ISN-GKHA: Structures, organization, and services for the management of kidney failure in Oceania and South East Asia

Supplementary Tables, Figures, and Appendix

Table S1. General demographic, economic indicators, and burden of chronic kidney disease in the Oceania and South East Asia countries and territories not participating in the ISN-GKHA survey.

Table S2. Burden of chronic kidney disease and its risk factors in the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.

Figure S1. Shortage in kidney care providers identified by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.

Figure S2. Proportion of patients starting dialysis with different forms of vascular access and adequate education in countries and territory participating in the ISN-GKHA survey.

Figure S3. Availability of services to diagnose and treat complications of kidney failure reported by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.

Figure S4. Quality indicators monitored and reported by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.

Figure S5. Registry characteristics for the Oceania and South East Asia countries and territory that have reported having one or more in the ISN-GKHA survey.

Figure S6. National strategies available in countries reported by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.

Figure S7. Population covered under national non-communicable disease and chronic kidney disease strategies reported by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.

Appendix. Reference list for annual cost of kidney replacement therapy (for Table 1).

Table S1. General demographic, economic indicators, and burden of chronic kidney disease in the Oceania and South East Asia countries and territories not participating in the ISN-GKHA survey.[S1,S2,S3]

Country/Territory	World Bank ranking	Area (km^2)	Total population (2018)	GDP (PPP) (billion, est. 2017, US$)	Total health expenditures (% of GDP)	CKD Prevalence % (95% CI)
American Samoa (USA)	Upper-middle income	224	50,826	0.658	---	11.89 (10.97-12.84)
French Polynesia (France)	High-income	4167	290,373	5.49	---	---
Guam (USA)	High-income	544	167,772	5.793	---	13.41 (12.41-14.49)
Kiribati	Lower-middle income	811	109,367	0.227	11.9	9.93 (9.15-10.78)
Marshall Islands*	Upper-middle income	181	75,684	0.196	23.3	9.67 (8.88-10.47)
Micronesia, Federal States of*	Lower-middle income	702	103,643	0.348	12.6	10.70 (9.88-11.62)
Nauru	Upper-middle income	21	9,692	0.160	11.1	---
Northern Mariana Islands (USA)	High-income	464	51,994	1.242	---	14.69 (13.47-16.05)
Palau	High-income	459	21,516	0.264	11.7	---
Papua New Guinea	Lower-middle income	462,840	7,027,332	30.19	2.0	8.23 (7.54-8.94)
Solomon Islands	Lower-middle income	28,896	660,121	1.33	5.2	8.63 (7.96-9.41)
Timor-Leste	Lower-middle income	14,874	1,321,929	7.426	4.0	7.47 (6.94-8.07)
Tonga	Upper-middle income	747	106,398	0.591	5.3	11.81 (10.91-12.75)
Tuvalu	Upper-middle income	26	11,147	0.042	15.5	---
Vanuatu	Lower-middle income	12,189	288,037	0.772	3.7	9.03 (8.36-9.80)

Abbreviations: CI: confidence interval; GDP: gross domestic product; PPP: purchasing power parity; ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas; CKD: chronic kidney disease

Results of CKD prevalence are expressed as percentage (%) of the population.
'---': data not available
*associated with the USA

Table S2. Burden of chronic kidney disease and its risk factors in the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.[S1,S2]

Country/Territory	CKD Prevalence % (95% CI)	Death attributed to CKD % (95% CI)	DALYs attributed to CKD % (95% CI)	Obesity % (95% CI)	Increased BP % (95% CI)	Smoking % (95% CI)
Australia	11.15 (10.35 - 12.08)	2.61 (2.48 - 2.74)	1.26 (1.14 - 1.38)	30.4 (26.5 - 34.4)	15.2 (11.5 - 19.4)	14.6 (13.6 - 15.6)
Brunei Darussalam	10.26 (9.36 - 11.23)	3.75 (3.48 - 4.03)	2.45 (2.18 - 2.71)	14.7 (11.0 - 18.9)	18.9 (13.5 - 25.2)	12.7 (11.3 - 14.2)
Cambodia	8.0 (7.39 - 8.66)	1.8 (1.66 - 1.96)	1.26 (1.13 - 1.4)	3.5 (2.3 - 5.1)	26.1 (19.6 - 33.0)	15.4 (13.7 - 17.1)
Fiji	13.64 (12.56 - 14.8)	3.83 (3.53 - 4.14)	2.7 (2.44 - 2.96)	30.0 (24.4 - 35.9)	21.7 (15.6 - 28.7)	11.1 (9.5 - 12.9)
Indonesia	10.84 (9.99 - 11.71)	2.16 (2.07 - 2.33)	1.71 (1.57 - 1.83)	6.9 (5.1 - 9.1)	23.8 (18.5 - 29.5)	25.6 (23.6 - 27.8)
Lao PDR	8.54 (7.9 - 9.22)	2.3 (1.99 - 2.54)	1.51 (1.29 - 1.72)	4.5 (3.0 - 6.4)	24.8 (18.8 - 31.1)	25.1 (21.6 - 29.2)
Malaysia	11.08 (10.12 - 12.1)	2.86 (2.65 - 3.1)	1.85 (1.67 - 2.06)	15.3 (12.3 - 18.7)	22.9 (17.9 - 28.7)	17.2 (15.2 - 19.2)
Myanmar	10.23 (9.45 - 11.03)	2.93 (2.69 - 3.3)	2.07 (1.84 - 2.32)	5.7 (4.0 - 7.8)	24.6 (18.5 - 31.1)	15.0 (13.3 - 17.0)
New Caledonia	-	-	-	-	-	-
New Zealand	10.95 (10.15 - 11.87)	2.37 (2.26 - 2.48)	1.27 (1.14 - 1.4)	32.0 (28.4 - 35.6)	16.2 (12.3 - 20.8)	15.3 (14.4 - 16.2)
Philippines	9.31 (8.6 - 10.02)	5.11 (4.84 - 5.37)	3.31 (2.97 - 3.65)	6.0 (4.3 - 8.1)	22.6 (17.4 - 28.1)	20.1 (17.5 - 23.0)
Samoa	9.94 (9.19 - 10.69)	5.21 (4.56 - 5.75)	3.07 (2.63 - 3.51)	45.5 (39.8 - 51.5)	24.0 (17.9 - 30.8)	21.5 (18.5 - 24.7)
Singapore	12.43 (11.49 - 13.46)	3 (2.85 - 3.15)	1.81 (1.6 - 2.01)	6.6 (4.6 - 9.0)	14.6 (10.8 - 19.0)	12.4 (11.1 - 13.7)
Thailand	13.9 (12.75 - 15.13)	4.69 (4.15 - 5.02)	2.74 (2.45 - 3.02)	10.8 (8.0 - 14.0)	22.3 (16.9 - 28.3)	17.9 (15.8 - 20.3)
Vietnam	10.72 (9.93 - 11.59)	2.87 (2.63 - 3.12)	1.89 (1.7 - 2.09)	2.1 (1.4 - 3.1)	23.4 (18.0 - 29.4)	18.8 (16.8 - 20.9)

Abbreviations: CI: confidence interval; CKD: chronic kidney disease; DALYs: disability-adjusted life years; BP: blood pressure; ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas

Results are expressed as percentage (%) of the population.
'-': data not available

Figure S1. Shortage in kidney care providers identified by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.

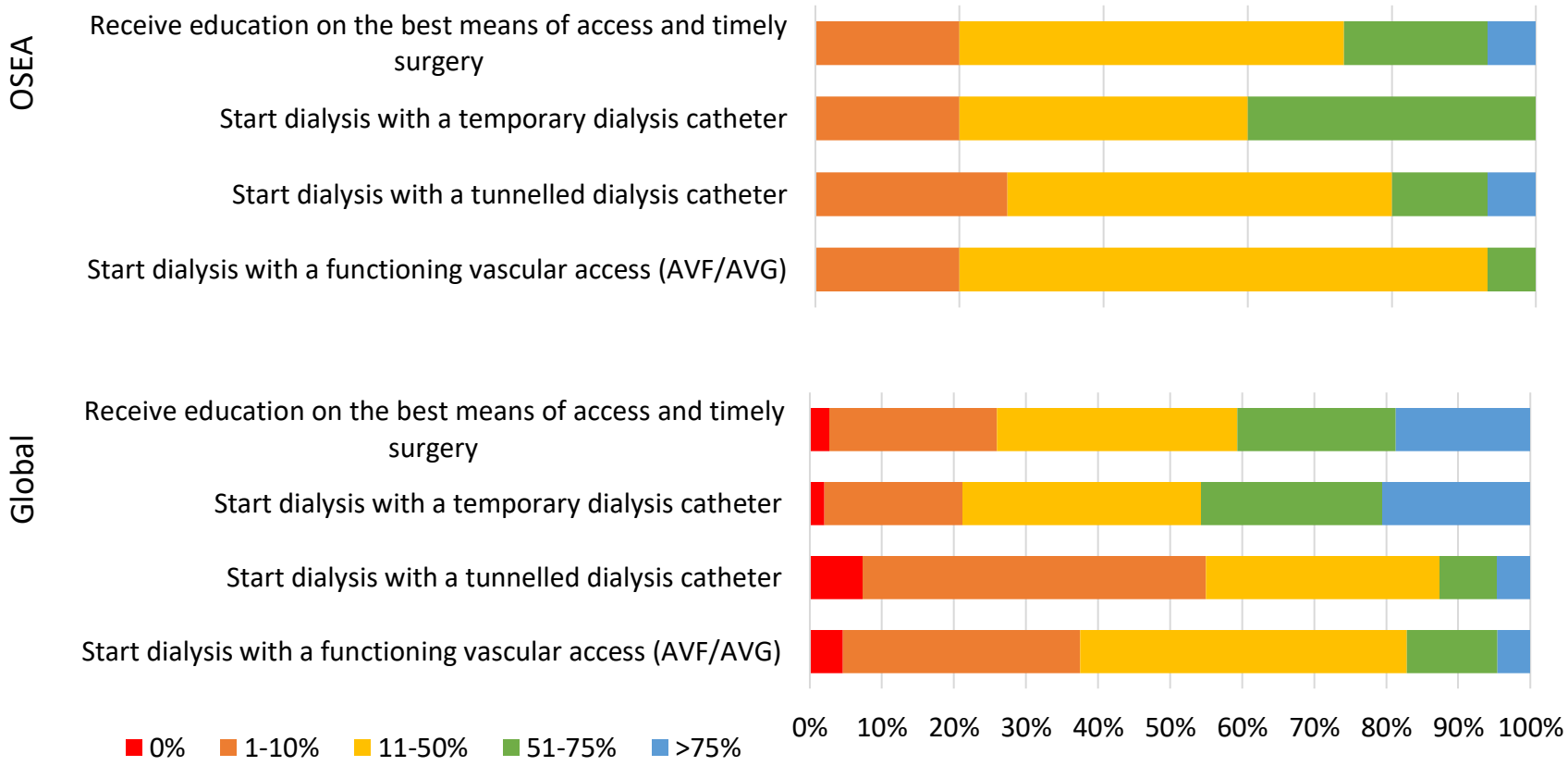
	Nephrologists	Transplant surgeons	Surgeons (HD access)	Surgeons (PD access)	Interventional radiologists (HD access)	Interventional radiologists (PD access)	Dietitians	Laboratory technicians	Radiologists (ultrasound)	Vascular access coordinators	Counsellors/ psychologists	Transplant coordinators	Dialysis nurses	Dialysis technicians	TOTAL SHORTAGE
N=	12	10	11	10	11	9	8	6	5	12	11	10	12	11	
Australia															0
Brunei Darussalam															11
Cambodia															14
Fiji															11
Indonesia															12
Lao PDR															7
Malaysia															14
Myanmar															14
New Caledonia															1
New Zealand															5
Philippines															12
Samoa															11
Singapore															5
Thailand															9
Vietnam															12

Abbreviations: ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas; HD: hemodialysis; PD: peritoneal dialysis; PDR: People's Democratic Republic

No shortage

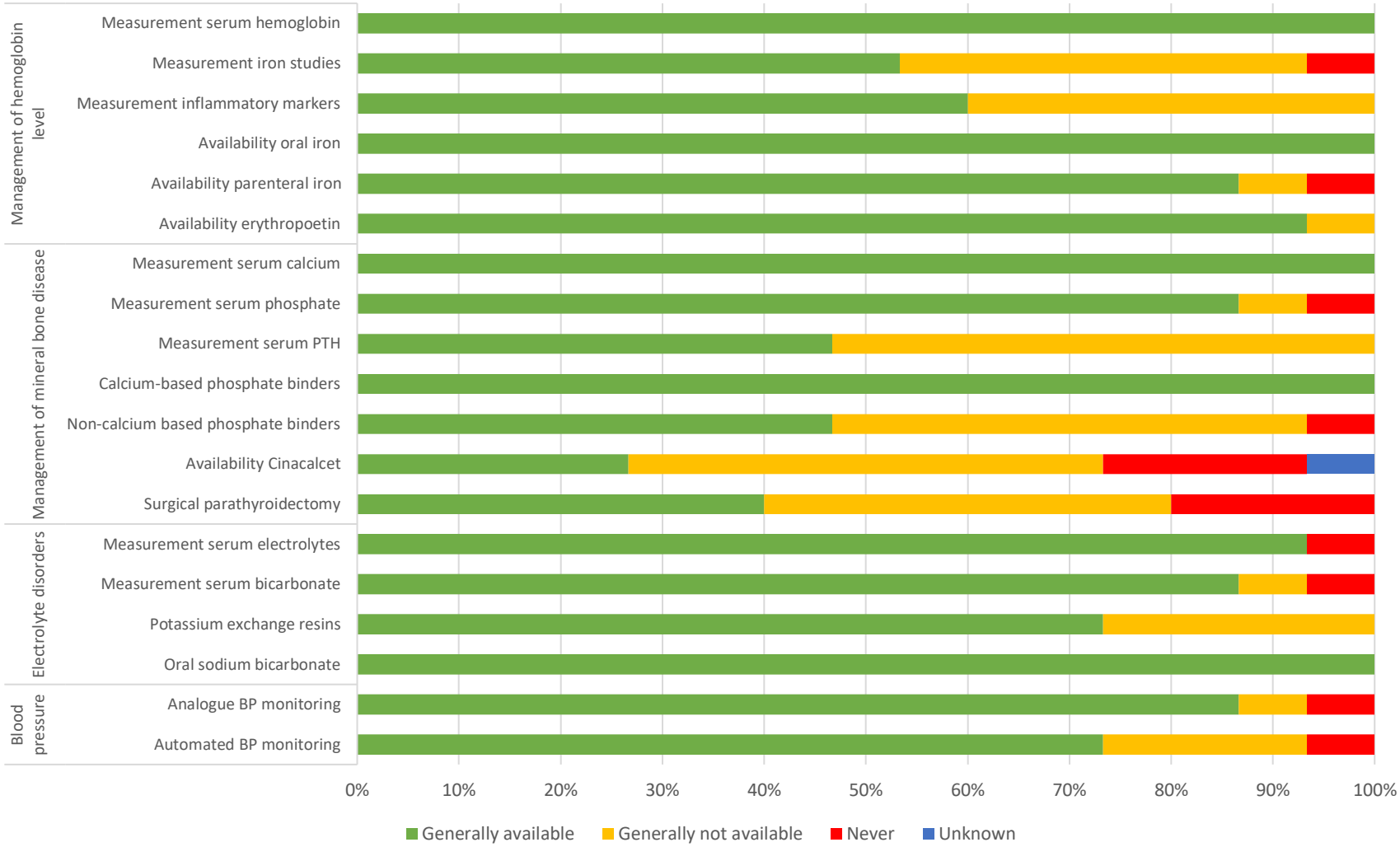
Shortage

Figure S2. Proportion of patients starting dialysis with different forms of vascular access and adequate education in countries and territory participating in the ISN-GKHA survey.



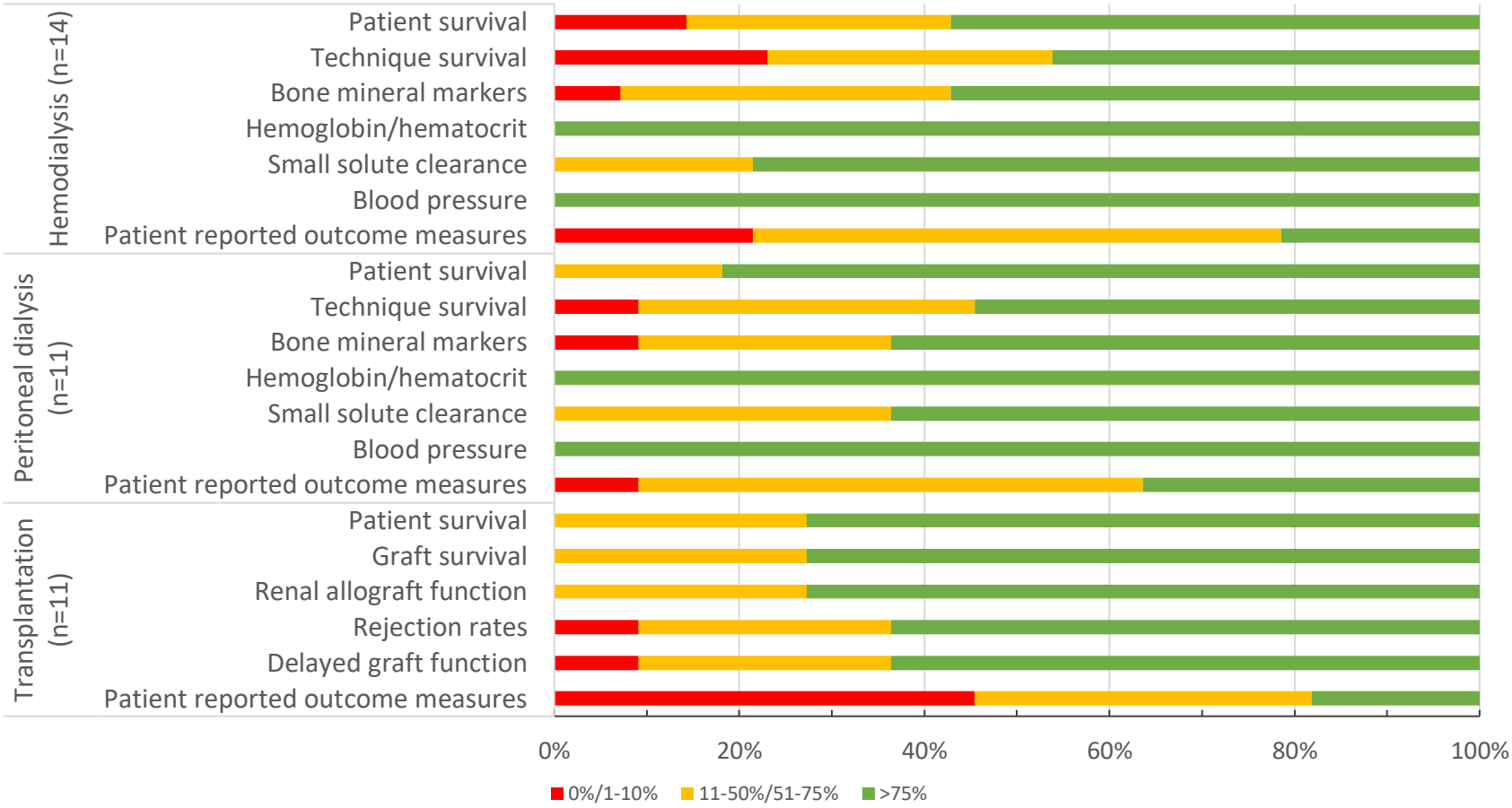
Abbreviations: ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas; AVF: arteriovenous fistula; AVG: arteriovenous graft; OSEA: Oceania and South East Asia

Figure S3. Availability of services to diagnose and treat complications of kidney failure reported by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.



Abbreviations: ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas; BP: blood pressure; PTH: parathyroid hormone

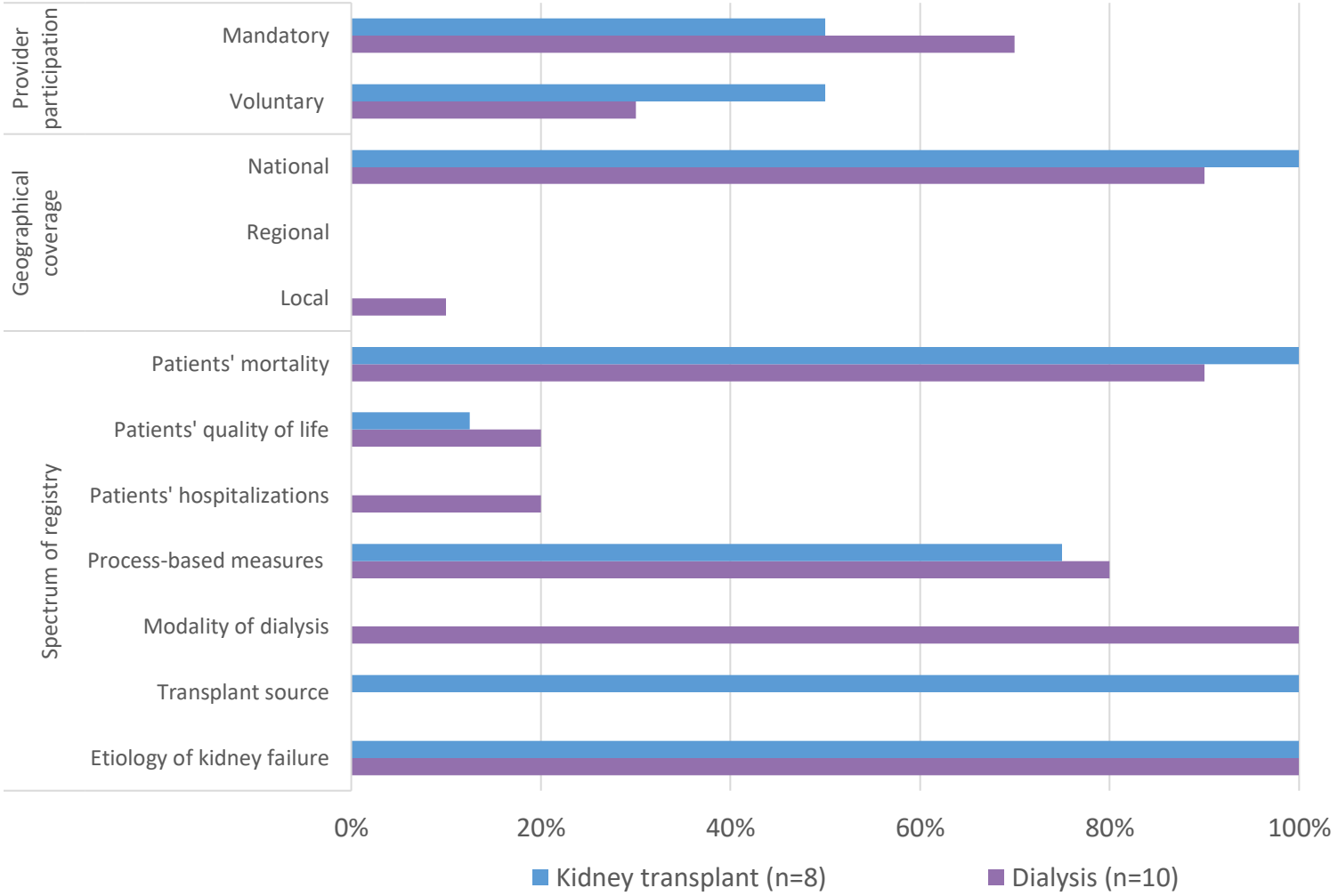
Figure S4. Quality indicators monitored and reported by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.



Abbreviations: ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas

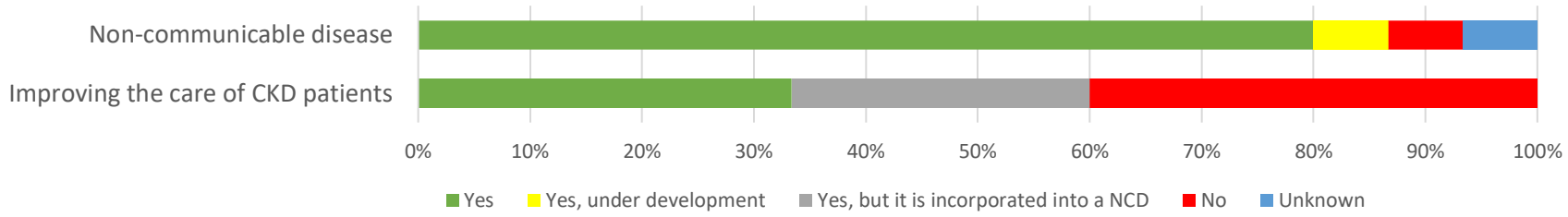
Hemodialysis: data is missing for Lao People's Democratic Republic; Peritoneal dialysis: data is missing for Fiji; Transplantation: data is included for New Caledonia

Figure S5. Registry characteristics for the Oceania and South East Asia countries and territory that have reported having one or more in the ISN-GKHA survey.



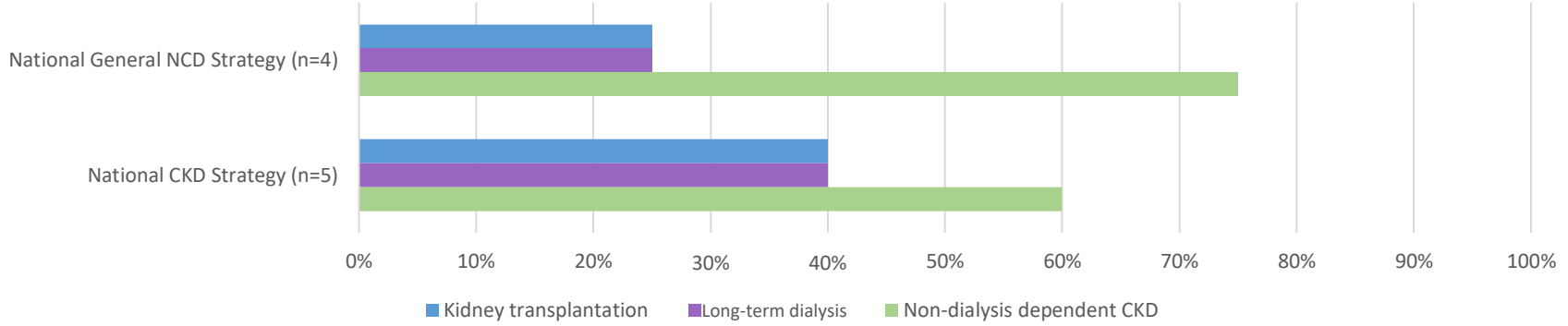
Abbreviations: ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas

Figure S6. National strategies available in countries reported by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.



Abbreviations: ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas; CKD: chronic kidney disease; NCD: non-communicable disease

Figure S7. Population covered under national non-communicable disease and chronic kidney disease strategies reported by the 15 Oceania and South East Asia countries and territory participating in the ISN-GKHA survey.



Abbreviations: ISN: International Society of Nephrology; GKHA: Global Kidney Health Atlas; CKD: chronic kidney disease; NCD: non-communicable disease

Supplementary References:

S1. Institute for Health Metrics and Evaluation. Global Burden of Disease Study 2017 (GBD 2017) Data Resources. Available at: http://ghdx.healthdata.org/gbd-2017. Accessed August 6, 2020.

S2. World Health Organization. The Global Health Observatory. Available at: https://www.who.int/gho/en/. Published 2019. Accessed: August 6, 2020.

S3. Central Intelligence Agency. The World Factbook. Available at: https://www.cia.gov/library/publications/the-world-factbook/. Published 2019. Accessed July 16, 2020.

Appendix. Reference list for annual cost of kidney replacement therapy (for Table 1) (APA format).

Agar, J. W., Knight, R. J., Simmonds, R. E., Boddington, J. M., Waldron, C. M., & Somerville, C. A. (2005). Nocturnal haemodialysis: an Australian cost comparison with conventional satellite haemodialysis. Nephrology, 10(6), 557-570.

Ashton, T., & Marshall, M. R. (2007). The organization and financing of dialysis and kidney transplantation services in New Zealand. International journal of health care finance and economics, 7(4), 233.

Bavanandan, S., Yap, Y. C., Ahmad, G., Wong, H. S., Azmi, S., & Goh, A. (2015). The cost and utility of renal transplantation in Malaysia. Transplantation direct, 1(10).

Hooi, L. S., Lim, T. O., Goh, A., Wong, H. S., Tan, C. C., Ahmad, G., & Morad, Z. (2005). Economic evaluation of centre haemodialysis and continuous ambulatory peritoneal dialysis in Ministry of Health hospitals, Malaysia. Nephrology, 10(1), 25-32.

Howard, K., Salkeld, G., White, S., Mcdonald, S., Chadban, S., Craig, J. C., & Cass, A. (2009). The cost-effectiveness of increasing kidney transplantation and home-based dialysis. Nephrology, 14(1), 123-132.

Khoe, L. C., Kristin, E., Masytoh, L. S., Herlinawaty, E., Werayingyong, P., Nadjib, M., ... & Teerawattananon, Y. (2017). Economic evaluation of policy options for dialysis in end-stage renal disease patients under the universal health coverage in Indonesia. PLoS One, 12(5), e0177436.

Komenda, P., Gavaghan, M. B., Garfield, S. S., Poret, A. W., & Sood, M. M. (2012). An economic assessment model for in-center, conventional home, and more frequent home hemodialysis. Kidney international, 81(3), 307-313.

Li, P. K., & Chow, K. M. (2001). The cost barrier to peritoneal dialysis in the developing world—an Asian perspective. Peritoneal Dialysis International, 21(3_suppl), 307-313.

Morad, Z., Lee, D. G., Lim, Y. N., & Tan, P. C. (2005). Peritoneal dialysis in Malaysia. Peritoneal dialysis international, 25(5), 426-431.

Naidas, O. D., Chan-Licuanan, K. R., Velasco, V. P., Dalay, C. V., & Bayog, D. V. (1998). Cost effectiveness analysis of alternative treatments of end-stage renal disease: Philippine experience. In Transplantation proceedings (Vol. 30, No. 7).

Neil, N., Walker, D. R., Sesso, R., Blackburn, J. C., Tschosik, E. A., Sciaraffia, V., ... & Bhattacharyya, S. K. (2009). Gaining efficiencies: resources and demand for dialysis around the globe. Value in Health, 12(1), 73-79.

Prodjosudjadi, W. (2006). Incidence, prevalence, treatment and cost of end-stage renal disease in Indonesia. Ethnicity and Disease, 16(2), S2.

Sitprija, V. (2003). Nephrology in South East Asia: fact and concept. Kidney International, 63, S128-S130.

Tan, C. C., Chan, C. M., Ho, C. K., Wong, K. S., Lee, E. J., & Woo, K. T. (2005). Health economics of renal replacement therapy: perspectives from Singapore. Kidney International, 67, S19-S22.

Teerawattananon, Y., Mugford, M., & Tangcharoensathien, V. (2007). Economic evaluation of palliative management versus peritoneal dialysis and hemodialysis for end-stage renal disease: evidence for coverage decisions in Thailand. Value in health, 10(1), 61-72.

UKM, G. A. M. M., Singam, T. S., Morad, Z., Lim, T. O., & Pahang, J. (1999). Cost effectiveness evaluation of the Ministry of Health Malaysia dialysis programme. Med J Malaysia, 54, 442-452.

Van Bui, P. (2008). How peritoneal dialysis has developed in Vietnam. Peritoneal Dialysis International, 28(Supplement 3), S63-S66.

van der Tol, A., Lameire, N., Morton, R. L., Van Biesen, W., & Vanholder, R. (2019). An international analysis of dialysis services reimbursement. Clinical Journal of the American Society of Nephrology, 14(1), 84-93.

Yang, F., Lau, T., & Luo, N. (2016). Cost-effectiveness of haemodialysis and peritoneal dialysis for patients with end-stage renal disease in Singapore. Nephrology, 21(8), 669-677.