

# Limited Public Knowledge of Chronic Kidney Disease in a Resource-Limited Setting: A Cross-Sectional Study

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**Background:** The general public's awareness and knowledge of chronic kidney disease (CKD) and its risk factors remains low, which may contribute to the development of CKD and undiagnosed disease. Therefore, the current study aimed to assess public knowledge of CKD in the Ethiopian community using a validated tool.

**Methods:** A community-based cross-sectional study was conducted in Ethiopia's capital, Addis Ababa. For administrative purposes, the city is divided into ten sub-cities; proportional numbers of study participants were drawn from each sub-city based on their total population size. This study's target population was the general public, and health professionals were excluded. SPSS version 26 was used to analyze the data, and frequencies, tables, percentages, mean, and standard deviation were used to describe the responses of the participants. To identify factors associated with public knowledge of CKD, an independent *T*-test and one-way ANOVA statistics were used.

**Results:** A total of 350 people were approached, with 301 of them completing and returning the questionnaire, yielding an 86% response rate. The mean (S.D.) knowledge score of participants in this study was 11.12 ( $\pm 4.21$ ), with a minimum of 0 and a maximum of 22. In terms of the distribution of the CKD knowledge score, half of the respondents have a score of 11 or less. One-way ANOVA revealed that respondents with a degree educational background and family history of CKD had higher knowledge scores. An independent *t*-test was also performed, but it found no link between socio-demographic characteristics and knowledge score.

**Conclusion:** The Ethiopian population has a low level of general knowledge about CKD and its risk factors. Non-communicable diseases, such as diabetes and hypertension, are currently a public health concern and one of the major risk factors for CKD.

**Keywords:** limited chronic kidney disease, public knowledge, Ethiopia

## Background

Awareness of Chronic Kidney Disease (CKD) includes general knowledge, risk factors, and consequences owing to CKD.<sup>1,2</sup> CKD is defined as an estimated or measured glomerular filtration rate (GFR)  $<60$  mL/min/1.73m<sup>2</sup> that persists for  $\geq$ three months with or without evidence of kidney damage or evidence of kidney damage with or without decreased GFR.<sup>3</sup>

Early detection and management of CKD can help to improve disease outcomes. However, nearly all CKD conditions were clinically unfamiliar, owing to a lack of public awareness about the disease.<sup>4</sup> A lack of general knowledge about the disease is a barrier to the successful implementation of prevention programs.<sup>5</sup> According to a study conducted in the United States on 676 patients with CKD, more than one-third of patients know little about their CKD diagnosis, and nearly half are unaware of treatment options if their kidneys fail.<sup>6</sup> In Ethiopia, there has been a shift in the last few decades from infectious disease to non-communicable chronic disease.<sup>7</sup>

Poor glycemic control, uncontrolled hypertension, nephrotoxic drugs, and smoking are recognized as the leading risk factors for CKD worldwide.<sup>8,9</sup> Between 1990 and 2010, the prevalence of CKD raised from 29th to 18th on the list of

leading causes of death worldwide.<sup>10</sup> A large Chinese study discovered a 10.8% prevalence of CKD, but only 12.5% of them were aware of their condition.<sup>11</sup>

There is widespread agreement that CKD prevention is the best health policy option for lowering the costs associated with a better health outcome from this disease, particularly in developing countries like Ethiopia.<sup>12</sup> As a result, raising public awareness about CKD and its risk factors is generating a lot of interest in CKD prevention strategies. In contrast, a lack of knowledge about CKD and its risk factors could hamper prevention and health promotion efforts.

Information on public knowledge of CKD is critical for understanding the knowledge gap and planning various educational interventions. Previous work in Ethiopia, on the other hand, has only focused on aspects of CKD prevention and has failed to address public knowledge. As a result, this cross-sectional study was carried out in order to evaluate public awareness and answer the fallacy areas in the population. The study's findings will help in identifying knowledge gaps, planning educational sessions, facilitating screening programs in the community, and preventing the occurrence of CKD. Therefore, the current study aimed to assess public knowledge of CKD in the Ethiopian community using a validated tool.

## Methods

### Study Design and Setting

A community-based cross-sectional study was conducted in Addis Ababa, which is the capital of Ethiopia. The city is administratively divided into ten sub-cities. However, it is believed that this figure was incorrectly recorded and understated the city's population. The city has seen a robust annual growth rate in recent years, and population counts as of 2017 are approaching 4 million. The most recent census was scheduled for the fiscal year 2018–2019, after being postponed due to security concerns in 2017 and 2018 (CSA, 2017).

### Participant Recruitment

The target population of this study was lay public, and health professionals were excluded from the study. Each sub-city had a proportional number of study participants based on its total population size. Convenience sampling was used to collect data from all ten sub-cities until we had a representative sample from each. Each study participant provided written or verbal consent based on their educational status. The Institutional Review Board approved the verbal informed consent process for participants whose education level prevented them from signing written consent.

### Study Instrument

To collect data from study participants, a paper-based self-administered and interviewer-administered questionnaire was used. The data collection tool was developed after a thorough review of the literature. The survey was designed in English, then translated into Amharic and back to English to ensure that the final version conveyed the intended meaning. For data collection, an Amharic version of the questionnaire was used. The survey instrument was pretested on 25 Addis Ababa residents who were not included in the final analysis, and minor changes were made to the final data collection tool. The final questionnaire is divided into six sections, with survey questions on Kidney and CKD knowledge classified into three categories (True, False, and I do not know).

### Data Collection

Data collection was carried out by two data collectors (one Bsc nurse and one BPharm). The principal investigators provided data collectors with a half-day training on the data collection instrument and ethics issues. The data was collected between September and November of 2018.

### Statistical Analysis

The data were analyzed using the statistical package for social science (SPSS) version 26. To describe the responses of participants, frequencies, tables, percentage, mean, interquartile range (IQR), and standard deviation (S.D.) were used. To identify factors associated with public knowledge of CKD, an independent *T*-test and one-way ANOVA statistics were

used, a p-value <0.05 were considered as a significant association. When the correct answer for the specific question is correct, the response of the study participants was rated as True = 1, False = 0, and I do not know = 0. Otherwise, when the correct answer is False, it is coded as True = 0, False = 1, and I do not know = 0.

## Results

A total of 350 individuals were approached, 301 of whom completed and returned the questionnaire, giving a response rate of 86%. The mean (S.D.) age of study participants was 33.03 ( $\pm$ 10.05) years, and it ranged from 18 to 65 years. Almost equal number of male (48.2%) and female (51.8%) respondents represented the study. More than one-quarter of respondents completed secondary school (28.9%) and were unemployed (29.9%), respectively. The majority of the respondents were single (58.1%).

Of the total 301 participants, forty (13.3%) of them had a familial history of CKD, and less than five percent of respondents had a personal history of stroke (3.7%). Remarkably, eighty percent of the participants were free from any medical condition that requires medication at the time of the study. Among the study participants 10.6%, 7.6% and 7.0% of them had hypertension, diabetes and heart attack, respectively. In this study, the majority of participants live in the house of five and above (54.5%) (see Table 1).

In this study, the mean (S.D.) knowledge score of participants was 11.12 ( $\pm$ 4.21) with a minimum score of 0 and a maximum of 22. Concerning the distribution of CKD knowledge score, half of the respondents score 11 and less. The majority of the participants are aware that kidney makes urine (72.8%) and clean blood (67.8%). More than half of the participants identified that diabetes (57.8%) and hypertension (51.8%) are the risk factors for CKD. However, only one-fourth of the participants knew that being female has got nothing to do with increasing the risk of CKD (25.2%). A significant number of respondents knew that urine test help to determine kidney health (87.7%). More than half of the respondents recognized that certain medications could help in lowering the progression of CKD (57.5%) (see Table 2).

One-way ANOVA was employed to test significant association between socio-demographic characteristics and knowledge score. The analysis revealed that educational level and family history of CKD had a significant effect on

**Table 1** Socio-Demographic Characteristics of Study Participants (n=301)

Variables	Frequency (%)
Age	
Mean ( $\pm$ SD)	33.03 ( $\pm$ 10.05)
Median (IQR)	32 (14.0)
Sex	
Male	145 (48.2)
Female	156 (51.8)
Educational status	
Able to read and write	57 (18.9)
Secondary school	87 (28.9)
Diploma holder	65 (21.6)
Degree Holder	68 (22.6)
Masters and above	24 (8.0)
Marital status	
Single	175 (58.1)
Married	114 (37.9)
Divorced/widowed	12 (4.0)
Employment status	
Unemployed	90 (29.9)
Labour	47 (15.6)

**Table 2** Number (Percentage) of the Correct Response to Individual Items on the Questionnaire by Respondents (n=301)

Question		Correct Response N (%)
1.	A person can lead a normal life with one healthy kidney	252 (83.7)
2.	Herbal supplements can be effective in treating chronic kidney disease	68 (22.6)
3.	Certain medications can help to slow down the worsening of chronic Kidney disease.	173 (57.5)
What functions does the kidney perform in our body?		
4.	The kidneys make urine	219 (72.8)
5.	The kidneys clean blood	204 (67.8)
6.	The kidneys help to keep blood sugar level normal	63 (20.9)
7.	The kidneys help to maintain blood pressure	117 (38.9)
8.	The kidneys help to breakdown protein in the body	36 (12.0)
9.	The kidneys help to keep the bones healthy	101 (33.6)
Which of the following are commonly used to determine the health of your Kidneys?		
10.	Blood test	158 (52.5)
11.	Urine test	264 (87.7)
12.	A fecal test	123 (40.9)
13.	Blood pressure monitoring	94 (31.2)
What are the risk factors for chronic kidney disease?		
14.	Diabetes	174 (57.8)

knowledge of CKD. Respondents who had an educational background of degree had relatively higher knowledge scores than the other category participants ( $P$ -value= 0.015). Similarly, study participants with family history of CKD had increased knowledge mean score than their counter parts ( $P$ -value= 0.001). Independent  $t$ -test was also performed but failed to reveal any association between socio-demographic characteristics and knowledge score (see Table 3).

## Discussion

An important aspect of health literacy is knowledge of disease and risk factors.<sup>13–16</sup> The purpose of this study was to assess the general public's knowledge of chronic disease. CKD is a significant health concern in Ethiopia, and despite the lack of national data, hospital-based assessments revealed a higher magnitude of CKD.<sup>17</sup> Consequently, the study's findings would be an important input for policymakers and program managers looking into appropriate intervention.

The computed mean (S.D.) knowledge score was found to be 11.2 ( $\pm$ 4.21), which is comparable to the findings reported from Australia and Tanzania, which were 10.34 ( $\pm$ 5.0) and 3.85 ( $\pm$ 4.66), respectively.<sup>5,13</sup> The current findings revealed that educational level had a significant effect on knowledge of CKD, with a  $P$ -value of 0.015. Because the study was conducted in the country's capital, this finding would not be representative; thus, the literacy rate of the Ethiopian population is less than 50%, and only 20.4% of the population lives in the urban areas.<sup>18</sup> Similarly, in this study, respondents with a family history of CKD had a higher mean score of CKD knowledge, which was in line with other studies.<sup>5,11,13</sup>

Regarding general knowledge of study participants on CKD, 83.7% of the study participants knew that a person could lead a healthy life with one healthy kidney; this was slightly lower in comparison to Hong Kong study.<sup>11</sup> However, the finding of the current study is also promising since organ shortage is a global crisis and the public knowledge and awareness is a crucial element for promoting the living organ donation practice.<sup>19</sup> As a developing country, the level of awareness claimed in this study is substantial. A lower number of a study respondent (22.6%) believes that herbal supplements can be useful in treating CKD. However, 2/3rd of the participant from Tanzania study claimed that they were likely to use traditional medicines for the treatment of kidney disease and also around 14% of use self-treatment

**Table 3** Relationship Between Socio-Demographic Characteristics and Mean Knowledge Score

Characteristics	Mean Score (S.D.)	Df	F	P-value
<i>Gender**</i> Male Female	11.1 (4.3) 11.2 (4.1)	300	0.31	0.860
<i>Marital status***</i> Single Married Divorced/widowed	11.5 (3.9) 10.6 (4.5) 12 (4.5)	300	1.798	0.167
<i>Education level***</i> Able to read and write Secondary school Diploma holder Degree holder Masters and above	9.7 (4.56) 11.7 (3.9) 11 (3.8) 13.2 (3.7) 11.2 (5.9)	300	3.151	0.015*
<i>Occupation***</i> Unemployed Labor Government employee Private employee Others	11.8 (3.4) 10.65 (5.0) 11.0 (4.6) 10.9 (3.9) 11.3 (4.7)	300	0.761	0.551
<i>Family history of CKD**</i> Yes No	11.6 (4.9) 11.1 (4.1)	300	4.386	0.001*
<i>A medical condition that requires medication**</i> Yes No	11.2 (4.1) 11.2 (4.2)	300	0.001	0.972
<i>Hypertension***</i> Yes No I do not know	12.0 (4.2) 11.1 (4.2) 10.6 (4.25)	300	0.744	0.462
<i>Diabetes***</i> Yes No I do not know	11.7 (3.0) 11.2 (4.2) 10.4 (5.1)	300	0.818	0.442
<i>Heart attack***</i> Yes No I do not know	10.8 (5.1) 11.3 (4.1) 10.5 (4.2)	300	0.760	0.468
<i>History of stroke**</i> Yes No	10.8 (5.8) 11.2 (4.1)	300	0.088	0.766
<i>Number of people in the household***</i> One Two Three Four Five and above	11.6 (4.2) 11.1 (4.1) 11.9 (4.2) 10.8 (3.7) 9.5 (5.1)	300	1.705	0.149

**Notes:** Df: the degree of freedom; \* statistically significant; \*\* t-independent test; \*\*\* one-way ANOVA.

with home remedies.<sup>13</sup> A study from Nigeria revealed that 47.8% of respondents have faith in local herbal concoctions and spiritual means to cure CKD.<sup>10</sup>

In the present study, more than half (57.5%) of the study participants knew that certain medications could help to slow down the worsening of CKD, which was lower in comparison to Hong Kong study (80%). In the previously mentioned study, half of the study group had a risk factor for CKD such as diabetes and hypertension<sup>11</sup> that may increase their awareness towards risk factor for CKD. With current evidence, expanding health education to prevent CKD is indispensable, since there are several treatment options that are able to render the progression of CKD by preventing the advance in risk factor.<sup>20</sup> Most participants knew that the kidney makes urine and kidney clean blood, but around 21 and 34% of the participants identified that the kidney helps to maintain blood pressure and keep bones healthy, respectively. Likewise, in Hong Kong study, nearly half of the study participants did not know the role of the kidney in maintaining blood pressure.<sup>11</sup> Therefore, health education focusing on chronic disease prevention and management is critical; there is an increase in the prevalence of chronic disease in Ethiopia, particularly in urban settings; as a result, policymakers and health care strategists should pay close attention.<sup>21</sup>

The majority of the study respondents knew that hypertension (51.8%) and diabetes (57.8%) are the risk factors for the development of CKD. This finding is similar to several studies elsewhere.<sup>10–12</sup> About signs and symptoms of an advanced stage of CKD, 68.8% of recognized water retention is one of the advanced stage symptoms, nausea and vomiting (39.5%), loss of appetite (56.6%) and increased fatigue (75.7%). This finding depicted that participants had good knowledge of alarming signs and symptoms of CKD in comparison to previously reported results.<sup>5,10</sup> This would help implement prevention strategies and management of a communicable disease.

Similar to other studies, public knowledge of CKD is significantly associated with the level of education. Several other studies reported that the level of education is significantly associated with knowledge related to CKD.<sup>5,10,11</sup> Since health literacy is highly associated with personal determinants like knowledge and competence, this variation is the expected.<sup>14</sup> This study assessed the public knowledge of CKD for the first time in Ethiopia, and it produced useful findings that serve as an input for health education programs at the community level, in health facilities and media sector. Furthermore, the findings serve as an input for in-service and pre-service training of health professionals in Ethiopia. As a limitation, we recruited participants only from the capital city of the country and further studies focusing on the rural base of the country will be needed.

## Conclusion

The general knowledge level of the Ethiopian population about CKD and its risk factors is low. Currently, non-communicable diseases such as diabetes and hypertension have become a public concern. Those are one of the significant risk factors for CKD. Future public awareness programs should be more targeted toward patients with CKD risk factors and communities with low educational level.

## Abbreviations

CKD, chronic kidney disease; GFR: glomerular filtration rate; IQR: interquartile range.

## Data Sharing Statement

The data sets analyzed in the current study are available from the corresponding author on request.

## Ethical Approval and Consent to Participation

The ethics review committee approved the study of the school of pharmacy, Ambo University. The current study complies with the Declaration of Helsinki, before initiation of the study, written or verbal informed consent was obtained from all of the participants. The Institutional Review Board approved the verbal informed consent process for participants whose education level prevented them from signing written consent.

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## Disclosure

The authors declared no conflicts of interest.

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