

# THE GLOBAL KIDNEY HEALTH ATLAS



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Date

[www.theisn.org/global-atlas](http://www.theisn.org/global-atlas)

# Overview

- **Aim**
- **Methods**
- **Key Results**
- **Implications**

# Aim of the Global Kidney Health Atlas

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**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

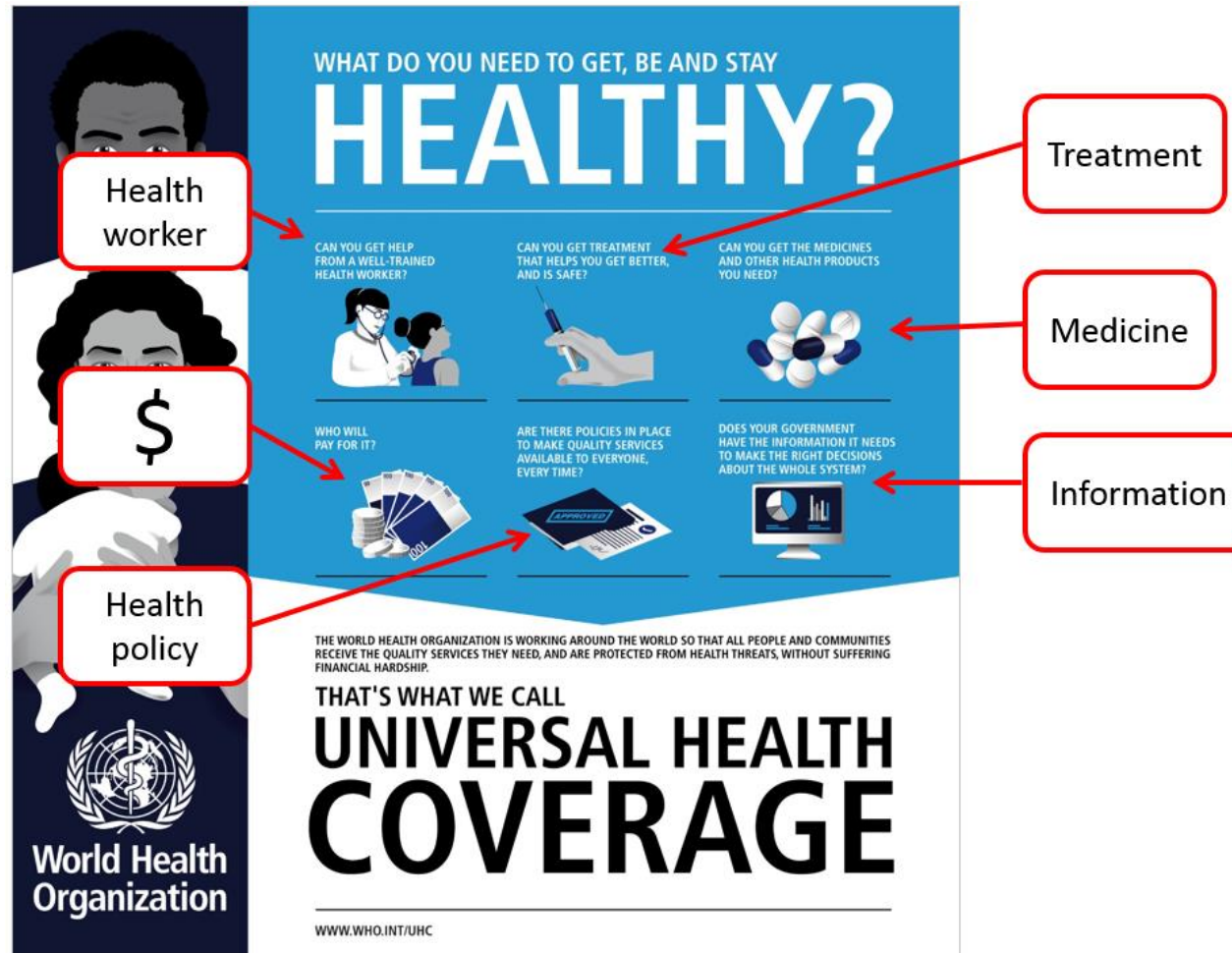
## Desk research (across countries and regions)

- 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
- $\geq 3$  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

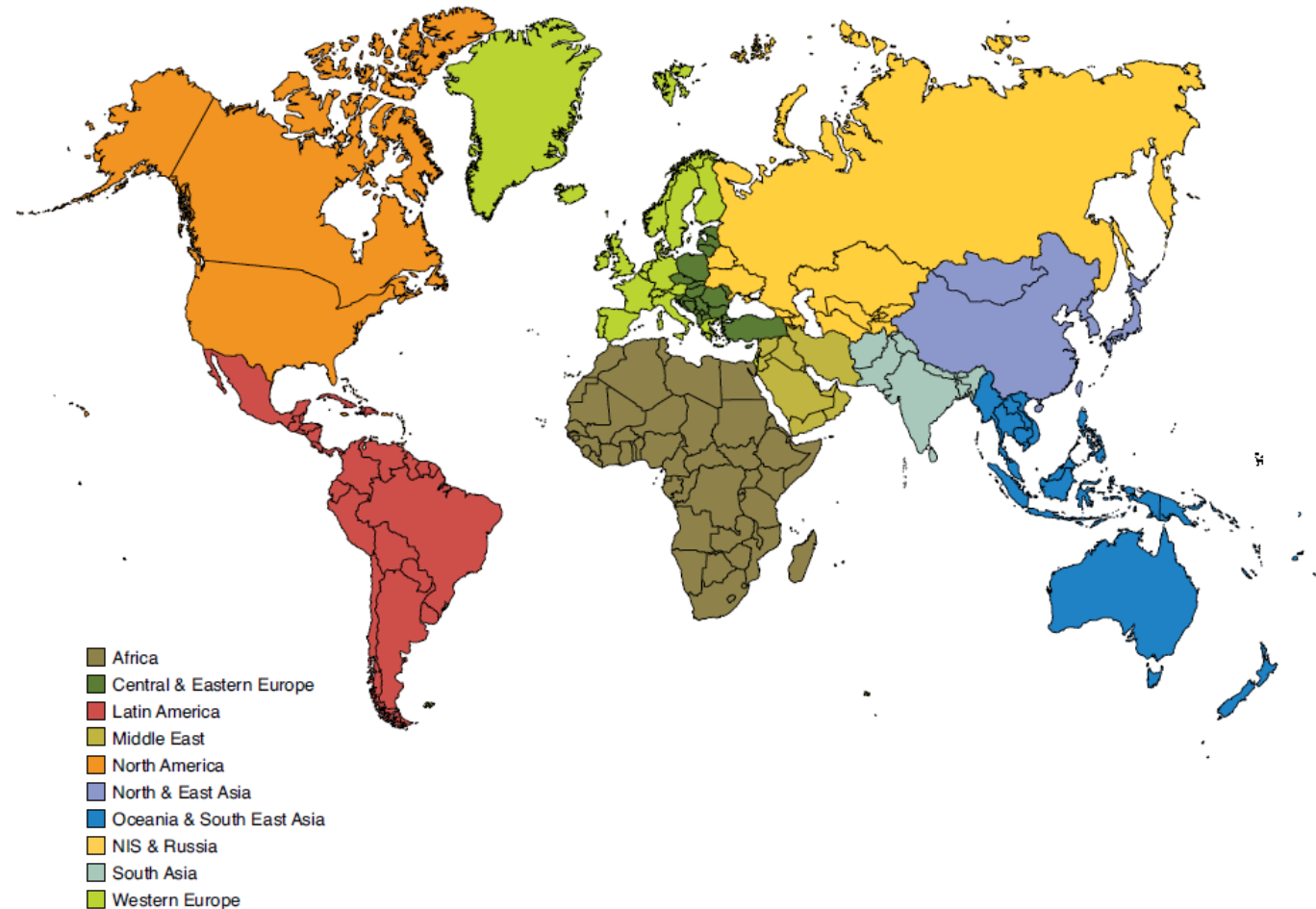
■ Participated in survey   ■ Did not participate in survey



**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





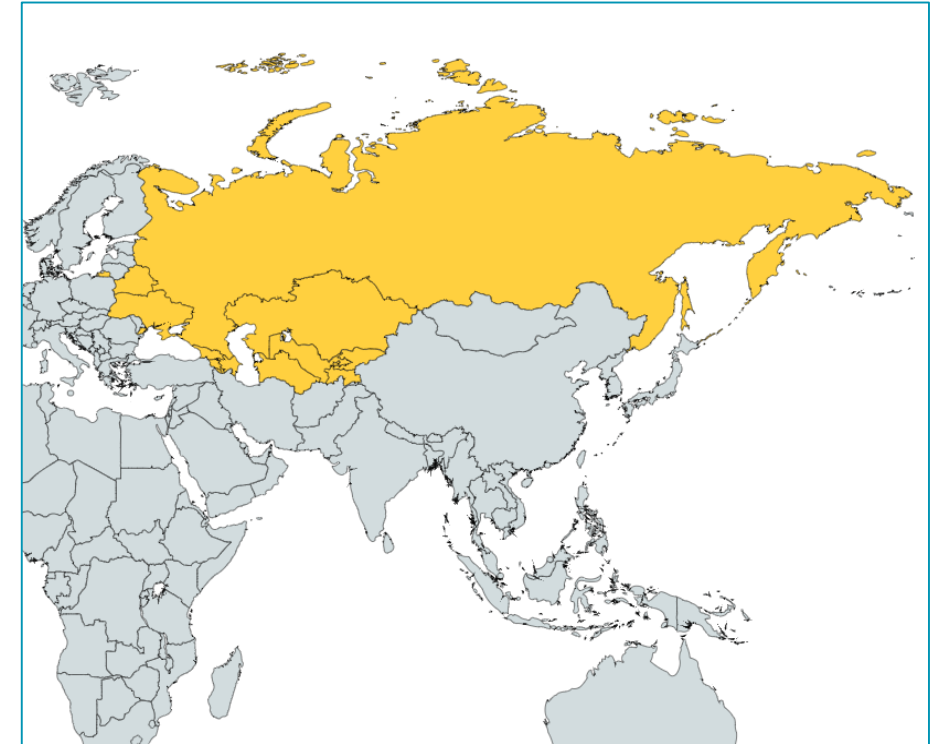
# ISN Region: NIS & Russia



# 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/>)

‘ – ’ : data not reported/unavailable

# Burden of ESKD

Prevalence of treated ESKD



Treated ESKD: all dialysis + transplant

\* pmp (per million population)

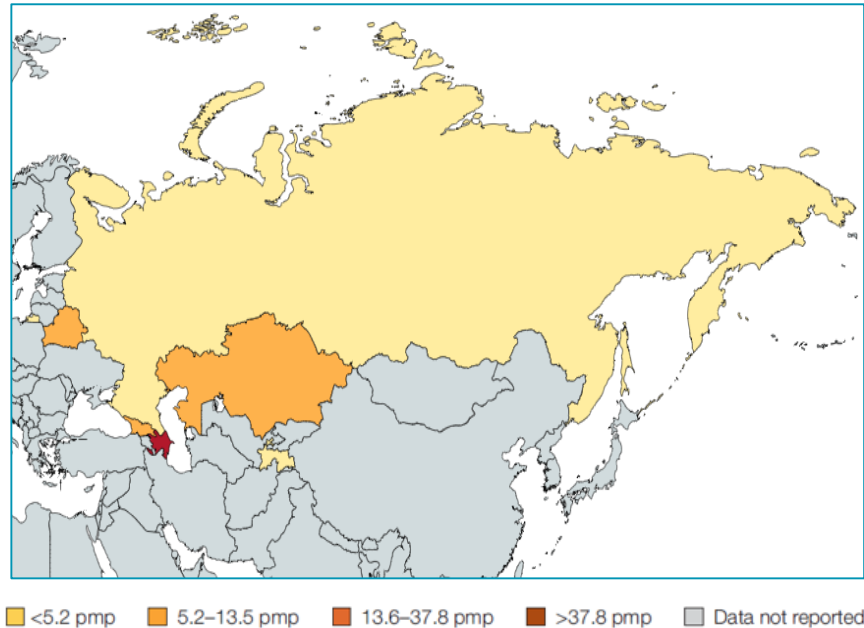
Data source: ERA-EDTA Registry Annual Report 2016/2017, Jain et al. (JASN) 2012, 2017/2018 USRDS Annual Data Report

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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



\* pmp (per million population)

Data sources: GODT database

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

‘ – ’ : data not reported/unavailable

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)

'-': data not reported/unavailable



# Survey response

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- 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	Nephrologist trainees
<b>NIS &amp; Russia</b>																
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															

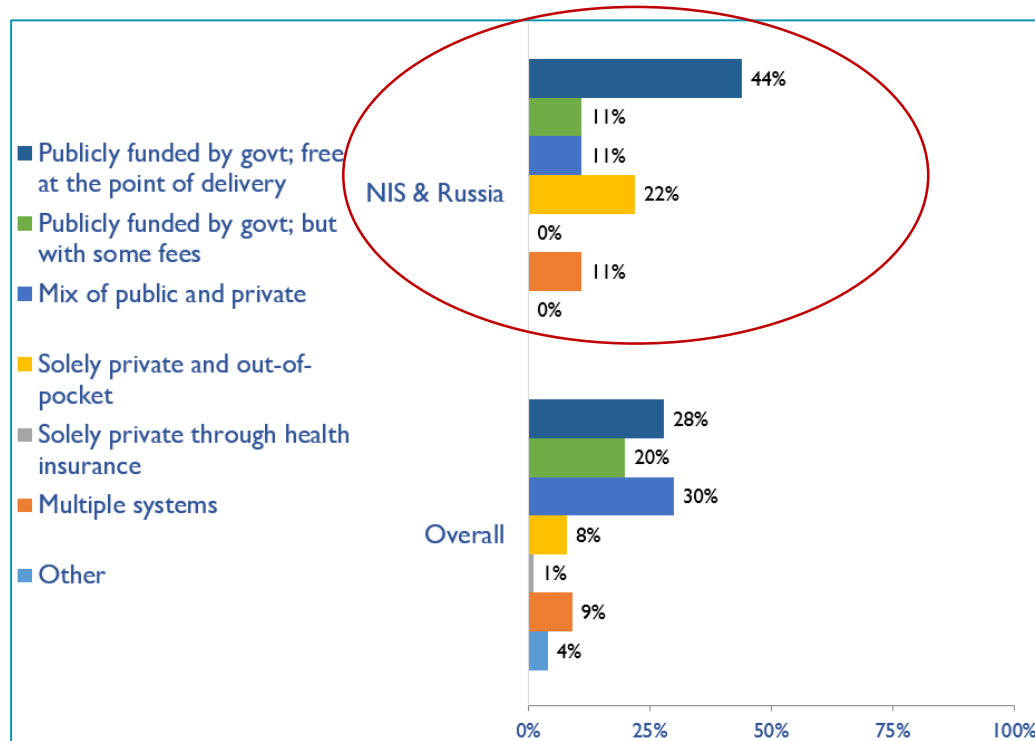
Yes  
No  
N/A

## 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

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

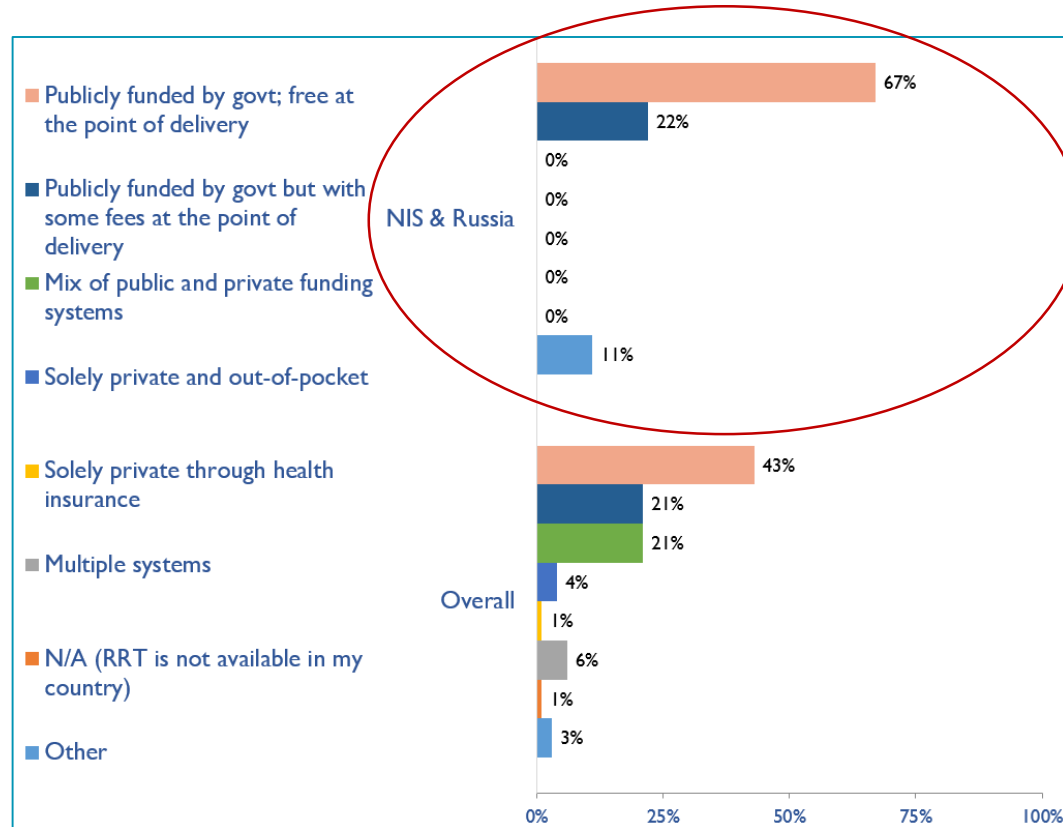
# Funding for non-dialysis CKD



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

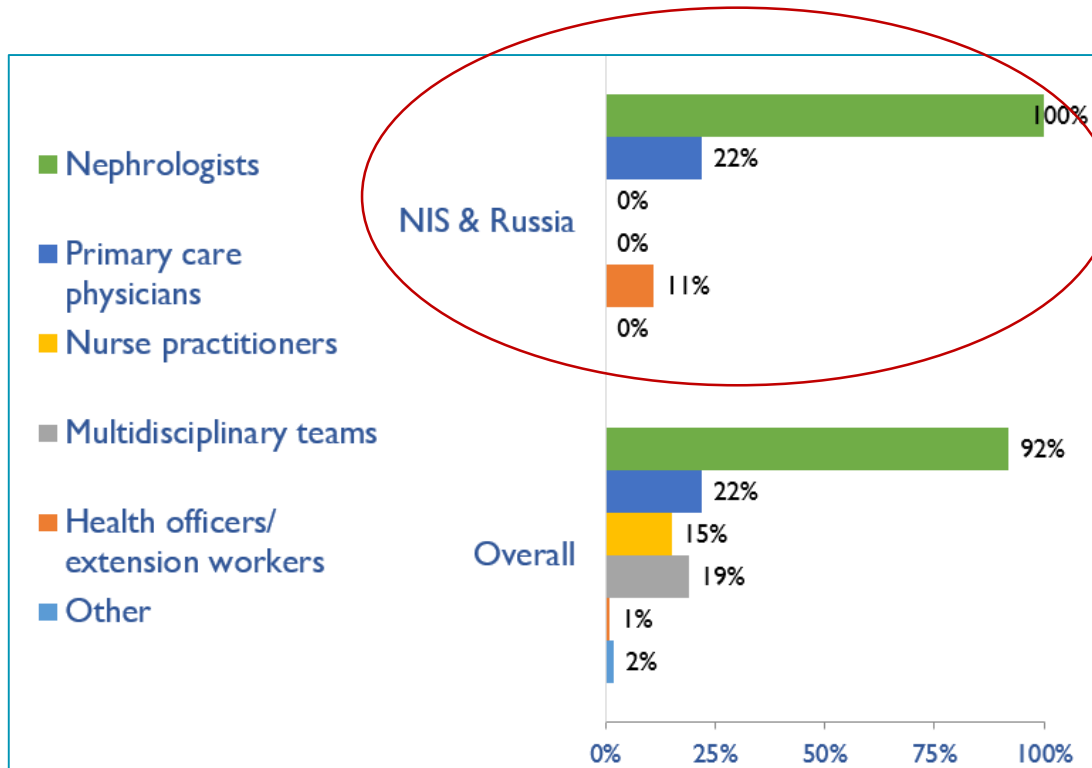
# Funding for kidney replacement therapy (KRT)



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 not provided
  <0.2 pmp
  0.2–0.4 pmp
  0.5–0.7 pmp
  >0.7 pmp
  Data not reported

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

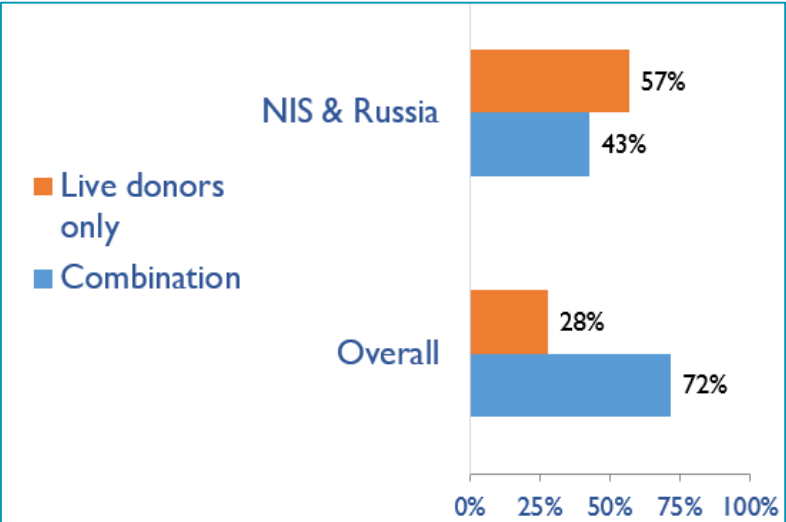
Country	Kidney Transplantation availability	Transplant centers PMP
Armenia	X	0.33
Azerbaijan	X	0.30
Belarus	X	0.73
Georgia	X	0.51
Kazakhstan	X	0.43
Russian Federation	X	0.26
Tajikistan	X	0.23
Ukraine		-
Uzbekistan		-

‘-’: data not reported/unavailable

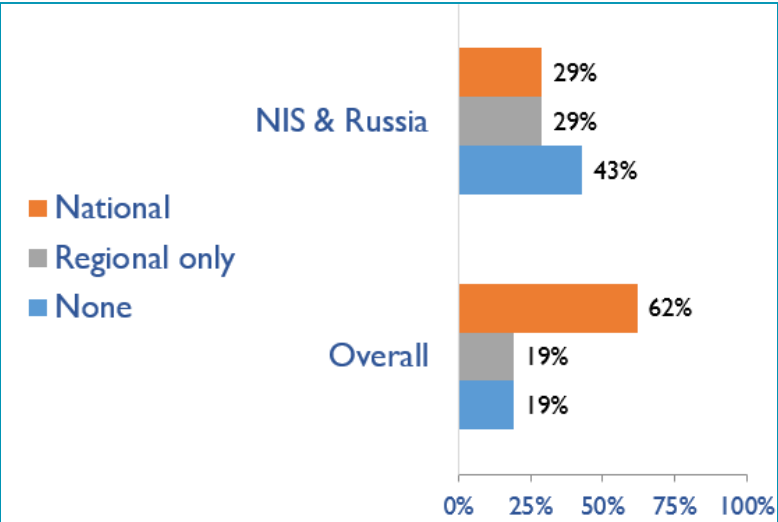
X : Yes

# Capacity for kidney transplantation (cont'd)

Transplant donor type



Transplant waitlist

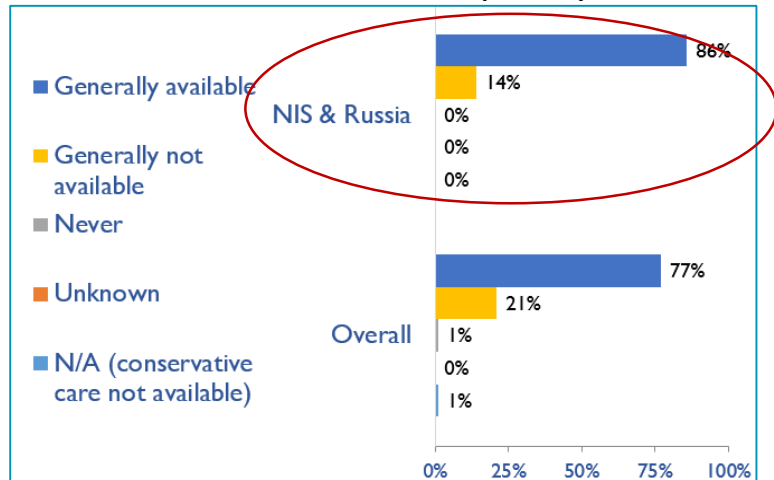


Country	Donor type		Transplant waitlist		
	Live donors only	Combination	National	Regional only	None
Armenia	X				X
Azerbaijan	X		X		
Belarus		X	X		
Georgia	X				X
Kazakhstan		X		X	
Russian Federation		X		X	
Tajikistan	X				X
Ukraine					
Uzbekistan					

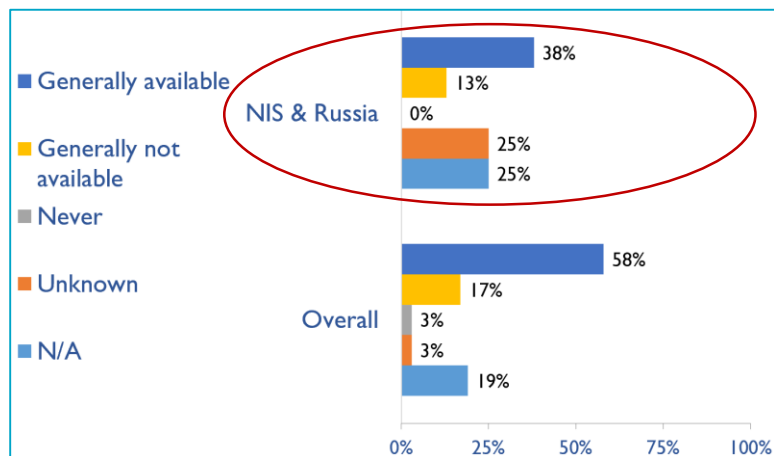
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# Availability of services within dialysis care

## HD frequency



## PD frequency

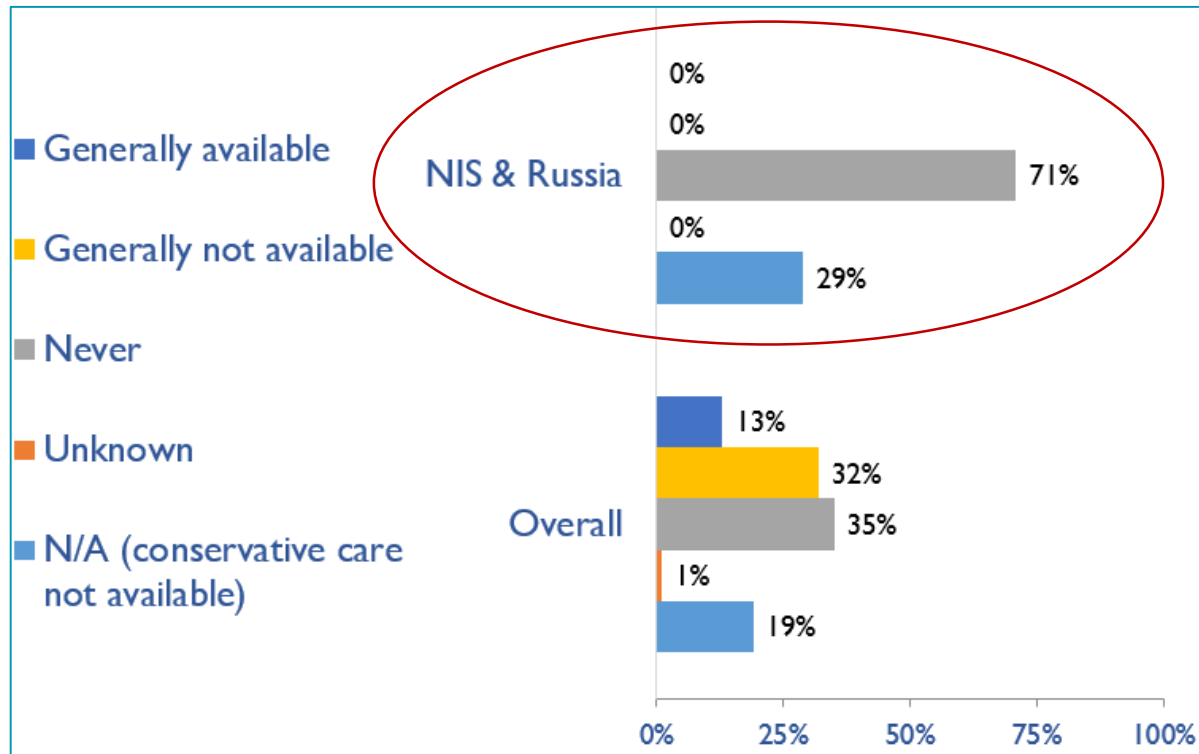


Country	HD frequency a center-based service that involves treatment 3x week/3-4x hours					PD frequency ability to do adequate exchanges 3-4x day (or equivalent cycles on automated PD)				
	Generally available	Generally not available	Never	Unknown	N/A (dialysis not provided)	Generally available	Generally 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

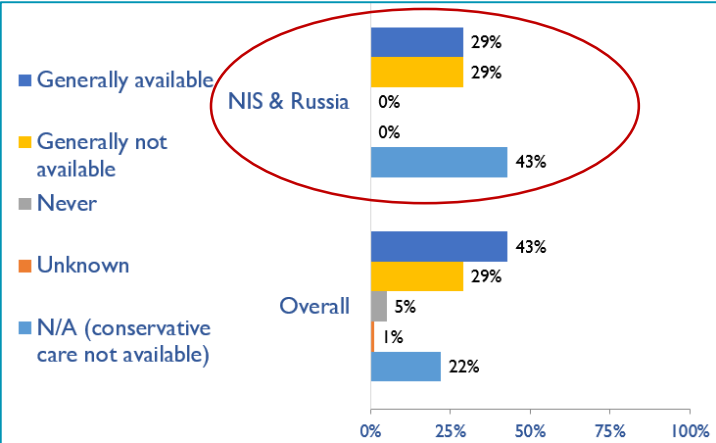


Country	Availability of Home hemodialysis				
	Generally available	Generally not available	Never	Unknown	N/A (dialysis not provided)
Armenia				X	
Azerbaijan			X		
Belarus			X		
Georgia			X		
Kazakhstan			X		
Russian Federation			X		
Tajikistan				X	
Ukraine					
Uzbekistan					

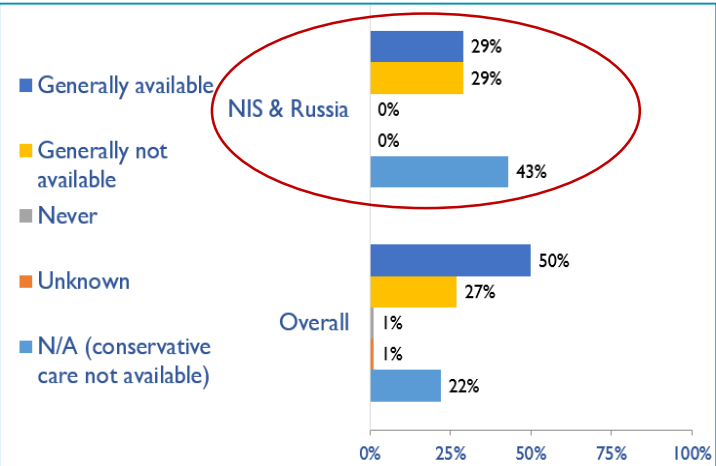
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Yes

# Capacity for conservative kidney management (CKM)

Choice–restricted CKM



Chosen or medically advised CKM

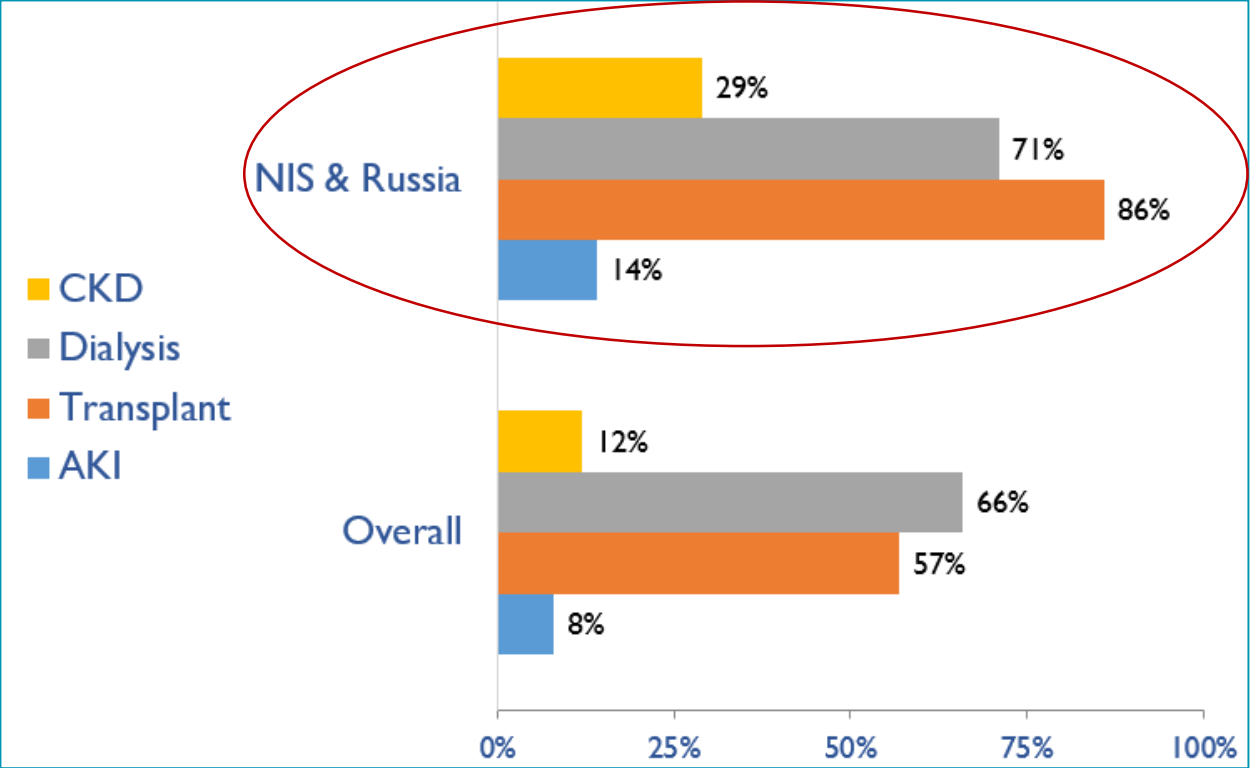


Country	Established choice–restricted conservative care					Established conservative care that is chosen or medically advised				
	Generally available	Generally not available	Never	Unknown	N/A (conservative care not available)	Generally available	Generally not available	Never	Unknown	N/A (conservative 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

# 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

- Increase health care financing for ESKD prevention and management
- Address workforce shortages through multidisciplinary teams and telemedicine
- Incorporate the collection and reporting of quality indicators in ESKD care
- Expand health information systems to prevent and manage ESKD
- Promote ESKD prevention and treatment by implementing policies, strategies, and advocacy, and mitigating barriers

# To access the Atlas report:

[\*www.theisn.org/global-atlas\*](http://www.theisn.org/global-atlas)