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**Distribution of episodes of kidney diseases admitted at the University Hospital Center  
“Mother Teresa” in Tirana, Albania, during the period 2010-2023**

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### **Abstract**

Our aim was to describe the distribution of kidney diseases among hospitalized patients in Tirana, the capital of Albania, during the period 2010-2023. A case-series study was conducted including all episodes admitted with kidney diseases at the University Hospital Center “Mother Teresa” in Tirana during the period 2010-2023 (overall: 15,763 episodes; 46% females; overall mean age:  $54.0 \pm 17.3$  years). We found that  $\approx 56\%$  of the kidney disease episodes were 35-65 years old, followed by  $>65$ -year-old individuals ( $\approx 28\%$ ). Most of the kidney disease episodes (about 43%) hospitalized were from the Tirana region, followed by districts pertinent to South Albania (23%). Older patients ( $>65$  years) were more prevalent among males compared to females (30% vs 25%, respectively;  $p < 0.001$ ). Patients from the Tirana region were more prevalent among females compared to males (45% vs 42%, respectively,  $p < 0.001$ ). This study provides evidence on the distribution of the episodes of kidney diseases admitted at University Hospital Center “Mother Teresa” in Tirana, the largest region in Albania, a country in the Western Balkans that is undergoing deep reforms in all sectors, including also the health sector.

## **Introduction**

Kidney diseases constitute an important public health problem worldwide.<sup>1-3</sup> In particular, the toll of chronic kidney disease is increasing, which is compatible also with the general increase in Noncommunicable Diseases (NCDs).<sup>2</sup> The Global Burden of Disease (GBD) 2015 study has estimated that chronic kidney disease concerns about 10% of the adult population worldwide.<sup>3</sup> Chronic kidney disease is primarily caused by diabetes, hypertension, vascular disease, and glomerulonephritis,<sup>2,3</sup> and also leads to other deleterious health outcomes, such as higher rates of symptomatic intracerebral hemorrhage, increased mortality, and poorer functional outcomes in patients with acute ischemic stroke.<sup>1,4,5</sup> Furthermore, a fairly recent meta-analysis indicated that chronic kidney disease constitutes a significant comorbidity in patients with acute ischemic stroke highlighting the need for tailored management strategies to enhance patient outcomes.<sup>1</sup> In addition, chronic disease patients are at high risk of developing a common mental disorder.<sup>6</sup> As a matter of fact, patients with chronic kidney disease and mental disorders have a higher risk of hospitalizations,<sup>7</sup> poor quality of life,<sup>8</sup> difficulties adhering to medications,<sup>9</sup> rapid progression to End-Stage Renal Disease (ESRD),<sup>10</sup> as well as several other unfavorable conditions including mortality.<sup>11,12</sup> It has been shown that the mortality risk and hospitalization rate among patients with chronic kidney disease accompanied by mental disorders is much higher than among chronic disease patients without mental disorders.<sup>10</sup>

Albania emerged from the most rigid socialist regime in 1990 and since has been undergoing considerable changes toward a market-oriented system which has been associated with changes in lifestyle and changes in morbidity and mortality patterns.<sup>13</sup> The Albanian population is rapidly aging (in 2020, around 15% of the population was aged 65 years and above) as a result of a steady increase in life expectancy, a gradual decrease in fertility rate, and emigration of particularly young adults.<sup>14,15</sup> This demographic transition observed in the past thirty years has unavoidably led to a substantial change in the epidemiological profile of the Albanian

population, which consists of an outstanding shift from infectious diseases to NCDs, including primarily cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes.<sup>14,16</sup> However, the proportional mortality from NCDs in the Albanian population in 2021 was estimated at about 73%, displaying a significant decrease from around 93% in 2019 (*i.e.*, before the COVID-19 pandemic).<sup>16</sup> Yet, the overall mortality rate from NCDs has increased in Albania from 798 deaths in 2019 to 820 deaths in 2021 (per 100,000 population),<sup>16</sup> indicating an increase in the death rates from both infectious diseases (due to COVID-19) and NCDs. The main risk factors in the Albanian population include high blood pressure, smoking, and dietary factors.<sup>16</sup>

According to the estimates of the Global Burden of Disease 2021 study, the proportional mortality due to kidney dysfunction in Albania increased from 5.1% in 1990 to 6.0% in 2021.<sup>16</sup> On the other hand, the mortality rate and burden of acute glomerulonephritis has declined in the past three decades in the Albanian population (age-standardized mortality rates in 1990 and 2021 were 0.52 and 0.14 deaths per 100,000 population, respectively).<sup>16</sup> Conversely, in line with the gradual population aging, at a crude level, chronic kidney disease has steadily increased during the period 1990-2021 (mortality rates in 1990 and 2021 were about 7 and 16 deaths per 100,000 population, respectively).<sup>16</sup> However, in Albania, the information about kidney diseases in the general population is scarce and not well-documented.

In this framework, the aim of this study was to describe the distribution of kidney diseases among hospitalized patients in Tirana, the capital of Albania, during the period 2010-2023.

## **Materials and Methods**

This was a case-series study including all episodes admitted with kidney diseases at the University Hospital Center “Mother Teresa” in Tirana, the largest public hospital in Albania, during the period 2010-2023.

The information about the episodes with kidney diseases was provided by the Statistics Office of the University Hospital Center “Mother Teresa” in Tirana, according to each patient’s medical chart. Data on the diagnoses of kidney disease episodes were collected for each year under investigation, in addition to selected demographic factors of the patients (including age, gender, and region of the country).

Measures of central tendency (mean and median values) and dispersion (standard deviation and the interquartile range) were calculated for the age of the patients admitted with kidney disease episodes during the study period. In addition, absolute numbers and their respective percentages were calculated for the episodes of kidney diseases by selected demographic characteristics of the patients (age-group, gender, and region of Albania) and each year covering the study period (*i.e.*, from 2010 to 2023).

Fisher’s exact test was used to compare the gender-specific distribution of the hospitalized episodes of kidney diseases according to selected demographic factors (age-group and region of the patients). A p-value of  $\leq 0.05$  was considered statistically significant. Statistical Package for the Social Sciences (SPSS, version 19.00) was used for all the statistical analyses.

## **Results**

Table 1 presents the distribution of episodes of kidney diseases admitted at the University Hospital Center “Mother Teresa” in Tirana during the period 2010-2023 by selected demographic characteristics. On the whole, during the period 2010-2023, there were 15,763 episodes of various kidney diseases that required hospitalization at the University Hospital Center “Mother Teresa” in Tirana. Of these, 54% of the episodes involved male patients, whereas the remaining 46% were pertinent to female patients. Overall, the mean age of the patients admitted with kidney disease episodes for the entire duration of the study period was  $54.0 \pm 17.3$  years. Conversely, the median age was 55.9 years (interquartile range: 43.4-66.5

years). Regarding the age group distribution, the majority (almost 56%) of the kidney disease episodes concerned the age group 35-65 years, followed by individuals aged more than 65 years (almost 28%). As for the regional distribution, most of the kidney disease episodes (about 43%) hospitalized were from the Tirana region, followed by districts pertinent to South Albania (23%). Notably, 109 episodes (0.7% of the overall kidney disease episodes admitted during the period 2010-2023) were from Kosovo (Table 1).

Table 2 presents the distribution of kidney disease episodes admitted at the University Hospital Center “Mother Teresa” in Tirana for each year of the study period (*i.e.*, from 2010 to 2023). The year which marked the highest number of admissions of kidney diseases episodes was 2018 (8.9% of the overall number of episodes during the period 2010-2023), followed by the year 2019 (8.7%) and next the year 2017 (8.2%) and the year 2022 (8.1%). Conversely, the year with the lowest number of admissions with kidney disease episodes was 2023 (1.8% of the overall number of episodes under the study period) followed by the year 2020 (5.1%) (Table 2).

A higher proportion of female patients were younger (<35 years) compared to male patients (19.5% vs 13.5%, respectively) (Table 3). Consequently, older patients (individuals aged 65 years and above) were more prevalent among males compared to females (30.5% vs 24.7%, respectively). These age differences between males and females were highly statistically significant ( $p < 0.001$ ). Patients from the Tirana region were more prevalent among females compared to males (44.6% vs 42.3%, respectively). Conversely, a higher proportion of patients from South Albania was evident among males compared to females (24.7% vs 20.5%, respectively). These regional differences between males and females were highly statistically significant too ( $p < 0.001$ ) (Table 3).

Figure 1 presents the trend in the number of episodes with kidney diseases admitted at the University Hospital Center “Mother Teresa” in Tirana by gender and year. During the first

three years under investigation (*i.e.*, during the years 2010-2012), the number of episodes with kidney diseases admitted at the University Hospital Center “Mother Teresa” in Tirana was higher in females than in males. On the other hand, for each subsequent year (*i.e.*, from 2013 to 2023), the number of kidney disease episodes hospitalized was higher in males than in females.

Of note, the number of kidney disease episodes admitted at the University Hospital Center “Mother Teresa” in Tirana in 2023 was remarkably low (N=287) compared with the other years covering the study period. This may be due to the under-recording of the cases for this year, a finding which deserves further investigation.

## **Discussion**

This study provides evidence on the distribution of kidney diseases among hospitalized patients in Tirana, the capital of Albania, during the period 2010-2023. The main findings of this study indicate that about 56% of the kidney disease episodes were confined to the age group 35-65 years, followed by older individuals (about 28%). Most of the kidney disease episodes (about 43%) hospitalized were from the Tirana region, followed by districts in South Albania (23%). The year 2018 exhibited the highest number of admissions of kidney disease episodes (8.9%). Conversely, the year 2023 had the lowest number of admissions with kidney disease episodes (1.8%). Older patients (>65 years) were more prevalent among males compared to females. Patients from the Tirana region were more prevalent among females compared to males, whereas a higher proportion of patients from South Albania was evident among males compared to females. During the years 2010-2012, the number of episodes with kidney diseases was higher in females than in males, whereas during 2013-2023 the number of kidney disease episodes hospitalized was higher in males than in females.



The episodes of kidney diseases admitted during the study period included chronic kidney disease, acute glomerulonephritis, acute kidney injuries, polycystic kidney disease, nephrotic syndrome, nephrolithiasis (kidney stones), urinary tract infections, diabetic nephropathy, as well as other kidney diseases and conditions which have deleterious effects on the kidneys' functions.

Chronic kidney disease represented the most prevalent condition. This progressive condition characterized by structural and functional changes in the kidney is globally recognized as an important public health problem.<sup>17</sup> This disease increases the risk of end-stage kidney disease and is an independent risk factor for cardiovascular diseases and premature death.<sup>18,19</sup> At a global level, the prevalence of chronic kidney disease is increasing, with the fastest progression occurring in low-income and middle-income countries such as Albania.<sup>3,17,20,21</sup> The main risk factors for this condition include hyperglycemia, hypertension, hyperlipidemia, and obesity.<sup>17,22,23</sup>

The GBD study showed that in 2017, there were 697.5 million cases of chronic kidney disease worldwide, with 1.2 million deaths from this condition.<sup>24</sup> Projections indicate that by 2040, chronic kidney disease will be the fifth leading cause of mortality.<sup>25</sup> However, the development of nephrology and the focus on the treatment of early-stage chronic kidney disease decrease mortality and prevent the progression of ESKD.<sup>26</sup>

While there is no specific information about kidney diseases for the general population of Albania, the age-standardized mortality rate from all NCDs in 2019 was estimated at 520 (95% CI=413-649) deaths per 100,000 population.<sup>14,16</sup> In 2019, about 93% (95% CI=92-94%) of all deaths in Albania were caused by NCDs.<sup>14,16</sup> In particular, cardiovascular diseases constitute 57% (95% CI=52-60%) of the overall mortality in the Albanian population.<sup>14,16</sup>

This study may have some limitations including the reporting system pertinent to the University Hospital Center "Mother Teresa" in Tirana, which still needs strengthening and improvement.

Hence, some data on kidney disease patients including laboratory results (creatinine levels, or glomerular filtration rate) may be incomplete or inaccurate, which could lead to misdiagnosis. Also, poor coordination between the Nephrology Department and other departments such as Radiology may result in fragmented data (regarding imaging procedures such as ultrasounds, or CT scans). In addition, this is a tertiary hospital and episodes admitted at this center may not necessarily represent all episodes of kidney diseases across Albania.

## **Conclusions**

Despite the aforementioned potential limitations, this study provides a valuable description of the burden of kidney diseases admitted at the largest tertiary care facility in Albania. Further studies are needed to provide a more comprehensive overview and more detailed analyses regarding the burden of kidney diseases in Albania.

In conclusion, this study provides evidence on the distribution of the episodes of kidney diseases admitted at University Hospital Center “Mother Teresa” in Tirana, the largest region in Albania, a country in the Western Balkans which is undergoing deep reforms in all sectors, including also the health sector.

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**Table 1.** Distribution of episodes of kidney diseases admitted at the University Hospital Center “Mother Teresa” in Tirana during 2010-2023 by demographic characteristics.

<b>Variable</b>	<b>Number</b>	<b>Percentage</b>
<b>Age group</b>		
<35 years	2564	16.3
35-65 years	8817	55.9
>65 years	4382	27.8
Total	15763	100.0
<b>Gender</b>		
Males	8502	53.9
Females	7261	46.1
<b>Region</b>		
Tirana	6835	43.4
North Albania	2469	15.7
Central Albania	2761	17.5
South Albania	3589	22.8
Kosovo	109	0.7
<b>Parameter</b>	<b>Age (numerical variable)</b>	
Mean ± SD	54.0±17.3 years	
Median (interquartile range)	55.9 years (43.4-66.5 years)	

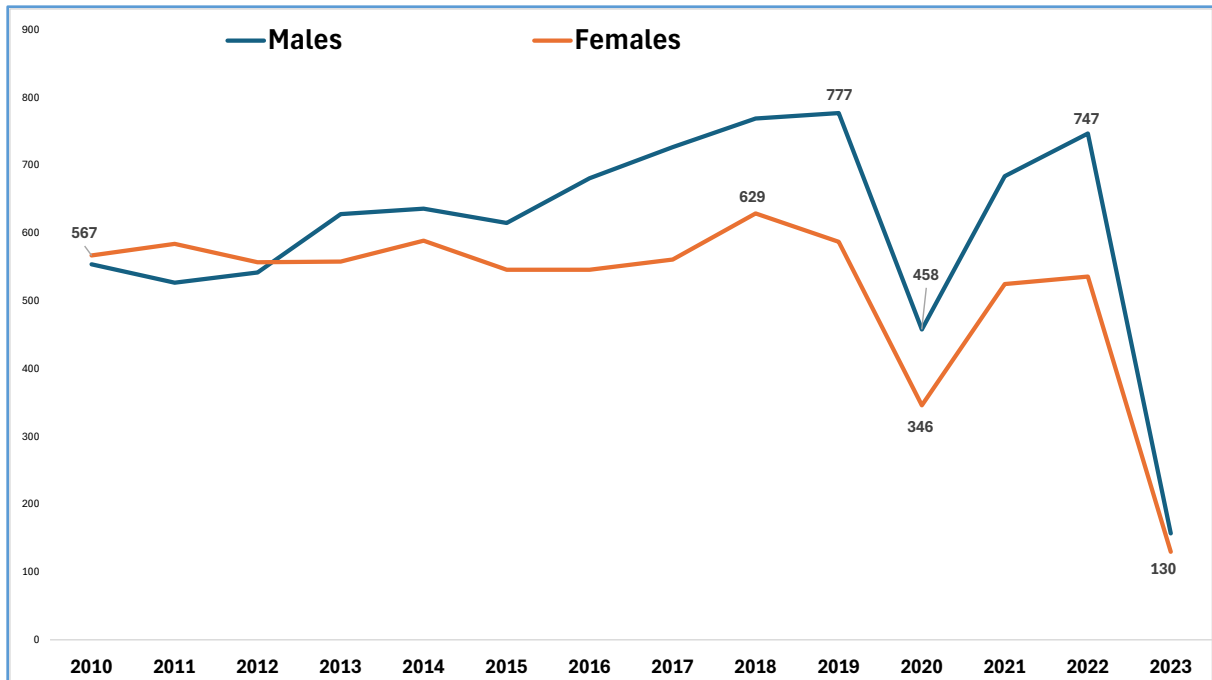
**Table 2.** Distribution of kidney disease episodes admitted at the University Hospital Center “Mother Teresa” in Tirana by year.

<b>Year</b>	<b>Number</b>	<b>Percentage</b>	<b>Cumulative percentage</b>
2010	1121	7.1	7.1
2011	1111	7.0	14.2
2012	1099	7.0	21.1
2013	1186	7.5	28.7
2014	1225	7.8	36.4
2015	1161	7.4	43.8
2016	1227	7.8	51.6

2017	1288	8.2	59.7
2018	1398	8.9	68.6
2019	1364	8.7	77.3
2020	804	5.1	82.4
2021	1209	7.7	90.0
2022	1283	8.1	98.2
2023	287	1.8	100.0
<b>Total</b>	<b>15763</b>	<b>100.0</b>	

**Table 3.** Gender-specific distribution of episodes of kidney diseases admitted at the University Hospital Center “Mother Teresa” in Tirana by age and region.

<b>Variable</b>	<b>Males</b>	<b>Females</b>	<b>p</b>
<b>Age-group</b>			
<35 years	13.5%	19.5%	<0.001
35-65 years	56.0%	55.8%	
>65 years	30.5%	24.7%	
Total	100.0%	100.0%	
<b>Region</b>			
Tirana	42.3%	44.6%	<0.001
North Albania	15.5%	15.9%	
Central Albania	16.9%	18.3%	
South Albania	24.7%	20.5%	
Kosovo	0.7%	0.7%	
Total	100.0%	100.0%	



**Figure 1.** Number of episodes with kidney diseases admitted at the University Hospital Center “Mother Teresa” in Tirana by gender and year.

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