ASSOCIATION BETWEEN SOCIODEMOGRAPHIC FACTORS, DIALYSIS MALNUTRITION SCORE (DMS), AND QUALITY OF LIFE (QOL) AMONG HEMODIALYSIS PATIENTS IN HPUSM

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by

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DECLARTIONS

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research, and promotional purposes.

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Nor Zur Hafizah Binti Zakaria

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LIST OF ABBREVIATIONS

USM: Universiti Sains Malaysia

SPSS: Statistical Package for Social Science

CKD: Chronic Kidney Disease

HD: Hemodialysis

HDU: Hemodialysis Unit

DMS: Dialysis Malnutrition Score

QoL: Quality of Life

KDQOL: Kidney Disease Quality of Life Instrument

HPUSM: Hospital Pakar University Sains Malaysia

ESRD: end-stage renal disease

GFR: A glomerular filtration rate

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ABSTRACT

Background: Hemodialysis (HD) is a treatment process that removes toxins, excess fluid, and waste products from the blood in patients with end-stage kidney disease. Despite its life-saving role, HD contributes to increased protein-energy loss, inflammation, and metabolic stress, all of which heighten the risk of malnutrition, and the demanding treatment schedule and physical limitations lead to a reduced quality of life (QoL). Sociodemographic factors, like age, education, income, and work status, influence a patient's ability to afford renal-friendly foods, understand dietary advice, and cope with the demands of long-term treatment. Lower-income patients struggle to meet dietary needs, while older patients face more physical limitations that increase their risk of malnutrition and lower their quality of life. This study contributes valuable insights into how sociodemographic factors influence the nutritional status and quality of life of hemodialysis patients and identify specific groups that may be more vulnerable to malnutrition or reduced quality of life. **Objective:** This study aimed to determine the association between sociodemographic factors, prevalence of malnutrition, and quality of life among hemodialysis patients in HPUSM. **Methodology:** A cross-sectional study was conducted among 81 hemodialysis patients at HPUSM. Sociodemographic data were collected through structured questionnaires. Meanwhile malnutrition status was assessed using the Dialysis Malnutrition Score (DMS), and quality of life was evaluated using the Kidney Disease Quality of Life-24 (KDQOL-24). Statistical analysis was performed using descriptive statistics, Mann–Whitney U-test, and Kruskal–Wallis test to determine group differences, while associations were interpreted using median and interquartile ranges (IQR). **Results:** The prevalence of 40–59 years (43.2%) and older adults 60–81 years (44.4%)**,** with only (12.3%) in the younger age group. The gender distribution was balanced, with (49.4%) males and **(**50.6%) females. The majority of patients were Malay

(92.6%)**,** and most were married (74.1%)**.** More than half had a secondary education level (58.0%)**,** and most patients were unemployed or retired (65.4**%)**. Income levels were generally low, with (75.3%) earning below RM2500 per month. More than half of the patients were mild to moderately malnourished (53.9%)**,** while **(**35.8%) were considered well-nourished and (4.9%**)** were severe malnutrition**.** Quality of life scores varied across KDQOL-24 domains, with Role Limitation Physical and emotional scoring the lowest However, quality of social Interaction and dialysis staff encouragement were higher than the standard form, indicating good support from healthcare providers. The Dialysis Malnutrition Score (DMS) was significantly higher in older patients (60–81 years), divorced/widowed individuals, those with lower education, and unemployed/retired patients ($p < 0.05$). No significant differences were observed for gender, ethnicity, or household income. These findings suggest that age, marital status, education, and employment are key factors influencing malnutrition risk among hemodialysis patients. Most QoL domains did not differ significantly between male and female patients ($p > 0.05$). The exception was Work Status, where a small but significant difference was observed ($p = 0.028$). This indicates that gender had minimal impact on QoL among the hemodialysis patients in this study. Significant differences in QoL were observed across age groups in several domains. Work Status ($p = 0.007$), Cognitive Function ($p = 0.043$), Physical Functioning ($p = 0.001$), Pain ($p = 0.024$), and Emotional Well-being ($p = 0.011$) showed that younger patients (19–39 and 40–59 years) generally reported higher QoL scores compared to older patients (60–81 years). QoL scores were significantly lower in patients with worse nutritional status. Across multiple domains including Symptoms/Problem, Effect of Kidney Disease, Physical Functioning, Pain, General Health, Emotional Well-being, and Overall Health patients who were mild-moderate or severely malnourished scored lower compared to well-nourished patients ($p < 0.05$). This

indicates that malnutrition is strongly associated with reduced QoL **Conclusion:** Malnutrition remains highly prevalent among hemodialysis patients in HPUSM, with most patients falling into the moderate category. Both sociodemographic and malnutrition significantly associated with quality of life, underscoring the need for early nutritional interventions and patient-centered care strategies to improve long-term outcomes.

ABSTRAK

Latar Belakang: Hemodialisis (HD) adalah proses rawatan yang menyingkirkan toksin, cecair berlebihan, dan bahan buangan dari darah bagi pesakit penyakit buah pinggang peringkat akhir. Walaupun ia menyelamatkan nyawa, HD menyumbang kepada kehilangan protein-tenaga, keradangan, dan tekanan metabolik, yang meningkatkan risiko malnutrisi. Jadual rawatan yang ketat dan had fizikal juga menyebabkan penurunan kualiti hidup (QoL). Faktor sosiodemografi, seperti umur, pendidikan, pendapatan, dan status pekerjaan, mempengaruhi kemampuan pesakit untuk mendapatkan makanan mesra buah pinggang, memahami nasihat diet, dan menghadapi tuntutan rawatan jangka panjang. Pesakit berpendapatan rendah sukar memenuhi keperluan diet, manakala pesakit yang lebih tua menghadapi batasan fizikal yang meningkatkan risiko malnutrisi dan menurunkan kualiti hidup. Kajian ini memberikan pandangan penting mengenai bagaimana faktor sosiodemografi mempengaruhi status pemakanan dan kualiti hidup pesakit hemodialisis serta mengenal pasti kumpulan yang lebih berisiko terhadap malnutrisi atau penurunan QoL. **Objektif:** Kajian ini bertujuan untuk menilai hubungan antara faktor sosiodemografi, prevalens malnutrisi, dan kualiti hidup di kalangan pesakit hemodialisis di HPUSM. **Metodologi:** Kajian keratan rentas dijalankan ke atas 81 pesakit hemodialisis di HPUSM. Data sosiodemografi dikumpul melalui soal selidik berstruktur. Status malnutrisi dinilai menggunakan Dialysis Malnutrition Score (DMS), manakala kualiti hidup diukur menggunakan Kidney Disease Quality of Life-24 (KDQOL-24). Analisis statistik dilakukan menggunakan statistik deskriptif, U-test Mann–Whitney, dan Kruskal–Wallis untuk menentukan perbezaan kumpulan, manakala hubungan dinilai menggunakan median dan julat interkuartil (IQR). **Keputusan:** Majoriti pesakit berumur 40–59 tahun (43.2%) dan 60–81 tahun (44.4%), dengan hanya 12.3% berumur muda. Pembahagian jantina seimbang (49.4% lelaki, 50.6% wanita), majoriti berbangsa Melayu

(92.6%) dan berkahwin (74.1%). Lebih separuh mempunyai pendidikan menengah (58.0%) dan kebanyakan pesakit tidak bekerja atau bersara (65.4%). Pendapatan kebanyakannya rendah, dengan 75.3% berpendapatan di bawah RM2500 sebulan.Lebih separuh pesakit mengalami malnutrisi ringan hingga sederhana (53.9%), 35.8% dalam keadaan baik, dan 4.9% mengalami malnutrisi teruk. Skor QoL berbeza mengikut domain KDQOL-24, dengan Role Limitation (Physical) dan Emotional Well-being mencatat skor terendah, manakala Quality of Social Interaction dan Dialysis Staff Encouragement lebih tinggi daripada bentuk standard, menunjukkan sokongan baik dari penyedia penjagaan kesihatan.DMS lebih tinggi secara signifikan pada pesakit lebih tua (60–81 tahun), individu bercerai/janda/duda, pesakit dengan pendidikan rendah, dan mereka yang tidak bekerja/bersara ($p < 0.05$). Tidak terdapat perbezaan signifikan mengikut jantina, etnik, atau pendapatan isi rumah. Hal ini menunjukkan umur, status perkahwinan, pendidikan, dan pekerjaan adalah faktor utama mempengaruhi risiko malnutrisi.Kebanyakan domain QoL tidak berbeza mengikut jantina ($p > 0.05$), kecuali Work Status yang menunjukkan perbezaan kecil tetapi signifikan ($p = 0.028$). Terdapat perbezaan signifikan QoL mengikut umur dalam beberapa domain: Work Status ($p = 0.007$), Cognitive Function ($p = 0.043$), Physical Functioning ($p = 0.001$), Pain ($p = 0.024$), dan Emotional Well-being ($p = 0.011$), dengan pesakit muda (19–39 dan 40–59 tahun) melaporkan skor QoL lebih tinggi berbanding pesakit tua (60–81 tahun). Skor QoL lebih rendah pada pesakit yang mengalami malnutrisi. Dalam beberapa domain termasuk Symptoms/Problem, Effect of Kidney Disease, Physical Functioning, Pain, General Health, Emotional Well-being, dan Overall Health, pesakit yang malnutrisi ringan-seederhana atau teruk mencatat skor lebih rendah berbanding pesakit yang sihat ($p < 0.05$). Ini menunjukkan malnutrisi berkait rapat dengan penurunan QoL.**Kesimpulan:** Malnutrisi masih tinggi dalam kalangan pesakit hemodialisis di HPUSM, dengan kebanyakan berada dalam kategori sederhana. Faktor

sosiodemografi dan malnutrisi berkait signifikan dengan QoL, menekankan kepentingan intervensi pemakanan awal dan strategi penjagaan berpusatkan pesakit untuk meningkatkan hasil jangka panjang.

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CHAPTER 1 INTRODUCTION

1.1 Background Of Study

End Stage Renal Disease (ESRD) was also referred as End Stage Kidney Disease ESKD, was the final phase of chronic kidney disease (CKD), where the kidneys were no longer able to perform the necessary functions for human's body (American Kidney Fund, 2024). A glomerular filtration rate (GFR) decreased to 15 mL/min per 1.73 m^2 or lower, need for dialysis or a kidney transplantation to sustain life. This condition's worsening of kidney function. (Abbasi et al., 2010). According to National Kidney Foundation (NKF) defines hemodialysis as a medical procedure done to clear any waste material and excess fluid from the blood within the context of kidney problems (NKF 2024). Around the world, more than 850 million people are living with kidney-related health issues, including chronic kidney disease (CKD), acute kidney injury (AKI), and those who rely on dialysis and renal replacement therapy. This surprising number was twice as high as the global count of people with diabetes and more than 20 times greater than those affected by AIDS/HIV (Jager et al., 2019). It was pointed out that the occurrence of CKD in Malaysia, has significantly increased in recent years. It was found that the prevalence of CKD in Malaysia was 15.48% in 2018, which was higher than the 9.07% in 2011 (Saminathan et al., 2020).

However, health and well-being were not shaped by medical treatment alone. Sociodemographic factors including age, gender, marital status, educational level, employment status, and household income play a powerful role in determining both nutritional status and QoL (Gobbens et al, 2019). For instance, patients with lower income may struggle to afford nutrient-dense foods or transportation to dialysis sessions. Education level can influence how well a patient understands and follows dietary advice.

Older patients may face greater physical limitations, while those who are socially isolated may experience poorer emotional well-being. These sociodemographic realities interact with medical factors to create highly individualized patient experiences (Gobbens et al, 2019).

Malnutrition means deficiency or excess or abnormal nutrition that manifests through lack, excess or abnormal amounts of energy or nutrients (WHO 2024). Regarding the patients undergoing hemodialysis, the term malnourished encompasses a range of various nutrition conditions, however, based on the most significant parameters they were tightly associated with protein energy wasting (PEW), nutrition deficit, health influence, and inflammation (Ghorbani et al., 2020). It occurs in which the body's protein and energy stores are greatly used up. It may lead to decreased physical energy, muscle atrophy, decrease in body weight, lack of certain vitamin and mineral necessities which are toxic to overall well-being and recovery (Ghorbani et al., 2020).

Malnutrition was highly correlated with inflammation in haemodialysis patients, in which commonly presented by high level of C-reactive protein (CRP) (Ghorbani et al., 2020). The main malnutrition causes in HD group were iatrogenic and non-iatrogenic (Sahathevan et al., 2020). Iatrogenic factors were those that contribute to iatrogenesis, which means any unwanted or unfavourable outcome of medical treatment. Non-Iatrogenic factors are the factors which are not caused by doctors or any other health care staff (Prasad et al., 2015).

Meanwhile, non-iatrogenic factors were suboptimal dietary intakes, psychosocial factors, taste alteration, and insulin resistance (Sahathevan et al., 2020). Suboptimal dietary intake can cause a lack of appetite, poor food quality, and a high level of diet monotony and lead to inadequate calorie and protein intake (Sahathevan et al., 2020). A

psychosocial factor, which includes social support and financial constraints, might influence nutritional intake and choices, while insulin resistance and altered taste were two other physiological alterations that may be linked to worse nutritional status and less food consumption (Sahathevan et al., 2020).

Some of the reasons which can lead to malnutrition include chronic renal disease, dietary restrictions, and inflammation (Salmi et al., 2021). According to a study done by Salmi et al (2021) the malnourished patients' common symptoms were weakness and fatigue which affects their mental health and their willingness and ability to perform routine tasks, and this often leads to a poor quality of life (QoL).

Alongside physical health, quality of life (QoL) was a crucial outcome for patients undergoing hemodialysis. Quality of life (QoL) has become an important outcome measure in chronic disease management, particularly in end-stage renal disease (ESRD) where patients require long-term dialysis to sustain life. In hemodialysis, clinical measures such as laboratory results provide valuable medical information, but they do not fully capture the patient's lived experience (Abbas et al., 2024). Patients may have "good" clinical parameters yet still experience significant physical limitations, emotional distress, and social challenges.

The KDQOL-24 is specifically designed for patients with chronic kidney disease, including those undergoing hemodialysis or peritoneal dialysis. It measures four main components, which were health, kidney disease, effect of kidney disease on daily life and satisfaction with care. Responses were scored on a 0–100 scale, with higher scores indicating better perceived quality of life. The KDQOL-24 has been validated in various languages and cultural settings, including Malaysia, making it suitable for local research and clinical use. The strength of the KDQOL-24 lies in its ability to combine the medical

realities of kidney disease with the human experience of living with it. By capturing both physical and psychosocial dimensions, it allows healthcare professionals to identify specific areas where patients may need additional medical, nutritional, or psychosocial support.

In the context of this study, the KDQOL-24 is particularly relevant as it provides a comprehensive yet efficient way to measure the quality of life among hemodialysis patients in Hospital Universiti Sains Malaysia (HPUSM). When analyzed alongside sociodemographic factors and nutritional status assessed by the Dialysis Malnutrition Score (DMS), it can offer valuable insights into how social and nutritional determinants influence overall patient well-being.

1.2 Problem Statement

End-stage renal disease (ESRD) was not just a medical condition, it was a life-altering reality that demands lifelong treatment and continuous adaptation. In Malaysia, the number of patients requiring hemodialysis has been rising steadily, reflecting both the growing prevalence of chronic kidney disease (CKD) and improved access to dialysis facilities. For patients, however, hemodialysis was far more than a medical procedure. It shapes their daily routines, limits their activities, and introduces ongoing physical, emotional, and social challenges.

Patients having HD face higher nutritional demands because the catabolic state caused by renal failure and dialysis and the loss of proteins and amino acids during the dialysis process which make it challenging for patients to meet their meal requirements through normal diet intake (Zha & Qian, 2017). Many of the individuals with ESRD are diabetic or hypertensive or have other chronic diseases that complicate nutritional

management. As these comorbidities affect appetite, metabolism, and digestion of food, they contribute to malnutrition by raising the risk of malnutrition (Zha & Qian, 2017).

Despite advancements in dialysis technology and patient care, many hemodialysis patients continue to experience poor quality of life (QoL) (Salmi et al., 2021). The chronic nature of renal disease and the need of daily hemodialysis can lead to emotions of worry, sadness, and hopelessness (Salmi et al., 2021). Based on the similar study stated that patients' mental health and general quality of life may suffer as a result of the emotional breakdown (Salmi et al., 2021).

Hemodialysis patients are required to follow strict dietary guidelines, which can be difficult and cause feelings of deprivation (NKF 2024). Limitations on potassium, phosphorus, and fluid consumption might make meal preparation and social eating more difficult, which also affects how much they enjoy food and social interactions (NKF,2024) The costs associated with hemodialysis, including transportation to treatment centers, medications, and dietary needs, can create financial stress, indirectly this burden can further impact QoL by causing anxiety and limiting access to other resources or activities (Salmi et al., 2021).

However, the patient’s experience of malnutrition and QoL does not occur in isolation it is also shaped by sociodemographic factors. Age, gender, education, income level, and marital status can influence dietary habits, access to nutritious food, understanding of medical advice, coping strategies, and social support. For example, a patient with limited income may struggle to follow recommended dietary plans due to cost, while a socially isolated patient may have poorer mental health outcomes.

Based on that, gaining knowledge about these correlations may help shape the therapeutic treatments, which will enhance patient outcomes by offering insightful

information about the complex issues this of population faces. By evaluating the relationship between sociodemographics, DMS, and QoL, this study aims to close the current information gap and enhance management practices for renal patients at Hospital Pakar Universiti Sains Malaysia. The results of this study have the potential to educate healthcare professionals on the significance of nutritional evaluation and its impact on the effectiveness of dialysis and the overall health of patients. This might ultimately result in improved care protocols that cater to the comprehensive requirements of patients receiving hemodialysis.

1.3 Research Questions

I. What is the sociodemographic factors of hemodialysis patients in HPUSM?

II. What is the prevalence of malnutrition using Dialysis Malnutrition Score (DMS) among hemodialysis patients in HPUSM?

III. What is the prevalence of hemodialysis patients' Quality of Life (QoL) status in HPUSM?

IV. Is there any association between sociodemographic and Dialysis Malnutrition Score (DMS) among hemodialysis patients in HPUSM?

V. Is there any association between sociodemographic and the quality of life hemodialysis patients?

VI. Is there any association between malnutrition and quality of life among hemodialysis patients?

1.4 Objective

1.4.1 General Objective

To determine the association between sociodemographic factors, Dialysis Malnutrition Score (DMS), and quality of life (QoL) among hemodialysis patients in HPUSM.

1.4.2 Specific Objectives

I. To determine the sociodemographic among hemodialysis patients using DMS in HPUSM.

II. To determine the prevalence of malnutrition among hemodialysis patients in HPUSM.

III. To identify the of quality of life among hemodialysis patients in HPUSM.

IV. To study the association between sociodemographic and Dialysis Malnutrition Score (DMS) among hemodialysis patients in HPUSM.

V. To study the association between sociodemographic and quality of life among hemodialysis patients in HPUSM.

VI. To study the association between malnutrition and quality of life among hemodialysis patients in HPUSM.

1.5 Study Hypothesis

Alternative Hypotheses (H_1):

I. There is an association between sociodemographic and Dialysis Malnitrition Score(DMS) among hemodialysis patients.

II. There is an association between sociodemographic and quality of life among hemodialysis patients.

III. There is an association between Dialysis Malnutrition Score (DMS) and quality of life among hemodialysis patients

Null Hypothesis (H_0)

I. There is no association between sociodemographic characteristic and malnutrition among hemodialysis patients in HPUSM

II. There is no association between sociodemographic characteristic and quality of life among hemodialysis patients in HPUSM

III. There is no association between malnutrition and quality of life among hemodialysis patients in HPUSM.

Alternative Hypothesis (H_A)

I. There is an association between sociodemographic and Dialysis Malnutrition Score (DMS) among hemodialysis patients in HPUSM

II. There is an association between sociodemographic and quality of life among hemodialysis patients in HPUSM

III. There is an association between Dialysis Malnutrition Score (DMS) and quality of life among hemodialysis patients in HPUSM.

1.6 Significance Of Study

For many patients, hemodialysis was not just a treatment, it was a lifelong commitment that reshaped their daily lives, relationships, and overall well-being. While dialysis keeps people alive, it also brings profound physical and emotional challenges. Fatigue, dietary restrictions, and frequent hospital visits can become overwhelming, and over time, many patients silently struggle with malnutrition, declining health, and reduced quality of life. These challenges were often under-recognized in busy clinical settings, where attention were often focused on lab results and dialysis adequacy rather than the lived experience of the patient. Socio-demographic characteristics significantly influence malnutrition and quality of life among elderly hemodialysis patients. Factors such as age, gender, education level, socioeconomic status, and social support systems can affect nutritional status and the patient's overall well-being. For example, higher education levels are associated with better health literacy, leading to improved adherence to dietary guidelines

and treatment regimens, which can reduce malnutrition risk (Shahrin et al., 2019). Conversely, older age is often linked to decreased physical and cognitive functions, increasing vulnerability to malnutrition and negatively impacting quality of life. Social support, such as living with family, has been shown to enhance emotional well-being and improve nutritional intake, thereby positively affecting QoL. On the other hand, socio-economic disadvantages may limit access to nutritious food and health services, exacerbating malnutrition and impairing quality of life. Overall, socio-demographic factors shape patients' capacity to maintain adequate nutrition and their psychological and physical health, thereby directly influencing their quality of life (Shahrin et al., 2019) According the result of the study, 6% to 8% of hemodialysis patients experience severe malnutrition, whereas 30% to 65% experience mild malnutrition (Afaghi et al., 2021). Hence, by examining these relationships, researchers can better understand the factors that contribute to malnourished, and other health issues and develop evidence-based interventions to address them It can also help educators and health professionals develop strategies to improve overall health among hemodialysis patients in HPUSM.

CHAPTER 2 LITERATURE REVIEW

2.1.1 Sociodemographic of hemodialysis patients

End-stage renal disease (ESRD) is a growing health concern worldwide, with hemodialysis being one of the most widely used renal replacement therapies. Globally, the dialysis population was aging, with many patients also facing multiple comorbidities such as hypertension, diabetes, and cardiovascular disease. Chronic kidney disease (CKD) was more common in older people, especially those over 60. About 6% of adults aged 18 to 44 have CKD, but this number goes up to around 38.1%

for people over 65. Men are 50% more likely than women to reach the final stage of kidney disease, which shows the need for early care. (Rout and Aslam, 2025) As we get older, the chance of having chronic kidney disease increases, so it is important for older adults to check their kidney health. The big difference in CKD rates between younger and older people shows why regular kidney tests are important as we aged.

In Malaysia, data from the Malaysian Dialysis and Transplant Registry (MDTR, 2021) revealed that the majority of dialysis patients are older adults, with a higher proportion of male patients and a large percentage living with diabetes as the primary cause of ESRD. Sociodemographic factors such as age, gender, education level, marital status, employment status, and income are known to significantly influence patient outcomes. For example, older patients often face more functional limitations and higher rates of malnutrition, while education and income levels influence dietary choices, treatment adherence, and access to healthcare. In Malaysia, the incidence and prevalence of end-stage renal disease (ESRD) are rising, with a growing proportion of elderly patients on RRT. A single-center, descriptive, retrospective study was conducted in the Nephrology Unit of Queen Elizabeth Hospital, Sabah, including new patients aged 65 years and above who initiated dialysis between January 1, 2014, and December 31, 2017. Epidemiological and clinical data were collected, including age, gender, ethnicity, primary cause of ESRD, dialysis modality, dialysis access, and mortality outcomes A total of 263 elderly dialysis patients were included, with a mean age of 70.7 years; diabetes mellitus (DM) was the primary cause of ESRD in 67.3% of the patients (Yao et al., 2021).

Understanding these characteristics is essential to designing patient-centered care strategies, particularly in the Malaysian context, where cultural and socioeconomic diversity strongly shape health behaviors.

2.1.2 Malnutrition among hemodialysis patients

Hemodialysis is the common treatment technique for chronic kidney disease (CKD). According to the study shows that the prevalence of CKD in Malaysia was 15.48% (95% CI: 12.30, 19.31) in 2018, an increase compared to the year 2011 when the prevalence of CKD was 9.07%. Stage 1 CKD was projected to affect 3.85% of people, stage 2 CKD to 4.82%, stage 3 CKD to 6.48%, and stage 4–5 CKD to 0.33% (Saminathan et al., 2020). It is usually started when kidney function decline to a level that can no longer support life (Bakari et al., 2024). According to the National Kidney Foundation (NKF), this is typically indicated by having only 10% to 15% of kidney function left, which corresponds to an estimated glomerular filtration rate (eGFR) below 15 mL/min (NKF 2023). NKF also stated that hemodialysis is a medical procedure when the kidneys can no longer adequately filter waste materials and extra fluid from the blood. Patients suffering from acute kidney injury (AKI) or end-stage renal disease (ESRD) indicated as stage 5, are the main conditions it is used to treat (NKF 2023). A dialyzer, also known as an artificial kidney, was used in the procedure to circulate the patient's blood and it works by carrying out the vital duties of healthy kidneys, such as removing waste materials and extra fluid from the bloodstream to stop the body's harmful toxin build-up (Tang et al., 2022). It has a semipermeable membrane that retains blood cells and larger proteins while allowing the exchange of waste products, electrolytes, and fluids (Tang et al., 2022).

The primary role of hemodialysis is eliminating waste products, including urea, creatinine, and other toxins that build up in the bloodstream due to compromised kidney function (Bakari et al., 2024). Additionally, it helps maintain fluid balance by removing excess fluid from the body, thus preventing complications like hypertension and edema (Bakari et al., 2024). Furthermore, hemodialysis plays a crucial role in regulating

electrolytes, ensuring that levels of essential electrolytes such as potassium and sodium remain stable, which is vital for normal bodily function (Wieliczko et al., 2022). Lastly, based on the similar study, it aids in maintaining acid-base balance by addressing metabolic acidosis through the removal of excess hydrogen ions and the restoration of bicarbonate levels (Wieliczko et al., 2022). In addition to hemodialysis, there were other treatment options available for managing ESRD that require renal replacement therapy (RRT) and peritoneal dialysis (PD) (Mazzuchi et al., 2000).

Hemodialysis (HD) was the most prevalent of RRT in Malaysia, with a prevalence of 1059 patients per million population (pmp) in 2016 (Ismail et al., 2019). According to the same study, peritoneal dialysis (PD) and renal transplantation (RT) are the next most frequent types, with 127 and 59 patients per million population (pmp), respectively which 1814 patients had functional RT grafts in 2016, whereas 35,781 patients were on HD and 3930 were on PD. According of all the dialysis patients, just 1% were at home/office HD (Ismail et al., 2019). Malaysia has seen a 2.3-fold increase in HD prevalence and a 2.5-fold increase in PD prevalence between 2007 and 2016 and the RT's prevalence has not changed (Ismail et al.,2019). A kidney transplant involves surgical by placing a healthy kidney from a donor into a patient with ESRD and this option can restore normal kidney function and eliminate the need for dialysis (Mazzuchi et al., 2000). However, it requires good matching and long-term immunosuppressive therapy to prevent rejection (Mazzuchi et al., 2000). Peritoneal Dialysis (PD) uses the lining of the abdominal cavity, the peritoneum, as a natural filter (Mehrotra et al., 2016). A catheter was inserted into the abdomen to introduce a special dialysis solution that absorbs waste products from the blood vessels in the peritoneum (Mehrotra et al., 2016). PD can be performed at home and may offer more flexibility compared to HD (Mehrotra et al., 2016).

According to Saminathan, it mentioned the growing of (CKD) in Malaysia was a result of demographic shifts such as population aging and the increased incidence of non-communicable illnesses like diabetes and hypertension (Saminathan et al., 2020). The study shown that, there is a high correlation between hypertension and CKD, as seen by the adjusted odds ratio (aOR) of 3.72 and with an (aOR) of 3.32, diabetes also exhibits a strong correlation with CKD (Saminathan et al., 2020). Growing Body Mass Index (BMI), with an (aOR) of 1.06, indicate a growing BMI is linked to CKD and growing older with an (aOR) of 1.06, age is another important factor that indicates older people are more likely to have chronic kidney disease (Saminathan et al., 2020).

A common nutritional issue among patients receiving hemodialysis (HD) for end-stage renal disease (ESRD) is malnutrition (Ghorbani et al., 2020). A lack of calories, protein, and other nutrients is one of its defining characteristics, and it can have a negative impact on health by raising morbidity and death (Ghorbani et al., 2020). Inadequate nutrient intake may result from anorexia or decreased appetite, which can result in inadequate consumption of vital nutrients such as vitamins, minerals, and proteins, and their meal options may be further restricted by dietary restrictions associated with their disease (Ghorbani et al., 2020). If this loss is not sufficiently made up for by diet or supplements, it may result in nutritional deficiencies (Ghorbani et al., 2020). Hemodialysis patients frequently have higher levels of protein catabolism because they are producing more inflammatory cytokines, because of this elevated metabolic state, there may be an increased need for protein consumption that cannot be satisfied (Ghorbani et al., 2020). According to the same study, malnutrition can result from the illness itself, especially from chronic kidney disease (CKD) and its progression to end-stage renal disease (ESRD), which require haemodialysis, through a number of causes such as metabolic disturbances, inflammation and hormonal changes (Ghorbani et al., 2020).

Normal metabolic processes are disturbed by CKD, which results in abnormalities in nutrition metabolism, electrolyte balance, and acid-base status and changes to leptin and ghrelin, two hormones that control hunger and metabolism. (Ghorbani et al., 2020). These modifications may worsen problems with nutrition intake and hunger (Ghorbani et al., 2020). Chronic inflammation, which is frequently linked to CKD, can have a harmful effect on nutritional status which may result from inflammatory processes that change metabolism, decrease appetite, and raise the body's nutritional needs (Ghorbani et al., 2020).

2.1.3 Dialysis Malnutrition Score (DMS) Among Hemodialysis Patients

Malnutrition is a common and clinically significant complication among patients undergoing hemodialysis. This condition can arise from multiple factors, including poor appetite, chronic inflammation, metabolic disturbances, dietary restrictions, and a high burden of comorbidities. Malnutrition in dialysis patients is associated with increased hospital admissions, reduced muscle mass, impaired physical function, diminished immune response, and higher mortality rates (Lacquaniti et al., 2009). Early identification of malnutrition is essential to enable timely nutritional intervention and prevent further deterioration of health status.

There are a few screening tools that have been used to assess malnutrition among patients which include, Subjective Global Assessment (SGA), Mini Nutritional Assessment (MNA), Malnutrition-Inflammation Score (MIS), and Dialysis Malnutrition Score (DMS). The Dialysis Malnutrition Score (DMS) was developed by Kalantar-Zadeh and colleagues as a modified version of the Subjective Global Assessment (SGA) specifically for patients on dialysis. DMS evaluates seven domains: changes in weight, dietary intake, gastrointestinal symptoms, functional capacity, comorbidities, loss of

subcutaneous fat, and muscle wasting. The scoring range is from 7 to 35, where higher scores indicate more severe malnutrition (Kalantar-Zadeh et al., 1999). DMS is widely used because it is simple, cost-effective, and does not require advanced laboratory investigations, making it practical for routine clinical assessment. DMS has been shown to correlate significantly with biochemical markers such as serum albumin, as well as with anthropometric measures including mid-arm circumference and triceps skinfold thickness (Kalantar-Zadeh et al., 1999). Recent studies further support its diagnostic value. A comparative analysis found that DMS demonstrated better sensitivity and specificity for detecting malnutrition among hemodialysis patients compared with the Body Mass Index (BMI). Using a cut-off point of ≥14, DMS achieved a sensitivity of 84.3% and a specificity of 60.7% in identifying patients at risk (Hassanin et al., 2021).

Several studies have demonstrated a strong relationship between DMS scores and the quality of life (QoL) of hemodialysis patients. Higher DMS scores, indicating poorer nutritional status, are associated with significant impairments across physical, psychological, and social domains of QoL. Research involving hemodialysis patients with diabetes reported that malnutrition, as assessed by DMS, significantly predicted lower QoL scores (Uy et al., 2018). Long-term cohort studies also revealed that malnutrition–inflammation scores, which share similar components with DMS, predict increased mortality and declining QoL over time (Kalantar-Zadeh et al., 1999). Given the high prevalence of malnutrition among hemodialysis patients, routine use of DMS in dialysis units is recommended to identify patients at risk. Early identification allows for timely interventions such as individualized dietary counseling, intradialytic nutritional supplementation, protein-energy fortification, and psychological or social support where needed. Research further shows that malnutrition and inflammation are closely linked

with depressive symptoms, fatigue, and a greater symptom burden factors that collectively reduce QoL in this population (Ibrahim & Salamony, 2008). Addressing nutritional issues holistically is therefore essential for improving patient outcomes.

Although DMS is valuable and widely used, it has limitations. As a semi-subjective tool, scoring may vary depending on the evaluator's experience, leading to inter-observer variability. In addition, DMS does not incorporate objective body composition measurements. Future studies are encouraged to combine DMS with tools such as bioelectrical impedance analysis (BIA) or handgrip strength to provide a more comprehensive assessment of nutritional status. Research focusing on the effectiveness of interventions targeted at patients with high DMS scores may also help improve long-term clinical outcomes and QoL.

2.1.4 Malnutrition and QoL among HD patients

Quality of life (QoL) and malnutrition of hemodialysis patients' have a varied interaction that affects their physical and mental health. According to research done at the Miri Red Crescent Dialysis Centre in Northern Sarawak, Malaysia, haemodialysis (HD) patients are more likely to have a poor quality of life (QOL) and to be at risk for malnutrition (Osman Ali, 2019). Based on the same study, several aspects of QOL were measured in the study using the Kidney Disease Quality of Life-Short Form (KDQOL-SF), with a mean overall score of 69.1, indicates the patients' quality of life was generally good (Osman Ali, 2019). Nevertheless, significant differences were found in the scores for the various components, which were Kidney Disease Component Score (KDCS) had a mean score of 66.3, patients appeared to be generally satisfied with the way their renal illness was being managed So, this shown successful treatment approaches. Then, the Mental Component Score (MCS) had a mean score of 52.6, indicate a moderate mental health issue (Osman Ali, 2019).

Based on that, it seems like they could be handling their kidney condition, but they might also be facing some underlying mental health challenges that could be impacting their overall well-being. It could be really helpful for healthcare providers to incorporate mental health support into the treatment plans for these patients. Physical Component Score (PCS) had a mean score of 39.4, it was noticeably low and indicated serious physical health restrictions (Osman Ali, 2019). This is concerning because it shows that patients are experiencing significant limitations in their physical functioning despite possibly satisfactory management of kidney disease. Treatment of these physical health issues should be a priority, possibly through supportive therapies or rehabilitation programs. Dietary limitations, inflammation, and the metabolic needs of dialysis treatment are some of the factors that contribute to malnutrition (Ghorbani et al., 2020). There are several screening tools that can be used to assess malnutrition in CKD which are Subjective Global Assessment (SGA). Dialysis Malnutrition Score (DMS) and the Malnutrition Inflammation Score (MIS), which are frequently used instruments to assess nutritional status in this population (Zhang et al., 2020). Hence, there was a strong correlation in using DMS in HD patients which has a sensitivity value in HD 59% (Harvinder et al., 2016).

The quality of life of patients receiving hemodialysis is significantly impacted by malnutrition. According to the study conducted in China, 162 ESRD patients were enrolled, and 52 HD patients and 60 PD patients underwent the study (Zhang et al., 2020), Based on the same study, patients' quality of life is negatively impacted by hemodialysis, and it is linked to a decline in social engagement and physical functioning, an elevated risk of depression, and a worsening of symptoms such as fatigue, muscle weakness, and restless legs (Zhang et al., 2020). Furthermore, patients' lives are drastically limited by their reliance on hemodialysis machines, which may also negatively affect their mental

health. Patients receiving kidney transplants have a higher quality of life than those receiving hemodialysis or peritoneal dialysis (Zhang et al., 2020). Patients receiving hemodialysis have a worse quality of life than those receiving peritoneal dialysis. (Zhang et al., 2020)

In the end, malnutrition can lower a patient's overall quality of life by causing weakness, exhaustion, and a reduction in physical performance, which can impact everyday activities and social interactions (Zhang et al., 2020) Inflammation is often associated with starvation which can increase symptoms of depression and anxiety. (Zhang et al., 2020). Furthermore, the physical symptoms of malnutrition, such as muscle wasting and fatigue, can lead to decreased activity and social withdrawal, further impacting mental health and QoL (Mak et al., 2011). The QoL of dialysis patients is further deteriorated by malnutrition, which impacts both physical and psychological health, according to another study by Kovesdy et al. (2018). According to the research, improving QoL can result from dietary changes that treat malnutrition (Kovesdy, et al. 2018).

2.2 Conceptual Framework

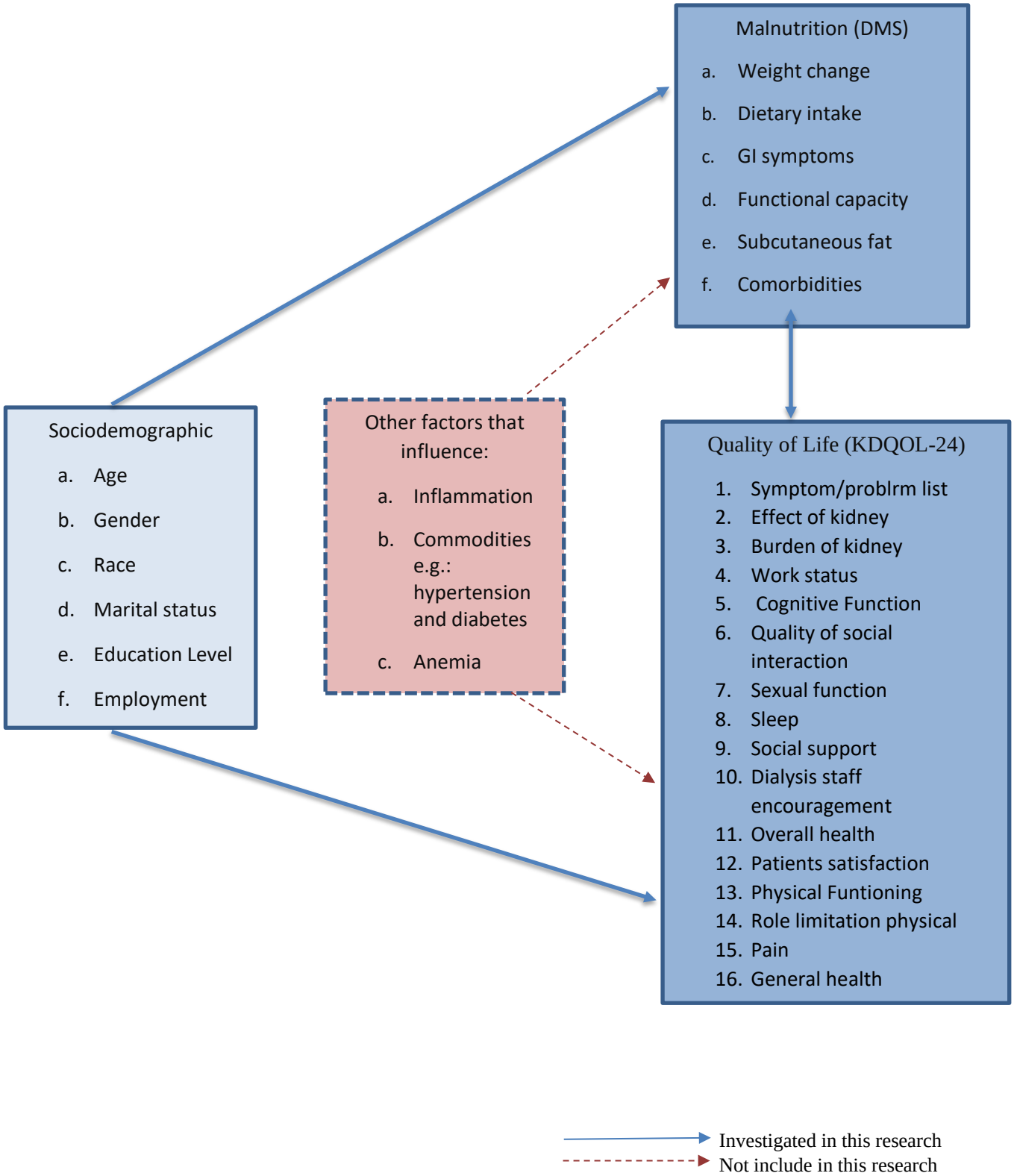

Figure 1: Conceptual framework of Sociodemographic and effect related to malnourished and quality of life

Sociodemographic characteristics play a critical role in shaping patients' health outcomes. Age is a well-recognized determinant, as older patients often experience declining physical strength, comorbidities, and reduced dietary intake, which increase the risk of malnutrition and lower QoL (Lopez-Vargas et al., 2016) Gender differences have also been reported, with women often experiencing poorer QoL due to higher symptom burden and psychosocial stress, while men may face limitations related to work and functional roles (Almutary et al., 2013). Race and cultural background can influence dietary practices, social support, and health-seeking behaviors, which in turn affect nutrition and QoL (Chilcot et al., 2012). In addition, marital status has been shown to provide a protective effect, as patients with spousal support tend to have better dietary adherence and emotional well-being, compared to those who are single, divorced, or widowed (Wang et al., 2021)

Educational attainment also plays an important role, as patients with higher education levels often demonstrate better knowledge of renal diets, adherence to medical advice, and coping strategies, which translate into improved QoL (Pagels et al., 2012). Similarly, employment status reflects both financial stability and psychosocial well-being; employed patients generally report higher QoL compared to unemployed patients, who may suffer from financial strain and social isolation (Chilcot et al., 2012).

Patients receiving haemodialysis frequently consume insufficient amounts of protein and calories. According to studies, the average energy intake is usually lower than what is advised, and many patients do not consume enough protein, which is essential for preserving muscle mass and general health (Vaz et al., 2014). For these people, the recommended daily protein intake is typically between 1.2 and 1.4 grams per kilogram of body weight (Vaz et al., 2014). Deficits in vital vitamins and minerals, including water-soluble vitamins, iron, and zinc, are common in patients (Vaz et al., 2014). Their general

health and nutritional status may suffer due to these inadequacies, which could raise their DMS (Stark et al., 2011). Hence, increased inflammatory indicators, such as C-reactive protein (CRP), have a negatively effect on nutritional status and are linked to malnutrition.

According to National Kidney foundation (NKF), due to comorbidities, social isolation, and decreased appetite, older age is frequently linked to an increased risk of malnutrition. Gender variations may also impact dietary adherence and nutritional requirements (NKF,2024). The presence of others comorbidity such as hypertension, and diabetes can worsen complications and negatively impact both nutritional status and quality of life (Yonata et al., 2022). Longer dialysis stays are linked to changes in nutritional status and quality of life, which frequently raises the risk of malnutrition and lowers QoL. (Yonata et al., 2022) Hence, malnutrition among haemodialysis patients can worsen by lower socioeconomic position, which might restrict access to wholesome food options, medical care, and dietary management education. (Stark et al., 2011).

CHAPTER 3 METHODOLOGY

3.1 Research Design

This research used a cross-sectional study design to comprehensively allow the researcher to gather, summarize, present, and interpret information appropriately. A survey in the form of standardized questions and questionnaires was used to determine the hemodialysis patients' malnutrition and to evaluate their quality of life. Hence, cross-sectional studies only provided a snapshot of a population at a single point in time, which made it difficult to determine cause-and-effect correlations and monitor changes over time. They were exposed to a number of biases, such as recall and selection bias, which might have affected the reliability of the results. Furthermore, confounding factors might have made it difficult to determine the real correlations between variables, which made it challenging to reach solid findings (Cheng & Wang, 2020). Since it could provide an overview of a population at a particular moment in time, the cross-sectional research design was recommended for the effective evaluation of several variables simultaneously. This design enabled researchers to gather valuable information on the prevalence and distribution of various factors of interest, facilitating the identification of associations and patterns within the population. The prevalence of sociodemographic, malnutrition, and quality of life was compared with the prevalence of poor sociodemohgraphic, malnutrition, and quality of life.

3.2 Study Location

The research and study were conducted at the Hemodialysis Centre in Hospital Pakar USM (HPUSM) in Kubang Kerian, Kelantan. The study was carried out among the outpatient clinic settings, which included the Hemodialysis Centre, Dietetics Outpatient Clinic, Klinik Rawatan Keluarga (KRK), Klinik Pakar Perubatan (KPP), and the inpatient settings, involving patients who were undergoing hemodialysis treatment in the medical

wards: 8 Selatan, 7 Selatan, 7 Utara, and 1 Selatan in HPUSM. This study was conducted at Hospital Pakar USM (HPUSM) from April 2025 until June 2025. Hospital Pakar USM (HPUSM) was chosen as the study site due to its strategic location, which allowed the researcher to efficiently carry out the data collection process within a compressed timeframe.

3.3 Study Population

The decision to investigate the (HD) patient population at Hospital Pakar Universiti Sains Malaysia (HPUSM) was made for relevant for number of reasons. In order to provide appropriate healthcare, it was considered important to first understand the malnutrition and quality of life (QoL) of patients with chronic kidney disease (CKD), as well as the effect of sociodemographic, which had become increasingly common in Malaysia. Secondly, due to its wide range of patients, HPUSM was able to support comprehensive research on the variables contributing to malnutrition in HD patients, thereby increasing the study's relevance to Malaysian healthcare in general. Lastly, the new knowledge was expected to help in developing plans to enhance patient care and improve support systems for both patients and caregivers.

Reference population

Haemodialysis patients in HPUSM, Haemodialysis patients were chosen from both inpatient and outpatient.

Target population

Haemodialysis patients in the outpatient clinic setting and hemodialysis patients who have been admitted into wards, HPUSM.

Source population

Haemodialysis patients who were attending outpatient clinics and who are staying in specific wards in (HPUSM).

Sampling frame

Registration list for haemodialysis patients in outpatient clinics and admission list for haemodialysis patients in specific wards in (HPUSM).

3.4 Selection Criteria

3.4.1 Inclusion Criteria

I. Patient age above 18 years old

II. Female and Male CKD patients above stage 3 that are undergoing hemodialysis treatment for above 3 months

III. Malaysian citizen.

3.4.2 Exclusion Criteria

I. Patients undergoing peritoneal dialysis

II. Patients in ICU.

III. Pregnant and lactating mother

3.5 Sample Size Calculation

The Third objective is (to analyze the Quality of Life (QoL) status of hemodialysis patients in HUSM Kubang Kerian, Kelantan) which demands a sample size of 119 participants. This calculation employs a 95% confidence level ($\alpha = 0.09$), yielding a Z-score of 1.96. Hence, the estimated proportion (p) of 0.50 (50%) is derived from (Dorinna anak Ngalai, Osman Ali, n.d.) the previous study on Quality of life among Hemodialysis patients in a dialysis centre in the northern region of Sarawak. To consider potential non-responses or subject withdrawals (referred to as the dropout rate), an extra 10% was added