

THE GLOBAL KIDNEY HEALTH ATLAS

<Congress title>

Date

Overview



- Aim
- Methods
- Key Results
- Implications

Aim of the Global Kidney Health Atlas



To understand, compare and monitor how different countries around the world detect, treat, monitor and advocate for people with kidney disease (AKI or CKD)

Key focus on availability, accessibility, affordability and quality of ESKD care

Global Kidney Health Atlas survey



Design and scope

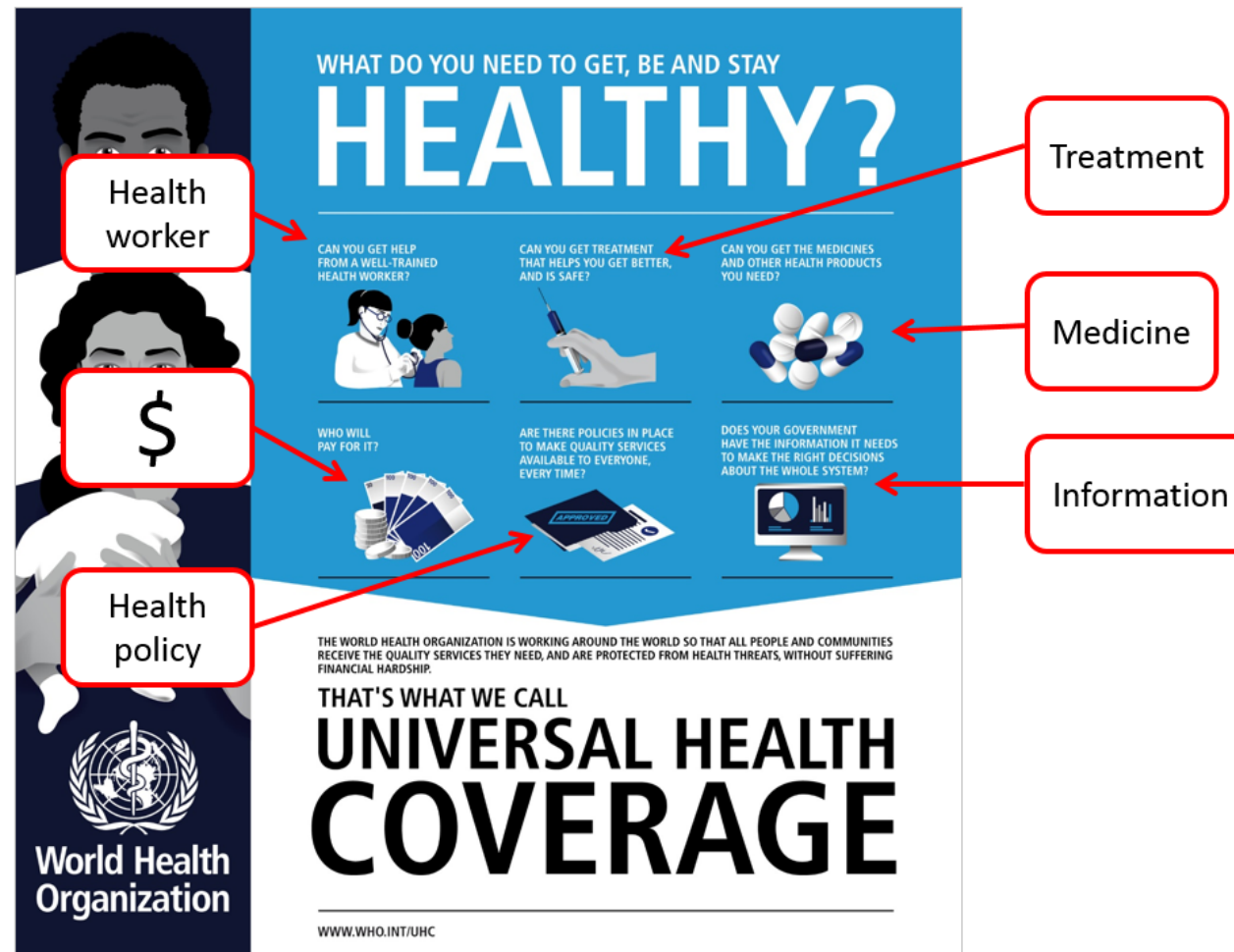
Desk research (across countries and regions)

- Published and grey literature review
- Systematic review ESKD burden and outcomes
- Data extraction from major renal registries (USRDS, ERA-EDTA) and relevant national registries where available
- Scoping review of KRT cost estimates

Online questionnaire-based survey July – September 2018

- 3 languages (English, French, Spanish)
- Across 182 countries
- ≥3 stakeholders per country
 - National nephrology society leadership
 - Healthcare policymakers
 - Patients / patient advocacy groups
- Discrepancies resolved by follow-up conferences with regional and country nephrology leaders

Overall survey components



Overall GKHA response

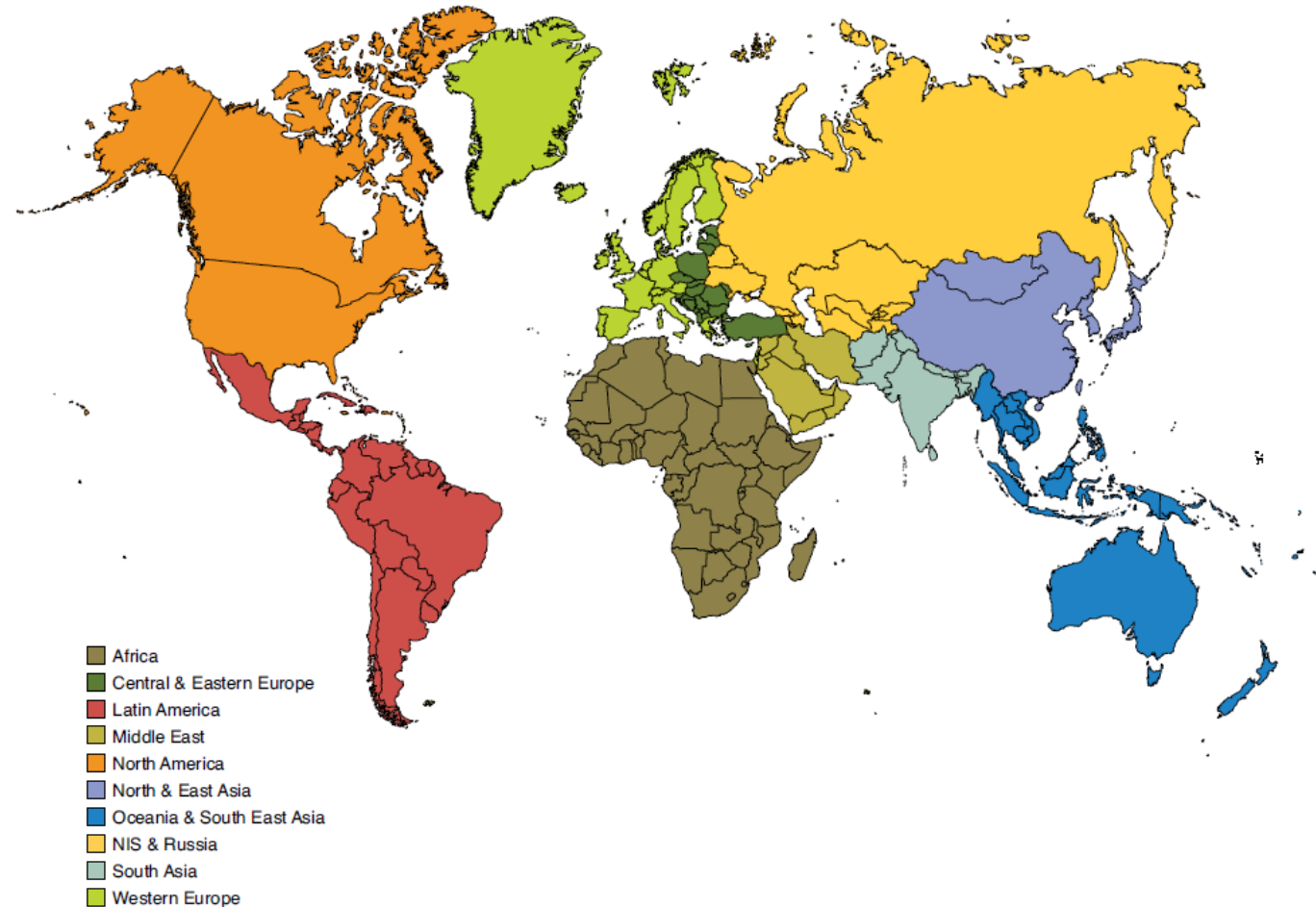
■ Participated in survey ■ Did not participate in survey



160 countries (88%)
99% world's population
317 individuals (69%) response
3 respondents/country (IQR 2-4)

113 countries participated
in both GKHA surveys

Results presented by ISN regions



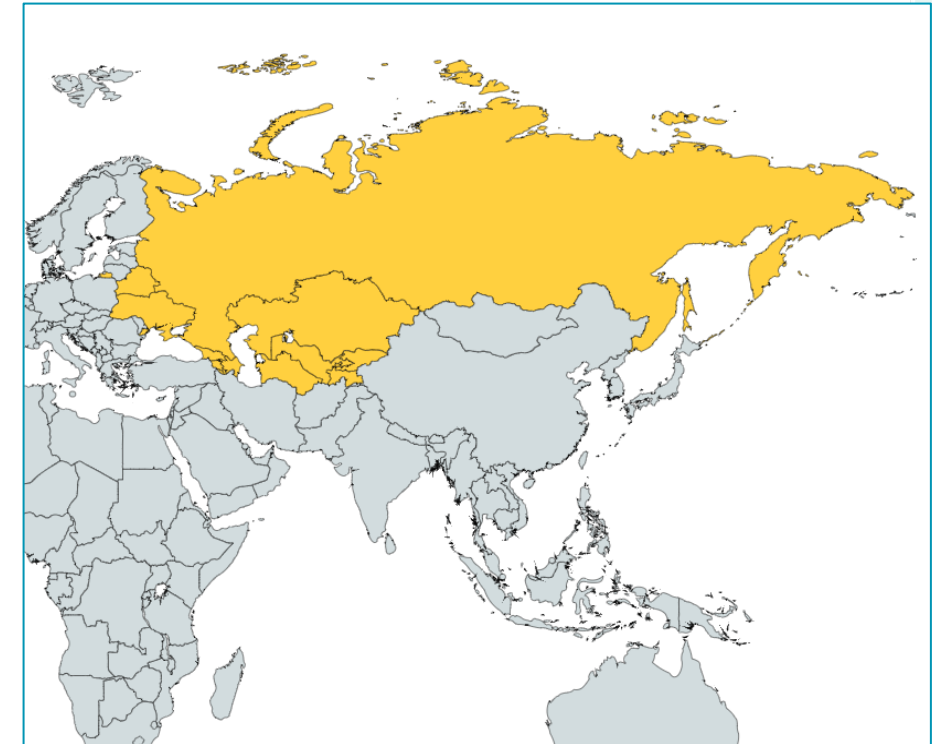
ISN Region: NIS & Russia



Demographics

Country	World bank ranking	Area (sq km)	Total population (2018)	GDP (PPP) (\$ billion)	Total health expenditures (% of GDP)
Armenia	Upper middle income	29,743	3,038,217	28.34	9.9
Azerbaijan	Upper middle income	86,600	10,046,516	172.2	6.9
Belarus	Upper middle income	207,600	9,527,543	179.4	6.3
Georgia	Upper middle income	69,700	4,926,087	39.85	7.9
Kazakhstan	Upper middle income	2,724,900	18,744,548	478.6	3.9
Kyrgyz Republic	Lower middle income	199,951	5,849,296	23.15	6.6
Russian Federation	High income	17,098,242	142,122,776	4016	5.6
Tajikistan	Low income	144,100	8,604,882	28.43	6.9
Turkmenistan	Upper middle income	783,562	81,257,239	2186	4.1
Ukraine	Lower middle income	603,550	43,952,299	369.6	6.1
Uzbekistan	Lower middle income	447,400	30,023,709	223	6.2

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CKD and its risk factors burden

Country	CKD Prevalence % (95% CI)	Death attributed to CKD % (95% CI)	DALYS attributed to CKD % (95% CI)	Obesity % (95% CI)	Increased BP % (95% CI)	Smoking % (95% CI)
Armenia	14.89 (13.82 - 16.08)	1.52 (1.45 - 1.59)	1.29 (1.2 - 1.38)	20.9 (16.3 - 25.7)	25.5 (18.7 - 32.8)	21.9 (19.9 - 23.9)
Azerbaijan	11.26 (10.37 - 12.14)	1.55 (1.33 - 1.68)	1.32 (1.19 - 1.45)	19.9 (15.3 - 24.9)	24.5 (18.1 - 32.0)	22.0 (19.7 - 24.2)
Belarus	17.13 (15.82 - 18.65)	0.4 (0.38 - 0.42)	0.48 (0.44 - 0.53)	26.6 (21.2 - 32.4)	27.1 (20.3 - 34.2)	27.6 (25.2 - 30.0)
Georgia	12.55 (11.65 - 13.56)	1.55 (1.46 - 1.64)	1.49 (1.4 - 1.59)	23.3 (18.4 - 28.5)	26.3 (20.0 - 33.5)	21.3 (19.1 - 23.5)
Kazakhstan	10.42 (9.65 - 11.24)	1.1 (1.05 - 1.16)	0.98 (0.91 - 1.04)	21.3 (17.1 - 25.7)	27.1 (20.1 - 34.6)	21.0 (19.1 - 22.8)
Kyrgyz Republic	7.91 (7.33 - 8.55)	1.33 (1.25 - 1.41)	1.24 (1.14 - 1.34)	15.4 (11.5 - 19.9)	26.7 (20.3 - 33.6)	17.4 (15.5 - 19.5)
Russian Federation	19.23 (17.82 - 20.89)	0.62 (0.61 - 0.63)	0.67 (0.63 - 0.71)	25.7 (21.7 - 30.1)	27.2 (21.2 - 33.6)	25.3 (23.3 - 27.2)
Tajikistan	7.4 (6.86 - 8.0)	1.34 (1.21 - 1.44)	1.04 (0.94 - 1.14)	12.6 (9.2 - 16.6)	26.1 (18.9 - 34.2)	9.9 (8.2 - 11.6)
Turkmenistan	10.04 (9.29 - 10.84)	1.92 (1.82 - 2.02)	1.62 (1.5 - 1.75)	17.5 (13.3 - 22.3)	25.4 (19.3 - 32.4)	7.2 (6.0 - 8.6)
Ukraine	18.18 (16.81 - 19.64)	0.42 (0.41 - 0.44)	0.49 (0.46 - 0.53)	26.1 (20.2 - 32.3)	27.1 (20.7 - 34.2)	25.4 (22.9 - 27.7)
Uzbekistan	9.37 (8.68 - 10.12)	1.75 (1.65 - 1.84)	1.61 (1.48 - 1.74)	15.3 (11.5 - 19.8)	25.6 (19.3 - 32.4)	8.8 (7.4 - 10.3)

Abbreviations:

CKD (Chronic Kidney Disease),
DALYS (disability-adjusted life years),
BP (blood pressure),
CI (confidence interval)

Data sources:

GBD study database
(<http://www.healthdata.org/gbd>),
WHO data observatory
(<https://www.who.int/gho/en/>)

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Burden of ESKD

Prevalence of treated ESKD



■ <433.0 pmp
 ■ 433.0–759.0 pmp
 ■ 759.1–1048.0 pmp
 ■ >1048.0 pmp
 ■ Data not reported

Treated ESKD: all dialysis + transplant

* pmp (per million population)

Data source: ERA-EDTA Registry Annual Report 2016/2017, Jain et al. (JASN) 2012, 2017/2018 USRDS Annual Data Report

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Country	Treated ESKD		Chronic dialysis (HD+PD)		Chronic HD		Chronic PD	
	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence
Armenia	-	-	-	-	-	-	-	0
Azerbaijan	-	-	-	-	-	-	-	0
Belarus	62	289	-	221.3	-	194.4	-	26.9
Georgia	203	713	-	179.3	-	162	-	17.3
Kazakhstan	-	211	-	186	-	-	-	-
Kyrgyz Republic	-	-	-	-	-	-	-	-
Russian Federation	67	333	-	245	-	113.2	-	11.7
Tajikistan	-	-	-	-	-	-	-	-
Turkmenistan	-	-	-	-	-	-	-	-
Ukraine	37	210	-	161	-	66.4	-	10.8
Uzbekistan	-	-	-	-	-	-	-	0

Burden of ESKD (cont'd)

Incidence of kidney transplantation



■ <5.2 pmp
 ■ 5.2–13.5 pmp
 ■ 13.6–37.8 pmp
 ■ >37.8 pmp
 ■ Data not reported

* pmp (per million population)

Data sources: GODT database

(<http://www.transplant-observatory.org/data-charts-and-tables/>)

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Country	Kidney transplantation				
	Incidence overall	Prevalence overall	Incidence of deceased donor	Incidence of living donor	Incidence of pre-emptive
Armenia	3.79	-	0	3.79	-
Azerbaijan	-	-	-	-	-
Belarus	38.11	-	37.16	0.95	-
Georgia	5.38	-	0	5.38	-
Kazakhstan	12.35	25	1.68	10.67	-
Kyrgyz Republic	-	-	-	-	-
Russian Federation	8.16	58	6.76	1.4	-
Tajikistan	2.94	-	0	2.94	-
Turkmenistan	-	-	-	-	-
Ukraine	2.81	27	0.13	2.68	-
Uzbekistan	-	-	-	-	-

Annual cost of kidney replacement therapy components

Country	Hemodialysis	Peritoneal dialysis	Kidney Transplant (First year)	Kidney Transplant (later years)	HD/PD cost ratio
Armenia	-	-	-	-	-
Azerbaijan	-	-	-	-	-
Belarus	5,070	6,789	-	-	0.75
Georgia	5,876	10,064	-	-	0.58
Kazakhstan	-	-	-	-	-
Kyrgyz Republic	-	-	-	-	-
Russian Federation	14,882	23,640	-	-	0.63
Tajikistan	-	-	-	-	-
Turkmenistan	-	-	-	-	-
Ukraine	-	-	-	-	-
Uzbekistan	-	-	-	-	-

*Cost is in \$US 2016

Abbreviations:

HD (hemodialysis),
PD (peritoneal dialysis)

Data source: van der Tol et al. (2019)

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Survey response



- 9 of 11 countries (82%) in NIS & Russia responded to the 2018 survey
- This represents 96% of the region's population

Country level scorecard

Countries		Availability of KRT and CKM				Funding for Medications		Availability and Distribution of Registry				Advocacy Group			Nephrology Workforce (PMP)	
		Chronic hemodialysis	Chronic peritoneal dialysis	Kidney transplantation	CKM	Dialysis medications	Transplant medications	CKD	Dialysis	Transplantation	AKI	CKD	AKI	ESKD/RRT	Nephrologists	Nephrology trainees
NIS & Russia																
Armenia	2017														8.18	3.44
	2019														3.29	1.65
Azerbaijan	2017															
	2019														18.41	49.77
Belarus	2017														20.86	2.19
	2019														26.24	
Georgia	2017														23.32	
	2019														28.42	3.25
Kazakhstan	2017														5.51	0.83
	2019														13.34	1.60
Russia	2017														18.61	2.11
	2019														15.48	0.70
Tajikistan	2017															
	2019														1.74	0.46
Ukraine	2017														9.00	0.23
	2019														9.94	0.11
Uzbekistan	2017															
	2019															
Nephrologists density		<1.2 PMP				1.2–10.0 PMP				10.1–22.9 PMP				>22.9 PMP		
Nephrology trainees density		<0.3 PMP				0.3–1.4 PMP				1.5–3.7 PMP				>3.7 PMP		

Yes

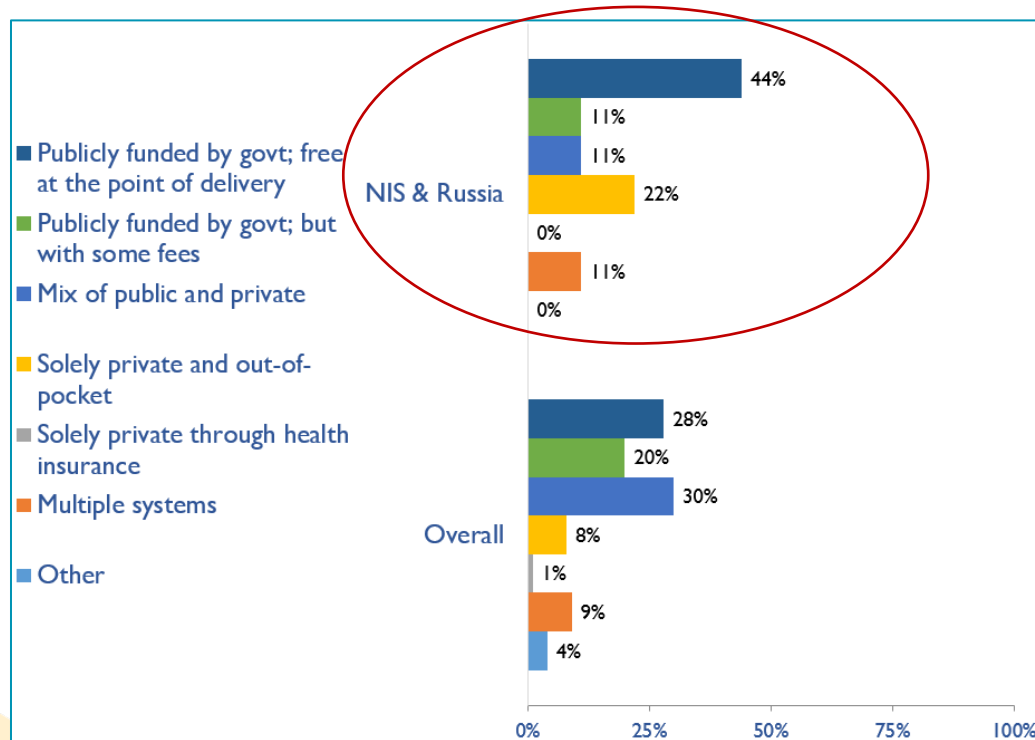
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N/A

Abbreviations

KRT: kidney replacement therapy
CKM: conservative kidney management
CKD: chronic kidney disease
AKI: acute kidney injury
ESKD: end stage kidney disease
RRT: renal replacement therapy

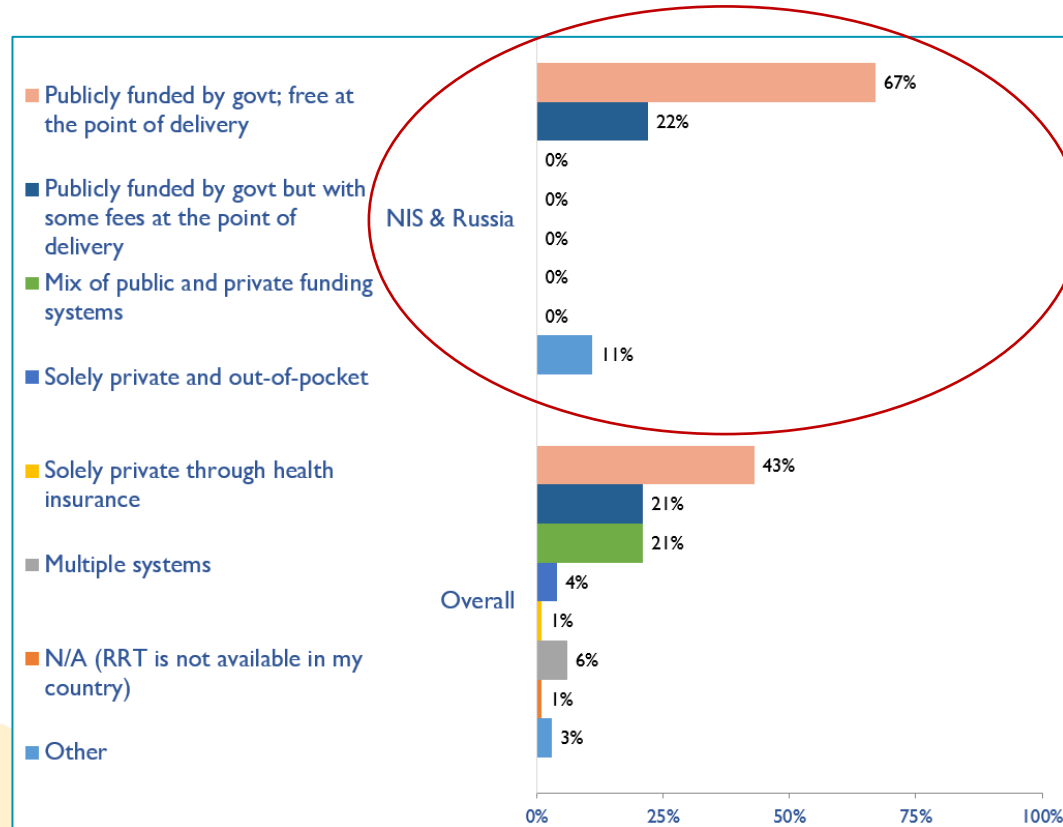
Funding for non-dialysis CKD



Country	Publicly funded by govt; free at the point of delivery	Publicly funded by govt but with some fees at the point of delivery	Mix of public and private funding systems	Solely private and out-of-pocket	Solely private through health insurance	Multiple systems	Other
Armenia				X			
Azerbaijan	X						
Belarus	X						
Georgia				X			
Kazakhstan	X						
Russian Federation			X				
Tajikistan						X	
Ukraine		X					
Uzbekistan	X						

X : Yes

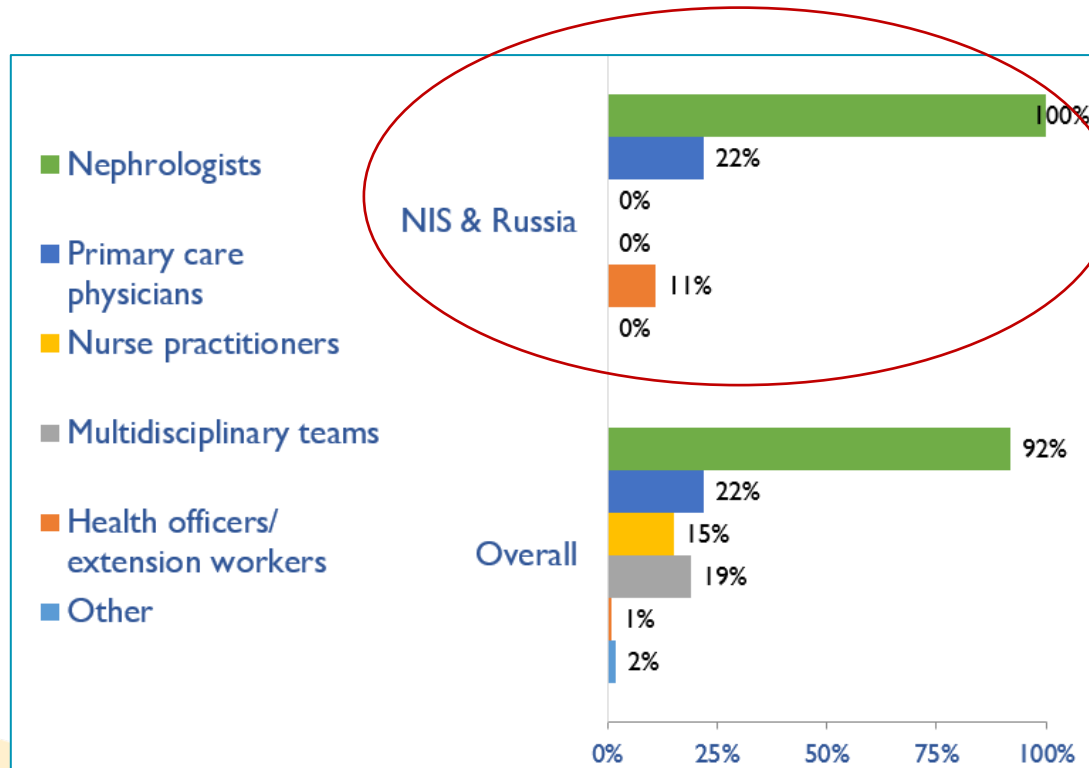
Funding for kidney replacement therapy (KRT)



Country	Publicly funded by govt; free at the point of delivery	Publicly funded by govt but with some fees at the point of delivery	Mix of public and private funding systems	Solely private and out-of-pocket	Solely private through health insurance	Multiple systems	N/A (RRT is not available in my country)	Other
Armenia		X						
Azerbaijan	X							
Belarus	X							
Georgia	X							
Kazakhstan	X							
Russian Federation	X							
Tajikistan								X
Ukraine		X						
Uzbekistan	X							

X : Yes

Providers primarily responsible for ESKD care



Country	Nephrologists	Primary care physicians	Nurse practitioners or specialized nurses	Multidisciplinary teams	Health officers/extension workers	Other
Armenia	X					
Azerbaijan	X					
Belarus	X					
Georgia	X	X				
Kazakhstan	X					
Russian Federation	X					
Tajikistan	X	X			X	
Ukraine	X					
Uzbekistan	X					

X : Yes

Shortage of ESKD care providers

Country	Nephrologists	Transplant surgeons	Surgeons (HD access)	Surgeons (PD access)	Interventional radiologists (HD access)	Interventional radiologists (PD access)	Laboratory technicians	Dietitians	Radiologists (ultrasound)	Vascular access coordinators	Counsellors/psychologists	Transplant coordinators	Dialysis nurses	Dialysis technicians
Armenia														
Azerbaijan														
Belarus														
Georgia														
Kazakhstan														
Russian Federation														
Tajikistan														
Ukraine														
Uzbekistan														

No shortage

Shortage

No
response

Prevalence of nephrologists and trainees

Nephrologists



■ <1.2 pmp
 ■ 1.2–10.0 pmp
 ■ 10.1–22.9 pmp
 ■ >22.9 pmp
 ■ Data not reported

Nephrology trainees



■ <0.3 pmp
 ■ 0.3–1.4 pmp
 ■ 1.5–3.7 pmp
 ■ >3.7 pmp
 ■ Data not reported

Country	Nephrologists PMP	Nephrology trainees PMP
Armenia	3.29	1.65
Azerbaijan	18.41	49.77
Belarus	26.24	-
Georgia	28.42	3.25
Kazakhstan	13.34	1.60
Russian Federation	15.48	0.70
Tajikistan	1.74	0.46
Ukraine	9.94	0.11
Uzbekistan	-	-

‘-’: data not reported/unavailable

Capacity for chronic dialysis (HD)


Chronic HD centers



- Chronic HD services are available in all countries of the region
- The NIS & Russia average of HD treatment centers is 3.72 pmp

Country	Chronic HD Centres PMP
Armenia	3.95
Azerbaijan	3.48
Belarus	5.56
Georgia	5.68
Kazakhstan	5.33
Russian Federation	3.28
Tajikistan	0.23
Ukraine	1.05
Uzbekistan	-

‘ - ’ : data not reported/unavailable

 <1.2 pmp  1.2–4.5 pmp  4.6–9.9 pmp  >9.9 pmp  Data not reported

Capacity for chronic dialysis (PD)

Chronic PD centers



- Chronic PD services are available in 6 (75%) countries of the region
- The NIS & Russia average of PD treatment centers is 0.41 pmp

Country	Chronic PD Centres PMP
Armenia	-
Azerbaijan	0.10
Belarus	1.89
Georgia	0.41
Kazakhstan	0.21
Russian Federation	0.78
Tajikistan	-
Ukraine	-
Uzbekistan	-

'-': data not reported/unavailable

Chronic PD not provided <0.4 pmp 0.4–1.3 pmp 1.4–2.5 pmp >2.5 pmp Data not reported

Capacity for kidney transplantation

Kidney transplantation centers



- Kidney transplantation services are available in all countries of the region
- The NIS & Russia average of Kidney transplantation centers is 0.33 pmp

Country	Kidney Transplantation availability	Transplant centers PMP
Armenia	X	0.33
Azerbaijan	X	0.30
Belarus	X	0.73
Georgia	X	0.51
Kazakhstan	X	0.43
Russian Federation	X	0.26
Tajikistan	X	0.23
Ukraine		-
Uzbekistan		-

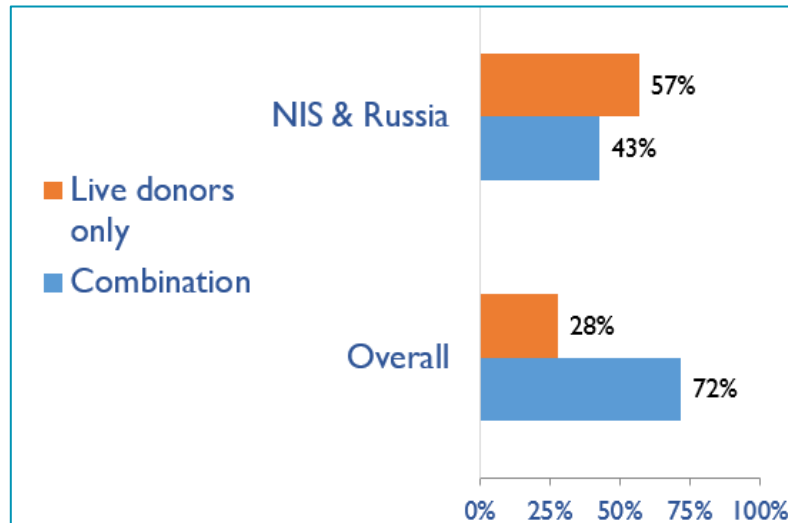
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X: Yes

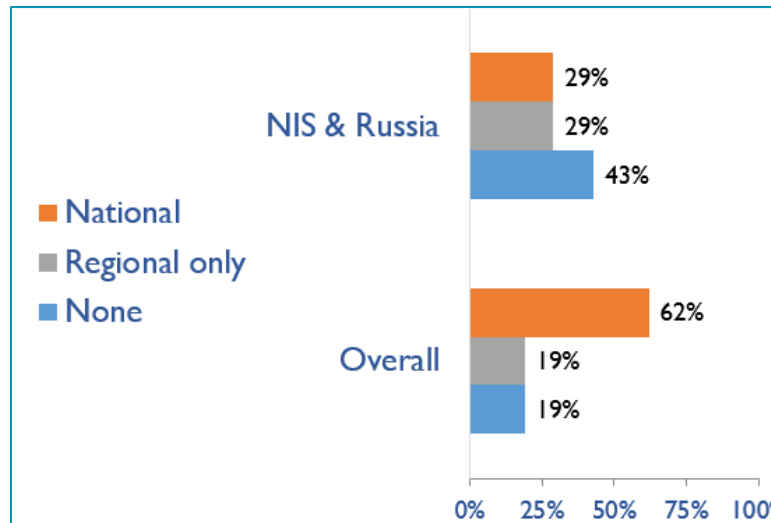
■ Kidney transplantation not provided ■ <0.2 pmp ■ 0.2-0.4 pmp ■ 0.5-0.7 pmp ■ >0.7 pmp
■ Data not reported

Capacity for kidney transplantation (cont'd)

Transplant donor type



Transplant waitlist

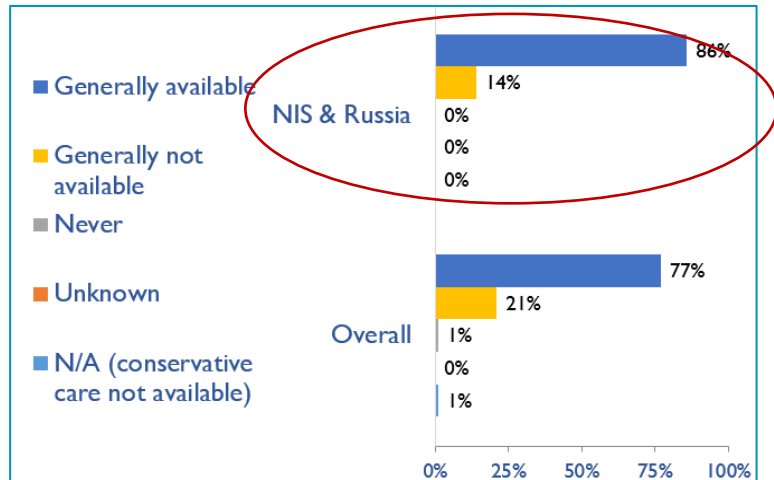


Country	Donor type		Transplant waitlist		
	Live donors only	Combination	National	Regional only	None
Armenia	X				X
Azerbaijan	X		X		
Belarus		X	X		
Georgia	X				X
Kazakhstan		X		X	
Russian Federation		X		X	
Tajikistan	X				X
Ukraine					
Uzbekistan					

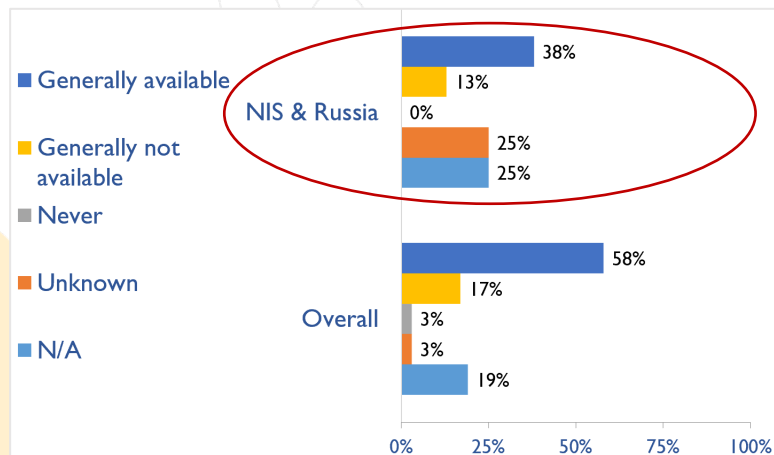
X : Yes

Availability of services within dialysis care

HD frequency



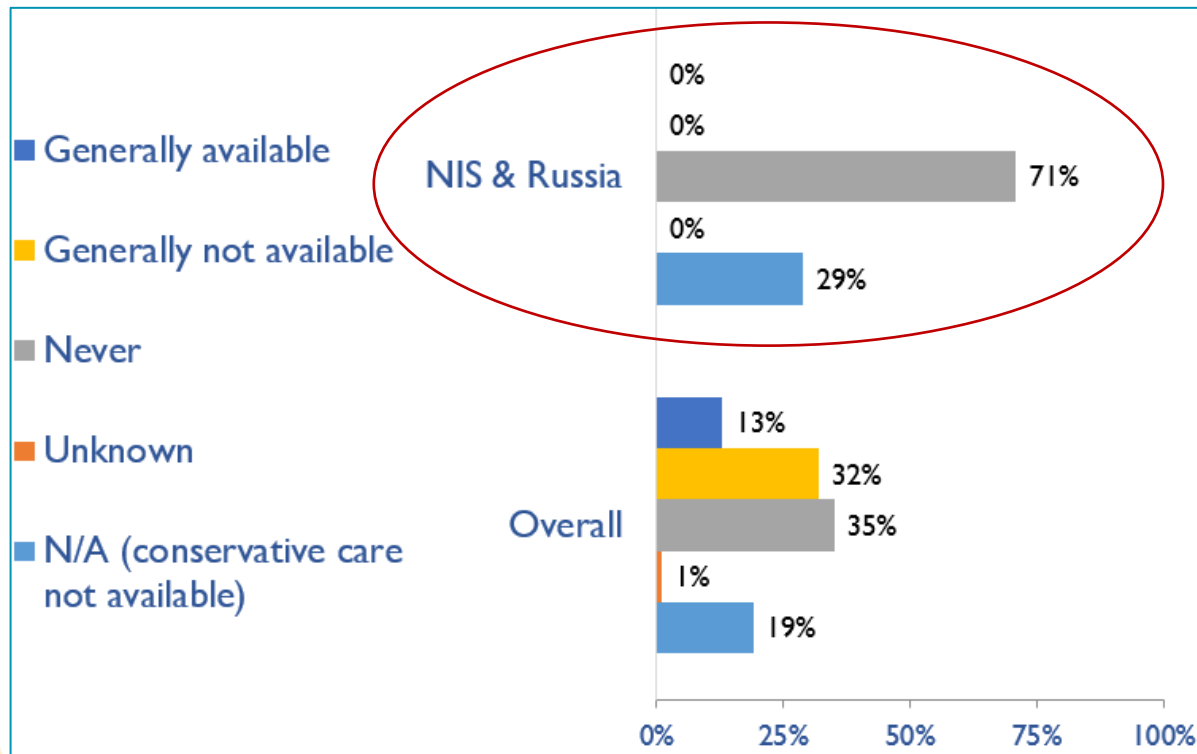
PD frequency



Country	HD frequency a center-based service that involves treatment 3x week/3-4x hours					PD frequency ability to do adequate exchanges 3-4x day (or equivalent cycles on automated PD)				
	Generally available	Generally not available	Never	Unknown	N/A (dialysis not provided)	Generally available	Generally not available	Never	Unknown	N/A (dialysis not provided)
Armenia	X									X
Azerbaijan	X								X	
Belarus	X					X				
Georgia	X					X				
Kazakhstan	X						X			
Russian Federation	X					X				
Tajikistan		X								X
Ukraine										
Uzbekistan										

X : Yes

Availability of home hemodialysis

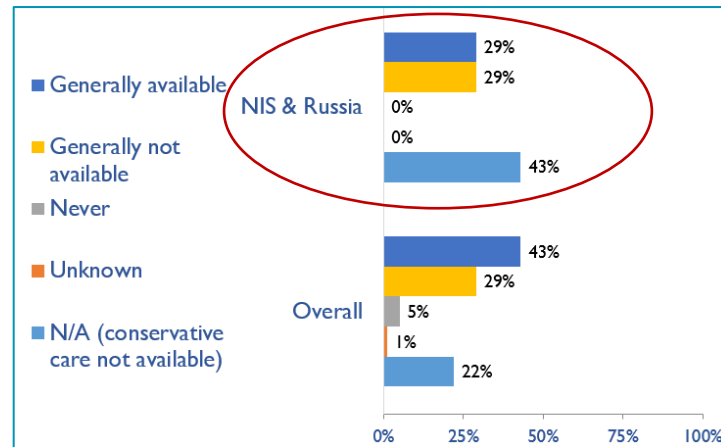


Country	Availability of Home hemodialysis				
	Generally available	Generally not available	Never	Unknown	N/A (dialysis not provided)
Armenia				X	
Azerbaijan			X		
Belarus			X		
Georgia			X		
Kazakhstan			X		
Russian Federation			X		
Tajikistan				X	
Ukraine					
Uzbekistan					

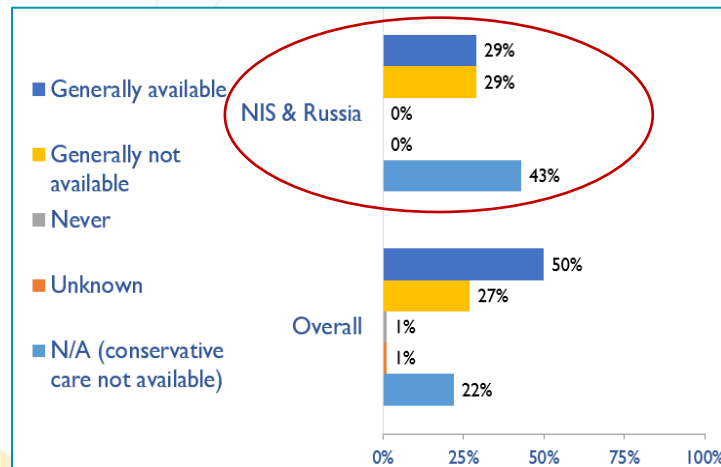
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Capacity for conservative kidney management (CKM)

Choice–restricted CKM



Chosen or medically advised CKM

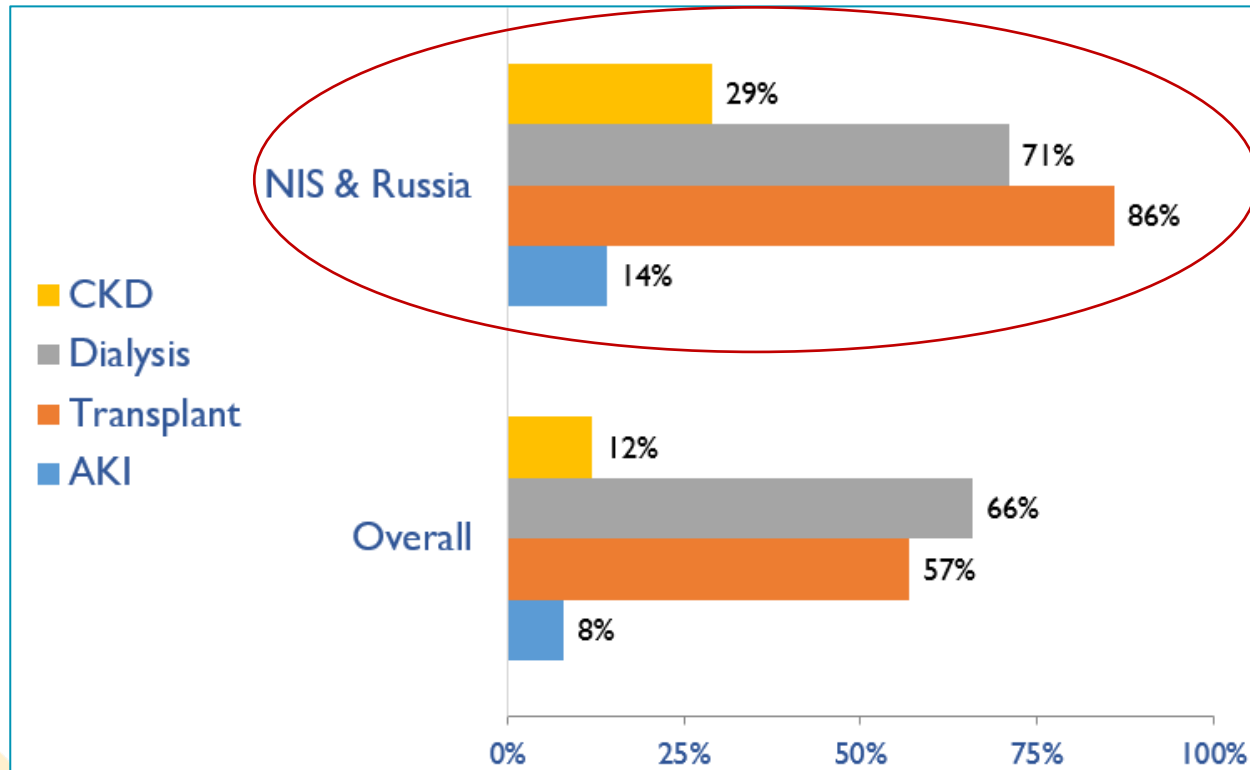


Country	Established choice–restricted conservative care					Established conservative care that is chosen or medically advised				
	Generally available	Generally not available	Never	Unknown	N/A (conservative care not available)	Generally available	Generally not available	Never	Unknown	N/A (conservative care not available)
Armenia		X					X			
Azerbaijan	X					X				
Belarus					X					X
Georgia	X					X				
Kazakhstan					X					X
Russian Federation					X					X
Tajikistan		X					X			
Ukraine										
Uzbekistan										

X : Yes

X : Yes

Availability of official registry



Country	CKD	Dialysis	Transplant	AKI
Armenia			X	
Azerbaijan	X	X	X	X
Belarus		X	X	
Georgia		X	X	
Kazakhstan				
Russian Federation		X	X	
Tajikistan	X	X	X	
Ukraine				
Uzbekistan				

X : Yes

Summary of 2019 GKHA findings



- KRT availability, access, and quality is high
- Conservative kidney management is limited
- Government funding for kidney care is low
- Few registries for non-dialysis CKD and AKI, overall higher than global average
- Moderate workforce limitations, high densities of nephrologists and trainees
- Little advocacy for kidney disease in NIS & Russia, particularly for CKD and AKI

Implications



To access the Atlas report:



www.theisn.org/global-atlas