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Public Awareness of Chronic Kidney Disease in Malaysia

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Abstract
Chronic kidney disease (CKD) is a growing public health issue in Malaysia, driven by diabetes, hypertension, and aging. Despite its high prevalence, public knowledge about CKD remains low, contributing to late diagnoses and poor management. A cross-sectional study of 1,391 individuals aged 17 and above from two Malaysian states found significant associations between CKD knowledge and demographics, lifestyle habits, medical history, family history, and participation in awareness programs. The mean knowledge score was 11.51 (±5.9). Enhancing public awareness through targeted education, particularly in high-risk populations, and promoting early detection and prevention are crucial for improving CKD outcomes.

Keywords: Chronic kidney disease; knowledge; awareness; public

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1.0 Introduction

Chronic kidney disease (CKD) is a long-term condition marked by kidney abnormalities lasting over three months (Chen et al., 2019). It affects over 10% of the global population (Kovesdy, 2022) and varies significantly by region, especially in Asia (Banik & Ghosh, 2021). In Malaysia, CKD and end-stage renal disease (ESRD) rates have surged over the past two decades due to diabetes, hypertension, and an aging population. Patients with ESRD face high complication rates and often receive inadequate disease management, underscoring the need for early detection and prevention since CKD lacks a definitive cure (Saminathan, 2020).

CKD is also an independent risk factor for cardiovascular disease, leading to premature death and end-stage renal failure. The financial burden is high, with annual treatment costs per patient for hemodialysis and peritoneal dialysis estimated at RM39,791 and RM37,576, respectively (Surendra et al., 2019).

In developing countries, CKD is often driven by a combination of noncommunicable diseases (NCDs) such as type 2 diabetes, hypertension, obesity, and aging, as well as communicable diseases (CDs) like HIV and hepatitis B (Badro, 2023). The burden of CKD is disproportionately higher in low- and middle-income countries (LMICs) compared to high-income countries (HICs) due to limited access to healthcare resources and effective prevention programs (Badro, 2023).

The prevalence of CKD in Malaysia has increased from 9.07% in 2011 to 15.48% in 2018, highlighting the growing public health issue (Saminathan et al., 2020). Factors such as hypertension, diabetes mellitus, increasing body mass index (BMI), and aging are

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significantly associated with CKD (Saminathan et al., 2020). The high prevalence of CKD in Malaysia is further exacerbated by the consumption of unregistered health supplement products, which have been linked to adverse renal events (Loo et al., 2020).

Despite the increasing prevalence and health impact of CKD; studies reveal that understanding of CKD and its risk factors remains low, particularly in developing countries (Gheewala et al., 2018); including in Malaysia, contributing to late diagnoses and poor disease management (Saminathan et al., 2020). Projections show that the number of hemodialysis patients in Malaysia will rise significantly, from 32,026 in 2013 to 106,249 by 2040, with the incidence rate nearly doubling (Bujang et al., 2017). A study conducted among students at a public university in Klang Valley, Malaysia, found that almost one-third of the respondents had below-average knowledge of CKD; and revealed that there was lack of extensive local research on CKD knowledge and suggested further investigate socioeconomic and ethnic factors affecting CKD awareness especially among the public (Loo et al., 2020).

Early detection, prevention, and effective management of CKD are crucial. Public knowledge and awareness are vital for improving outcomes for at-risk or early-stage CKD patients (Ahmed et al., 2018). Thus, this study aims to assess CKD knowledge levels and identify predictors among Malaysian residents using a validated questionnaire.

2.0 Literature Review

Chronic kidney disease (CKD) is a significant global health issue affecting millions worldwide. Early detection and prevention are crucial to slowing its progression to end-stage renal failure (ESRF). Effective management requires a thorough understanding of CKD, its risk factors, symptoms, diagnostic tests, and treatments. Various studies have assessed the public's knowledge of CKD across different regions, revealing substantial gaps in awareness.

Alobaidi (2021) found low CKD knowledge among Saudi Arabian participants, with a mean score of 11.99, where nearly 43% scored below 11. While 80.5% knew that one kidney is sufficient, 50.1% were unaware of medications to slow CKD progression. Similarly, Gheewala et al. (2018) reported low CKD knowledge, with 50% of respondents scoring below 11. Although 85.6% knew that one kidney suffices, 76.6% incorrectly believed herbal supplements could cure CKD. Yabeyu et al. (2022) found moderate knowledge in Ethiopia, with 50% scoring below 11. While 83.75% knew one healthy kidney is sufficient, only 57.5% understood medications could slow CKD progression.

In Egypt, Fathy et al. (2021) reported better CKD knowledge, with a mean score of 13.12, though 45% still scored below 11. Despite understanding that medications can delay CKD, only 17.2% believed herbal supplements were ineffective. Rashid et al. (2022) in India reported moderate CKD knowledge with a mean score of 16.49, but 79.89% of respondents mistakenly thought herbal supplements could treat CKD.

The studies highlight persistent gaps in CKD knowledge, particularly regarding kidney functions, risk factors, and treatments. Misconceptions about herbal supplements were common, and while awareness of diagnostic tests was somewhat higher, the public remained largely uninformed about other diagnostic methods.

CKD awareness is influenced by socio-demographic and personal factors such as age, gender, education, and socioeconomic status. While some studies suggest older adults have better CKD knowledge due to increased health literacy (Nakagawa, 2022), others report younger individuals being more knowledgeable due to modern information access (Mahmoud et al., 2023). Gender differences also exist, with males scoring higher in CKD knowledge in some studies (Wolide et al., 2020; Mahmoud et al., 2023). Education and income levels significantly impact CKD awareness (Gheewala et al., 2018; Al-Momany et al., 2024). Research shows urban populations generally have higher CKD knowledge compared to rural areas (Asmelash et al., 2020; Rashid et al., 2022). Information sources play a crucial role in shaping CKD awareness (Nakagawa, 2022; Al-Momany et al., 2024).

Chronic kidney disease (CKD) in Malaysia disproportionately affects certain at-risk groups due to health conditions, lifestyle habits, and socio-demographic factors. These groups include individuals with diabetes or hypertension (Aziz et al., 2017; Ismail et al., 2021), older adults (Ng et al., 2020), obese individuals (Khor et al., 2021), those with a family history of kidney disease (Chong et al., 2019), smokers, and excessive alcohol consumers (Rahman et al., 2020). Additionally, those with cardiovascular issues (Tan et al., 2018), low-income populations (Zainuddin et al., 2022), and pregnant women with pre-eclampsia (Mohamad et al., 2019) are at higher risk of CKD.

These findings stress the importance of targeted educational interventions, especially for at-risk groups. Public health campaigns should focus on raising awareness about CKD symptoms, risk factors, and the significance of early detection through regular screenings and healthcare provider involvement. Integrating CKD education into the management of chronic conditions like diabetes and hypertension is also essential. By addressing these knowledge gaps, we can enhance early detection, slow CKD progression, and improve overall kidney health outcomes. Improved public awareness and education programs can significantly impact CKD detection and management, particularly in regions with low awareness levels.

3.0 Methodology

This cross-sectional study involved 1,391 participants aged 18 and above, with the sample size calculated using the Raosoft sample size calculator. Participants were selected through convenience sampling from Negeri Sembilan and Perlis, two Malaysian states with some of the highest diabetes mellitus rates, the leading cause of chronic kidney disease (CKD). The study included all districts within these states.

Data collection was carried out using an adapted questionnaire from a previous study by Gheewala et al. (2018), which was provided in both languages (English and Bahasa Malaysia) through a translation process conducted by language experts. The content was reviewed by both experts and the general public to ensure its validity. A pilot study was also conducted, and the Cronbach's alpha result was 0.84, indicating good internal consistency. The questionnaire consisted of two main sections. The first section gathered information on demographics, lifestyle, medical history, family history, kidney assessments, and participation in CKD awareness programs. The second section included 24 multiple-choice questions aimed at assessing knowledge of kidney functions, diagnostic tests, risk factors, and symptoms. Participants were asked to choose "True," "False," or "I don't know." Correct answers earned points, and scores were calculated as percentages.

Data collection took place from June to September 2024, following ethical approval from the UiTM Ethics Committee. (FERC/FSK/MR/2024/00157). The study was conducted in public spaces such as parks, shopping malls, community centers, and markets, where people gather or pass through. This survey was also made available to the public through a Google Form link. The link was shared via social media platforms to encourage greater community participation across the two states. Data analysis was performed using the Statistical Package for Social Sciences (SPSS) Version 28.0, employing descriptive and inferential statistics, including Independent T-tests, Chi-Square tests, and One-Way ANOVA to analyze the data.

4.0 Finding

Table 1 provides detailed demographic information on the 1391 study participants. The average age was 39.03 years, with the majority (63.8%) falling in the 31–60-year age group. Most participants identified as Malay (47%), were married (55.1%), and had attained tertiary education (42.6%). A substantial number resided in suburban areas (46%) and were employed in the government sector (31.1%). Income distribution revealed that 36.7% belonged to the B40 group, 35.4% to the M40 group, and 19.7% to the T20 group.

Table 1: Demographics Characteristics of the respondents

Variable	Frequency	Percentage
Age		
Mean: 39.03; SD:12.25		
18-30 years old	398	28.6
31-60 years old	887	63.8
More than 60 years old	106	7.6
Gender		
Male	658	47.3
Female	733	52.7
Race		
Malay	654	47
Chinese	411	29.5
Indian	254	18.3
Others	72	5.2
Marital Status		
Single	390	28
Marriage	767	55.1
Divorced/Widowed/Separated	234	16.8

Variable	Frequency	Percentage
Level of Education		
Primary School	227	16.3
Secondary School	560	40.3
Tertiary Education	593	42.6
Others	11	0.8
Type of Residency		
Urban	433	31.1
Sub-Urban	640	46
Rural	318	22.9
Occupation		
Unemployed	215	15.5
Government Sector	433	31.1
Military Sector	307	22.1
Private Sector	357	25.7
Others	79	5.7
Gross Monthly		
B40 (Below RM5,250)	510	36.7
M40 (RM5,250-RM11819)	492	35.4
T20 (RM11,820 and above)	274	19.7
Others	115	8.3

Table 2 presents an overview of the respondents' lifestyle choices, medical and family histories, renal function screenings, CKD awareness levels, and sources of health information. Most respondents (76.9%) reported abstaining from alcohol, and 67.1% were non-smokers. Regarding physical activity, 27.2% led a sedentary lifestyle, while 26.7% engaged in over 150 minutes of physical activity per week. Osteoarthritis affected 25.5% of respondents, and 29.9% regularly used painkillers, with 26.0% specifically using NSAIDs. Additionally, 28.3% reported using herbal medicine. In terms of medical history, 93.9% of respondents had no kidney disease, 75.4% did not have hypertension, 80.7% were non-diabetic, and 79.7% did not have heart problems. Family history data

indicated that 43.2% had a healthcare professional in the family, 32.7% had a family history of kidney disease, and 38.0% had other chronic illnesses in the family. Renal function screenings were performed for 12.8% of respondents within the last six months, while 21.5% had never been screened. Concerning CKD awareness, 40.8% of participants had attended awareness programs. Social media (52.0%) emerged as the most common source of health information, followed by health workers (43.9%) and print media (42.8%).

Table 2: Respondents' lifestyle choices, medical and family histories, renal function screenings, CKD awareness levels, and sources of health information

Variable	Frequency	Percentage
Respondent's Lifestyle		
Alcoholic		
Yes	322	23.1
No	1069	76.9
Smoker		
Yes	457	32.9
No	934	67.1
Physical Activity		
Sedentary Lifestyle (none)	379	27.2
< 150 min/week	640	46
> 150 min/week	372	26.7
Do You Have Osteoarthritis?		
Yes	355	25.5
No	1036	74.5
Do you take Pain Killer?		
Yes	416	29.9
No	975	70.1
Do you take NSAIDS?		
Yes	362	26
No	1029	74
Do you take Herbal Medicine?		
Yes	393	28.3
No	998	71.7
The Past Medical Illness		
History of Kidney Disease		
Yes	85	6.1
No	1306	93.9
High blood pressure known as hypertension		

Variable	Frequency	Percentage
Last Renal Function Assessment/Screening		
When did you do the last renal function screening?		
< 6 months	178	12.8
6-12 month	261	18.8
1-2 years	260	18.7
> 2 years	232	16.7
Never been tested	299	21.5
Do not know/remember	161	11.6
Attended Any CKD Awareness Education		
Have you ever attended any CKD awareness presentations?		
Yes	567	40.8
No	824	59.2
Family History		
Does anyone in your immediate family work as a registered healthcare professional (e.g. doctor, nurse, dietician or pharmacist)?		
Yes	601	43.2
No	790	56.8
Do you have any family history of kidney failure/chronic kidney disease?		
Yes	455	32.7
No	936	67.3
Do you have any family history other than kidney failure?		
Yes	529	38
Do you have any family history other than kidney failure?		
Yes	529	38
No	862	62
Source of Health Information		
Health Workers	Yes	611	43.9
	No	318	22.9
	Not Sure	462	33.2
Television	Yes	593	42.6

Yes	342	24.6	
No	1049	75.4	
Raised blood sugar known as diabetes			
Yes	269	19.3	
No	1122	80.7	
Heart problem such as heart failure/heart attack			
Yes	282	20.3	
No	1109	79.7	
Personal History of Stroke			
Yes	227	16.3	
No	1164	83.7	

No	340	24.4	
Not Sure	458	32.9	
Radio			
Yes	577	41.5	
No	361	26	
Not Sure	453	32.6	
Social Media			
Yes	724	52	
No	273	19.6	
Not Sure	394	28.3	
Print Media			
Yes	595	42.8	
No	333	23.9	
Not Sure	463	33.3	
Other			
Yes	342	24.6	
No	549	39.5	
Not Sure	500	35.9	

The mean (SD) CKD knowledge score among the Malaysian public was 11.51 (± 5.9), with 63% of participants scoring below 12. The study assessed respondents' CKD knowledge, revealing that 52% correctly identified that one can live with one healthy kidney, and 54.8% understood that herbal supplements are ineffective for CKD. However, only 39.7% were knowledgeable about medications that delay CKD progression. While more than half were aware of kidney functions like urine production (52.7%) and blood filtration (52.1%), fewer understood other kidney functions such as blood pressure regulation (43%) and bone health (32.2%). Awareness of CKD risk factors varied, with diabetes being the most recognized (51.8%), followed by hypertension (47.4%) and obesity (44.5%). Symptoms like water retention (51.8%) were more commonly known than others like nausea (37%) and fatigue (44.8%) (Table 3).

Table 3: The Chronic Kidney Disease (CKD) Knowledge

No	Item	Correct
1	A person can lead a normal life with one healthy kidney	723 (52.0%)
2	Herbal supplements can be effective in treating chronic kidney disease	762 (54.8%)
3	Certain medications can help to slow-down the worsening of chronic kidney disease.	552 (39.7%)
Which of the following are commonly used to determine the health of your kidneys?		
4	A blood test	746 (53.6%)
5	A urine test	761 (54.7%)
6	A fecal (poo) test	761 (54.7%)
7	Blood pressure monitoring	556 (40.0%)
What functions do the kidney perform in our body		
8	The kidneys make urine	733 (52.7%)
9	The kidneys clean blood	725 (52.1%)
10	The kidneys help to keep blood sugar level normal	692 (49.7%)
11	The kidneys help to maintain blood pressure	598 (43.0%)
12	The kidneys help to breakdown protein in the body	676 (48.6%)
13	The kidneys help to keep the bones healthy	448 (32.2%)

No	Item	Correct
What are the risk factors for chronic kidney disease?		
14	Diabetes	720 (51.8%)
15	Being female	785 (56.4%)
16	High blood pressure	660 (47.4%)
17	Heart problems such as heart failure or heart attack	586 (42.1%)
18	Excess stress	686 (49.3%)
19	Obesity	619 (44.5%)
What are the signs and symptoms that a person might chronic kidney disease or kidney failure? have if they have advanced		
20	Water retention (excess water in the body).	721 (51.8%)
21	Fever	756 (54.2%)
22	Nausea/vomiting.	515 (37.0%)
23	Loss of appetite	602 (43.3%)
24	Increased fatigue (tiredness)	623 (44.8%)

This study found significant associations between CKD knowledge and several demographic factors, including gender (χ^2: 5.06), age (F: 47.17), race (χ^2: 100.13), marital status (F: 11.08), education level (F: 74.90), type of residency (F: 6.39), occupation (F: 65.11), and gross monthly income (F: 102.6), all with p-values less than 0.05. Additionally, the study identified associations between CKD knowledge and lifestyle factors, such as alcohol consumption (χ^2: 60.91), history of osteoarthritis (χ^2: 166.63), use of painkillers (χ^2: 48.04), use of NSAIDs (χ^2: 111.09), and consumption of herbal medicine (χ^2: 120.17), all with p-values less than 0.05. The study also established significant associations between CKD knowledge and respondents' medical history, including diabetes (χ^2: 45.97), heart problems (χ^2: 59.33), and stroke (χ^2: 60.20), all with p-values less than 0.05. Moreover, there were associations between CKD knowledge and family history factors, such as having a healthcare professional in the family (χ^2: 46.03) and a family history of kidney failure (χ^2: 30.86), both with p-values less than 0.05. Additionally, the study found a strong association between CKD knowledge and the timing of the last renal function screening (χ^2: 188.28), with a p-value less than 0.05. Finally, there was a significant association between CKD knowledge and whether the respondent had attended CKD awareness presentations or educational sessions (χ^2: 66.65), with a p-value less than 0.05 (Table 4).

Table 4: The association between chronic kidney disease (CKD) knowledge with the characteristics of the respondents

Variable	x^2	*p*-value
Demographic Characteristic		
Gender	5.06	0.02
Lifestyle of respondents		
Alcoholic	60.91	0.01
Do You Have Osteoarthritis	166.63	0.01
Do you take Pain Killer	48.04	0.01
Do you take NSAIDS?	111.09	0.01
Do you take Herbal Medicine?	120.17	0.01
The Past Medical Illness		
Raised blood sugar known as diabetes	45.97	0.01
Heart problem such as heart failure/heart attack	59.33	0.01
Personal History of Stroke	65.2	0.01
Family History		
Does anyone in your immediate family work as a registered healthcare professional (e.g. doctor, nurse, dietician or pharmacist)?	46.03	0.01
Do you have any family history other than kidney failure?	30.86	0.02
Last Renal Function Assessment/Screening		
When did you do the last renal function screening?	188.28	0.01
Attended Any CKD Awareness Presentation/Education		
Attended Any CKD Awareness Presentation/Education	66.65	0.01

Variable	*F*	*p*-value
Demographic Characteristic		
Age	47.17	0.01
Race	100.13	0.01
Marital Status	11.08	0.01
Level of Education	74.9	0.01
Type of Residency	6.39	0.04
Occupation	65.11	0.01
Gross Monthly	102.6	0.01

5.0 Discussion

This study highlighted significant knowledge gaps in chronic kidney disease (CKD) awareness, which could impede effective management and prevention of the disease. Respondents exhibited a basic understanding of living with one healthy kidney and the ineffectiveness of herbal supplements, but there was a notable lack of knowledge about medications that can slow CKD progression and the comprehensive range of kidney functions. While diabetes was widely recognized as a CKD risk factor, other contributing factors such as hypertension, heart disease, and obesity were less acknowledged by the respondents.

The study also found that CKD knowledge is influenced by various factors, including demographics, lifestyle choices, and medical history. For instance, age plays a significant role in CKD awareness. Some studies, such as Nakagawa (2022), report that older respondents in Japan exhibited higher CKD knowledge, possibly due to increased health literacy or greater exposure to CKD-related information through traditional media like television. Conversely, research by Mahmoud et al. (2023) in Saudi Arabia found that younger individuals (18–27 years) had better CKD knowledge than older adults, likely due to greater access to health information through modern technologies. These divergent findings underscore the role of cultural and educational systems in shaping CKD knowledge across different age groups. Interestingly, Almutary (2021) observed no significant associations between CKD knowledge and age, suggesting that other factors might be at play.

Gender differences in CKD knowledge were also noted. Studies by Wolide et al. (2020) and Mahmoud et al. (2023) revealed that males scored better than females in CKD knowledge. These findings highlight the potential influence of cultural and educational systems on CKD awareness between different genders. Education remains a crucial predictor of CKD awareness. Research by Gheewala et al. (2018) and Al-Momany et al. (2024) found that individuals with higher educational attainment had better CKD knowledge, emphasizing the critical role of education in health literacy. Similarly, Fathy et al. (2021) demonstrated that respondents with postgraduate qualifications had substantially higher CKD knowledge compared to those with primary or no education.

Socioeconomic factors, such as income and occupation, also affect CKD knowledge levels. Studies by Alobaidi (2021) and Younes et al. (2022) showed a significant association between CKD awareness and income level as well as employment status. Rashid et al. (2022) reported that employed individuals had better CKD knowledge than unemployed individuals, illustrating how access to healthcare education is highly driven by economic stability. CKD knowledge is also influenced by geographical location. Urban populations are generally more knowledgeable compared to rural populations, as noted by Asmelash et al. (2020) and Rashid et al. (2022). Akokuwebe et al. (2019) found that suburban residents in Nigeria exhibited lower CKD knowledge than urban dwellers. However, Al-Momany et al. (2024) presented different results, showing that participants in rural areas had higher CKD knowledge, possibly due to targeted educational efforts in these regions.

Individual and family health histories significantly influence CKD knowledge. Studies by Gheewala et al. (2018) and Yabeyu et al. (2022) indicated that people with a family history of CKD or related comorbidities (e.g., hypertension, diabetes) were more aware of CKD. Tegegne et al. (2020) discovered that hypertensive individuals with family members who had kidney disease had a better understanding of preventing CKD.

Although previous literature has investigated CKD knowledge across various demographic and socio-economic backgrounds, there are still significant gaps. The existing research primarily focuses on specific population groups who had health conditions (Tegegne et al., 2020; Almutary, 2021) and urban residents (Akokuwebe et al., 2019; Asmelash et al., 2020), while underrepresenting rural areas and less-privileged populations. Moreover, most studies are based on cross-sectional designs, which may limit the ability to assess the causal relationships between CKD knowledge and respondents' characteristics.

The role of information sources should also be considered. Nakagawa (2022) explored the impact of health information sources on CKD knowledge, finding that traditional media like television played a significant role in increasing awareness. Additionally, Al-Momany et al. (2024) reported that respondents relying on healthcare professionals and TV scored higher in CKD knowledge compared to those using social media. This underscores the importance of healthcare professionals and traditional media in effective health communication, especially in regions with limited digital literacy.

These findings highlight the need for targeted educational initiatives, especially for high-risk groups. Public health campaigns should raise awareness about CKD symptoms, risk factors, and the importance of early detection through regular screenings and healthcare provider engagement. Integrating CKD education into chronic disease management, particularly for diabetes and hypertension, is essential. Such efforts can promote early diagnosis, slow disease progression, and improve kidney health outcomes.

However, the study's cross-sectional design limits causal interpretation and long-term insights. Future research should adopt a longitudinal approach, incorporate qualitative methods, and expand geographic coverage to enhance understanding, impact assessment, and generalizability.

6.0 Conclusion and Recommendation

This study highlighted significant gaps in chronic kidney disease (CKD) awareness among Malaysians. While participants understood the ineffectiveness of herbal supplements and the possibility of living with one healthy kidney, they lacked knowledge about medications that could slow CKD progression and the full range of kidney functions. Although diabetes was widely recognized as a risk factor for CKD, other critical factors like hypertension, heart disease, and obesity were less acknowledged. The study also found that CKD knowledge is influenced by demographics, lifestyle choices, and medical history.

These findings emphasize the urgent need for targeted educational interventions, particularly for high-risk groups. Public health campaigns should focus on raising awareness about CKD symptoms, risk factors, and the importance of early detection through regular screenings and involvement of healthcare providers. Integrating CKD education into the management of chronic conditions such as diabetes and hypertension is essential for a more comprehensive approach to kidney health.

Addressing these knowledge gaps can significantly improve early detection, slow CKD progression, and enhance overall kidney health outcomes. By equipping individuals with the knowledge to manage and prevent CKD, we can achieve better health outcomes. Strengthening public awareness and education is crucial for improving CKD detection and management, ultimately leading to healthier lives for those at risk or already affected by CKD.

However, the study's cross-sectional design limits causal relationships and long-term insights. Future research should consider a longitudinal approach, qualitative methods, and a broader geographic scope to enhance understanding, assess impact, and improve generalizability.

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Paper Contribution to Related Field of Study

This study contributes to existing knowledge by identifying significant gaps in public awareness of chronic kidney disease (CKD) in Malaysia. It highlights insufficient understanding of CKD medications, kidney functions, and risk factors beyond diabetes, such as hypertension and obesity. Additionally, it demonstrates how demographics, lifestyle habits, and medical history influence CKD knowledge. The findings emphasize the need for targeted public health campaigns and integrating CKD education into chronic disease management. This research offers a baseline for future studies and provides valuable insights for improving CKD education, early detection, and prevention efforts, ultimately enhancing health outcomes.

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