

# Health Inequity Associated with Financial Hardship Among Patients with End-stage Kidney Disease: A Secondary Analysis

--Manuscript Draft--

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<b>Abstract:</b>	Financial hardship is a common challenge among patients with end-stage kidney disease and may have negative health consequences. Therefore, financial status is regarded as an important determinant of health, and its impact needs to be investigated. This cross-sectional study aimed to identify the differences in patient-reported and clinical outcomes among patients with different financial status. 354 patients with end-stage kidney disease were recruited from March to June 2017 at two regional hospitals in Hong Kong. The Dialysis Symptoms Index and Kidney Disease Quality of Life-36 were used to evaluate patient-reported outcomes. Clinical outcomes were retrieved from medical records and assessed using the Karnofsky Performance Scale (functional status) and Charlson Comorbidity Index (comorbidity level). Patients were stratified using two dichotomised variables, employment status and income level, and their outcomes were compared using independent sample t-tests. In this sample, the employment rate was 17.8% and the poverty rate was 61.2%. Compared with other patients, increased symptom distress, a higher comorbidity level, and more emergency room visits were found in patients with poorer financial status. Unemployed patients reported a decreased physical quality of life, while low-income patients had a lower serum albumin concentration than other patients (all $p < 0.05$ ). Financially underprivileged patients experienced health inequity in terms of impaired patient-reported and clinical outcomes. Attention needs to be paid to these patients by providing financial assessments and interventions. Additional research is warranted to understand the experience of financial hardship and examine equity in healthcare.
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## Abstract

Financial hardship is a common challenge among patients with end-stage kidney disease and may have negative health consequences. Therefore, financial status is regarded as an important determinant of health, and its impact needs to be investigated. This cross-sectional study aimed to identify the differences in patient-reported and clinical outcomes among patients with different financial status. 354 patients with end-stage kidney disease were recruited from March to June 2017 at two regional hospitals in Hong Kong. The Dialysis Symptoms Index and Kidney Disease Quality of Life-36 were used to evaluate patient-reported outcomes. Clinical outcomes were retrieved from medical records and assessed using the Karnofsky Performance Scale (functional status) and Charlson Comorbidity Index (comorbidity level). Patients were stratified using two dichotomised variables, employment status and income level, and their outcomes were compared using independent sample t-tests. In this sample, the employment rate was 17.8% and the poverty rate was 61.2%. Compared with other patients, increased symptom distress, a higher comorbidity level, and more emergency room visits were found in patients with poorer financial status. Unemployed patients reported a decreased physical quality of life, while low-income patients had a lower serum albumin concentration than other patients (all  $p < 0.05$ ). Financially underprivileged patients experienced health inequity in terms of impaired patient-reported and clinical outcomes. Attention needs to be paid to these patients by providing financial assessments and interventions. Additional research is warranted to understand the experience of financial hardship and examine equity in healthcare.



## Introduction

The global burden of end-stage kidney disease (ESKD) is increasing. More than 2 million patients have been diagnosed and treated with life-sustaining dialysis therapy worldwide (1). In some countries, 2–3% of healthcare expenditures are used for managing ESKD, and the demand for dialysis continues to surge (2). At the individual level, patients often experience financial hardship associated with high treatment costs, unemployment, and reduced income. Although many countries provide reimbursement for dialysis therapy, patients are required to cover 12–71% of the costs out of pocket (3). In addition, these patients have reduced productivity associated with disease-related disabilities. According to an international survey (4), less than 55% of haemodialysis (HD) and 68% of peritoneal dialysis (PD) patients are employed. Limited income due to decreased employment may amplify financial hardship among these patients (5).

Financial hardship is a profound and significant determinant of health. Patients utilize their personal resources to pay for their medical and other daily expenses, which may lead to the depletion of financial reserves or incurrence of debt (6). Evidence suggests that impaired financial well-being is associated with poor physical and psychological health in patients with chronic illnesses (7). Negative health outcomes, including depression, anxiety, lower health-related quality of life (HRQoL), and higher mortality risk, have been reported (8,9). These outcomes may be seen as the consequences of health inequity caused by social determinants, especially financial factors.

Despite the impact of financial hardship on health, few studies have evaluated the relationships between this hardship and various health outcomes among patients with ESKD (10). A better understanding of these relationships may advance our understanding of health inequity among patients with ESKD. Hence, in addition to financial aids, renal care providers can proactively identify financially underprivileged patients and provide specific

interventions that promote equal participation in daily life (11). Therefore, the aim of this secondary analysis was to identify the differences in patient-reported and clinical outcomes between ESKD patients with high and low financial status.

## **Materials and Methods**

The cross-sectional data of 354 patients from a mixed-methods study were analysed (12). These patients were recruited from two regional hospitals in Hong Kong from March to June 2017. The inclusion and exclusion criteria have been described in our previous reported. After obtaining informed consent, a research assistant administered a questionnaire and reviewed electronic health records. This study was approved by the institutional research boards of the university and the involved hospitals.

## **Instruments**

Symptoms and HRQoL were selected as the patient-reported outcomes. The Dialysis Symptoms Index (DSI) was used to assess 30 symptoms experienced in the past month. A higher score indicates a higher level of distress. The Chinese version of the DSI demonstrated excellent content validity (0.99) and internal consistency ( $\alpha = 0.87$ ) (13). The Kidney Disease Quality of Life-36 was used to evaluate the HRQoL of patients. It consists of 24 disease-specific and 12 generic questions that can be divided into three subscales and two summary scores. A higher score indicates better performance in the specific domain. Its Chinese version demonstrated good test-retest reliability (interclass correlation coefficient = 0.79–0.92) and acceptable internal consistency ( $\alpha = 0.60$ –0.93) (14).

The clinical outcomes included the functional status, comorbidity level, healthcare service utilization, and biochemical parameters. The Karnofsky Performance Scale was used to evaluate functional status (range: 0–100) (15). The Charlson Comorbidity Index was used

to assess the comorbidity level (range: 0–33) (16). Other clinical data were retrieved from the patients' electronic health records.

## Analyses

Background characteristics and outcomes were summarised using descriptive statistics (e.g., frequency, percentage, mean). Two dichotomized variables that reflected the patient's financial status were created: employment status and income level. In terms of income level, those earning a monthly household income of  $\leq 10,000$  HKD (approximately 1,290 USD) were regarded as below the poverty line, which is in line with the government's definition (17). After stratifying the patients by these variables, patient-reported and clinical outcomes were compared using independent sample t-tests. All analyses were conducted using SPSS version 25.0 (IBM Corp., Armonk, NY). A two-sided p-value of  $< 0.05$  was considered as statistically significant.

## Results

Of the 354 patients, 58.5% were male. The patients had a mean age of 60.9 years (Table 1). Most of the patients received PD (69.9%) and had been on dialysis for a mean of 51.6 months. Overall, 17.8% of the patients were employed, and 61.2% were below the poverty line. The education level significantly differentiated patients regardless employment status and income level ( $p \leq 0.001$ ). Compared with other patients, a larger proportion of employed patients had received kidney transplants (9.5%;  $p = 0.035$ ), and a larger proportion of patients above the poverty line were married (76.6%;  $p = 0.01$ ).

Table 1 presents the differences in patient-reported and clinical outcomes between groups. Compared with employed patients, those who were unemployed reported higher levels of tiredness (mean: 2.33), joint or bone pain (mean: 1.60), and trouble falling asleep (mean: 2.13) (all  $p \leq 0.033$ ). The KDQOL-36 Physical Component Summary scale scores

(mean: 37.27) for unemployed patients were significantly lower than for employed patients ( $p = 0.011$ ). Patients below the poverty line reported higher levels of dry mouth (mean: 1.63), dry skin (mean: 2.68), itching (mean: 2.76), and trouble staying asleep (mean: 2.07) than those above the poverty line (all  $p \leq 0.045$ ). Interestingly, patients with lower income had less severe sexual symptoms ( $p \leq 0.004$ ), namely a decreased interest in sex (mean: 0.41) and difficulty becoming sexually aroused (mean: 0.37). However, no significant difference was found in other KDQOL-36 sub-scale scores.

In terms of clinical outcomes, in general, patients with a poorer financial status had higher comorbidity levels (all  $p \leq 0.033$ ) and more emergency room (ER) visits in the past six months (all  $p \leq 0.008$ ) than other patients. In addition, patients below the poverty line had a lower serum albumin concentration (mean: 35.39 g/L) than did patients with higher earnings ( $p = 0.004$ ).

## Discussion

The findings from this secondary analysis suggest that patient-reported and clinical outcomes differ between patients with different financial statuses in terms of their employment and income level. Patients who were financially underprivileged reported higher distress associated with symptoms, higher comorbidity levels, and more ER visits than other patients. Consistent with existing evidence (8,9), the impact of financial hardship on health disparities among patients with ESKD warrants additional attention.

The rates of unemployment and poverty in this study were much higher than the rate of poor households in the territory (cf. employment rate: 34.9%; poverty rate: 21.4%) (17). This finding is an alarming sign that in this city, which is well known for economic inequality, financial hardship is very common among patients with ESKD. Our findings indicate the negative impact of such hardship within this group. There are some possible reasons for this relationship. As reported in one study (18), financially underprivileged

patients may have fewer resources to pay for healthcare services, especially preventive care. This may explain why patients with impaired financial well-being reported poorer outcomes, particularly a higher mean number of ER visits. Therefore, renal care providers need to pay special attention to the financial needs of patients by incorporating appropriate assessments and interventions in routine care (10). Nevertheless, there is a need to examine equity in the healthcare system to ensure that essential services are provided regardless of a person's financial status. In addition, there may be a reciprocal relationship between financial hardship and outcomes. While symptoms and other outcomes are signs of deteriorating health, patients with a poorer symptom status or poorer outcomes may have a higher demand for healthcare services and a lower physical capacity for engaging actively in employment (19). These consequences lead to increased medical expenditures and decreased income, which eventually intensify financial hardship (6). A better understanding of the experience of financial hardship is warranted to explore the factors that modulate the relationship between financial hardship and health.

Our preliminary evidence reveals the consequences of health inequity and suggests directions for researching issues associated with financial hardship among patients with ESKD. However, several limitations warrant consideration. Although cross-sectional data were analyzed and limited variables were evaluated, other factors that might confound the relationship between financial hardship and outcomes (e.g., financial aids) were not controlled. In addition, financial status was conceptualized in terms of employment status and income level only, which might inadequately reflect the full picture of financial well-being. Therefore, the following suggestions are made: 1) factors influencing financial hardship should be identified and controlled in further analyses; 2) a longitudinal study should be conducted to evaluate changes in financial status; and 3) a comprehensive conceptualization of financial hardship should be adopted.

## **Conclusion**

Financial hardship is very common among patients with ESKD, especially in Hong Kong, in terms of high percentages of unemployment and poverty. Our preliminary evidence suggests that this hardship may result in health inequity and manifest in impaired patient-reported and clinical outcomes. Additional research is warranted to understand the experience of financial hardship and the equity of the healthcare system.

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## **Financial Disclosure**

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## **Competing Interests Statement**

The authors have declared that no competing interests exist.

## **Ethics Statement**

This study was approved by the Joint CUHK-NTEC Clinical Research Ethics Committee (reference number: 2017.092). Written consent was obtained from all participants.

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Table 1. Background Characteristics and Comparison of Patient-reported and Clinical Outcomes

	Overall (N=354)		Unemployed (n=291; 82.2%)		Employed (n=63; 17.8%)				Below Poverty Line (n=217; 61.3%)		Above Poverty Line (n=137; 38.7%)			
<i>Background characteristics</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>p</i>		<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>		<i>p</i>
Male	207	56.7%	164	56.4%	43	68.3%	0.082		128	59.0%	79	36.4%		0.806
Married	243	66.6%	206	70.8%	37	58.7%	0.061		138	63.6%	105	76.6%		0.010*
Secondary education	231	63.3%	177	60.8%	54	85.7%	<0.001**		127	58.5%	104	75.9%		0.001*
Peritoneal dialysis	255	69.9%	212	72.9%	43	68.3%	0.461		158	72.8%	97	70.8%		0.682
History of transplantation	16	4.4%	10	3.4%	6	9.5%	0.035*		10	4.6%	6	4.4%		0.920
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>P</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>P</i>
Age (years)	60.93	11.89	62.70	0.11	52.63	11.00	6.51	<0.001**	63.36	11.51	57.10	0.12	4.98	<0.001**
Month on dialysis	51.63	64.96	50.32	61.02	57.59	80.75	-0.80	0.503	52.01	57.28	51.05	75.53	0.13	0.899
<i>Patient-reported outcomes</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>P</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>P</i>
Tiredness	2.23	1.66	2.33	1.65	1.79	1.65	2.34	0.020*	2.21	1.64	2.28	1.70	-0.386	0.700
Dry mouth	1.49	1.56	1.54	1.58	1.24	1.43	1.38	0.164	1.63	1.60	1.26	1.46	2.22	0.027*
Joint/bone pain	1.51	1.75	1.60	1.75	1.08	1.69	2.14	0.033*	1.55	1.74	1.43	1.77	0.64	0.522
Dry skin	2.42	1.73	2.42	1.78	2.40	1.51	0.10	0.918	2.68	1.68	1.99	1.73	3.72	<0.001**
Itching	2.58	1.74	2.66	1.76	2.21	1.62	1.86	0.063	2.76	1.75	2.28	1.70	2.58	0.010*
Trouble falling asleep	2.02	1.98	2.13	1.99	1.51	1.87	2.26	0.024*	2.12	1.99	1.85	1.97	1.29	0.200
Trouble staying asleep	1.92	1.88	2.00	1.89	1.54	1.76	1.76	0.080	2.07	1.86	1.66	1.88	2.01	0.045*
Decreased interest in sex	0.56	1.28	0.54	1.29	0.70	1.20	-0.92	0.361	0.41	1.08	0.82	1.51	-2.99	0.003*
Difficulty getting sexually aroused	0.53	1.27	0.48	1.25	0.73	1.33	-1.40	0.164	0.37	1.51	0.77	1.52	-2.92	0.004*
KDQOL-36 PCS	37.87	9.54	37.27	9.61	40.65	8.74	-2.57	0.011*	37.51	9.56	38.45	9.50	-0.90	0.367
KDQOL-36 MCS	48.54	10.84	48.80	11.05	47.36	9.86	0.96	0.340	47.88	10.98	49.58	10.59	-1.44	0.151
<i>Clinical Outcomes</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>P</i>	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>P</i>
KPS	88.59	13.43	87.56	14.07	93.33	8.61	-4.24	<0.001**						
CCI	1.83	2.00	1.98	2.05	1.14	1.64	3.05	0.002*	2.01	1.85	1.55	2.20	2.14	0.033*
ER attendance	0.60	1.12	0.68	1.20	0.24	0.56	4.43	<0.001*	0.72	1.28	0.42	0.80	2.68	0.008*
Serum albumin (g/L)	35.96	4.68	35.73	4.74	36.98	4.28	-1.91	0.054	35.39	4.83	36.85	4.30	-2.88	0.004*

\*P < 0.05; \*\*P < 0.001

Abbreviations: CCI = Charlson Comorbidity Index; ER = Emergency room; g/L = Gram per litre; KDQOL-36 = Kidney Disease Quality of Life-36; ; KPS = Karnofsky Performance Scale; MCS = Mental Component Summary; PCS = Physical Component Summary