



A Global Perspective of CKD Surveillance Endeavours

David Harris 23/08/17



CKD – achievements & gaps

Achievements

Definitions & classification system
Increasing awareness of CKD as public global health problem
Growing number of consortia & collaborations for basic & clinical science
New therapies for some specific causes of CKD
Genetic & molecular mechanisms more carefully studied & understood

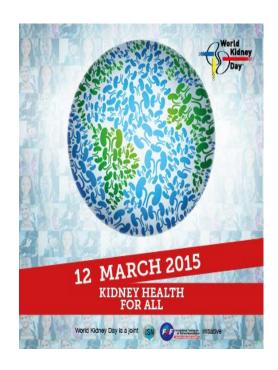
Gaps in knowledge

Mechanisms of disease(s); responders & non responders Epidemiology & burden in different locations Genetic & environmental interactions

Shortcomings described by the community

Limited possibilities to influence the course of the disease Failure of trials (study design, populations, size, duration...) Few mechanistic targets identified Absent culture for clinical trials & inquiry

CKD increasingly recognized in multiple countries as a public health problem







Burden of CKD has moved from 35th to 19th place over in less than 25y

Global, regional, and national age—sex specific all-cause and cause-specific mortality for 240 causes of death, 1990— 2013: a systematic analysis for the Global Burden of Disease Study 2013

Lancet 2015;385:117-171

	1990 mean rank (95% UI)		2013 mean rank (95% UI)		Median % chang
1·0 (1 to 1)	1 Lower respiratory infections		1 Ischaemic heart disease	1-0 (1 to 1)	31% (24 to 41)
2-0 (2 to 2)	2 Diarrhoeal diseases		2 Lower respiratory infections	2-3 (2 to 3)	-48% (-54 to -43
3-0 (3 to 4)	3 Preterm birth		3 Cerebrovascular disease	2-7 (2 to 3)	24% (18 to 32)
4·0 (4 to 4)	4 Ischaemic heart disease		4 Diarrhoeal diseases	5-5 (4 to 8)	-62% (-66 to -57
5·1 (5 to 6)	5 Cerebrovascular disease		5 Road injuries	5-9 (4 to 8)	15% (2 to 23)
6-4 (5 to 9)	6 Neonatal encephalopathy		6 HIV/AIDS	6-0 (4 to 8)	344% (245 to 44
7-5 (6 to 9)	7 Tuberculosis		7 Preterm birth	6-3 (4 to 9)	-53% (-59 to -45
	8 Malaria	7	8 Malaria	6-9 (4 to 10)	-5% (-26 to 24
	9 Congenital anomalies		9 Neonatal encephalopathy	8-7 (6 to 11)	-26% (-38 to -11
	10 Road injuries		10 Congenital anomalies	10-3 (8 to 12)	-18% (-33 to -4)
	11 COPD	J	11 Tuberculosis	11-1 (10 to 12)	-31% (-40 to -24
	12 Measles		12 COPD	11-3 (10 to 12)	-1% (-9 to 9)
	13 Drowning		13 Cirrhosis	13-4 (13 to 15)	36% (28 to 45)
	14 Protein-energy malnutrition		14 Self-harm	14-4 (13 to 16)	9% (-3 to 24)
	15 Meningitis		15 Lung cancer	15-0 (14 to 16)	39% (31 to 48)
	16 Self-harm		16 Neonatal sepsis	15·7 (12 to 22)	
	17 Neonatal sepsis	1	17 Diabetes	17-2 (16 to 19)	6% (-16 to 38
		1			67% (59 to 77)
	18 Cirrhosis	1	18 Protein-energy malnutrition	17-9 (16 to 22)	-28% (-40 to -1
	19 Tetanus		19 Chronic kidney disease	20-6 (19 to 25)	90% (74 to 103
	20 Lung cancer	A V X	20 Drowning	20-7 (16 to 24)	-46% (-54 to 3)
	21 Maternal disorders	1 / W/	21 Liver cancer	21-1 (19 to 24)	42% (26 to 58)
	22 Syphilis	1	22 Interpersonal violence	21-2 (18 to 27)	10% (2 to 21)
	23 Interpersonal violence	7/1	23 Meningitis	22-9 (19 to 26)	-43% (-53 to -33
	24 Stomach cancer	1	24 Hypertensive heart disease	24-5 (20 to 29)	56% (33 to 75)
	25 Fire and heat	1///	25 Stomach cancer	25-0 (23 to 27)	-2% (-9 to 5)
1/	26 Diabetes		26 Maternal disorders	26-1 (24 to 29)	-23% (-32 to -12
	27 HIV/AIDS	XXV	27 Colorectal cancer	27-9 (26 to 30)	44% (38 to 49)
28-6 (22 to 33) 2	28 Asthma	1/11/1/	28 Falls	28-8 (26 to 33)	18% (-14 to 40
28-7 (27 to 32)	29 Liver cancer		29 Alzheimer disease	29-3 (27 to 31)	89% (81 to 103
31-3 (28 to 35)	30 Other cardiovascular	1/1/2///	30 Breast cancer	31-9 (30 to 35)	37% (28 to 46)
32-6 (28 to 36)	31 Falls	1 / ///	31 Cardiomyopathy	33-3 (30 to 38)	32% (14 to 47)
33-2 (29 to 39) 3	32 Rheumatic heart disease	1 / /	32 Asthma	33-7 (27 to 37)	-22% (-35 to -4)
33-4 (22 to 48)	33 Typhoid fever		33 Other cardiovascular	33-7 (30 to 37)	-12% (-17 to 4)
34-3 (29 to 39) 3	34 Hypertensive heart disease	Y/ / //	34 Fire and heat	34-5 (30 to 38)	-35% (-46 to -1
35-6 (25 to 46)	35 Iron-deficiency anaemia	1 / 1	35 Syphilis	34·8 (25 to 46)	-46% (-57 to -33
35-8 (33 to 40)	6 Chronic kidney disease		36 Sickle cell	35-0 (17 to 63)	42% (8 to 138)
37-2 (19 to 61)	37 Whooping cough	1/1/2	37 Typhoid fever	35-7 (24 to 52)	-13% (-27 to 1)
37-2 (35 to 39) 3	38 Colorectal cancer		38 Oesophageal cancer	37-2 (34 to 40)	31% (18 to 48)
	39 Leukaemia	1/// ///	39 Leukaemia	38-7 (37 to 41)	-9% (-16 to -3)
	40 Peptic ulcer disease	1/2/	40 Interstitial lung disease	40-8 (36 to 48)	86% (26 to 194
	41 Breast cancer	1/1-1/2 /	41 Rheumatic heart disease	41·9 (37 to 48)	-37% (-44 to -2
41-3 (37 to 46)	42 Cardiomyopathy	1/1/11/11	42 Peptic ulcer disease	43-8 (40 to 51)	-20% (-36 to -6
The state of the s	43 Pulmonary aspiration		43 Measles	43-8 (30 to 62)	-83% (-90 to -6
	14 Alzheimer's disease		44 Pancreatic cancer	44·2 (42 to 48)	74% (67 to 80)
	45 Oesophageal cancer	// X X	45 Iron-deficiency anaemia	45·2 (36 to 59)	-37% (-52 to -21
	46 Sickle cell	/ 1/1/	46 Cervical cancer	46-2 (42 to 54)	14% (4 to 23)
	47 Poisonings		47 Brain cancer	47·1 (42 to 54)	27% (10 to 40)
	48 Unintentional suffocation	IN /XX	48 Pulmonary aspiration	47-4 (39 to 59)	-22% (-40 to 18
	49 Encephalitis	NA VI	49 Endocrine, metabolic, blood,	48-4 (43 to 54)	29% (7 to 49)
	50 Epilepsy		and immune disorders	40 m (m) to 34)	2310 (71043)
	53 Cervical cancer	AL	50 Lymphoma	49·6 (45 to 55)	43% (23 to 57)
		11	52 Epilepsy	1,50 (45 (0 55))	7577(25105/)
	7 Brain cancer	1/1/	58 Whooping cough		
5	58 Endocrine, metabolic, blood, and immune disorders	1/			
0		M	59 Encephalitis		
	52 Lymphoma	//	60 Poisonings		Group 1
	54 Interstitial lung disease 56 Pancreatic cancer	/	69 Tetanus		Non-communic
			77 Unintentional suffocation		Injuries

International estimates of CKD prevalence are consistent ~ 10-16% of adults

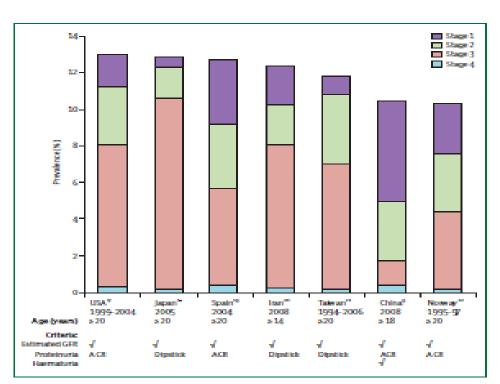
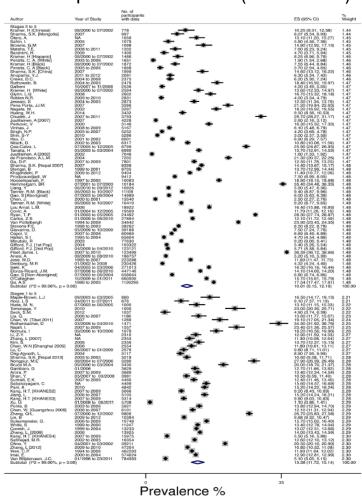


Figure 1: Population-based estimates of prevalence of chronic kidney disease ACR-albumin-to-creatinine ratio. GFR-glomerular filtration rate.

James, Hemmelgarn & Tonelli, Lancet 2010

CKD prevalence 13.4% (11.7-15.1%)



Hill et al PLoS One 2016;11: e0158765

Chronic kidney disease and cardiovascular risk in six regions of the world (ISN-KDDC): a cross-sectional study



Bogdan Ene-Iordache, Norberto Perico*, Boris Bikbov*, Sergio Carminati, Andrea Remuzzi, Annalisa Perna, Nazmul Islam, Rodolfo Flores Bravo, Mirna Aleckovic-Halilovic, Hequn Zou, Luxia Zhang, Zaghloul Gouda, Irma Tchokhonelidze, Georgi Abraham, Mitra Mahdavi-Mazdeh, Maurizio Gallieni, Igor Codreanu, Ariunaa Toqtokh, Sanjib Kumar Sharma, Puru Koirala, Samyoq Uprety, Ifeoma Ulasi, Giuseppe Remuzzi



Cross-sectional study in 12 countries from six world regions: (Bangladesh, Bolivia, Bosnia & Herzegovina, China, Egypt, Georgia, India, Iran, Moldova, Mongolia, Nepal, and Nigeria)

Volunteers in screening programs & high risk clinics

CKD prevalence (N=75,058)

14·3% (95% CI 14·0–14·5) in general populations

36.1% (34.7–37.6) in high-risk populations

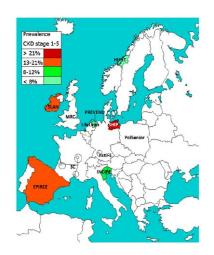
Awareness very low:

CKD 6% in general populations; 10% in high-risk populations

Awareness also low for HTN 56% and DM 69%

CKD Prevalence Varies across the European General Population

Katharina Brück,* Vianda S. Stel,* Giovanni Gambaro,[†] Stein Hallan,[‡] Henry Völzke,[§] Johan Ärnlöv,[®] Mika Kastarinen,[¶] Idris Guessous,** José Vinhas,^{††} Bénédicte Stengel,^{‡‡} Hermann Brenner,^{§§} Jerzy Chudek,[®] Solfrid Romundstad,^{¶¶} Charles Tomson,*** Alfonso Otero Gonzalez,^{†††} Aminu K. Bello,^{‡‡‡} Jean Ferrieres,^{§§§} Luigi Palmieri,[®] Gemma Browne,^{¶¶¶} Vincenzo Capuano,**** Wim Van Biesen,^{††††} Carmine Zoccali,^{‡‡‡‡} Ron Gansevoort,^{§§§§} Gerjan Navis,[®] Dietrich Rothenbacher,^{¶¶¶¶} Pietro Manuel Ferraro,[†] Dorothea Nitsch,***** Christoph Wanner,^{†††††} Kitty J. Jager,* and on behalf of the European CKD Burden Consortium



Individual data pooled from 19 general-population studies from 13 European countries KDIGO stages; CKD-Epi eGFR; ACR 30-299, 300+; age- and sex-standardized

Adjusted CKD prevalence

Stages 1-5: 3.3%(3.3%-3.3%) in Norway to 17.3% (16.5%-18.1%) in N-E Germany

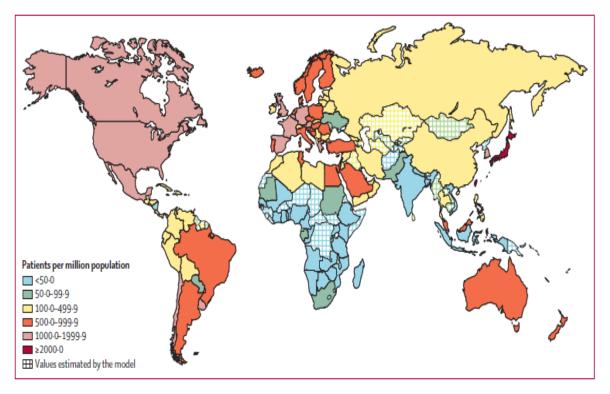
Stages 3–5: 1.0% (0.7%-1.3%) in central Italy to 5.9% (5.2%-6.6%) in N-E Germany

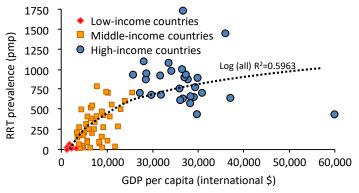
Substantial variation in CKD prevalence independent prevalence of diabetes, hypertension, and obesity

CKD of unknown aetiology (CKDu)



RRT
2.6m in 2010
2.3-7.1m dying without





Liyanage et al Lancet 2015;385:1975-82

White et al, WHO Bull 2008; Nugent et al, NCP 2011

CKD – Global perspective

Common, harmful, treatable

Linked to other NCDs (DM, HTN, CVD)

Variability in approaches, resources, policies Between and within countries and regions

Role of health care systems in prevention and control of CKD in integrating with national and international NCD management strategies

Need for better understanding and unified advocacy approach to CKD

ISN CKD - Closing The Gaps

All individuals with CKD who can benefit from prevention or treatment should be have access to those strategies and therapies

To improve access to identification, prevention and treatment options for all individuals with kidney disease, irrespective of geographical location

Strategic Objectives

Develop a systematic, international inventory of health systems, health status, care gaps & inequalities for kidney patients

Provide recommendations to address these gaps & inequalities, to improve standards of care

Describe essential components of CKD care

human & financial resources

health policies, structures, processes & infrastructure

Leverage lessons from country level data for regional & international dissemination

Collaborate at country level to

- provide technical assistance & advice
- stimulate & support national strategic initiatives

ISN CKD - Closing the Gaps

Global Kidney Health Atlas (JAMA)
Global Kidney Health Summit (The Lancet)
ISN Global Policy Forums: Regional focus

Lancet Campaign (online awareness campaign)

ISN Global Kidney Atlas



Survey of current capacity for kidney health care delivery in each country & region

6 dimensions of Universal Health Coverage (WHO)

- 1. Health Finance
- 2. Health Policy
- 3. Service Delivery and Safety
- 4. Essential Medications and Health Products
- 5. Health Information and Statistics
- 6. Health Workforce

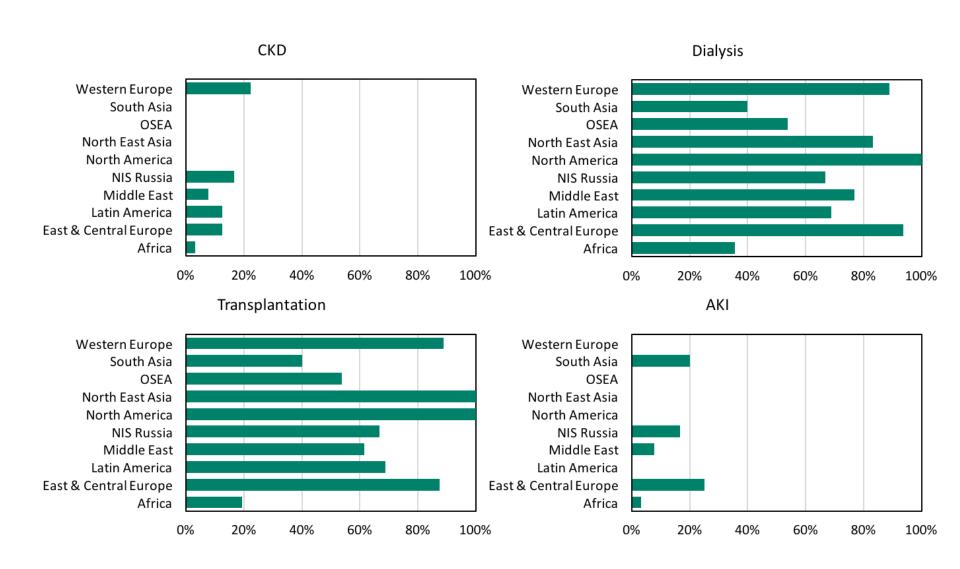
Global, regional & national data

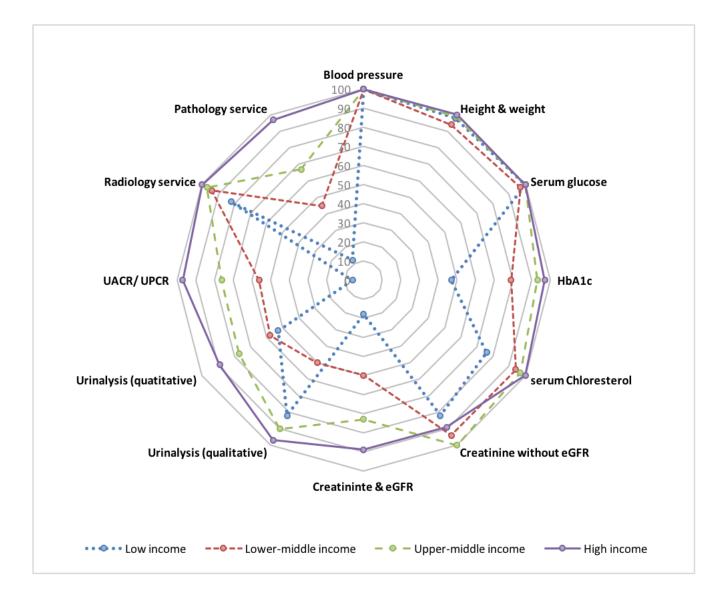
Biannual

Survey of 125 UN Member States ~93% of the world's population

	N of countries	Total population (millions)	N of countries that completed the survey	Population for countries that completed the survey (millions)
Overall	202	7242	125	6734
ISN regions:				
Africa	55	1160	35	964
Middle East	14	225	13	223
Latin America	24	608	16	560
North & East Asia	7	1580	6	1560
South Asia	9	1710	6	1670
OSEA	26	678	13	661
East & Central Europe	20	209	17	199
NIS Russia	11	281	6	223
Western Europe	22	429	11	318
North America	14	362	2	356

GKHA: global variability in availability of renal registries for CKD, Dialysis, Tx & AKI





Healthcare services available for identification & management of CKD in secondary/tertiary care levels by World Bank income groups

Conclusions of GKHA

Substantial inter- and intra-regional variability in kidney care across the world Important gaps in services, facilities and workforce in many countries

Frequent kidney health workforce shortages

Poor availability of healthcare services for identifying and treating kidney disease

Underutilisation of peritoneal dialysis

Low rate of public funding for kidney care

Lack of national strategies for kidney disease

Lack of kidney disease registries

Suboptimal advocacy for kidney disease

Less than half countries have research capacity

→ Opportunities

engage key governmental & non-governmental stakeholders to improve quality of kidney care

hold countries to account

devise policy implications for including CKD and AKI in the global health agenda

ISN Global Policy Forum Mexico, April 2017

Co-hosted by

Mexican Health Ministry

ISN

The Lancet

International representation

Ministers of Health, PAHO, WHO, UNESCO

Clinicians, Researchers &

Scientists

Patient groups

Goals

Improve outcomes for patients living with kidney disease

Increase awareness of magnitude of the problem

Increase awareness of changes required to impact the problem

Collective commitment to change Signed document

Mexico Policy Forum Key messages about CKD

GLOBALLY

important contributor to NCD burden affects up to 1 in 10 people direct cause of 1.2 million deaths (2013) 7% of CV deaths associated with reduced kidney function (2013) important risk multiplier of CV disease & diabetes burden prevalence in many LMIC unknown lack of access to diagnosis and poor awareness therefore true global burden likely underestimated

since 1990, moved from 30th to 20th leading cause of global DALYs

LATIN AMERICA

8th most common cause of death (among top 5 in 9 countries) 10th leading cause of global DALYs (among top 3 in 3 countries)

Mexico Policy Forum Key commitments for CKD

1. Work within current frameworks promoted by WHO & UN

Sustainable Development Goals Universal Health Coverage Life Course approach

2. Develop & implement public health policies to prevent & reduce risk

maternal and child health and nutrition diabetes, hypertension, obesity and tobacco consumption safe work environment infectious diseases

- 3. Implement & support ongoing surveillance (national & regional registries)
- 4. Educate public and people at risk about kidney disease
- 5. Improve awareness of kidney disease among health care workers
- 6. Work towards universal health coverage
- 7. Support education for a skilled nephrology workforce
- 8. Implement early detection, prevention & treatment strategies for AKI
- 9. Integrate early evidence-based treatment for CKD, integrated with other NCDs
- 10. Implement transparent policies for equitable access to kidney disease care
- 11. Promote kidney transplantation
- 12. Support local, regional & transnational kidney research



ISN facilitates research activities to address some of the gaps identified

INET CKD: International Network of CKD Cohort Studies

>20 cohorts with biosamples and individual level data in CKD patients

Develop collaborative research projects to

Identify international similarities and differences Validate findings across international boundaries

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ISN ACTs: ISN - Advancing Clinical Trials

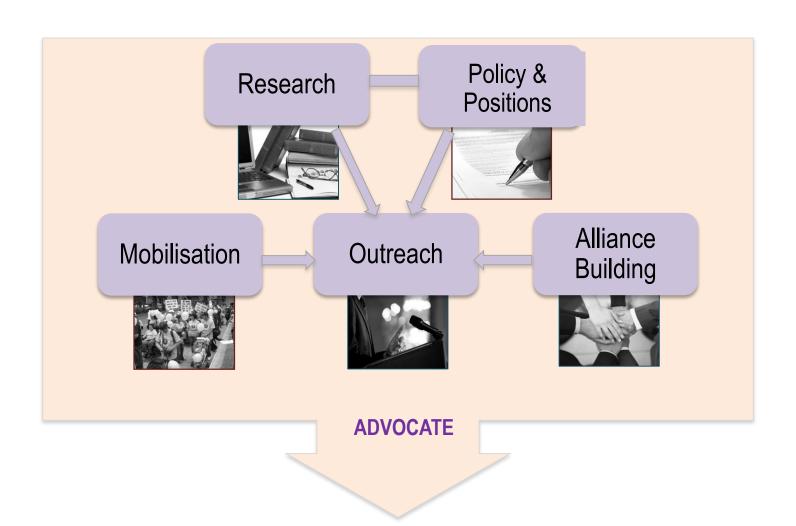
Improve the ability of international community to conduct important clinical trials Collaborative capacity building:

Education and training Vetting of protocols/ harmonization

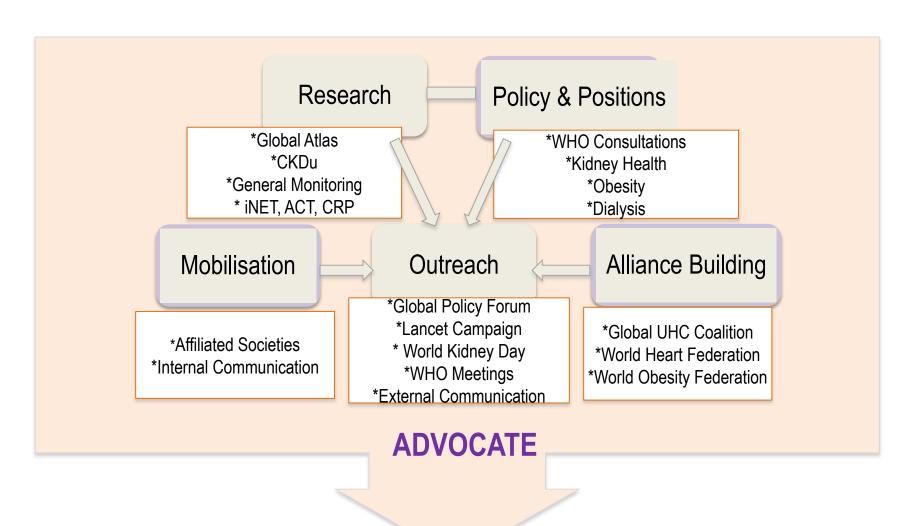
Clinical Research Program

Small seed grants to conduct research in LMIC Integrated with 0by25 and Closing the Gaps Mentoring and writing support

Integrated approach to improve Kidney Health



Current ISN activities in collaboration with partners



Responding to a challenging global health environment

