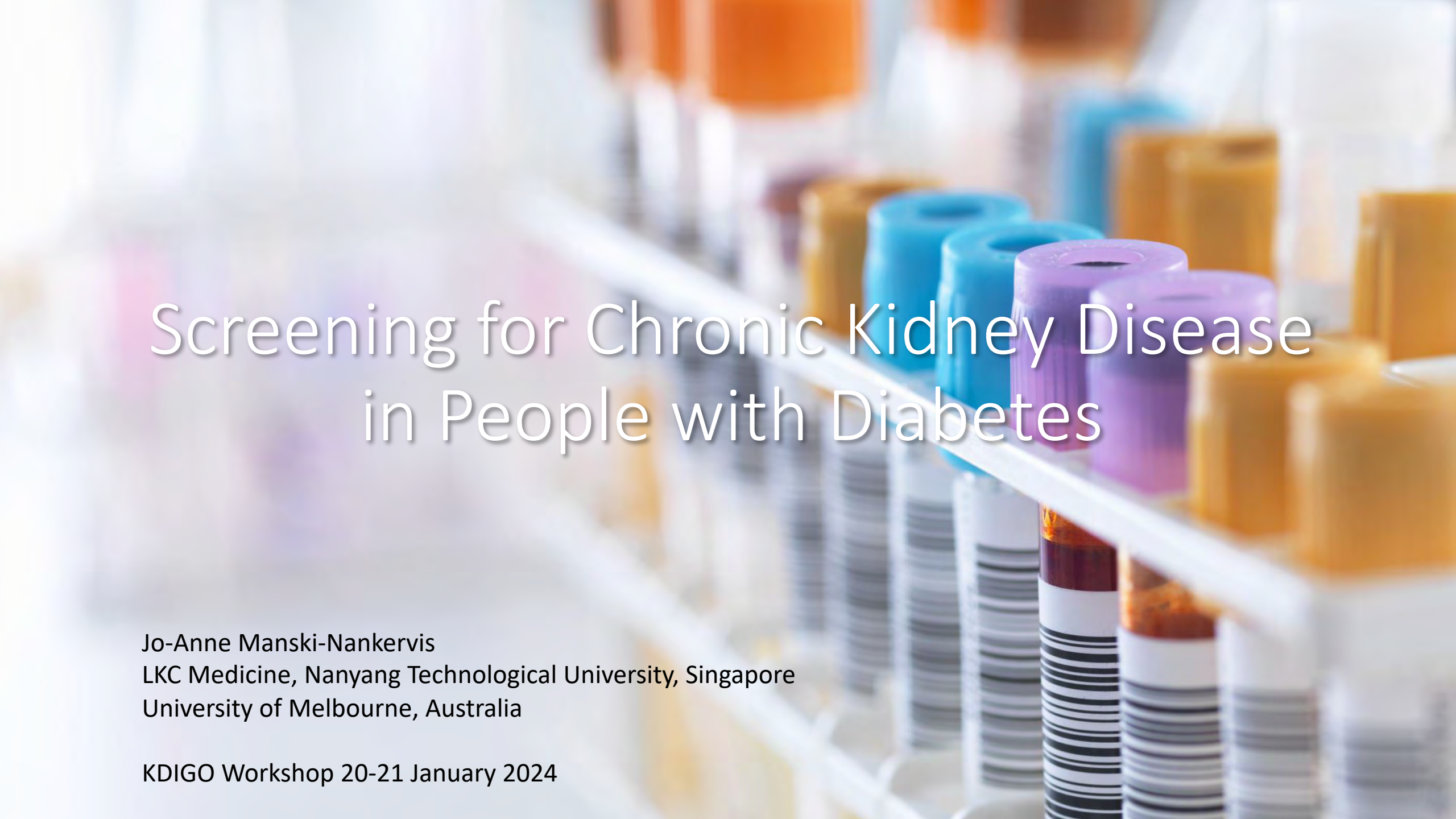

Screening for Chronic Kidney Disease in People with Diabetes

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KDIGO Workshop 20-21 January 2024

Screening and Detection of CKD in Diabetes

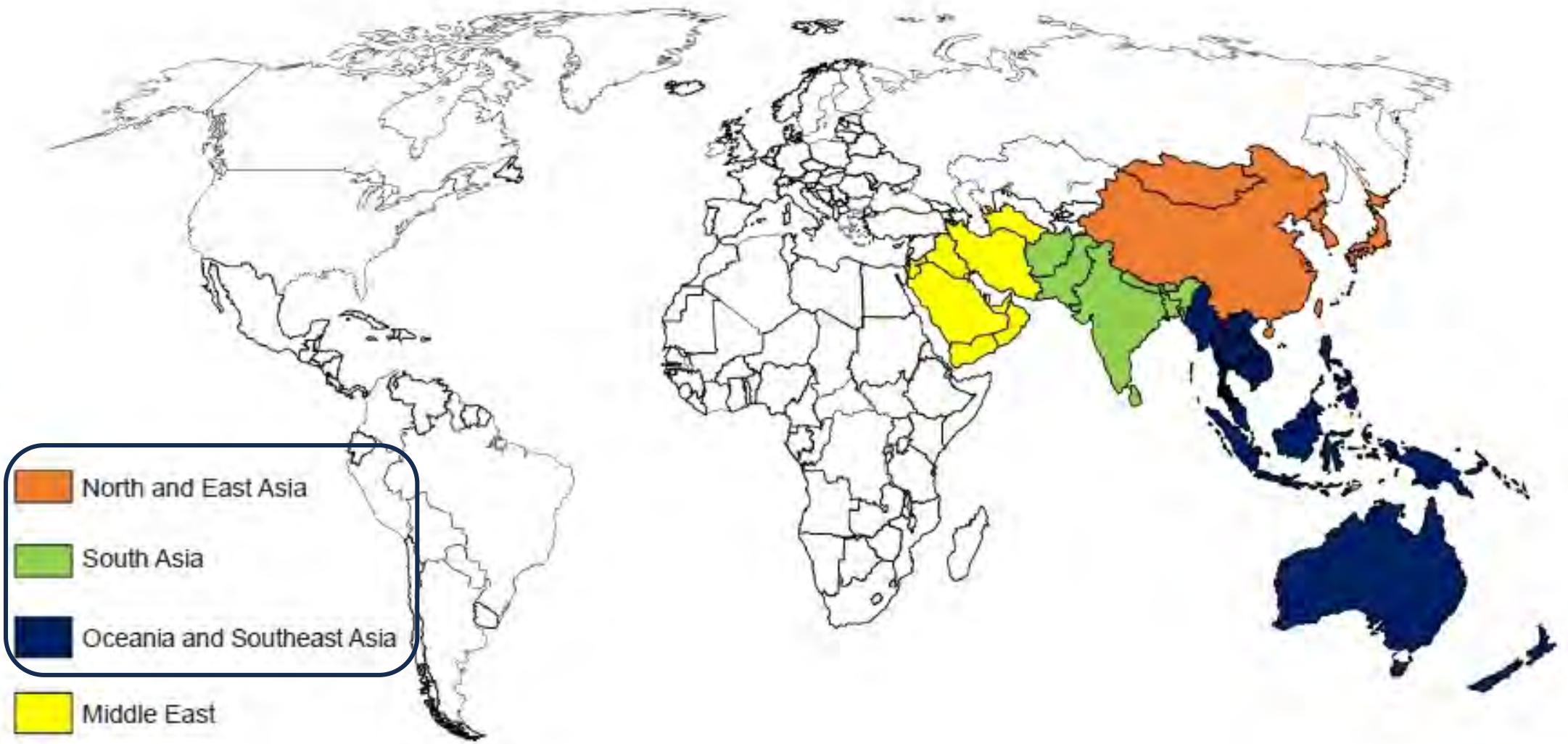
Who should be screened?

How should they be screened?

What are the challenges associated with screening?

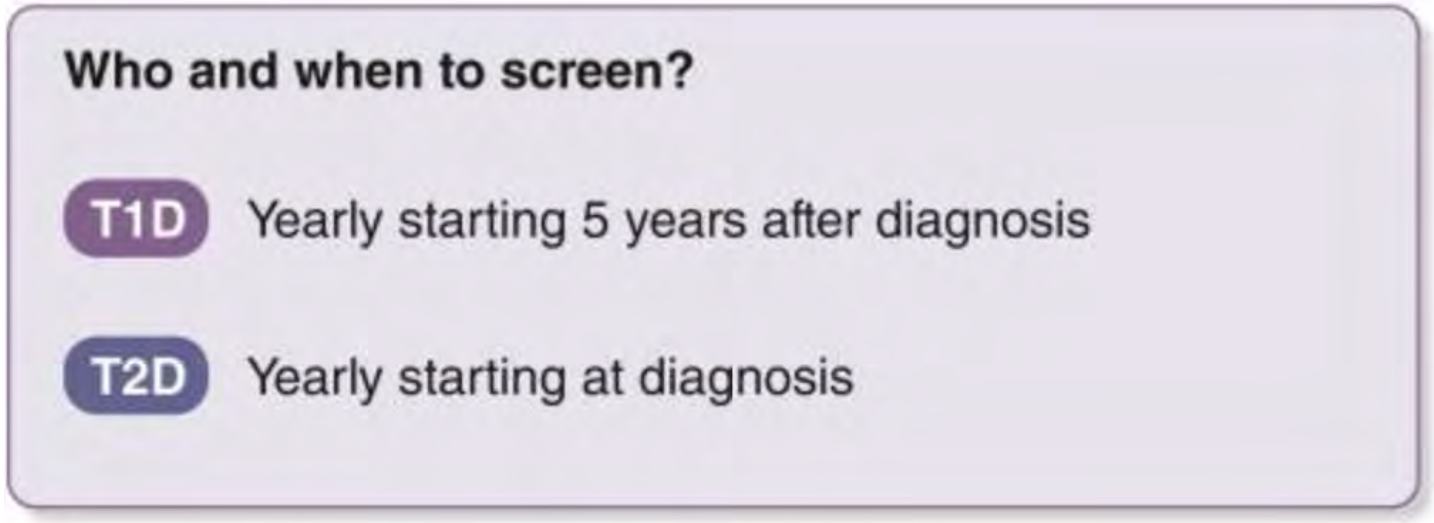
The cost (and cost effectiveness) of screening for CKD in people with diabetes

ISN construct of Asia



Bharati and Jar (2022) Global Kidney Health Atlas: a spotlight on the Asia-Pacific sector. Kidney Res Clin Pract. 2022;41(1):22-30. **DOI:** https://doi.org/10.23876/j.krcp.21.236

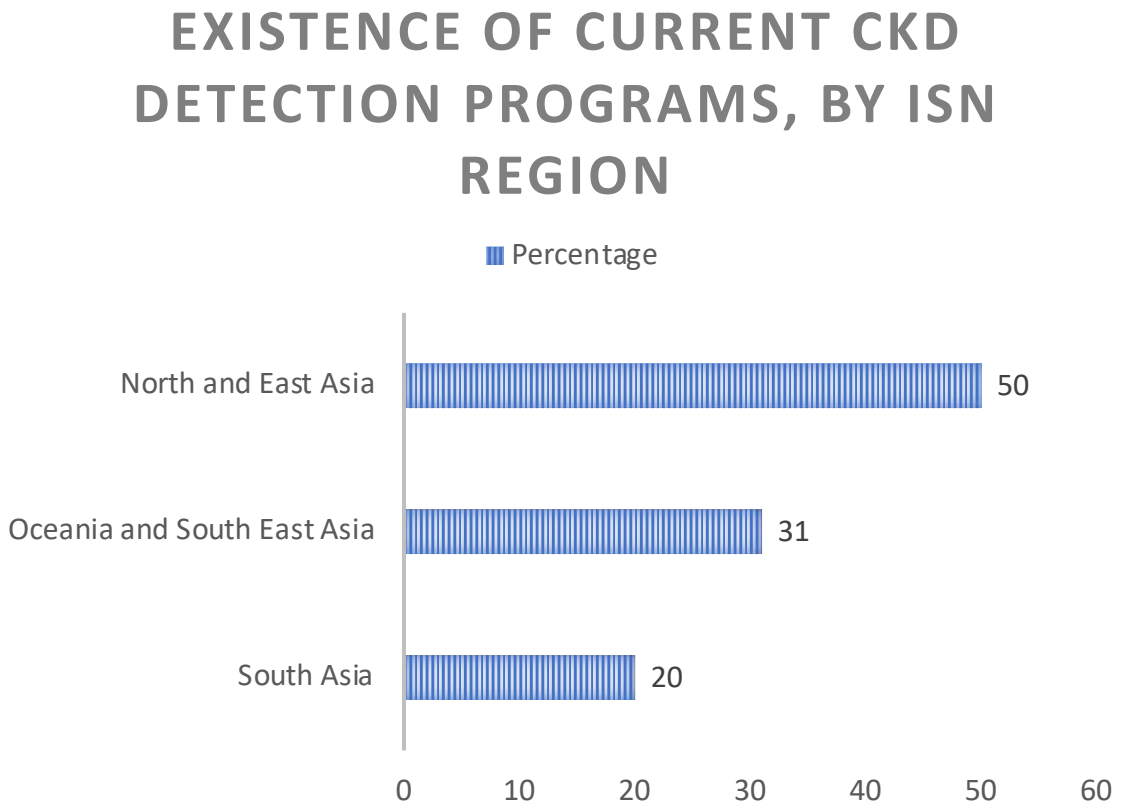
Who should be screened?

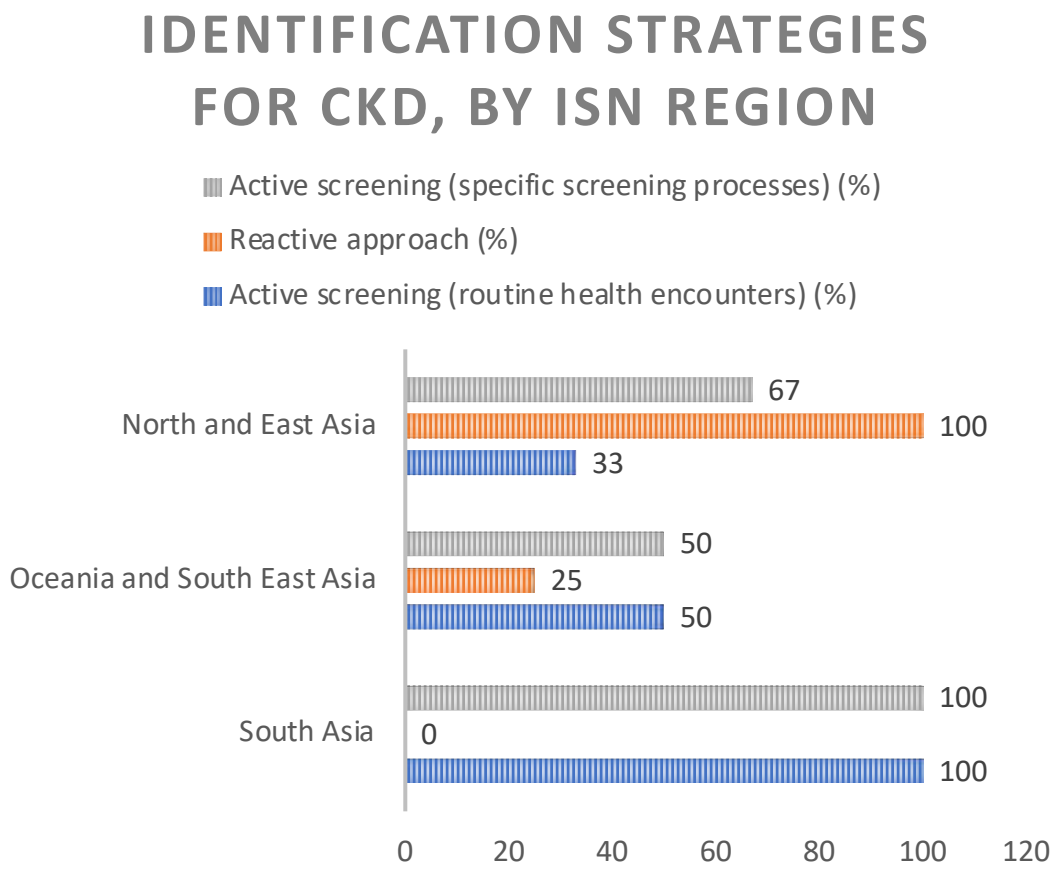


de Boer IH et al Diabetes Management in Chronic Kidney Disease: A Consensus Report by the American Diabetes Association (ADA) and Kidney Disease: Improving Global Outcomes (KDIGO). Diabetes Care. 2022 Dec 1;45(12):3075-3090

Global Kidney Health Atlas

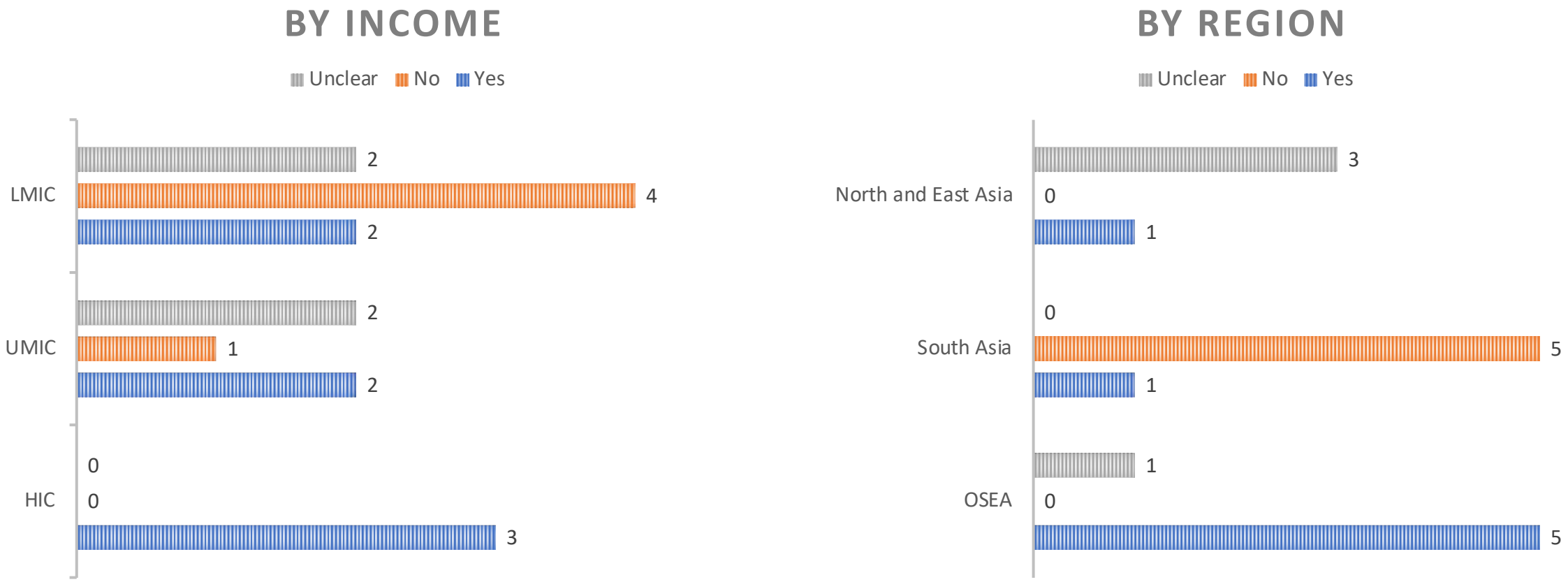
All countries (n=117) offer CKD screening to people with diabetes





https://www.theisn.org/wp-content/uploads/2021/05/GKDAtlas_2017_FinalVersion-1.pdf, accessed 9 January 2024

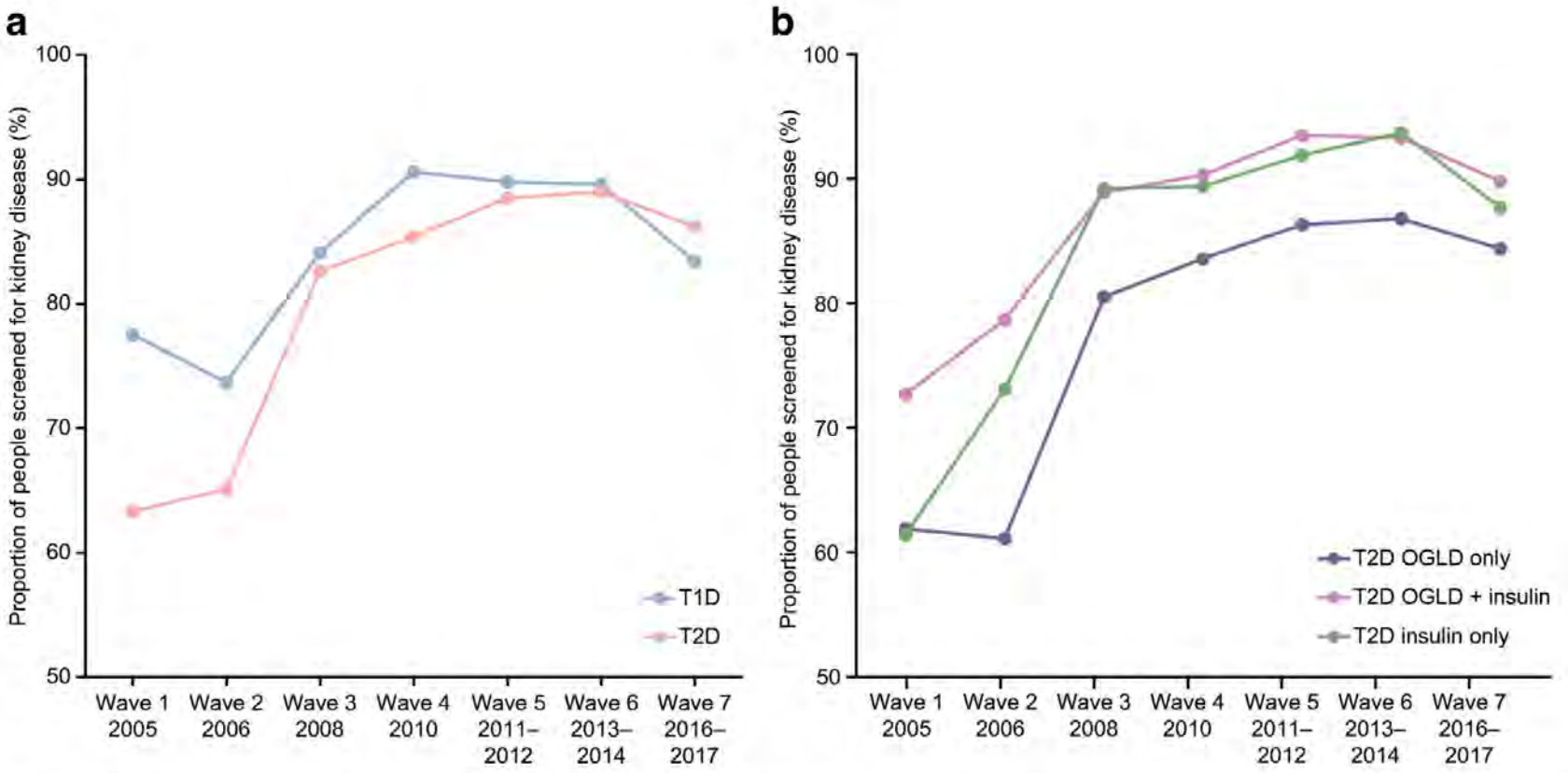
Countries with available policies/guidelines on CKD early detection programs



OSEA – Oceania and South-East Asia (Australia, Cambodia, Malaysia, Indonesia, Singapore, Thailand); South Asia (India, Bangladesh, Nepal, Pakistan, Sri Lanka, Vietnam); North and East Asia (China, Korea, Taiwan, Mongolia)

https://www.theisn.org/wp-content/uploads/2021/05/GKDAtlas_2017_FinalVersion-1.pdf, accessed 9 January 2024

A diabetes lens: IDMPS in 49 LMICs



Screening for kidney disease in (**a**) patients with type 1 and type 2 diabetes over time and (**b**) patients with type 2 diabetes divided by therapy type. Percentages were calculated for patients with available data; these varied by each category/wave. T1D, type 1 diabetes; T2D, type 2 diabetes

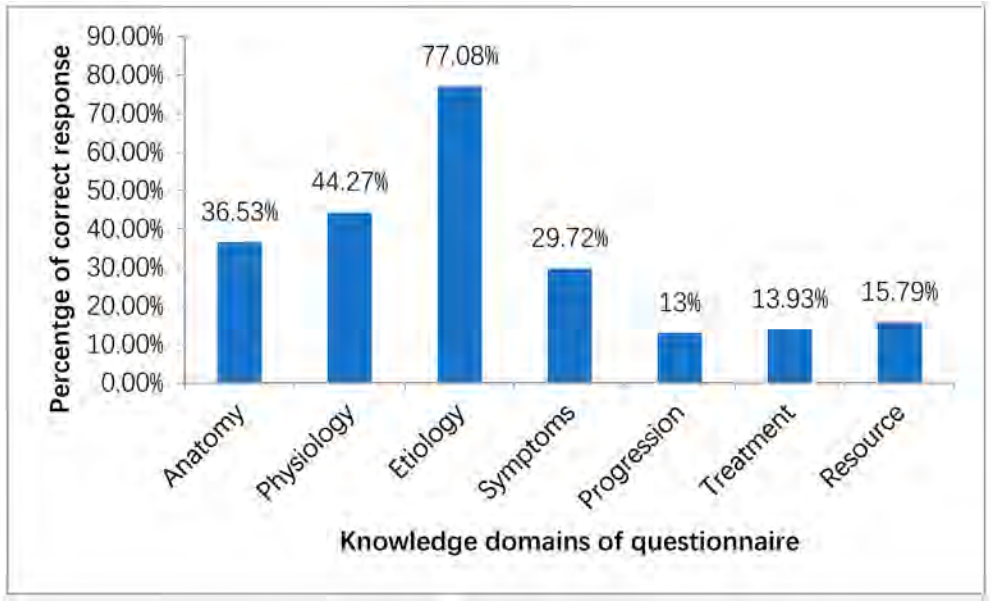
Mbanya, J.C. *et al (2021)*. Screening, prevalence, treatment and control of kidney disease in patients with type 1 and type 2 diabetes in low-to-middle-income countries (2005–2017): the International Diabetes Management Practices Study (IDMPS). *Diabetologia* **64**, 1246–1255

What about consumers?

Knowledge of chronic kidney disease in people with type 2 diabetes attending endocrinology outpatients clinic in India

Questionnaire to assess the awareness of kidney disease:

1. How many healthy kidney(s) does a person need to lead a normal life?
   ① One ② Two ③ I don't know
2. What is the function of a kidney in a human body?
   ① To break down food
   ② To produce substances that breakdown fat
   ③ To filter waste products in the blood
   ④ I don't know
3. What can cause kidney disease?
   ① High blood pressure
   ② Diabetes
   ③ Inherited condition
   ④ All of the above
   ⑤ I don't know
4. What are the symptoms of early kidney disease that might progress to kidney failure?
   ① Bubbles in the urine
   ② Back pain
   ③ Blood in the urine
   ④ Can present without any symptoms/ complaints
   ⑤ All of the above
   ⑥ I don't know
5. Which of the following statement about kidney disease is INCORRECT:
   ① Kidney disease can be prevented
   ② Kidney disease can be cured with medications
   ③ A person is said to have kidney disease when he/she needs dialysis
   ④ None of the above
   ⑤ I don't know
6. Where can dialysis treatment be carried out?
   ① In a dialysis centre and at home
   ② Only in a dialysis centre
   ③ Only at home
   ④ I don't know
7. What is the best medical treatment for End Stage Kidney Failure?
   ① Medication
   ② Dialysis
   ③ Kidney transplant
   ④ I don't know



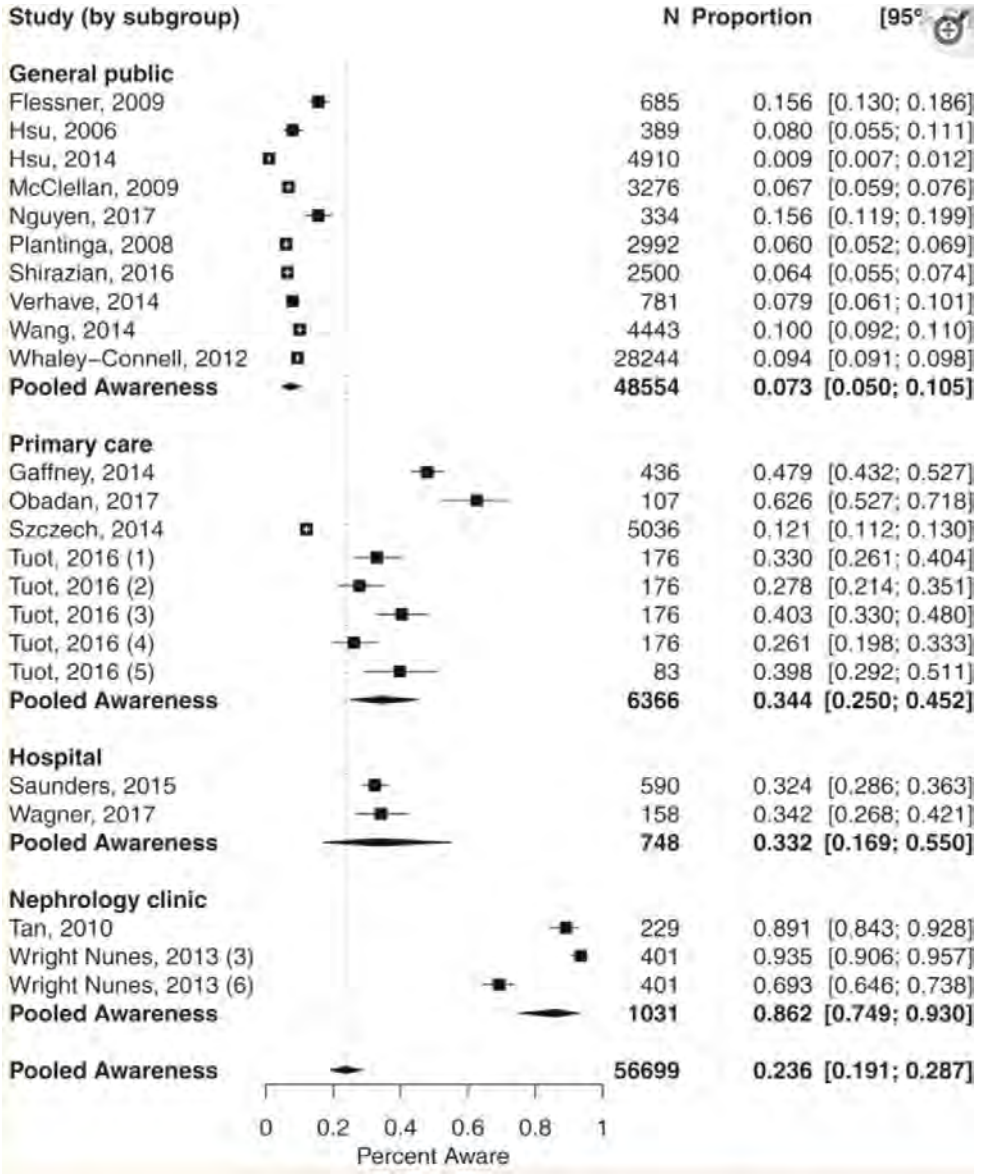
Hussain, Salman, Anwar Habib, and Abul Kalam Najmi. 2019. "Limited Knowledge of Chronic Kidney Disease among Type 2 Diabetes Mellitus Patients in India" *International Journal of Environmental Research and Public Health* 16, no. 8: 1443.

Awareness in the general population

No	Question	Correct response (%) *N* = 943
1*	A person can lead a normal life with one healthy kidney.	85.6
2	Herbal supplements can be effective in treating chronic kidney disease.	23.4
3*	Certain medications can help to slow-down the worsening of chronic kidney disease.	51.2
What functions do the kidneys perform in the body?		
4*	The kidneys make urine.	62.1
5*	The kidneys clean blood.	69.8
6	The kidneys help to keep blood sugar level normal.	22.6
7*	The kidneys help to maintain blood pressure.	26.4
8	The kidneys help to breakdown protein in the body.	14.3
9*	The kidneys help to keep the bones healthy.	14.3
Which of the following are commonly used to determine health of the kidneys?		
10*	A blood test.	68.2
11*	A urine test.	76.2
12	A faecal test.	45.9
13*	Blood pressure monitoring.	20.3
What are the risk factors for chronic kidney disease?		
14*	Diabetes.	60.6
15	Being female.	42.4
16*	High blood pressure.	38.3
17*	Heart problems such as heart failure or heart attack.	26.3
18	Excess stress.	16.4
19*	Obesity.	58.6
What are the signs and symptoms that a person might have if they have advanced chronic kidney disease or kidney failure?		
20*	Water retention. (excess water in the body)	61.1
21	Fever.	15.2
22*	Nausea/vomiting.	37.6
23*	Loss of appetite.	38.4
24*	Increased fatigue (tiredness).	58.7

Gheewala, P.A., Peterson, G.M., Zaidi, S.T.R. *et al.* Public knowledge of chronic kidney disease evaluated using a validated questionnaire: a cross-sectional study. *BMC Public Health* **18**, 371 (2018). https://doi.org/10.1186/s12889-018-5301-4

There are low levels of awareness of CKD diagnosis



Chu CD et al (2021) Patient Awareness of CKD: A Systematic Review and Meta-analysis of Patient-Oriented Questions and Study Setting. Kidney Med. 1;3(4):576-585.e1.

In summary

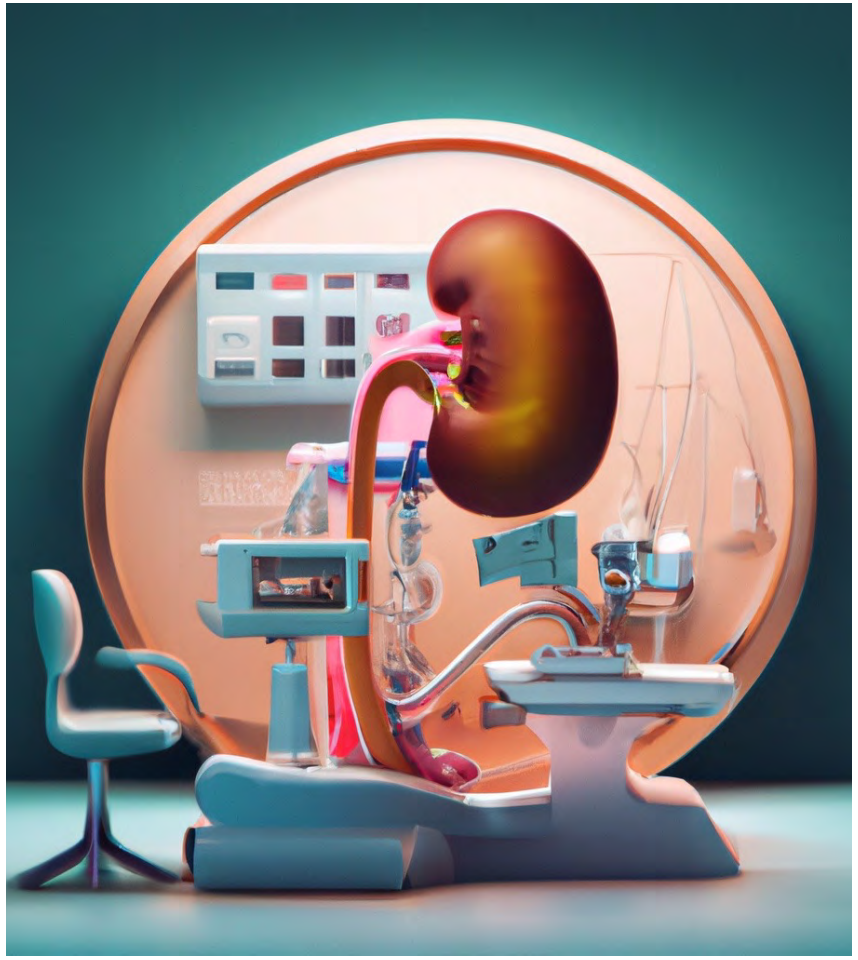
There is clear direction which people with diabetes should be screened

All countries participating in the Kidney Health Atlas reported CKD screening was offered to people with diabetes

There is variability in availability of CKD detection programs, our knowledge, the availability of policies and guidelines and primary care activity

Need to facilitate increased consumer knowledge about CKD screening and diagnosis

Screening options across Asia Pacific



AI generated image from Shutterstock

How to screen?

Spot urine ACR

and

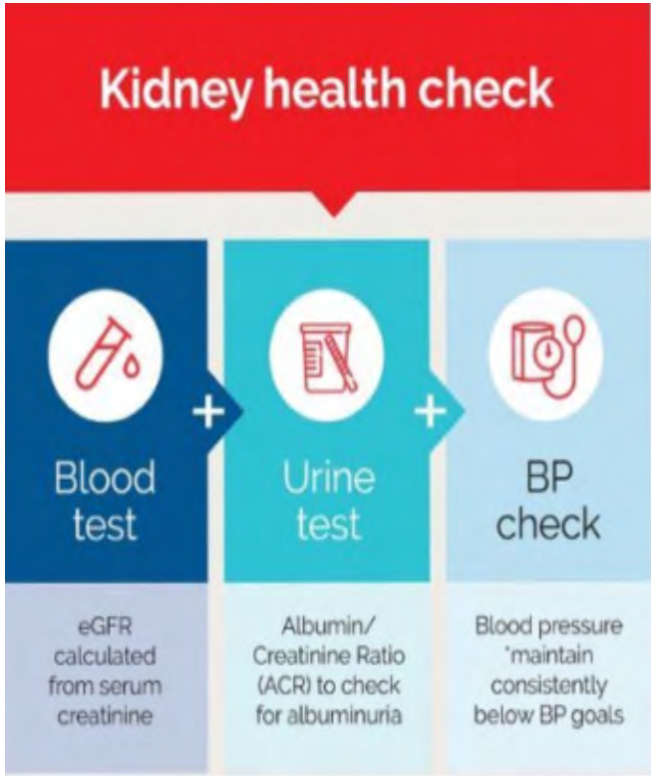
eGFR

de Boer IH et al Diabetes Management in Chronic Kidney Disease: A Consensus Report by the American Diabetes Association (ADA) and Kidney Disease: Improving Global Outcomes (KDIGO). Diabetes Care. 2022 Dec 1;45(12):3075-3090

High Income Countries

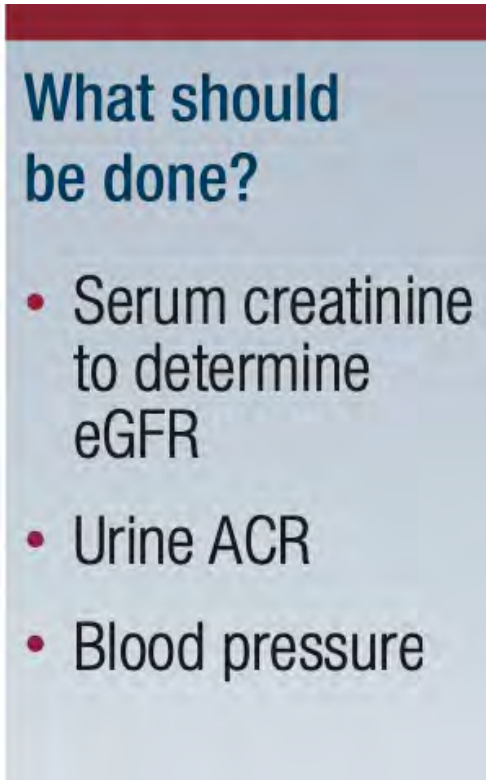
Australia

Kidney Health Australia



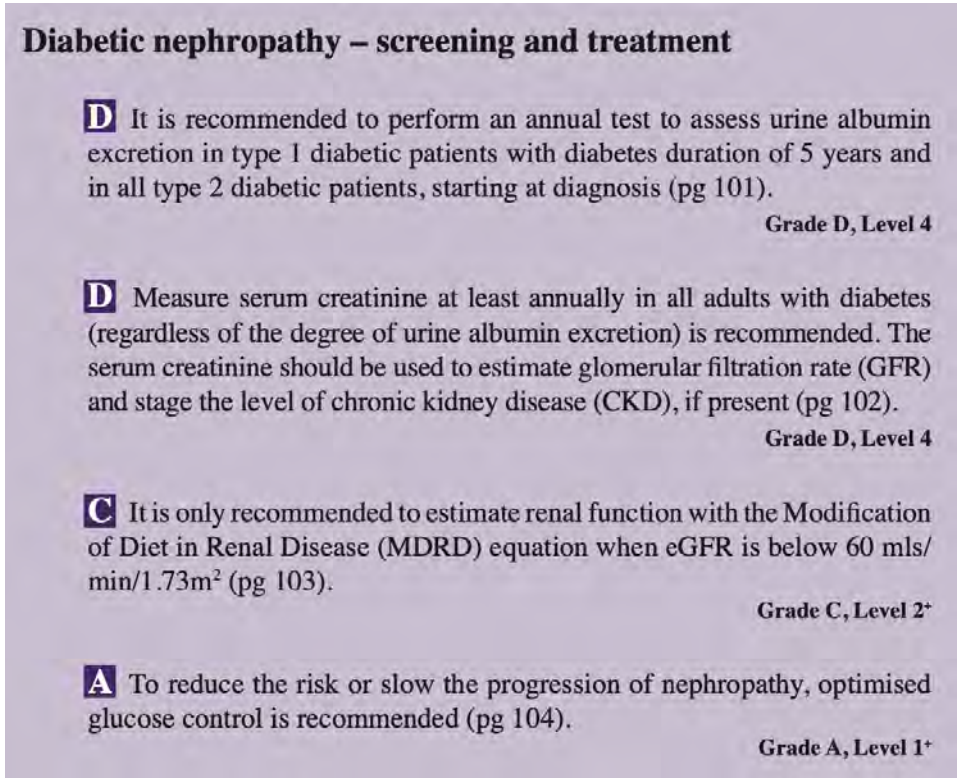
New Zealand

Kidney Health New Zealand



Singapore

Ministry of Health



Diabetic nephropathy – screening and treatment

D It is recommended to perform an annual test to assess urine albumin excretion in type 1 diabetic patients with diabetes duration of 5 years and in all type 2 diabetic patients, starting at diagnosis (pg 101).

Grade D, Level 4

D Measure serum creatinine at least annually in all adults with diabetes (regardless of the degree of urine albumin excretion) is recommended. The serum creatinine should be used to estimate glomerular filtration rate (GFR) and stage the level of chronic kidney disease (CKD), if present (pg 102).

Grade D, Level 4

C It is only recommended to estimate renal function with the Modification of Diet in Renal Disease (MDRD) equation when eGFR is below 60 mls/ min/1.73m^2 (pg 103).

Grade C, Level 2$^+$

A To reduce the risk or slow the progression of nephropathy, optimised glucose control is recommended (pg 104).

Grade A, Level 1$^+$

Challenges

National

Doctor's to raise standard consultation fees due to biting living pressures

Australians are set to be charged more than $100 for a standard non-bulk billed GP appointment.

Eleanor Campbell

less than 2 min read October 23, 2023 - 6:40AM

NCA NewsWire

Lack of patient registration

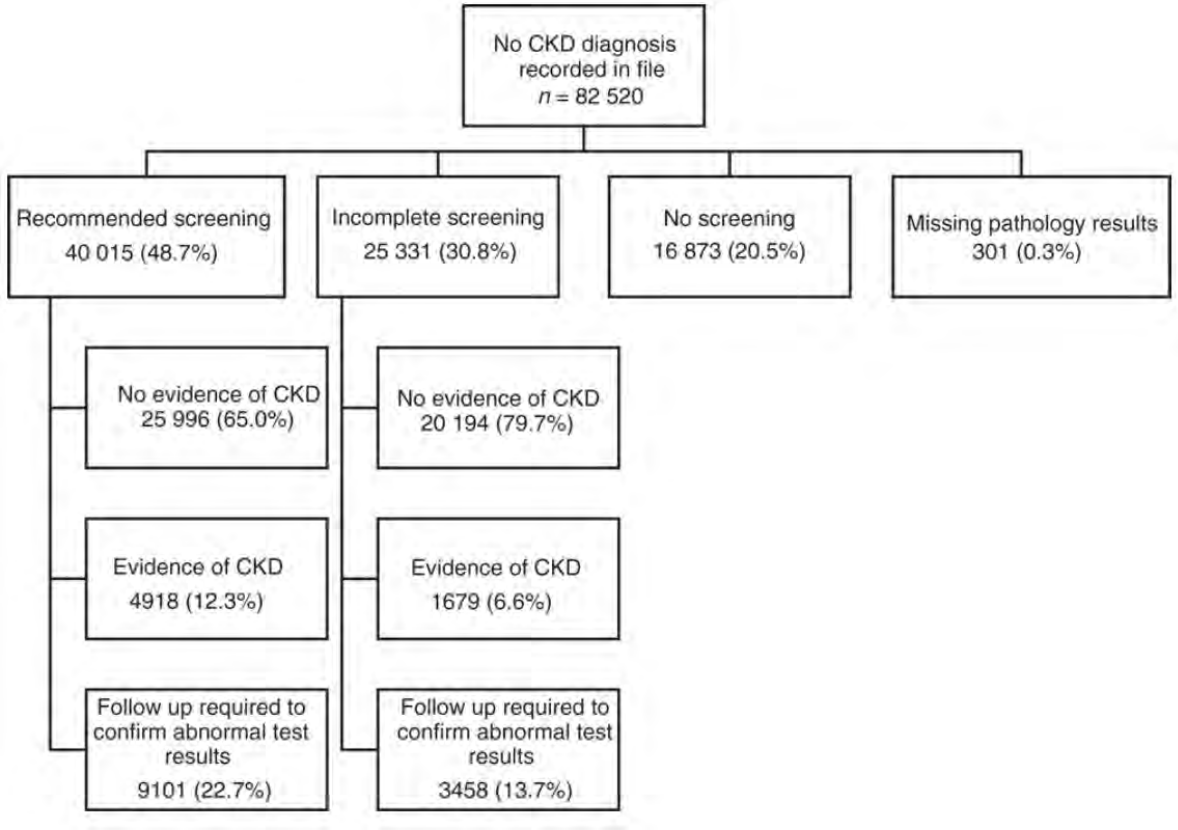
Out of pocket costs for pathology tests

No registry – reminders dependent on health service

News.com.au, https://www.news.com.au/national/doctors-to-raise-standard-consultation-fees-due-to-biting-living-pressures/news-story/40b3a1f5fca4b168e600339be19f6de3, accessed 16 January 2024

What we think we do vs What we actually do

99.5% of Australian GPs reported they assess kidney health at least annually for people with diabetes



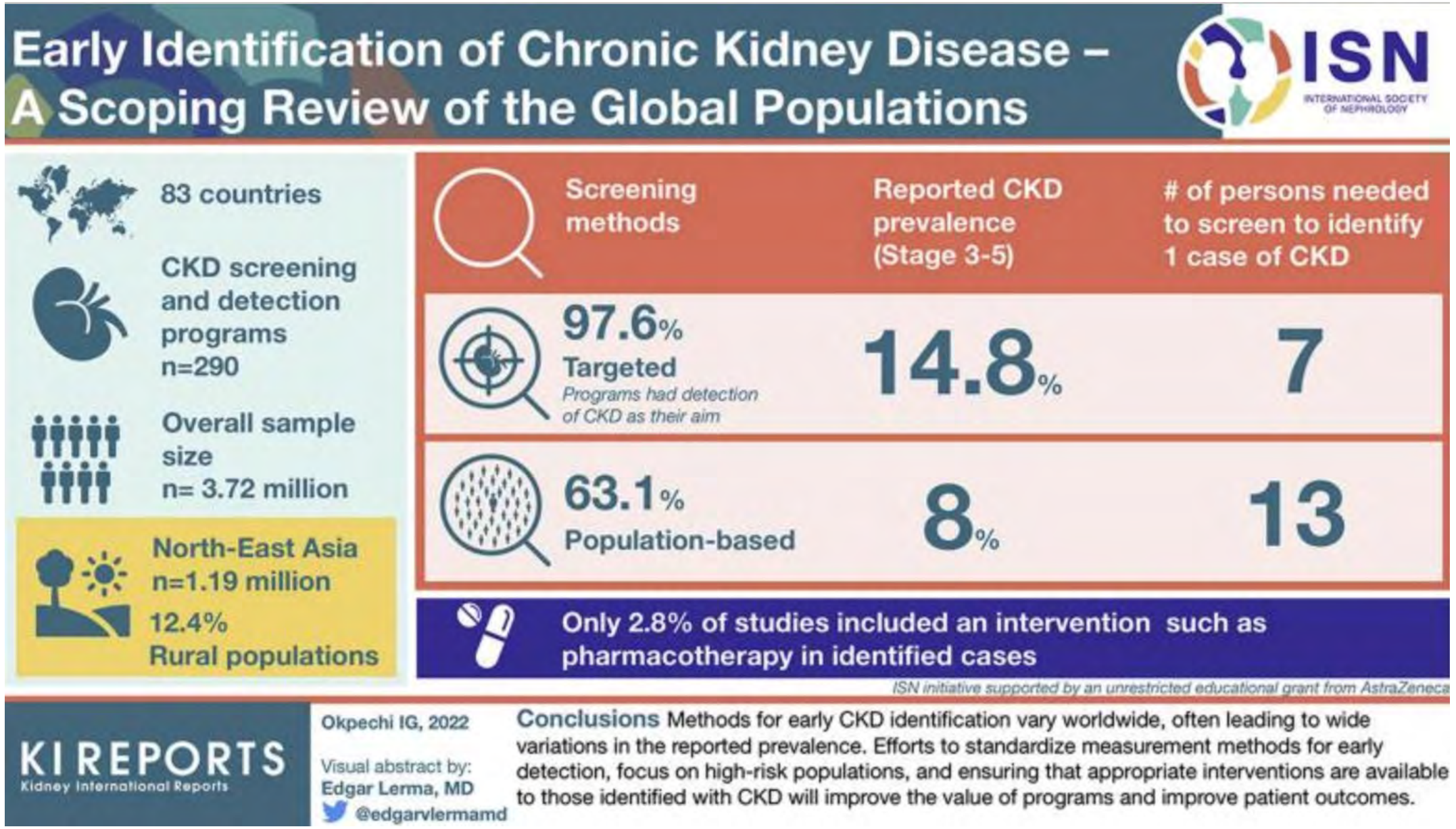
Ludlow M et al (2015) National General Practitioner Survey: chronic kidney disease (CKD) detection and management. *Nephrology* **20**, 60–89.

Manski-Nankervis J et al (2018) Screening and diagnosis of chronic kidney disease in people with type 2 diabetes attending Australian general practice *Australian Journal of Primary Health* 24(3) 280-286

Benefits and Limitations of CKD screening in people with diabetes in LMIC

Benefits	Limitations/barriers
Detect CKD in the early, asymptomatic stages	The cost of screening is out of reach for many LMICs Infrastructure and staff needed for testing is not available in most LMICs Many LMICs do not have access to laboratory testing in primary care facilities for HbA1c, serum and urinary creatinine and urinary albumin Many LMICs struggle to treat current (known) CKD cases
Early referral to nephrologist	Scarcity of kidney care workforce (e.g. nephrologists, renal nurses, dieticians, and social workers) in LMICs Poorly structured health care delivery systems providing fragmented and interrupted care
Early initiation of treatment	Excessive out-of-pocket costs are associated with treatment Access to treatment, including KRT, is limited Supportive care for people with advanced CKD is non-existent No LMIC has implemented a fully subsidized healthcare program for individuals with non-dialysis CKD Newer classes of antidiabetic agents like sodium-glucose cotransporter 2 inhibitors and glucagon-like peptide 1 receptor agonists are unaffordable Considerable anxiety to patients and families, when effective treatment is not available or is causing economic hardship
Opportunity for intervention to improve prognosis	Management of detected cases over years or decades is difficult or impossible in most LMICs, due to excessive cost, lack of infrastructure, specialists, etc Few LMICs would be able to integrate CKD cases identified by screening into the broader health system, as it is already over-burdened

George, C. et al (2022) The need for screening, early diagnosis, and prediction of chronic kidney disease in people with diabetes in low- and middle-income countries—a review of the current literature. *BMC Med* **20**, 247 (2022). https://doi.org/10.1186/s12916-022-02438-6



Okpechi I et al (2022) Early identification of CKD – A scoping review of the global populations. Kidney Int Rep 7(6):1341-1353

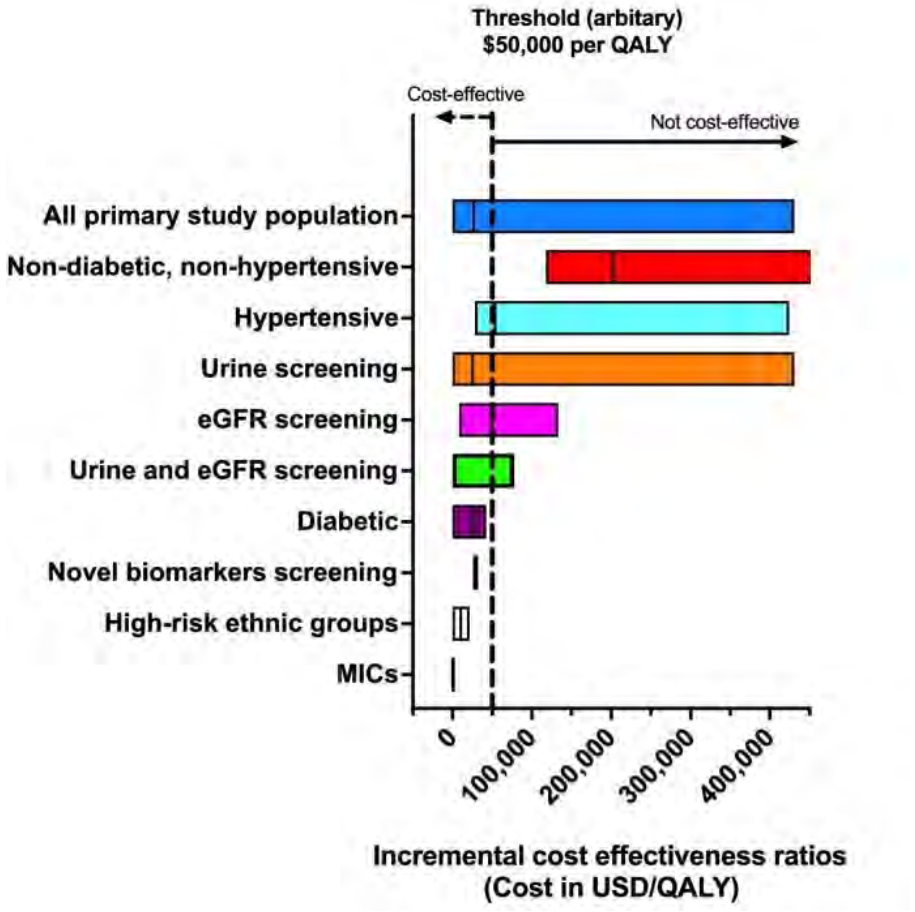
Systematic review of cost effectiveness

21 studies

3 studies from MIC (Thailand x2; China)

CKD screening in people with diabetes had ICER ranging from $113 to $42,359 (median $27,471) per QALY

Treatment effectiveness, prevalence of CKD, cost of CKD treatment and discount rate were the most influential drivers of ICER



Yeo SC et al (2023) Cost-effectiveness of screening for chronic kidney disease in the general adult population: a systematic review. Clin Kidney J. 17(1):sfad137

What about cost-effectiveness in LMIC

Little data to demonstrate cost effectiveness

80% of undiagnosed cases of diabetes are in LMIC and therefore won't be screened for CKD

There is insufficient access in primary care to laboratory testing to screen for CKD in LMIC

George, C. et al (2022) The need for screening, early diagnosis, and prediction of chronic kidney disease in people with diabetes in low- and middle-income countries—a review of the current literature. *BMC Med* **20**, 247 (2022). https://doi.org/10.1186/s12916-022-02438-6

Screening and Detection of CKD in Diabetes

Who should be screened?	Type 1 diabetes 5 years post diagnosis; Type 1 diabetes from diagnosis
How should they be screened?	eGFR and urine ACR
What are the challenges associated with screening?	Funding and access to pathology testing Under diagnosis of diabetes Cost to access health care, treatment Policy/guidelines for CKD screening Heterogeneity CKD screening program availability Health system, workforce challenges Consumer awareness
Cost-effectiveness of screening	Lack of evidence in LMIC Cost effective for people with diabetes

Countries with available policies/guidelines on CKD early detection programs

Country	ISN region	Income group	National CKD Identification Guideline available
Australia	OSEA	HIC	Yes
Bangladesh	South Asia	LMIC	No
Cambodia	OSEA	LMIC	Unclear
China	North and East Asia	UMIC	Unclear
India	South Asia	LMIC	No
Indonesia	OSEA	LMIC	Yes
Malaysia	OSEA	UMIC	Yes
Mongolia	North and East Asia	LMIC	Unclear
Nepal	South Asia	LMIC	No
Pakistan	South Asia	LMIC	No
Singapore	OSEA	HIC	Yes

What about LMIC?

Table 2. Yield of Screening for CKD

Group[a]	Patients per 1000 individuals screened, No. (95% CI)				
	China	India	Mexico	Senegal	United States
Primary definition					
No CKD	975 (973-976)	977 (974-980)	895 (892-897)	869 (856-883)	932 (925-938)
CKD but no change in treatment					
New CKD with hypertension[b]	1 (1-2)	0 (0-1)	6 (5-7)	21 (15-26)	13 (10-15)
New CKD with diabetes[c]	0 (0-1)	1 (0-1)	7 (7-8)	3 (1-6)	8 (6-9)
Known CKD	1 (1-2)	0 (0-1)	0 (0-1)	4 (2-7)	3 (2-4)
Total	2 (2-3)	1 (0-1)	13 (12-14)	28 (21-34)	24 (20-27)
Need for change in treatment without assessing eGFR or albuminuria					
New CKD with hypertension	9 (8-9)	7 (5-9)	34 (33-36)	28 (21-34)	13 (12-16)
New CKD with diabetes	3 (2-3)	9 (7-11)	32 (31-34)	12 (7-16)	6 (5-8)
Known CKD	3 (2-3)	1 (1-2)	0 (0-1)	4 (2-7)	6 (5-8)
Total	15 (13-15)	17 (15-20)	66 (65-69)	44 (35-52)	25 (23-29)
Need for change in treatment based on eGFR or albuminuria					
New CKD with hypertension, controlled BP, not taking ACEI or ARB	0 (0-1)	0 (0-1)	3 (3-4)	4 (2-7)	6 (5-8)
New CKD with diabetes; controlled BP, HbA_{1c}, and FPG; not taking ACEI or ARB	0 (0-1)	2 (1-3)	4 (3-4)	0 (0-3)	3 (2-4)
New CKD, no hypertension or diabetes	8 (7-8)	3 (2-4)	19 (17-20)	55 (46-64)	10 (8-13)
Total	8 (8-9)	5 (4-7)	26 (24-27)	59 (50-69)	19 (16-23)
NNS[d]	117 (107-130)	189 (149-259)	40 (38-42)	17 (15-20)	52 (44-62)

Table 3. Testing Requirements and Yield of Screening vs Case Finding

Strategy[a]	% (95% CI)[b]				
	China	India	Mexico	Senegal	United States
Screening[c]					
Measuring eGFR required, No.	47 204	9817	51 137	2441	223M
Individuals identified with CKD requiring treatment change, No.	1065	220	4701	251	10.4 million
Proportion	2.3 (2.1-2.4)	2.2 (1.9-2.5)	9.2 (8.9-9.4)	10.3 (9.1-11.5)	4.7 (4.2-5.2)
Change required based on eGFR measurement, No.	403	52	1286	145	4.3 million
Proportion	0.9 (0.8-0.9)	0.5 (0.4-0.7)	2.5 (2.4-2.7)	5.9 (5.0-6.9)	1.9 (1.6-2.3)
Case finding[d]					
Measuring eGFR required, No.	19 234	5348	31 489	1106	93.9 million
Individuals identified with CKD requiring treatment change, No.	704	190	3753	116	8.4 million
Proportion	3.7 (3.4-3.9)	3.6 (3.1-4.1)	11.9 (11.5-12.3)	10.5 (8.7-12.3)	8.9 (8.1-9.8)
Implications of case finding vs screening					
Decrease in proportion of individuals with recommended eGFR measurement	59.3 (58.8-59.7)	45.5 (44.5-46.5)	38.4 (38.0-38.8)	54.7 (52.7-56.7)	57.8 (56.3-59.3)
Increase in proportion of individuals with detected CKD requiring treatment change	62.2 (59.3-65.1)	58.5 (52.0-65.0)	29.6 (28.3-31.0)	2.0 (0.3-3.7)	89.6 (80.4-99.3)
Proportion of individuals with CKD identified with case-finding strategy	66.1 (65.9-66.3)	86.4 (85.4-87.3)	79.8 (79.8-79.9)	46.2 (45.1-47.4)	86.3 (83.1-89.0)
Proportion of individuals with treatment change requiring eGFR to be detected	37.8 (37.5-38.1)	23.6 (21.8-25.5)	27.4 (27.3-27.4)	57.8 (56.7-58.8)	42.9 (38.5-47.4)

Focus on who may benefit from treatment?

NNS to find 1 participant in whom assessing CKD status was associated with a change in treatment ranged from 17 in Senegal to 117 in China

Conclusions and Relevance This study found that most additional individuals with CKD identified by population-based screening programs did not need a change in treatment compared with a strategy of measuring blood pressure and assessing glycemia and that case finding was more efficient than screening for early detection of CKD.

Tonelli M et al. (2021) Diagnostic Yield of Population-Based Screening for Chronic Kidney Disease in Low-Income, Middle-Income, and High-Income Countries. *JAMA Netw Open.* 4(10):e2127396.