



AKI management in Developing Countries

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澎湖雙心石滬

KDIGO

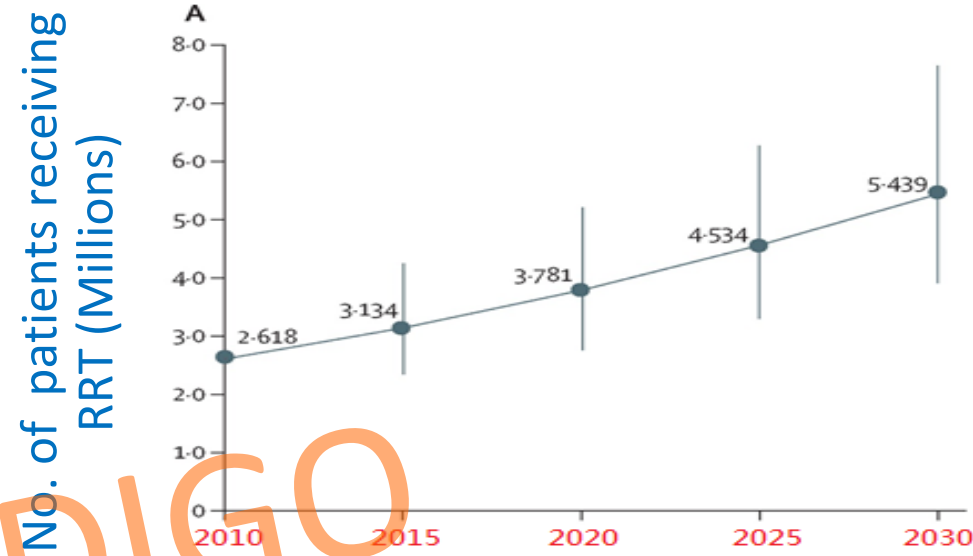
No conflicts of interests to be disclosed

A nighttime photograph of Taipei, Taiwan, featuring the Taipei 101 skyscraper illuminated with blue and white lights. A large, bright full moon is visible in the dark blue sky above the city. The city lights create a vibrant, colorful glow across the lower half of the image.

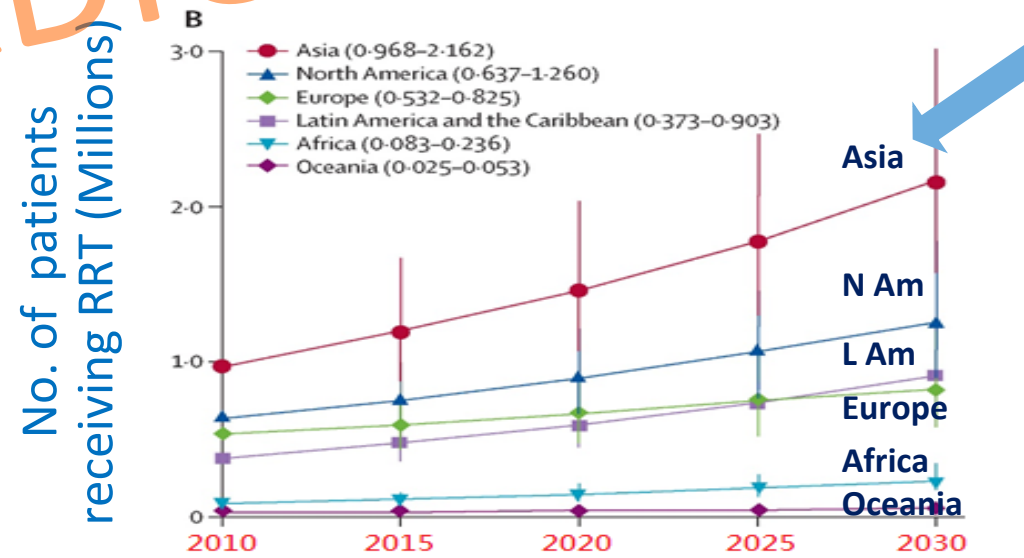
Why do We Talk about AKI in
developing country ?

Patients undergoing RRT from 2010 to 2030

Worldwide

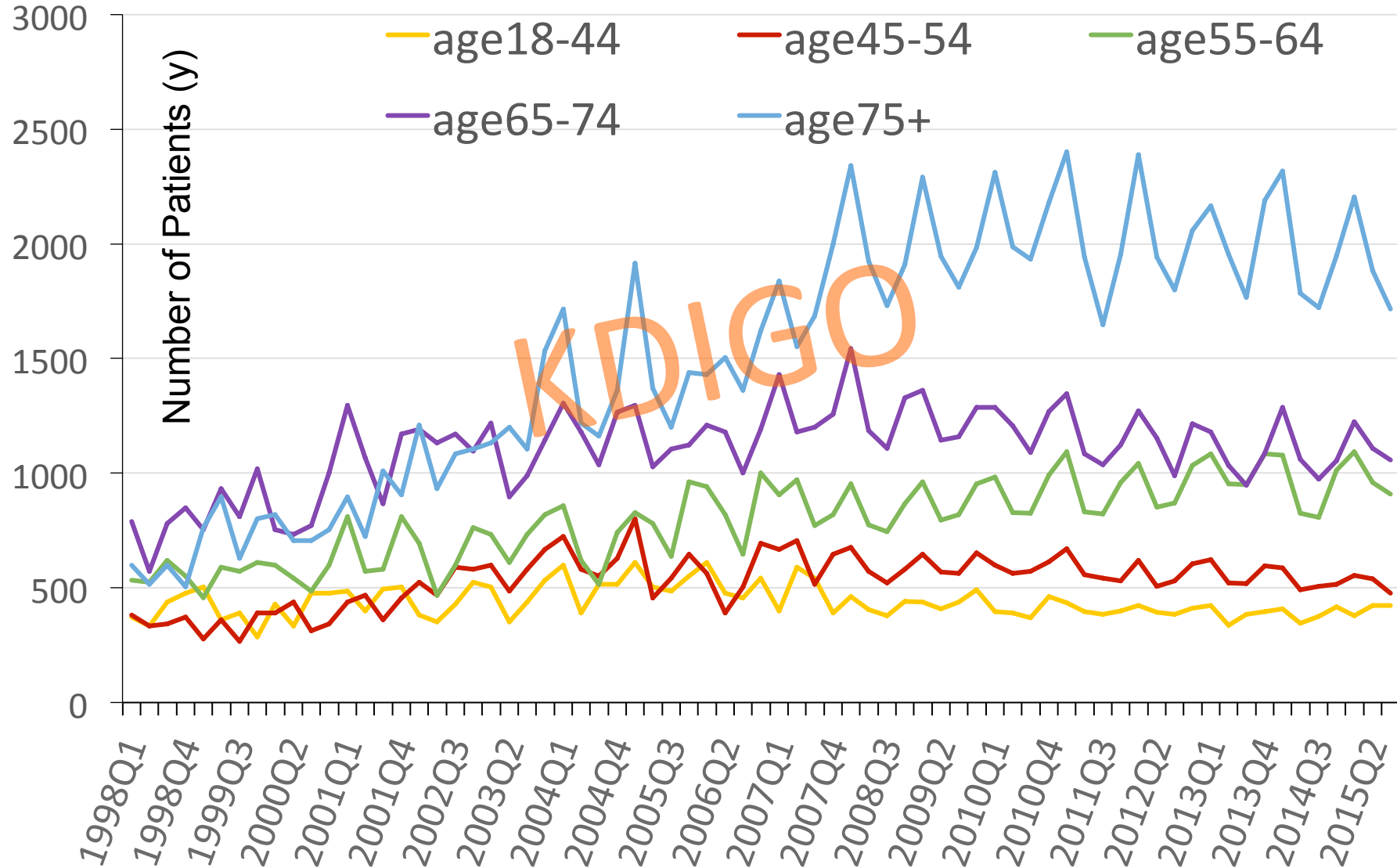


By region



Incidence of dialysis –requiring AKI in Taiwan

1998~2015



Taiwan National Health Insurance data

An iceberg floating in the ocean. The tip of the iceberg is above the water line, while the much larger base is submerged. The water is a deep blue, and the sky is a lighter blue. The iceberg is white and textured, with some shadows indicating its shape.

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Developing world

12 to 40 PMP/YR

Developed world

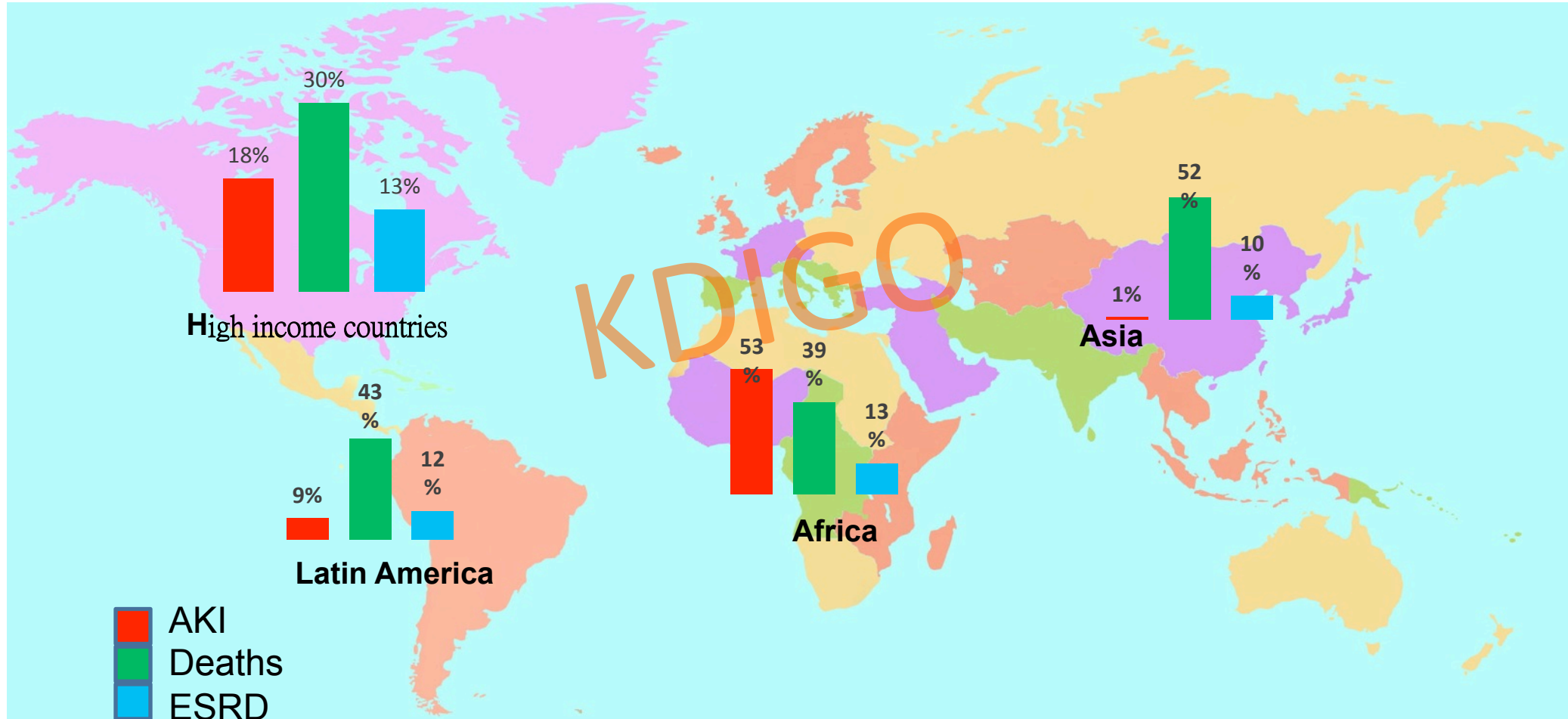
100 to 200 PMP/YR

Community acquired

AKI

0 by 25-Acute kidney injury

Incidence and outcome



Global variation in the incidence of AKI

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THE LOST WORLD

JURASSIC PARK

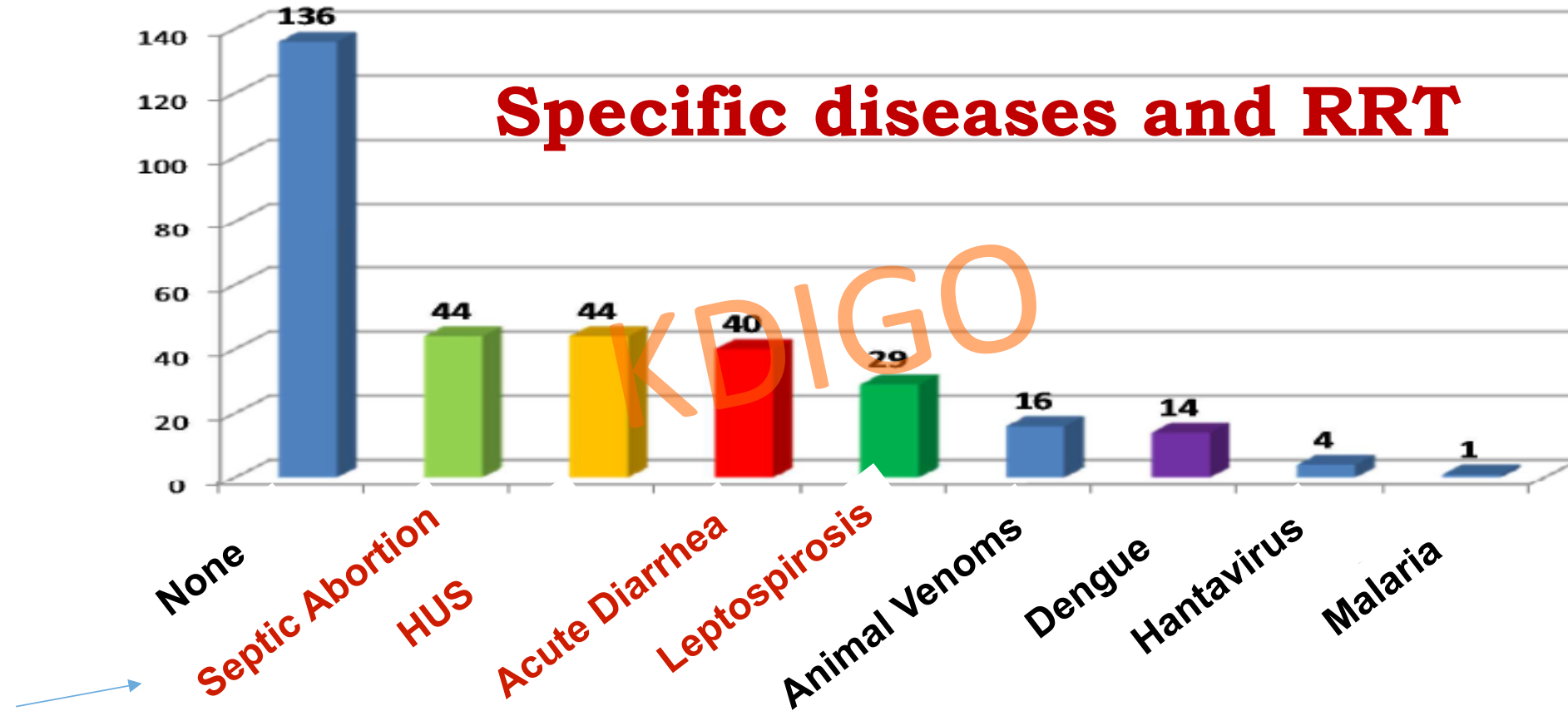
 <p>AKI DEVELOPMENT</p>	<p>HD</p>
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What's the difference of AKI,
developing countries (DC) perspective



Community AKI Latin American



Data from Dr Burdmann, Brazil

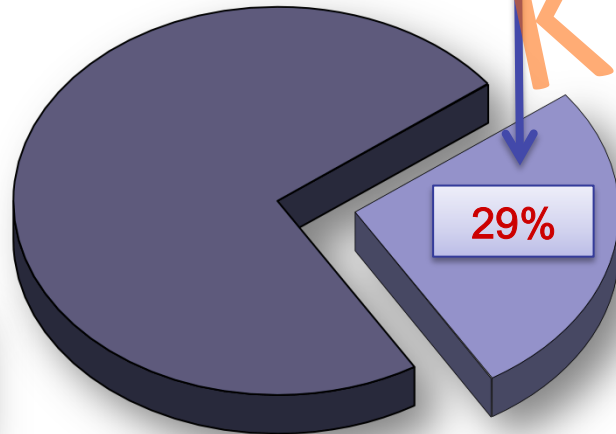
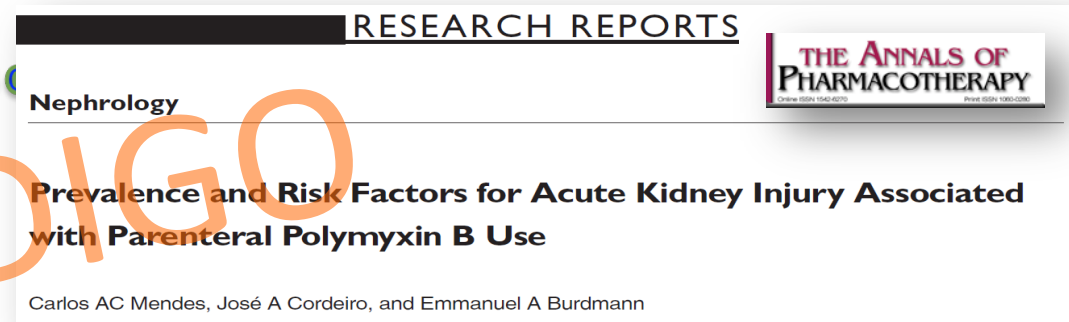
AKI Snakebite LA



Crotalus snakebite-induced AKI

- Prospective
- 100 consecutive patients
- AKI: GFR < 60 ml/min/1.73m² (first 30 days)

Comparing with polymyxin B



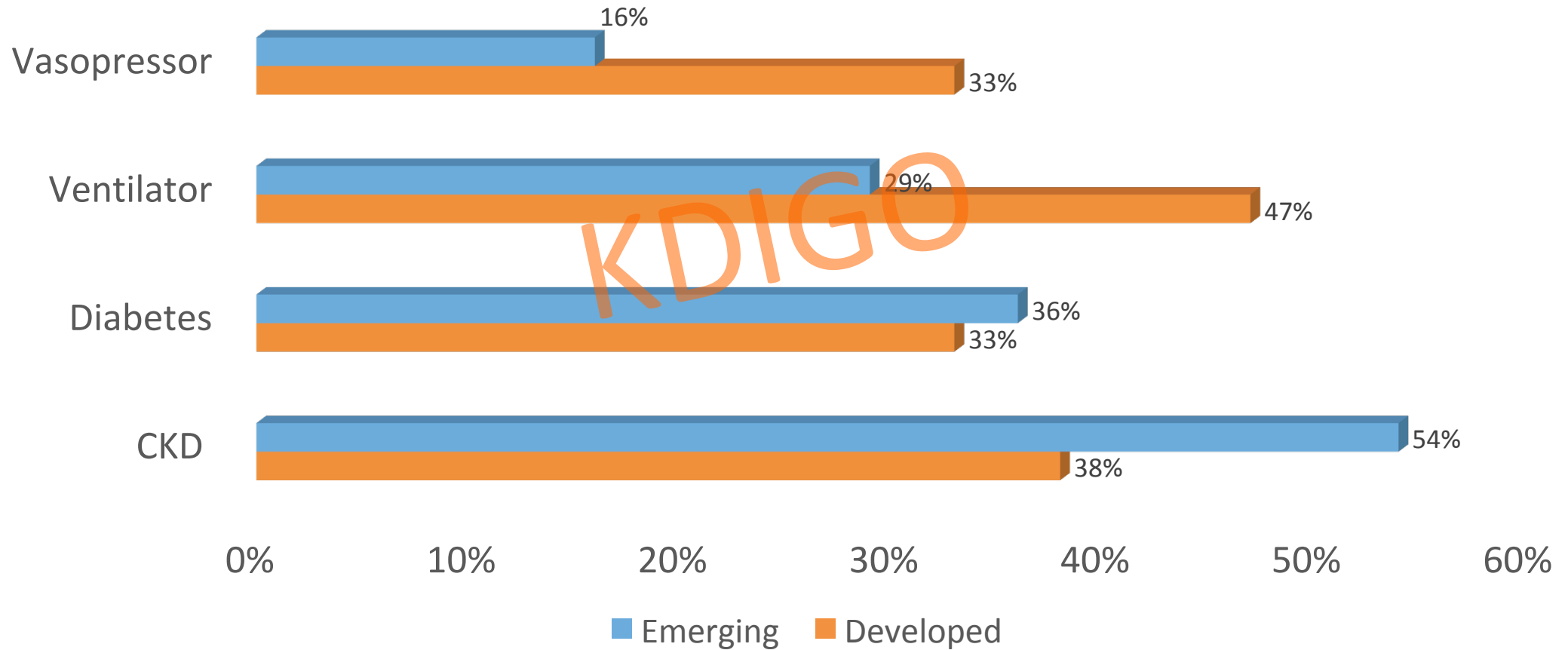
“AKI developed in 22% of the patients.”

Mendes, Cordeiro, Burdmann, Ann Pharmacother 2009

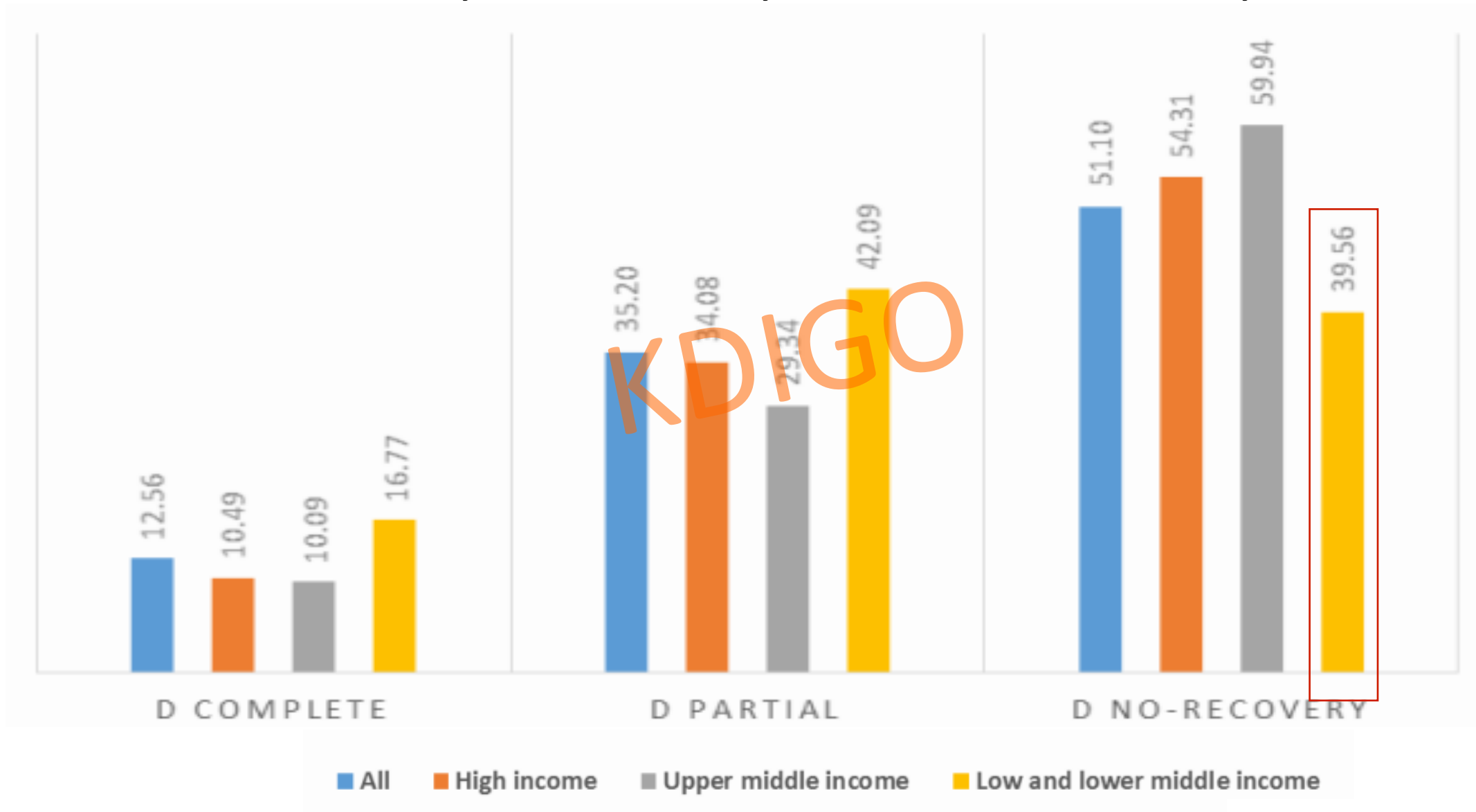


Comorbidity of AKI

Less sepsis
Less severity of illness scores
But high mortality



Kidney recovery after AKI- 0 by 25



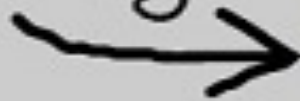


← Developing Country

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graphicreflections.org

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Developed Country





AKI, DC difference

Water borne illness /dehydration

Venomous animals /insects/
Vector-transmitted infections
(endemic conditions)

Consumption of toxic plants/
herbs

Obstetric disease



Proportion of population using improved drinking water sources (%), 2015



Acute kidney injury (AKI) in Chinese children

Methods and Cohort

1 month to 18 years



25 Chinese hospitals



101,836 inpatients



No AKI in 81,928 (80%)



AKI in 19,908 (20%)

↑ in Cr of ≥ 0.3 mg/dL in 48 hrs
or $\geq 50\%$ in 7 days

0.5%



mortality

4%

96% with AKI had no discharge diagnosis of AKI

Community acquired AKI

N = 7220



Diarrhea



Sepsis

Hospital acquired AKI

N = 12,688

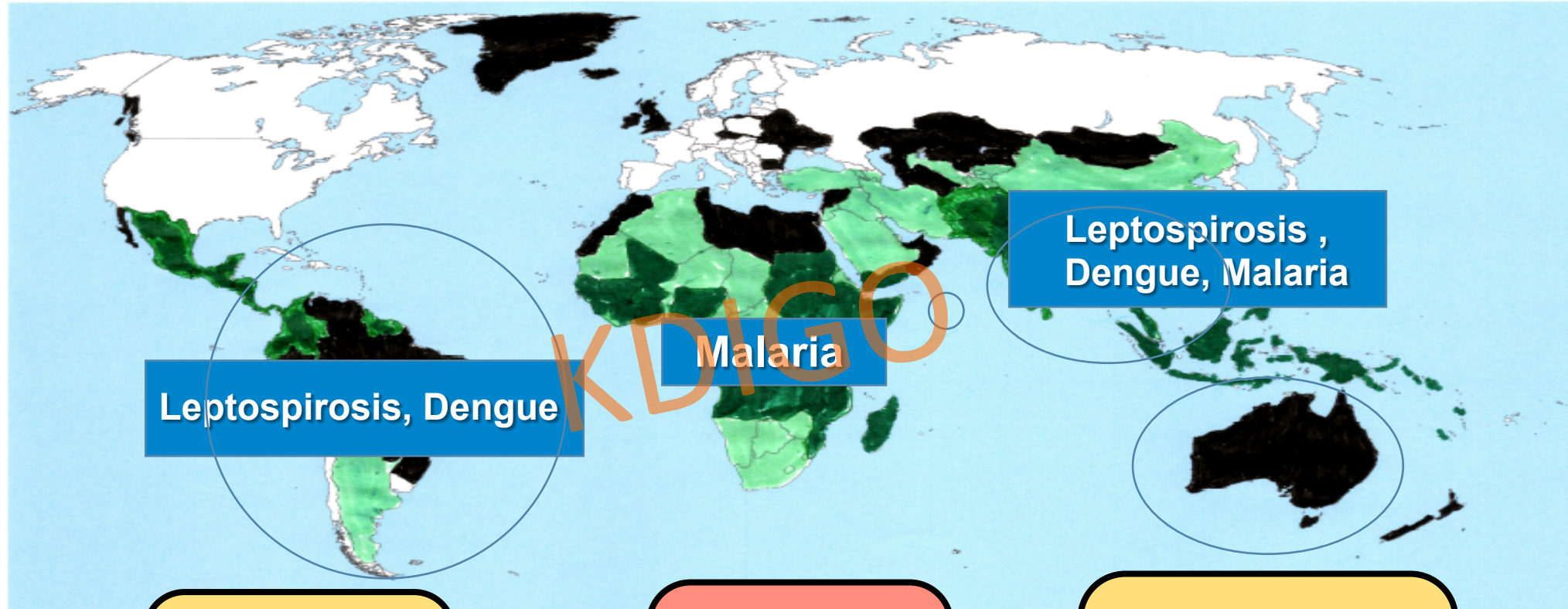


Congenital heart
Cardiac surgery



NSAIDs
PPIs

Tropical infections causing AKI

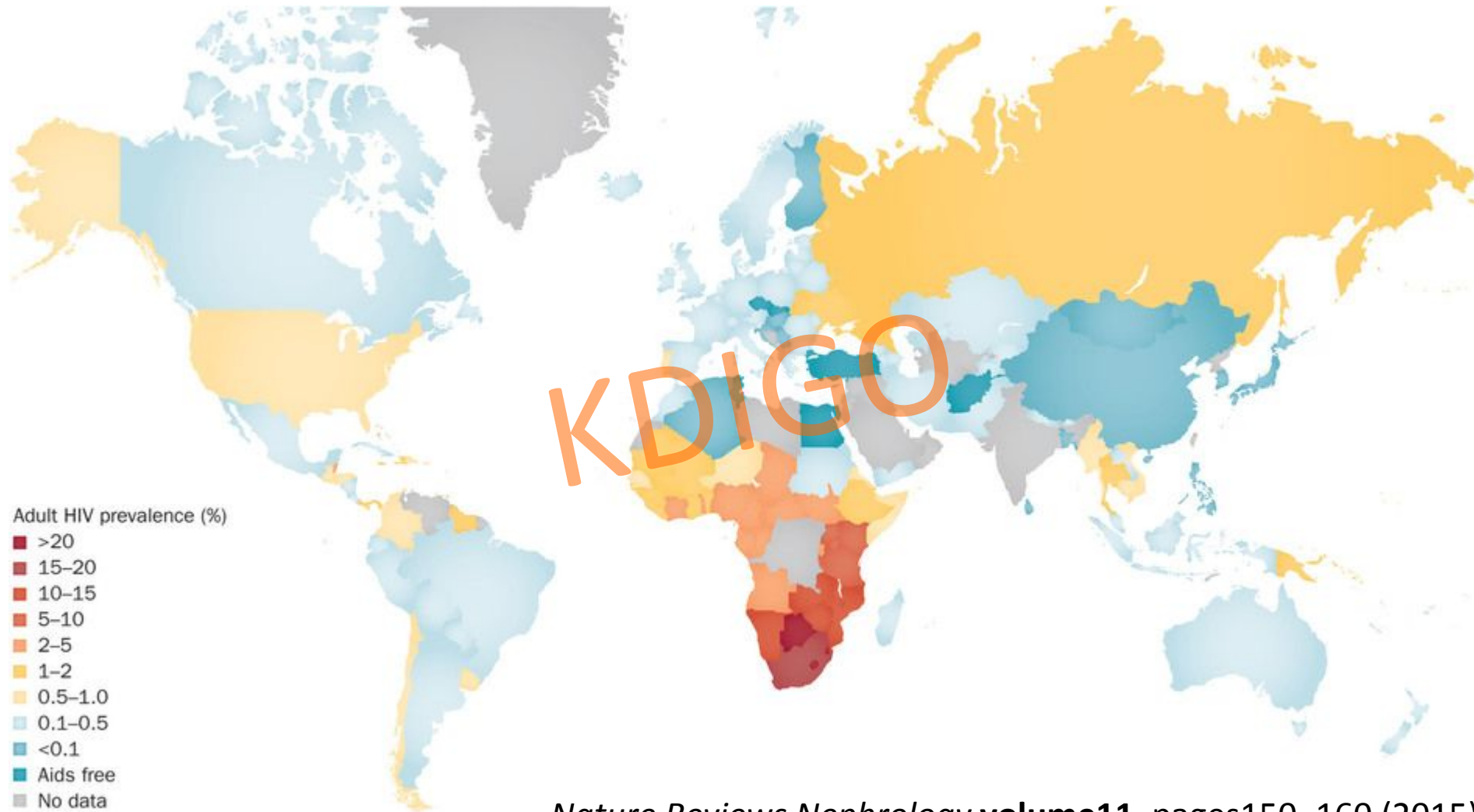


Leptospirosis
1 million cases/
year
60,000 deaths/
year

Dengue
390 million
cases/year
60,000 deaths/
year

Malaria
214 million cases/
year
400,000 deaths/year

HIV associated Nephropathy



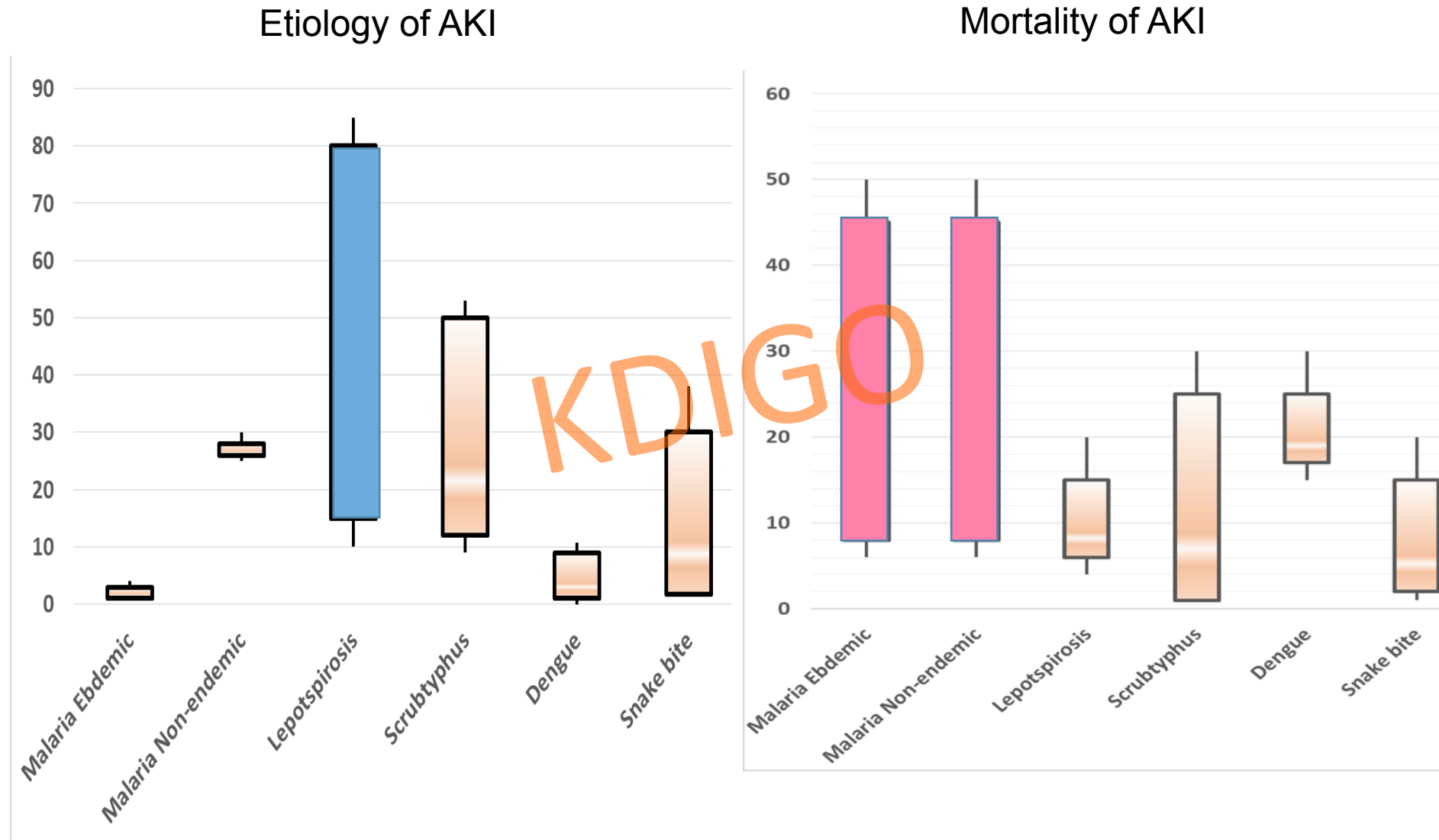
Nature Reviews Nephrology **volume11**, pages150–160 (2015)

Nature Reviews | Nephrology

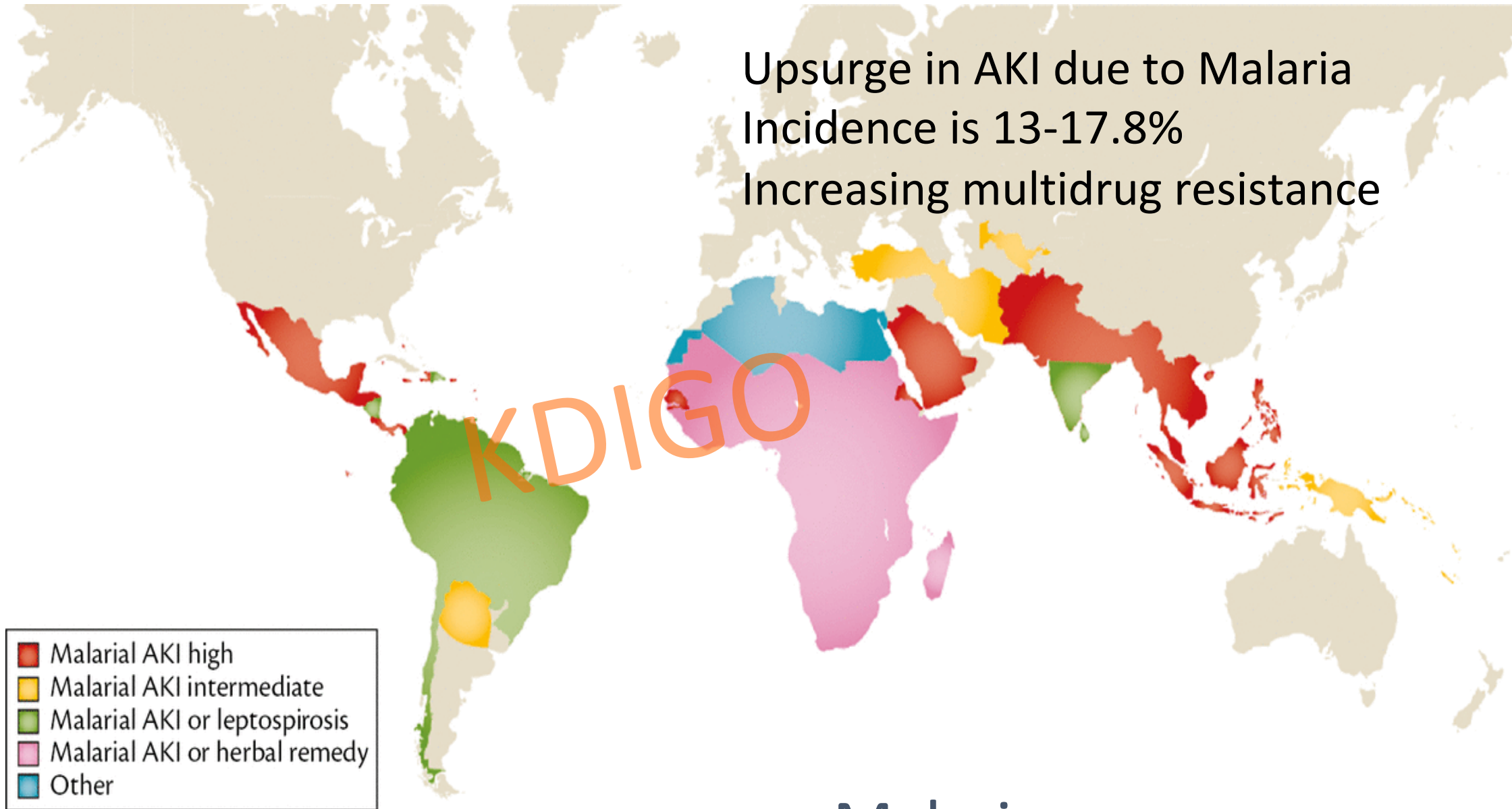
Advancing Nephrology Around the World



Major etiology of AKI in tropical area

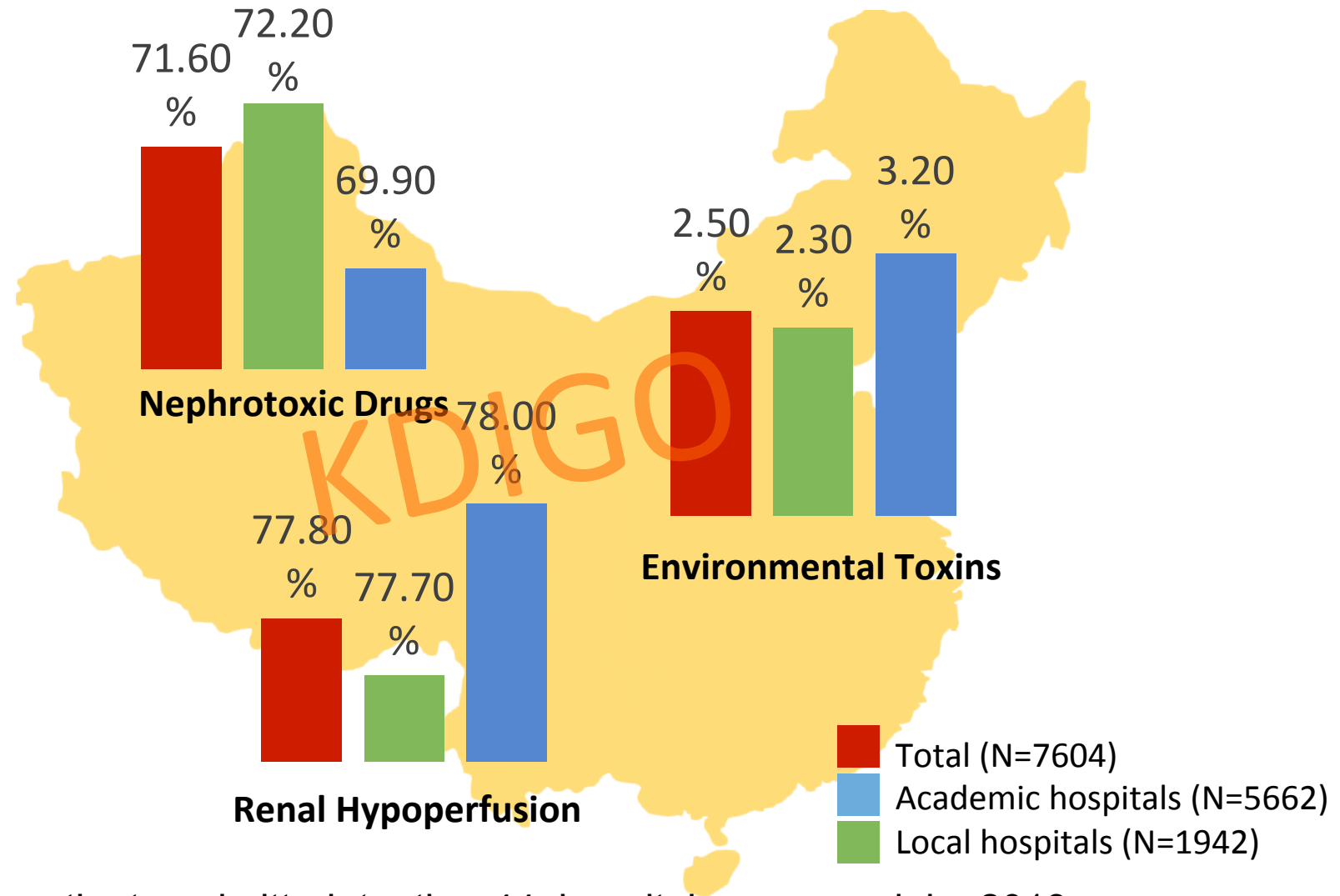


Upsurge in AKI due to Malaria
Incidence is 13-17.8%
Increasing multidrug resistance



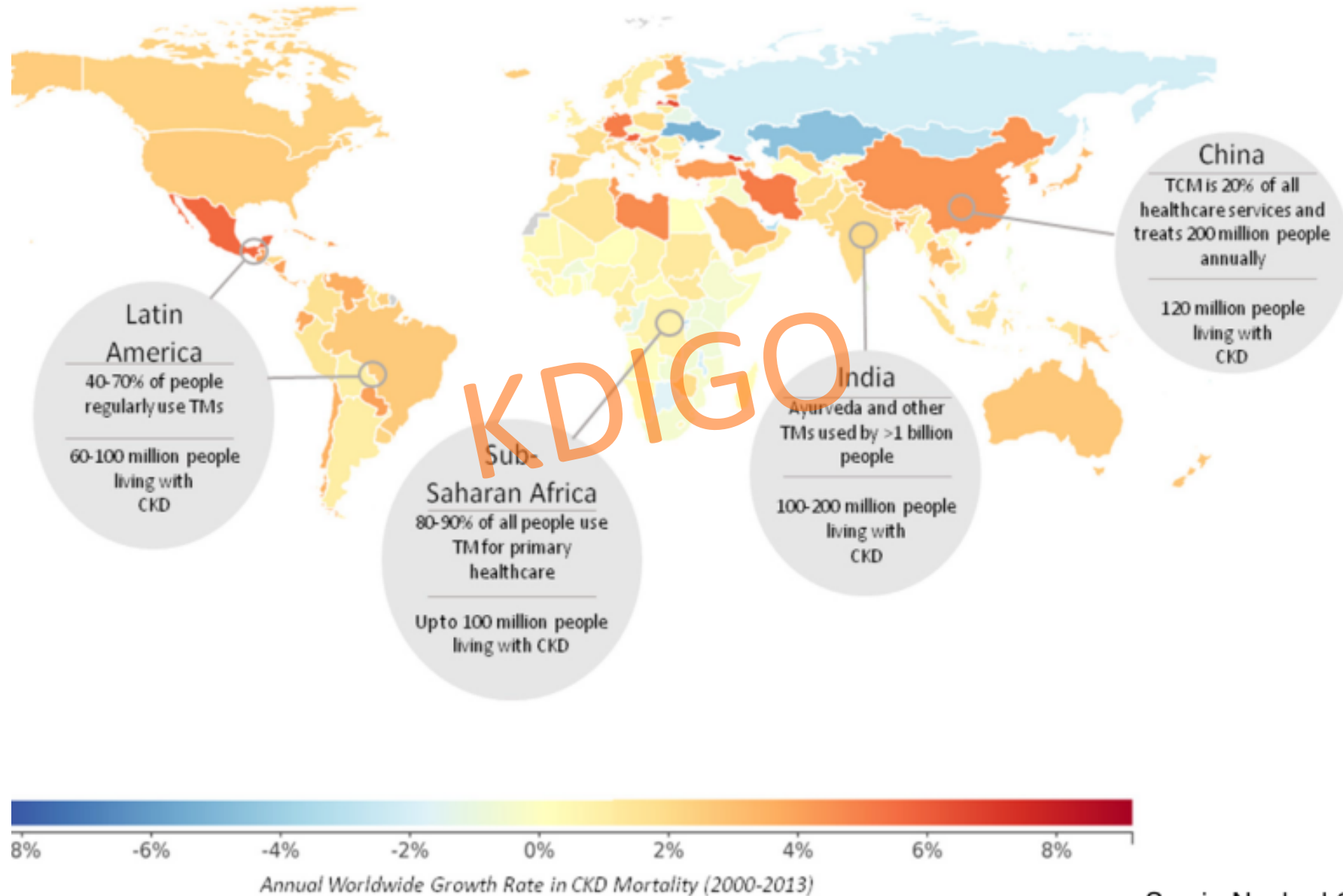
Malaria

Habitual difference, AKI in China



2, 223, 230 patients admitted to the 44 hospitals screened in 2013,

Traditional medicine in LMIC area



Population Pyramid



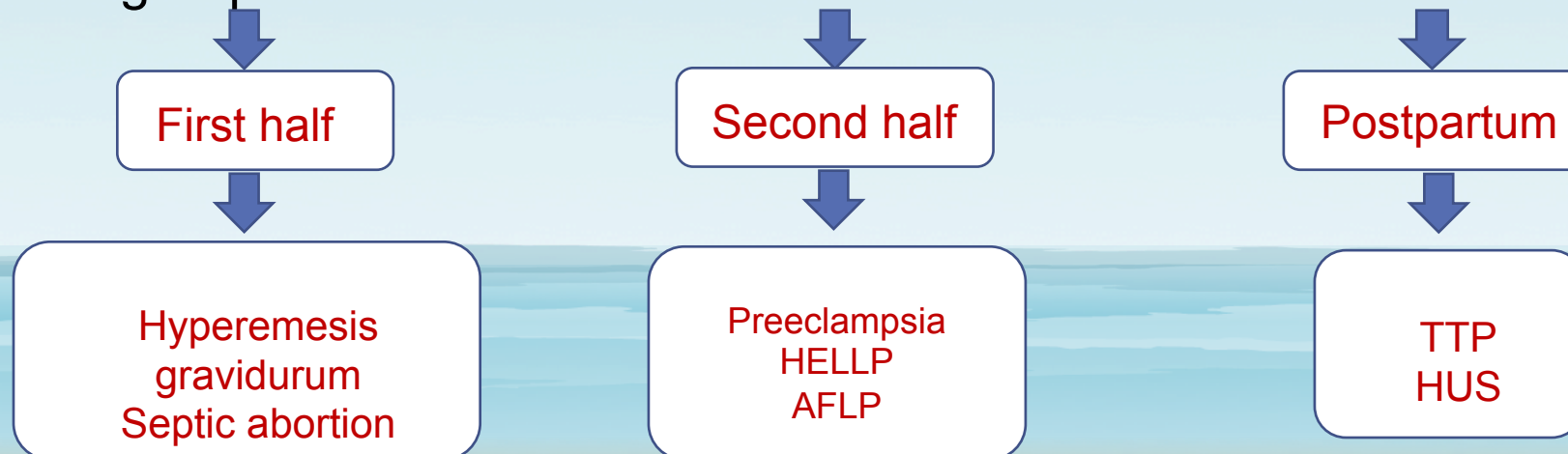
Source: UN Population Division, *World Population Prospects: The 2008 Revision* (2009).

Etiology of AKI during pregnancy

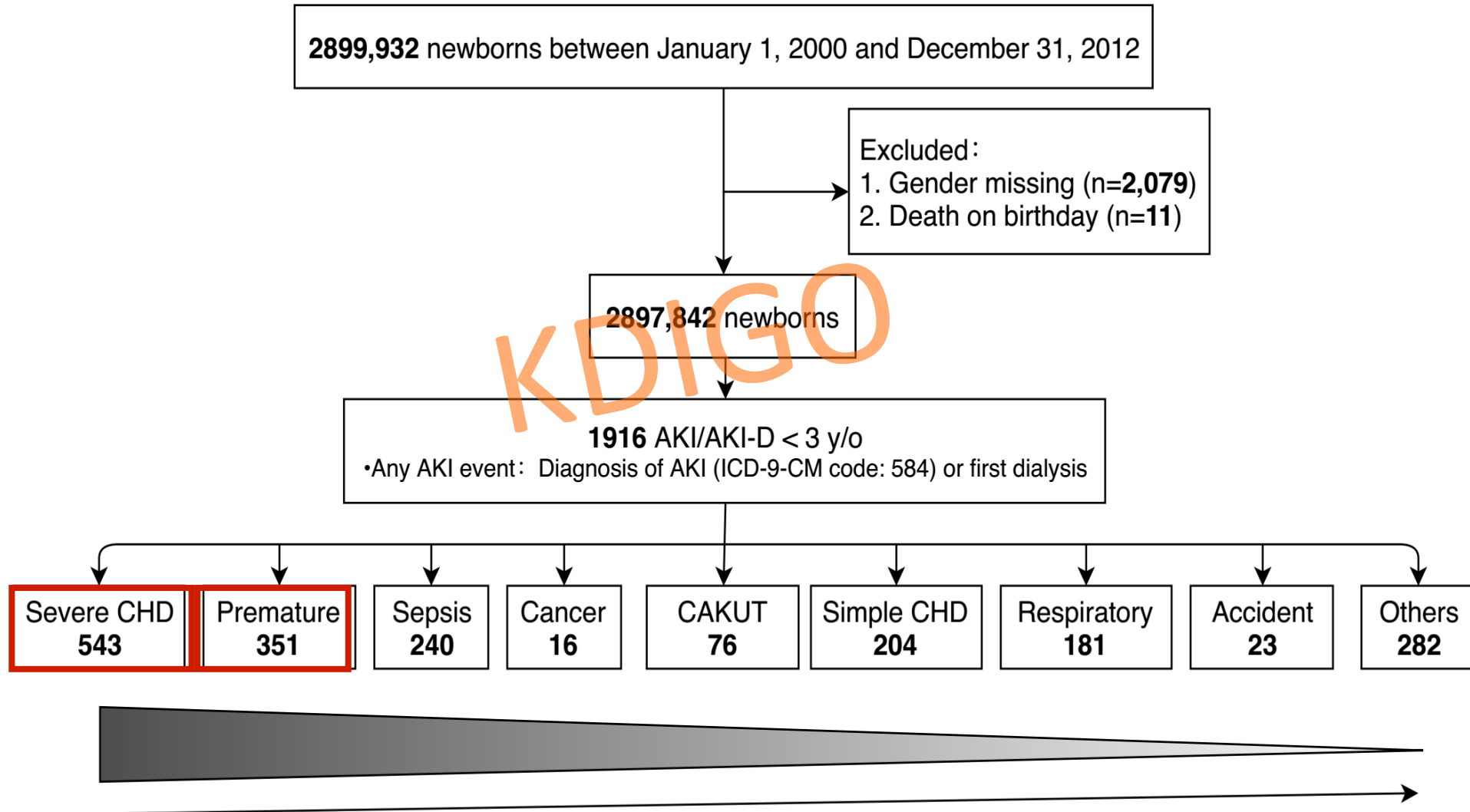
It occurs with bimodal distribution



Based on trimester of pregnancy AKI can be classified into three groups:



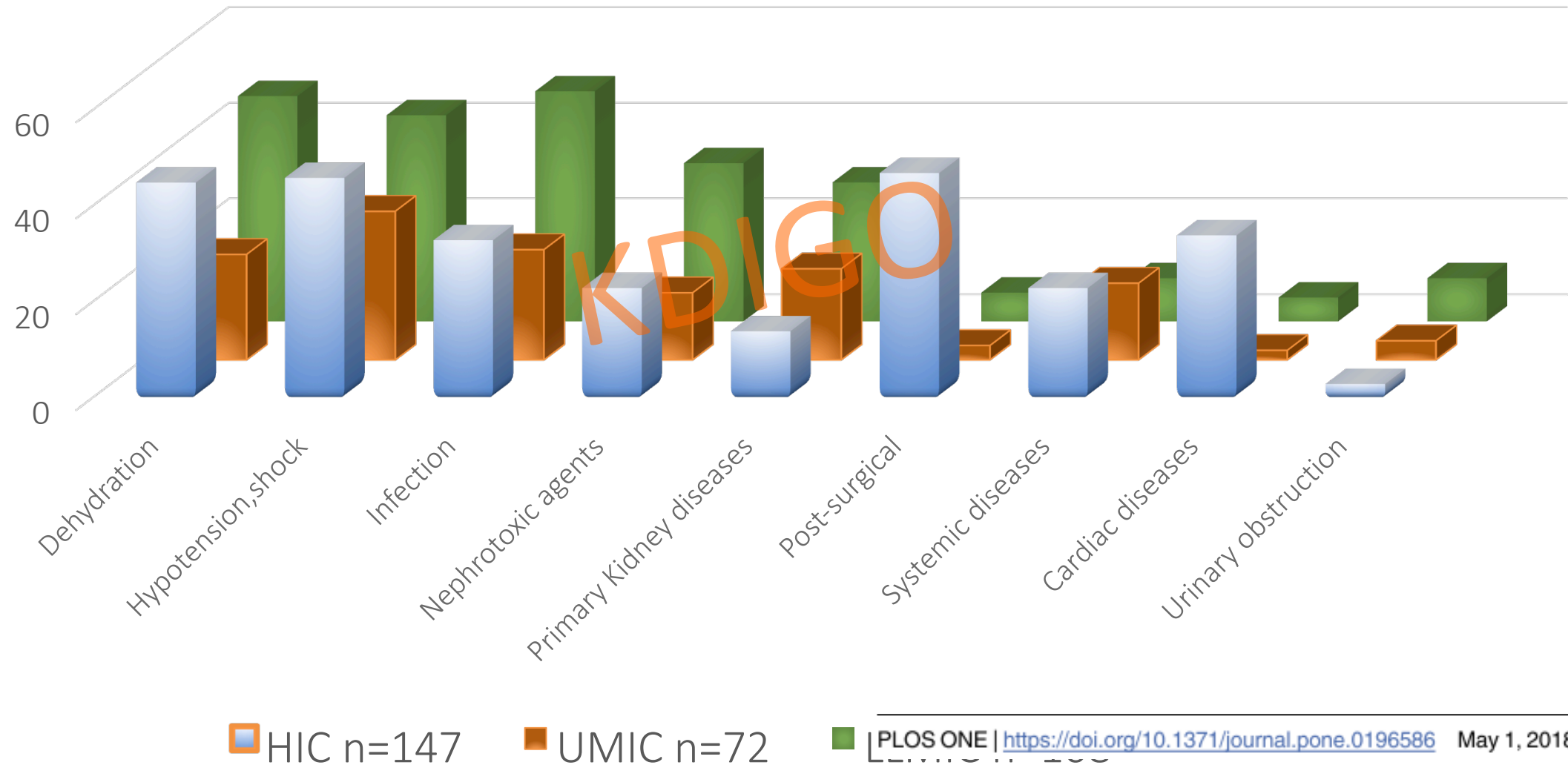
Pediatric AKI, less than 3 years



•Risk factors: Medication, intervention or surgery before AKI

•Outcomes: death, chronic kidney disease (CKD), congestive heart failure (CHF), and

AKI in Children form 0-25 snapshot, child





Challenging problems in AKI in DC

1. *Changing disease etiology*
2. *Climate problem*
3. *Health resources*

In South Asia...difficulty

Nephrol Dial Transplant (2003) 18: 1820–1823

DOI: 10.1093/ndt/gfg260

**Nephrology
Dialysis
Transplantation**

Original Article

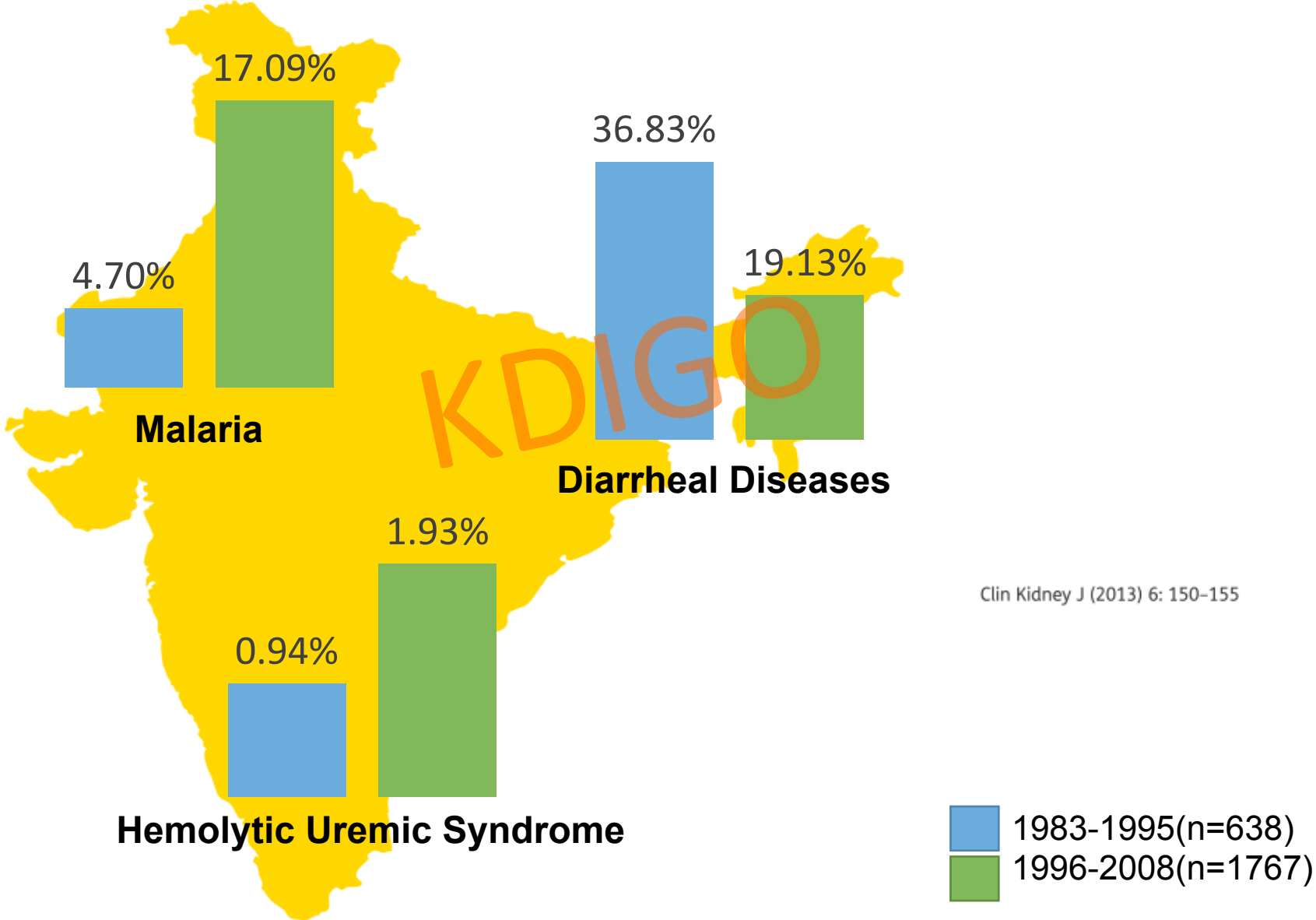
Outcome in severe acute renal failure associated with malaria

Rubina Naqvi, Ejaz Ahmad, Fazal Akhtar, Anwar Naqvi and Adib Rizvi

Sindh Institute of Urology and Transplantation, Dow Medical College and Civil Hospital, Karachi, Pakistan

Changing disease epidemiology

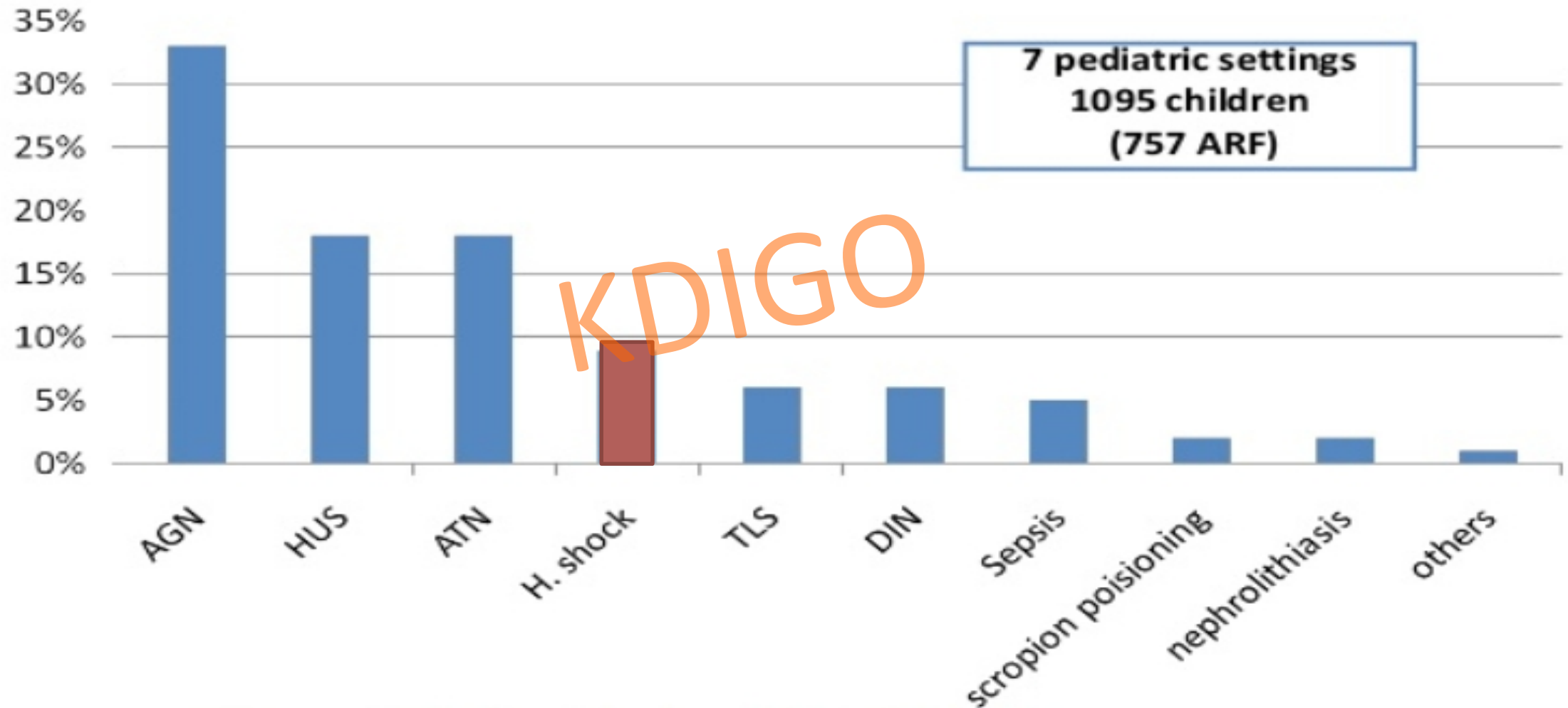
Etiological pattern of AKI, India



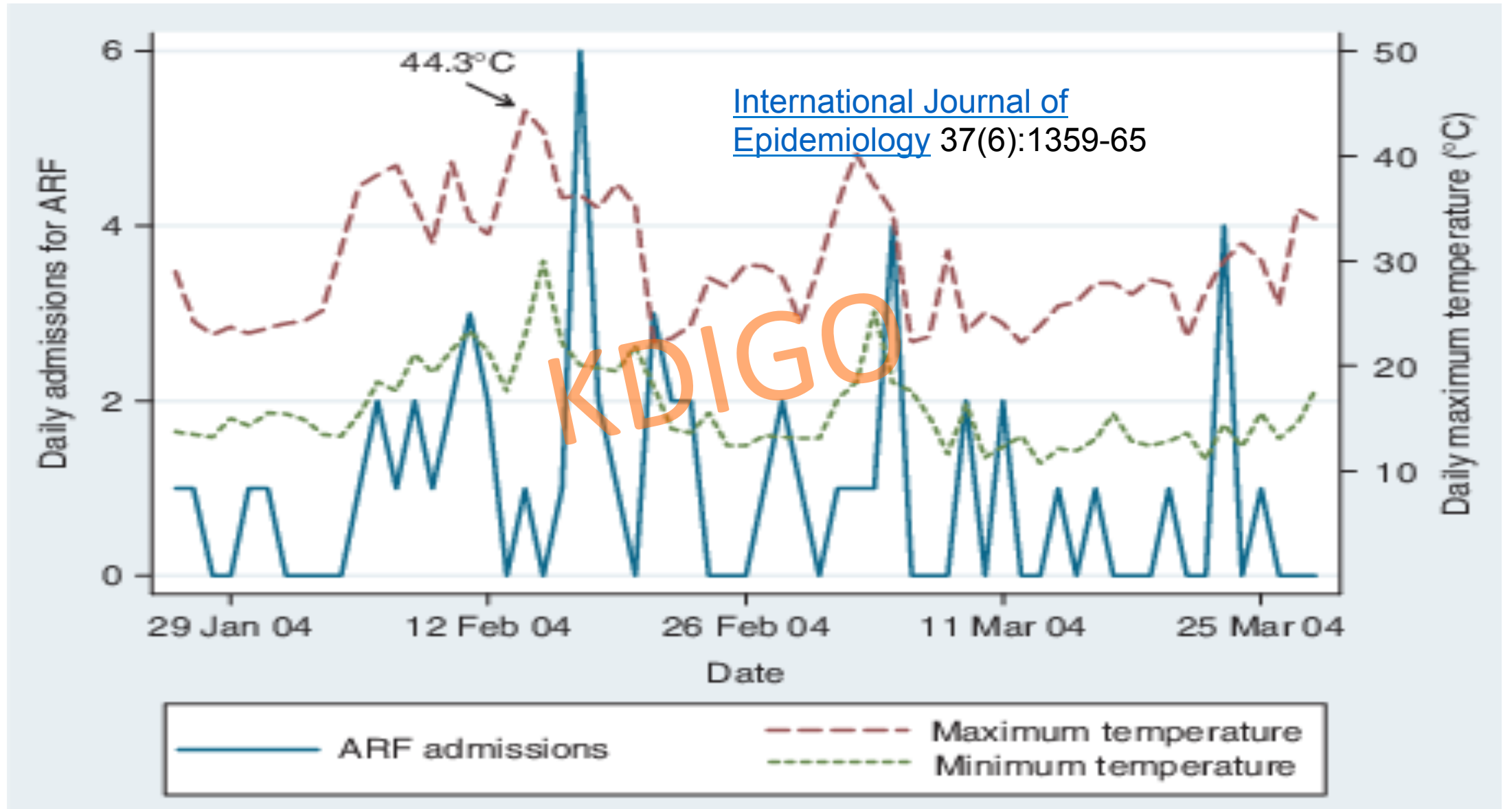
Climate Change Effects on Human Health



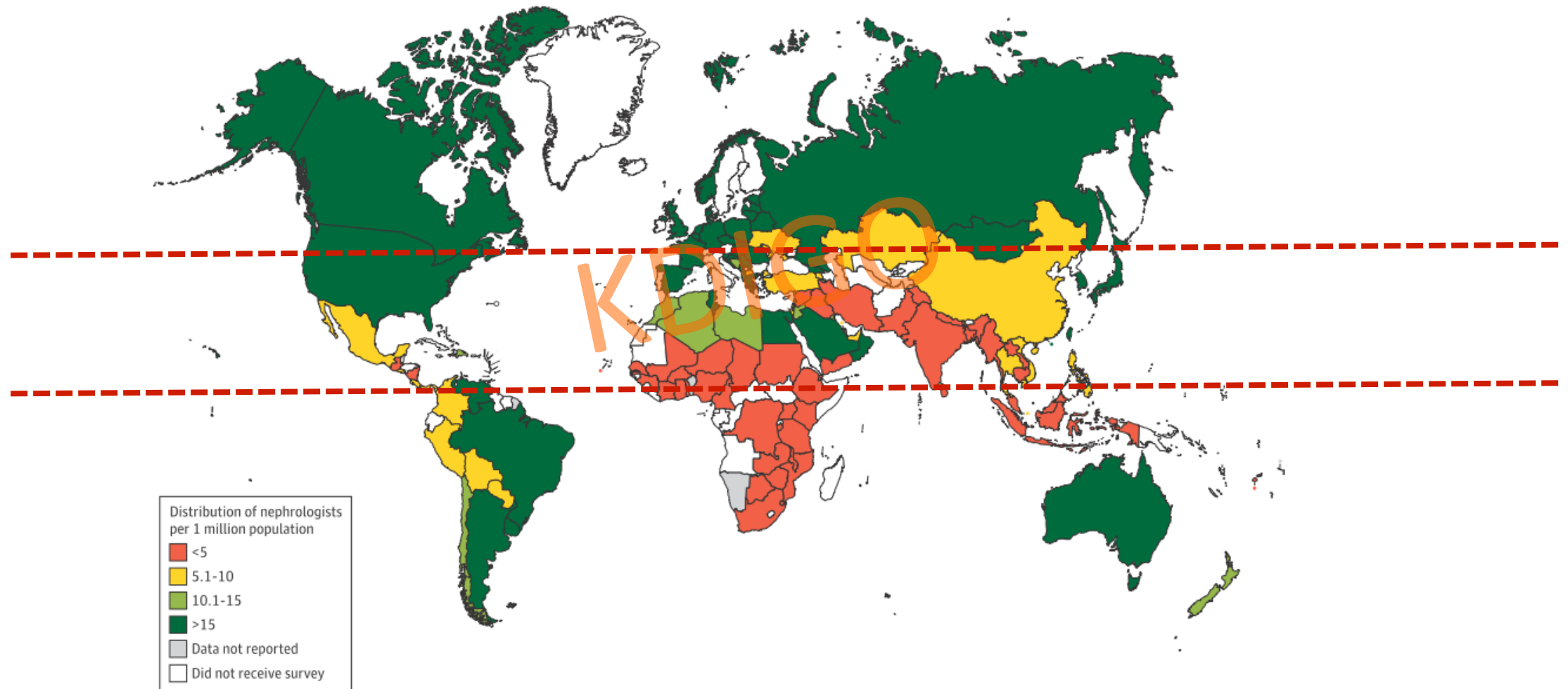
The etiology of AKI – Iran



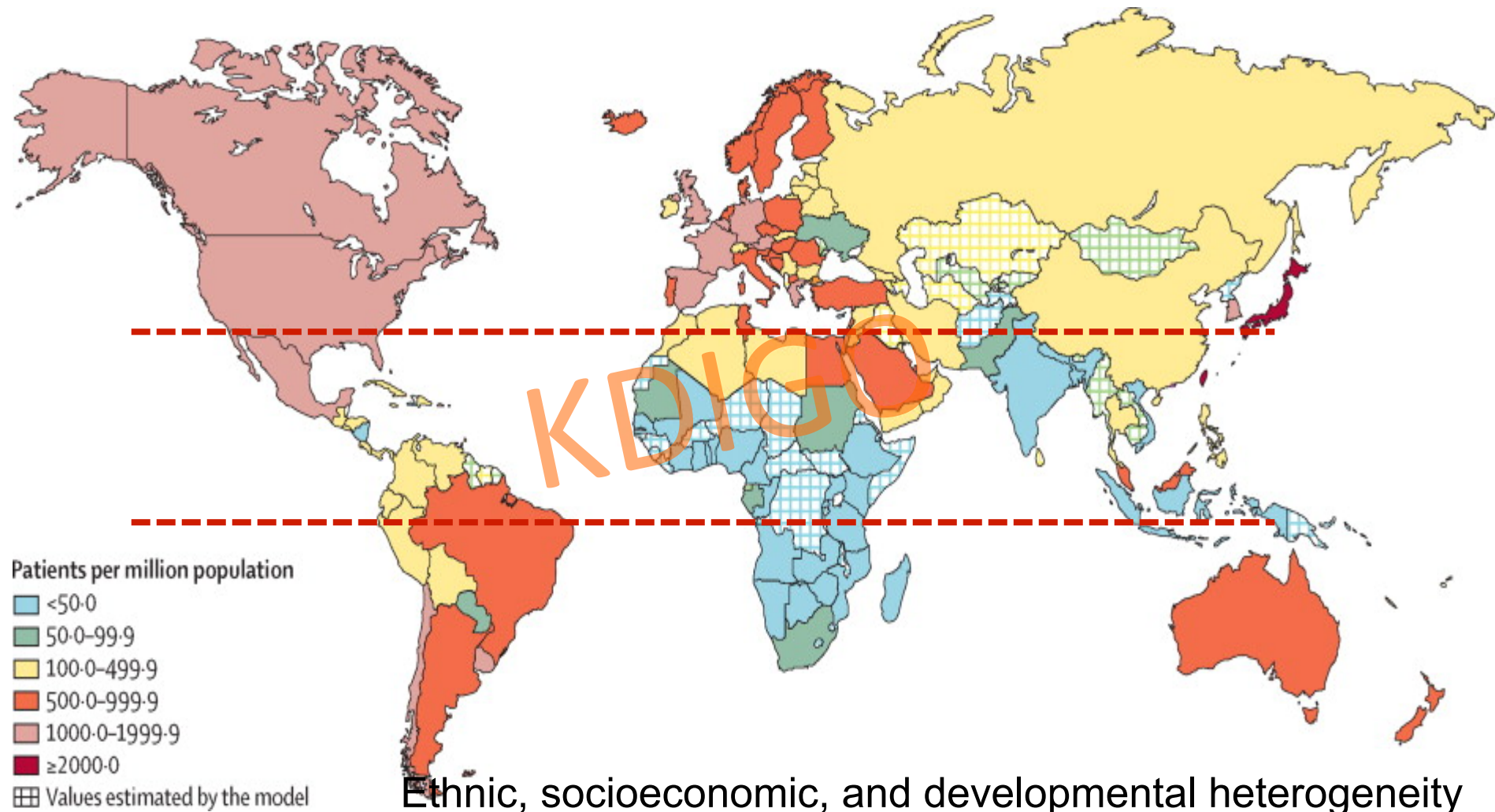
Heat waves on AKI



Global distribution of nephrologists per 1 million population (ISN)



Patients received RRT



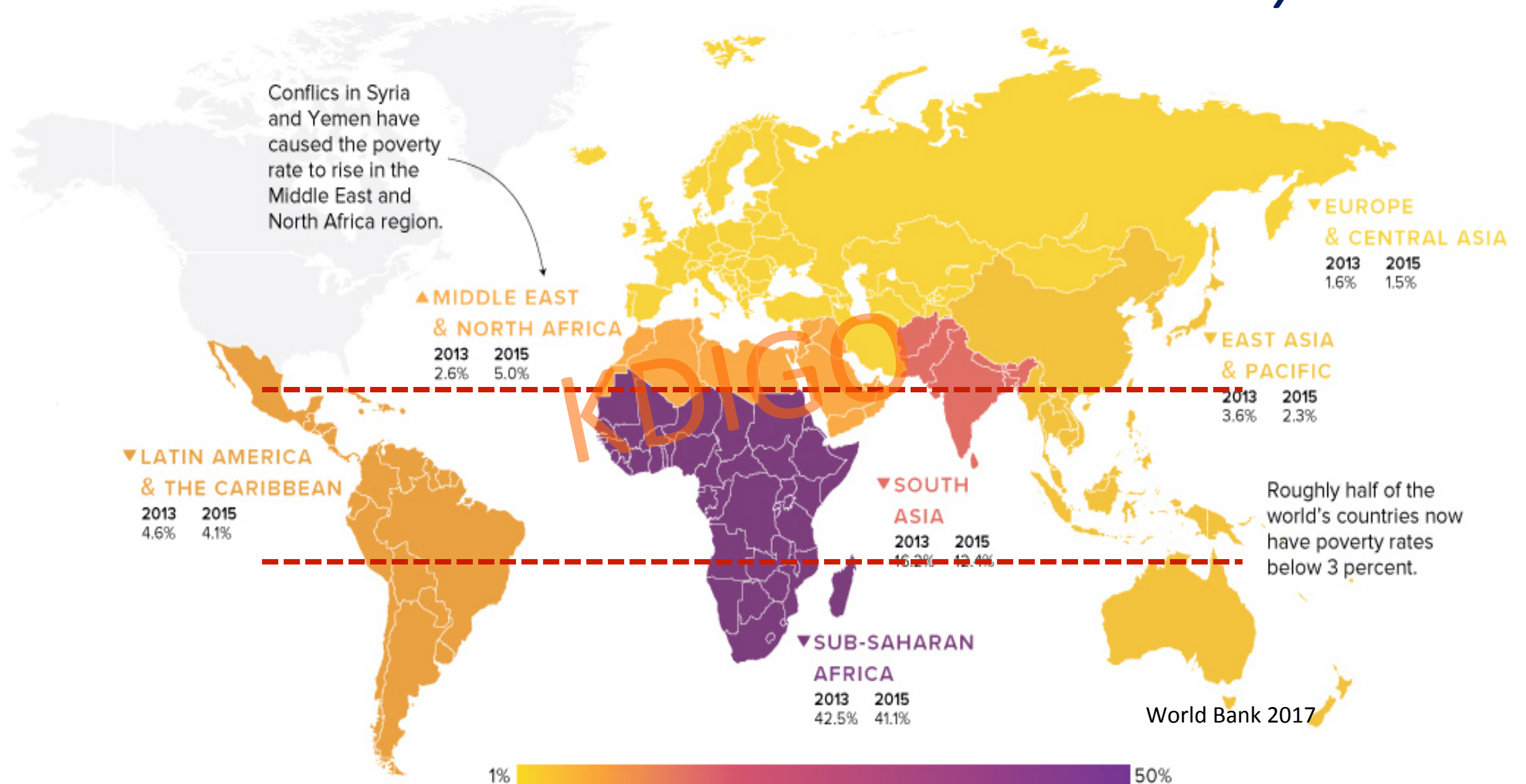
Not getting dialysis



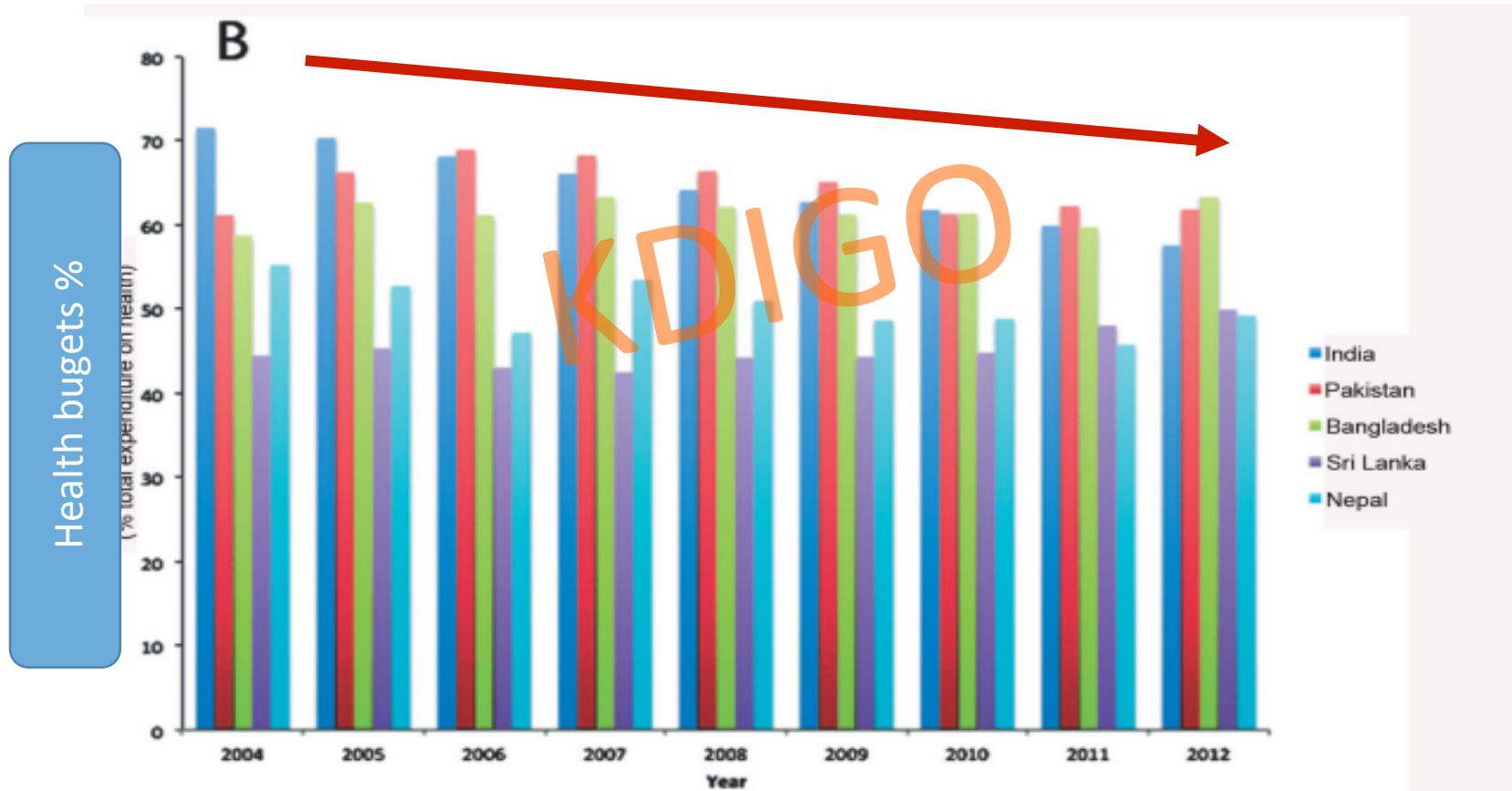
Ethnic, socioeconomic, and developmental heterogeneity

Poverty headcount % ratio, 2015

Extreme Poverty Rate

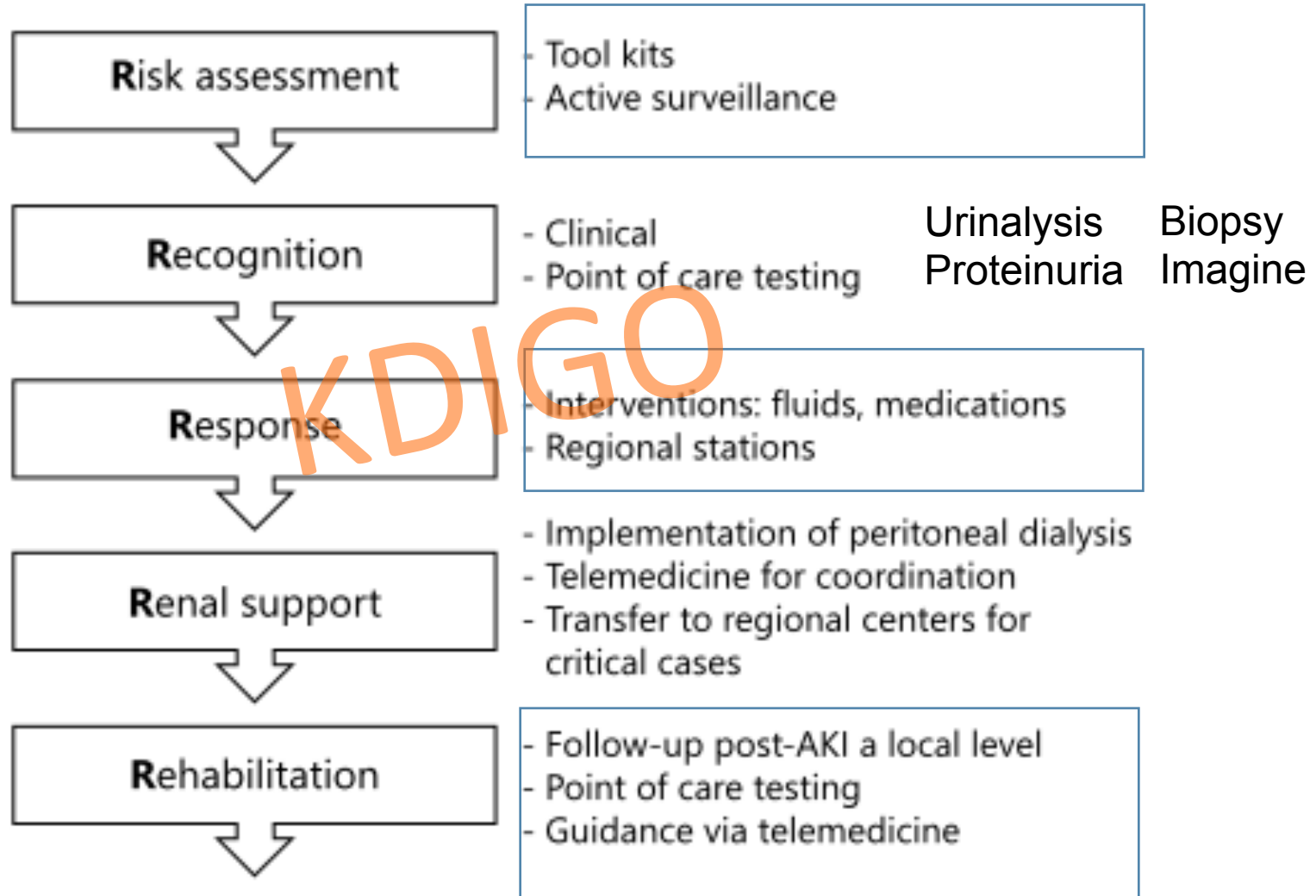


Expenditures burden in South Asia: the challenges are facing



Limited resources and low awareness

The ISN '0 by 25' Project



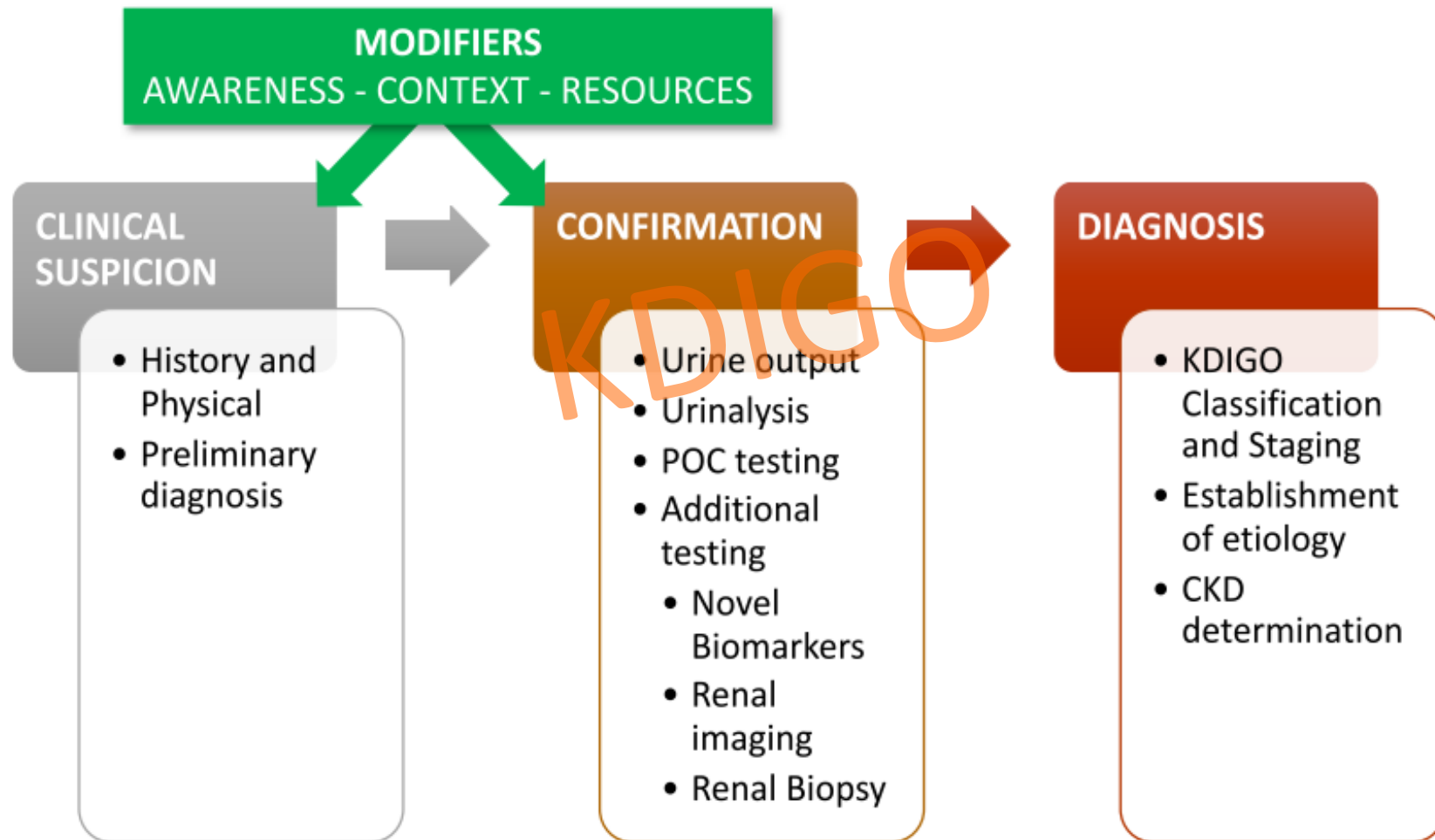
AKI prediction score

Limitations of disease score

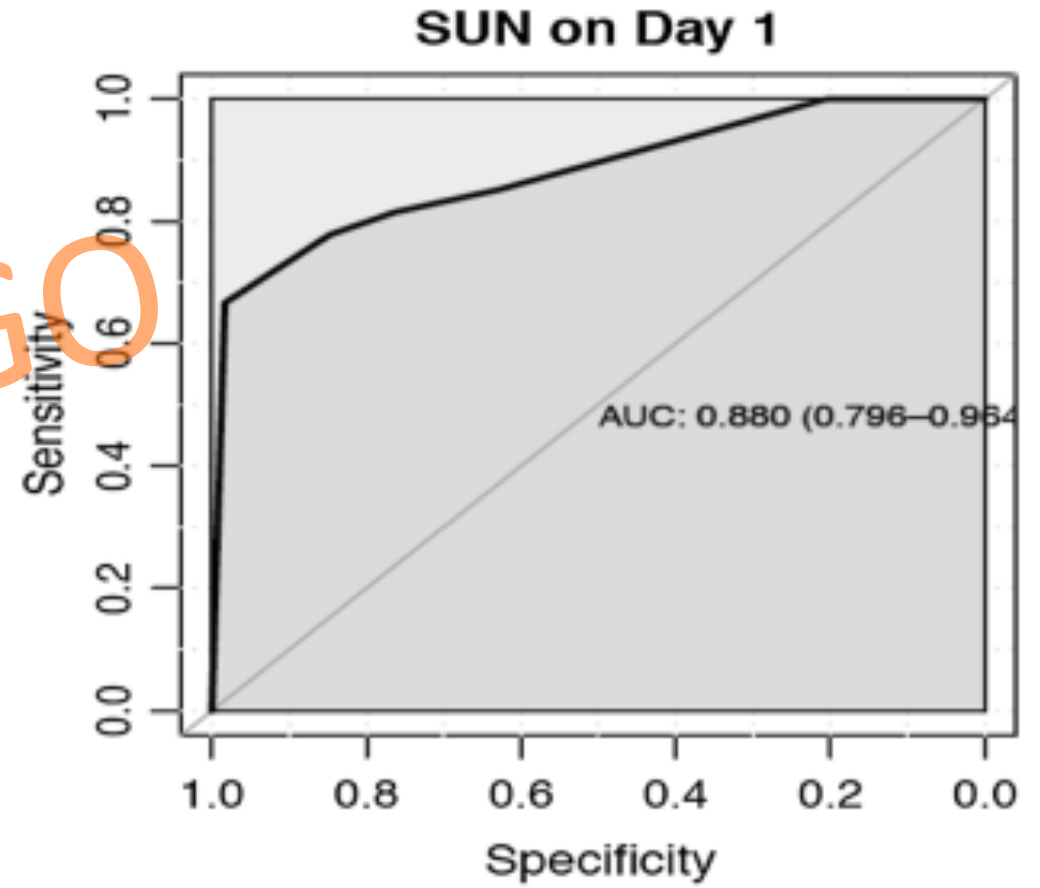
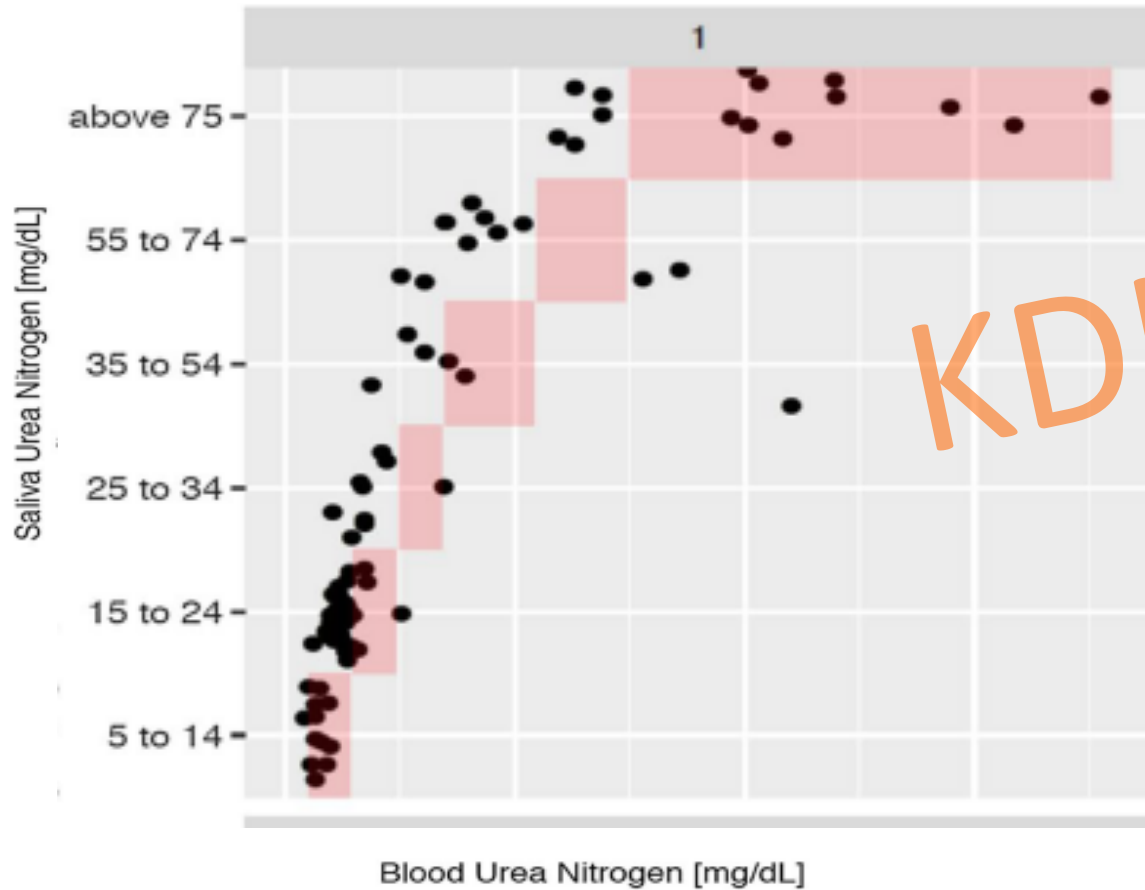
1. Disease-specific
 2. Mostly from **developed countries**
 3. Mostly for hospital-acquired acute kidney injury
 4. Mostly focused on inherent risk factors
 5. Limited evaluation of providers, **healthcare systems, and population-level factors**
 6. Limited use of the process of care quality indexes
-



AKI- recognition.-The ISN '0 by 25' Project



Salivary urea nitrogen dipstick- Angola

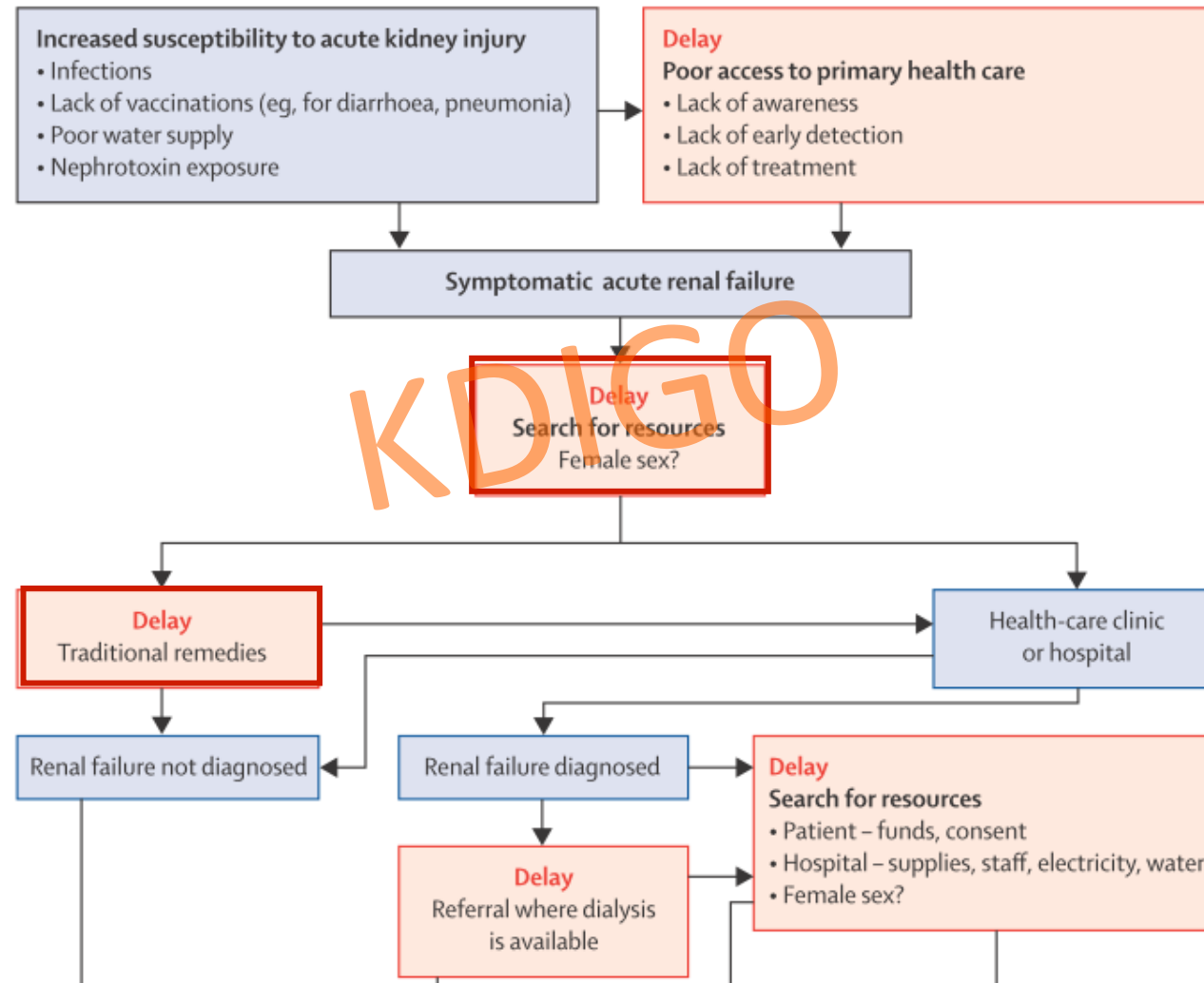


Eight-six patients malaria

Biopsy could be necessary in LMIC

	Children (n=1643)*	Adults (n=993)†
Infection	380 (23%)	274 (28%)
Septicaemia	370	232
HIV	6	0
Tetanus	4	1
Pyelonephritis	0	12
Typhoid	0	7
Cholera	0	22
Glomerular disease	350 (21%)	76 (8%)
Acute glomerulonephritis	183	57
Nephrotic syndrome	115	10
Rapidly progressive acute glomerulonephritis	46	4
Lupus nephritis	5	5
Membranoproliferative acute glomerulonephritis	1	0
Nephrotoxin	270 (16%)	182 (18%)
Haemoglobinuria from:		
<i>Plasmodium falciparum</i> malaria haemolysis	198	34

Barriers to care in AKI-sub-Saharan Africa



Minimum treatment parameter requirements in the community setting

Minimum treatment/ parameters requirements	Suspected AKI	Confirmed AKI	Complete response	Persistent AKI
Fluid resuscitation	→			Nephrology referral Book for ongoing volume needs risk of volume overload avoidance of nephrotoxic drugs
Fluid challenge	→			
Furosemide stress test	→			
Mental status	→			
Hemodynamic parameters: BP, HR	→			
Capillary refill	→			
Urinalysis	→			
UOP, fluid balance	→			

A Nurse Led Intervention



STOP AKI
in Malawi

'STOP' AKI!

Sepsis and hypoperfusion

(Dehydration, haemorrhage, cardiac failure, liver failure, renovascular insult)

Toxicity

(Drugs, contrast)

Obstruction

(Tumour, stones, extrinsic compression)

Parenchymal kidney disease

(Glomerulonephritis, rhabdomyolysis)

Remember.... Prevent AKI!

The 4 'M's

Monitor Patient

(vital signs, regular blood tests, fluid charts, urine volumes)

Maintain Circulation

(hydration, resuscitation, oxygenation)

Minimise Kidney Insults

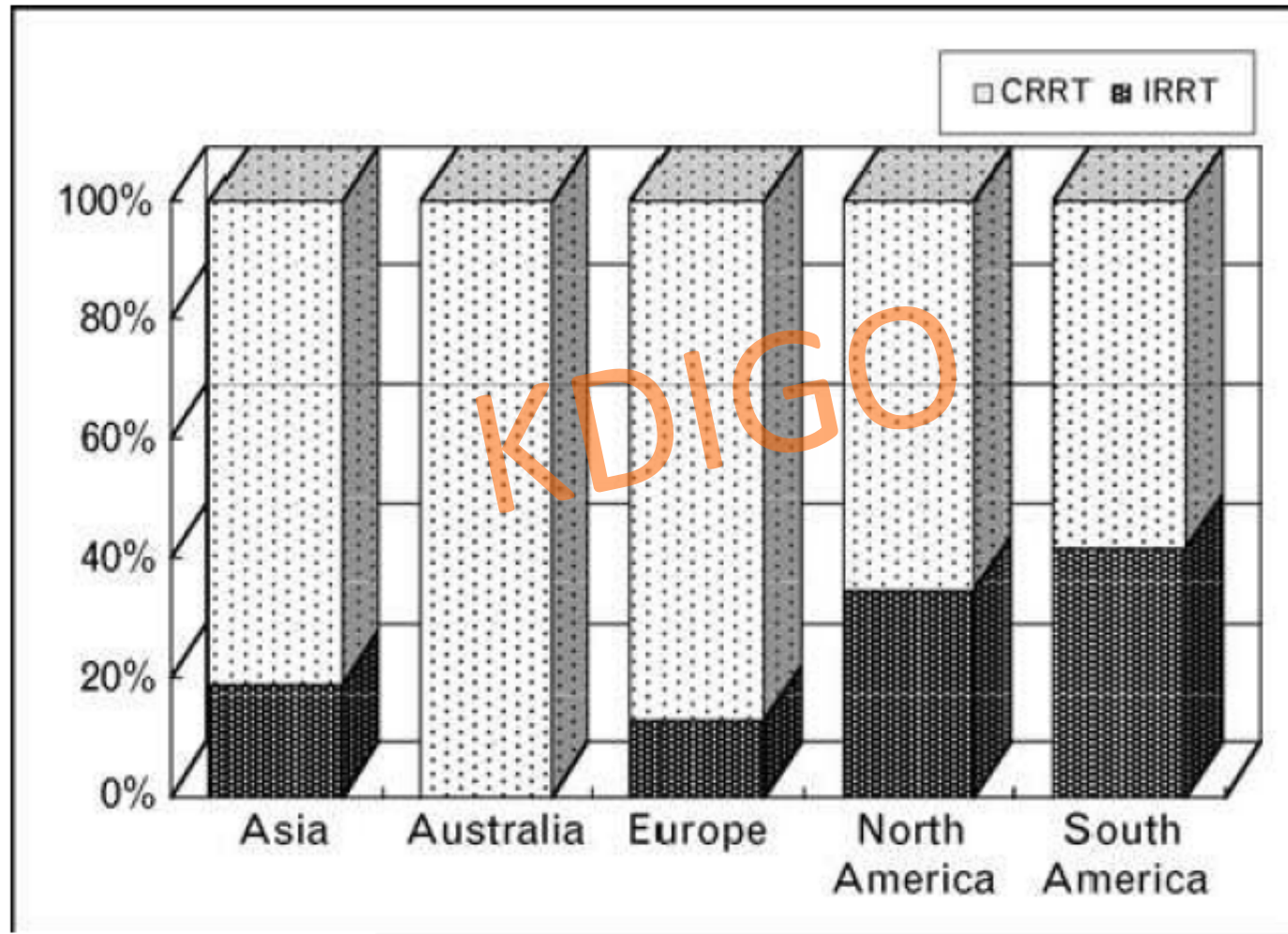
(e.g. nephrotoxic medications, surgery or high risk interventions, hospital acquired infection)

Manage The Acute Illness

(e.g. sepsis, heart failure, liver failure)

You can make a difference!

- Regional differences in choice of RRT modality



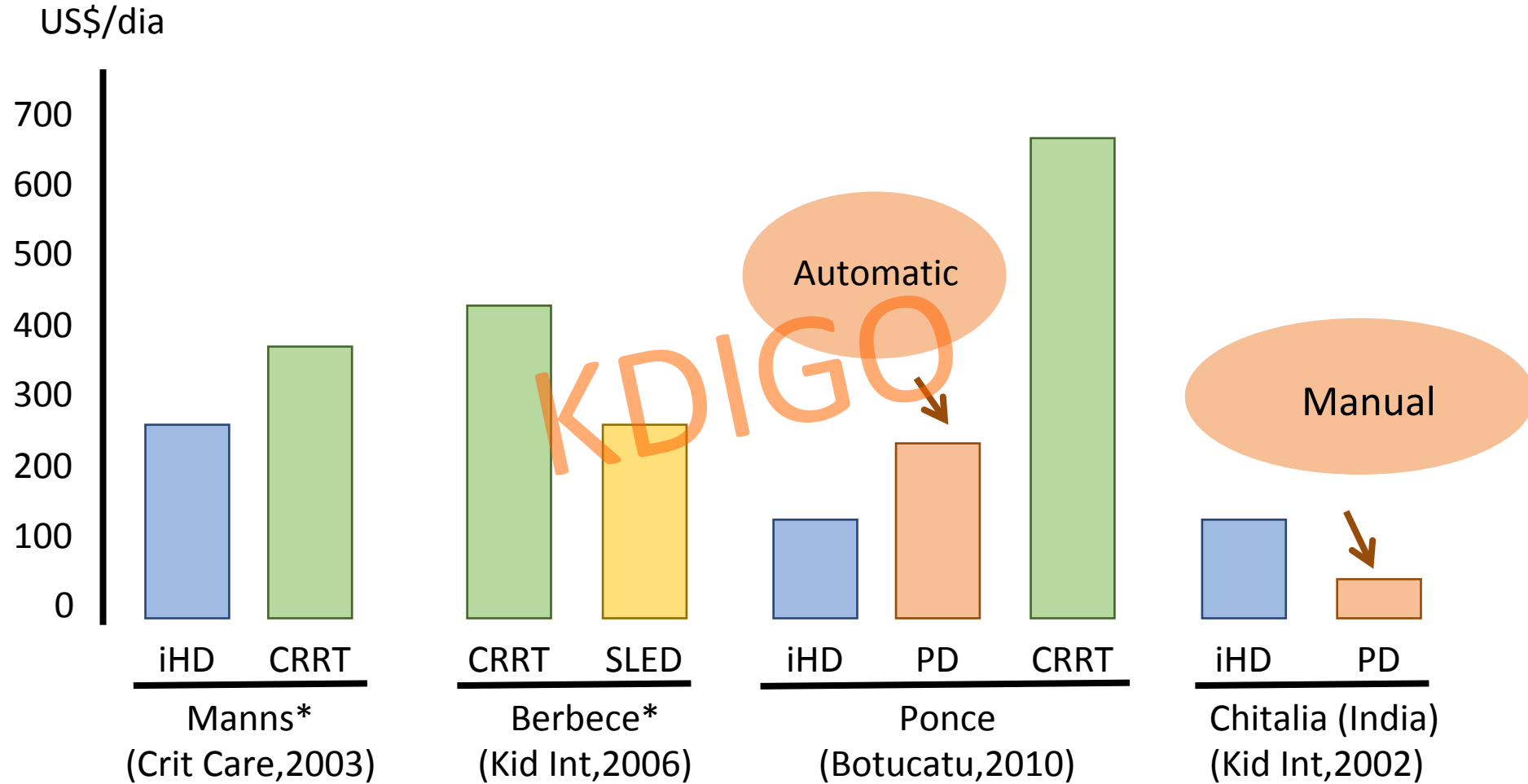
Curr Opin Crit Care 12:538-543.

Resources
Experience

Treatment of AKI in DC

	DEVELOPED WORLD	DEVELOPING WORLD
TREATMENT	RRT widely immediately available IHD>CRRT>SLED>PD KDIGO	Poorly available PD>>IHD
TRANSPORTATION	Immediate	Severe delays→ increased mortality
COSTS	High, affordable	Low, unaffordable, increases mortality

Costs of dialysis therapy in AKI



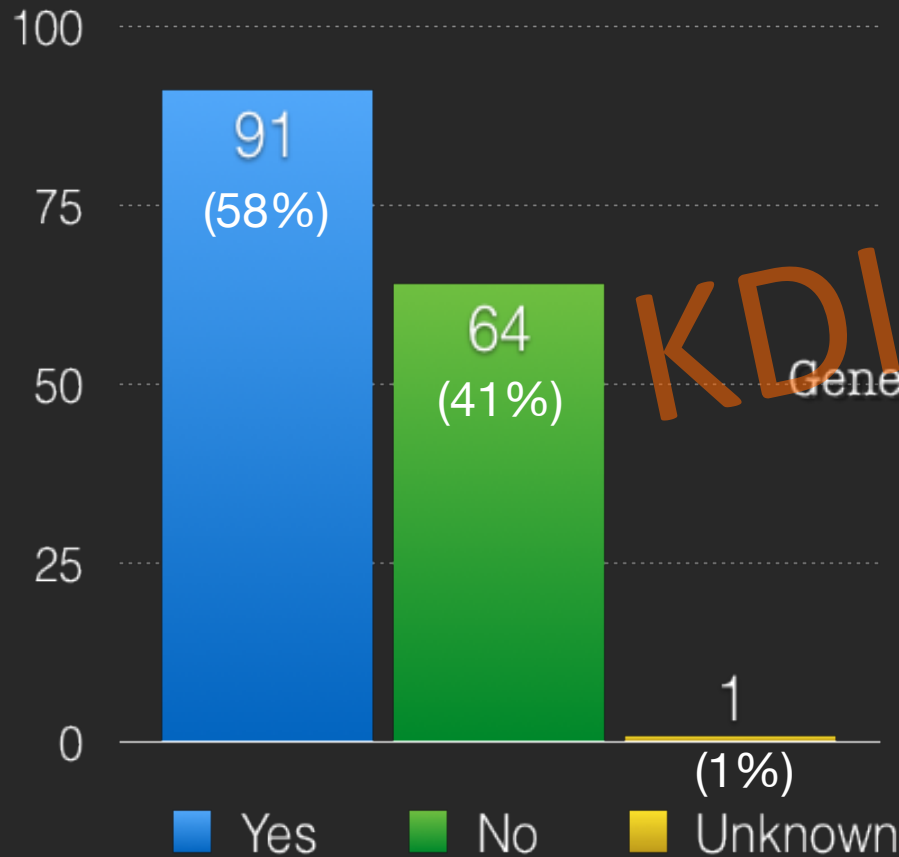
All-cause mortality in hospital

	KDIGO AKI criteria†	
	OR (95% CI)	p value
Age (per 10 years increase)	1.33 (1.25–1.42)	<0.0001
Sex (male vs female‡)	1.21 (0.99–1.49)	0.06
History of cardiovascular disease (yes vs no‡)	1.25 (1.03–1.53)	0.0263
Diabetes (yes vs no‡)	1.11 (0.88–1.39)	0.39
Chronic kidney disease (yes vs no‡)	0.81 (0.63–1.03)	0.09
Delayed vs timely‡ recognition of AKI	1.29 (0.89–1.89)	0.18
Severe comorbidity (yes vs no‡)	4.84 (3.86–6.06)	<0.0001
AKI stage at peak		
1	1‡	--
2	1.89 (1.46–2.44)	<0.0001
3	1.95 (1.38–2.75)	0.0001
Peak serum creatinine (natural logarithm transformed)	1.87 (1.42–2.47)	<0.0001
RRT indication (yes vs no‡)	1.46 (1.13–1.90)	0.0042
Renal referral (yes vs no‡)	0.61 (0.47–0.80)	0.0002
Academic vs local‡ hospital	1.14 (0.91–1.43)	0.26

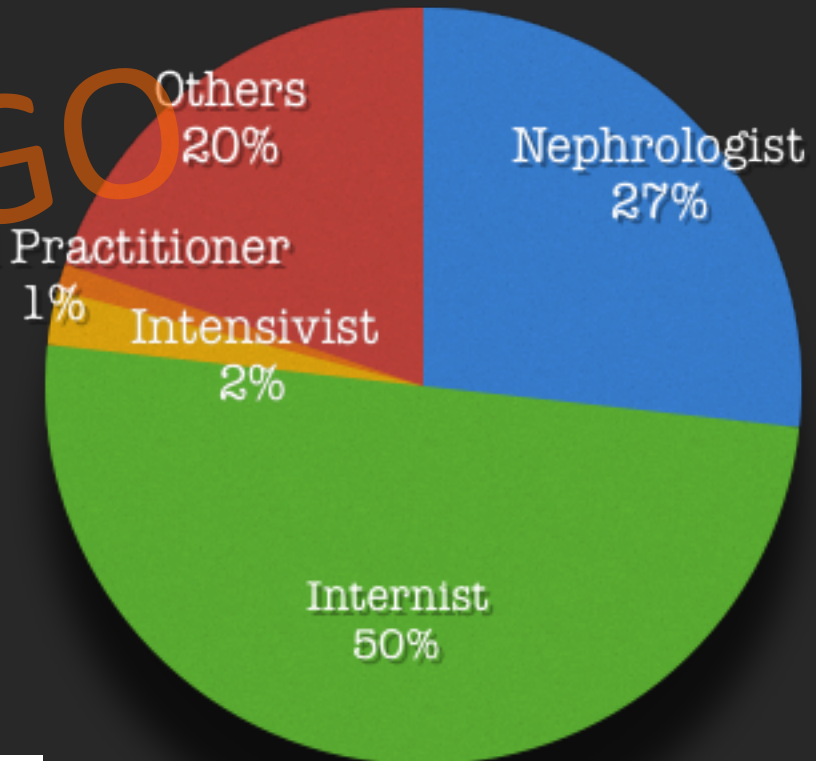
2 223 230 patients admitted to the 44 hospitals screened in 2013, 154 950 (7.0%) AKI

AKI Snapshot , Taiwan

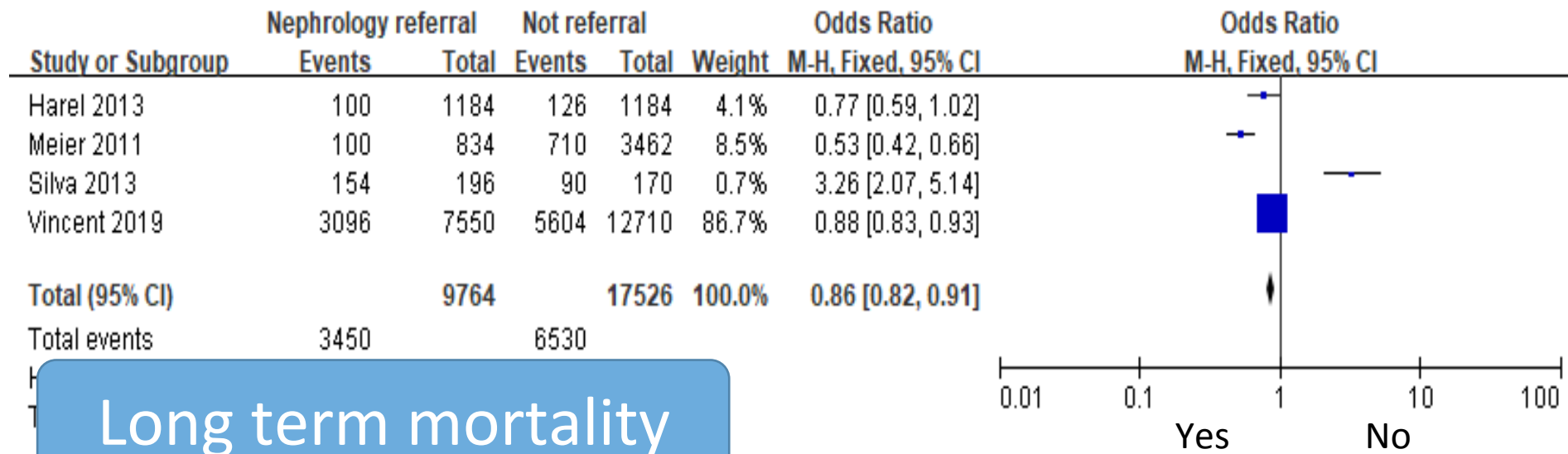
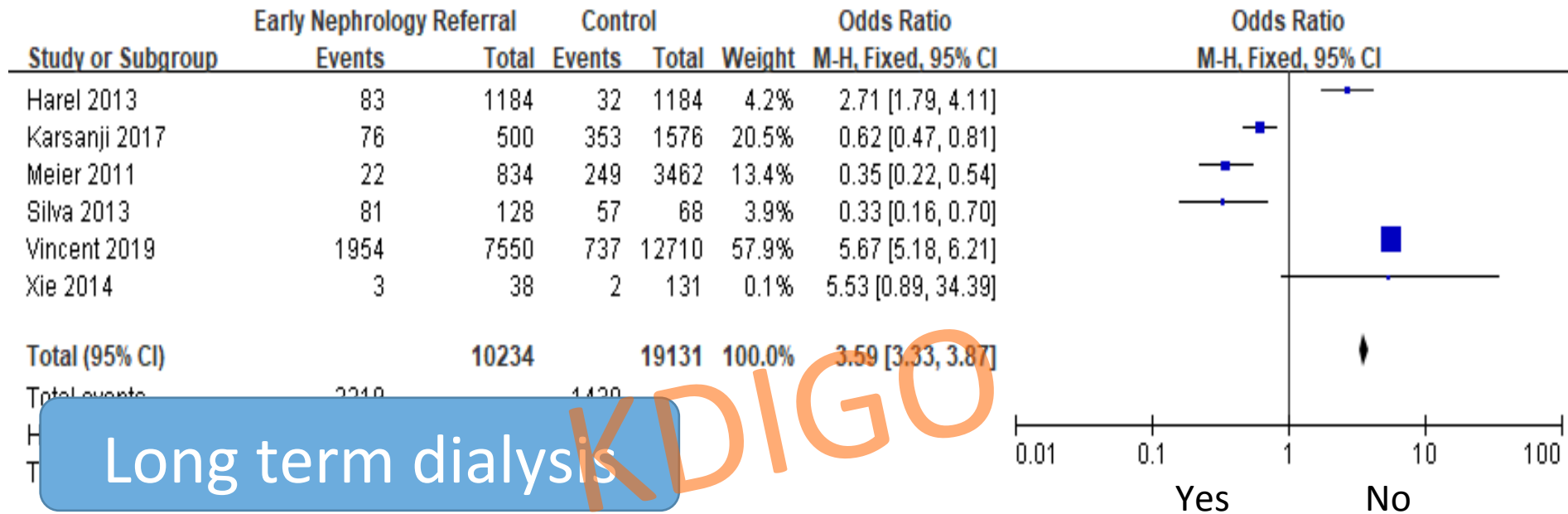
Follow up since AKI



Who follows the patient ?



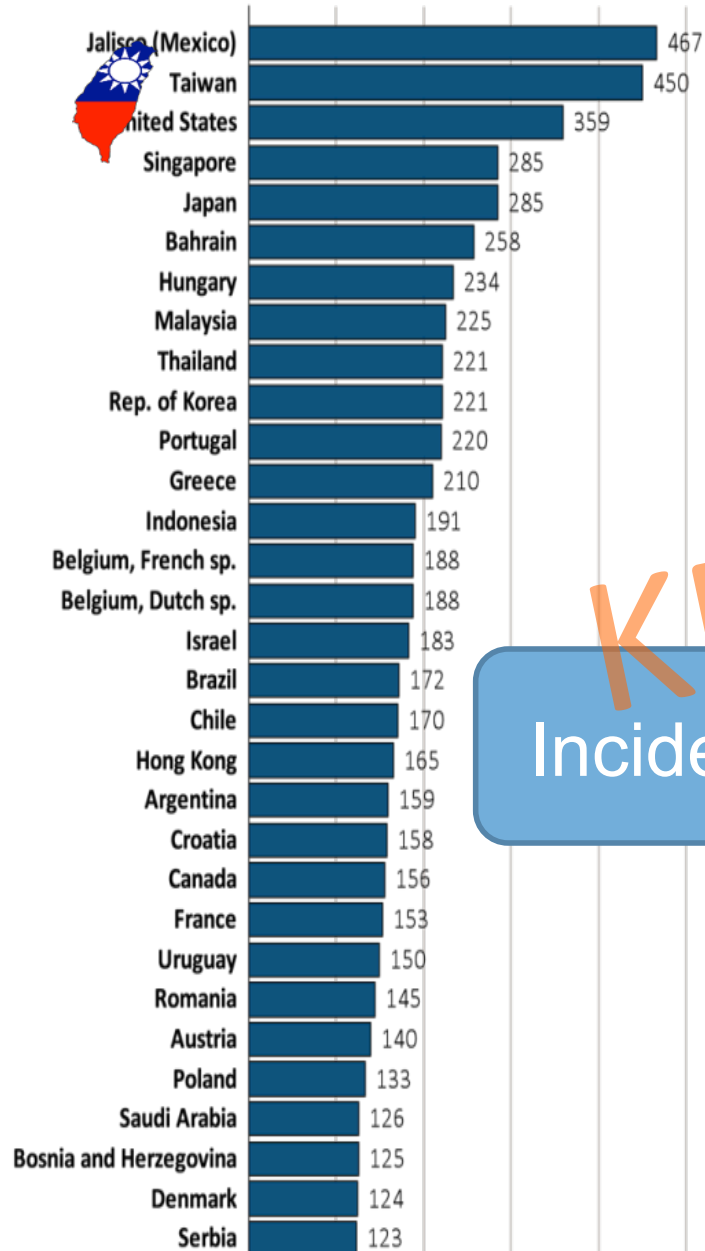
Nephrology referral and outcome



Acute kidney injury risk levels and dimensions



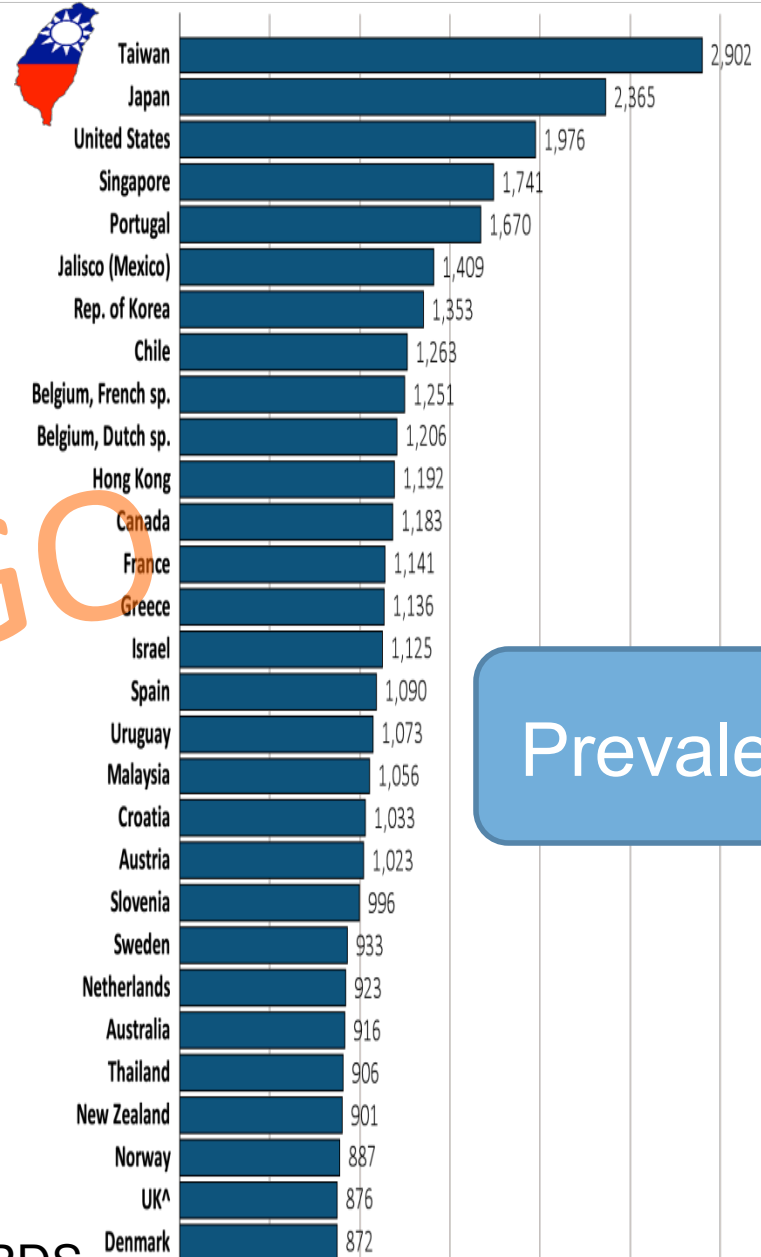
Country



Incidence

2016 USRDS

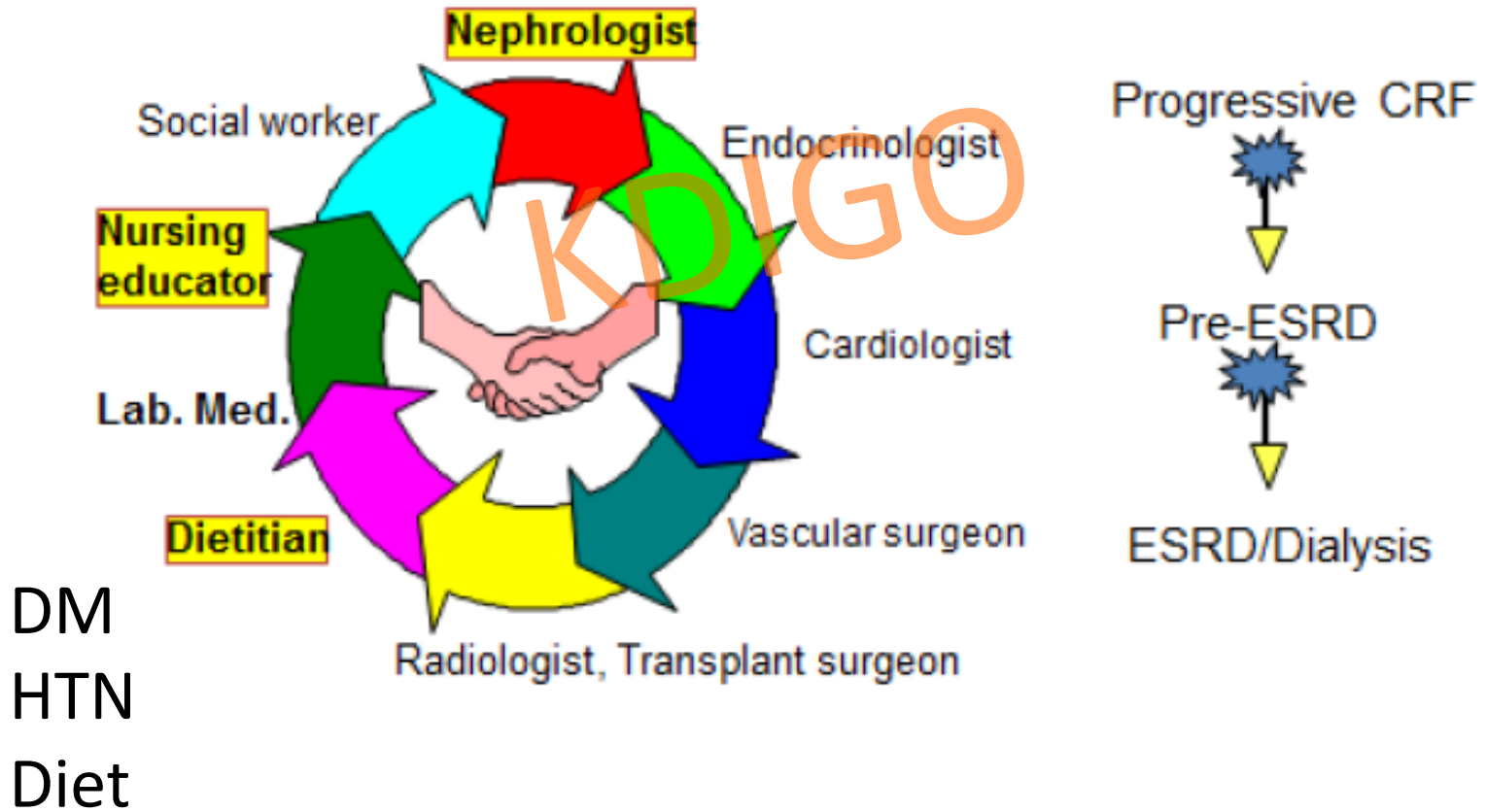
Country



Prevalence

Multidisciplinary care Team for kidney disease

Multidisciplinary Care Team for CKD Patients
in Hospitals/Clinics—Preparatory works in a pilot study



Public approach



1. Awareness of nephrotoxin , chemicals
2. Control of infection and vector
3. Surveillance of pharmacy
4. Safe water and food
5. Referral to nephrologist

AKI



DC Perspectives

Vin-cent Wu, M.D.

dr.vincentwu@gmail.com



AKI is increasing rapidly in DC, limited awareness



AKI specific risk in DC deserve long-term follow up



Water and health care system, resources



Tropical AKI irrevocably linked to tropical co-system and culture

Thank you

KDIGO