SECTION 9

LEADERSHIP AND GOVERNANCE

9.1 Advocacy for kidney care

9.1.1 CKD advocacy

In only 36% of countries, the government recognized CKD as a health priority. More than half of low-income countries (59%) recognized CKD as a health priority, followed by 50% of lower-middle-, 17% of upper-middle-, and 29% of high-income countries. Chronic kidney disease was recognized as a health priority by the governments of less than half of the countries in every ISN region except South Asia (60% of countries did recognize it) and NIS & Russia (50%).

Similarly, 42% of countries reported an advocacy group at higher levels of government or an NGO to raise the profile of CKD and its prevention (Table 9.1). Advocacy groups existed in half of low- (53%) and lower-middle-income countries (50%), and 34% and 37% of upper-middle- and high-income countries, respectively. Advocacy groups were reported in at least half the countries in North America, Oceania & South East Asia, Africa, and NIS & Russia (Table 9.1). No countries (0%) in North & East Asia reported an advocacy group for CKD.

Table 9.1 | Advocacy and support for CKD treatment and prevention
Countries with specified forms of advocacy and support

	Governmental recognition of CKD as a health priority N (%)	Presence of advocacy group for CKD or organization at higher level of government N (%)	National/regional physician-oriented organizations or patient organizations that provide resources for CKD management N (%)
Overall	**42 (36)**	**49 (42)**	**62 (53)**
ISN regions			
Africa	14 (47)	16 (53)	16 (53)
Eastern & Central Europe	2 (13)	3 (19)	9 (56)
Latin America	5 (31)	7 (44)	7 (44)
Middle East	6 (46)	6 (46)	8 (62)
NIS & Russia	3 (50)	3 (50)	3 (50)
North America	0 (0)	2 (100)	2 (100)
North & East Asia	2 (33)	0 (0)	1 (17)
Oceania & South East Asia	4 (31)	8 (62)	9 (69)
South Asia	3 (60)	1 (20)	2 (40)
Western Europe	3 (33)	3 (33)	5 (56)
World Bank income groups			
Low-income	10 (59)	9 (53)	5 (29)
Lower-middle-income	16 (50)	16 (50)	19 (59)
Upper-middle-income	5 (17)	10 (34)	13 (45)
High-income	11 (29)	14 (37)	25 (66)

More than half (53%) of countries had national or regional physician- (or patient-) oriented organizations that provided resources for CKD management. Such organizations provided resources in 66% of high-income countries but did so in less than half of upper-middle- and low-income countries. Organizations for CKD management were found in at least 40% of the countries of each ISN region other than North & East Asia, where only 17% of countries had organizations.

9.1.2 AKI advocacy

Fewer countries had advocacy groups within government for AKI (19%) than for CKD (42%). Advocacy for AKI was more common in lower-income groups: 25% of low- and 32% of lower-middle-income countries reported government advocacy groups for AKI, compared to 18% in upper-middle- and 5% in high-income countries (Table 9.2). Advocacy groups for AKI were found in no more than a third of the countries in any ISN region and were particularly rare in Eastern & Central Europe, the Middle East, North America, North & East Asia, and Western Europe.

Similarly, fewer countries reported a national or regional physician- (or patient-) oriented organization that provided resources for AKI management, compared to CKD: 23% of countries had organizations for AKI, compared to 53% for CKD. Nearly a third of high-income and upper-middle countries had organizations that provided resources for AKI management, compared to 22% of lower-middle and 6% of low-income countries. Organizations for AKI management were found in less than a third of countries in each ISN region other than North America (both countries had an organization), Oceania & South East Asia (46%), and Western Europe (33%). No countries in South Asia had organizations for AKI management.

Table 9.2 | Advocacy and support for AKI treatment and prevention

Countries with specified forms of advocacy and support

	Presence of advocacy group for AKI N (%)	Presence of organizations that provide resources for AKI management N (%)
Overall	**21 (19)**	**27 (23)**
ISN regions		
Africa	9 (32)	7 (23)
Eastern & Central Europe	1 (6)	4 (25)
Latin America	3 (20)	2 (13)
Middle East	1 (8)	1 (8)
NIS & Russia	2 (33)	1 (17)
North America	0 (0)	2 (100)
North & East Asia	0 (0)	1 (17)
Oceania & South East Asia	3 (23)	6 (46)
South Asia	1 (20)	0 (0)
Western Europe	1 (11)	3 (33)
World Bank income groups		
Low-income	4 (25)	1 (6)
Lower-middle-income	10 (32)	7 (22)
Upper-middle-income	5 (18)	8 (28)
High-income	2 (5)	11 (29)

9.2 CKD and non-communicable chronic disease policy and strategy

More than three-quarters of all countries had a policy and strategy for chronic NCDs (Figure 9.1). Fifty-nine per cent of countries had a completed policy, and 18% of countries had one under development. Twenty-three per cent of countries did not have any policies or strategies for chronic NCDs.

Across all income groups, more than half of countries had a policy or strategy for chronic NCDs in place (Figure 9.2).

At least 40% of countries in Eastern & Central Europe, NIS & Russia, South Asia, and Western Europe lacked a national chronic NCD strategy (Table 9.3).

In each of the three major areas of kidney patient care—care of non-dialysis CKD patients, chronic dialysis, and kidney transplantation—at least 45% of countries lacked a national strategy for improvement. Where there was a national strategy for non-dialysis CKD, it was more commonly combined with an overarching NCD strategy (27%), whereas national strategies for chronic dialysis and kidney transplantation were more often stand-alone (43% and 40%, respectively) (Figure 9.3).

High-income countries reported more national strategies targeted specifically toward kidney care, whereas low-income countries reported more strategies incorporated into a general NCD strategy.

In total, of the 81 countries that lacked a national strategy for improving the care of CKD patients, almost half (47%) had a national position paper on CKD care. This was more common in higher-income countries than in lower-income ones. Thirty-two per cent and 35% offered provider incentives for identifying CKD and providing quality care to CKD patients, respectively. Twenty countries (25%) had important regional or state level strategies for CKD care. There was substantial regional variation (Figure 9.4).

Figure 9.1 | Existence of a national strategy for non-communicable chronic diseases

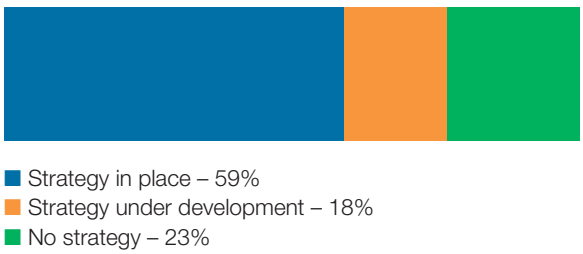


Figure 9.2 | Existence of a national strategy for non-communicable chronic diseases, by World Bank income group

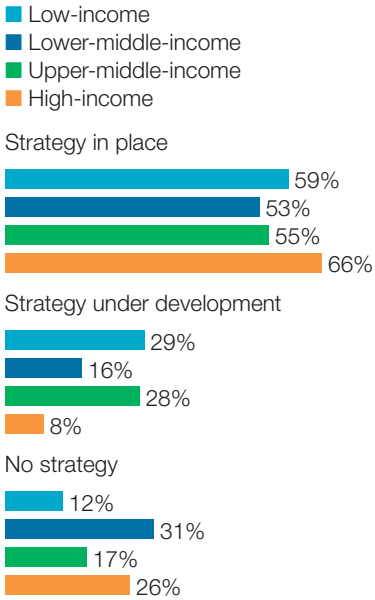


Figure 9.3 | Existence of a national strategy for improving the care of CKD patients

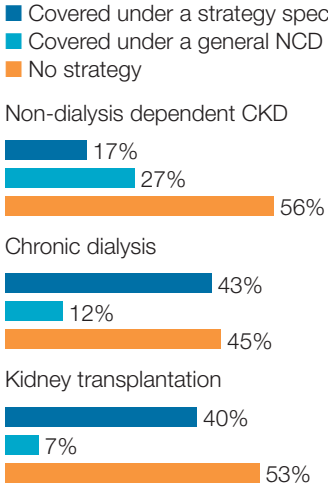
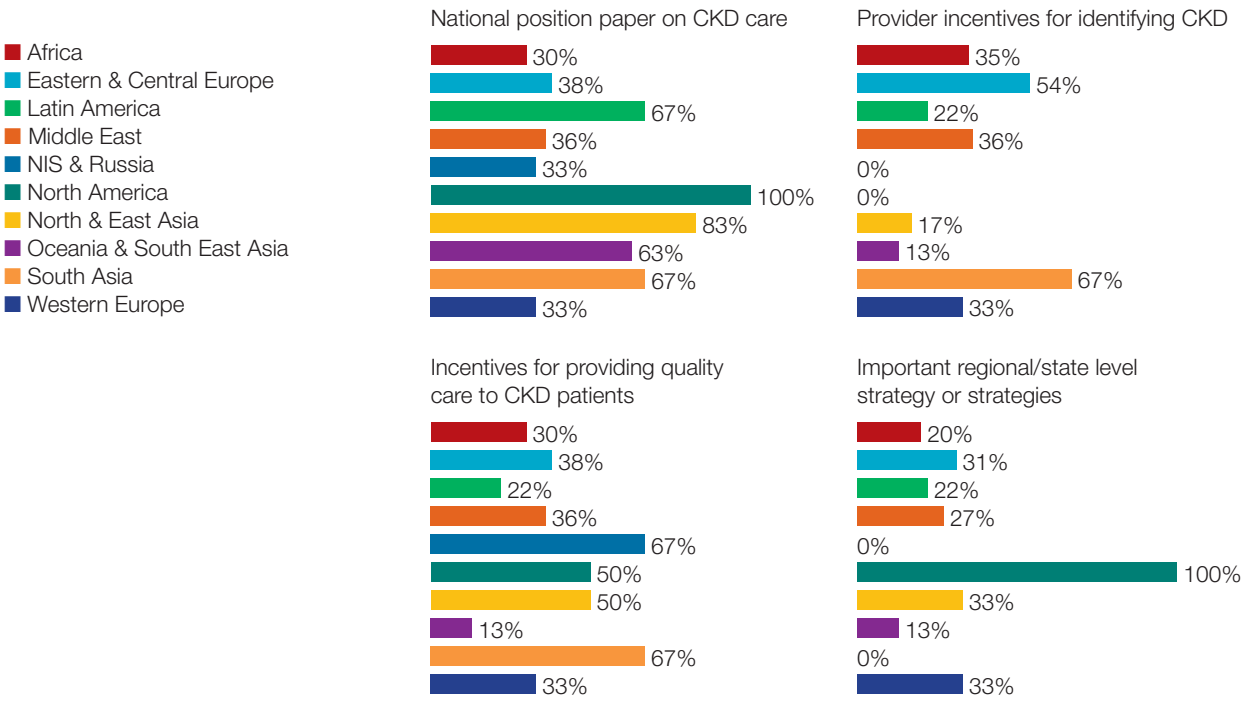


Table 9.3 | Existence of a national strategy for non-communicable chronic diseases

Countries with specified status of implementation

	Strategy in place N (%)	Strategy under development N (%)	No strategy N (%)
Overall	**68 (59)**	**21 (18)**	**27 (23)**
ISN regions			
Africa	18 (60)	9 (30)	3 (10)
Eastern & Central Europe	7 (44)	1 (6)	8 (50)
Latin America	9 (56)	5 (31)	2 (13)
Middle East	6 (46)	4 (31)	3 (23)
NIS & Russia	3 (50)	0 (0)	3 (50)
North America	2 (100)	0 (0)	0 (0)
North & East Asia	6 (100)	0 (0)	0 (0)
Oceania & South East Asia	11 (85)	0 (0)	2 (15)
South Asia	2 (40)	1 (20)	2 (40)
Western Europe	4 (44)	1 (11)	4 (44)
World Bank income groups			
Low-income	10 (59)	5 (29)	2 (12)
Lower-middle-income	17 (53)	5 (16)	10 (31)
Upper-middle-income	16 (55)	8 (28)	5 (17)
High-income	25 (66)	3 (8)	10 (26)

Figure 9.4 | Existence of initiatives for improving the care of CKD patients, by ISN region



9.3 CKD specific policies, guidelines, and/or service frameworks

Twenty one per cent of countries did not have any CKD management and referral guidelines (Figure 9.5; Table 9.4). Half (52%) had access to international guidelines, and 27% to national guidelines. One country had major regional guidelines. Over half (53%) of low-income countries did not have any management and referral guidelines for CKD, compared to 28% of lower-middle-, 17% of upper-middle-, and 3% of high-income countries (Figure 9.5; Table 9.4).

More than 80% of countries that had guidelines included identification of CKD progression, timing and urgency for nephrology referral, risk factor management, and management of complications. More than 70% of countries with guidelines covered a multidisciplinary care approach (Figure 9.6; Table 9.5).

Figure 9.5 | Availability of CKD management and referral guidelines, by World Bank income group

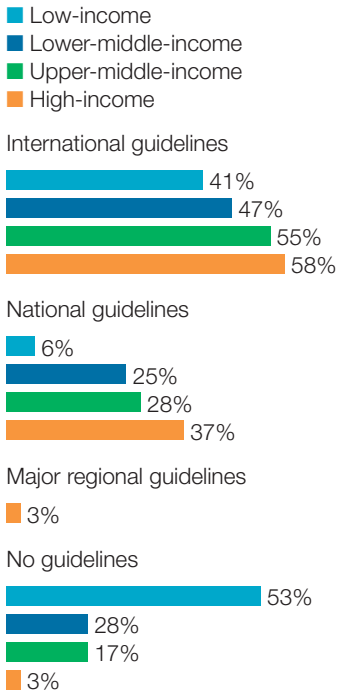


Table 9.4 | Availability of CKD management and referral guidelines

	International guidelines N (%)	National guidelines N (%)	Regional guidelines N (%)	No guidelines N (%)
Overall	**60 (52)**	**31 (27)**	**1 (1)**	**24 (21)**
ISN regions				
Africa	13 (43)	4 (13)	0 (0)	13 (43)
Eastern & Central Europe	13 (81)	2 (13)	0 (0)	1 (6)
Latin America	7 (44)	9 (56)	0 (0)	0 (0)
Middle East	8 (62)	1 (8)	1 (8)	3 (23)
NIS & Russia	5 (83)	1 (17)	0 (0)	0 (0)
North America	1 (50)	1 (50)	0 (0)	0 (0)
North & East Asia	3 (50)	3 (50)	0 (0)	0 (0)
Oceania & South East Asia	2 (15)	6 (46)	0 (0)	5 (38)
South Asia	3 (60)	0 (0)	0 (0)	2 (40)
Western Europe	5 (56)	4 (44)	0 (0)	0 (0)
World Bank income groups				
Low-income	7 (41)	1 (6)	0 (0)	9 (53)
Lower-middle-income	15 (47)	8 (25)	0 (0)	9 (28)
Upper-middle-income	16 (55)	8 (28)	0 (0)	5 (17)
High-income	22 (58)	14 (37)	1 (3)	1 (3)

Percentages do not total 100 due to rounding.

Figure 9.6 | Topics covered in CKD guidelines

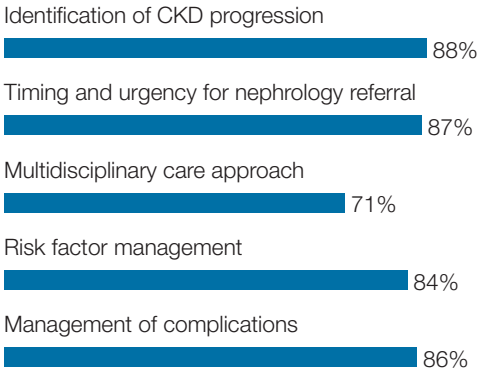
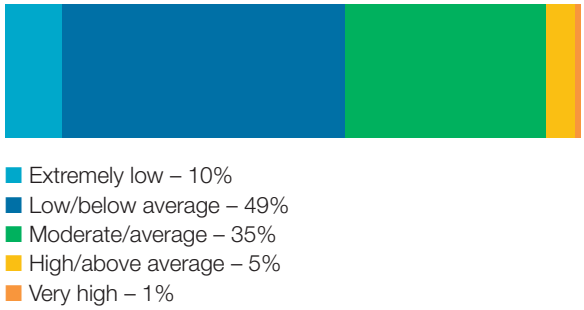


Figure 9.7 | Awareness of CKD guidelines among non-nephrologist physicians



The inclusion of identification of CKD progression, and timing and urgency for nephrology referral increased uniformly with income level (Table 9.5).

Nearly half (49%) of countries reported that the awareness of CKD guidelines among non-nephrologist physicians was low/below average (Figure 9.7; Table 9.6). Ten per cent reported extremely low awareness, and 35% reported moderate/average awareness. Five per cent reported high/above average awareness. One country reported very high awareness.

Low- and lower-middle-income countries reported generally poorer awareness among non-nephrologist physicians compared to upper-middle- and high-income countries (Figure 9.8; Table 9.6).

Most countries, irrespective of ISN region, rated awareness of CKD guidelines among non-

Table 9.5 | Coverage of CKD management and referral guidelines

Countries having guidelines covering the specified aspect of care

	Identification of CKD progression N (%)	Timing and urgency for nephrology referral N (%)	Multidisciplinary care approach N (%)	Risk factor management N (%)	Management of complications N (%)
Overall	**81 (88)**	**80 (87)**	**65 (71)**	**77 (84)**	**79 (86)**
ISN regions					
Africa	13 (76)	11 (65)	12 (71)	11 (65)	14 (82)
Eastern & Central Europe	15 (100)	15 (100)	8 (53)	13 (87)	13 (87)
Latin America	13 (81)	15 (94)	12 (75)	14 (88)	13 (81)
Middle East	7 (70)	7 (70)	7 (70)	6 (60)	8 (80)
NIS & Russia	6 (100)	6 (100)	2 (33)	6 (100)	5 (83)
North America	2 (100)	2 (100)	2 (100)	2 (100)	2 (100)
North & East Asia	6 (100)	6 (100)	6 (100)	6 (100)	5 (83)
Oceania & South East Asia	8 (100)	7 (88)	8 (100)	8 (100)	7 (88)
South Asia	3 (100)	2 (67)	1 (33)	2 (67)	3 (100)
Western Europe	8 (89)	9 (100)	7 (78)	9 (100)	9 (100)
World Bank income groups					
Low-income	6 (75)	4 (50)	7 (88)	6 (75)	7 (88)
Lower-middle-income	19 (83)	19 (83)	11 (48)	17 (74)	17 (74)
Upper-middle-income	21 (88)	21 (88)	18 (75)	20 (83)	20 (83)
High-income	35 (95)	36 (97)	29 (78)	34 (92)	35 (95)

Percentages are calculated relative to the corresponding countries that have CKD guidelines available.

nephrologist physicians as low or moderate (Table 9.6).

Similarly, adoption of CKD guidelines was quite low among non-nephrologist physicians (Figure 9.9; Table 9.6). Almost half (46%) of countries reported low/below average adoption, and 20% reported extremely low adoption. No countries reported very high adoption among non-nephrologist physicians.

Table 9.6 | Awareness and adoption of CKD guidelines among non-nephrologist physicians
Countries with specified ratings

	Extremely low N (%)	Low/below average N (%)	Moderate/ average N (%)	High/above average N (%)	Very high N (%)
AWARENESS OF CKD GUIDELINES					
Overall	**9 (10)**	**45 (49)**	**32 (35)**	**5 (5)**	**1 (1)**
ISN regions					
Africa	2 (12)	11 (65)	3 (18)	1 (6)	0 (0)
Eastern & Central Europe	2 (13)	5 (33)	7 (47)	1 (7)	0 (0)
Latin America	2 (13)	8 (50)	6 (38)	0 (0)	0 (0)
Middle East	2 (20)	3 (30)	4 (40)	1 (10)	0 (0)
NIS & Russia	0 (0)	4 (67)	2 (33)	0 (0)	0 (0)
North America	0 (0)	1 (50)	0 (0)	1 (50)	0 (0)
North & East Asia	0 (0)	4 (67)	2 (33)	0 (0)	0 (0)
Oceania & South East Asia	1 (13)	3 (38)	3 (38)	1 (13)	0 (0)
South Asia	0 (0)	2 (67)	1 (33)	0 (0)	0 (0)
Western Europe	0 (0)	4 (44)	4 (44)	0 (0)	1 (11)
World Bank income groups					
Low-income	2 (25)	5 (63)	0 (0)	1 (13)	0 (0)
Lower-middle-income	4 (17)	13 (57)	5 (22)	1 (4)	0 (0)
Upper-middle-income	3 (13)	10 (42)	10 (42)	1 (4)	0 (0)
High-income	0 (0)	17 (46)	17 (46)	2 (5)	1 (3)
ADOPTION OF CKD GUIDELINES					
Overall	**18 (20)**	**42 (46)**	**25 (27)**	**6 (7)**	**0 (0)**
ISN regions					
Africa	6 (38)	7 (44)	2 (13)	1 (6)	0 (0)
Eastern & Central Europe	1 (7)	8 (53)	5 (33)	1 (7)	0 (0)
Latin America	3 (19)	8 (50)	5 (31)	0 (0)	0 (0)
Middle East	4 (40)	2 (20)	3 (30)	1 (10)	0 (0)
NIS & Russia	1 (17)	3 (50)	2 (33)	0 (0)	0 (0)
North America	0 (0)	2 (100)	0 (0)	0 (0)	0 (0)
North & East Asia	1 (17)	4 (67)	1 (17)	0 (0)	0 (0)
Oceania & South East Asia	0 (0)	4 (50)	2 (25)	2 (25)	0 (0)
South Asia	1 (33)	1 (33)	1 (33)	0 (0)	0 (0)
Western Europe	1 (11)	3 (33)	4 (44)	1 (11)	0 (0)
World Bank income groups					
Low-income	3 (38)	4 (50)	0 (0)	1 (13)	0 (0)
Lower-middle-income	8 (36)	9 (41)	4 (18)	1 (5)	0 (0)
Upper-middle-income	5 (21)	11 (46)	7 (29)	1 (4)	0 (0)
High-income	2 (5)	18 (49)	14 (38)	3 (8)	0 (0)

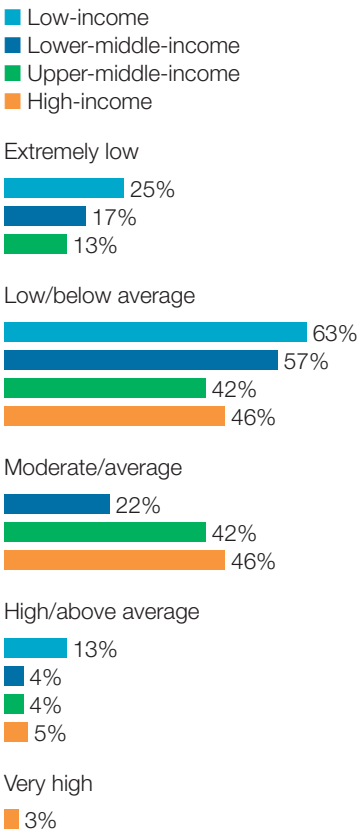
Percentages are calculated relative to the corresponding countries that have CKD guidelines available.

Low- and lower-middle-income countries reported generally poorer adoption of CKD guidelines among non-nephrologist physicians compared to upper-middle- and high-income countries (Figure 9.10; Table 9.6).

While awareness of CKD guidelines was generally low or moderate among non-nephrologist physicians, countries reported a high level of awareness among nephrologists (Figure 9.11). Nearly three-quarters (74%) of countries reported that the awareness among nephrologists was very high or high/above average.

The majority of countries, regardless of income level, rated CKD guideline awareness among nephrologists as high (Figure 9.12). In most ISN regions, at least half the countries rated awareness of CKD guidelines among nephrologists as high; however, ratings were slightly lower in NIS & Russia and South Asia (Table 9.7).

Figure 9.8 | Awareness of CKD guidelines among non-nephrologist physicians, by World Bank income group



More than half (56%) of all countries rated adoption of CKD guidelines by nephrologists as very high or high/above average (Figure 9.13).

Similarly, in every income group, the majority of countries rated CKD guideline adoption among nephrologists as moderate or high (Figure 9.14; Table 9.7). In every ISN region, a large majority of countries rated adoption of CKD guidelines among nephrologists as at least moderate (Table 9.7).

Figure 9.9 | Adoption of CKD guidelines among non-nephrologist physicians

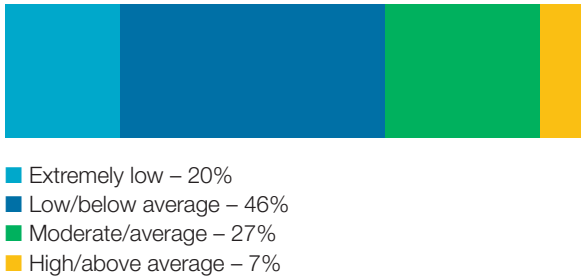


Figure 9.10 | Adoption of CKD guidelines among non-nephrologist physicians, by World Bank income group

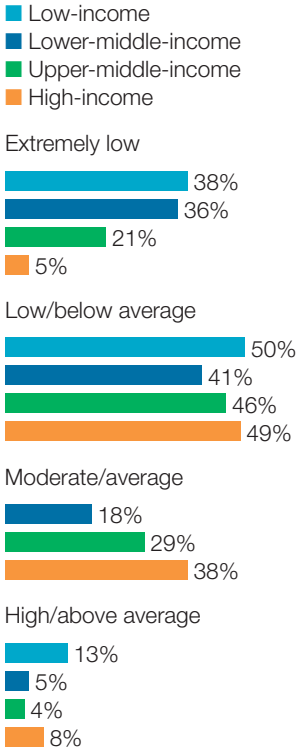


Figure 9.11 | Awareness of CKD guidelines among nephrologists

- Extremely low – 2%
- Low/below average – 2%
- Moderate/average – 22%
- High/above average – 56%
- Very high – 18%

Figure 9.12 | Awareness of CKD guidelines among nephrologists, by World Bank income group

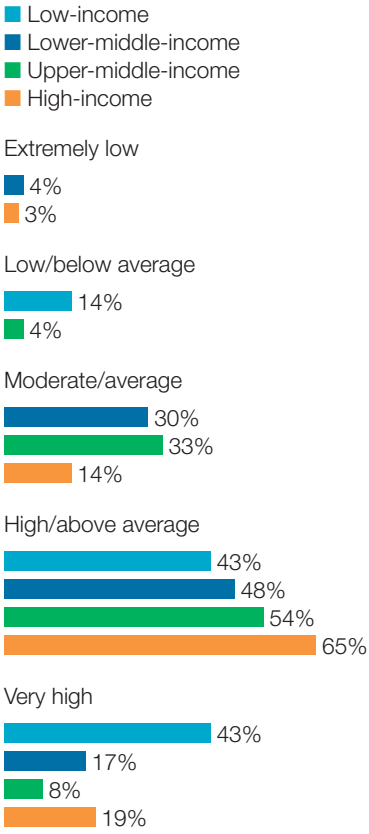


Figure 9.13 | Adoption of CKD guidelines among nephrologists

- Low/below average – 5%
- Moderate/average – 39%
- High/above average – 47%
- Very high – 9%

Figure 9.14 | Adoption of CKD guidelines among nephrologists, by World Bank income group

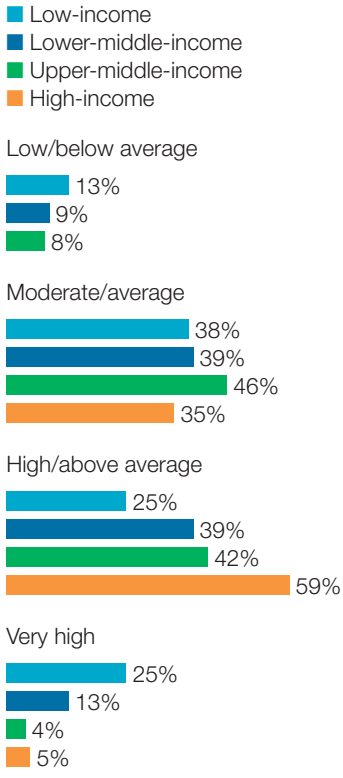


Table 9.7 | Awareness and adoption of CKD guidelines guidelines among nephrologists

Countries with specified ratings

	Extremely low N (%)	Low/below average N (%)	Moderate/ average N (%)	High/above average N (%)	Very high N (%)
AWARENESS OF CKD GUIDELINES					
Overall	**2 (2)**	**2 (2)**	**20 (22)**	**51 (56)**	**16 (18)**
ISN regions					
Africa	1 (6)	1 (6)	2 (13)	8 (50)	4 (25)
Eastern & Central Europe	0 (0)	0 (0)	3 (20)	11 (73)	1 (7)
Latin America	0 (0)	1 (6)	6 (38)	6 (38)	3 (19)
Middle East	1 (10)	0 (0)	1 (10)	7 (70)	1 (10)
NIS & Russia	0 (0)	0 (0)	3 (50)	3 (50)	0 (0)
North America	0 (0)	0 (0)	0 (0)	1 (50)	1 (50)
North & East Asia	0 (0)	0 (0)	1 (17)	4 (67)	1 (17)
Oceania & South East Asia	0 (0)	0 (0)	0 (0)	4 (50)	4 (50)
South Asia	0 (0)	0 (0)	2 (67)	1 (33)	0 (0)
Western Europe	0 (0)	0 (0)	2 (22)	6 (67)	1 (11)
World Bank income groups					
Low-income	0 (0)	1 (14)	0 (0)	3 (43)	3 (43)
Lower-middle-income	1 (4)	0 (0)	7 (30)	11 (48)	4 (17)
Upper-middle-income	0 (0)	1 (4)	8 (33)	13 (54)	2 (8)
High-income	1 (3)	0 (0)	5 (14)	24 (65)	7 (19)
ADOPTION OF CKD GUIDELINES					
Overall	**0 (0)**	**5 (5)**	**36 (39)**	**43 (47)**	**8 (9)**
ISN regions					
Africa	0 (0)	3 (18)	5 (29)	6 (35)	3 (18)
Eastern & Central Europe	0 (0)	1 (7)	4 (27)	10 (67)	0 (0)
Latin America	0 (0)	1 (6)	7 (44)	5 (31)	3 (19)
Middle East	0 (0)	0 (0)	5 (50)	4 (40)	1 (10)
NIS & Russia	0 (0)	0 (0)	3 (50)	3 (50)	0 (0)
North America	0 (0)	0 (0)	1 (50)	1 (50)	0 (0)
North & East Asia	0 (0)	0 (0)	4 (67)	2 (33)	0 (0)
Oceania & South East Asia	0 (0)	0 (0)	1 (13)	7 (88)	0 (0)
South Asia	0 (0)	0 (0)	2 (67)	1 (33)	0 (0)
Western Europe	0 (0)	0 (0)	4 (44)	4 (44)	1 (11)
World Bank income groups					
Low-income	0 (0)	1 (13)	3 (38)	2 (25)	2 (25)
Lower-middle-income	0 (0)	2 (9)	9 (39)	9 (39)	3 (13)
Upper-middle-income	0 (0)	2 (8)	11 (46)	10 (42)	1 (4)
High-income	0 (0)	0 (0)	13 (35)	22 (59)	2 (5)

Percentages are calculated relative to the corresponding countries that have CKD guidelines available.

9.4 AKI specific policy and strategy

Nearly half (49%) of countries had a strategy for improving the identification of AKI (Table 9.8). Nineteen per cent of countries rated adoption of countries had a national position paper on AKI identification and care. Thirty-two per cent of countries had tools available for the identification of AKI, and 12% offered incentives for providing quality care to AKI patients. Ten per cent had an important regional/state level strategy or strategies. Thirty-one per cent of countries had incentives to increase access to acute dialysis facilities. Half (51%) of countries had no strategies for AKI care. Eleven per cent of countries had another type of initiative that identified AKI as an important healthcare priority in their country.

Most countries in Africa (60%), Eastern & Central Europe (56%), Latin America (63%), NIS & Russia (67%), and Western Europe (56%) had no strategy for improving the identification of AKI (Table 9.8). Except in North & East Asia, a minority of countries had a national position paper on AKI identification and care. Both countries in North America had at least one form of strategy for AKI, mainly tools, regional strategies, or other.

Nearly half (47%) of countries did not have any AKI management and referral guidelines (Figure 9.15; Table 9.9). Forty-five per cent had international guidelines, and 7% had national guidelines. One country had major regional guidelines.

Over 75% of low-income countries did not have any management and referral guidelines for AKI (Figure 9.15). Of countries that had access to guidelines, the majority were international guidelines. Availability of guidelines increased with income level (Figure 9.15). Very few countries had national or major regional guidelines for AKI.

Table 9.8 | Availability of strategies for improving the identification of AKI
Countries using specified strategies

	National position paper on AKI identification and care N (%)	Tools available for identification of AKI N (%)	Incentives for providing quality care to AKI patients N (%)	Important regional/state level strategy or strategies N (%)	Increasing access to acute dialysis facilities N (%)	No strategies exist for AKI N (%)	Other N (%)
Overall	**19 (16)**	**37 (32)**	**14 (12)**	**12 (10)**	**36 (31)**	**59 (51)**	**13 (11)**
ISN regions							
Africa	3 (10)	8 (27)	1 (3)	2 (7)	7 (23)	18 (60)	2 (7)
Eastern & Central Europe	1 (6)	5 (31)	4 (25)	2 (13)	5 (31)	9 (56)	0 (0)
Latin America	4 (25)	3 (19)	0 (0)	1 (6)	4 (25)	10 (63)	2 (13)
Middle East	2 (15)	4 (31)	2 (15)	0 (0)	6 (46)	6 (46)	0 (0)
NIS & Russia	1 (17)	2 (33)	1 (17)	0 (0)	2 (33)	4 (67)	0 (0)
North America	0 (0)	1 (50)	0 (0)	1 (50)	0 (0)	0 (0)	1 (50)
North & East Asia	3 (50)	2 (33)	2 (33)	0 (0)	1 (17)	2 (33)	1 (17)
Oceania & South East Asia	2 (15)	6 (46)	1 (8)	3 (23)	8 (62)	4 (31)	3 (23)
South Asia	0 (0)	3 (60)	2 (40)	2 (40)	2 (40)	1 (20)	2 (40)
Western Europe	3 (33)	3 (33)	1 (11)	1 (11)	1 (11)	5 (56)	2 (22)
World Bank income groups							
Low-income	0 (0)	5 (29)	1 (6)	2 (12)	2 (12)	11 (65)	1 (6)
Lower-middle-income	4 (13)	9 (28)	4 (13)	3 (9)	11 (34)	16 (50)	3 (9)
Upper-middle-income	6 (21)	10 (34)	3 (10)	3 (10)	14 (48)	15 (52)	5 (17)
High-income	9 (24)	13 (34)	6 (16)	4 (11)	9 (24)	17 (45)	4 (11)

Percentages are calculated relative to the corresponding number of countries.

Figure 9.15 | Availability of AKI management and referral guidelines

In every ISN region and every income group, any guidelines for managing and referring AKI were most commonly international. Very few countries reported the use of national or regional guidelines (Table 9.9). The majority of countries in Africa, the Middle East, North & East Asia, Oceania & South East Asia, and South Asia reported no guidelines for AKI.

Figure 9.16 | Topics covered in AKI guidelines

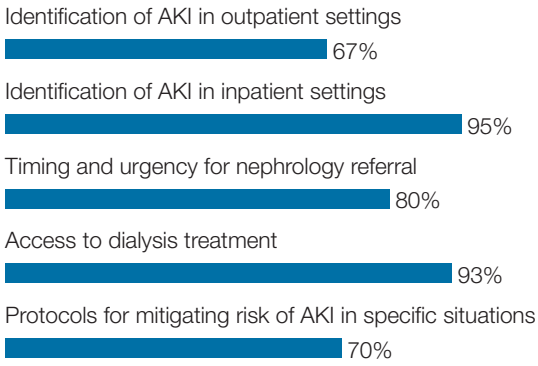


Table 9.9 | Availability of AKI management and referral guidelines

Countries having guidelines of the specified level

	International guidelines N (%)	National guidelines N (%)	Regional guidelines N (%)	No guidelines N (%)
Overall	**52 (45)**	**8 (7)**	**1 (1)**	**55 (47)**
ISN regions				
Africa	8 (27)	2 (7)	0 (0)	20 (67)
Eastern & Central Europe	15 (94)	0 (0)	0 (0)	1 (6)
Latin America	7 (44)	1 (6)	0 (0)	8 (50)
Middle East	5 (38)	0 (0)	0 (0)	8 (62)
NIS & Russia	3 (50)	2 (33)	0 (0)	1 (17)
North America	2 (100)	0 (0)	0 (0)	0 (0)
North & East Asia	2 (33)	0 (0)	0 (0)	4 (67)
Oceania & South East Asia	3 (23)	2 (15)	1 (8)	7 (54)
South Asia	1 (20)	0 (0)	0 (0)	4 (80)
Western Europe	6 (67)	1 (11)	0 (0)	2 (22)
World Bank income groups				
Low-income	4 (24)	0 (0)	0 (0)	13 (76)
Lower-middle-income	11 (34)	5 (16)	0 (0)	16 (50)
Upper-middle-income	13 (45)	1 (3)	1 (3)	14 (48)
High-income	24 (63)	2 (5)	0 (0)	12 (32)

Nearly all of the 62 countries with AKI guidelines covered the identification of AKI in inpatient settings (95%), and access to dialysis treatment (93%) (Figure 9.16; Table 9.10). Eighty per cent covered timing and urgency for nephrology referral, and 70% included protocols for mitigating risk of AKI in specific situations. Two-thirds (67%) covered the identification of AKI in outpatient settings.

More than half (56%) of countries reported that the awareness of AKI guidelines among non-nephrologist physicians was extremely low or low/below average (Figure 9.17; Table 9.11).

Low- and lower-middle-income countries reported generally poorer awareness among non-nephrologist physicians compared to upper-middle- and high-income countries (Figure 9.18; Table 9.11).

Similarly to CKD guidelines, the adoption of AKI guidelines was quite low among non-nephrologist physicians (Figure 9.19; Table 9.11). Almost two-thirds (65%) of countries reported adoption as extremely low or low/below average.

Most countries, regardless of income level, rated the adoption of AKI guidelines among non-nephrologist physicians as low or moderate (Figure 9.20; Table 9.11). Lower-income countries had lower ratings than those at other income levels.

Adoption of AKI guidelines among non-nephrologist physicians was similar across ISN regions (Table 9.11). More countries in Africa, Latin America, and the Middle East had ratings of extremely low than in other ISN regions.

Table 9.10 | Coverage of AKI management and referral guidelines
Countries having guidelines covering the specified aspect of care

	Identification of AKI in outpatient settings N (%)	Identification of AKI in inpatient settings N (%)	Timing and urgency for nephrology referral N (%)	Access to dialysis treatment N (%)	Protocols for mitigating risk of AKI in specific situations N (%)
Overall	**40 (67)**	**57 (95)**	**48 (80)**	**56 (93)**	**42 (70)**
ISN regions					
Africa	3 (33)	9 (100)	7 (78)	9 (100)	7 (78)
Eastern & Central Europe	10 (67)	14 (93)	13 (87)	14 (93)	9 (60)
Latin America	8 (100)	8 (100)	8 (100)	8 (100)	8 (100)
Middle East	4 (80)	5 (100)	4 (80)	5 (100)	3 (60)
NIS & Russia	1 (20)	4 (80)	3 (60)	5 (100)	2 (40)
North America	1 (50)	2 (100)	0 (0)	1 (50)	2 (100)
North & East Asia	2 (100)	2 (100)	2 (100)	2 (100)	1 (50)
Oceania & South East Asia	4 (67)	6 (100)	6 (100)	5 (83)	4 (67)
South Asia	1 (100)	0 (0)	0 (0)	1 (100)	0 (0)
Western Europe	6 (86)	7 (100)	5 (71)	6 (86)	6 (86)
World Bank income groups					
Low-income	2 (50)	4 (100)	3 (75)	4 (100)	3 (75)
Lower-middle-income	6 (40)	13 (87)	10 (67)	14 (93)	9 (60)
Upper-middle-income	12 (80)	14 (93)	14 (93)	15 (100)	9 (60)
High-income	20 (77)	26 (100)	21 (81)	23 (88)	21 (81)

Percentages are calculated relative to the corresponding countries that have AKI guidelines available.

Table 9.11 | Awareness and adoption of AKI guidelines among non-nephrologist physicians

Countries with specified ratings

	Extremely low N (%)	Low/below average N (%)	Moderate/ average N (%)	High/above average N (%)	Very high N (%)
AWARENESS OF AKI GUIDELINES					
Overall	**8 (13)**	**26 (43)**	**21 (34)**	**5 (8)**	**1 (2)**
ISN regions					
Africa	2 (20)	6 (60)	1 (10)	1 (10)	0 (0)
Eastern & Central Europe	2 (13)	7 (47)	5 (33)	1 (7)	0 (0)
Latin America	1 (13)	4 (50)	3 (38)	0 (0)	0 (0)
Middle East	1 (20)	1 (20)	2 (40)	1 (20)	0 (0)
NIS & Russia	1 (20)	1 (20)	3 (60)	0 (0)	0 (0)
North America	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)
North & East Asia	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)
Oceania & South East Asia	1 (17)	3 (50)	1 (17)	1 (17)	0 (0)
South Asia	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)
Western Europe	0 (0)	2 (29)	4 (57)	1 (14)	0 (0)
World Bank income groups					
Low-income	1 (25)	3 (75)	0 (0)	0 (0)	0 (0)
Lower-middle-income	5 (31)	4 (25)	4 (25)	2 (13)	1 (6)
Upper-middle-income	2 (13)	6 (40)	7 (47)	0 (0)	0 (0)
High-income	0 (0)	13 (50)	10 (38)	3 (12)	0 (0)
ADOPTION OF AKI GUIDELINES					
Overall	**10 (17)**	**29 (48)**	**17 (28)**	**4 (7)**	**0 (0)**
ISN regions					
Africa	3 (33)	6 (67)	0 (0)	0 (0)	0 (0)
Eastern & Central Europe	1 (7)	9 (60)	3 (20)	2 (13)	0 (0)
Latin America	3 (38)	4 (50)	1 (13)	0 (0)	0 (0)
Middle East	2 (40)	1 (20)	1 (20)	1 (20)	0 (0)
NIS & Russia	0 (0)	3 (60)	2 (40)	0 (0)	0 (0)
North America	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)
North & East Asia	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)
Oceania & South East Asia	1 (17)	2 (33)	2 (33)	1 (17)	0 (0)
South Asia	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)
Western Europe	0 (0)	2 (29)	5 (71)	0 (0)	0 (0)
World Bank income groups					
Low-income	1 (25)	3 (75)	0 (0)	0 (0)	0 (0)
Lower-middle-income	5 (33)	6 (40)	3 (20)	1 (7)	0 (0)
Upper-middle-income	2 (13)	7 (47)	5 (33)	1 (7)	0 (0)
High-income	2 (8)	13 (50)	9 (35)	2 (8)	0 (0)

Percentages are calculated relative to the corresponding countries that have AKI guidelines available.

As with CKD guidelines, countries reported a high level of awareness of AKI guidelines among nephrologists (Figure 9.21; Table 9.12). More than two-thirds (68%) of countries reported that the awareness among nephrologists was very high or high/above average.

Notably, a higher proportion of low- and lower-middle-income countries rated awareness as high or very high, compared to upper-middle- and high-income countries (Figure 9.22; Table 9.12).

More than half (57%) of countries reported that adoption of AKI guidelines by nephrologists was

Figure 9.17 | Awareness of AKI guidelines among non-nephrologist physicians

- Extremely low – 13%
- Low/below average – 43%
- Moderate/average – 34%
- High/above average – 8%
- Very high – 2%

Figure 9.18 | Awareness of AKI guidelines among non-nephrologist physicians, by World Bank income group

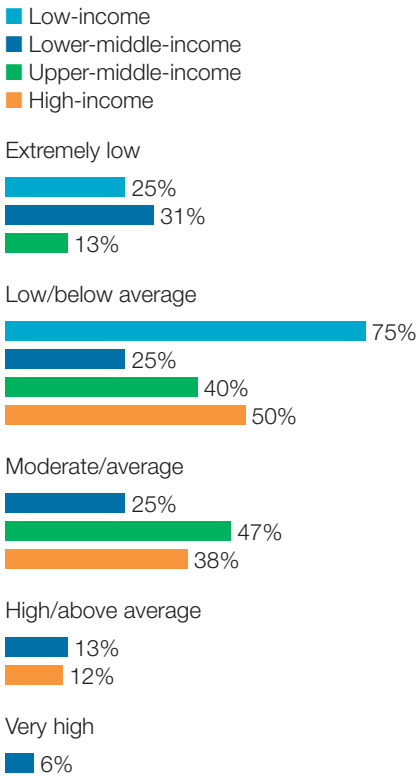
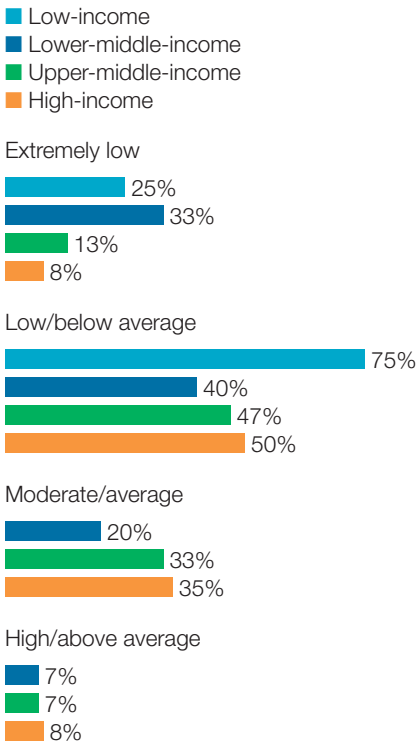


Figure 9.19 | Adoption of AKI guidelines among non-nephrologist physicians

- Extremely low – 17%
- Low/below average – 48%
- Moderate average – 28%
- High/above average – 7%

Figure 9.20 | Adoption of AKI guidelines among non-nephrologist physicians, by World Bank income group



very high or high/above average (Figure 9.23; Table 9.12).

Similarly, the majority of countries, irrespective of income group, rated adoption of AKI guidelines among nephrologists as moderate or high (Figure 9.24; Table 9.12). A greater proportion of low-income countries rated adoption as high or very high than in other income groups, which were split between moderate and high awareness (Figure 9.24; Table 9.12).

Figure 9.21 | Awareness of AKI guidelines among nephrologists

- Low/below average – 3%
- Moderate average – 28%
- High/above average – 56%
- Very high – 13%

Figure 9.22 | Awareness of AKI guidelines among nephrologists, by World Bank income group

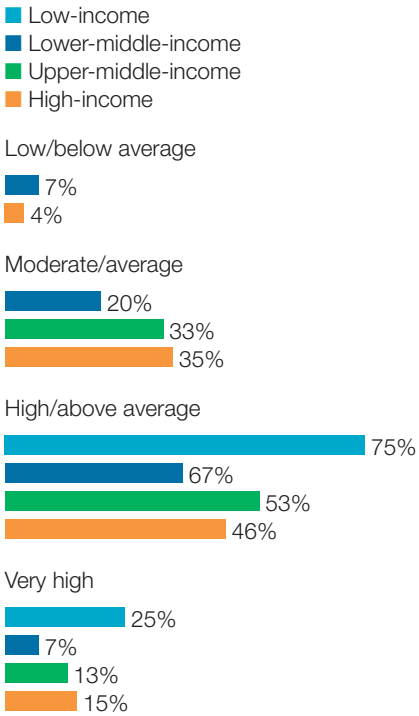


Figure 9.23 | Adoption of AKI guidelines among nephrologists

- Low/below average – 2%
- Moderate/average – 41%
- High/above average – 46%
- Very high – 11%

Figure 9.24 | Adoption of AKI guidelines among nephrologists, by World Bank income group

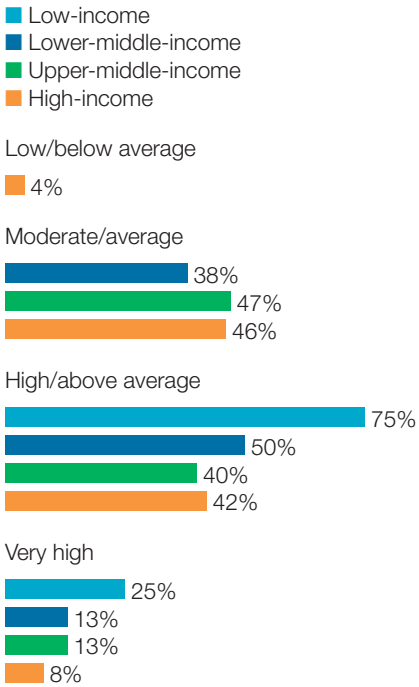


Table 9.12 | Awareness and adoption of AKI guidelines among nephrologists

Countries with specified ratings

	Extremely low N (%)	Low/below average N (%)	Moderate/ average N (%)	High/above average N (%)	Very high N (%)
AWARENESS OF AKI GUIDELINES					
Overall	**0 (0)**	**2 (3)**	**17 (28)**	**33 (55)**	**8 (13)**
ISN regions					
Africa	0 (0)	0 (0)	1 (11)	7 (78)	1 (11)
Eastern & Central Europe	0 (0)	0 (0)	3 (20)	9 (60)	3 (20)
Latin America	0 (0)	1 (13)	4 (50)	2 (25)	1 (13)
Middle East	0 (0)	0 (0)	2 (40)	3 (60)	0 (0)
NIS & Russia	0 (0)	1 (20)	2 (40)	2 (40)	0 (0)
North America	0 (0)	0 (0)	1 (50)	0 (0)	1 (50)
North & East Asia	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)
Oceania & South East Asia	0 (0)	0 (0)	0 (0)	5 (83)	1 (17)
South Asia	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)
Western Europe	0 (0)	0 (0)	1 (14)	5 (71)	1 (14)
World Bank income groups					
Low-income	0 (0)	0 (0)	0 (0)	3 (75)	1 (25)
Lower-middle-income	0 (0)	1 (7)	3 (20)	10 (67)	1 (7)
Upper-middle-income	0 (0)	0 (0)	5 (33)	8 (53)	2 (13)
High-income	0 (0)	1 (4)	9 (35)	12 (46)	4 (15)
ADOPTION OF AKI GUIDELINES					
Overall	**0 (0)**	**1 (2)**	**25 (41)**	**28 (46)**	**7 (11)**
ISN regions					
Africa	0 (0)	0 (0)	1 (10)	7 (70)	2 (20)
Eastern & Central Europe	0 (0)	0 (0)	6 (40)	7 (47)	2 (13)
Latin America	0 (0)	0 (0)	5 (63)	2 (25)	1 (13)
Middle East	0 (0)	1 (20)	2 (40)	2 (40)	0 (0)
NIS & Russia	0 (0)	0 (0)	3 (60)	2 (40)	0 (0)
North America	0 (0)	0 (0)	1 (50)	0 (0)	1 (50)
North & East Asia	0 (0)	0 (0)	2 (100)	0 (0)	0 (0)
Oceania & South East Asia	0 (0)	0 (0)	1 (17)	4 (67)	1 (17)
South Asia	0 (0)	0 (0)	1 (100)	0 (0)	0 (0)
Western Europe	0 (0)	0 (0)	3 (43)	4 (57)	0 (0)
World Bank income groups					
Low-income	0 (0)	0 (0)	0 (0)	3 (75)	1 (25)
Lower-middle-income	0 (0)	0 (0)	6 (38)	8 (50)	2 (13)
Upper-middle-income	0 (0)	0 (0)	7 (47)	6 (40)	2 (13)
High-income	0 (0)	1 (4)	12 (46)	11 (42)	2 (8)

Percentages are calculated relative to the corresponding countries that have AKI guidelines available.

SECTION 10

ASSESSING RESPONSE OF THE NEPHROLOGY COMMUNITY

10.1 Kidney disease awareness

Overall, non-nephrologist specialists were reported to have comparable levels of awareness of CKD and of AKI. Most countries rated their awareness as low/below average or moderate/average (Figure 10.1).

Likewise, the levels of awareness of CKD and of AKI among PCPs were comparable (Figure 10.2).

10.1.1 Awareness of CKD

Non-nephrologist specialists

Almost half of countries (48%) rated CKD awareness among non-nephrologist specialists as moderate/average, and another 42% rated it extremely low or low/below average (Figure 10.1).

Irrespective of ISN region, most countries rated the awareness of CKD among non-nephrologist specialists as moderate or low. Slightly higher proportions of countries in lower income groups rated awareness as low, and a higher proportion of high-income countries rated awareness as moderate (Figure 10.3). Extremely low levels of awareness were reported by a total of five countries, which were in Latin America, the Middle East, and NIS & Russia.

Figure 10.1 | Awareness of CKD and AKI among non-nephrologist specialists

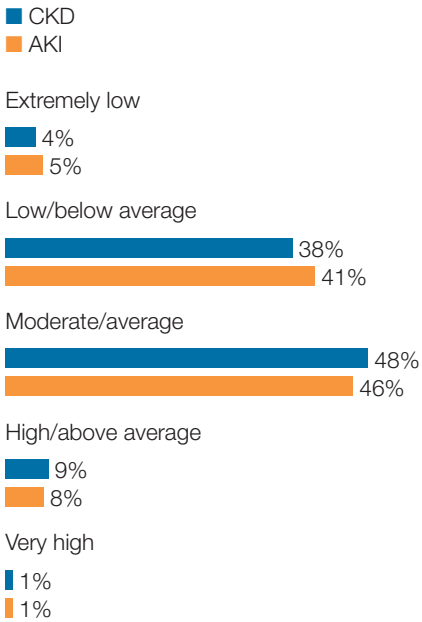
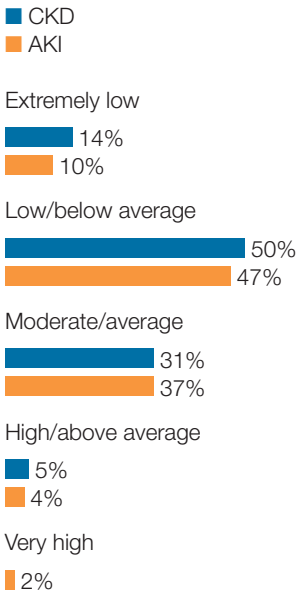


Figure 10.2 | Awareness of CKD and AKI among primary care physicians



Primary care physicians

Almost two-thirds (64%) of countries rated CKD awareness among PCPs as low/below average or extremely low (Figure 10.2). Very few countries, regardless of income level, rated awareness of CKD among PCPs as higher than moderate (Figure 10.4). Nearly 40% of countries in Latin America rated PCP awareness as extremely low.

10.1.2 Awareness of AKI

Non-nephrologist specialists

Nearly half (46%) of countries reported that AKI awareness among non-nephrologist specialists was low/below average or extremely low, while another 46% rated awareness as moderate/average (Figure 10.1).

Higher-income countries generally reported a higher level of awareness than did lower-income countries (Figure 10.5). Irrespective of ISN region, most countries rated AKI awareness among non-nephrologist specialists as low or moderate. Higher proportions of countries in Eastern & Central Europe, North America, and Western Europe rated awareness as moderate than in other ISN regions.

Primary care physicians

Nearly half (47%) of countries rated AKI awareness among PCPs as low/below average, and most of the rest (37%) rated it moderate/average (Figure 10.2).

Similarly to AKI awareness among non-nephrologist specialists, AKI awareness among PCPs was generally rated higher in higher-income countries than in lower-income countries (Figure 10.6). Irrespective of ISN region, most countries rated awareness of AKI among PCPs as low or moderate. Extremely low ratings were more common in Africa, Latin America, NIS & Russia, and South Asia, compared to other regions.

Figure 10.3 | Awareness of CKD among non-nephrologist specialists, by World Bank income group

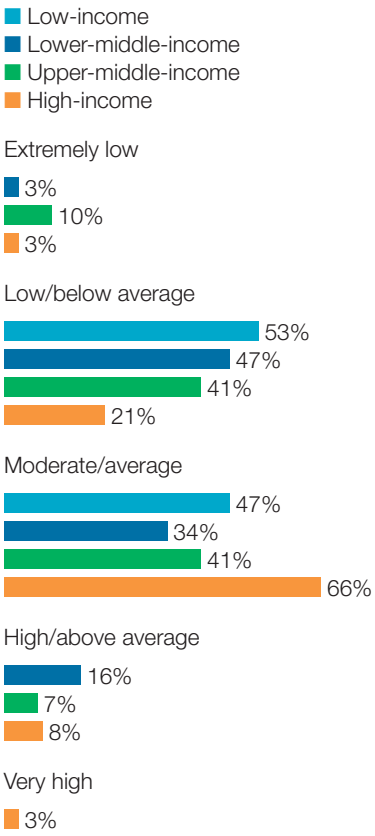


Figure 10.4 | Awareness of CKD among primary care physicians, by World Bank income group

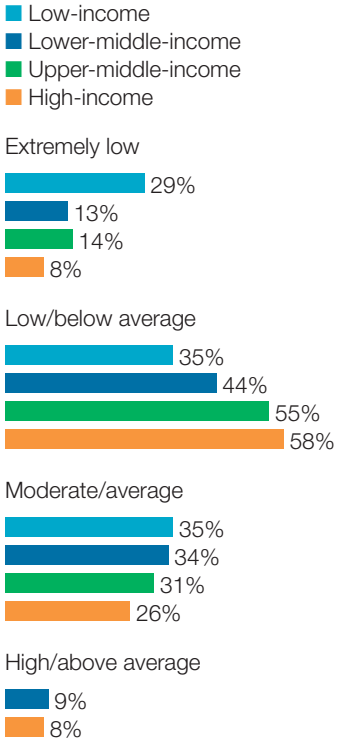


Figure 10.5 | Awareness of AKI among non-nephrologist specialists, by World Bank income group

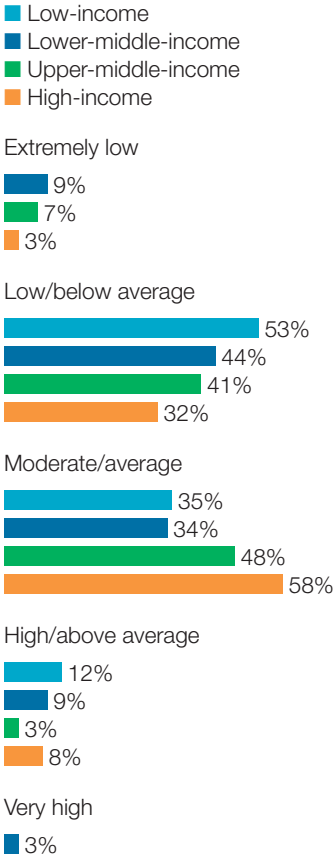
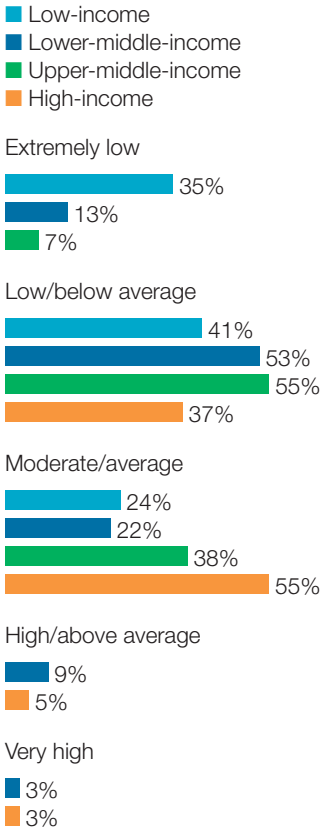


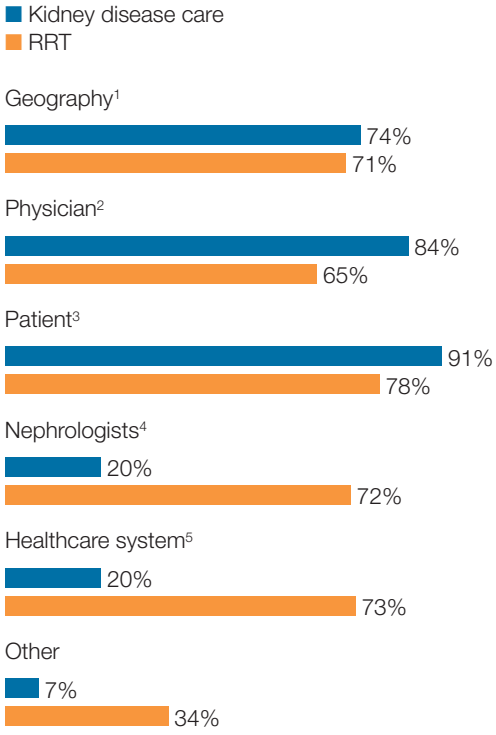
Figure 10.6 | Awareness of AKI among primary care physicians, by World Bank income group



10.2 Identified barriers to kidney disease care

The top barriers to optimal kidney disease care (both general and related to RRT) were identified as being related to geography, physicians, and patients (Figure 10.7; Table 10.1). In most countries, availability of nephrologists and the healthcare system were also considered major barriers to RRT, but not to kidney disease care generally (Figure 10.7; Table 10.1). Barriers to optimal kidney disease care and to optimal RRT were generally lower in the high-income group and otherwise broadly similar across the other three income groups.

Figure 10.7 | Barriers to optimal kidney disease care and renal replacement therapy



1 Distance from care or prolonged travel time
2 Availability, access, knowledge, attitude
3 Knowledge, attitude
4 Availability
5 Availability, access, capability

Table 10.1 | Barriers to optimal kidney disease care and renal replacement therapy

Countries reporting specified barriers

	Geography[1] N (%)	Physician[2] N (%)	Patient[3] N (%)	Nephrologists[4] N (%)	Healthcare system[5] N (%)	Other N (%)
BARRIERS TO OPTIMAL KIDNEY DISEASE CARE						
Overall	**81 (74)**	**92 (84)**	**100 (91)**	**22 (20)**	**22 (20)**	**8 (7)**
ISN regions						
Africa	28 (97)	23 (79)	26 (90)	7 (24)	7 (24)	0 (0)
Eastern & Central Europe	5 (38)	11 (85)	13 (100)	0 (0)	0 (0)	0 (0)
Latin America	13 (81)	13 (81)	11 (69)	13 (81)	13 (81)	6 (38)
Middle East	6 (50)	11 (92)	12 (100)	0 (0)	0 (0)	0 (0)
NIS & Russia	5 (83)	4 (67)	5 (83)	0 (0)	0 (0)	0 (0)
North America	1 (50)	2 (100)	2 (100)	0 (0)	0 (0)	0 (0)
North & East Asia	2 (33)	6 (100)	6 (100)	0 (0)	0 (0)	0 (0)
Oceania & South East Asia	11 (85)	13 (100)	13 (100)	1 (8)	1 (8)	1 (8)
South Asia	5 (100)	5 (100)	5 (100)	0 (0)	0 (0)	0 (0)
Western Europe	5 (63)	4 (50)	7 (88)	1 (13)	1 (13)	1 (13)
World Bank income groups						
Low-income	16 (94)	14 (82)	15 (88)	6 (35)	6 (35)	1 (6)
Lower-middle-income	29 (94)	28 (90)	30 (97)	5 (16)	5 (16)	2 (6)
Upper-middle-income	23 (82)	23 (82)	23 (82)	8 (29)	6 (21)	2 (7)
High-income	13 (38)	27 (79)	32 (94)	3 (9)	5 (15)	3 (9)
BARRIERS TO OPTIMAL RRT CARE						
Overall	**82 (71)**	**75 (65)**	**90 (78)**	**83 (72)**	**85 (73)**	**40 (34)**
ISN regions						
Africa	25 (83)	22 (73)	21 (70)	25 (83)	29 (97)	6 (20)
Eastern & Central Europe	5 (31)	4 (25)	9 (56)	7 (44)	9 (56)	5 (31)
Latin America	13 (81)	9 (56)	12 (75)	13 (81)	4 (25)	3 (19)
Middle East	6 (46)	10 (77)	11 (85)	9 (69)	12 (92)	5 (38)
NIS & Russia	5 (83)	3 (50)	6 (100)	4 (67)	3 (50)	1 (17)
North America	1 (50)	1 (50)	2 (100)	2 (100)	2 (100)	1 (50)
North & East Asia	4 (67)	4 (67)	6 (100)	4 (67)	4 (67)	4 (67)
Oceania & South East Asia	12 (92)	13 (100)	13 (100)	12 (92)	13 (100)	8 (62)
South Asia	5 (100)	5 (100)	5 (100)	5 (100)	5 (100)	2 (40)
Western Europe	6 (67)	4 (44)	5 (56)	2 (22)	4 (44)	5 (56)
World Bank income groups						
Low-income	15 (88)	14 (82)	14 (82)	14 (82)	17 (100)	3 (18)
Lower-middle-income	29 (91)	23 (72)	27 (84)	30 (94)	25 (78)	13 (41)
Upper-middle-income	22 (76)	20 (69)	23 (79)	23 (79)	20 (69)	5 (17)
High-income	16 (42)	18 (47)	26 (68)	16 (42)	23 (61)	19 (50)

1 Distance from care or prolonged travel time
2 Availability, access, knowledge, attitude
3 Knowledge, attitude
4 Availability
5 Availability, access, capability

10.3 Capacity for research and development

10.3.1 Clinical trials

Capacity for all clinical trials

Twenty-seven per cent of countries reported a national agency for funding clinical trials. Existence of an agency increased with income level (Figure 10.8).

All countries in North America and at least half in Oceania & South East Asia, Western Europe, and North & East Asia had an agency for funding clinical trials (Figure 10.9; Table 10.2). Few countries in Africa, Latin America, and Eastern & Central Europe reported an agency.

Almost half (46%) of countries had formal training for physicians in clinical trial conduct (Table 10.2). Of the 53 countries with formal training, 21 (40%) made it mandatory. Formal training was more widely available (up to 66%) and much more likely to be mandatory (up to 54%) in higher-income groups. Both countries in North America and most in North & East Asia, Western Europe, Latin America, and Oceania & South East Asia had

Figure 10.8 | Presence of a national agency for funding clinical trials, by World Bank income group

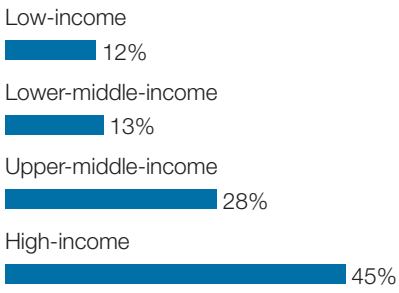


Table 10.2 | Availability of training programs in clinical trials
Countries with specified status of formal training in clinical trial conduct

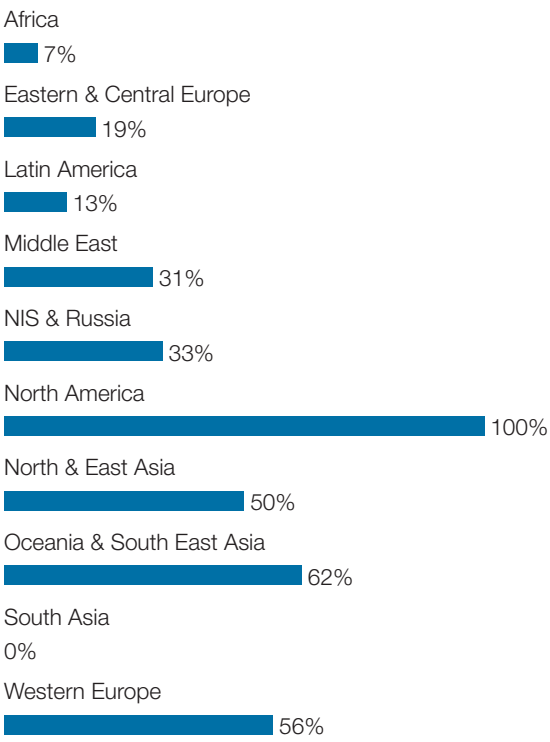
	Formal training for physicians is available N (%)	Formal training for physicians is mandatory N (%)[1]	Formal training for non-physicians/ research assistants and associates is available N (%)	Formal training for non-physicians/ research assistants and associates is mandatory N (%)[2]
Overall	**53 (46)**	**21 (40)**	**39 (34)**	**23 (61)**
ISN regions				
Africa	8 (27)	0 (0)	4 (13)	1 (25)
Eastern & Central Europe	8 (50)	5 (63)	6 (38)	4 (67)
Latin America	11 (69)	5 (45)	6 (38)	5 (83)
Middle East	2 (15)	1 (50)	4 (31)	0 (0)
NIS & Russia	3 (50)	2 (67)	2 (33)	2 (100)
North America	2 (100)	0 (0)	2 (100)	1 (50)
North & East Asia	5 (83)	2 (40)	3 (50)	3 (100)
Oceania & South East Asia	8 (62)	2 (25)	5 (38)	2 (40)
South Asia	0 (0)	0 (0)	1 (20)	5 (83)
Western Europe	6 (67)	4 (67)	6 (67)	0 (0)
World Bank income groups				
Low-income	3 (18)	0 (0)	1 (6)	0 (0)
Lower-middle-income	12 (38)	4 (33)	8 (25)	4 (57)
Upper-middle-income	13 (45)	7 (54)	10 (34)	6 (60)
High-income	25 (66)	10 (40)	20 (53)	13 (65)

1 Percentages are calculated relative to the number of countries where such training for physicians is available.
2 Percentages are calculated relative to the number of countries where such training for non-physicians is available.

formal training. Mandatory participation for physicians varied across regions (Table 10.2). At least half of programs in Eastern & Central Europe, the Middle East, NIS & Russia, and Western Europe were mandatory. None of the programs in Africa or North America were mandatory.

Formal training programs for non-physicians or research assistants/associates in clinical trials were fewer (34%) than for physicians (Table 10.2). Existence of a formal training program increased with income level, being most common in the high-income group (53%). Of the 39 countries with formal training for non-physicians, 23 (61%) required the training. Such training was mandatory in at least half of the countries in the high-, upper-middle-, and lower-middle-income groups, but in none of the low-income countries. Where training programs for non-physicians existed, at least half were mandatory in Eastern & Central Europe, Latin America, NIS & Russia, North America, North & East Asia, and South Asia (Table 10.2).

Figure 10.9 | Presence of a national agency for funding clinical trials, by ISN region



Of the 116 countries responding to the question about biobanking, nearly half (45%) had facilities.This varied widely with income level, from 6% in the low-income group to 79% in the high-income group. Both countries (100%) in North America and more than 80% of those in Western Europe and North & East Asia had facilities.

Overall, capacity for storing clinical trial medications was moderate across countries (Figure 10.10). Only 32% of countries reported that most or all study medications could be stored.

Overall, lower-income countries had less (or unknown) capacity for storing clinical trial medications, compared to higher-income countries (Figure 10.11). Countries in Eastern & Central Europe, Western Europe, North America, and North & East Asia reported higher capacities relative to other ISN regions (Figure 10.12).

Capacity for renal clinical trials

Fifteen per cent of all countries did not participate in clinical trials on kidney disease. Over half of countries participated in phase 3 (62%), phase 4 (63%), and health service delivery trials (68%). Less than half participated in phase 1 (33%) and phase 2 trials (46%) on kidney disease (Figure 10.13).

Few countries in Africa, Eastern & Central Europe, Latin America, the Middle East, and NIS & Russia participated in phase 1 trials. Low-income countries had lower participation in clinical trials (Figure 10.14). Two low-income countries participated in phase 1 research and no low-

Figure 10.10 | Capacity to store clinical trial medications

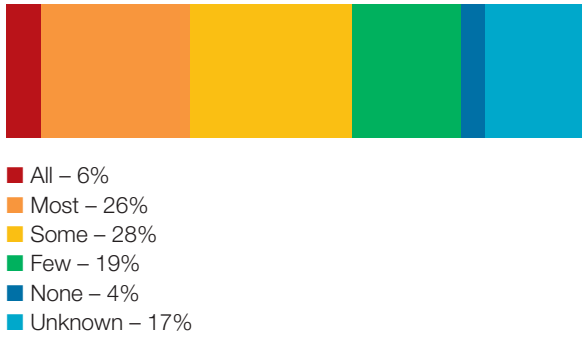


Figure 10.11 | Capacity to store clinical trial medications, by World Bank income group

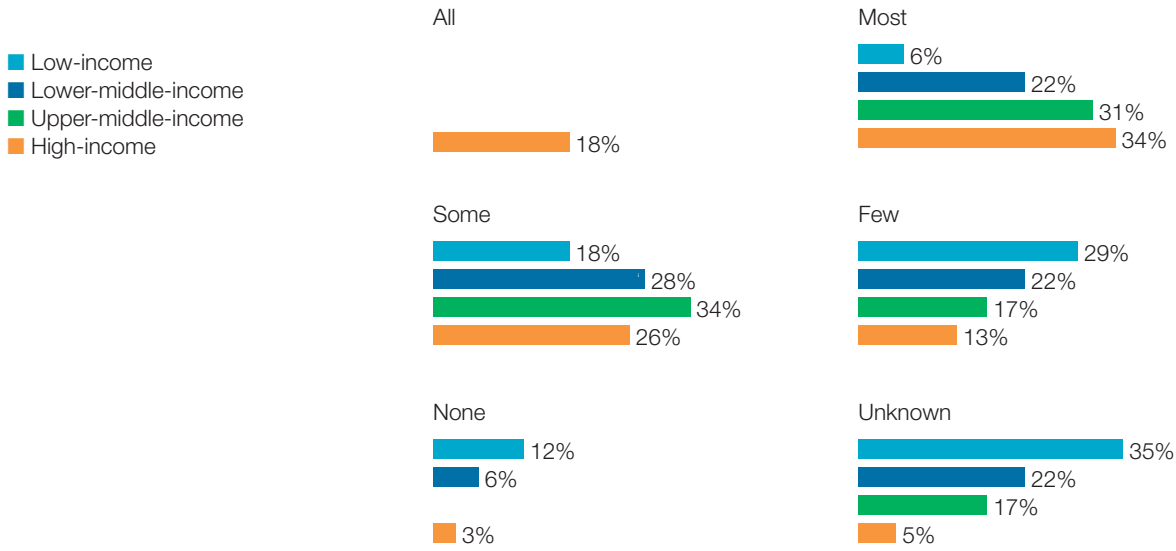
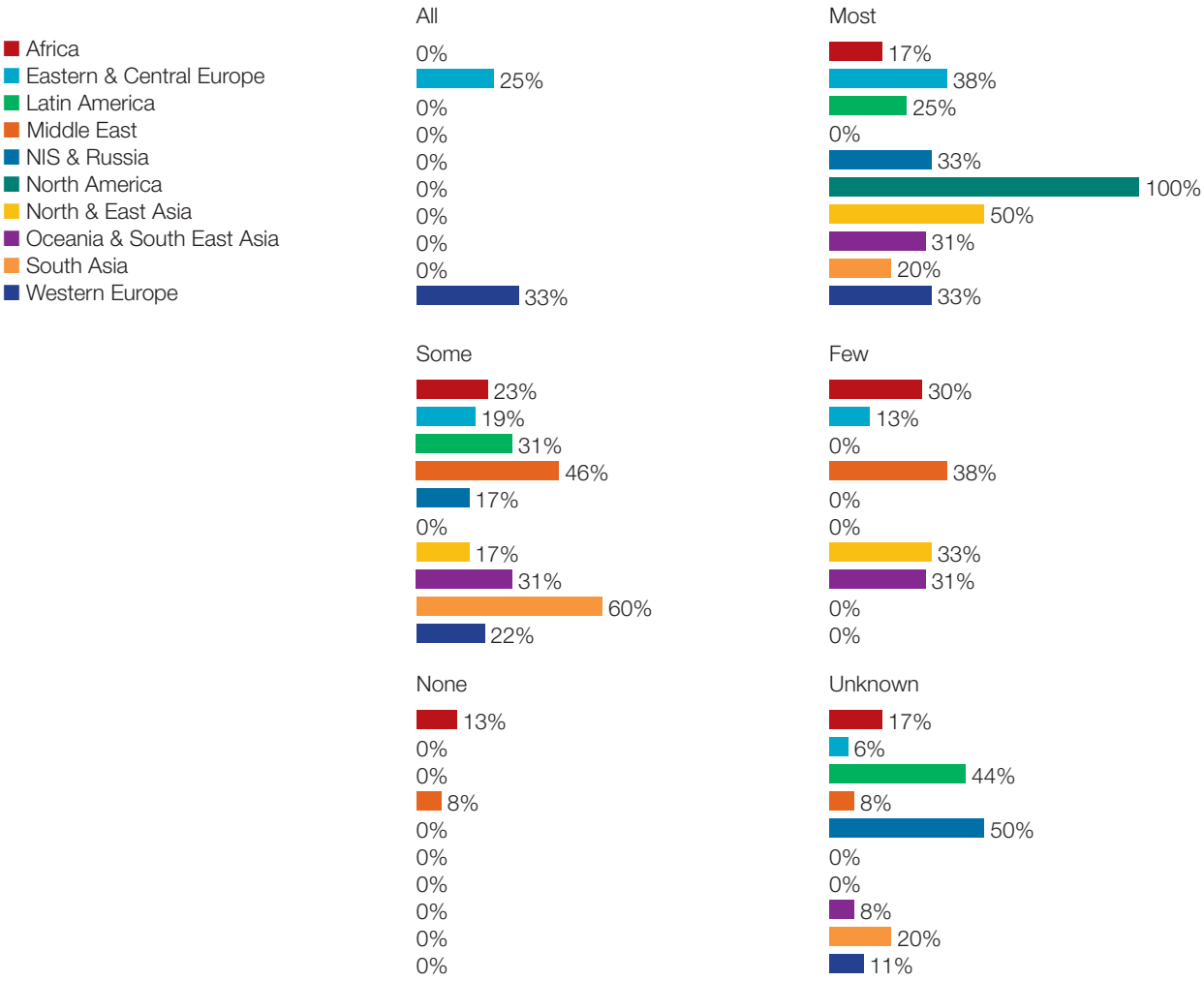


Figure 10.12 | Capacity to store clinical trial medications, by ISN region



income countries participated in phases 2, 3, or 4. However, low-income countries reported the highest proportion of health service delivery trials, compared to the other income groups. Health service delivery trials had participation from a majority of countries in all ISN regions except Eastern & Central Europe, NIS & Russia, and South Asia (Figure 10.15). Few countries in Africa participated in any other phase of clinical trials.

Figure 10.13 | Renal clinical trial participation

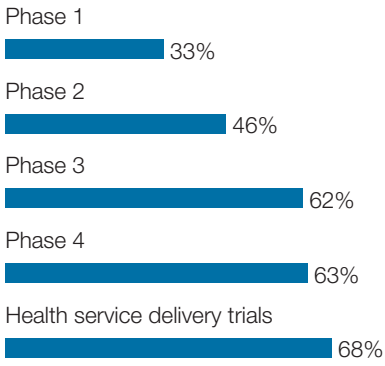


Figure 10.14 | Renal clinical trial participation, by World Bank income group

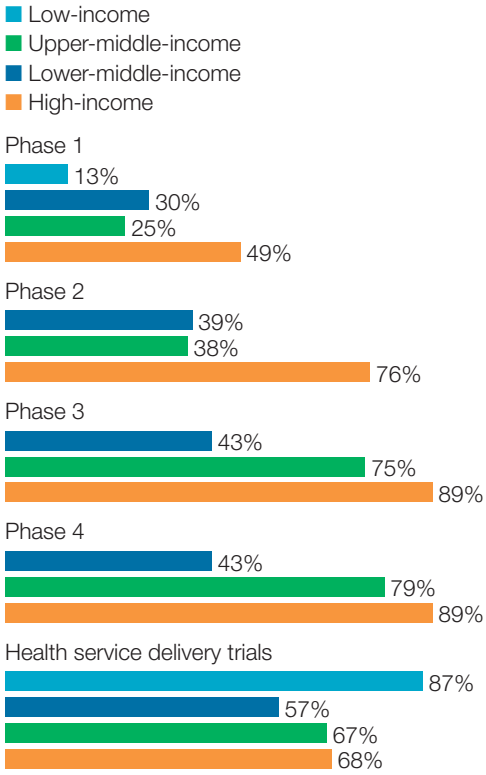
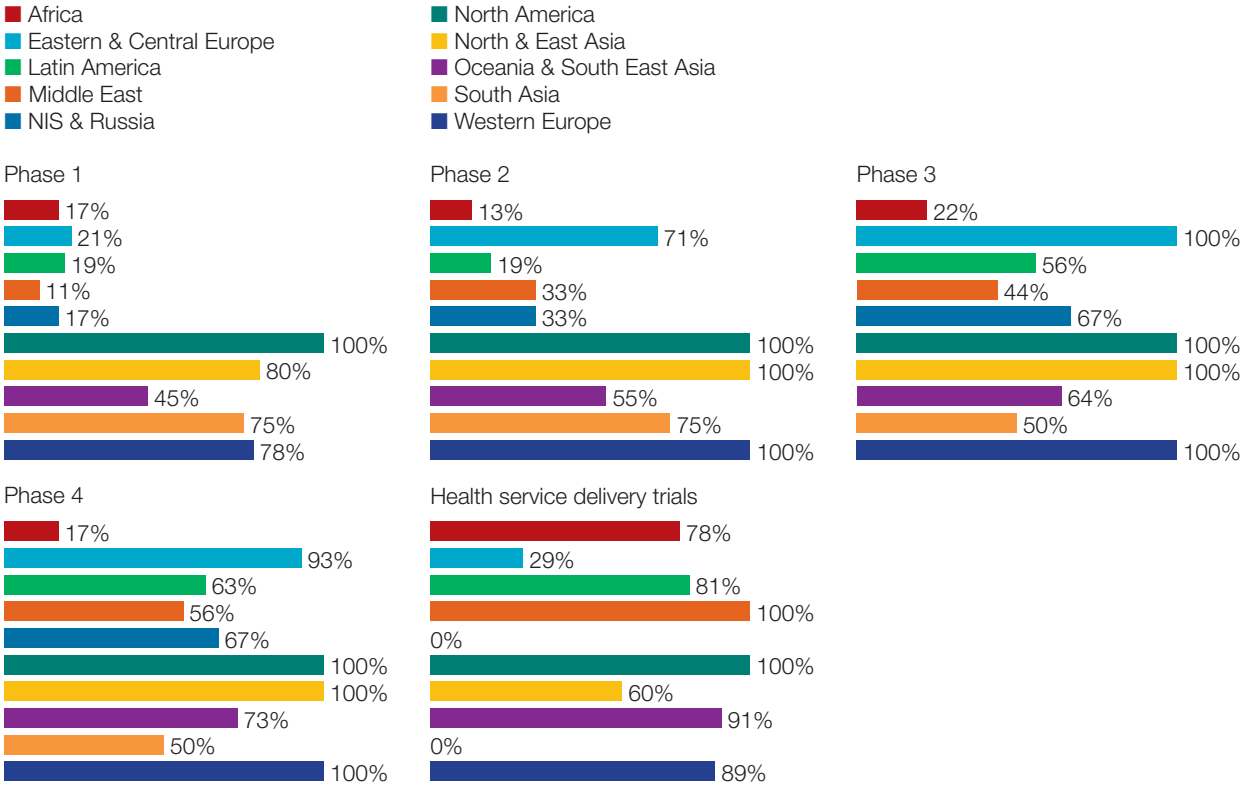


Figure 10.15 | Renal clinical trial participation, by ISN region



High-income countires reported the highest participation across phases 1–4 of clinical research. Both countries in North America participated in all phases of research.

Almost half (47%) of all countries had academic centres that coordinated and monitor sites involved in renal clinical trials. The proportion of countries that had a centre was higher in high- (63%) and upper-middle-income countries (62%) compared to lower-middle- (34%) and low-income countries (12%) (Figure 10.16).

All countries in North America and North & East Asia and more than half in Western Europe, Eastern & Central Europe, South Asia, and Oceania & South East Asia had an academic centre for conducting renal clinical trials (Figure 10.17).

10.3.2 Observational cohort studies

A large majority (85%) of countries stated they had the capacity to conduct observational cohort studies (Table 10.3). While this was higher in high-income countries (95% for high-, 83% for upper-middle-, and 81% for lower-middle-income), the proportion of low-income countries that had the capacity for observational cohort studies was still quite high (76%). More than 80% of countries in all ISN regions except Eastern & Central Europe, the Middle East, and NIS & Russia had workforce capacity for observational studies (Figure 10.18; Table 10.3).

Although 99 countries had a capacity to conduct observational studies, only 56 had funding (Table 10.3). The proportion of countries with funding was much higher in high-income countries (76%) than in upper-middle-, lower-middle-, or low-income countries (between 29% and 38%). More than 60% of countries in North America, North & East Asia, South Asia, and Western Europe had funding (Figure 10.18). Few countries in Africa, Eastern & Central Europe, Latin America, and NIS & Russia had funding. Overall, 53 countries were involved in any observational cohort studies in CKD; the proportion was higher in high-income countries (79%) than in upper-middle-, lower-middle-, or low-income countries (all under 35%). All countries in North America and North & East Asia, and most in Western Europe, participated in observational studies. Less than half of countries in Africa, Latin America, the Middle East, NIS & Russia, and South Asia participated in observational studies.

Figure 10.16 | Availability of academic centres for renal clinical trial management, by World Bank income group

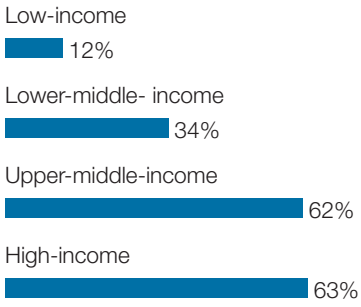


Figure 10.17 | Availability of academic centres for renal clinical trial management, by ISN region

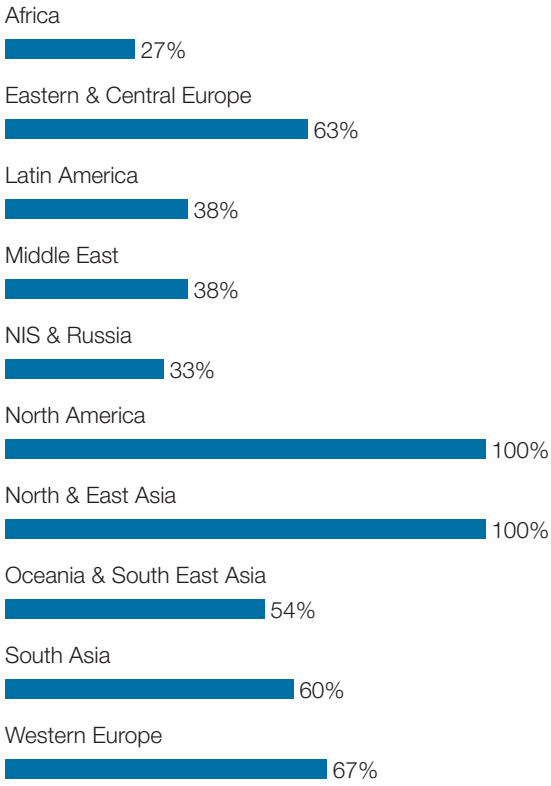


Figure 10.18 | Observational cohort studies for kidney disease, by ISN region

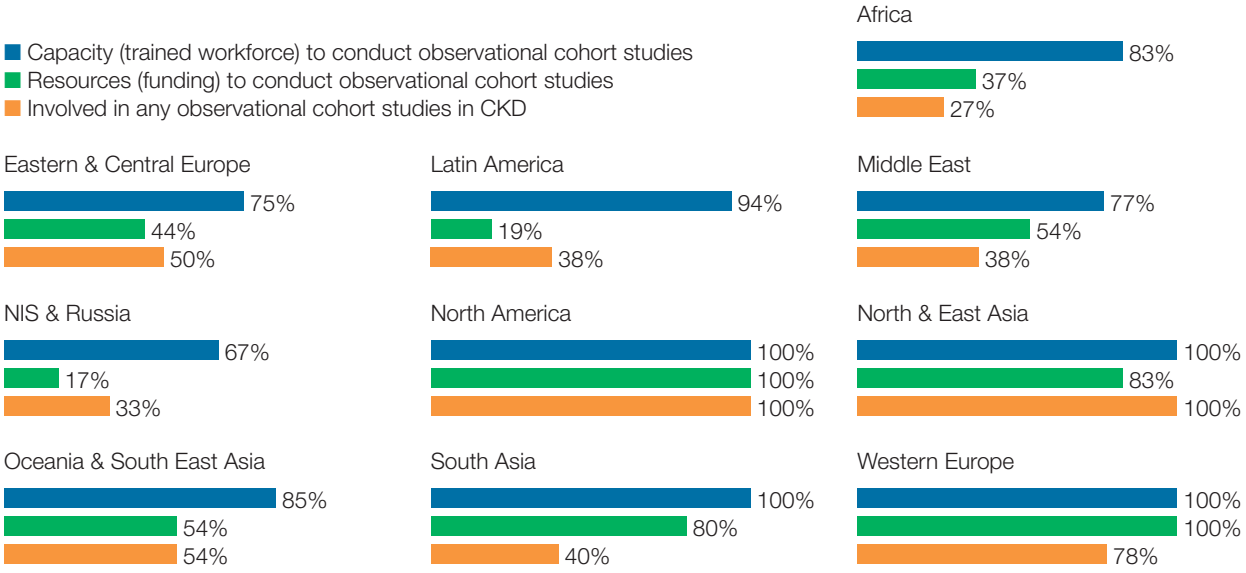


Table 10.3 | Capacity for and scope of observational cohort studies

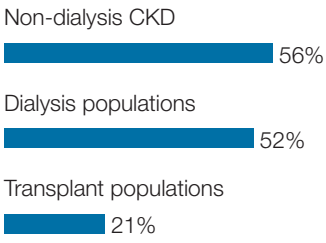
Countries meeting specified criteria

	Trained workforce to conduct observational cohort studies N (%)[1]	Funding to conduct observational cohort studies N (%)[1]	Involvement in any observational cohort studies in CKD N (%)[1]	Population studied in observational cohort studies		
				Non-dialysis CKD populations N (%)[2]	Dialysis populations N (%)[2]	Transplant populations N (%)[2]
Overall	**99 (85)**	**56 (48)**	**53 (46)**	**29 (56)**	**27 (52)**	**11 (21)**
ISN regions						
Africa	25 (83)	11 (37)	8 (27)	6 (75)	4 (50)	0 (0)
Eastern & Central Europe	12 (75)	7 (44)	8 (50)	3 (38)	3 (38)	2 (25)
Latin America	15 (94)	3 (19)	6 (38)	4 (67)	3 (50)	1 (17)
Middle East	10 (77)	7 (54)	5 (38)	1 (20)	5 (100)	0 (0)
NIS & Russia	4 (67)	1 (17)	2 (33)	0 (0)	1 (50)	1 (50)
North America	2 (100)	2 (100)	2 (100)	2 (100)	0 (0)	1 (50)
North & East Asia	6 (100)	5 (83)	6 (100)	6 (100)	3 (50)	1 (17)
Oceania & South East Asia	11 (85)	7 (54)	7 (54)	2 (29)	6 (86)	3 (43)
South Asia	5 (100)	4 (80)	2 (40)	1 (50)	0 (0)	1 (50)
Western Europe	9 (100)	9 (100)	7 (78)	4 (67)	2 (33)	1 (17)
World Bank income groups						
Low-income	13 (76)	5 (29)	3 (18)	2 (67)	1 (33)	1 (33)
Lower-middle-income	26 (81)	12 (38)	10 (31)	7 (70)	5 (50)	1 (10)
Upper-middle-income	24 (83)	10 (34)	10 (34)	6 (60)	6 (60)	1 (10)
High-income	36 (95)	29 (76)	30 (79)	14 (48)	15 (52)	8 (28)

1 Percentages are calculated relative to the corresponding total number of countries.

2 Percentages are calculated relative to the corresponding number of countries that were involved in observational cohort studies in CKD and responded to the question about areas of research.

Figure 10.19 | Kidney patient populations under observational study



Of the 53 countries that participated in observational studies in CKD, more than half studied non-dialysis CKD (56%) and dialysis patients (52%), and 21% studied transplant populations (Figure 10.19; Table 10.3). Non-dialysis CKD studies were most commonly conducted in Africa, Latin America, North America, North & East Asia, and Western Europe. Observational studies in dialysis patients were most commonly conducted in the Middle East and Oceania & South East Asia.

Half of countries in NIS & Russia, North America, and South Asia, and 43% of countries in Oceania & South East Asia conducted transplant observational studies; elsewhere, participation in transplant studies was quite low.

Ethics approval was mandatory for observational studies in most countries, across all regions of income and irrespective of ISN region (Table 10.4). The majority (62%) of ethics approvals were managed by an institutional regulatory agency. Thirty-nine per cent were overseen by a national body, and 12% by a regional body. Twelve per cent were managed by another regulatory agency.

Twenty per cent of countries stated that there were often challenges in getting timely approvals. Thirty-three per cent reported "sometimes," and 25% "occasionally." Challenges were reported most often in South Asia, NIS & Russia, and the Middle East. North America reported the least challenge.

Table 10.4 | Ethics approval process for observational cohort studies in CKD
Countries meeting specified criteria for ethics approval of observational cohort studies

	Mandatory N (%)[1]	Responsible body			
		Institutional N (%)[2]	Regional N (%)[2]	National N (%)[2]	Other N (%)[2]
Overall	**106 (91)**	**66 (62)**	**13 (12)**	**41 (39)**	**13 (12)**
ISN regions					
Africa	26 (87)	11 (42)	4 (15)	12 (46)	3 (12)
Eastern & Central Europe	16 (100)	8 (50)	1 (6)	6 (38)	2 (13)
Latin America	15 (94)	12 (80)	1 (7)	5 (33)	3 (20)
Middle East	10 (77)	7 (70)	2 (20)	4 (40)	0 (0)
NIS & Russia	6 (100)	3 (50)	0 (0)	3 (50)	1 (17)
North America	2 (100)	2 (100)	1 (50)	0 (0)	0 (0)
North & East Asia	6 (100)	6 (100)	1 (17)	1 (17)	0 (0)
Oceania & South East Asia	12 (92)	8 (67)	0 (0)	6 (50)	2 (17)
South Asia	4 (80)	4 (100)	0 (0)	2 (50)	0 (0)
Western Europe	9 (100)	5 (56)	3 (33)	2 (22)	2 (22)
World Bank income groups					
Low-income	14 (82)	5 (36)	1 (7)	9 (64)	1 (7)
Lower-middle-income	27 (84)	18 (67)	2 (7)	9 (33)	4 (15)
Upper-middle-income	27 (93)	17 (63)	2 (7)	13 (48)	5 (19)
High-income	38 (100)	26 (68)	8 (21)	10 (26)	3 (8)

1 Percentages are calculated relative to the corresponding total number of countries.
2 Percentages are calculated relative to the corresponding number of countries where ethics approval for observational cohort studies in CKD is mandatory.

SECTION 11

DISCUSSION

11.1 Gaps in services and resources

This is the first initiative to assess global capacity for kidney care in terms of the key building blocks of a functional health system – and to evaluate the readiness of countries and regions to enhance such care. Some countries and regions reported significant gaps in their services, facilities, and workforce.

This information is helpful to identify inconsistencies of care across the globe and to further document the current status of kidney care as a means to monitor progress in future.

Irrespective of income level or ISN region, AKI and non-dialysis CKD appeared to receive less attention than ESRD. For example, the proportion of countries that reported an advocacy group for AKI at higher levels of government was less than half that for CKD. Similarly, both AKI and non-dialysis CKD registries were far less common than those for dialysis or transplant patients. Most countries had access to CKD management and referral guidelines, yet less than half had access to AKI guidelines. Less than a quarter of countries identified an existing CKD detection program. Lastly, public funding for medications was less available, as were technologies to identify or prevent the progression of CKD, particularly in low-income countries.

Across most countries, renal pathologists, vascular access coordinators, dietitians, and nephrologists were identified as in short supply. Gaps in workforce capacity were notably higher in low-income countries. Awareness and adoption of both CKD and AKI guidelines among non-nephrologist physicians were low or moderate across all income groups and regions.

We identified major discrepancies between countries in the extent of care offered. Health infrastructure for both CKD and AKI were rated more poorly in low-income countries than in those at a higher income level. Nephrologist density was much lower in low-income countries, and general workforce shortages were more common in low-income countries. No low-income countries reported a general availability of eGFR testing through primary care, and pathology services at any level of care were limited. Low-income countries had less capacity for and lower participation in kidney disease research than did countries at higher income levels, and were less able to estimate CKD prevalence.

Key implications of these findings are discussed below based on the six WHO UHC Domains covered on the survey.

11.2 Implications

11.2.1 Health finance and service delivery

Almost half (43%) of countries funded healthcare publicly, either with no fees at the point of delivery, or with some fees. Nearly half (44%) funded healthcare through a mix of public and private sources. Just over half (59%) of countries that had publicly funded systems included all residents in their public coverage.

Only 35% of countries funded all aspects of kidney care. The aspects most commonly excluded from coverage were related to detection and early management of CKD. Early detection in at-risk individuals was excluded from coverage by the most countries (52%), followed by early or general management to reduce the risk of progression (42%–43%) and management of CKD complications (40%). Considering the importance of prevention and delaying progression to ESRD, coverage of these aspects of care should be increased; doing so would benefit both patients and the healthcare system by averting costs associated with treating more severe cases of kidney disease.

Coverage of care for dialysis and kidney transplant patients was most often publicly funded, whereas coverage for non-dialysis CKD and AKI was slightly more through a mix of public and private. While coverage for dialysis and transplantation is very necessary for managing kidney disease, further efforts could be made to support non-dialysis and AKI patients to prevent the progression or development of kidney disease.

Nearly all (94%) countries reported some form of direction regarding kidney disease care. Most countries either reported direction by a national body (66%) or by individual hospitals, trusts, or organizations (51%). Of the countries that had no organized system, none were in the high-income group. For countries with limited resources, international standards or guidelines may help provide direction until national bodies have been developed.

Health infrastructure for CKD was rated as good or above average by the majority of high-income countries, and excellent by nearly a quarter. Lower-income countries reported poorer health infrastructure for CKD. Health infrastructure for AKI was similar. Unsurprisingly, the high-income groups also reported better infrastructure for AKI than did lower-income groups. This may suggest that infrastructure may be a barrier to care in lower-income countries; however, infrastructure may not be as limiting as workforce capacity and leadership and governance, which were rated low among low-income countries.

11.2.2 Health workforce

Not surprisingly, nephrologists were primarily responsible in most countries for both CKD and AKI. Primary care physicians had more responsibility for CKD than for AKI: 64% of countries reported PCPs primarily responsible for CKD and 35% for AKI, respectively. Intensive care specialists were primarily responsible for AKI in 75% of countries, typically because AKI is an acute condition often treated in hospital. Only ~45% of low-income countries reported that intensive care specialists were primarily responsible for AKI, compared to ~90% of high-income countries. This discrepancy may be due to a general shortage of intensive care specialists in low-income countries.

The mean density of nephrologists was 8.83 PMP (number per million population). Nephrologist density varied strongly with national income, from 28.52 PMP in the high-income group to 0.31 PMP in the low-income group. The appropriate number of nephrologists in a country depends on many factors including need, priority, and resources; as such, there is no global standard with respect to nephrologist density. Regardless, the density in low-income countries suggests a shortage of nephrologists, which is problematic, as nephrologists are essential to provide leadership, and a lack of

them had negative consequences for policy and practice. Notably, the role of a nephrologist may differ depending on how the healthcare system is structured. In some regions, kidney disease care was managed by both PCPs and nephrologists, whereas other regions depended primary on nephrologists. Lastly, density in itself does not indicate the quality of care or adequacy of the provider.

Similar findings were observed for nephrology trainees. The mean density of nephrology trainees was 1.87 PMP overall and was more than 30-fold higher in the high-income group than the low-income group (6.03 vs. 0.18 PMP). Seventy-nine per cent of countries had a nephrology training program, and the proportion was much higher in the high-income group (97%) than in the low-income group (35%). The large majority (86%) of programs were 2 to 4 years in length. Most (56%) were structured following completion of a general medicine degree. Again for nephrology trainees, the data collected did not indicate the quality of the program.

The most common provider shortages overall were renal pathologists (86%), vascular access coordinators (81%), dietitians (78%), and nephrologists (74%). Shortages were more common in low-income countries than in high-income countries except for social workers, NPs, and PCPs, for which the shortages were similar across income groups. (~40%–50%). Shortages of pathologists can greatly limit proper diagnosis and treatment of primary renal diseases. However, health technologies enable pathologists in developed regions to offer support remotely via telehealth, which could reduce this barrier in low- and lower-middle-income countries. Time and resources for training should be considered when allocating roles or tasks to providers across settings. For example, given that nephrologists are in short supply across most countries, delegating tasks to members of other disciplines (e.g., nurses, PCPs, social workers, and pharmacists) may address some of the identified limitations and furthermore promote the adoption of MDTs and collaborative practice. Moreover, in interpreting these discrepancies it is important to recognize that no standard metrics exist to indicate what provider supply is needed for a given population. Thus, reported differences in perceived workforce shortages may reflect discrepancies in how countries identify a short supply as well as objective shortages.

11.2.3 Essential medicines and technologies

Nearly all countries, irrespective of income level, offered measurement of blood pressure and height and weight at the primary level, although almost one-quarter of low-income countries and 21% of lower-middle-income countries reported not measuring height and weight. Fewer services specifically targeted toward preventing CKD were available.

There were serious deficiencies in laboratory diagnostic services available through primary care. Measurements of cholesterol and HbA1c were all minimally available in low-income countries (18% and 6%), which may limit efforts to prevent the development or progression of CKD. No low-income countries measured serum creatinine and estimated GFR, and only 35% measured serum creatinine without eGFR. While these services had greater availability in high-income countries (68% and 71%, respectively), less than three-quarters of countries offered the tests. Less than half (41%) of low-income countries offered qualitative urinalysis, and none offered quantitative urinalysis. Similarly, no low-income countries offered UACR or UPCR.

As expected, radiology and pathology services were less available through primary care (46% and 10%, respectively). Nearly all (95%) countries offered radiology through secondary care, but only 63% offered pathology through secondary care: from 12% of low-income countries to 97% of high-income countries. A lack of pathology services in low-income countries is problematic because fewer cases of CKD may be properly diagnosed.

Chronic HD was available in all countries. Chronic PD was available in 100% of high-income countries, but in only 29% of low-income countries. Acute HD was also available in almost all (98%) countries, but acute PD was available in only 61% of countries overall, and in only 18% of low-income countries. Transplantation was available in 100% of high-income countries but in only 12% of low-income countries.

Most countries funded RRT services through government. Just over half (54%) of countries funded chronic HD publicly, and 35% funded it through a mix of public and private sources. Similarly, 58% and 35% of countries funded acute HD through government and a mix, respectively. Sixty-three per cent of countries funded chronic PD through government, and 29% used a mixed funding model of private and public sources, and the proportions for these funding models were similar for acute PD. Of countries that offered transplantation, 60% funded it through government, and 30% used a mixed funding model. While more than half of all countries funded RRT through government, many (mainly low-income) countries used a mixed model or private sources, which could be a potential barrier for patients. When funding models for RRT were compared across ISN regions or World Bank income groups, the structures appeared to vary according to income level: generally speaking, higher-income countries provided more funding through government and lower-income countries varied between government, private, and mixed sources.

Funding of medications of CKD patients was covered by government somewhat less often than was RRT. Thirty-eight per cent of countries publicly funded medications of CKD patients, and 43% used a mixed model. Nearly half of countries publicly funded medications of dialysis patients (47%) and medications of transplant patients (49%). Overall, the lower coverage of medications of CKD patients relative to those for ESRD patients could be a barrier to preventing the progression of CKD to ESRD.

11.2.4 Health information systems

Most countries (64%) had a registry for dialysis, and 58% had a registry for transplantation. Very few had a registry for CKD not requiring dialysis (8%) and AKI (7%). This is expected, in that patients undergoing dialysis and transplantation are typically entered into a system for resource management and thus are more traceable than patients with CKD, who may be primarily treated by a family doctor, or AKI patients who may not receive dialysis or care requiring tracking for resource allocation purposes. However, increasing the capture of information for these patients is critical for understanding whether the incidence of CKD and AKI is changing over time, and for better managing cases and predicting future resource requirements.

Nearly two-thirds of countries (62%) were able to estimate the prevalence of CKD; this capacity was much higher in high-income countries (68%) than in low-income countries (18%). Difficulty collecting epidemiological information on CKD in low-income countries is likely due to a combination of both resource and nephrologist limitations.

Fewer countries were able to estimate the prevalence of AKI than that of CKD. Only 19% of countries could estimate the prevalence of AKI not requiring dialysis, and 41% of countries could estimate the prevalence of AKI requiring dialysis. Capacity to estimate the incidence of AKI of either severity was closely comparable.

Less than a quarter (24%) of countries reported a current CKD detection program, much more common in high-income (32%) than low-income (6%) countries. Detection programs for CKD are essential for identifying and preventing the progression of kidney disease, and more efforts should be placed to increasing these programs, particularly in low-income countries. Better understanding of what factors may impede detection programs in low-income countries, for example, awareness or access to services, will help in developing strategies to increase the implementation of such programs.

11.2.5 Leadership and governance

In only 36% of countries did the government recognize CKD as a health priority. A lack of priority could represent a lack of awareness or the precedence of other political issues. Also, the definition of health priority differs across countries: in some regions it could represent a focus on prevention, whereas elsewhere it could refer to increasing access to treatment. One caution is that priority does not in itself translate into effective action.

Nearly half (42%) of countries reported an advocacy group at higher levels of government or NGOs for CKD; however, only 19% of countries reported a group for AKI. The lesser attention to AKI advocacy has been recognized, and as such, the ISN launched the "0by25" initiative in 2013, which strives to eliminate all preventable deaths from AKI worldwide by 2025. By disseminating this strategy, the ISN hopes to increase advocacy for AKI and awareness of the importance of its prevention.

Both CKD and AKI advocacy groups were more common in low-income countries than high-income; however, details regarding these groups' actions or roles were not captured. More than half (53%) of countries had national or regional physician- (or patient-) oriented organizations that provided resources for CKD management. These organizations were more common in high-income (66%) than low-income countries (29%).

Fifty-nine per cent of countries had a completed national strategy or policy for chronic NCDs, and 18% had one under development. Twenty-three per cent of countries did not have any policies or strategies. Specific to kidney disease, 17% had a national strategy for non-dialysis CKD, 43% had a strategy for chronic dialysis, and 40% had one for kidney transplantation. A focus on earlier stages of kidney disease may significantly affect patient care and costs, and thus strengthening the direction and standardization of care for these patients is critical. Overall, national strategies were uncommon, particularly in low-income countries. Because of their importance for providing consistent high-quality and safe care, and additionally for standardizing metrics for evaluating quality and outcomes of care, such strategies should be given more attention.

Seventy-nine per cent of countries had CKD management and referral guidelines, whereas only 53% had AKI management and referral guidelines. This difference likely reflects the greater strength and persistence of CKD advocacy. The perceived public-health importance of CKD is enhanced by its association with other conditions such as diabetes and high blood pressure, whereas AKI tends to be a hospital-based condition and often is not recognized as the primary focus. For both CKD and AKI, the proportion of low-income countries reporting no guidelines was greater than in the high-income group.

Awareness and adoption of both CKD and AKI guidelines were generally low among non-nephrologist physicians. This may be reflected in a similarly low reported level of awareness of CKD in general among non-nephrologist physicians. The reasons for non-nephrologist physicians' levels of awareness and adoption of CKD guidelines need to be better understood to help facilitate guideline use. Even where national or regional guidelines do not exist, international guidelines should be accessible globally; if barriers such as language or access to the Internet are preventing the distribution or adoption of guidelines, these issues should be addressed. Because CKD guidelines often cover identification of CKD progression, referral, and risk factor management, wider adoption of guidelines by non-nephrologist physicians would improve the identification of early cases of CKD, thereby reducing unnecessary referrals, which are burdensome to patients and costly to the healthcare system. If guidelines are underused because of lack of time, it may be helpful to develop a condensed version of them for PCPs and other non-nephrologist providers.

Awareness and adoption of CKD guidelines among nephrologists were considerably higher

than among non-nephrologist physicians; however, it is of concern that awareness and adoption were lower in low-income countries. Barriers to CKD guidelines in these countries should be identified and mitigated.

11.2.6 Response

The top barriers to optimal kidney disease care (both general and related to RRT) were identified as being related to geography, physicians, and patients. For most countries, availability of nephrologists and the healthcare system were also considered major barriers to RRT, but not for kidney disease care generally. To mitigate patient-related barriers, we must first clarify whether these are related to, for example, financial reasons, poor access, or low motivation or education. Secondly, barriers related to physicians should also be explored to identify areas where other providers may be able to assist. The supply of nephrologists was identified as a barrier to RRT in most countries. Where possible, utilizing dialysis nurses or technologists to take on certain duties with respect to RRT may be a potential solution. The ISN is funding a nephrology-fellowship training program designed to increase the number of nephrologists in developing countries, which could help reduce nephrologist-related barriers to RRT. Barriers related to geography may sometimes be reduced or resolved through applications of telehealth or homecare.

Ensuring global representation of research for kidney disease is imperative. Only 27% of countries reported a national agency for funding clinical trials. Agencies were much more common in high-income countries (45%) than in low-income countries (12%). Specific to kidney disease, 15% of all countries did not participate in clinical trials on kidney disease. Overall, low-income countries had lower participation across all phases (1–4) of clinical trials.

Less than half (46%) of countries had formal training for physicians in clinical trial conduct, and even fewer (34%) countries had formal training for non-physicians or research assistants/associates in clinical trials. For both physician and non-physician training, programs were more common in the high-income group than in the low-income group, which may be both the cause and effect of lower participation in research.

Biobanks, which enable the storage of specimens for ongoing investigations, support countries' capacity for biomedical research. Less than half (45%) of countries reported biobank facilities, which were much more common in high-income countries (79%) than in low-income countries (6%). Further understanding of the barriers to biobanks may be useful for developing strategies to increase participation in this area of research.

Similarly, capacity for storing clinical trial medications was low across countries. Only 32% of countries reported that most or all study medications could be stored, and 17% did not know. Storing medications requires equipment, electricity, facilities, and other resources.

While 85% of countries had the capacity (trained workforce) to conduct observational cohort studies, far fewer (48% overall) had funding to conduct the studies, particularly in the low-income group. Regardless, 91% of countries had ethics approval for observational studies in CKD, 62% of which were managed by an institutional regulatory agency. Half (47%) of all countries had academic centres for coordinating and monitoring sites for renal clinical studies, which was much more common in high-income countries (63%) than low-income (12%). Initiatives targeted specifically toward funding research, for example the Clinical Research Program through the ISN, are essential for enhancing participation and commitment of marginalized countries in both clinical trials and observational studies for kidney disease research.

11.3 Limitations in national and regional capacity

Globally, the prevalence of CKD is 1 in every 10 people. This ranges from 7% in South Asia to over 12% in Latin America, Europe, East Asia, and the Middle East. Furthermore, CKD is associated with several other conditions, which together can have great impact on both patients and a healthcare system. Despite this, infectious diseases or other more common NCDs (CVDs, cancer, chronic respiratory diseases, and diabetes) may be given precedence over CKD for several reasons including higher prevalence, costs, awareness, and advocacy. Similarly, issues not related to specific health conditions—conflict or famine, for example—may be of higher priority. Even so, it is worth raising awareness of the impact of kidney disease on patients' quality of life, progression to other conditions, and the healthcare system. By sharing guidelines and information and suggesting low-cost therapeutic and preventative solutions, we may reduce the need for kidney care to compete with countries' other priorities.

Additionally, a lack of funding may be a major limiting factor for optimal kidney care delivery. Whether related to infrastructure, workforce, medications, or technology, shortages in resources undoubtedly reduce capacity for care. Most countries identified a shortage in healthcare providers, particularly dialysis nurses, and nearly three-quarters of countries identified a shortage in nephrologists. Furthermore, funding models for RRT and medications for kidney disease may limit care delivery. Out-of-pocket or health insurance may limit who can access treatment, which creates inequity and inevitably increases the cost of kidney disease management.

Optimizing the workforce by delegating workload appropriately and introducing international telehealth, whereby providers from higher-income countries may support lower-income countries, may help prevent the incidence or progression of kidney disease. Additionally, helping patients overcome financial barriers may further reduce the burden of kidney disease, which could result in cost savings to the healthcare system at large.

Overall, healthcare systems exhibited a stronger focus on treatment and management of kidney disease than on prevention. Less than a quarter of countries reported an active CKD detection program. Increasing efforts to identify patients before they are diagnosed with kidney failure will greatly benefit the healthcare system, especially in lower-income countries.

Lastly, a lack of consistency, both nationally and internationally, can limit the capacity for kidney care. While 59% of countries had a national NCD strategy in place, few had strategies specifically focused on kidney disease care. Awareness and adoption of CKD and AKI guidelines were low among non-nephrologist physicians, which can impact prevention of developing CKD or AKI. Standard guidelines facilitate the provision of consistent, high-quality evidence-based care and further provide benchmarks or goals for monitoring care over time.

11.4 Opportunities to build capacity

While competing priorities, limited resources, lack of attention to prevention, and lack of standardization may all impede kidney care, there are solutions.

Preventing both CKD and AKI is cost-effective and achievable through appropriate use of guidelines at a primary care level, ensuring patients have access to medications, and increasing advocacy[26],[46],[47]. Given that guidelines created for nephrologists may not be appropriate for PCPs or other non-nephrologist physicians, creating tailored guidelines may increase adoption among providers relevant to prevention. Delegation of duties from more specialized, resource-intensive providers to a primary care team (PCPs, nurses, community health extension workers, etc.) is another approach to providing cost-effective care to patients, particularly in developing nations. Furthermore, expanding care teams to include PCPs, nurses, pharmacists, and social workers, all of whom were in greater supply, may enhance the quality of care from both preventive and management perspectives. Furthermore, establishing guidelines on how to evaluate workforce shortages may lead toward more equitable workforce capacity in all regions.

Standardization may also build capacity so that optimal approaches to care delivery are documented and, furthermore, developed through input from multiple countries. In this way, lessons learned can be shared collectively and applied efficiently. Standardized practice guidelines and metrics for evaluation may also help track progress to learn which methods are resulting in optimal outcomes. Ongoing revision of guidelines to keep practice recommendations current is essential in maintaining their relevancy and fostering their adoption.

Good information systems help countries prepare for healthcare needs and better understand the health conditions they are aiming to prevent and manage. Registries are useful in predicting costs for RRT and can further track progress of preventing kidney disease over time, to better understand which approaches are most effective. Furthermore, global participation in research strengthens the generalizability of the resultant findings. Wide involvement in research enables strategies to be applicable to varying demographics and healthcare systems.

Patient awareness, access, and motivation together influence the effectiveness of care. Translating knowledge appropriately to patients may help them access information relevant to their needs and interests. Patients' engagement in their own care plans, and access to relevant information about their conditions may increase awareness and self-management. Patients may thus be more motivated to take on more responsibility in preventing the progression of CKD through lifestyle interventions (exercise, nutrition) and treatment adherence.

11.5 Recommendations

The desk research and survey yielded useful findings on the current status of kidney care across the globe, from which we identify key areas for future efforts.

Workforce shortage was identified as a significant limitation to optimal kidney care delivery. This is more germane for some key specialties such as renal pathologists, vascular access coordinators, dietitians, and nephrologists. A lack of national policy or standard of care or poor adoption of guidelines in primary care was also highlighted, which may hinder the prevention of CKD and may also lead to an inefficient use of resources through unnecessary referral. Similarly, other aspects of preventive care received less focus compared to management of CKD and RRT. Increasing the support for non-dialysis kidney disease patients may prevent or delay the progression to ESRD, thereby alleviating strain on healthcare professionals and saving on costs to the healthcare system. Lastly, ensuring equal participation in research and promoting use of registries across all types of kidney patients may bring several benefits.

In this section we describe each of these priorities and suggest remedial strategies.

Extend healthcare financing and services to reduce shortfalls in access to RRT

Several elements of kidney care were excluded from public coverage, particularly those related to detection and early management of CKD. Coverage of care for non-dialysis CKD and AKI was less than for RRT. Increasing funding for preventive kidney care, including medications of non-dialysis CKD patients, may reduce the need for RRT. Access to RRT is essential for patients with ESRD but may be limited in most low- and middle-income countries[26],[46],[47]. Such prevention of CKD and AKI to the extent possible, followed by sound identification and management practices for these conditions, can keep them from progressing to ESRD and thus reduce the number of patients requiring RRT, thereby lowering treatment-associated costs for the healthcare system and patients.

Increase capacity by addressing workforce shortages

A shortage of healthcare professionals was highlighted across most countries, particularly those in the low-income group. Density of nephrologists and nephrology trainees varied significantly across countries and regions; to better interpret this discrepancy, one must consider the local context, available resources, and development index. A universal benchmark for the density of nephrologists and other healthcare providers would be challenging to develop because differences in resources, demand, awareness, and overall healthcare systems would influence the number of personnel needed for a given population. Given that training and costs associated with increasing the availability of workers vary by specialty, delegating work where possible that is appropriate for care and available resources may increase workforce in a cost-effective manner. For example, dialysis technologists could adopt certain aspects of work from dialysis nurses, or healthcare extension workers could support prevention at a primary care level. Primary care physicians, social workers, health extension workers, and other members of an MDT had a much smaller role in kidney care than did nephrologists. Incorporating MDTs in delivering care for kidney disease patients may lessen the impact of shortages of nephrologists and dialysis nurses.

Enhance consistency of care through national strategies and guidelines

In few countries did the government recognize CKD as a health priority. Less than half reported an advocacy group for CKD and even fewer reported one for AKI. Advocacy at an international, regional, and national level is needed around the globe to

enhance access to dialysis and transplantation, as well as CKD and AKI prevention efforts[26],[46],[48]. Many countries reported a national strategy for NCDs, but CKD care was included in only a portion of these strategies (27% for non-dialysis CKD, 12% for chronic dialysis, and 7% for transplant). Less than half of countries had national strategies specific to kidney care, the least common in non-dialysis CKD (17%). More than three-quarters of countries did have management and referral guidelines for CKD, but the adoption of these guidelines among non-nephrologist physicians, particularly PCPs, was low. Leadership and governance for AKI care were less developed than for CKD care. More than half of countries had no strategies for AKI. Because AKI is a risk factor for CKD and can lead to costly and grave health effects on patients, more focus on preventing and appropriately managing AKI is warranted.

Increase support for prevention

Similarly, other aspects of preventing CKD could be expanded to improve kidney care. Primary care physicians, MDTs, and health extension workers played a smaller role in CKD and AKI care compared to nephrologists. While this is expected to a degree, an increased role of kidney care at the primary care level may prevent the incidence or progression of CKD, alleviating some of the burden on nephrologists, whose numbers limit care in many countries. Furthermore, increasing the number of non-dialysis CKD registries would place more emphasis on preventing the progression of kidney disease and on learning more about earlier stages of kidney disease. Similarly, AKI registries would help improve planning for resource allocation including workforce demand, as AKI can lead to CKD.

Enhance knowledge by facilitating equitable participation in research

Few countries, particularly those of low income, had a national agency for funding clinical trials. Most countries participated in health service delivery trials, but few reported capacity for phase 1 and 2. Low-income countries had low participation in all phases of clinical research but reported the highest participation in health services delivery trials. The capacity in observational cohort studies was much higher, across all income levels; however, funding was a limitation and, as such, less than half of countries could actually participate in studies. Academic institutions for overseeing research in kidney disease were common in upper-middle- and high-income countries, but limited in lower-income countries, possibly resulting in the discrepancy in participation in kidney research. Enhancing involvement in research in lower-income countries through funding research programs and coordinating academic centres may lead to a more representative understanding of kidney disease across the globe.

11.6 Conclusion

This survey demonstrated significant inter- and intra-regional variability in the current capacity for kidney care across the world. Significant gaps in services, facilities, and workforce were identified in many countries and regions.

The findings have implications for policy development towards establishment of robust kidney care programs, particularly for low- and middle-income countries. Low-income countries require a comprehensive approach spanning all components of the health system. Basic infrastructure must be strengthened at the primary care level for early detection and management of CKD and AKI. To maximize effectiveness of early CKD management and reduce risk of adverse health outcomes, access to essential medications should be assured, as should sustainable RRT provision. Health information systems (CKD and AKI registries) are needed for robust information on the burden of these diseases, and their clinical outcomes.

The findings reported in this Atlas are vital for advocacy among governmental and non-governmental stakeholders to help countries improve the quality of kidney care. Its baseline measures of where countries and regions stand with respect to each domain of the health system allow the monitoring of progress over time. Furthermore, by identifying region-specific limitations and barriers, the Atlas helps to target strategic efforts applicable to each context. Finally, sharing this knowledge across regions will help reduce global inequities in healthcare.

11.7 Future Work

Next steps to enhance kidney care delivery are to focus on prevention through creating and disseminating guidelines on both CKD and AKI that are accessible and relevant to their intended audience, particularly PCPs or other non-nephrologist physicians.

Furthermore, increasing appropriate services at the primary care level (for example, measuring creatinine) and enhancing the use of MDTs may help prevent the progression of kidney disease. More active CKD detection programs will further identify patients before they develop ESRD, resulting in significant cost savings to the healthcare system and patients.

Increasing information collection through registries is needed in order to predict the burden of disease and allocate resources appropriately. Furthermore, equitable participation in research across the globe will further our understanding of kidney disease and care delivery.

Lastly, advocacy groups at higher levels of government are needed to raise awareness and ensure support for optimal kidney care.

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APPENDICES

APPENDIX 1

SURVEY RESPONSE

A total of 124 UN Member States responded to the survey, comprising 93% of the world population with adequate representation based on number of countries and population size across regions (Table A1.1).

The affiliations of survey respondents were: nephrologists (76%), non-nephrologist physicians (4%), healthcare administrators/policymakers (11%), and others affiliated with kidney disease patient advocacy (9%) (Table A1.2).

Table A1.1 | Countries and population covered by survey responses

	Number of countries	Total population (millions)	Number of countries that completed survey	Total population of countries that completed survey (millions)
Overall	**200**	**7250**	**124**	**6754**
ISN regions				
Africa	54	1156	35	964
Eastern & Central Europe	20	209	17	199
Latin America & the Caribbean	25	608	16	560
Middle East	14	225	13	223
NIS & Russia	11	281	6	223
North America & the Caribbean	14	362	2	356
North & East Asia	7	1602	6	1577
Oceania & South East Asia	25	671	13	661
South Asia	8	1707	5	1673
Western Europe	22	429	11	318
World Bank income groups				
Low-income	31	631	18	405
Lower-middle-income	52	2862	34	2786
Upper-middle-income	53	2370	32	2293
High-income	63	1386	40	1270
Not classified	1	0.015	0	-

Table A1.2 | Disciplinary affiliation of survey respondents

	Nephrologists N (%)	Physicians (non-nephrologists) N (%)	Policymakers N (%)	Other N (%)
Overall	**246 (75)**	**14 (4)**	**37 (11)**	**29 (9)**
ISN regions				
Africa	42 (65)	6 (9)	8 (12)	9 (14)
Eastern & Central Europe	26 (90)	1 (3)	1 (3)	1 (3)
Latin America & the Caribbean	49 (88)	1 (2)	3 (5)	3 (5)
Middle East	29 (69)	2 (5)	8 (19)	3 (7)
NIS & Russia	7 (54)	0 (0)	5 (38)	1 (8)
North America & the Caribbean	6 (86)	0 (0)	0 (0)	1 (14)
North & East Asia	29 (88)	0 (0)	2 (6)	2 (6)
Oceania & South East Asia	31 (72)	2 (5)	6 (14)	4 (9)
South Asia	10 (67)	1 (7)	3 (20)	1 (7)
Western Europe	17 (74)	1 (4)	1 (4)	4 (17)
World Bank income groups				
Low-income	22 (69)	4 (13)	3 (9)	3 (9)
Lower-middle-income	50 (66)	5 (7)	14 (18)	7 (9)
Upper-middle-income	76 (81)	4 (4)	8 (9)	6 (6)
High-income	98 (79)	1 (1)	12 (10)	13 (10)

APPENDIX 2
LIST OF COUNTRIES

Table A2.1 | List of countries by ISN region and World Bank income group
Countries that participated in the survey are highlighted.

Country	ISN Region	Income Group
Afghanistan	South Asia	Low-income
Albania	Eastern & Central Europe	Upper-middle-income
Algeria	Africa	Upper-middle-income
American Samoa	Oceania & South East Asia	Upper-middle-income
Andorra	Western Europe	High-income
Angola	Africa	Upper-middle-income
Anguilla	Latin America & the Caribbean	Not classified
Antigua and Barbuda	North America & the Caribbean	High-income
Argentina	Latin America & the Caribbean	High-income
Armenia	NIS & Russia	Lower-middle-income
Aruba	North America & the Caribbean	High-income
Australia	Oceania & South East Asia	High-income
Austria	Western Europe	High-income
Azerbaijan	NIS & Russia	Upper-middle-income
Bahamas, The	North America & the Caribbean	High-income
Bahrain	Middle East	High-income
Bangladesh	South Asia	Lower-middle-income
Barbados	North America & the Caribbean	High-income
Belarus	NIS & Russia	Upper-middle-income
Belgium	Western Europe	High-income
Belize	Latin America & the Caribbean	Upper-middle-income
Benin	Africa	Low-income
Bermuda	North America & the Caribbean	High-income
Bhutan	South Asia	Lower-middle-income
Bolivia	Latin America & the Caribbean	Lower-middle-income
Bosnia and Herzegovina	Eastern & Central Europe	Upper-middle-income
Botswana	Africa	Upper-middle-income
Brazil	Latin America & the Caribbean	Upper-middle-income
Brunei Darussalam	Oceania & South East Asia	High-income
Bulgaria	Eastern & Central Europe	Upper-middle-income
Burkina Faso	Africa	Low-income
Burma	Oceania & South East Asia	Lower-middle-income
Burundi	Africa	Low-income
Cambodia	Oceania & South East Asia	Low-income
Cameroon	Africa	Lower-middle-income

Country	ISN Region	Income Group
Canada	North America & the Caribbean	High-income
Cape Verde	Africa	Lower-middle-income
Cayman Islands	North America & the Caribbean	High-income
Central African Republic	Africa	Low-income
Chad	Africa	Low-income
Chile	Latin America & the Caribbean	High-income
China	North & East Asia	Upper-middle-income
Colombia	Latin America & the Caribbean	Upper-middle-income
Comoros	Africa	Low-income
Congo, Republic of the	Africa	Lower-middle-income
Costa Rica	Latin America & the Caribbean	Upper-middle-income
Cote d'Ivoire	Africa	Lower-middle-income
Croatia	Eastern & Central Europe	High-income
Cuba	Latin America & the Caribbean	Upper-middle-income
Cyprus	Eastern & Central Europe	High-income
Czech Republic	Eastern & Central Europe	High-income
Democratic Republic of Congo	Africa	Low-income
Denmark	Western Europe	High-income
Djibouti	Africa	Lower-middle-income
Dominica	Latin America & the Caribbean	Upper-middle-income
Dominican Republic	Latin America & the Caribbean	Upper-middle-income
Ecuador	Latin America & the Caribbean	Upper-middle-income
Egypt	Africa	Lower-middle-income
El Salvador	Latin America & the Caribbean	Lower-middle-income
Equatorial Guinea	Africa	High-income
Eritrea	Africa	Low-income
Estonia	Eastern & Central Europe	High-income
Ethiopia	Africa	Low-income
Fiji	Oceania & South East Asia	Upper-middle-income
Finland	Western Europe	High-income
France	Western Europe	High-income
Micronesia, Federated States	Oceania & South East Asia	Lower-middle-income
Gabon	Africa	Upper-middle-income
Gambia, The	Africa	Low-income
Gaza	Middle East	Lower-middle-income
Georgia	NIS & Russia	Lower-middle-income
Germany	Western Europe	High-income
Ghana	Africa	Lower-middle-income
Greece	Western Europe	High-income
Grenada	North America & the Caribbean	Upper-middle-income
Guatemala	Latin America & the Caribbean	Lower-middle-income
Guinea	Africa	Low-income
Guinea Bissau	Africa	Low-income
Guyana	Latin America & the Caribbean	Lower-middle-income
Haiti	Latin America & the Caribbean	Low-income
Honduras	Latin America & the Caribbean	Lower-middle-income
Hong Kong	North and East Asia	High-income
Hungary	Eastern & Central Europe	High-income
Iceland	Western Europe	High-income

Country	ISN Region	Income Group
India	South Asia	Lower-middle-income
Indonesia	Oceania & South East Asia	Lower-middle-income
Iran	Middle East	Upper-middle-income
Iraq	Middle East	Upper-middle-income
Ireland	Western Europe	High-income
Israel	Western Europe	High-income
Italy	Western Europe	High-income
Jamaica	North America & the Caribbean	Upper-middle-income
Japan	North & East Asia	High-income
Jordan	Middle East	Upper-middle-income
Kazakhstan	NIS & Russia	Upper-middle-income
Kenya	Africa	Lower-middle-income
Kiribati	Oceania & South East Asia	Lower-middle-income
Korea, Democratic People's Republic of	North & East Asia	Low-income
Korea, South	North & East Asia	High-income
Kosovo	Eastern & Central Europe	Lower-middle-income
Kuwait	Middle East	High-income
Kyrgyzstan	NIS & Russia	Lower-middle-income
Laos	Oceania & South East Asia	Lower-middle-income
Latvia	Eastern & Central Europe	High-income
Lebanon	Middle East	Upper-middle-income
Lesotho	Africa	Lower-middle-income
Liberia	Africa	Low-income
Libya	Africa	Upper-middle-income
Lithuania	Eastern & Central Europe	High-income
Luxembourg	Western Europe	High-income
Macedonia	Eastern & Central Europe	Upper-middle-income
Madagascar	Africa	Low-income
Malawi	Africa	Low-income
Malaysia	Oceania & South East Asia	Upper-middle-income
Maldives	South Asia	Upper-middle-income
Mali	Africa	Low-income
Malta	Western Europe	High-income
Marshall Islands	Oceania & South East Asia	Upper-middle-income
Mauritania	Africa	Lower-middle-income
Mauritius	Africa	Upper-middle-income
Mexico	Latin America & the Caribbean	Upper-middle-income
Moldova	Eastern & Central Europe	Lower-middle-income
Mongolia	North & East Asia	Upper-middle-income
Montenegro	Eastern & Central Europe	Upper-middle-income
Morocco	Africa	Lower-middle-income
Mozambique	Africa	Low-income
Namibia	Africa	Upper-middle-income
Nepal	South Asia	Low-income
Netherlands	Western Europe	High-income
New Zealand	Oceania & South East Asia	High-income
Nicaragua	Latin America & the Caribbean	Lower-middle-income
Niger	Africa	Low-income
Nigeria	Africa	Lower-middle-income

Country	ISN Region	Income Group
Norway	Western Europe	High-income
Oman	Middle East	High-income
Pakistan	South Asia	Lower-middle-income
Palau	Oceania & South East Asia	Upper-middle-income
Panama	Latin America & the Caribbean	Upper-middle-income
Papua New Guinea	Oceania & South East Asia	Lower-middle-income
Paraguay	Latin America & the Caribbean	Upper-middle-income
Peru	Latin America & the Caribbean	Upper-middle-income
Philippines	Oceania & South East Asia	Lower-middle-income
Poland	Eastern & Central Europe	High-income
Portugal	Western Europe	High-income
Qatar	Middle East	High-income
Romania	Eastern & Central Europe	Upper-middle-income
Russia	NIS & Russia	High-income
Rwanda	Africa	Low-income
Samoa	Oceania & South East Asia	Lower-middle-income
San Marino	Western Europe	High-income
Sao Tome and Principe	Africa	Lower-middle-income
Saudi Arabia	Middle East	High-income
Senegal	Africa	Lower-middle-income
Serbia	Eastern & Central Europe	Upper-middle-income
Seychelles	Africa	High-income
Sierra Leone	Africa	Low-income
Singapore	Oceania & South East Asia	High-income
Slovakia	Eastern & Central Europe	High-income
Slovenia	Eastern & Central Europe	High-income
Solomon Islands	Oceania & South East Asia	Lower-middle-income
Somalia	Africa	Low-income
South Africa	Africa	Upper-middle-income
South Sudan	Africa	Low-income
Spain	Western Europe	High-income
Sri Lanka	South Asia	Lower-middle-income
St. Kitts and Nevis	North America & the Caribbean	High-income
St. Lucia	North America & the Caribbean	Upper-middle-income
St. Vincent and Grenadine	North America & the Caribbean	Upper-middle-income
Sudan	Africa	Lower-middle-income
Suriname	Latin America & the Caribbean	Upper-middle-income
Swaziland	Africa	Lower-middle-income
Sweden	Western Europe	High-income
Switzerland	Western Europe	High-income
Syria	Middle East	Lower-middle-income
Taiwan	North and East Asia	High-income
Tajikistan	NIS & Russia	Lower-middle-income
Tanzania	Africa	Low-income
Thailand	Oceania & South East Asia	Lower-middle-income
Timor Leste (East Timor)	Oceania & South East Asia	Lower-middle-income
Togo	Africa	Low-income
Tonga	Oceania & South East Asia	Upper-middle-income
Trinidad and Tobago	North America & the Caribbean	High-income

Country	ISN Region	Income Group
Tunisia	Africa	Upper-middle-income
Turkey	Eastern & Central Europe	Upper-middle-income
Turkmenistan	NIS & Russia	Upper-middle-income
Tuvalu	Oceania & South East Asia	Upper-middle-income
Uganda	Africa	Low-income
Ukraine	NIS & Russia	Lower-middle-income
United Arab Emirates	Middle East	High-income
United Kingdom	Western Europe	High-income
United States	North America & the Caribbean	High-income
Uruguay	Latin America & the Caribbean	High-income
Uzbekistan	NIS & Russia	Lower-middle-income
Vanuatu	Oceania & South East Asia	Lower-middle-income
Venezuela	Latin America & the Caribbean	High-income
Vietnam	Oceania & South East Asia	Lower-middle-income
West Bank	Middle East	Lower-middle-income
Yemen	Middle East	Lower-middle-income
Zambia	Africa	Lower-middle-income
Zimbabwe	Africa	Low-income

APPENDIX 3

GLOBAL KIDNEY HEALTH ATLAS (GKHA) QUESTIONNAIRE

Assessing country and regional profile for readiness, capacity and response to CKD and AKI

The International Society of Nephrology (ISN) plans to work collaboratively with existing organizations and initiatives at international and national levels – to promote early detection and effective treatment of kidney diseases in order to improve patient health and quality of life. Through understanding and potentially helping to shape relevant health policies, practices and infrastructure, ISN aims to facilitate the implementation of equitable and ethical care for kidney patients in all regions and countries of the world.

ISN intends to conduct a research exercise on the current status of care for kidney patients across all countries of the world. This project will determine the global status of CKD and AKI care structures and organization towards achieving universal health care (UHC), and devise policy implications for including CKD and AKI in the global health agenda.

This questionnaire is designed to address the 6 core areas which inform aspects of universal health coverage: health finance, health workforce, essential medications and health products access, health information systems and statistics, national health policy, and service delivery and safety as well as the response of nephrology community and capacity for research and development. Using this framework, we will be able to develop an appropriate global perspective on the state of kidney health and disease.

If you have any questions about completing the questionnaire please contact: Sandrine Damster (email: globalatlas@theisn.org).

Thank you for your involvement and readiness to participate.

Dr. Adeera Levin, MD, FRCPC, FACP
President, International Society of Nephrology

Questionnaire modules

Standardized questions to allow comparisons of country capacities and readiness based on WHO six domains of UHC, and responses (based on awareness, identified barriers and capacity for research and development in nephrology community)

Assessing capacity and readiness of nations for kidney care based on UHC domains

A HF, SDS Health finance, service delivery and safety
- Funding mechanism and availability
- Structure and organization of care delivery for CKD
- Structure and organization of care delivery for AKI

B HW Health workforce for nephrology care
- Essential workforce for CKD and AKI care

C EMHPA Essential medications and health product access
- Availability, coverage and access

D HISS Health information systems and statistics
- Databases, registries and surveillance systems

E NHP National health policy
- CKD policy, strategies and frameworks in the context of existing NCD programs
- AKI policy, strategies and frameworks

Assessing response of nephrology community (awareness, identified barriers and capacity for research and development)

F. CKD awareness and education

G. AKI awareness and education

H. Barriers to optimal kidney disease care

I. Capacity for research and development

Contact

Who is the focal person completing this survey?
Survey ID (optional):

Status? *Please tick all that apply.*
☐ Nephrologist
☐ Health professional (non-physician)
☐ Other (please specify)
☐ Non-nephrologist (physician)
☐ Administrator/policymaker

In which country do you reside?

ISN region?

City?

Assessing capacity and readiness of nations for kidney care

A. Health finance, service delivery and safety

A1. Description of the healthcare system

A.1.1. In general, what best describes your healthcare system?

- ☐ Publicly funded by government and free at the point of delivery
- ☐ Publicly funded by government but with some fees at the point of delivery
- ☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)
- ☐ Solely private and out-of-pocket
- ☐ Multiple systems –programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

A.1.1.1. If your healthcare system is publicly funded (in whole or in part) is this coverage universal (ie: are all residents of your country eligible to participate)?

- ☐ Yes, all residents are included in the coverage
- ☐ No, not all residents are included (please provide details)

A.1.1.2. If your healthcare system is publicly funded (in whole or in part), which aspects of care are not included in the coverage? *Please tick all that apply.*

- ☐ Dialysis
- ☐ Transplantation
- ☐ Management of CKD complications (anemia, bone disease, malnutrition)
- ☐ Management to reduce the risk of CKD progression (risk factor control)
- ☐ Other (please specify)
- ☐ Early management to reduce risk of CKD progression (risk factor control)
- ☐ Early detection in individuals at risk
- ☐ Management of AKI
- ☐ None – all aspects funded

A.1.2. What best describes your healthcare system's coverage for care of patients with kidney disease (excluding medications)? *Please tick all that apply. For option 'a mix of publicly funded and private systems': 'publicly funded' is whether or not publicly funded component is free at point of delivery.*

	Publicly funded by government and free at the point of delivery	Publicly funded bygovernment but with some fees at the point of delivery	A mix of publicly funded and private systems	Solely private and out-of pocket	Solely private through health insurance providers
Non-dialysis CKD	☐	☐	☐	☐	☐
Dialysis	☐	☐	☐	☐	☐
Kidney transplantation	☐	☐	☐	☐	☐
AKI	☐	☐	☐	☐	☐

Other (please specify)

A.1.3. We are interested in understanding within-country variation in kidney care delivery as well as between-country variation. In your opinion, is there important variation in the way that kidney care is organized or delivered between different regions/states within your country?

☐ Yes (if possible, please provide brief details)

☐ No (please explain why)

A.2 Service delivery and safety: structure and organization of care delivery for CKD and AKI

A.2.1. What best describes the oversight/direction of kidney disease care in your country?
Please tick all that apply.

☐ Managed/overseen by a national body

☐ Managed/overseen by provincial/regional/state level authorities only

☐ Managed by individual hospitals/trusts/Organizations

☐ Other (please specify)

☐ Managed by non-governmental organizations (NGOs)

☐ No organized system

A.2.2. How would you rate the health infrastructure in your country, in terms of adequacy for providing CKD care?

☐ Extremely poor

☐ Poor/below average

☐ Fair/average

☐ Good/above average

☐ Excellent

A.2.3. How would you rate the health infrastructure in your country, in terms of adequacy for providing AKI care?

☐ Extremely poor

☐ Poor/below average

☐ Fair/average

☐ Good/above average

☐ Excellent

Data sources for Section A

We would like you to consult as many colleagues or sources of data as needed to provide the answers that best describe nephrology care in your country.

What is/are the sources for the data you provided above for Section A?

How certain are you of the answers you have provided for Section A?

☐ Very uncertain

☐ Uncertain

☐ Moderate

☐ Certain

☐ Very certain

B. Health workforce for nephrology care

B1. Existing workforce capacity

B.1.1. Who bears primary responsibility for the delivery of CKD care in your country?
Please tick all that apply.

- ☐ Nephrologists
- ☐ Primary care physicians
- ☐ Nurse practitioners or specialized nurses
- ☐ Other specialists? (please specify)
- ☐ Multidisciplinary teams
- ☐ Health officers/extension workers

B.1.2. Who bears primary responsibility for the delivery of AKI care in your country?
Please tick all that apply.

- ☐ Nephrologists
- ☐ Intensive care specialists
- ☐ Primary care physicians
- ☐ Nurse practitioners or specialized nurses
- ☐ Other specialists? (please specify)
- ☐ Health officers/extension workers
- ☐ Technicians

B.1.3. Approximately how many nephrologists are there in your country, and how many nephrology trainees?

Nephrologists:

Nephrology trainees:

B.1.4. In your opinion, is there a shortage of any of the following providers in your country?
Please tick all that apply.

- ☐ Nephrologists
- ☐ Dietitians
- ☐ Renal pathologists
- ☐ Laboratory technicians
- ☐ Social workers
- ☐ Pharmacists
- ☐ Vascular access coordinators
- ☐ Nurse practitioners
- ☐ Counselors/ psychologists
- ☐ Transplant coordinators
- ☐ Dialysis nurses
- ☐ Dialysis technicians
- ☐ General practitioners/ primary care physicians
- ☐ No shortage of any of the staff mentioned above

B2. Training capacity

B.2.1. Is there a nephrology training program in your country?

☐ Yes ☐ No

B.2.2. How long is the training in nephrology (years)?

☐ 1
☐ 2
☐ 3
☐ 4
☐ > 4

B.2.3. How is the training in nephrology structured?

☐ Following general internal medicine
☐ Solo training after basic qualification as medical doctor
☐ A mix of 1 & 2 depending on region and/or training centre
☐ Other (please specify)

Data sources for Section B

We would like you to consult as many colleagues or sources of data as needed to provide the answers that best describe nephrology care in your country.

What is/are the sources for the data you provided above for Section B?

How certain are you of the answers you have provided for Section B?

☐ Very uncertain
☐ Uncertain
☐ Moderate
☐ Certain
☐ Very certain

C. Essential medications and health products access

C1. Identification and Management of CKD

C.1.1. Indicate the availability of the following services for CKD monitoring and management at PRIMARY care level in your country:

	Always	Usually	Rarely	Never
Blood pressure measurement	☐	☐	☐	☐
Height and weight measures	☐	☐	☐	☐
Serum glucose measurement	☐	☐	☐	☐
HbA1C test	☐	☐	☐	☐
Serum cholesterol measurement	☐	☐	☐	☐
Serum creatinine measurement without automated eGFR reporting	☐	☐	☐	☐
Serum creatinine measurement with automated eGFR reporting	☐	☐	☐	☐
Urinalysis using test strips for albumin/protein (qualitative assays)	☐	☐	☐	☐
Urinalysis using test strips for albumin/protein (quantitative assays)	☐	☐	☐	☐
Urine albumin: creatinine ratio (ACR) or protein: creatinine ratio (PCR) measurements	☐	☐	☐	☐
Radiological services (eg: facilities for kidney ultrasound)	☐	☐	☐	☐
Pathology services (renal biopsy interpretation facilities)	☐	☐	☐	☐

C.1.2. Indicate the availability of the following services for CKD monitoring and management at SECONDARY OR TERTIARY care level in your country:

	Always	Usually	Rarely	Never
Blood pressure measurement	☐	☐	☐	☐
Height and weight measures	☐	☐	☐	☐
Serum glucose measurement	☐	☐	☐	☐
HbA1C test	☐	☐	☐	☐
Serum cholesterol measurement	☐	☐	☐	☐
Serum creatinine measurement without automated eGFR reporting	☐	☐	☐	☐
Serum creatinine measurement with automated eGFR reporting	☐	☐	☐	☐
Urinalysis using test strips for albumin/protein (qualitative assays)	☐	☐	☐	☐
Urinalysis using test strips for albumin/protein (quantitative assays)	☐	☐	☐	☐
Urine albumin: creatinine ratio (ACR) or protein: creatinine ratio (PCR) measurements	☐	☐	☐	☐
Radiological services (eg: facilities for kidney ultrasound)	☐	☐	☐	☐
Pathology services (renal biopsy interpretation facilities)	☐	☐	☐	☐

C2. Capacity for chronic renal replacement therapy (RRT) service provision

C.2.1 Is chronic hemodialysis available in your country?

☐ Yes ☐ No

C.2.1.1 If yes, how is chronic hemodialysis funded in your country?

☐ Publicly funded by government and free at the point of delivery

☐ Publicly funded by government but with some fees at the point of delivery

☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)

☐ Solely private and out-of-pocket

☐ Solely private through health insurance providers

☐ Multiple systems – programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

C.2.2 Is chronic peritoneal dialysis (PD) available in your country?

☐ Yes ☐ No

C.2.2.1 If yes, how is chronic PD funded in your country?

☐ Publicly funded by government and free at the point of delivery

☐ Publicly funded by government but with some fees at the point of delivery

☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)

☐ Solely private and out-of-pocket

☐ Solely private through health insurance providers

☐ Multiple systems – programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

C.2.3 Is kidney transplantation available in your country?

☐ Yes ☐ No

C.2.3.1 If yes:

☐ Deceased donor kidney transplant only

☐ Live donor kidney transplant only

☐ A combination of deceased and live donor kidney transplant (proportion: deceased % live %)

C.2.3.2. If yes, how is kidney transplantation funded in your country?

- ☐ Publicly funded by government and free at the point of delivery
- ☐ Publicly funded by government but with some fees at the point of delivery
- ☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)
- ☐ Solely private and out-of-pocket
- ☐ Solely private through health insurance providers
- ☐ Multiple systems – programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

C.2.4. Is there a national kidney transplant waitlist?

☐ Yes ☐ No, waiting lists are regional ☐ No

C3. Capacity for acute RRT service provision

C.3.1 Is acute hemodialysis available in your country?

☐ Yes ☐ No

C.3.1.1 If yes, how is acute hemodialysis funded in your country?

- ☐ Publicly funded by government and free at the point of delivery
- ☐ Publicly funded by government but with some fees at the point of delivery
- ☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)
- ☐ Solely private and out-of-pocket
- ☐ Solely private through health insurance providers
- ☐ Multiple systems – programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

C.3.2 Is acute peritoneal dialysis available in your country?

☐ Yes ☐ No

C.3.2.1 If yes, how is acute peritoneal dialysis funded in your country?

- ☐ Publicly funded by government and free at the point of delivery
- ☐ Publicly funded by government but with some fees at the point of delivery
- ☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)
- ☐ Solely private and out-of-pocket
- ☐ Solely private through health insurance providers
- ☐ Multiple systems – programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

C4. Access to Medications and reimbursement plans

C.4.1 For all CKD patients: How are medications funded?

- ☐ Publicly funded by government and free at the point of delivery
- ☐ Publicly funded by government but with some fees at the point of delivery
- ☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)
- ☐ Solely private and out-of-pocket
- ☐ Solely private through health insurance providers
- ☐ Multiple systems – programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

C.4.2 For all dialysis patients: How are medications funded?

- ☐ Publicly funded by government and free at the point of delivery
- ☐ Publicly funded by government but with some fees at the point of delivery
- ☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)
- ☐ Solely private and out-of-pocket
- ☐ Solely private through health insurance providers
- ☐ Multiple systems – programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

C.4.3 For all transplant patients: How are medications funded?

- ☐ Publicly funded by government and free at the point of delivery
- ☐ Publicly funded by government but with some fees at the point of delivery
- ☐ A mix of publicly funded (whether or not publicly funded component is free at point of delivery) and private systems (please explain)
- ☐ Solely private and out-of-pocket
- ☐ Solely private through health insurance providers
- ☐ Multiple systems – programs provided by government, nongovernmental organizations (NGOs), and communities

If a mix of publicly funded and private systems (please explain) or "Other" (please specify)

Data sources for Section C

We would like you to consult as many colleagues or sources of data as needed to provide the answers that best describe nephrology care in your country.

What is/are the sources for the data you provided above for Section C?

How certain are you of the answers you have provided for Section C?

- ☐ Very uncertain
- ☐ Uncertain
- ☐ Moderate
- ☐ Certain
- ☐ Very certain

D. Health information systems and statistics

D1. Availability of registry

D.1.1. Is there an official registry in your country for?

	Yes	No
Non-dialysis CKD	☐	☐
Dialysis	☐	☐
Transplantation	☐	☐
AKI	☐	☐

D.1.1.1. If yes [Non-dialysis CKD], is participation by providers?

☐ Voluntary

☐ Mandatory

☐ I do not know/Information not available

D.1.1.2. If yes [Non-dialysis CKD], what does this non-dialysis dependent CKD registry cover?
Please tick all that apply.

☐ The whole spectrum of CKD (Stages 1-5)

☐ Advanced CKD only (Stages 4/5)

☐ The whole country

☐ Specific regions only (please name)

D.1.1.3. If yes [Dialysis], is participation by providers?

☐ Voluntary

☐ Mandatory

☐ I do not know/Information not available

D.1.1.4. If yes [Transplantation], is participation by providers:

☐ Voluntary

☐ Mandatory

☐ I do not know/Information not available

D.1.1.5. If yes [AKI], is participation by providers:

☐ Voluntary

☐ Mandatory

☐ I do not know/Information not available

D2. Burden of CKD (CKD prevalence)

D.2.1. Are there data on the prevalence of CKD in your country?

☐ Yes ☐ No

D3. Identification of CKD

D.3.1. For which of the following high-risk groups do practitioners in your country routinely offer testing for CKD?

- ☐ Those with hypertension
- ☐ Those with diabetes
- ☐ Those with cardiovascular disease (Ischaemic heart disease, stroke, PVD, heart failure)
- ☐ Those with autoimmune/multisystem diseases (systemic lupus erythematous, Rheumatoid arthritis)
- ☐ The elderly (65 years and older)
- ☐ Those with urological disorders (structural, stone diseases)
- ☐ Chronic users of nephrotoxic medications
- ☐ Members of high-risk ethnic groups (Aboriginal, Africans, Indo-Asians)
- ☐ Those with a family history of CKD

D.3.2. In your country, are there ethnic groups considered to be at increased risk for CKD?

☐ No ☐ Yes (please specify)

D.3.3. In your country, is there an active CKD detection program based on national policy and/or guidelines?

☐ Yes ☐ No

D.3.3.1. If yes, how is this program implemented? Please tick all that apply.

- ☐ Reactive approach - cases managed as identified through practice
- ☐ Active screening of population at-risk through routine health encounters
- ☐ Active screening of population at-risk through specific screening processes
- ☐ Other (please specify)

D4. Burden of AKI (incidence and prevalence)

D.4.1. Does your country have the ability to determine the prevalence of AKI not requiring dialysis?

☐ Yes ☐ No ☐ I do not know/info not available

D.4.2. Does your country have the ability to determine the incidence of AKI NOT requiring dialysis?

☐ Yes ☐ No ☐ I do not know/info not available

D.4.3. Does your country have the ability to determine the prevalence of AKI requiring dialysis?

☐ Yes ☐ No ☐ I do not know/info not available

D.4.4. Does your country have the ability to determine the incidence of AKI requiring dialysis?

☐ Yes ☐ No ☐ I do not know/info not available

D5. Identification of AKI

D.5.1. In your country, are there specific groups considered to be at increased risk for AKI?

☐ No ☐ Yes (please specify)

Data sources for Section D

We would like you to consult as many colleagues or sources of data as needed to provide the answers that best describe nephrology care in your country.

What is/are the sources for the data you provided above for Section D?

How certain are you of the answers you have provided for Section D?

☐ Very uncertain
☐ Uncertain
☐ Moderate
☐ Certain
☐ Very certain

E. National health policy

E1. CKD advocacy

E.1.1. In your opinion, is CKD recognized as a health priority by the government in your country?

☐ Yes (please provide details)
☐ No (please explain why)

E.1.2. Is there an advocacy group at the higher levels of government (ie: a Parliamentary committee) or an NGO (ie: a health charity) to raise the profile of CKD and its prevention?

☐ Yes (please provide details)
☐ No (please explain why)

E.1.3. Are there existing national/regional physician oriented organizations or patient organizations that,provide resources for CKD management?

☐ Yes (please provide details)
☐ No (please explain why)

E2. AKI advocacy

E.2.1. Is there an advocacy group at the higher levels of government (ie: a Parliamentary committee) or an NGO to raise the profile of AKI and its prevention?

☐ Yes (please provide details)
☐ No (please explain why)

E.2.2. Are there existing national/regional physician oriented organizations or patient organizations that provide resources for AKI management?

☐ Yes (please provide details)
☐ No (please explain why)

E3. CKD and non-communicable chronic disease (NCD) policy and strategy

E.3.1. Does your country have a national non-communicable chronic disease strategy?

☐ Yes (please provide details)

☐ Yes, under development (please provide details)

☐ No (not detail needed)

E.3.2. Does your country have a national strategy for improving the care of CKD patients?

	Non-dialysis dependent CKD	Chronic dialysis	Kidney transplantation
Yes, a national CKD specific strategy exists for the following populations *(please tick all that apply)*:	☐	☐	☐
Yes, but the CKD strategy is incorporated into a NCD strategy that includes other diseases. The CKD strategy applies to the following populations *(please tick all that apply)*:	☐	☐	☐
No	☐	☐	☐

E.3.3. If your country does not have a national strategy for improving the care of CKD patients, are there other initiatives that identify CKD as a health care priority in your country? *Please tick all that apply.*

☐ National position paper on CKD care

☐ Provider incentives for identifying CKD

☐ Incentives for providing quality care to CKD patients

☐ Important regional/level strategy or strategies (please provide details)

If Important regional/state level strategy or strategies or "Other" (please specify)

E4. CKD specific policies, guidelines and/or service frameworks

E.4.1. Are there available CKD management and referral guidelines in your country?

☐ Yes, national guidelines

☐ Yes, major regional guidelines

☐ Yes, uses or adopt the existing international guidelines (eg: KDIGO)

☐ No

E.4.1.1. If yes, what do these management and referral guidelines cover? *Please tick all that apply.*

☐ Identification of CKD progression

☐ Timing and urgency for nephrology referral

☐ Multidisciplinary care approach

☐ Risk factor management

☐ Management of complications (cardiovascular disease, hematologic and bone disorders, malnutrition)

E.4.1.2. Please rate awareness of the CKD guideline among non-nephrologists in your country.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

E.4.1.3. Please rate the adoption (application in clinical practice) of the CKD guideline among non-nephrologists in your country.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

E.4.1.4. Please rate the awareness of the CKD guideline among nephrologists in your country.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

E.4.1.5. Please rate the adoption (application in clinical practice) of the CKD guideline among nephrologists in your country.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

E5. AKI specific policy and strategy

E.5.1. Does your country have a national strategy for improving the identification of AKI, are there other initiatives that identify AKI as an important health care priority in your country?
Please tick all that apply.

- ☐ National position paper on AKI identification and care
- ☐ Tools available for identification of AKI
- ☐ Incentives for providing quality care to AKI patients
- ☐ Important regional/state level strategy or strategies (please provide details)
- ☐ Increasing access to acute dialysis facilities
- ☐ No strategies exist for AKI

If Important regional/state level strategy or strategies or Other (please specify)

E.5.2. Please provide additional details on important regional/state level strategy or strategies important regional/state level strategy or strategies (5 lines):

E6. AKI specific policies, guidelines and/or service frameworks

E.6.1. Are there AKI management & referral guidelines in your country?

- ☐ Yes, national guidelines
- ☐ Yes, major regional guidelines
- ☐ Yes, uses or adopt the existing international guidelines (eg KDIGO)
- ☐ No

E.6.1.1. If yes, what do these management & referral guidelines cover? *Please tick all that apply.*

- ☐ Identification of AKI in outpatient settings
- ☐ Identification of AKI in inpatient settings
- ☐ Timing and urgency for nephrology referral
- ☐ Access to dialysis treatment
- ☐ Protocols for mitigating risk of AKI in specific situations

E.6.1.2. Please rate the awareness of the AKI management guideline among non-nephrologists in your country.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

E.6.1.3. Please rate the adoption (application in clinical practice) of the AKI management guideline among non-nephrologists in your country.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

E.6.1.4. Please rate the awareness of the AKI management guideline among nephrologists in your country.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

E.6.1.5. Please rate the adoption (application in clinical practice) of the AKI management guideline among nephrologists in your country.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

Data sources for Section E

We would like you to consult as many colleagues or sources of data as needed to provide the answers that best describe nephrology care in your country.

What is/are the sources for the data you provided above for Section E?

How certain are you of the answers you have provided for Section E?

- ☐ Very uncertain
- ☐ Uncertain
- ☐ Moderate
- ☐ Certain
- ☐ Very certain

Assessing response of nephrology community

F. Awareness and education about CKD

F1. Please rate the typical level of CKD awareness among non-nephrologist specialists.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

F2. Please rate the typical level of CKD awareness among primary care physicians (eg: general practitioners).

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

G. Awareness and education about AKI

G1. Please rate the typical level of AKI awareness among non-nephrologist specialists.

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

G2. Please rate the typical level of AKI awareness among primary care physicians (eg: general practitioners)

- ☐ Extremely low
- ☐ Low/below average
- ☐ Moderate/average
- ☐ High/above average
- ☐ Very high

H. Barriers to optimal kidney disease care

H1. Barriers to optimal kidney disease care

H.1.1. Are there specific barriers to optimal kidney disease care in your country? *Please tick all that apply.*

- ☐ Geography (distance from care or prolonged travel time)
- ☐ Physician (availability, access, knowledge, attitude)
- ☐ Patient (knowledge, attitude)
- ☐ Nephrologists (availability)
- ☐ Healthcare system (availability, access, capability)
- ☐ Other (please specify)

H2. Barriers to optimal RRT provision

H.2.1. Are there specific barriers to optimal RRT care in your country? *Please tick all that apply.*

- ☐ Geography (distance from care or prolonged travel time)
- ☐ Physician (availability, access, knowledge, attitude)
- ☐ Patient (knowledge, attitude)
- ☐ Nephrologists (availability)
- ☐ Healthcare system (availability, access, capability)
- ☐ Other (please specify)

I. Capacity for research and development

I.1. Is there a national agency responsible for funding clinical trials in your country?

☐ Yes ☐ No

I.2. Does your country participate in clinical trials in kidney disease? *Please tick all that apply.*

☐ Phase 1
☐ Phase 2
☐ Phase 3
☐ Phase 4
☐ Health service delivery trials

I.3. Does your country have formal training for physicians in clinical trial conduct?

☐ Yes ☐ No ☐ I do not know/info not available

I.3.1. If yes, is it mandatory?

☐ Yes ☐ No ☐ I do not know/info not available

I.4. Does your country have formal training for non-physicians/ research assistants and associates in clinical trial conduct?

☐ Yes ☐ No ☐ I do not know/info not available

I.4.1. If yes, is it mandatory?

☐ Yes ☐ No ☐ I do not know/info not available

I.5. Does your country have biobanking facilities?

☐ Yes ☐ No ☐ I do not know/info not available

I.6. Does your country have the capacity (trained workforce) to conduct observational cohort studies?

☐ Yes ☐ No ☐ I do not know/info not available

I.7. Does your country usually have resources (funding) to conduct observational cohort studies?

☐ Yes ☐ No ☐ I do not know/info not available

I.8. Is your country involved in any observational cohort studies in CKD?

☐ Yes ☐ No ☐ I do not know/info not available

I.8.1. If yes, where?

☐ In non dialysis CKD populations
☐ In dialysis populations
☐ In transplant populations

I.9. Is ethics approval in your country mandatory for observational cohort studies in CKD?

☐ Yes ☐ No ☐ I do not know/info not available

I.9.1. If yes, is the ethics approval

☐ Institutional ☐ National

☐ Regional ☐ Other (please specify)

I.10. Which regulatory agencies oversee clinical trials in your country? Please list if known.

I.11. Are there challenges in getting timely regulatory approvals in your country?

☐ Often ☐ Occasionally

☐ Sometimes ☐ No

I.11.1. If yes, please list any common issues you are aware of.

I.12. Are there academic centres that co-ordinate and monitor sites involved in renal clinical trials in your country?

☐ Yes ☐ No ☐ I do not know/info not available

I.12.1. If yes, please list any you are aware of, and if possible provide website links and/or contact details.

I.13. In what proportion of sites in your country is there capacity for storing clinical trial medications?

☐ All ☐ Few

☐ Most ☐ None

☐ Some ☐ Unknown

Thank you

Thank you very much for taking the time to respond to this survey!

Your active participation in helping ISN develop an appropriate global perspective on the state of kidney health and disease is greatly appreciated.

The Global Kidney Disease Atlas (GKHA) Questionnaire team

Online version of *ISN Global Kidney Health Atlas*: www.theisn.org/global-atlas

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