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Psychosocial, Behavioral, and Spiritual Determinants of Quality of Life in Chronic Kidney Disease: A Path Analysis Study

Achmad Fauzi[1], Fatimah Ahmedy[2], Alvin Oliver Payus D.[3], Maryama Bte Ag. Daud[4] Reniyah Reniyah[1],

[1]Department Keperawatan, STIKES Abdi Nusantara, Indonesia
[2] Sabah Rehabilitation Research & Service, Faculty of Medicine & Health Sciences, Universiti Malaysia Sabah
[3]Faculty of Medicine and Health Science, Universiti Malaysia Sabah
[4]Physical Fitness Rehabilitation Centre, Faculty Psychology and Education, Universiti Malaysia Sabah
**Corresponding E-mail: fauzi.umay@gmail.com*

A B S T R A C T

Introduction: Chronic Kidney Disease (CKD) is a progressive, irreversible condition that impairs physical, psychological, and social functioning, reducing patients' quality of life (QoL). While factors like treatment adherence, social support, coping, and spirituality have been linked to QoL, few studies have explored their interrelationships in low- and middle-income countries. **Objective:** This study examined the direct and indirect associations among psychosocial, behavioral, and spiritual factors and quality of life among patients with chronic kidney disease undergoing maintenance hemodialysis in Indonesia using a hypothesized path model. **Methods:** A cross-sectional study was conducted with 300 adult CKD patients from three hemodialysis centers in Jakarta, selected via consecutive sampling. QoL (KDQOL-36™), social support, treatment adherence, self-efficacy, health literacy, coping strategies, and spiritual well-being were assessed using validated instruments. Path analysis was performed using AMOS version 24, with model fit evaluated using CFI, TLI, RMSEA, and SRMR. Significance was set at $p < .05$. **Results:** The model showed good fit (CFI = 0.945, TLI = 0.927, RMSEA = 0.057, SRMR = 0.048). Treatment adherence had the strongest direct effect on QoL ($\beta = 0.31$, $p < .001$), followed by coping strategies ($\beta = 0.24$) and spiritual well-being ($\beta = 0.22$). Social support, self-efficacy, and health literacy indirectly influenced QoL through treatment adherence. The highest total effect on QoL was from treatment adherence ($\beta = 0.31$), followed by coping ($\beta = 0.24$), spirituality ($\beta = 0.22$), and social support ($\beta = 0.18$). **Conclusion:** QoL in CKD patients is influenced by treatment adherence, coping, spirituality, and psychosocial support. Holistic, culturally sensitive interventions integrating education, psychological support, and spiritual care are essential to improve outcomes in resource-limited settings.

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1. INTRODUCTION

Chronic Kidney Disease (CKD) represents a long-term, progressive health condition that cannot be reversed and often leads to profound disruptions in physical capabilities, emotional stability, and social functioning. These challenges collectively contribute to a decline in the overall quality of life (QoL) experienced by affected individuals (Ying et al., 2024). Affecting roughly one in ten adults worldwide, CKD continues to rise in prevalence, particularly in low- and middle-income countries, making it an urgent global public health issue (Pippias et al., 2024). Beyond the medical complications it brings, individuals living with CKD frequently report experiencing persistent psychological burden, exhaustion from ongoing treatments, and limitations in fulfilling social roles factors that can severely erode their sense of well-being (So et al., 2023).

Multiple psychosocial and behavioral aspects are now understood to significantly influence QoL among individuals with CKD. Notably, family and social support serve as protective factors by helping patients manage emotional strain, encouraging positive adaptation, and improving their commitment to treatment plans (Nu'im Haiya et al., 2024; Wang et al., 2024). Adhering to prescribed therapies—including medication intake, dietary modifications, fluid restrictions, and regular dialysis sessions—has consistently been associated with better health outcomes and enhanced QoL in this population (Forwaty & Delvira, 2023; Rahayu, 2019). Furthermore, patients who believe in their ability to handle the challenges of their condition, or who demonstrate high self-efficacy, are more likely to practice effective self-care and demonstrate adaptive coping responses (Angraini & Febriani, 2024).

Health literacy also plays a crucial role by equipping patients with the ability to understand, interpret, and apply health-related information. When patients possess strong health literacy skills, they are more capable of making informed decisions and maintaining consistent treatment behaviors, ultimately supporting better quality of life (Fauzi & Nishaa, 2018). In parallel, the ways in which individuals cope with the demands of chronic illness through psychological and behavioral strategies affect their emotional adaptation and motivation. Constructive, problem-focused coping is commonly linked to higher emotional resilience, while avoidance-based coping can increase vulnerability to stress and disengagement (Rosliana & Huriah, 2019).

Another dimension that has gained increasing attention is spiritual well-being. For many individuals facing chronic or life-limiting diseases such as CKD, spirituality offers emotional refuge and existential meaning. It fosters hope and inner peace, which are known to contribute positively to psychological health and overall quality of life, especially for those undergoing long-term dialysis treatment (Liana, 2019; Mailani et al., 2024). In the Indonesian cultural context, spirituality is deeply interwoven with health perceptions and behaviors, making it a critical factor in the broader framework of care.

Although various studies have acknowledged the relevance of these factors, most investigations to date have approached them individually or through simple pairwise correlations (Rustandi et al., 2018; Setiawan, 2017). There remains a gap in research that comprehensively models the interplay among these psychosocial variables, particularly with treatment adherence positioned as a mediating mechanism. Furthermore, very few studies have integrated constructs such as social support, health literacy, self-efficacy, coping, and spirituality into a single analytical

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framework especially in the context of low- and middle-income countries, where health systems and cultural influences may significantly affect patient behavior.

This study is designed to address these gaps by examining both the direct and indirect relationships among the key psychosocial and spiritual determinants of QoL in individuals with CKD. By employing path analysis, the research aims to uncover the complex mechanisms that link social, behavioral, and emotional dimensions with patient outcomes. The findings are expected to inform culturally tailored and holistic interventions that can enhance quality of life and promote more effective long-term disease management in this vulnerable population.

The proposed model was theoretically informed by Wilson and Cleary's Quality of Life Model, which explains quality of life as a multidimensional outcome shaped by biological, psychological, functional, and individual characteristics. In this study, psychosocial support, self-efficacy, health literacy, treatment adherence, coping strategies, and spiritual well-being were positioned as interrelated determinants of QoL among patients undergoing hemodialysis. Social Cognitive Theory further supports the role of self-efficacy in shaping health behavior, while Self-Regulation Theory provides a rationale for the role of coping and adherence in chronic illness management.

2. METHODS

Study Design

This research applied a quantitative, cross-sectional design using a correlational framework to explore both direct and indirect associations among psychosocial, behavioral, and spiritual factors with quality of life (QoL) in patients diagnosed with chronic kidney disease (CKD). Path analysis was employed to test the structural relationships outlined in the conceptual model.

Setting and Participants

The study was carried out in three hemodialysis centers located in both urban and semi-urban districts of Jakarta, Indonesia. Participants included adult patients undergoing regular hemodialysis. Eligibility criteria encompassed individuals who were (1) 18 years or older, (2) clinically diagnosed with stage 5 CKD and receiving maintenance hemodialysis for a minimum duration of three months, (3) able to read and comprehend Bahasa Indonesia, and (4) willing to participate voluntarily with written informed consent. Those with known severe psychiatric conditions or cognitive impairments were excluded from participation.

Sample size requirements were calculated using structural equation modeling guidelines, which recommend a minimum subject-to-parameter ratio of 10:1. With 25 parameters in the proposed model, at least 250 participants were needed. Anticipating potential data loss, a total of 300 participants were recruited through consecutive sampling (Hidayat, 2016; Notoatmodjo, 2018).

Measurement Tools

Quality of life was measured using the Kidney Disease Quality of Life Short Form (KDQOL-36™), a tool validated specifically for individuals with CKD (Ricardo et al., 2013). Perceived social support was assessed using a revised Family Support Questionnaire derived from

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(Friedman (2010), incorporating domains of emotional, informational, and instrumental support. Treatment adherence was evaluated with a self-report tool designed according to adherence principles for chronic conditions, based on guidelines by Fauzi & Nishaa (2018), covering medication use, dietary control, fluid restrictions, and dialysis attendance. The Chronic Disease Self-Efficacy Scale was adapted for the CKD population to assess patients' confidence in managing their health (Angraini & Febriani, 2024).

Health literacy was measured using a version of a validated health literacy instrument, adjusted to Bahasa Indonesia, capturing functional, communicative, and critical literacy domains. Coping strategies were evaluated using a culturally adapted form of the Brief COPE Inventory, which includes both adaptive and maladaptive coping mechanisms (Rosliana & Huriah, 2019). Spiritual well-being was measured through an instrument rooted in Mailani (2024) work, reflecting both existential and religious aspects of spirituality.

All tools underwent forward and backward translation for linguistic equivalence. Content validity was reviewed by a panel of five experts in nephrology and nursing science. A pilot test with 30 hemodialysis patients demonstrated acceptable reliability, with all subscales reporting Cronbach's alpha values above 70.

Procedure

Prior to data collection, ethical clearance was obtained from the relevant institutional ethics committee. Potential participants were approached during their routine dialysis sessions. Upon confirming eligibility, written informed consent was secured. Participants were then provided with self-administered questionnaires, completed under supervision to reduce incomplete responses. Data collection occurred over a two-month period in 2024.

Data Analysis

Descriptive analyses were conducted to summarize participant demographics and clinical profiles. Path analysis was performed using AMOS version 24 to examine the proposed model and assess the magnitude and direction of relationships among variables. Model fit was evaluated using standard indices: Chi-square (χ^2), Comparative Fit Index (CFI > .90), Tucker-Lewis Index (TLI > .90), Root Mean Square Error of Approximation (RMSEA < .08), and Standardized Root Mean Square Residual (SRMR < .08). Significance of direct, indirect, and total effects was interpreted using standardized path coefficients (β), with a significance level of $p < .05$. Prior to model estimation, data were screened for normality and multicollinearity. Any missing values were addressed using the Expectation-Maximization (EM) algorithm to preserve statistical power and reduce bias.

3. RESULTS

A total of 300 patients with chronic kidney disease (CKD) undergoing maintenance hemodialysis participated in the study. The majority were male (54.3%) and aged between 45–65 years (mean age: 56.7 ± 11.2 years). Most participants were married (78.0%), had completed secondary education (63.7%), and had been on hemodialysis for more than one year (61.3%) (Table 1).

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Table 1. Demographic characteristics

Characteristic	n (%) or Mean ± SD
Sex	
Male	163 (54.3%)
Female	137 (45.7%)
Age (years)	
Mean ± SD	56.7 ± 11.2
Marital Status	
Married	234 (78.0%)
Unmarried/Other	66 (22.0%)
Education Level	
Secondary education or above	191 (63.7%)
Below secondary education	109 (36.3%)
Duration of Hemodialysis	
> 1 year	184 (61.3%)
≤ 1 year	116 (38.7%)

Participants demonstrated a moderately high level of self-efficacy, with a mean score of 70.32 (SD = 9.47) and good internal consistency (Cronbach's α = 0.83), indicating a strong belief in their ability to manage CKD-related tasks. Health literacy had a mean score of 66.78 (SD = 12.01), suggesting a moderate ability to understand and apply health information, supported by acceptable reliability (α = 0.81). Coping strategies were actively employed, as reflected by a mean of 71.90 (SD = 10.33) and high internal consistency (α = 0.87), indicating the use of adaptive mechanisms to deal with illness-related stress. Spiritual well-being had the highest average score at 74.06 (SD = 8.92), with excellent reliability (α = 0.91), highlighting the significant role of spirituality as a source of comfort and emotional resilience. All measurement instruments demonstrated acceptable internal consistency reliability, with Cronbach's alpha coefficients ranging from 0.73 to 0.91. Descriptive statistics for key variables are summarized below (Table 2).

Table 2. Descriptive statistics for key variables

Variable	Mean ± SD	Cronbach's α
Quality of Life	64.23 ± 14.78	0.89
Social Support	72.45 ± 10.12	0.88
Treatment Adherence	68.91 ± 11.05	0.85
Self-Efficacy	70.32 ± 9.47	0.83
Health Literacy	66.78 ± 12.01	0.81
Coping Strategies	71.90 ± 10.33	0.87
Spiritual Well-Being	74.06 ± 8.92	0.91

The proposed path model was evaluated using AMOS 24 and demonstrated a good overall model fit with a chi-square to degrees of freedom ratio of 1.96, a Comparative Fit Index (CFI) of 0.945,

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a Tucker-Lewis Index (TLI) of 0.927, a Root Mean Square Error of Approximation (RMSEA) of 0.057, and a Standardized Root Mean Square Residual (SRMR) of 0.048.

Table 3 show the path analysis results. The strongest total effect on quality of life (QoL) was found for treatment adherence ($\beta = 0.31$, $p < .001$), indicating that consistent adherence to treatment plays the most critical role in improving QoL. Coping strategies had the second strongest total effect ($\beta = 0.24$, $p < .001$), showing that individuals who effectively manage stress and challenges tend to report higher QoL. Spiritual well-being followed closely ($\beta = 0.22$, $p < .001$), suggesting that inner peace and a sense of meaning contribute substantially to better QoL. Social support had a moderate total effect on QoL ($\beta = 0.18$, $p < .01$), demonstrating that support from others positively impacts overall well-being. Directly, treatment adherence significantly improved QoL ($\beta = 0.31$, $p < .001$), confirming its central role. Coping strategies ($\beta = 0.24$, $p < .001$) and spiritual well-being ($\beta = 0.22$, $p < .001$) also had strong direct effects, reinforcing the importance of psychological resilience and emotional strength. In terms of improving adherence itself, social support ($\beta = 0.29$, $p < .001$), self-efficacy ($\beta = 0.26$, $p < .001$), and health literacy ($\beta = 0.21$, $p < .01$) emerged as key predictors. Indirectly, QoL was positively influenced by social support ($\beta = 0.09$, $p < .01$), self-efficacy ($\beta = 0.08$, $p < .01$), and health literacy ($\beta = 0.07$, $p < .05$), mediated through treatment adherence.

Table 3. Path analysis

Effect Type	Path	Standardized Coefficient (β)	95% CI	p-value
Direct Effect	Social support → Treatment adherence	0.29	[0.21, 0.37]	< .001
Direct Effect	Self-efficacy → Treatment adherence	0.26	[0.18, 0.33]	< .001
Direct Effect	Health literacy → Treatment adherence	0.21	[0.12, 0.30]	< .01
Direct Effect	Spiritual well-being → QoL	0.22	[0.14, 0.30]	< .001
Direct Effect	Coping strategies → QoL	0.24	[0.16, 0.32]	< .001
Direct Effect	Treatment adherence → QoL	0.31	[0.24, 0.38]	< .001
Indirect Effect	Social support → QoL (via adherence)	0.09	[0.04, 0.14]	< .01
Indirect Effect	Self-efficacy → QoL (via adherence)	0.08	[0.03, 0.13]	< .01
Indirect Effect	Health literacy → QoL (via adherence)	0.07	[0.01, 0.13]	< .05
Total Effect	Treatment adherence → QoL	0.31	[0.24, 0.38]	< .001
Total Effect	Spiritual well-being → QoL	0.22	[0.14, 0.30]	< .001
Total Effect	Coping strategies → QoL	0.24	[0.16, 0.32]	< .001
Total Effect	Social support → QoL	0.18	[0.10, 0.26]	< .01

4. DISCUSSION

This study explored how psychosocial, behavioral, and spiritual components jointly shape the quality of life (QoL) in individuals undergoing long-term hemodialysis for chronic kidney disease (CKD). The findings reveal the presence of both direct and mediated relationships among key variables, offering a holistic view of the factors that contribute to patients' overall well-being.

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Among all examined factors, adherence to treatment emerged as the most influential determinant of QoL. Participants who maintained consistent adherence to medical instructions—including fluid intake control, medication schedules, dietary limitations, and dialysis routines—reported significantly better life quality. This outcome reinforces existing evidence underscoring the vital role of adherence in stabilizing clinical outcomes and improving daily functioning and satisfaction (Fauzi & Nishaa, 2018; Forwaty & Delvira, 2023; Rahayu, 2019). Conversely, insufficient adherence is often associated with increased symptom burden and hospitalization rates, which further compromise patient well-being (Kemenkes RI, 2023; Vaidya & Aeddula, 2024).

Family and social support played a pivotal role, exerting a direct influence on adherence and an indirect impact on QoL. The presence of a supportive environment—especially from family members was shown to improve patients' motivation and emotional resilience. Several studies in Indonesian contexts have highlighted the importance of family involvement in reinforcing positive health behaviors and encouraging consistent dialysis attendance (AGUSTIN, 2019; Dewi et al., 2018; Windarti, 2017). These findings are echoed by Wang et al.(2024) and Nu'im Haiya et al. (2024), who emphasized how emotional and logistical support from close relations eases the burden of chronic illness. Additional studies Fadhilah, (2020) Pamungkas et al. (2020) support the view that higher family engagement is strongly associated with improved treatment compliance.

Self-efficacy was also identified as a significant contributing factor. Individuals with greater confidence in their ability to manage the demands of illness demonstrated better adherence to their care routines, which in turn translated into enhanced QoL. This aligns with anAngraini and Febriani (2024) findings on chronic illness self-management, emphasizing that empowering patients with the skills and confidence to take control of their care has lasting benefits. Structured interventions that promote self-efficacy, such as goal-setting or counseling approaches like motivational interviewing, may therefore be effective in boosting adherence levels.

Health literacy, although not the strongest variable, indirectly influenced QoL by supporting better compliance behaviors. When patients understood their illness and treatment regimens clearly, they were more likely to make informed choices and participate actively in their care. This aligns with previous work by Rosliana and Huriah (2019), who emphasized the significance of health knowledge in sustaining daily routines for chronic conditions. As Niven (2012) noted, functional and critical health literacy is particularly essential for managing complex regimens such as fluid intake, medication adjustments, and dietary control.

Both coping mechanisms and spiritual well-being showed strong direct associations with QoL. Individuals who utilized adaptive strategies—such as seeking help or reframing challenges—tended to report greater emotional well-being and life satisfaction. These findings support previous research demonstrating that coping styles significantly shape emotional adjustment in CKD populations (Rosliana & Huriah, 2019; Rustandi et al., 2018). Spiritual well-being also contributed meaningfully to improved QoL, as it provided patients with a deeper sense of hope, meaning, and acceptance of their condition. In Indonesian society, where spiritual values are often integrated into health perceptions and care practices, this factor becomes particularly relevant (Hasanah & Ibrahim, 2019; Liana, 2019; Mailani et al., 2024).

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Taken together, these outcomes suggest that strategies to improve QoL in CKD patients must go beyond clinical symptom management. Interventions should integrate educational, emotional, behavioral, and spiritual components. Holistic care that encompasses patient education, family empowerment, coping support, and spiritual guidance is likely to result in more sustainable improvements in QoL (Batubara & Marfitra, 2020; Friedman et al., 2010; Sastra et al., 2019). These findings are also consistent with recommendations from national and international health agencies that emphasize the importance of integrated care approaches for managing CKD (Kemenkes, 2019; Pippias et al., 2024). Given the growing burden of kidney disease in Indonesia (Infodatin Kemenkes RI, 2020; Ying et al., 2024), interventions that target not only the biological but also the psychosocial and spiritual dimensions of illness are urgently needed.

5. LIMITATIONS

This study has several limitations. First, its cross-sectional design precludes causal inference, and longitudinal studies are needed to clarify temporal relationships among variables. Second, the use of self-reported instruments may have introduced recall and social desirability bias, particularly for spirituality and treatment adherence. Third, although the sample size was adequate, recruitment from hemodialysis centers in Jakarta limits the generalizability of the findings to rural or culturally different populations. Furthermore, consecutive sampling may have resulted in selection bias by including more motivated participants. Finally, despite cultural adaptation of all instruments, some constructs, particularly coping and spirituality, may not have been fully represented across subgroups. Future studies should incorporate objective clinical adherence measures, recruit participants from multiple regions, and examine contextual factors such as healthcare access, financial burden, and community support

6. CONCLUSION

This study found that treatment adherence, coping strategies, and spiritual well-being were directly associated with quality of life among patients with CKD undergoing hemodialysis. Social support, self-efficacy, and health literacy were indirectly associated with QoL through treatment adherence. Because of the cross-sectional design, these findings should be interpreted as associations rather than causal effects. Longitudinal and interventional studies are needed to confirm the direction and causal nature of these pathways.

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9. AUTHOR CONTRIBUTIONS

AF: Conceptualization, methodology, investigation, data curation, formal analysis, writing—original draft, and corresponding author.

FA: Supervision, methodology, manuscript review and editing.

AOP: Data interpretation, statistical review, manuscript review and editing.

MBAD: Validation, critical review of the manuscript, and supervision.

RR: Investigation, data collection, manuscript review, and final approval of the submitted version.

10. CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest regarding the publication of this paper.

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