Assessing Health-Related Quality of Life in Bolivian Hemodialysis Patients: Validation of the KDQOL-36™ Questionnaire

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ABSTRACT

Background: Chronic kidney disease (CKD) is a global health concern, affecting 2% of patients who may progress to end-stage renal disease (ESRD). Hemodialysis (HD) is the primary therapy, but it poses challenges, impacting patients' quality of life. In Bolivia, CKD prevalence is 40%, making it the fourth leading cause of death. Risk factors encompass restricted access to safe water, sanitation, and exposure to toxic chemicals, presenting notable public health challenges in Bolivia.. The aim of the study is to assess Health-Related Quality of Life (HRQOL) in Bolivian HD patients through the application and validation of the cross-culturally adapted Latin-Spanish version of the KDQOL-36™ questionnaire.

Keywords: Chronic kidney disease, health-related quality of life, hemodialysis, Bolivia, latin america, Cross-cultural adaptation, validation, patient outcomes, public health, renal replacement therapy.

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ABSTRACT

Background: Chronic kidney disease (CKD) is a global health concern, affecting 2% of patients who may progress to end-stage renal disease (ESRD). Hemodialysis (HD) is the primary therapy, but it poses challenges, impacting patients' quality of life. In Bolivia, CKD prevalence is 40%, making it the fourth leading cause of death. Risk factors encompass restricted access to safe water, sanitation, and exposure to toxic chemicals, presenting notable public health challenges in Bolivia.. The aim of the study is to assess Health-Related Quality of Life (HRQOL) in Bolivian HD patients through the application and validation of the cross-culturally adapted Latin-Spanish version of the KDQOL-36™ questionnaire.

Methods: The cross-sectional study, approved by the Ethical Committee, involved 724 CKD patients undergoing HD in Bolivia's La Paz department. The sampling technique used proportional allocation based on registered patients in 23 HD units across three cities. Inclusion criteria comprised patients over 18 with at least two months of HD, capable of responding to the questionnaire. The cross-culturally adapted KDQOL-36™ survey, administered by trained healthcare staff, was assessed using SPSS for reliability, exploratory, and confirmatory factor analysis, ensuring validity and appropriateness for Bolivian patients. Data was collected between October and December 2023.

Results: The study included predominantly female participants (51.5%) with a mean age of 55.9 years and diverse educational backgrounds. HD was mainly received from the private health sector (65.7%), and the average duration was 31.4 months. Descriptive analysis of KDQOL-36™ scores showed variations across subscales, with symptoms and problems scoring highest (67.13, Min 10.42 Max 100) and the burden of kidney disease scoring lowest (24.61, Min 0 Max 100). Validity estimates, including McDonald's Omega (0.92), as well as exploratory and confirmatory factor analyses, were conducted.

Conclusions: The Latin-Spanish and cross-cultural adaptation version of the KDQOL-36™ questionnaire seems valid and reliable for assessing HRQOL in Bolivian patients with kidney disease undergoing HD. The sociocultural characteristics in the La Paz department may differ from those in other departments. Therefore, it is recommended to conduct this study in various Bolivian contexts. The utilization of this instrument is recommended for clinical research in Bolivia.

Keywords: Chronic kidney disease, health-related quality of life, hemodialysis, Bolivia, latin america, Cross-cultural adaptation, validation, patient outcomes, public health, renal replacement therapy.

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I. BACKGROUND

Chronic kidney disease (CKD) poses a substantial global health challenge. Recent research suggests that approximately 2% of CKD patients may eventually progress to end-stage renal disease (ESRD) (1). The preferred renal replacement therapy is hemodialysis (HD) (2), which can potentially improve patient survival rates. However, due to its limited efficacy and the significant time and effort involved, this treatment may give rise to noteworthy issues such as anemia, malnutrition, infections, and cardiovascular diseases, particularly among ESRD patients (3). Additionally, individuals undergoing HD also grapple with low employment rates, high economic burdens, limited social support, and psychological distress, all of which significantly impact their quality of life (4).

In Bolivia, the prevalence of CKD stage 3 was 40% by 2017, as reported by the Global Burden of Disease Project, making it the fourth most common cause of death in the country (5). This prevalence escalates rapidly in other low- and middle-income countries (6,7). CKD poses a significant public health challenge in Bolivia, with an estimated impact on approximately 10% of the population. CKD is characterized by the gradual and progressive loss of kidney function, often leading to the necessity for dialysis or kidney transplantation.

The roots of CKD in Bolivia trace back to the 1980s, marked by the initial reports of chronic renal failure cases in the Chimoré region within the Cochabamba department. These cases were attributed to exposure to pesticides and other chemicals utilized in cocaine production (8).

Subsequently, CKD has evolved into a major health concern across the entire country, particularly affecting rural and impoverished areas. The age-standardized mortality rate stands at 571.5 per 100,000 population, with about 35.26% of NCD-related deaths occurring prematurely. The probability of mortality between ages 30 and 70 due to cardiovascular disease, cancer, diabetes, or chronic respiratory diseases is 17.88 for both sexes, indicating a heightened risk compared to the Americas (9). Critical risk factors for CKD in Bolivia include limited access to safe drinking water, basic sanitation, and exposure to toxic chemicals. Furthermore, the prevalence of chronic conditions like diabetes and hypertension also contributes significantly to the CKD burden in Bolivia. Challenges such as inadequate access to quality healthcare and a lack of awareness regarding CKD risk factors represent major obstacles for the country in effectively preventing and managing this disease. Currently, Bolivia is in the process of updating national care standards with a focus on a comprehensive approach to CKD. This includes measures for both promotion and prevention, alongside initiatives to enhance healthcare personnel training and improve the availability of HD services in remote areas of the country.

In 2019, approximately 4,400 patients underwent renal replacement therapy, with 2,780 individuals receiving free HD, as reported by the National Renal Health Program of the Ministry of Health and Sports. This initiative was supported by the National Government.. To support this initiative, the government allocates 110,000 bolivianos annually for the care of each patient, resulting in a total disbursement exceeding 300 million bolivianos for all beneficiaries. This translates to an annual disbursement exceeding 43 million US dollars. (10). The highest number of individuals undergoing HD therapy were residing in La Paz city (45%). This data may reflect a higher patient registration, considering it is the second most densely populated department in Bolivia.

Health-related quality of life (HRQOL) refers to a person's perception of their health status and how it affects their physical, emotional, and social well-being. HRQOL assessment serves multiple objectives, including enhancing comprehension of the patient's disease experience, aiding health professionals in evaluating treatment effectiveness, and furnishing valuable data for medical care and public health policy decision-making. Monitoring HRQOL at different stages of CKD is recommended by nephrology societies (10), Furthermore, improving medical care for CKD patients on HD includes the crucial aspect of evaluating their HRQOL (11). Additional

information on the impact of CKD on HRQOL in the Bolivian context needs to be studied.

Various instruments are available to assess HRQOL, and one noteworthy tool is the Kidney Disease Quality of Life Questionnaire (KDQOL -36™). This questionnaire has undergone cross-cultural adaptation in several Spanish - speaking countries, demonstrating reliable psychometric characteristics (12–15). However, it is essential to note that the National Renal Health Program of the Bolivian Ministry of Health and Sports currently lacks any validated questionnaire. Research efforts are required to create or modify instruments that consider the Bolivian cultural context. This may entail collaborations with international organizations, research institutions, or healthcare professionals with expertise in nephrology and public health.

The history of the KDQOL-36™ dates back to the 1990s, when the KDQOL-SF questionnaire was developed by Tufts University in collaboration with the ERC Foundation and Duke University.

This questionnaire consisted of 134 questions and evaluated the health-related quality of life in patients with CKD. Due to the length of this questionnaire, it was decided to create a shorter and simplified version, which gave rise to the KDQOL-36™. The KDQOL-36™ survey, introduced in 2002, is a 36-item measure designed to assess Health-Related Quality of Life (HRQOL) in individuals with kidney disease. The initial version incorporated the Medical Outcomes Study 36 (MOS SF-36) as a generic chronic disease core, supplemented with items tailored to patients with kidney-related issues. These additional items cover symptoms, burden of illness, social interaction, staff encouragement, and patient satisfaction (16).

The 36 items are distributed across five subscales as follows: SF-12 Measure of Physical and Mental Functioning Subscales (1-5, 8 and 6-7, 9-12 respectively): Includes items on general health, activity limits, ability to accomplish desired tasks, depression, anxiety, energy level, and social activities with Likert-type response options of 3 or 5 points. Burden of Kidney Disease Subscale (14-17): Addresses the impact of kidney disease on daily life, considering factors like interference with daily activities, time consumption, frustration, and feelings of burden.

Symptoms and Problems Subscale (17-28b): Encompasses items evaluating the extent of bother related to various symptoms, including sore muscles, chest pain, cramps, itchy or dry skin, shortness of breath, faintness/dizziness, lack of appetite, feeling washed out, numbness in hands or feet, nausea, and issues with dialysis access. Effects of Kidney Disease on Daily Life Subscale (29-36): Examines the impact of kidney disease on daily life, gauging bother levels regarding fluid limits, diet restrictions, ability to perform household tasks or travel, dependence on medical professionals, stress or worries, sexual well-being, and personal appearance.The KDQOL -36™ has proven to be a valuable tool for assessing HRQOL in CKD patients and has been used in numerous clinical and epidemiological studies worldwide. In addition, it has been utilized and translated into multiple languages, consistently exhibiting good validity and reliability (13,15,17–32).

In this study, we utilized the Latin-Spanish and cross-cultural adaptation version of the KDQOL-36™. Chaves, Duarte, and Vesga carried out the cross-cultural adaptation of the Spanish version of the KDQOL-36™ instrument available on the RAND Health Care website, which is provided as a courtesy, and may not be free from errors (33). The instrument contains items that necessitate cross-cultural adaptations to enhance patient response.

The process of cross-cultural adaptation to Spanish spoken in Colombia, which is very similar to that spoken in Bolivia in general, significantly modified two items. In question 3, item b, "Moderate efforts, such as moving a table, vacuuming, playing bowling, or walking for more than 1 hour", was changed to "Moderate efforts, such as moving a table, vacuuming, or walking for more than 1 hour." This modification aimed to eliminate "playing bowling" from the item since, in both Colombia and Bolivia, it is a sporadically practiced sport and not widely popular, which

could impede understanding. Additionally, the original version mentions "playing golf" within the item, which is a less popular sport than bowling in Colombia and Bolivia. Therefore, this aspect was excluded from the item. Other modifications to the instrument include adjusting grammatical syntax and replacing words with more commonly used expressions in Colombian Spanish. The time required to fill out this questionnaire can be managed during HD sessions. Furthermore, the absence of cut-off points in the adapted versions' final results scale compels researchers to interpret the quality of life based on scores exceeding 50.

To date, no questionnaire that assesses explicitly the HRQOL of patients with CKD has been validated in Bolivia. This study aimed to evaluate the reliability and validity of the Latin-Spanish and cross-cultural adaptation version of the KDQOL-36™ among HD patients in Bolivia.

II. METHODS

The study received approval from the Ethical and Bioethical Committee of Faculty of Medicine, Nursing, Nutrition, and Medical Technology at Major University of San Andrés. (approval: COMETICA- RESOLUCIÓN Nro.02/2023 August 18, 2023). The confidentiality of the collected information was ensured by assigning anonymous codes to participants. Additionally, secure data management practices were implemented, involving storage on servers with restricted access. Participant confidentiality was maintained at every stage, from data collection to analysis, ensuring that only the research team had access to identifiable data. The KDQOL-36™ questionnaire was accompanied by an informative sheet outlining the study's objectives and the nature of the questionnaire. This sheet was presented to each participant, who subsequently signed the informed consent form. The participants were informed that their participation was voluntary and that they could withdraw at any stage.

3.1 Sampling and Data Collection Method

The cross-sectional study surveyed seven hundred twenty-four patients with CKD undergoing HD (excluding peritoneal dialysis) in the HD units registered in the National Renal Health Program of the Ministry of Health and Sports of Bolivia, specifically in the Department of La Paz. The sample size considered at least 20 participants for each item of the KDQOL-36™ instrument (34,35). The sampling frame for the La Paz department was 1.003 patients. The sampling technique used was proportional allocation based on the number of registered patients in each of the twenty-three HD units exclusively located in the three cities providing this service within the La Paz department (La Paz, El Alto, and Viacha), the information provided by the National Renal Health Program. The HD units belong to the public sector, short-term social security, or the private sector under an agreement with the Ministry of Health and Sports of the Bolivian health system. Inclusion criteria included patients over 18 years old with at least two months of renal replacement therapy through HD, capable of responding to the questionnaire. Exclusion criteria included patients with a positive diagnosis of COVID-19 and those with any mental illness or incapacity to respond to the questionnaire.

The health student volunteers underwent three training sessions conducted by the principal investigators. The training covered aspects such as biosafety in HD rooms, the protocol for reading the informative sheet to obtain informed consent, and time management for completing the questionnaire. Sessions were scheduled outside working hours due to the volunteers' daily activities.. Confidentiality of data was ensured before collecting information. Data was collected between October and December 2023. The period taken to reach the estimated sample size was determined once the ethics committee authorization was obtained.

3.2 Survey Instrument

Participants were surveyed by voluntary healthcare staff using the cross-culturally adapted Latin-Spanish version of the KDQOL-36™ and a sociodemographic questionnaire. This questionnaire was devised by the authors and encompassed variables associated with patients' backgrounds, including gender, age, educational attainment, employment status, and the duration

of HD. The survey was accessible in an Android version generated through the open-source, scalable, and remotely manageable software KoboToolBox and KoboCollect. This software automatically created the database, and real-time remote supervision and data quality control were conducted, offering assistance to volunteers when requested via phone. The scores for the five subscales of the KDQOL-36™ questionnaire were calculated using a Microsoft Excel scoring tool developed by the instrument's working team, accessible through the RANDHealthCare@ rand.org portal, with scores ranging from 0 to 100. The KDQOL-36™ scoring program (v1.0) is an Excel 97 spreadsheet with five sheets: RAW, CONVERT, SCORE, SCALE, and STATS. It allows data entry for up to 1000 cases, handling more with slight adjustments. The RAW sheet includes case details and KDQOL-36™ items with validation rules. CONVERT lists item rescores, and SCORE is an intermediate table. SCALE computes scale scores, while STATS provides descriptive statistics for KDQOL and SF-12 composite scores across all patients.

3.3 Statistical Analysis

The analysis was conducted using the SPSS 26.0.0.0 (IBM PASW, USA).

The reliability analysis involved calculating the McDonald's Omega index for both the overall scale and individual subscales (36), along with determining the mean and standard deviation for each. The McDonald's omega coefficient is applied when the response scale is ordinal and is considered more suitable than Cronbach's alpha when a questionnaire has interval scales and also when there are fewer than four response options on the Likert scale. The principal component method was utilized in an exploratory factor analysis EFA to condense dimensions based on the five theoretical domains of the instrument (latent variables). A deductive approach was implemented to propose the existence of specific dimensions and evaluate the unity of the obtained data with the previously suggested factorial structure. For the ultimate solution, eigenvalues surpassing one were acquired to illustrate the number of factors elucidating over 50% of the total variability. Varimax rotation with Kaiser normalization (orthogonal quadrant rotation) was executed, consolidating items within each distinct theoretical factor. (37). Additionally, a Confirmatory Factor Analysis (CFA) was conducted to obtain a well-adjusted factor structure for the data. The CFA was performed on the most appropriate variance-covariance matrix using the IBM SPSS Amos 26.0 statistical package. The Maximum Likelihood estimation method was employed. To achieve model identification, regression coefficients of error terms on endogenous variables were fixed at 1. Initially, two models were analyzed, varying in the number of items and latent factors: (1) 36 items and five latent factors; (2) 31 items and five factors – this model corresponds to the best 31 items selected after the EFA, excluding four items. In both individual and global models, each item was uniquely associated with its respective factor.

IV. RESULTS

4.1 Characteristics of the Study Subjects

More than half of the study participants were female (51.5%), with a mean age of 55.9 years. 43.6% of the participants had primary-level education. Most of them were married (60.1%) and received HD in the private sector of the health system (65.7%). The average duration of HDs among the study participants was 31.4 months, and the majority were employed in unskilled occupations (30.1%). For details, refer to Table 1.

4.2 Descriptive Analysis of the KDQOL-36 Scale

The mean scores for each subscale of the KDQOL-36™ varied between 24.61 and 67.13. Symptoms and problems related to kidney disease achieved the highest mean score (67.13 ± 17.82), whereas the Burden of kidney disease exhibited the lowest mean score (24.61 ± 18.80). Descriptive statistics for the KDQOL-36™ are presented in Table 2.

4.3 Validity Estimate: McDonald's Omega

The McDonald's Omega for each KDQOL-36™ subscale ranged from .704 to .855. The Kidney Disease Effects subscale achieved the highest Omega (.922 and .926 with standardized results),

while the Physical Component subscale had the lowest Omega (.704 and .792 with standardized results). The McDonald's Omega for the entire instrument was .922 with all 36 items (.926 with standardized results). To consider an acceptable reliability value using the omega coefficient, it should fall between .70 and .90, although in some circumstances, values higher than .65 may be acceptable (37). The results of McDonald's Omega and its standardized results are described in Table 2.

4.4 Construct Validity: Exploratory Factor Analysis

The exploratory factor analysis, employing the principal component extraction method and varimax rotation of KDQOL-36™ items, revealed their identification of the five subscales (latent variables) proposed by the instrument's developers. Individualized EFA facilitated the recognition of the five latent variables. The items were chosen in a way that allowed the analysis to identify a single known latent variable a priori. However, the renal disease symptoms/problems subscale adjusted to a single factor by excluding only item 20, "Is your skin itchy?" from the individual EFA. The final solution, with eigenvalues greater than 1, signifies five factors explaining 52.17% of the total variance. This ultimate solution necessitated the exclusion of items 1, "In general, would you say your health is...," and 4, "Did you accomplish less than you would like?" from the physical component subscale. It also excluded 28A, "Issues with the fistula?" from the renal disease symptoms/ problems subscale, and 35 "Your sex life?" from the renal disease effects subscale. This illustrates a model that identifies the established theoretical factors. These thirty-one items underwent Bartlett's test of sphericity (8677.993, df=465, Sig.<.001) and a significant Kaiser-Meyer-Olkin hypothesis test (0.918). Tables 3 and 4.

4.5 Construct Validity: Confirmatory Factor Analysis

The Confirmatory Factor Analysis (CFA) results for KDQOL-36™ data fitted with the hypothetical five-factor model with $\chi 2/df = 2.2$, RMSEA = 0.042 (90% CI 0.038–0.045), CFI = 0.939, GFI = 0.923, AGFI = 0.906, TLI = 0.931 and RMR = 0.058. The KDQOL-36™. The model had lower goodness-of-fit parameters when run without covariations (data not shown). For details, refer to Table 5.

V. DISCUSSION

Most previous studies assessing the validity of the KDQOL-36™ focused on Western populations, with only a few South American countries utilizing the KDQOL-36™ (22, 23, 28, 31, 39, 39–42). The findings suggest that the KDQOL-36™ demonstrates an excellent level of reliability, as indicated by McDonald's Omega values, and validity in comprehending the quality of life among HD patients in Bolivia. The assessment of scale reliability in Latin America using Mc Donald's omega coefficient reveals slight differences compared to those obtained by Valderrama in 2024 with 506 patients in Colombia. For the dimension of renal disease burden, the author demonstrated an omega of 0.82, whereas in the present study, it was 0.755. In the dimension of symptoms and problems related to renal disease, the study estimated an omega of 0.855, contrasting with 0.80 in the present study. Additionally, for the dimension of effects of renal disease, the author estimated an omega of 0.82, slightly higher than the 0.809 found in this study (42). In other countries, Rokhman in 2022 obtained omega values for generic domains of 0.62 and 0.84, and for specific renal domains, the values ranged from 0.56 to 0.92 in Bahasa Indonesia. This underscores the KDQOL-36 questionnaire's robust reliability indices (43). The results of this cross-sectional study provide valuable insights into the HRQOL among HD patients in Bolivia.

Exploratory factor analysis supported the presence of five subscales, as proposed by the instrument's developers. The Physical Component and Emotional Component subscales showed high factor loadings (>0.7), while the other domains exhibited reasonably good relationships, indicating a strong correlation among items within these subscales. Estimates of internal consistency reliability for the KDQOL-36™ and its eight subscales surpassed scores indicative of good reliability. Items generally correlated more

with others within their subscale than with items in other subscales, aligning with studies conducted in Greek, Korean, Singaporean, or Chinese HD patients with sample sizes exceeding 500 participants.

All these results endorse the use of the KDQOL-36™ with HD patients in Bolivia. However, attention should be directed to the four items that demonstrated lower factor loadings: "In general, would you say your health is...", "Did you accomplish less than you would like?", "Issues with the fistula?" and "Your sex life?". These lower factor loadings may stem from cultural differences, suggesting that Bolivians may perceive these items as about other latent variables. The implementation of the KDQOL-36™ in Bolivia holds significant clinical and public health implications. This questionnaire offers a detailed assessment of health-related quality of life in hemodialysis patients, enabling the identification of specific areas for improvement. The results can inform resource allocation, improve doctor-patient communication, aid in public health decision-making, and serve as a basis for research and the development of personalized interventions. The KDQOL-36™ emerges as a valuable tool for comprehending and addressing the needs of the hemodialysis patient population in Bolivia. Recognizing the inherent limitations of cross-sectional studies and the cultural diversity in Bolivia, a more in-depth exploration of the transcultural adaptation of the KDQOL-36 questionnaire in various cultural contexts spanning the different ecological zones in the country is recommended. Furthermore, it is suggested to implement research designs that surpass the constraints typically associated with cross-sectional studies.

VI. CONCLUSIONS

The validation of the KDQOL-36™ in Bolivia underscores the robustness and utility of the questionnaire in assessing HRQOL among patients undergoing HD in the country. The transcultural adaptation of the instrument has proven to be appropriate, yielding reliable and valid data within the Bolivian context. The obtained results suggest that the KDQOL-36™ is an effective tool for identifying specific areas of improvement in the quality of life of hemodialysis patients, providing valuable guidance for intervention strategies and resource allocation.

The internal consistency and reliability of the questionnaire, assessed through indicators such as McDonald's omega coefficient, further enhance its validity and credibility in the Bolivian context. Moreover, the significance of recognizing the inherent limitations of cross-sectional studies and cultural diversity in Bolivia is emphasized. The necessity for future research to explore transcultural adaptation in diverse cultural and geographical contexts within the country, along with the implementation of research designs that overcome constraints associated with cross-sectional studies, is recommended. The successful validation of the KDQOL-36 in Bolivia not only strengthens the evidence base for the care of HD patients in the country but also sets a valuable precedent for future research and the continuous enhancement of the quality of life in this specific population.

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DISCLOSURES

Ethics approval and consent to participate: Informed consent was obtained or waived by all participants in this study. Ethical approval (approval: COMETICA-RESOLUCIÓN Nro.02/2023 August 18, 2023) was obtained from the Ethical and Bioethical Committee of Faculty of Medicine, Nursing, Nutrition, and Medical Technology at Major University of San Andrés.

The study was conducted as per the tenets of Declaration of Helsinki and all participants signed an informed consent form. Participants were free to withdraw from the study at any point.
Publication consent. The authors grant their consent for the publication of the study.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available at https://www.synapse.org. DOI https://doi.org/10.7303/syn52541509.

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Authors' contributions

AEGA, have made substantial contributions to conception and design of the study. AEGA and KDQG were responsible for the acquisition of data. AEGA and RSS have made the analysis, interpretation of data, drafted the work and substantively revised it.

All authors were involved in drafting the manuscript or revising it critically for important intellectual content; and all have given final approval of the version to be published, and have participated sufficiently in the work to take public responsibility for appropriate portions of the content.

They have agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Table 1: Sociodemographic characteristics of the sample (n = 724)

Characteristics		n (%)
Gender	Male	351 (48.5%)
	Female	373 (51.5%)
Age in years (Mean, SD*)		55.9 (14.4)
Education	None	39 (5.4%)
	Primary school	316 (43.6%)
	Secondary school	197 (27.2%)
	High school graduate	128 (17.7%)
	Graduate studies	44 (6.1%)
Marital status	Single	128 (17.7%)
	Married	435 (60.1%)
	Divorced	68 (9.4%)
	Widowed	93 (12.8%)
Subsector of the health system	Public	197 (27.2%)
	Short-term social security	51 (7.0%)
	Private	476 (65.7%)
Months on hemodialysis (Mean, SD*)		31.4 (31.4)
Occupation	Executive or administrative manager	6 (0.8%)
	Military personnel	11 (1.5%)
	Agricultural, forestry, or fishing worker	14 (1.9%)
	Office employee	19 (2.6%)
	Middle-level technician	21 (2.9%)
	Facility operators, machinery operators, or assemblers	65 (9.0%)
	Construction, manufacturing, or other trade worker	84 (11.6%)
	Scientific or intellectual professional	85 (11.7%)
	Unemployed	91 (12.6%)
	Service or sales worker	110 (15.2%)
	Unskilled worker	218 (30.1%)

SD Standard Deviation

Table 2: Descriptive statistics of the KDQOL-36™

KDQOL-36™ Subscales	Mean	SD*	95% CI	Minimal	Maximal	Omega	Standardized results Omega
Physical Composite Sore	34.20	8.87	33.55-34.85	11.72	60.20	.704	.792
Mental Composite Score	39.93	10.68	39.15-40.71	13.99	66.96	.659	.777
Burden of kidney disease	24.61	18.80	23.24-25.98	0.0	100	.755	.780
Symptoms/problems list	67.13	17.82	65.83-68.43	10.42	100	.855	.856
Effects of kidney disease	47.47	19.92	46.02-48.93	0.0	96.88	.809	.815

SD Standard Deviation

Table 3: Communalities matrix

Selected Items	Communalities	
	Initial	Extraction
2 Does your current health limit you from doing moderate activities, such as moving a table, sweeping, or walking?	1.000	0.676
3 Does your current health limit you from climbing several flights of stairs?	1.000	0.702
5 Did it take more effort than usual to perform your job or daily activities?	1.000	0.461
8 How much has pain made it difficult for you to do your usual work?	1.000	0.738
6 Did you accomplish less than you would have liked due to emotional problems?	1.000	0.715
7 Did you not do your work or daily activities as carefully as usual due to emotional problems?	1.000	0.449
9 Did you feel calm and peaceful?	1.000	0.440
10 Did you have a lot of energy?	1.000	0.522
11 Did you feel downhearted and blue?	1.000	0.436
12 Have your physical health or emotional problems made it difficult for you to carry out your usual social activities?	1.000	0.415
13 My kidney disease interferes too much with my life	1.000	0.687
14 My kidney disease takes up too much of my time	1.000	0.642
15 feel frustrated having to deal with my kidney disease	1.000	0.719
16 I feel like a burden to my family	1.000	0.510
17 Muscle cramps?	1.000	0.485
18 Chest pain?	1.000	0.461
21 Dry skin?	1.000	0.398
22 Shortness of breath?	1.000	0.437
23 Fainting or dizziness?	1.000	0.478
24 Loss of appetite?	1.000	0.419
25 Exhausted, no energy?	1.000	0.330
26 Numbness in hands or feet?	1.000	0.503
27 Nausea or stomach discomfort?	1.000	0.465
19 Cramps?	1.000	0.498
29 Limitation in fluid intake?	1.000	0.548
30 Dietary limitations?	1.000	0.621
31 Your ability to work around the house?	1.000	0.570
32 Your ability to travel?	1.000	0.448
33 Depending on doctors and other health personnel?	1.000	0.483
34 Nervousness or worries caused by your kidney disease?	1.000	0.543
36 Your physical appearance?	1.000	0.373

Table 4: Rotated Component Matrix

Selected Items	Symptoms /problems list	Physical Composite Sore	Effects of kidney disease	Mental Composite Score	Burden of kidney disease
2 Does your current health limit you from doing moderate activities, such as moving a table, sweeping, or walking?		0.798			
3 Does your current health limit you from climbing several flights of stairs?		0.807			
5 Did it take more effort than usual to perform your job or daily activities?		0.544		0.350	
8 How much has pain made it difficult for you to do your usual work?	0.325	0.465			

6 Did you accomplish less than you would have liked due to emotional problems?				0.825	
7 Did you not do your work or daily activities as carefully as usual due to emotional problems?				0.813	
9 Did you feel calm and peaceful?		0.369		0.435	
10 Did you have a lot of energy?		0.616			
11 Did you feel downhearted and blue?				0.516	
12 Have your physical health or emotional problems made it difficult for you to carry out your usual social activities?				0.514	
13 My kidney disease interferes too much with my life					0.774
14 My kidney disease takes up too much of my time					0.780
15 feel frustrated having to deal with my kidney disease					0.760
16 I feel like a burden to my family				0.517	0.441
17 Muscle cramps?	0.603				
18 Chest pain?	0.627				
21 Dry skin?	0.638				
22 Shortness of breath?	0.661				
23 Fainting or dizziness?	0.621				
24 Loss of appetite?	0.438				
25 Exhausted, no energy?	0.431	0.400			
26 Numbness in hands or feet?	0.660				
27 Nausea or stomach discomfort?	0.679				
19 Cramps?	0.609				
29 Limitation in fluid intake?			0.723		
30 Dietary limitations?			0.756		
31 Your ability to work around the house?		0.397	0.540		
32 Your ability to travel?			0.614		
33 Depending on doctors and other health personnel?			0.619		
34 Nervousness or worries caused by your kidney disease?	0.326		0.464		0.358
36 Your physical appearance?	0.342		0.412		

Table 5: Expected fit indices for a structural equation model and obtained indices in CFA

Fit Index	Expected	CFA Model Fit
Model chi-Square(χ^2)	> 0.05	0.00
Relative/normed chi-squareCMIN/DF	< 5	2.248
Goodness-of-fit statisticGFI	0.9 – 1	0.923
Adjusted goodness-of-fit statisticAGFI	0.9 – 1	0.906
Root mean square residualRMR	Close to 0	0.058
Root mean square error of approximationRMSEA	< 0.05	0.042
Comparative fit indexCFI	0.9 – 1	0.939
Normed-fit indexNFI	0.9 – 1	0.896
Tucker-Lewis indexTLI	0.9 – 1	0.931