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Demographic characteristics of patients with end-stage renal disease in Somalia

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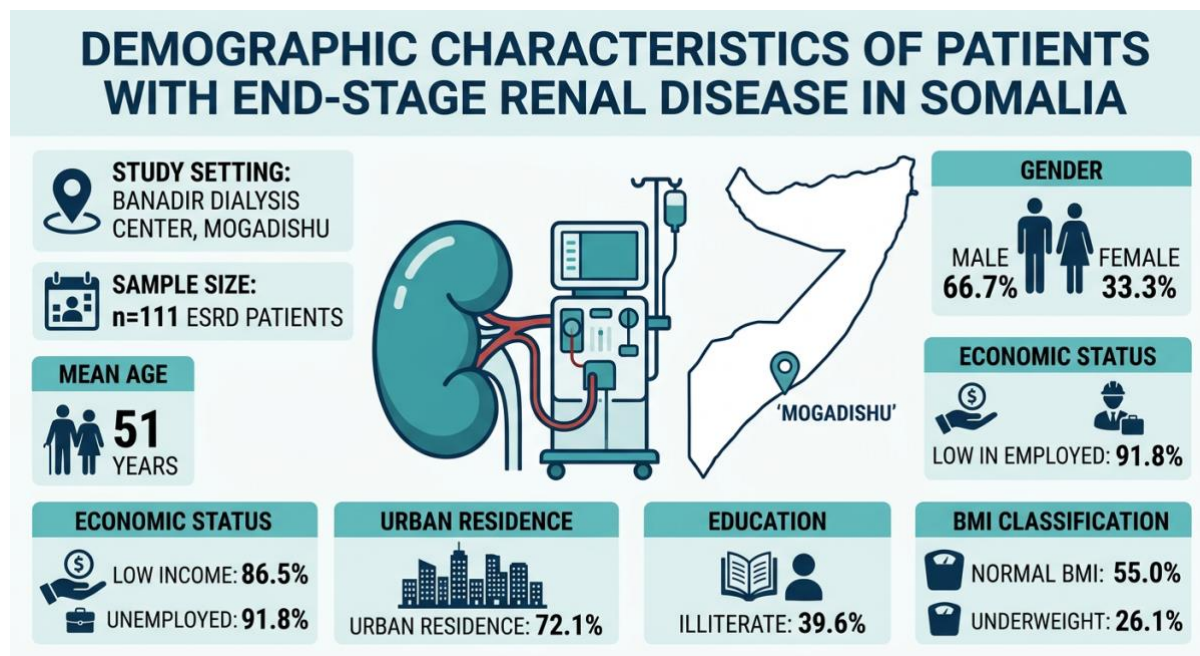
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ABSTRACT

Background: End-stage renal disease (ESRD) is an increasing public health challenge in low-resource settings, where late diagnosis and limited access to kidney replacement therapy worsen outcomes. Data on ESRD patients in Somalia remain scarce. This study aimed to describe the demographic and socioeconomic characteristics of ESRD patients attending Banadir Dialysis Center in Mogadishu, Somalia. **Methodology:** A retrospective descriptive study was conducted at Banadir Dialysis Center, Mogadishu. Medical records of patients diagnosed with ESRD and receiving dialysis care were reviewed. Data on age, sex, body mass index, marital status, education, occupation, residence, and income were extracted. Descriptive statistics were used, with continuous variables summarized as means and categorical variables as frequencies and percentages. **Results:** A total of 111 ESRD patients were included, aged 20–90 years, with a mean age of 51 years. Males comprised 74 patients (66.7%) and females 37 (33.3%), giving a male-to-female ratio of 2.0:1.0. The largest age group was 36–49 years (27, 24.3%), followed by 50–59 years (25, 22.5%). Most patients had normal BMI (61, 55.0%), while 29 (26.1%) were underweight. The majority were married (83, 74.8%). Illiteracy was common (44, 39.6%), and 31 patients (27.9%) had only basic school education. Occupational data were available for 110 patients; 101 (91.8%) were unemployed. Most patients lived in urban areas (80, 72.1%) and had low income (96, 86.5%). **Conclusion:** ESRD patients at Banadir Dialysis Center were predominantly male, relatively young, urban, unemployed, and socioeconomically disadvantaged. These findings highlight the need for

kidney disease surveillance, early detection, patient education, and equitable renal care expansion in Somalia.

Keywords: End-stage renal disease; chronic kidney disease; hemodialysis; dialysis; demographic characteristics; socioeconomic status; Somalia; Mogadishu; Banadir Dialysis Center.



INTRODUCTION

End-stage renal disease (ESRD), increasingly referred to as kidney failure, represents the final and irreversible stage of chronic kidney disease (CKD), in which survival usually depends on kidney replacement therapy, including hemodialysis, peritoneal dialysis, or kidney transplantation. CKD and ESRD are major global public health challenges, but their burden is especially severe in low- and middle-income countries, where late presentation, limited screening, high out-of-pocket costs, and restricted access to specialist nephrology services contribute to poor outcomes. In sub-Saharan Africa, CKD is a substantial and growing health problem, driven by both communicable and non-communicable disease risk factors, including hypertension, diabetes mellitus, infections, and poverty-related determinants of health [1].

The epidemiology of ESRD in sub-Saharan Africa is different from that of high-income settings. In high-income countries, the

disease is predominantly observed in older individuals. In many African countries, a high prevalence of ESRD is observed among young and middle-aged adults. This pattern has significant social and economic implications, since kidney failure often strikes during the most productive years of a person's life. While hemodialysis is available in many African countries, access is uneven and often limited by cost, poor health infrastructure, limited availability of trained personnel, and the absence of comprehensive national kidney registries [2].

The recognition and management of ESRD in Somalia has its own challenges. The availability of reliable epidemiological data has been limited by decades of a fragile health system, limited nephrology services, an absence of a national renal registry, and financial barriers to long-term dialysis care. Previous reports from Somalia have highlighted the inadequate national description of ESRD and the limited options

for kidney replacement therapy. In a single study from Mogadishu, the mean age of patients on routine hemodialysis was around 52.7 years, and 61.5% of patients were males. This shows relatively young age distribution and male predominance in affected patients [3].

Data from Somalia also indicate that awareness of kidney failure has been growing in different parts of the country over the past years. A multicenter study of patients on maintenance hemodialysis in Somalia showed that the majority of patients were male, with a mean age of 49.3 years. The study stressed the need for prevention, early detection, and appropriate management of CKD, especially in high-risk groups such as those with hypertension and diabetes. However, the demographic profile of patients with ESRD in Somalia is not yet

MATERIALS AND METHODS

A retrospective descriptive study was carried out in Banadir Dialysis Center, Mogadishu, Somalia, from January to May 2025. All records were gathered on patients diagnosed with end-stage renal disease who were referred for standard hemodialysis (complete coverage sample). Only patients with complete records and who were maintained on regular hemodialysis for at least three months were included. Those who refused or had inadequate acoustic windows were excluded.

RESULTS

This study investigated 111 ESRD patients aged 20 to 90 years with a mean age of 51 years, including 74/111 (66.7%) males and 37/111 (33.3%) females with a male-to-female ratio of 2.00:1.00. In terms of age, the largest group was participants aged 36–49 years, with 27 participants (24.3%), followed by those aged 50–59 years with 25 participants (22.5%). Participants aged 35 years accounted for 23 participants (20.7%), while those aged 60–69 years made up 22 participants (19.8%). The smallest group was participants aged 70 years and above, with 14 participants (12.6%).

well understood, especially in terms of age, sex, body mass index, marital status, education, occupation, residence, and income [4].

Knowledge of the demographic characteristics of patients with ESRD is essential to planning fair kidney care services, identifying vulnerable groups, directing prevention strategies, and future development of renal registries. Even descriptive studies based in hospitals can offer important evidence for clinicians, policymakers, and public health planners in settings such as Somalia, where epidemiological data are scarce. Therefore, this study aims to describe the demographic characteristics of patients with end-stage renal disease in Somalia and to contribute to the limited evidence base on kidney failure in the country.

Data analysis

A suitable data sheet template was created, and all variables present in patients' records were transferred to the data sheet. Subsequently, the data inputted into the software Statistical Package for Social Sciences (SPSS) was examined to derive frequencies, percentages, and crosstabulations.

For BMI, most participants had normal weight, with 61 participants (55.0%). This was followed by underweight participants, who accounted for 29 participants (26.1%). Overweight participants made up 14 participants (12.6%), while obese participants represented 7 participants (6.3%).

Regarding marital status, the majority of participants were married, with 83 participants (74.8%). Divorced and widowed participants each accounted for 10 participants (9.0%), while single participants represented 8 participants (7.2%).

Overall, males were more represented than females, making up about two-thirds of the total sample, as indicated in Table 1, Fig 1.

Table 1. Distribution of the patients by age, BMI, marital status, and sex

Variable	Males	Females	Total
Age			
35 years	15	8	23
36-49	14	13	27
50-59	15	10	25
60-69	17	5	22
70+	13	1	14
Total	74	37	111
BMI			
Underweight	23	6	29
Normal weight	40	21	61
Overweight	7	7	14
Obese	4	3	7
Total	74	37	111
Marital status			
Single	8	0	8
Married	57	26	83
Divorced	6	4	10
Widow	3	7	10
Total	74	37	111

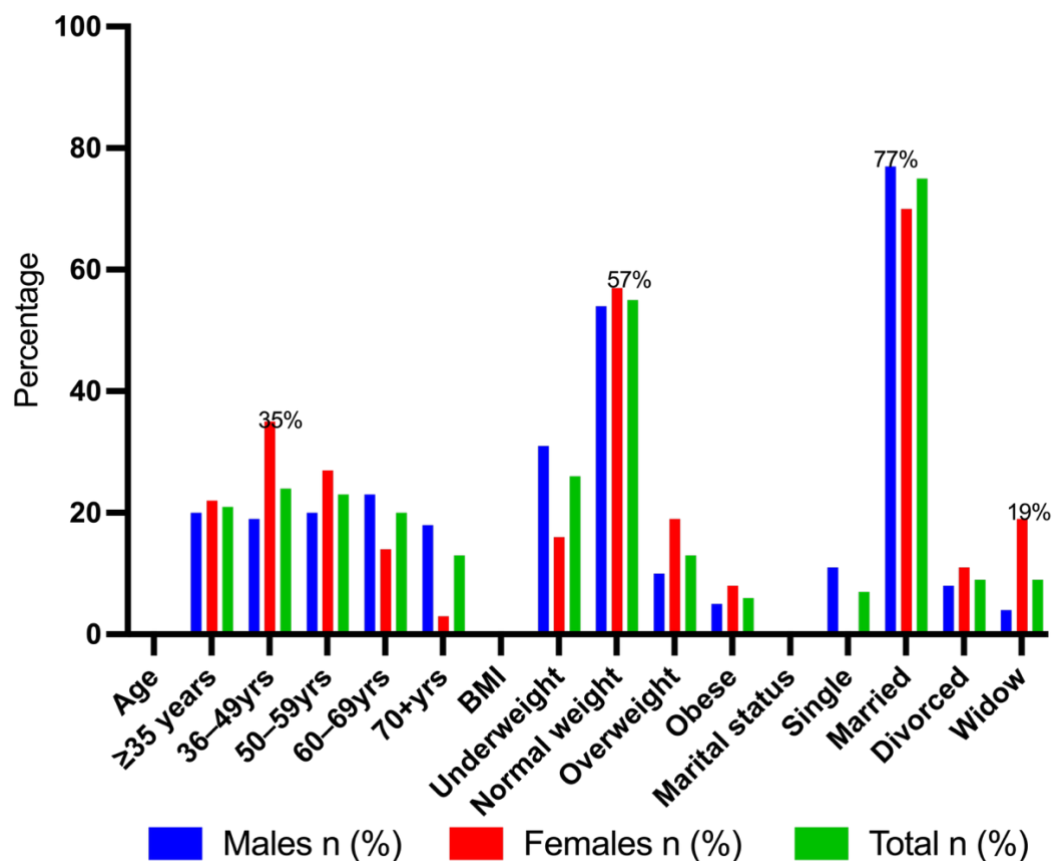


Figure 1. Description of the patients by age, BMI, marital status, and sex

Regarding education level, the largest group was illiterate patients, with 44 patients (39.6%), including 20 males and 24 females. This was followed by patients with basic school education, accounting for 31 patients (27.9%), and those with secondary education, representing 23 patients (20.7%). Patients with university education accounted for 11 patients (9.9%), while only 2 patients (1.8%) had postgraduate education.

For occupation, data were available for 110 patients, including 74 males (67.3%) and 36

females (32.7%). The majority of patients were unemployed, with 101 patients (91.8%), including 65 males and 36 females. Other occupations were much less common: laborers accounted for 4 patients (3.6%), while teachers and soldiers each represented 2 patients (1.8%). Only 1 patient (0.9%) was engaged in business.

Overall, most patients were illiterate or had basic education, and the vast majority were unemployed, as indicated in Table 2, Fig. 2.

Table 2 summarizes the distribution of patients according to sex, education level, and occupation.

Variable	Males	Females	Total
<i>Education</i>			
Illiterate	20	24	44
Basic school	20	11	31
Secondary	21	2	23
University	11	0	11
Postgraduate	2	0	2
Total	74	37	111
<i>Occupation</i>			
Teacher	2	0	2
Labor	4	0	4
Unemployed	65	36	101
Business	1	0	1
Solider	2	0	2
Total	74	36	110

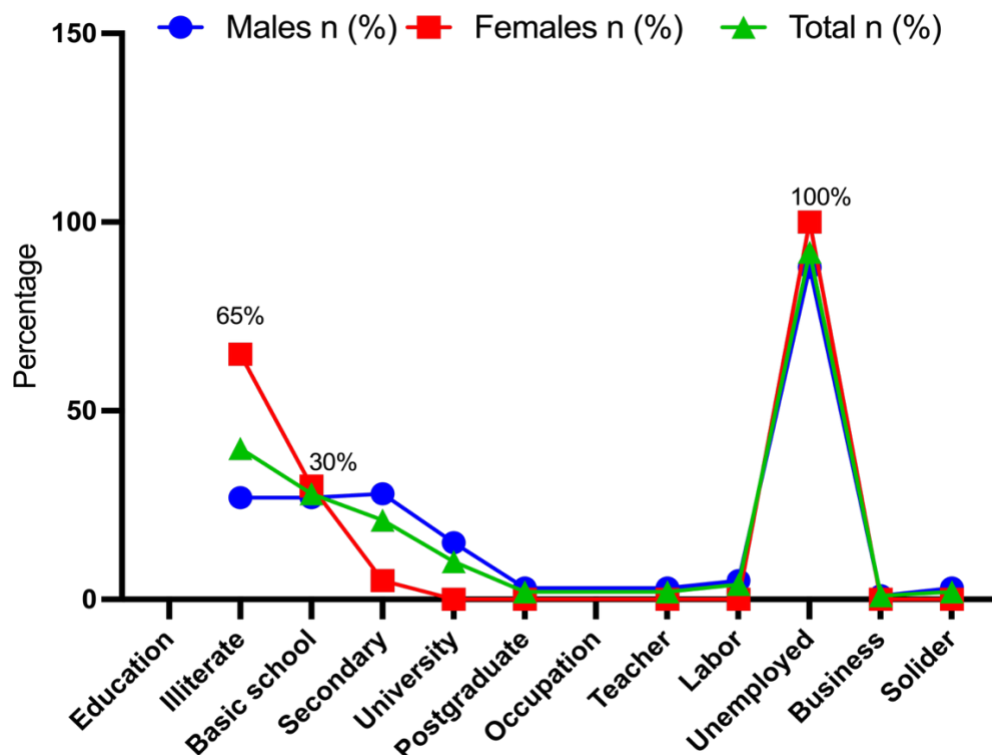


Figure 2. Description of the patients by education and occupation

Regarding residence, the majority of patients lived in urban areas, with 80 patients (72.1%), including 50 males and 30 females. Patients from rural areas accounted for 31 patients (27.9%), including 24 males and 7 females.

In terms of income, most patients had low income, representing 96 patients (86.5%),

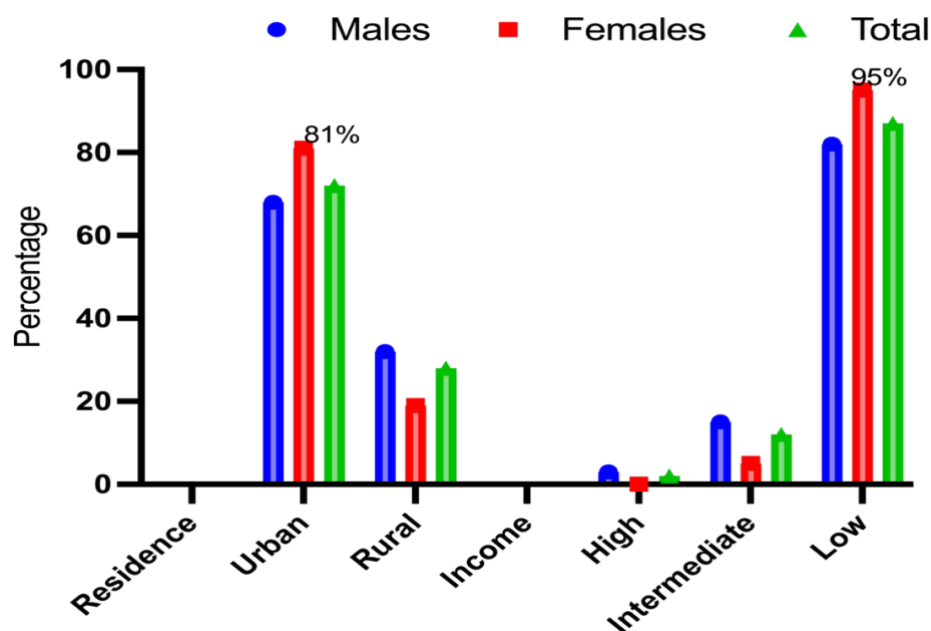
including 61 males and 35 females. Patients with intermediate income accounted for 13 patients (11.7%), while only 2 patients (1.8%) had high income.

Overall, most patients were from urban areas and had low income, with males representing about two-thirds of the total sample, as indicated in Table 3, Fig. 3.

Table 3. Distribution of the patients by residence, income, and gender

Variable	Males	Females	Total
<i>Residence</i>			
Urban	50	30	80
Rural	24	7	31
Total	74	37	111
<i>Income</i>			
High	2	0	2
Intermediate	11	2	13
low	61	35	96
Total	74	37	111

Figure 3. Description of the patients by residence, income, and gender



DISCUSSION

The demographic features of this study of 111 ESRD patients in Somalia showed predominance of males, relatively young mean age, low socioeconomic status, low educational level, and high unemployment. The mean age was 51 years, and nearly two-thirds of patients were male, giving a male-to-female ratio of 2.00:1.00. These findings are broadly consistent with previous Somali data. A tertiary-hospital study from Mogadishu reported a mean age of 52.7 years among ESRD patients receiving routine hemodialysis, with 61.5% being male, while a multicenter Somali study of maintenance hemodialysis patients reported a mean age of 49.3 years and a male proportion of 66.1% [3].

The present study has a remarkable age distribution. The largest age group was 36–49 years (24.3% of patients), followed by 50–59 years (22.5% of patients). Only 12.6% of patients were 70 years of age or older. This pattern is indicative of ESRD in many individuals in Somalia in early and middle adulthood with important implications for household income, productivity, dependency, and health-system planning. Similar findings have been reported across sub-Saharan Africa, where ESRD tends to

affect young and middle-aged people, as opposed to high-income countries, where dialysis populations are typically older. This situation is of particular concern in low-resource settings where the costs of dialysis, transportation, medications, and loss of employment can be high for patients and families in the economically active age groups [2].

The male predominance in this study may be the result of a combination of overlapping factors. Biologically, men may be at greater risk of progressing to kidney failure in certain settings; however, in Somalia and similar contexts, social and health system factors are also likely to contribute to this risk. Men may have greater access to hospital-based dialysis services than women because of mobility, financial resources, family decision-making, and healthcare-seeking opportunities. In contrast, women with advanced kidney disease may be underdiagnosed, referred late, or unable to sustain dialysis. Previous Somali studies have also reported a male predominance among hemodialysis patients, which supports the possibility that the observed sex distribution reflects disease burden but

also unequal access to kidney replacement therapy [3,4].

Most patients in this cohort had a normal BMI (55%), 26.1% were underweight, and only 18.9% were overweight/obese. This finding is different from dialysis populations in many high-income settings, where obesity and overweight are common and often associated with diabetes, hypertension, and metabolic disease. The high prevalence of underweight patients in Somalia could be attributed to chronic disease, inflammation, poor intake of nutrients, food insecurity, delayed presentation, and social deprivation. Malnutrition is an important concern in ESRD because it is associated with frailty, risk of infection, poor tolerance to dialysis, and adverse outcomes. BMI is a crude measure that cannot distinguish fluid overload, lean body mass, and adiposity, but the pattern seen in this study emphasizes the necessity of routine nutritional assessment in Somali dialysis units [5].

Marital status also influences the social context of ESRD. Most of the patients were married (74.8%), and a smaller number were divorced, widowed, or single. In the absence of formal social protection systems, family support may be essential in terms of transport, treatment costs, dietary care, and adherence to hemodialysis schedules. This is especially true in Somalia, where missed dialysis sessions have been identified as a major factor in hospital readmission, and continuity of care is poor due to financial barriers, limited health insurance coverage, and misconceptions about dialysis [3].

Educational attainment was low: 39.6% of patients were illiterate and 27.9% had only basic school education, whereas only 9.9% had university education and 1.8% had postgraduate education. This pattern has important clinical implications. Low literacy may affect patients' understanding of CKD progression, dialysis requirements, fluid restriction, medication adherence, vascular access care, and dietary recommendations. Patient education is central to self-

management of chronic diseases such as ESRD, and low literacy may be an important contributor to late presentation and preventable complications. Of particular importance is the high proportion of illiteracy among the female patients; 24 out of 37 women in this cohort were illiterate, indicating the need for gender-sensitive education and counseling strategies [6].

The occupational profile of the cohort further emphasizes the socioeconomic vulnerability of the ESRD patients in Somalia. Occupational data were available for 110 patients, with 91.8% being unemployed. This situation may reflect pre-existing poverty but may also be a reflection of the disabling nature of ESRD and the time demands of maintenance hemodialysis. Frequent dialysis, fatigue after dialysis, transportation difficulties, and frequent hospitalizations can make it difficult to hold a job. The economic consequences are likely to be substantial, particularly because ESRD often affects individuals in their productive years. In sub-Saharan Africa, affordability of dialysis remains one of the major determinants of survival, and systematic reviews have shown that many patients who start dialysis discontinue treatment, often with fatal outcomes, because of limited infrastructure and catastrophic out-of-pocket expenditure [7,3].

In this study most of the patients (72.1%) were from urban areas, and 27.9% were from rural areas. This should not be interpreted to imply a necessarily higher true burden of ESRD in urban populations. Rather, it may represent differences in access to diagnosis, referral pathways, and dialysis services, which are often located in cities. Patients in rural areas may be diagnosed later, travel further, pay more for transportation, and be less likely to receive regular hemodialysis. Thus, the lower proportion of rural patients may be an artifact of under-ascertainment rather than a lower prevalence of disease. Previous reviews of CKD in sub-Saharan Africa have

noted that data are often scarce because of the lack of renal registries and the patchy availability of diagnostic and treatment services [8,3].

Income distribution showed a significant economic disadvantage, with 86.5% of patients being low income and only 1.8% being high income. This is a very relevant finding in the Somali context, where long-term ESRD care requires repeated dialysis sessions, laboratory monitoring, medications, management of complications, and sometimes hospitalizations. Even if dialysis sessions are subsidized or externally sponsored, indirect costs can be prohibitive. In a Somali multicenter study, the cost of hemodialysis was largely covered for patients in the centers involved, but the study also reported that a substantial number of patients are still undiagnosed or diagnosed at an advanced stage, indicating the persistent gaps in prevention and early care of CKD [4]. Taken together, these findings suggest that ESRD in Somalia is not only a medical condition but also a marker of social and structural vulnerability. Low income, unemployment, low literacy, and urban concentration cluster, and this points out that patients who access dialysis services may only be a visible part of the larger burden of kidney failure. Patients living in rural areas, women, the very poor, and those with limited education may be less likely to be diagnosed, referred, or retained in care. This interpretation is consistent with broader evidence from sub-Saharan Africa, where the outcomes of ESRD are strongly influenced by the availability, affordability, and continuity of kidney replacement therapy [2,9].

The findings have several policy and clinical implications. First, Somalia needs strengthened CKD prevention and early detection programs, especially for high-risk groups such as patients with hypertension, diabetes, recurrent urinary tract disease, and family history of kidney disease. A recent Somali multicenter study

emphasized prevention of hypertension and diabetes, early detection, and prompt CKD management as priorities for reducing the burden of kidney failure [4]. Second, dialysis services should be accompanied by structured patient education adapted to low-literacy populations, including verbal counselling, pictorial materials, family involvement, and culturally appropriate communication. Third, expansion of renal services beyond major urban centers may reduce geographic inequities. Finally, a national renal registry is urgently needed to define the incidence, prevalence, causes, treatment patterns, and outcomes of ESRD in Somalia.

Limitations exist in this study. The findings of this descriptive study with 111 patients may not be generalized to all patients with ESRD in Somalia, especially those who never reach dialysis services. The high proportion of urban patients may reflect access bias. Some occupational data were missing, and fluid status may affect BMI in patients with ESRD. In addition, the study describes demographic characteristics but does not assess clinical outcomes, dialysis adequacy, comorbidities, causes of kidney failure, or survival. Nevertheless, the study provides important local data in a setting where ESRD remains under-described and where national registry data are lacking.

In conclusion, this study indicates that ESRD patients in Somalia are predominantly male, relatively young, socioeconomically disadvantaged, commonly unemployed, and often have low educational attainment. Most patients were urban residents and had low income, suggesting that access to dialysis and health-system geography strongly influence the observed patient profile. These findings support the urgent need for national kidney disease surveillance, earlier CKD detection, equitable dialysis access, nutritional and psychosocial support, and prevention programs targeting hypertension, diabetes, and other modifiable causes of kidney failure.

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Data availability: data regarding this study are available from the corresponding author.

Author contributions

All authors approved the final version of the publishable manuscript.