness for disaster response	Very important	91	52	85	$H=6.490$	0.165
	Comparatively important	34	22	26		
	Important	50	36	27		
	Not really important	12	6	3		
	Not important	1	1	0		
Learned/not learned about disaster preparedness	Yes	49	45	105	$\chi^2=78.829$	0.000**
	No	139	72	36		
Whether or not you participated in a disaster evacuation exercise	Yes	32	32	83	$\chi^2=66.104$	0.000**
	No	156	85	58		
Confidence in personal readiness to meet one's own needs when a disaster occurred.	I feel very confident that I could deal with all my needs.	29	40	81	$H=71.161$	0.000**
	I feel confident that I could meet some of my needs.	104	56	52		
	I feel less confident that I could not deal with all my needs	55	21	8		

Note: Multiple samples Kruskal–Wallis test was used for comparison between the three continuous groups and above. *H* was the result of the Kruskal–Wallis test. Binary and unordered categorical variables were compared using Pearson χ^2 or Fisher's exact test, when appropriate.

[a]Two independent samples Mann–Whitney *U* test was used for two ordinal group comparison and *Z* was the result of the Mann–Whitney *U* test.

**$p<0.01$ is statistically significant.

TABLE 3 Results of ordinal logistic regression model analysis for MHD patients ($n=446$).

Variables	*B*	*p*	OR	95% confidence interval for OR	
				Lower bound	Upper bound
Education (refence: university or higher)					
Junior high school or lower	1.250	0.000**	3.491	1.760	6.925
Senior high school	0.719	0.039*	2.052	1.038	4.057
Living place (refence: rural area)					
Urban area	−0.364	0.199	0.695	0.398	1.211
Town	−0.013	0.965	0.987	0.551	1.767
Knowledge of disaster preparedness (refence: no knowledge of disaster preparedness)					
Knowing about disaster preparedness	0.525	0.021*	1.691	1.081	2.644
Has there been a need to know about disaster preparedness? (refence: totally need)					
Not at all	0.630	0.274	1.877	0.608	5.794
No need	0.507	0.275	1.660	0.668	4.122
Uncertainty	0.162	0.651	1.176	0.582	2.377
Need	0.083	0.764	1.087	0.631	1.870
Have participated in a disaster evacuation exercise? (refence: no)					
Yes	0.924	0.000**	2.519	1.595	3.977
Have you learned about disaster preparedness? (refence: no)					
Yes	0.884	0.000**	2.421	1.542	3.802
How did you feel about your preparation to deal with your needs as a HD patient after a major disaster? (refence: I feel less confident that I could not deal with all my needs)					
I feel very confident that I could deal with all my needs	1.355	0.000**	3.878	2.904	7.181
I feel confident that I could meet some of my needs.	0.667	0.017*	1.949	1.124	3.379

Note: Link function: Logit. Pseudo $R^2=0.170$. Pearson: $\chi^2=409.435$, $p=0.457$, deviance: $\chi^2=163.680$, $p=0.000$.
*$p<0.05$ is statistically significant. **$p<0.01$ is statistically significant.

studies reporting that people with multiple chronic health problems, such as older adults, were more likely to be prepared for a disaster (Kang, 2014; Qin et al., 2022) because they were generally required to store a three-day supply of medications at home to maintain the stability of their health conditions.

4.2 | Influencing factors associated with personal preparedness in patients undergoing HD

The sociodemographic characteristics were different among those who were at the high preparedness level and those in the moderate and poor preparedness levels. The sociodemographic data suggested that education level was negatively related to preparedness level. It was controversial whether the level of education was a positive predictor of disaster preparedness (Najafi et al., 2015; Ning et al., 2013; Zhu et al., 2020). It seems reasonable that patients with higher education levels usually have better theoretical knowledge, but they do not translate their knowledge into effective behaviour for daily disaster preparedness (Ning et al., 2013). In addition, research showed that only a few patients prepared ID bracelets in the US or Japan (Foster et al., 2011; Nihonyanagi et al., 2022). In our study, highly educated patients disliked wearing bracelets and they were not likely to stockpile medication. This may be because they did not like wearing the ID bracelet and they made rational self-medication and behavioural decisions to dispose of and consume medications (the proportion of self-medication in the low education level group was significantly higher than in the high education level group) (Lei et al., 2017).

The regression analysis indicated that attitudes toward disaster preparedness, including knowing about disaster preparedness, participating in disaster drills and learning about disaster preparedness, were associated with high preparedness. Both training and preparedness education were proven to be effective in improving preparedness (Hoffmann & Muttarak, 2017; Torani et al., 2019), so it is evident that patients who learned preparedness knowledge or attended preparedness training, such as disaster evacuation exercise, had higher levels of preparedness.

4.3 | Other factors and personal preparedness

In our results, most patients prepared 2 weeks of medication available, while the fewest patients prepared a disaster kit and were ready to go. In China, storing medicines at home was common, with a prevalence of more than 60%. The drugs stored were mainly cold

medicines, chronic drugs and antibiotics (Cai, 2018; Liu et al., 2011). In addition, Chinese citizens were most likely to stockpile non-steroidal anti-inflammatory drugs and antidiarrheal drugs (Ge et al., 2022). Polypharmacy was common among patients receiving HD, accounting for anti-hypertensive drugs, anti-anaemia drugs, lipid-lowering medications, phosphate binders and vitamin D preparations (Shouqair et al., 2022). Thus, it was understandable for Chinese residents, especially patients on HD, to prepare medicines. Our results indicated that patients performed better in the medical aspects of preparing medications and recording the phone number of the supervising physician or dialysis center. In contrast, our patients performed worse in the routine disaster preparation aspects of preparing medication lists, disaster emergency kits, shelter locations and ID bracelets, relatively. The reason why the majority of patients did well in preparing their medication could be due to the health insurance policy that allows most patients with renal diseases to be prescribed medications once a month in the outpatient clinic (Bi et al., 2020). This suggests that medical institutions often focus on medical specialty education while neglecting general education. Thus, it is necessary to strengthen general preparedness for an emergency or natural disaster in addition to specialized medical aspects of disaster education.

Since our survey was conducted during the COVID-19 pandemic, other external, unpredictable factors may affect the level of preparedness. In addition to buying and stockpiling emergency supplies such as masks and alcohol, Chinese citizens were most likely to engage in panic buying and stockpiling antiviral and antipyretic medicines during the COVID-19 pandemic (Jin-yu et al., 2021). They might be fearful of where and how to prepare themselves for transportation, public transportation and dialysis facilities due to policy issues related to social distancing, isolation and quarantine measures (Verma et al., 2020). Evidence has demonstrated that unpredictable and long-lasting disasters such as COVID-19, which originated in China, could lead to mental health conditions or disorders such as depression, post-traumatic stress disorder and anxiety (Hossain et al., 2020). When people are in distressing situations, their ability to respond to a disaster could be affected (Roudini et al., 2017).

The majority of HD patients were more likely to prepare a supply of medications sufficient to last at least 2 weeks during the COVID-19 pandemic. However, since our questionnaire entries did not include COVID-19 preparedness, it could be a shortfall that limited generalization could be made. Further studies will be needed to explore disaster preparedness for multiple incidents (e.g., earthquake, pandemic) which may occur simultaneously.

Thus, healthcare providers should provide high-quality education about disaster preparedness to their patients and more attention should be paid to the public to improve their recognition and preparation for disasters.

4.4 | Limitations

Several limitations must be considered in this study. First, this study applied a convenience sampling methodology, which may raise the possibility of selection bias due to the non-random sampling among the six selected hospitals. Second, this study was conducted in Chengdu, Sichuan Province, China and the results may differ in other settings. Third, although the instruments used in the present study had satisfactory properties, no additional psychometric testing was done due to resource limitations. This is a limitation of our study, and we recommend further psychometric optimization and validation of the questionnaire in future research. Additionally, the disaster event in our study was an imaginary natural disaster such as an earthquake, fire, or flood where participants live, which did not align with an actual disaster event. Thus, our results may not totally reflect the level of preparedness. Finally, the cross-sectional design of this study did not allow for the determination of causal relationships among study variables. Future research with a longer time frame for follow-up observations or an extended longitudinal study is still needed.

5 | CONCLUSION

Certain sociodemographic characteristics and attitudes toward disaster preparedness predicted personal disaster-related preparedness behaviour in the event of an emergency. Factors such as education level, self-perceived knowledge of disaster preparedness, participation in disaster drills, learning about disaster preparedness and patients' perceived confidence in their self-needs were associated with their disaster preparedness. The results of this study could provide valuable insights for improving disaster preparedness among targeted patients on HD. Administrators could provide targeted training regarding disaster preparedness to further enhance their preparedness.

AUTHOR CONTRIBUTIONS

Linfang Zhu: methodology, conceptualization, writing—original draft, writing—review and editing; **Yang Liu**: data collection, writing—review and editing; **Ruoxi Liao**: writing—review and editing; **Ping Fu**: resource; **Sijian Li**: conceptualization, writing—review and editing; **Huaihong Yuan**: data collection, resource.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data available on request from the corresponding authors.

ETHICS STATEMENT

The study was approved by the ethics committee of the West China Hospital of Sichuan University (IRB No. 2022-993).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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