Capacity for the management of kidney failure in the International Society of Nephrology Eastern and Central Europe region: Report from the 2023 ISN Global Kidney Health Atlas (ISN-GKHA)

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Running title: ISN-GKHA – Eastern and Central Europe

Keywords (3-6): Eastern and Central Europe, Epidemiology, Global Kidney Health Atlas, Kidney failure, Kidney replacement therapy

Funding Source:
This work was supported by the International Society of Nephrology (Grant RES0033080 to the University of Alberta).

Abstract (212 words)

Delivery of care for kidney failure (KF) globally has a significant disparity; even in some countries, it means end-of-life for the person. The International Society of Nephrology Global Kidney Health Atlas (ISN-GKHA) tries to address gaps in KF care and standardize global nephrology care. From the third iteration of the ISN-GKHA, we present data for countries in the ISN Eastern and Central Europe region. The median prevalences of chronic kidney disease (12.8%) and treated KF (873.5 pmp) were higher than the global rates, respectively. Hemodialysis was the most preferred modality for KF in adults, whereas kidney replacement therapy was more balanced in children. Although most of the countries in the region had lower-middle-income and upper-middle-income levels, health expenditures for kidney healthcare were almost generally covered publicly. Nephrologists were responsible for the medical kidney care of people with KF in all countries. There was adequate infrastructure to provide all kinds of treatment for kidney care in the region. Regional characteristics such as high levels of obesity,
smoking, and Balkan nephropathy as an endemic disease, coupled with a shortage of
workforce and finance, continued to affect kidney care in the region negatively. By
making organizational and legislative arrangements, partnerships with national
authorities and societies may accelerate the improvement of kidney healthcare in the
region.

Introduction

Chronic kidney disease (CKD) affects approximately 850 million people around
the globe.\(^1\) Unfortunately, despite this large burden of people with kidney disease, there
is a wide gap in kidney care and reimbursement systems between countries. The
International Society of Nephrology Global Kidney Health Atlas (ISN-GKHA) initiative
attempts to understand, compare, and monitor how different countries within different
regions detect, treat, monitor, and advocate for people with kidney diseases with the
ultimate aim of closing this gap and standardizing kidney care.

Regional features are highly variable, especially in the ISN Eastern and Central
Europe region. The ISN Eastern and Central Europe region includes countries with
diverse demographics, economics, and cultural differences. There is an increasing rate
of CKD and kidney failure (KF) in the region.\(^2,3\) Diabetes mellitus, hypertension, and
glomerulonephritis are the main etiologies of CKD in the region\(^3\) and the high rate of
obesity, smoking, hypertension, and an aging population seem to be the significant
drivers of CKD progression in the region. Also, Balkan endemic nephropathy is a special
consideration for CKD in the region as opposed to other regions.\(^2,4\)
A diversity of kidney care resources is available in the region with a heterogeneous distribution. However, previous iterations of the ISN-GKHA have shown a need for overall improvement in the region, particularly with respect to the nephrology workforce and access to essential technology. Data from the 2023 ISN-GKHA were analyzed to report improvements and issues in kidney care in the ISN Eastern and Central Europe region. The methodology for this research is described in detail elsewhere.

Results

The results are presented in tables and figures and broadly summarized into two categories: desk research (Table 1, Table 2, and Table 3) and survey administration from countries that participated in the survey (Figures 1-5).

Setting and brief summary of the ISN Eastern and Central Europe region's current state of kidney care

The region encompasses Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Kosovo, Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Slovak Republic, Slovenia, and Turkey (Figure 1). This area covers a considerable part of Europe and represents 207,319,834 people with significant cultural, geographical, habitual, and economic diversity.

Overall, the general population decreased in the region, except for Turkey. Low birth rates and negative migration rates may have explained this population decline. Strikingly, Romania had nearly a 3 million drop in total population from 2018 to 2022. In contrast, although the refugee movement from Syria to Turkey decelerated, there were
still 3.5 million refugees in Turkey, which had an additive effect on the increased population in Turkey.\textsuperscript{2,23,24}

Unfortunately, the prevalence rate of CKD was high in Eastern and Central Europe. Hemodialysis (HD) was the most preferred kidney replacement therapy [KRT; HD, peritoneal dialysis (PD), and kidney transplantation (KT)] modality in adults, whereas the HD, PD, and KT rate was much more balanced in children.\textsuperscript{3}

\textbf{Literature review data for countries in the ISN Eastern and Central Europe region}

\textbf{Burden of CKD and kidney failure}

The median CKD prevalence in the region was 12.8\% (IQR: 11.92 – 14.13) (global median was 9.5\%) and ranged from 9.3\% in Cyprus to 16.8\% in Estonia (Table 2).\textsuperscript{15} Median disability-adjusted life years (DALYs) attributed to CKD was 1.3\%, lowest in Moldova (0.63\%), and highest in Turkey (2.45\%). Median deaths attributable to CKD were 1.5\% and were lowest in Moldova (0.6\%) and highest in Turkey (4.2\%)(Table 2).\textsuperscript{15} The prevalence of other risk factors (hypertension, obesity, and smoking) varied across the region (Table 2).\textsuperscript{16}

Incidence and prevalence data on treated KF, dialysis, and KT were readily available for most countries (Table 3).\textsuperscript{17-21} The median incidence and prevalence of treated KF were 138.7 per million population (pmp) (IQR: 121 – 191) and 873.5 pmp (IQR: 722 – 1003.6), respectively. The prevalence of treated KF was higher than the global prevalence rate of 822.8 pmp (IQR: 556 – 1114). The incidence of treated KF ranged from 74.0 pmp in Estonia to 284 pmp in Cyprus. The prevalence of treated KF ranged from 556 pmp in Poland to 1,248 pmp in Croatia. The median incidence of chronic dialysis (HD and PD) was 110.8 pmp (IQR: 81.6 -112.7), the highest in Romania
In the region, the median incidences of chronic HD and PD were 104.2 pmp (IQR: 72.8 – 122.5) [global rate: 107.4 pmp (IQR: 72.5 – 161.4)], and 8.8 pmp (IQR: 4 – 11.2) [global rate: 22.4 pmp (IQR: 12.9 – 37.4)], respectively. The overall prevalences of chronic dialysis, HD, and PD were higher than the global median prevalences of 604.5 pmp (IQR: 335 – 680.1), 532.1 pmp (IQR: 300.3 – 654.9), and 32.4 pmp (IQR: 21.4 – 52.8), respectively.

The overall incidence of KT was 20.2 pmp (IQR: 8.2 – 29.6) and ranged from 0.57 pmp in Serbia to 42.6 pmp in the Czech Republic (Table 3). The prevalence of KT in the region was 280 pmp (IQR: 107.9 – 328.2) and ranged from 80 pmp in Albania to 490 pmp in Estonia. The median incidence of deceased donor KT was 15.2 pmp (IQR: 2.9 – 26.7) and highest in the Czech Republic (38.69 pmp), Lithuania (34.81 pmp), and Estonia (34.62 pmp). The median living donor KT was 2.2 pmp (IQR: 0.8 – 3.5) and highest in Turkey (26.68 pmp), Cyprus (8.33 pmp), and the Czech Republic (3.93 pmp). The median incidence of pre-emptive KT was only available in Bosna and Herzegovina, Estonia, Romania, Serbia, and Slovenia, ranging from 1.6 pmp in Serbia to 0 pmp in Bosna and Herzegovina and Estonia (Table 3).

**Overview of GDP and government health expenditure**

The ISN Eastern and Central Europe region countries’ health expenditure payment rates increased despite increased global inflation, slow global economic growth after the pandemic, and war in Ukraine. Gross domestic product (GDP) purchasing power parity (PPP) in the region ranged from US$14.4 billion (Montenegro) to US$1.43 trillion (Poland). The median gross domestic health expenditure rate was 7.0% [interquartile range (IQR): 6.4 – 7.8]. The ratio of total health expenditures to GDP
varied between countries (a maximum of 9.1% in Bosnia and Herzegovina and a minimum of 4.3% in Turkey) (Table 1). Total health spending per capita ranged from US$235 (Moldova) to US$2,218 (Slovenia). However, government health spending per capita ranged from US$142 (Moldova) to US$1,672 (Czech Republic).

**Cost of KRT in the ISN Eastern and Central Europe region**

The median annual costs of in-center HD, PD, and first-year KT were US$19,028, US$21,765, and US$30,386, respectively (Table 1). Turkey had the lowest yearly cost of HD (US$10,057) and PD (US$2,593), while Bosnia and Herzegovina had the lowest first-year cost of KT (US$15,000). The annual cost of HD was higher than the yearly cost of PD in seven countries – Albania, Estonia, Latvia, Moldova, Romania, Slovenia, and Turkey, all of which had an HD: PD cost ratio greater than 1.

**Survey response data for the ISN Eastern and Central Europe region**

**Characteristics of participating countries**

Responses were received from 16 (80%) of the 20 countries, representing 96.2% of the region’s population. Kosovo, Moldova, Montenegro, and Slovenia did not respond (Figure 1). Turkey had the highest population (83.1 million), and Montenegro had the lowest population (604,966) (Table 1). There were 20 countries in the region; 9 (45%) were upper-middle-income countries (UMICs; Albania, Bosnia and Herzegovina, Bulgaria, Kosovo, Moldova, Montenegro, North Macedonia, Serbia, and Turkey), and 11 (55%) were high-income countries (HICs; Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, and Slovenia), as categorized by the World Bank country income classification.
**Health finance and service delivery**

Overall, reimbursement for non-dialysis CKD (ND-CKD) treatment mainly utilized public funding in 8 countries (Albania, Bosnia and Herzegovina, Czech Republic, Hungary, Macedonia, Romania, Serbia, and Slovak Republic) (free at the point of delivery) (44%) and a mixture of public and private funding systems in 5 countries (Cyprus, Estonia, Lithuania, Poland, and Turkey) (31%) (Figure 2). Funding for ND-CKD in the region was covered through public funds (free at point at delivery), publicly funded (with some fees), and a mix of public and private funding system. No country in the region utilizes solely private and out-of-pocket funding system for care coverage. Public government funding that was free for acute dialysis, chronic HD, chronic PD, and KT medication was available in 12 (75%) (Albania, Bosnia and Herzegovina, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Serbia), 11 (69%) (Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Hungary, Latvia, Macedonia, Poland, Romania, Serbia, Turkey), 14 (88%) (Albania, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Serbia, Turkey), and 12 (75%) (Albania, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Romania, Serbia, Slovak Republic, Turkey) countries, respectively (Figure 2). Solely private and out-of-pocket payment systems for these services were not in use in any of the countries in this region (Figure 2). In-center HD, PD, and KT were available in all countries (100%) that participated in the 2023 ISN-GKHA. Kosovo, Moldova, and Slovenia didn’t respond.

**Health workforce for kidney care**
Nephrologists were primarily responsible for the medical care of people with kidney failure in all countries (100%) of the ISN Eastern and Central European region (global median was 87%). Across most domains of healthcare workers, there were fewer countries with shortages compared to the global median of shortages from other regions. More than half (57%) of the region’s countries reported shortages of nephrologists (Albania, Bosnia and Herzegovina, Bulgaria, Cyprus, Estonia, Latvia, Lithuania, Macedonia, Serbia), pediatric nephrologists (37%) (Bosnia and Herzegovina, Estonia, Latvia, Lithuania, Macedonia, Poland, Serbia), transplant surgeons (69%) (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Latvia, Lithuania, Macedonia, Poland, Serbia), surgeons for PD Access (56%) (Albania, Croatia, Cyprus, Czech Republic, Estonia, Latvia, Macedonia, Serbia, Turkey), laboratory technicians (94%) (all countries in the region except Slovak Republic), radiologists (94%) (all countries in the region except Hungary), transplant coordinators (69%) (Albania, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Macedonia, Romania, Slovak Republic, Turkey), and dialysis technicians (69%) (Bulgaria, Cyprus, Estonia, Hungary, Latvia, Lithuania, Macedonia, Poland, Romania, Serbia, Turkey).

The ISN Eastern and Central Europe region had the third largest prevalence of nephrologists (24.8 pmp) (Figure 3); first was the ISN North East Asia region (28.7 pmp), and second was the ISN Western Europe region (25 pmp). Lithuania had the highest prevalence of nephrologists (52.2 pmp), while Turkey had the lowest (9.6 pmp). The prevalence of nephrology trainees in the region was 4.8 pmp, highest in Croatia (11.9 pmp) and lowest in Turkey (0.6 pmp) (Table 3) (Figures 3).
Availability of services for the delivery of kidney care

Estimates of the number of centers providing KRT were assessed across all countries in the region. HD centers were available in all countries with a median prevalence of 10.5 pmp. Lithuania had the highest prevalence of HD centers (25.3 pmp), while Albania had the lowest (4.9 pmp). Similarly, PD centers were available in all countries with a median prevalence of 2.0 pmp (compared to 1.57 pmp globally). Croatia had the highest prevalence of PD centers (4.8 pmp), while Albania had the lowest (0.32 pmp). KT centers were available in all countries with a median prevalence of 0.7 pmp, with the highest prevalence in Turkey (1.11 pmp) and the lowest in Romania (0.27 pmp).

Only Albania utilized live donors for KT, while all other countries in the region used a combination of deceased and live KT donor programs. Also, two (13%) countries (Bosnia and Herzegovina and Romania) used only a regional KT waitlist, while the remainder used a national KT waitlist.

Home HD was only available in two (13%) countries (Serbia and Turkey), was “generally not available” in three (19%) countries (Czech Republic, Macedonia, and Poland), and was never available in other countries.

Conservative kidney management was available in some form in 9 (56%) countries. CKM established through shared-decision making was available in 8 (50%) countries (Albania, Bulgaria, Estonia, Latvia, Macedonia, Poland, Romania, and the Slovak Republic). Many of these same countries also reported choice-restricted CKM (where resource constraints prevented or limited access) which was available in 6
(38%) countries (Albania, Bosnia and Herzegovina, Bulgaria, Estonia, Macedonia, and Poland). (Figure 4).

**Essential medications and health product access for KF care**

Only publicly funded by the government (whether free at the point of delivery or with some fee at the point of delivery) methods were used for funding the cost of kidney care medications in the region (Figure 2). Medications for ND-CKD were free at the point of delivery in 7 (44%) countries (Albania, Bosnia and Herzegovina, Czech Republic, Estonia, Latvia, Romania, Serbia). In comparison, some fees were included in 9 (56%) countries (Bulgaria, Croatia, Cyprus, Hungary, Lithuania, Macedonia, Poland, Slovak Republic, Turkey). However, medications for people on dialysis (HD or PD) were free in 10 (63%) countries (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Macedonia, Romania, Serbia) and available with some fees in 6 (35%) countries (Cyprus, Hungary, Lithuania, Poland, Slovak Republic, Turkey). Finally, KT medications were free in 9 countries (56%) (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Romania, Serbia) and available with some fees in 7 (44%) countries (Cyprus, Hungary, Lithuania, Macedonia, Poland, Slovak Republic, Turkey) in the region (Figure 2).

**KRT quality indicators**

Although all countries reported the ability to provide information about HD, PD, and KT adequacy, there was variability in the capacity for monitoring and reporting of these measures (Figure 5). In people utilizing HD, all countries were able to monitor and report bone mineral markers in almost all patients (i.e., >75% of patients). In kidney
transplant recipients, patient survival (n=14; 88%), kidney allograft function (n=13; 81%) and graft survival (n=13; 81%) were the quality indicators most frequently reported (Figure 5). Patient-reported outcome measures (PROMs) were the least reported across all KRT modalities while clinical quality indicators for KRT were frequently monitored and reported in nearly all participating countries.

Health information systems, statistics, and national health policies

The availability of official kidney registries varied across countries in the region (Figure 3). Acute kidney injury registry was reported to be available in Albania, Romania, and Slovenia. ND-CKD registries were available in 5 (31.3%) countries; dialysis and KT registries were available in 15 (93.8%) countries in the region; 2 (12.5%) countries (Albania and Romania) had an acute kidney injury registry; Albania had a CKM registry. Advocacy groups for CKD, kidney failure, and KRT remained low in the region (Figure 3).

Discussion

The 2023 ISN-GKHA data for the ISN Eastern and Central Europe region showed detailed information about CKD and KF in countries that participated in the survey. Both CKD and KF prevalences are mostly higher than the global median. In addition to the aging of the population, the increased rate of obesity, hypertension, and smoking in Eastern and Central Europe could be a potential explanation for the high rate of CKD and KF.

Obesity is one of the well-known drivers of CKD.25-27 The obesity rate in the region is mostly higher than the global obesity rate of 13%.28 Consequently, interventions for reducing the obesity rate, including diet campaigns and supporting
lifestyle modification, should form part of a central policy for national health authorities. Such measures could also help to control the hypertension rate. Hypertension, globally, is one of the leading causes of CKD and kidney failure.\textsuperscript{3,29,30} With some variation, nearly one-third of the population in this region is hypertensive. Dietary habits, obesity, salt consumption, smoking, and cultural effects on lifestyle, all influence the development of hypertension. In the SALTURK and SALTURK II studies, there were high amounts of salt consumption directly related to systolic hypertension in Turkey.\textsuperscript{31,32} Simple precautions like reduction of salt content in baked bread and lower salt use in food preparation and at the table were suggested in the SALTURK II study.\textsuperscript{32} It is evident that habits are hard to change in the population; however, national societies could advocate for health authorities to make obligatory reductions in salt content in the production process of foods. Lastly, the smoking rate in a large part of the region is higher than the global rate (22.3%).\textsuperscript{33} Cessation of smoking is another important factor, not only in CKD but also in general public health. There is inadequate data about smoking and the progression of CKD.\textsuperscript{34,35} However, the modification of cardiovascular risk factors with smoking cessation is evident.

Hemodialysis was predominantly chosen as a treatment for people with KF. Generally, PD cost was very low in the region. Nonetheless, it still needed to be utilized. The reasons for low PD utilization in the region are complex and similar to rationale for low use across other regions including factors related to the patient, caregivers, healthcare system, and industry (e.g., local manufacture, solution costs, etc.\textsuperscript{36}). However, there is no difference between incenter HD and PD in patient survival.\textsuperscript{37-39} The lack of caregivers in the aging population, the need for dialysis education in PD, and the
lack of nursing staff seem to be the main obstacles to the preference for PD. Also, home HD is only an option for a portion of the region. On the other hand, much more effective usage of home dialysis (PD & home HD) may relieve the shortage of healthcare workers and health expenditures. Introducing a new policy that proposes home dialysis,” like “PD-First” or home-dialysis favored policies, may increase the usage of home dialysis modalities. The “PD-First” policy implemented in Hong Kong in 1985 and Thailand in 2008 showed satisfactory results.\textsuperscript{39,40} In comparison with in-center HD, PD needs fewer dialysis nurses, lower cost (e.g., consumables, travel expense), and no transport time for dialysis in “PD-First Policy”.\textsuperscript{39,40} One report from Thailand had suggested that a PD-First policy is a good model of care delivery for LMICs.\textsuperscript{41} Home dialysis favored policies in Australia and New Zealand showed similar results.\textsuperscript{42}

In the post-COVID era, governments faced considerable economic obstacles in the balance of payments. Furthermore, the Ukraine—Russian war amplified this financial crisis. Governments in Eastern and Central Europe were able to have higher health expenditures despite the challenges.\textsuperscript{43} Health expenditures increased compared with the 2019 ISN-GKHA Eastern and Central Europe report.\textsuperscript{2} As mentioned in 2019, insufficient health expenditure still remains a significant challenge towards optimal delivery of kidney care in the region.

Countries in the region had capacity for monitoring and reporting quality indicators for the delivery of KRT. Routine measuring and reporting of PROMs enables health care providers to apply a more holistic approaches to healthcare delivery by implementing clinical parameters with the patient perspective for further improvement of the health care quality.\textsuperscript{44,45} The Determined application of standardized questionaries for
PROMs on the national or regional scale may positively affect this critical parameter and should be encouraged region-wide.

Furthermore, according to the last ISN-GKHA Eastern and Central Europe, KT incidence dropped from 17.7 pmp in 2019 to 15.0 pmp in 2023. The same situation also exists in living KT where the incidence dropped from 5.10 pmp in 2019 to 2.2 pmp in 2023. The negative impact of the COVID-19 pandemic on KT may explain it. Solid organ transplantation in Europe was markedly decelerated during the pandemic. A survey during the pandemic in Europe showed that more than half of the living KT and half of the deceased KT programs were paused. Although not marked as in adults, KT in children rate dropped. In Albania, lack of deceased donor kidneys for transplantation is due to the lack of capacity to implement deceased organ donor program: lack of organ banking system, limited human resources, and inadequately and limited trained staff, especially transplant coordinators.

Nephrology workforce prevalence was higher in the Eastern and Central Europe region than the global rate but was highly variable between countries and tended to correspond to country income levels. In the region, all medical kidney care for people living with KF was primarily provided by nephrologists. However, 57% of the countries (Albania, Bosnia and Herzegovina, Bulgaria, Cyprus, Estonia, Latvia, Lithuania, Macedonia, Serbia) reported a shortage of nephrologists indicating that a considerable proportion of the nephrologist workforce in the region was working in challenging conditions. The data also emphasized that the region’s nephrology training centers are highly needed despite the decreased interest in nephrology training in the last decade. An unsatisfactory work-life balance and concerns about economic and early
career issues are the main reasons for this disinterest.\textsuperscript{50} So, it is so evident that there needs to be a new perspective to overcome this critical issue. It has been suggested that the introduction of nephrology to medical students much earlier, more clinical exposure to nephrology, using new teaching tools (e.g., simulated patients, augmented reality for 3D visualization), development new methods for teaching, practical guidance of trainees in the beginning of their careers by mentors, combined fellowship programs (e.g., Onconephrology, critical care nephrology), and measures for reducing work overload can be associated with expansion and retention of nephrology workforce.\textsuperscript{50,51}

In responding countries, nearly all have official national registries for dialysis and KT. According to the 2023 ISN-GKHA report, national registries for CKD increased from one to five.

In conclusion, while improvements in income and health expenditures in the ISN Eastern and Central Europe region are promising, there remain some concerning issues, such as underutilization of PD, home HD, KT, and CKM and a shortage in the nephrology workforce, which seem to be significant obstacles to improving kidney care. Use of ISN-GKHA data in conjunction with guidance and advocacy from national kidney societies could help better inform national health authorities to close the gap and better standardize kidney care within the region. There were some limitations to the 2023 ISN-GKHA; these have been discussed.\textsuperscript{5} However, this work is important for guiding kidney care policy in the ISN Eastern and Central Europe region.

\textbf{Role of the Funder/Sponsor}
The ISN provided administrative support for the design and implementation of the study and data collection activities. The authors were responsible for data management, analysis, and interpretation, as well as manuscript preparation, review, and approval, and the decision to submit the manuscript for publication.

Disclosure
SA reports personal fees (salary) from The International Society of Nephrology, outside the submitted work. AKB reports other (consultancy and honoraria) from AMGEN Incorporated and Otsuka, other (consultancy) from Bayer and GSK, and grants from Canadian Institute of Health Research and Heart and Stroke Foundation of Canada, outside the submitted work; he is also Associate Editor of the Canadian Journal of Kidney Health and Disease and Co-chair of the ISN-Global Kidney Health Atlas. SD reports personal fees (salary) from The International Society of Nephrology, outside the submitted work. JD reports personal fees (salary) from The International Society of Nephrology, outside the submitted work. VJ reports personal fees from GSK, Astra Zeneca, Baxter Healthcare, Visterra, Biocryst, Chinook, Vera, and Bayer, paid to his institution, outside the submitted work. DWJ reports consultancy fees, research grants, speaker’s honoraria and travel sponsorships from Baxter Healthcare and Fresenius Medical Care, consultancy fees from Astra Zeneca, Bayer, and AWAK, speaker’s honoraria from ONO and Boehringer Ingelheim & Lilly, and travel sponsorships from Ono and Amgen, outside the submitted work. He is also a current recipient of an Australian National Health and Medical Research Council Leadership Investigator Grant, outside the submitted work. CM reports personal fees (salary) from The
International Society of Nephrology, outside the submitted work. MN reports grants and personal fees from KyowaKirin, Boehringer Ingelheim, Chugai, Daiichi Sankyo, Torii, JT, Mitsubishi Tanabe, grants from Takeda and Bayer, and personal fees from Astellas, Akebia, AstraZeneca, and GSK, outside the submitted work. VT reports personal fees from AstraZeneca, Bayer, Boehringer Ingelheim, Calliditas, Novartis, Omeros, Otsuka, and Travere, outside the submitted work. All others have nothing to declare.

Acknowledgements

This article is published as part of a supplement supported by the International Society of Nephrology (ISN; grant RES0033080 to the University of Alberta). The ISN provided administrative support for the design and implementation of the survey and data collection activities. The authors were responsible for data management, analysis, and interpretation, as well as manuscript preparation, review, and approval, and the decision to submit the manuscript for publication.

The authors appreciate the support from the ISN’s Executive Committee, regional leadership, and Affiliated Society leaders at the regional and country levels for their help with the ISN-GKHA.
References


<table>
<thead>
<tr>
<th>Country</th>
<th>World bank ranking</th>
<th>Area (km²)</th>
<th>Total population (2022)</th>
<th>GDP (PPP) ($ billion)</th>
<th>Total health expenditures (% of GDP)</th>
<th>HD (2021)</th>
<th>Annual cost KRT (US$) (2021)</th>
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ISN, International Society of Nephrology; GDP, gross domestic product; PPP, purchasing power parity; HD, hemodialysis; IQR, interquartile range; KRT, kidney replacement therapy; KT, kidney transplantation; PD, peritoneal dialysis; UMIC, upper-middle income country; HIC, high-income country

- data not reported/unavailable
Table 2. Burden of chronic kidney disease and risk factors in the ISN Eastern and Central Europe region.15,16

<table>
<thead>
<tr>
<th>Country</th>
<th>CKD Prevalence % (95% CI)</th>
<th>Death attributed to CKD % (95% CI)</th>
<th>DALYS attributed to CKD % (95% CI)</th>
<th>Obesity % (95% CI)</th>
<th>Increased BP % (95% CI)</th>
<th>Smoking % (95% CI)</th>
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<td>Global [median (IQR)]</td>
<td>9.37 (8.74 - 9.97)</td>
<td>1.64 (1.51 - 1.77)</td>
<td>2.53 (2.35 - 2.66)</td>
<td>13.2 (12.5 - 13.9)</td>
<td>22.1 (20.4 - 24.1)</td>
<td>14.0 (12.9 - 15.1)</td>
</tr>
<tr>
<td>Eastern and Central Europe [median (IQR)]</td>
<td>12.87 (12.00 - 13.75)</td>
<td>1.69 (1.24 - 2.14)</td>
<td>1.26 (1.05 – 1.47)</td>
<td>24.9 (23.4 - 26.5)</td>
<td>28.4 (26.9 - 29.9)</td>
<td>24.6 (22.5 - 26.6)</td>
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<tr>
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<td>1.29 (1.12 - 1.45)</td>
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<td>29.0 (22.4 - 36.2)</td>
<td>15.6 (14.0 - 17.3)</td>
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<tr>
<td>Bosnia and Herzegovina</td>
<td>12.23 (11.41 - 13.05)</td>
<td>1.76 (1.59 - 1.90)</td>
<td>1.43 (1.28 - 1.58)</td>
<td>19.4 (15.1 - 24.1)</td>
<td>30.8 (24.5 - 37.6)</td>
<td>30.5 (27.3 - 33.7)</td>
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<td>1.55 (1.40 - 1.71)</td>
<td>27.4 (21.8 - 33.3)</td>
<td>28.4 (21.7 - 35.5)</td>
<td>30.3 (27.2 - 33.3)</td>
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<td>1.76 (1.59 - 1.95)</td>
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<td>32.4 (26.4 - 39.3)</td>
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<tr>
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<td>1.77 (1.51 - 2.01)</td>
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<td>19.8 (14.1 - 26.7)</td>
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<tr>
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<td>0.84 (0.76 - 0.93)</td>
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<td>26.9 (24.7 - 29.2)</td>
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<td>0.66 (0.6 - 0.72)</td>
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<td>22.6 (20.4 - 24.9)</td>
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<td>31.4 (28.3 - 34.7)</td>
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CKD, chronic kidney disease; DALYS, disability-adjusted life years; ISN, International Society of Nephrology; BP, blood pressure; CI, confidence interval; IQR, interquartile range

–, data not reported/unavailable
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<th>Chronic Hemodialysis (pmp)</th>
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<th>Kidney Transplantation (pmp)</th>
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ISN, International Society of Nephrology; pmp, per million population; IQR, interquartile range; HD, hemodialysis; PD, peritoneal dialysis
– , data not reported/unavailable
Figure Legends

Figure 1. Countries of the ISN Eastern and Central Europe region.

ISN, International Society of Nephrology

Figure 2. Funding structures for non-dialysis CKD and KRT, globally and in the ISN Eastern and Central Europe region.*

*Values represent an absolute number of countries in each category expressed as a percentage of a total number of countries.

KRT, kidney replacement therapy; HD, hemodialysis; N/A, not provided; NGOs, nongovernmental organizations; PD, peritoneal dialysis; CKD, chronic kidney disease; ISN, International Society of Nephrology; AKI, acute kidney injury.

Figure 3. Country-level scorecard for kidney care in the ISN Eastern and Central Europe region, 2019 and 2023

Funding for medications refers to 100% publicly funded by the government (free at the point of delivery).

ISN, International Society of Nephrology; KRT, kidney replacement therapy; CKM, conservative kidney management; CKD, chronic kidney disease; AKI, acute kidney injury; KF, kidney failure; KRT, kidney replacement therapy; HD, hemodialysis; PD, peritoneal dialysis; PMP, per million population

Figure 4. Availability of choice in KRT or CKM for people living with kidney failure in the ISN Eastern and Central Europe region.*
*Values represent an absolute number of countries in each category expressed as a percentage of a total number of countries.

KRT, kidney replacement therapy; CKM, conservative kidney management; ISN, International Society of Nephrology; HD, hemodialysis; Kt/V, measure of dialysis adequacy; N/A, not provided; PD, peritoneal dialysis; URR, urea reduction ratio.

**Figure 5.** Quality indicators monitored and reported in the ISN Eastern and Central Europe region.

ISN, International Society of Nephrology; HBV, Hepatitis B Virus; HIV, Human Immunodeficiency Virus

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Regional Board and GKHA Team Author Disclosures
IAB reports personal fees (lecture fees) from AstraZeneca, Amgen, Bayer, outside the submitted work. MRD reports personal fees (consultancy) from National Renal Care, outside the submitted work, and is the Chair of the African Renal Registry and Co-chair of the South African Renal Registry. SND reports research funding from Canadian Institutes of Health Research, Alberta Innovates, and Alberta Health Services, outside the submitted work. IE reports grants from Fonds de Recherche du Québec - Santé, outside the submitted work HH reports personal fees from AWAK technology and Baxter Healthcare, and non-financial support from Mologic company, outside the submitted work. RK reports personal fees from Baxter healthcare, outside the submitted work. BLN reports personal fees (advisory boards, speaker honoraria) from AstraZeneca and Boehringer and Ingelheim, personal fees (advisory boards) from Alexion, Bayer and Cambridge Healthcare Research, and personal fees (speaker honoraria) from Cornerstone Medical Education, Medscape and The Limbic, outside the submitted work, with all fees paid to The George Institute for Global Health. MKNV reports personal fees (honoraria) from AstraZeneca and Boehringer Ingelheim, travel support from AstraZeneca, Boehringer Ingelheim and Astrellas, and participation on AstraZeneca's Data Safety Monitoring Board, outside the submitted work. ST reports Fellowship grants from the International Society of Nephrology-Salmasi Family and the Kidney Foundation of Thailand, outside the submitted work. All other authors have nothing to declare.