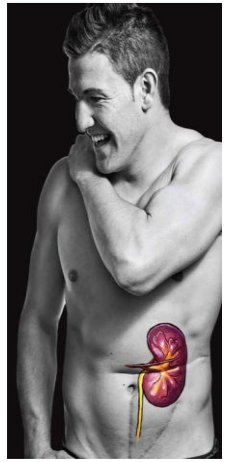
Kuwait City, Kuwait January 2017



Is there a global need for CKD screening programs? Integrated Approaches to Kidney Health

Adeera Levin MD FRCPC CM

University of British Columbia Vancouver Canada

BC Provincial Renal

President International Society of Nephrology

Overview

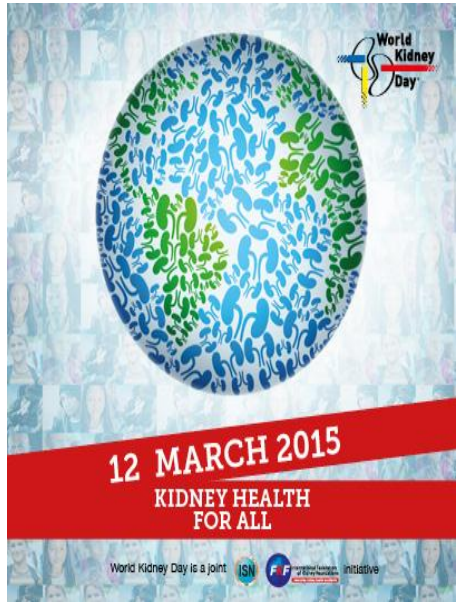
- What we know
  - Global burden of CKD
  - Variation in prevalence, incidence and treatments

- Universal health coverage and Kidney health

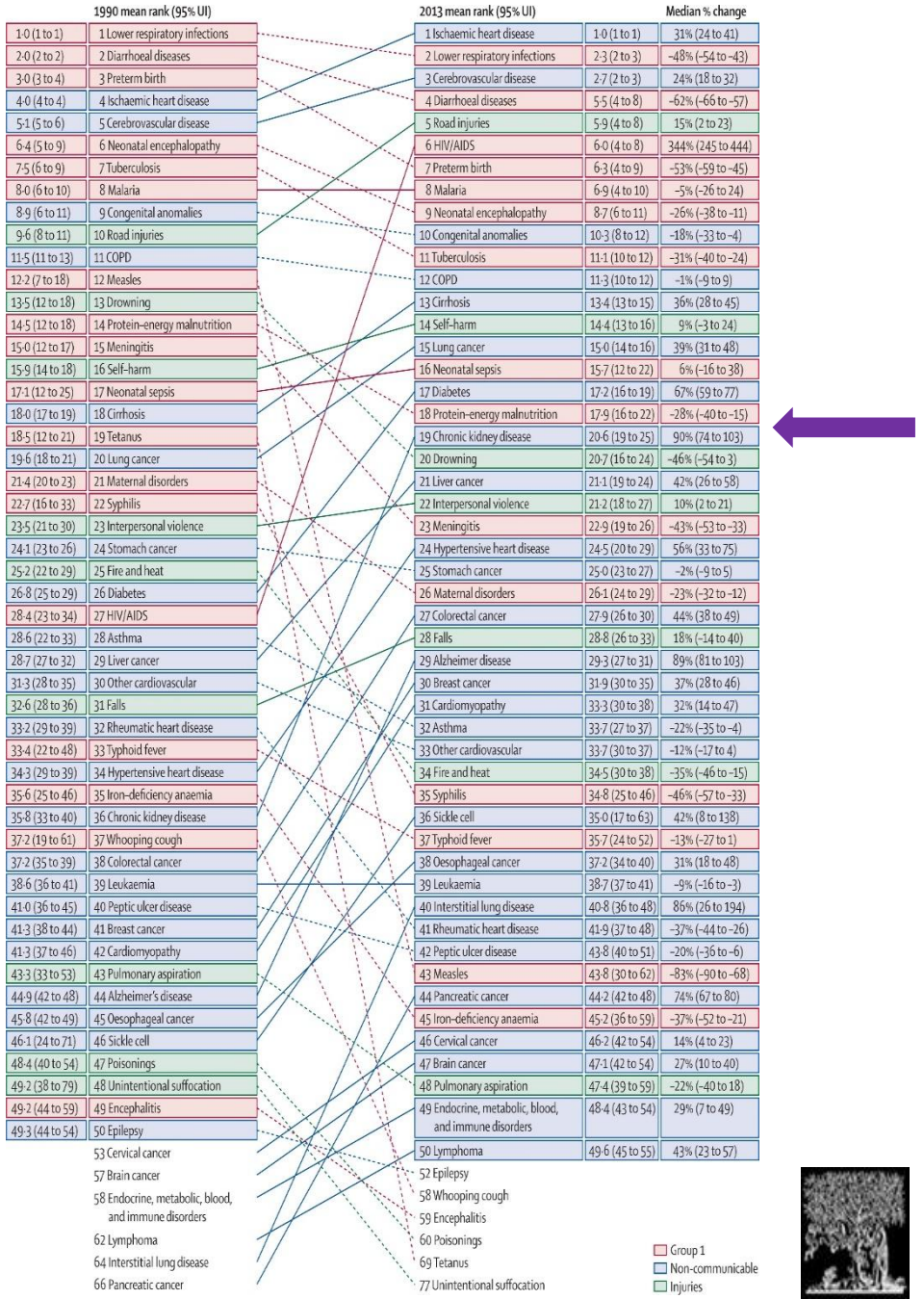
- Global Screening for CKD
  - Challenges and Opportunities

What we know
CKD is a Public Health problem

- CKD increasingly recognized in multiple countries



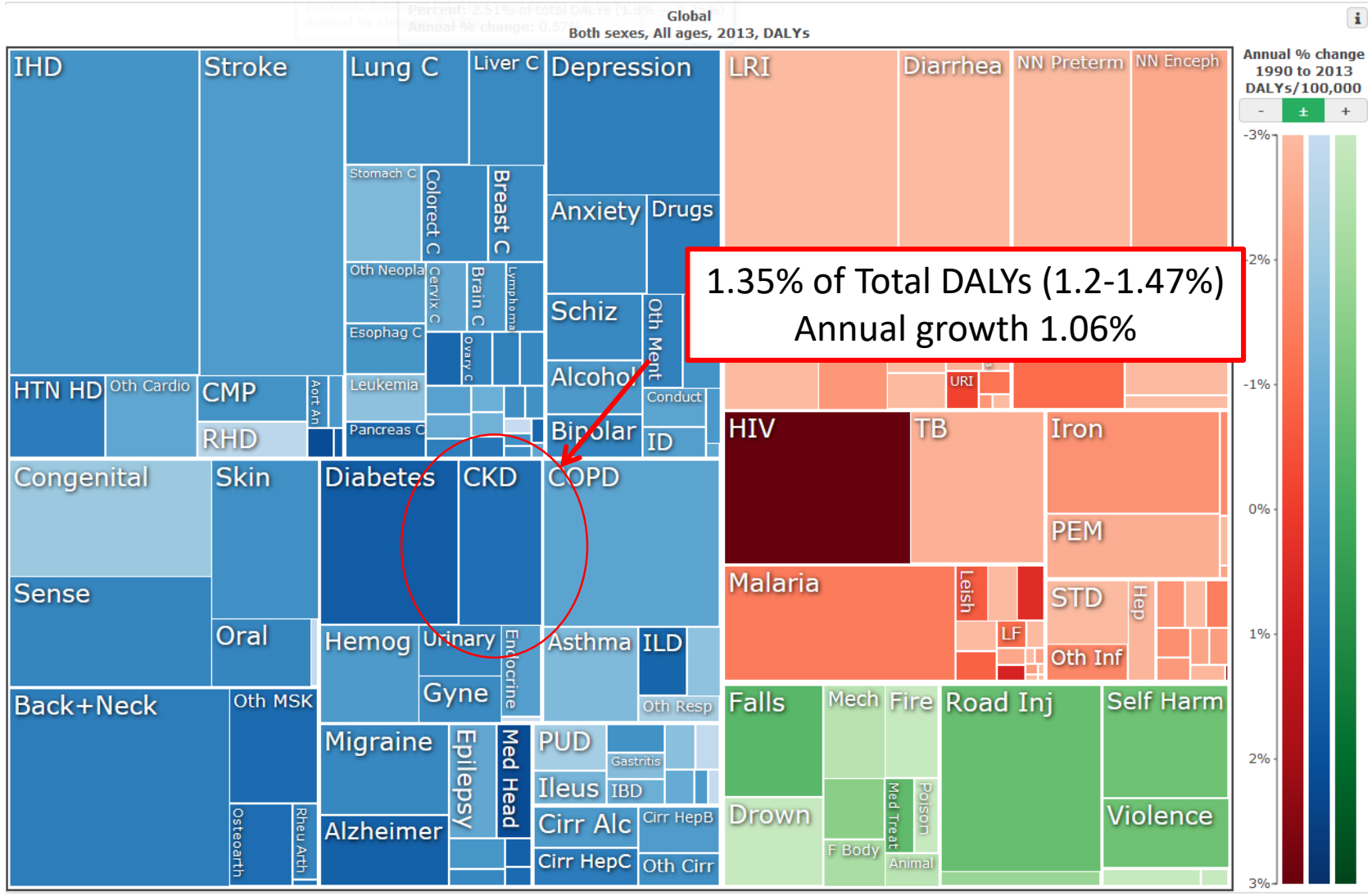
The burden of CKD has moved from 35th to 19th place over in less than 25 yrs



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

The Lancet Volume 385, Issue 9963, Pages 117-171 (January 2015)

Global Burden of Disease



http://vizhub.healthdata.org/gbd-compare/

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

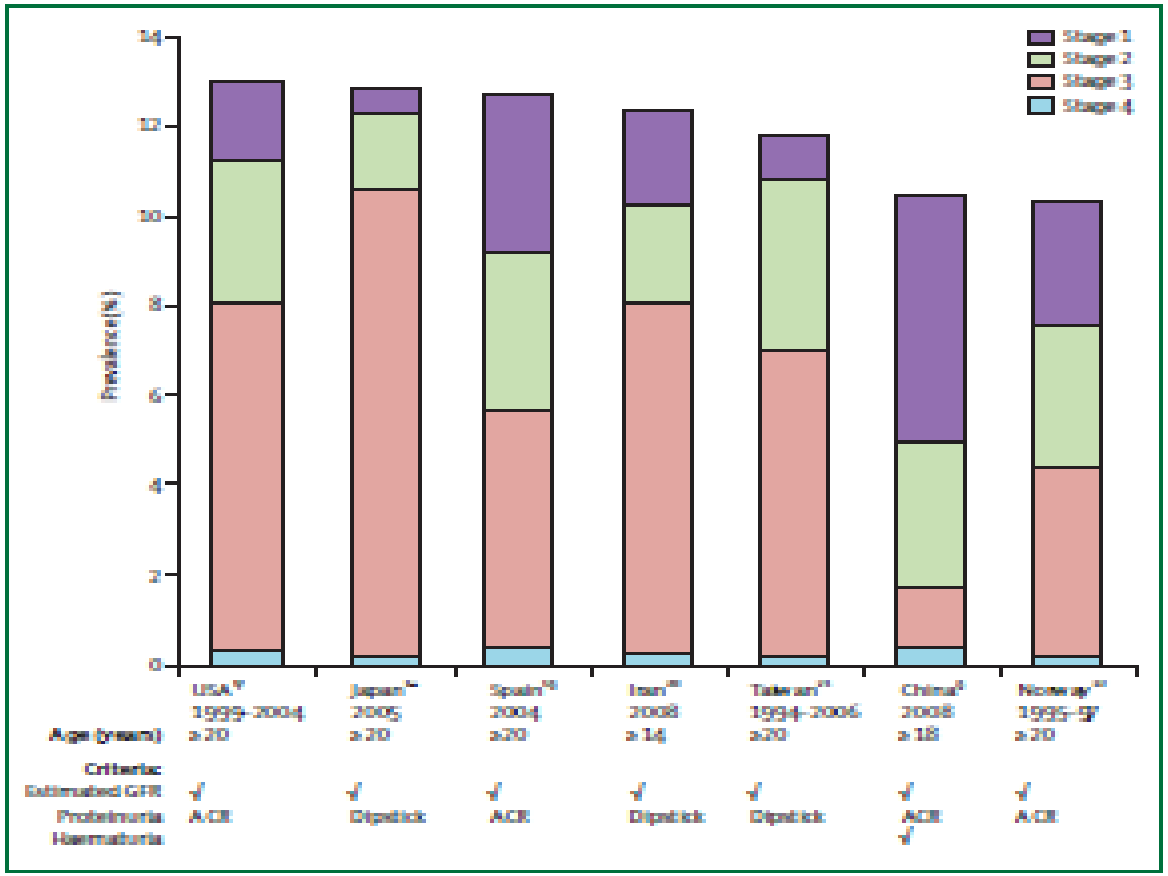
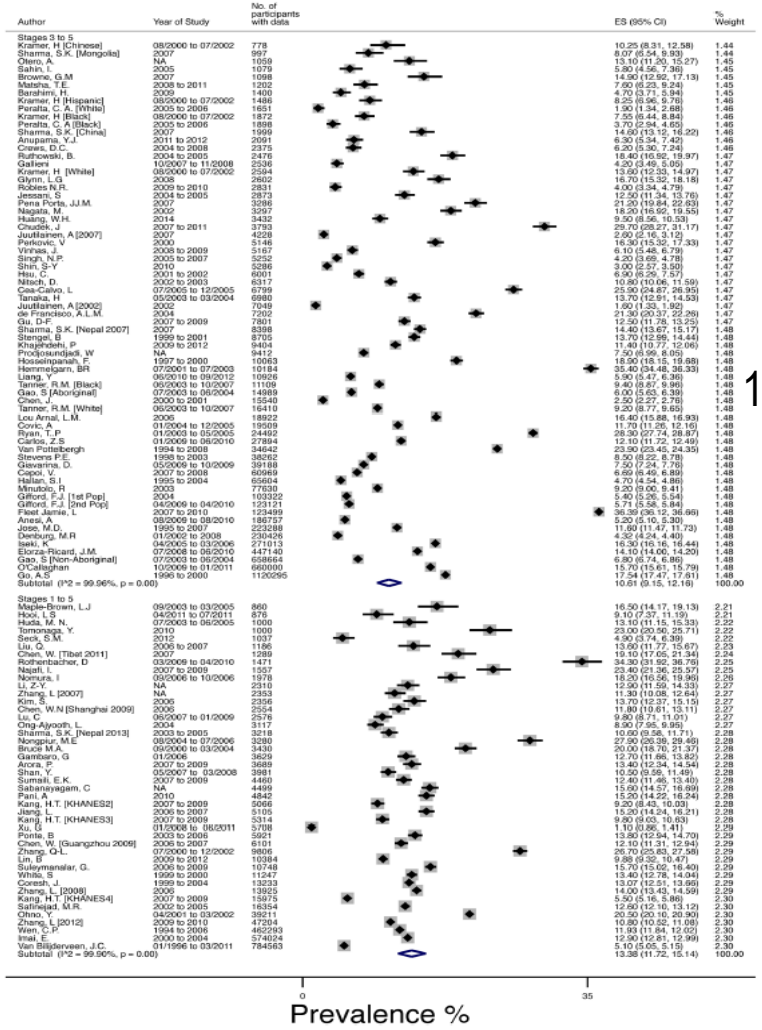


Figure 1: Population-based estimates of prevalence of chronic kidney disease
ACR=albumin-to-creatinine ratio. GFR=glomerular filtration rate.

James, Hemmelgarn and Tonelli, Lancet 2010



CKD prevalence
13.4% (11.7-15.1%)

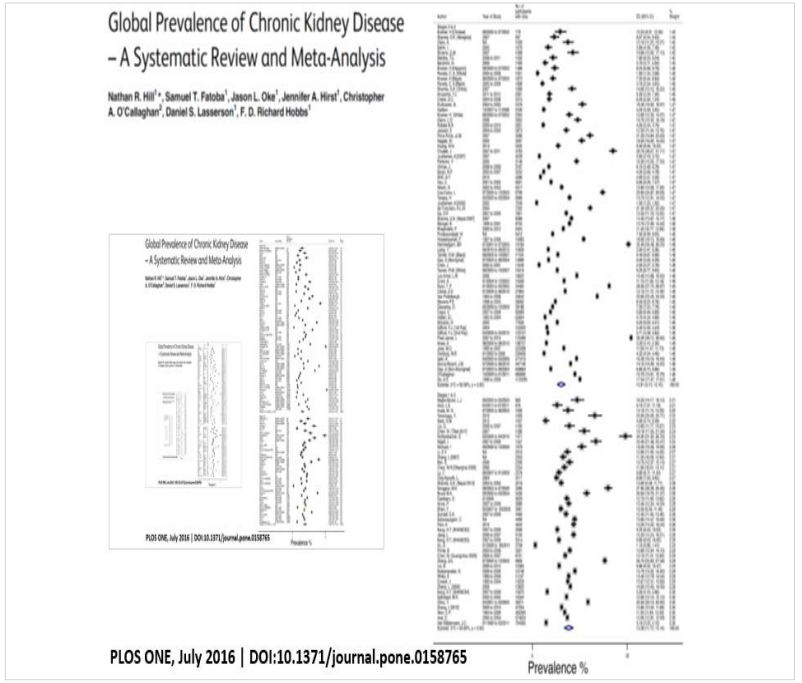
Hill et al PLoS One 21 June 2016 11 (7): e0158765

Newer estimates of prevalence:

Global Prevalence of Chronic Kidney Disease – A Systematic Review and Meta-Analysis

Nathan R. Hill[1]*, Samuel T. Fatoba[1], Jason L. Oke[1], Jennifer A. Hirst[1], Christopher A. O'Callaghan[2], Daniel S. Lasserson[1], F. D. Richard Hobbs[1]

- Methods: A systematic review and meta-analysis of observational studies estimating CKD prevalence in general populations; pooled data using a random effects model.
- Results: 100 studies of diverse quality; 6,908,440 patients.
- Global mean (95%CI) CKD prevalence of 5 stages
  - 13.4%(11.7–15.1%), and stages 3–5 was 10.6%(9.2–12.2%)
    - Weighting by study quality did not affect prevalence estimates.
    - Stage-1 (eGFR>90 +ACR>30): **3.5%** (2.8–4.2%);
    - Stage-2 (eGFR 60–89+ACR>30): **3.9%** (2.7–5.3%);
    - Stage-3 (eGFR 30–59): **7.6%** (6.4–8.9%);
    - Stage-4 = (eGFR 29–15): **0.4%** (0.3–0.5%); and
    - Stage-5 (eGFR<15): **0.1%** (0.1–0.1%).



PLOS ONE, July 2016 | DOI:10.1371/journal.pone.0158765

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

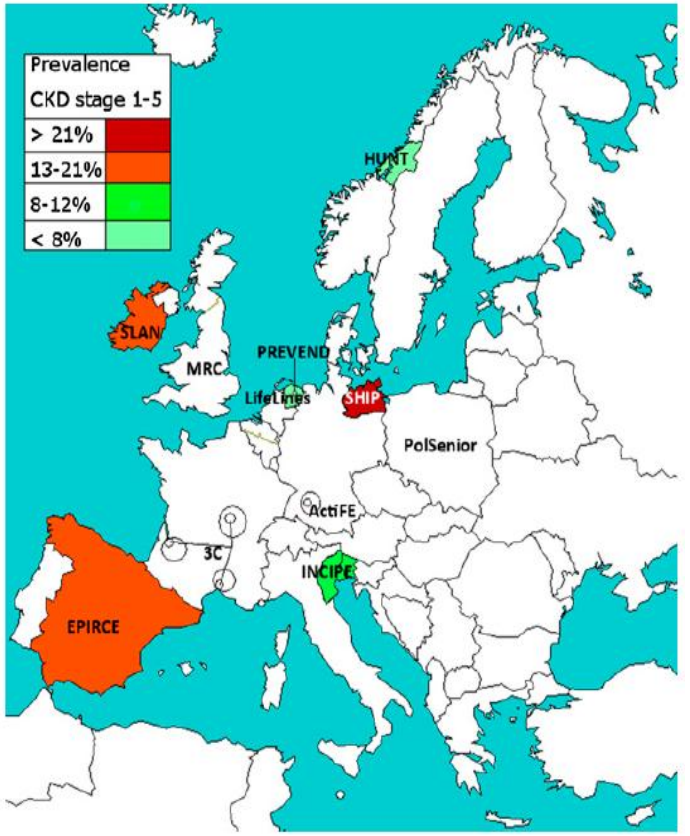
Bogdan Ene-Iordache, Norberto Perico*, Boris Bikbov*, Sergio Carminati, Andrea Remuzzi, Annalisa Perna, Nazmul Islam, Rodolfo Flores Bravo, Mirna Aleckovic-Halilovic, Hequn Zou, Luxia Zhang, Zaghloul Gouda, Irma Tchokhonelidze, Georgi Abraham, Mitra Mahdavi-Mazdeh, Maurizio Gallieni, Igor Codreanu, Ariunaa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

- **Design: Cross-sectional study in 12 countries from six world regions: Bangladesh, Bolivia, Bosnia and Herzegovina, China, Egypt, Georgia, India, Iran, Moldova, Mongolia, Nepal, and Nigeria.**
  - **Volunteers in screening programs & high risk clinics**
- **Results: 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%

Lancet Glob Health 2016; 4: e307–19

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



- **Methods**: Collected **data** from 19 general-population studies from 13 European countries.
  - KDIGO stages; CKD-Epi eGFR; ACR 30-299, 300+; age- and sex-standardized (EU27).
- **Results:** Adjusted CKD **prevalence**
  - Stages 1-5: 3.3%(3.3%-3.3%) in Norway TO 17.3% (16.5%-18.1%) in northeast Germany.
  - Stages 3–5: 1.0% (0.7%-1.3%) in central Italy TO 5.9% (5.2%-6.6%) in northeast Germany
- Variation stratified by diabetes, hypertension, and obesity status followed the same pattern as the overall prevalence.
- **Conclusion**: Identified substantial variation in CKD prevalence that appears to be due to factors other than the prevalence of diabetes, hypertension, and obesity.
- **Advantage**: **Individual** data pooling

J Am Soc Nephrol 27: ccc–ccc, 2015. doi: 10.1681/ASN.2015050542

Prevalence of Diabetes and HTN is increasing around the world

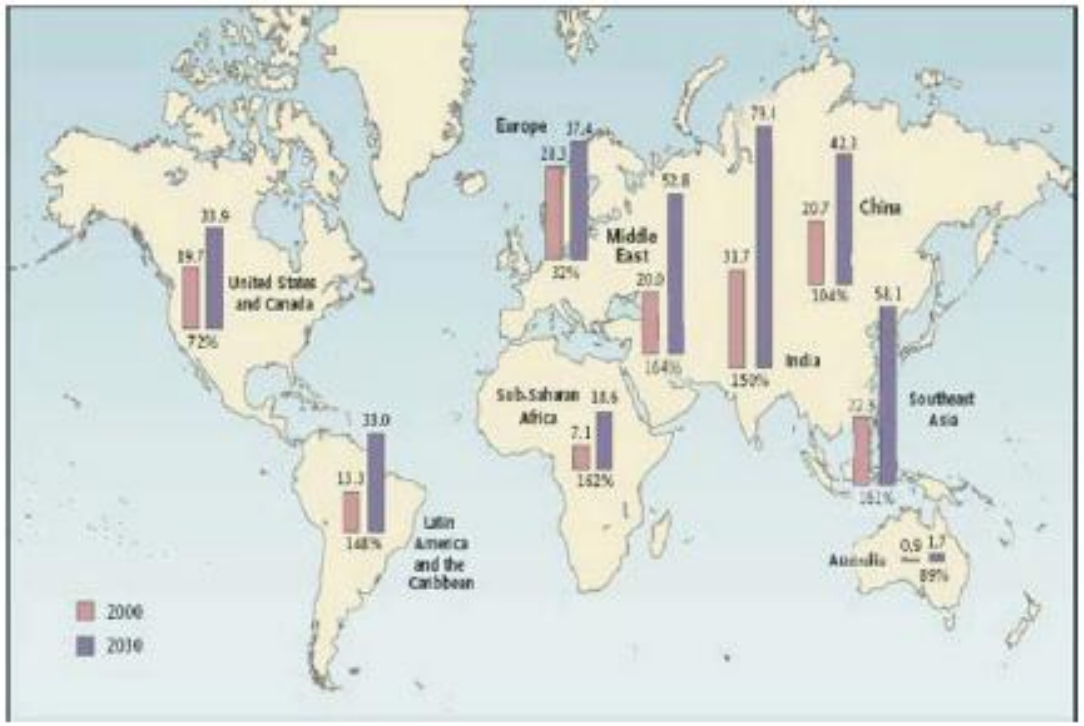


Figure 3. Global prevalence of diabetes mellitus (2000 and 2030). Reprinted with permission from Hossain et al.[28]

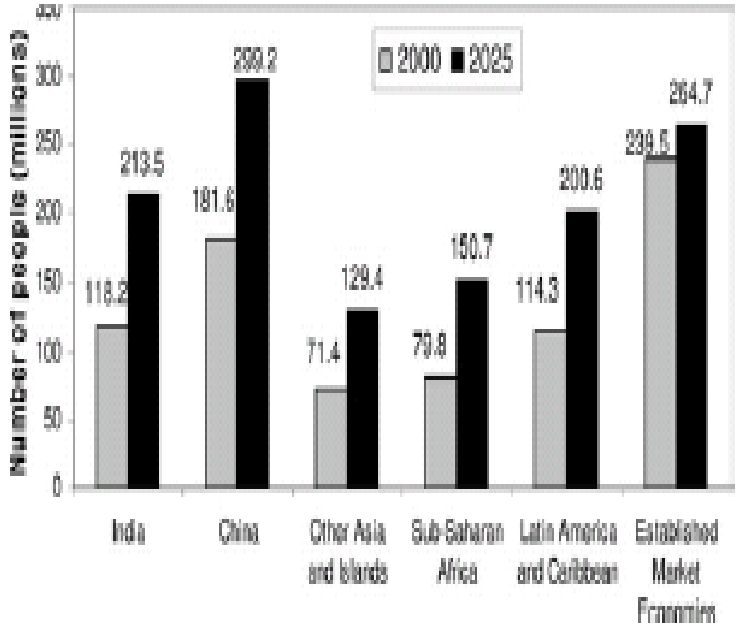
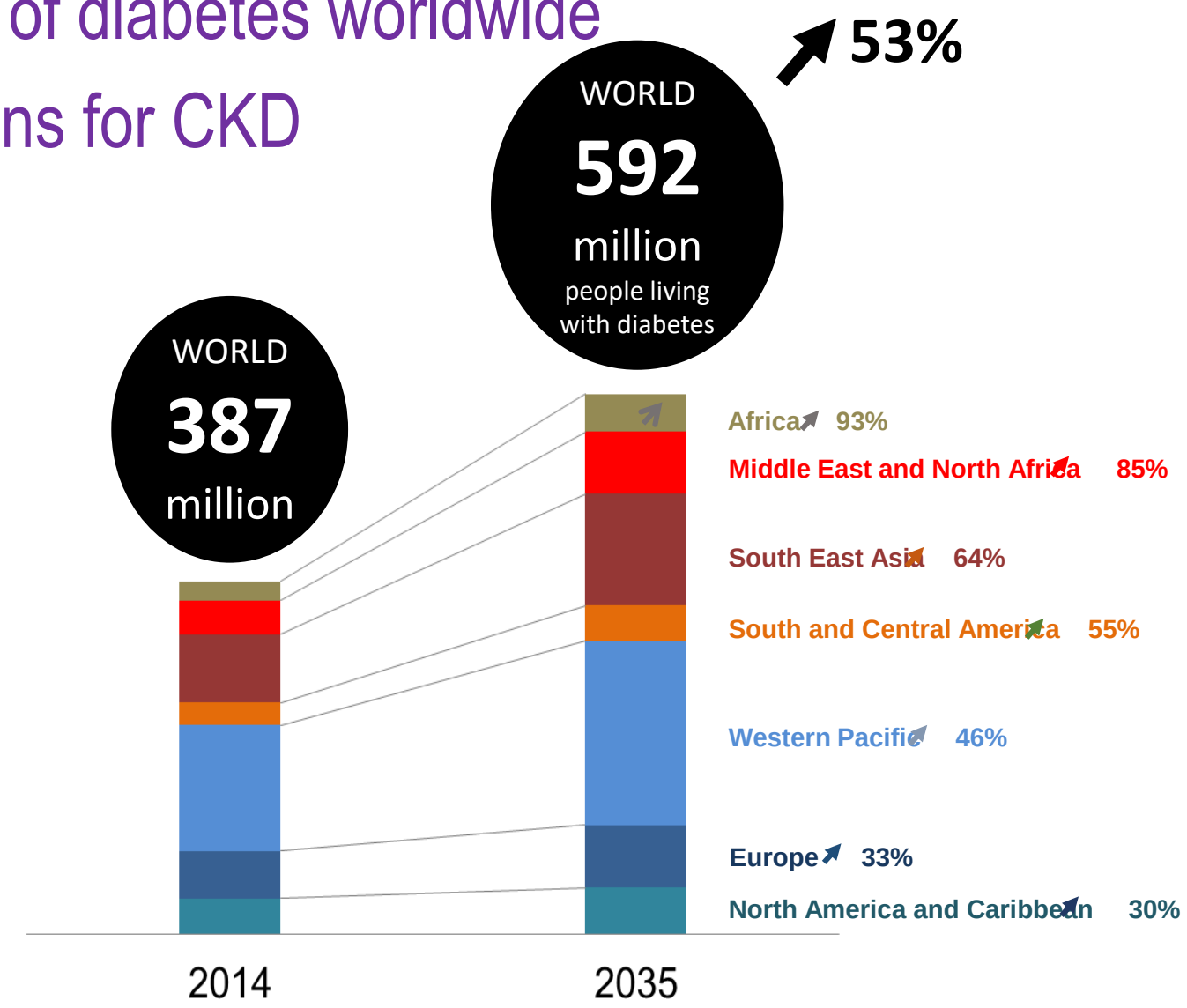


Figure 4. Global prevalence of hypertension (2000 and 2025).

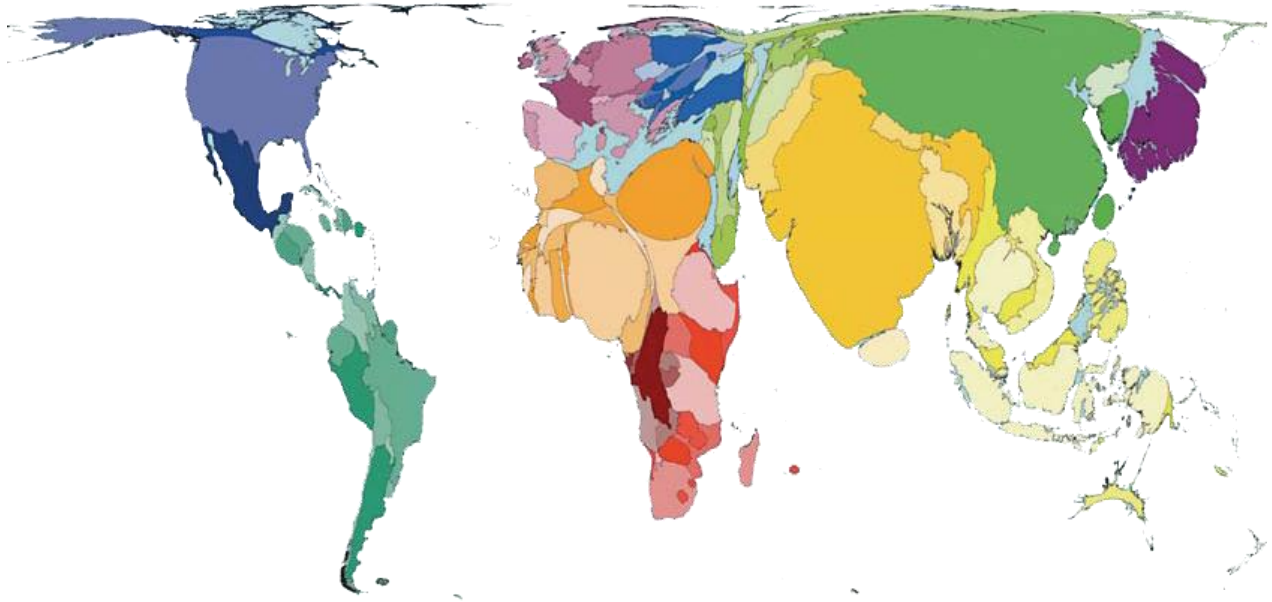
Increasing prevalence of diabetes worldwide

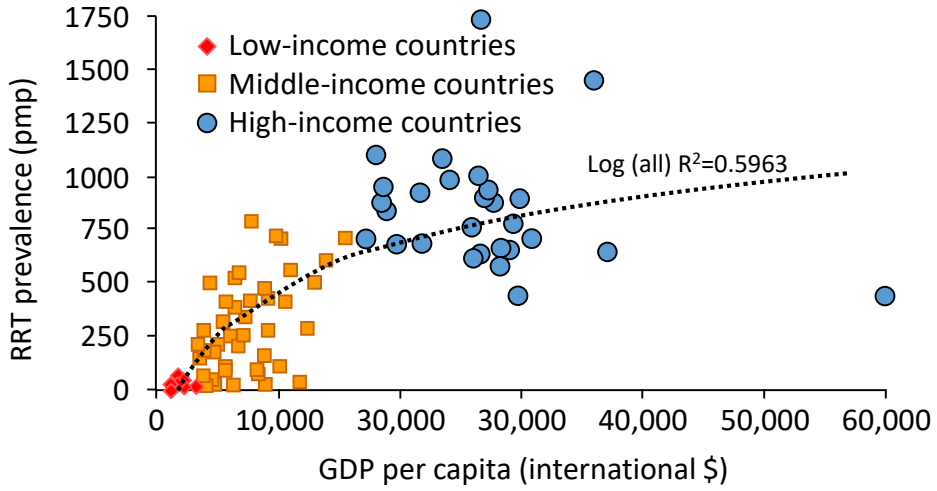
? Implications for CKD



The clinical problem

We have made little progress where RRT is available only to the most fortunate





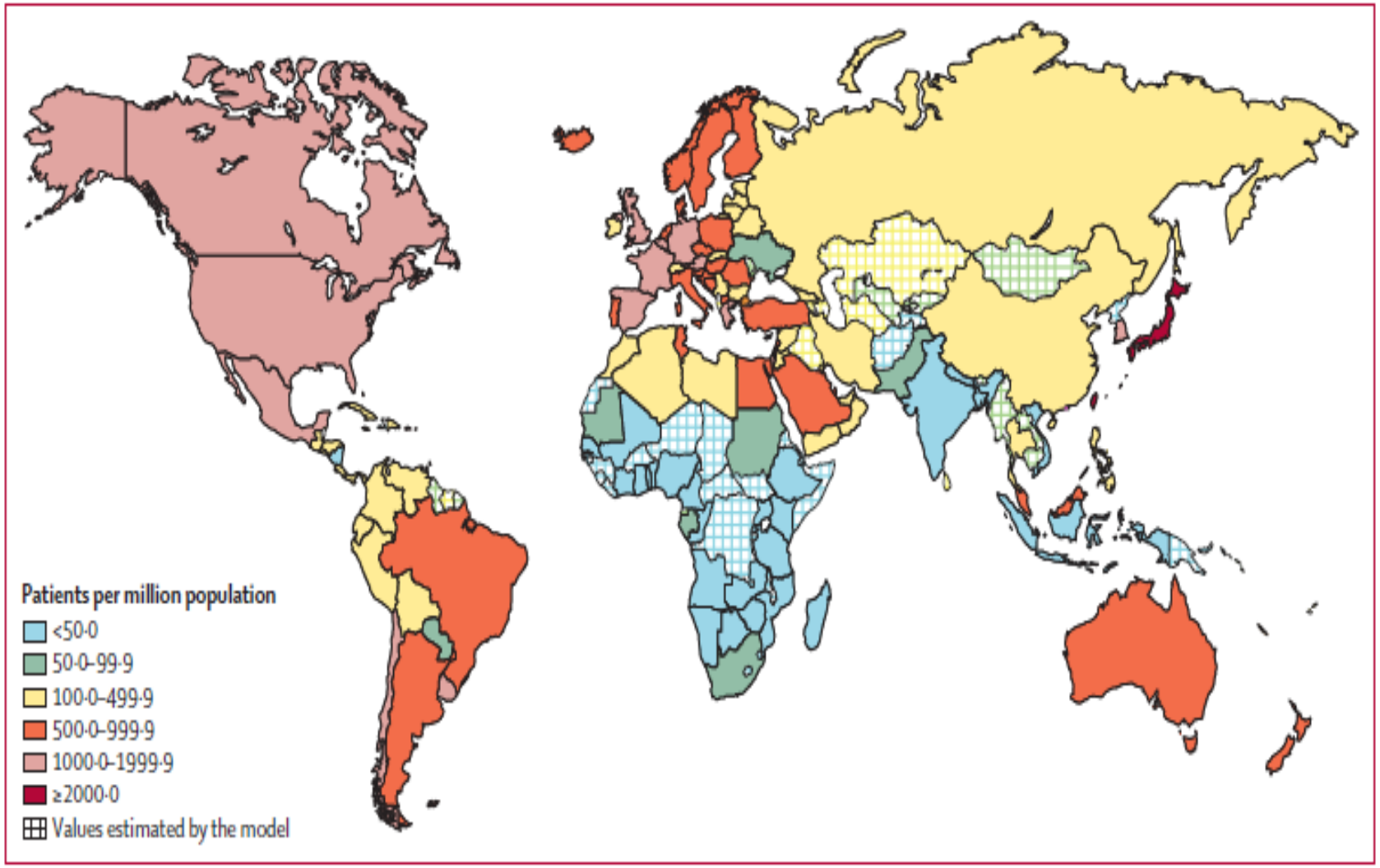
Territories are sized in proportion to the absolute number of people who die of CKD each year.

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

Many people do not receive RRT

Global RRT 2010 : Unmet Needs

Estimates27-53% of patients needing RRT receive RRT



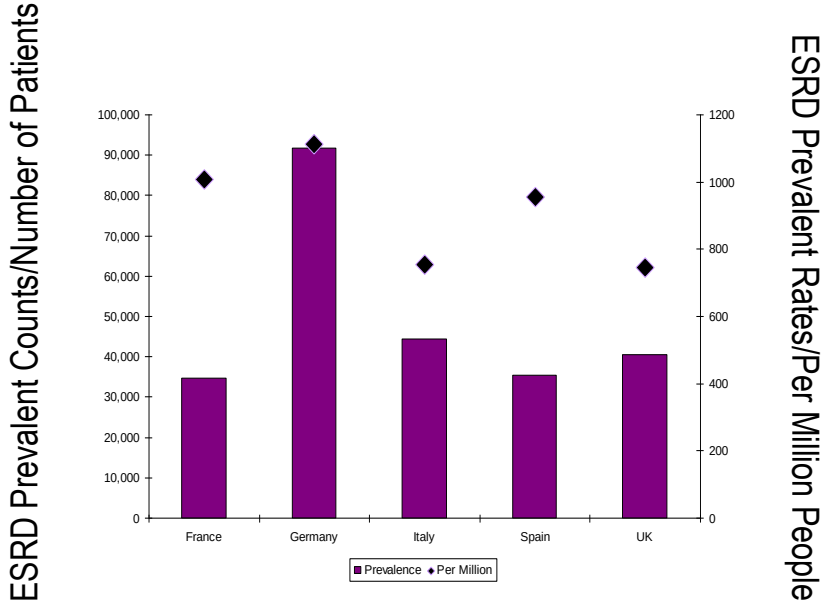
Liyanage et al Lancet 385:1975-82, 2015

Variability in care globally

- Access to prevention and treatment
- Access to dialysis
- Access to transplantation
- Access to trained nephrologists

Variable Prevalence of Dialysis & differential uptake of modalities

Among the big five European countries, Germany has the highest prevalence of ESRD and Italy has the lowest



* ESRD as dialysis and may be driven by availability and economic concerns

BioTrends Research Group, Inc
TreatmentTrends™: EU Nephrology Study Q409
Bone and Mineral Metabolism, December 2009

Proceedings of the ISPD 2008 — The 12th Congress of the ISPD
June 20 – 24, 2008, Istanbul, Turkey
Peritoneal Dialysis International, Vol. 29 (2009), Supplement 2

POLICIES AND HEALTH CARE FINANCING ISSUES FOR DIALYSIS IN LATIN AMERICA: EXTRACTS FROM THE ROUNDTABLE DISCUSSION ON THE ECONOMICS OF DIALYSIS AND CHRONIC KIDNEY DISEASE

Roberto Pecoits–Filho, Camilo Campos, Manuel Cerdas–Calderon, Paulo Fortes, Cecilia Jarpa, Paul Just, Paulo Luconi, Jocemir R. Lugon, Alejandro Pacheco, Ramon Paniagua, Konniev Rodriguez, Mauricio Sanabria, Vito Sciaraffia, Carlos Velasco, and Javier De Arteaga

Participants in the Roundtable Discussion on the Economics of Dialysis and Chronic Kidney Disease in Latin America

PD prevalence differs within Latin America

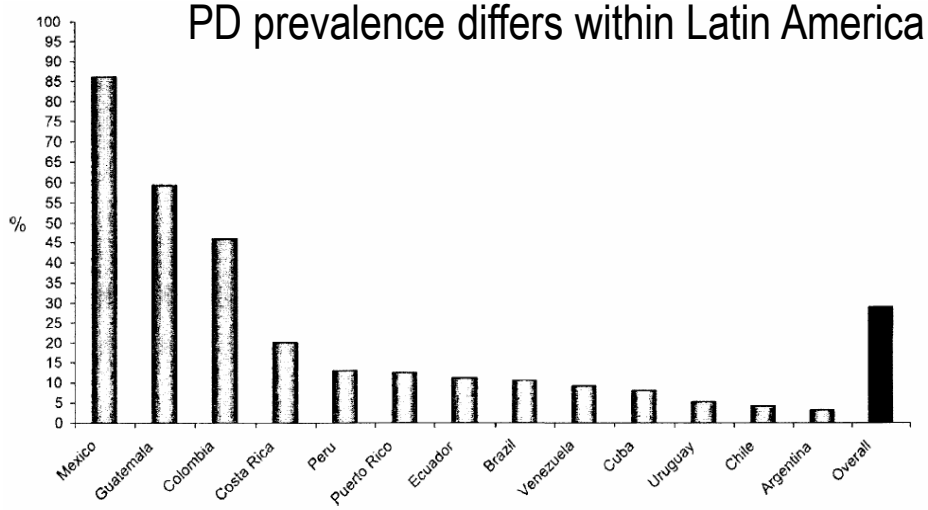


Figure 1 — Individual and global penetration of peritoneal dialysis in various countries of Latin America, showing an important variation in utilization.

Access to Care within and between countries

- Geography
- Race

clinical investigation http://www.kidney-international.org

Geographic variation and neighborhood factors are associated with low rates of pre–end-stage renal disease nephrology care

Hua Hao[1], Brendan P. Lovasik[2], Stephen O. Pastan[3,4], Howard H. Chang[5], Ritam Chowdhury[6,7] and Rachel E. Patzer[1,4,8]

Nephrol Dial Transplant (2011) 26: 899–908
doi: 10.1093/ndt/gfq473
Advance Access publication 5 August 2010

CMAJ RESEARCH

Access to health care among status Aboriginal people with chronic kidney disease

Song Gao MSc, Braden J. Manns MD MSc, Bruce F. Culleton MD, Marcello Tonelli MD SM, Hude Quan PhD, Lynden Crowshoe MD, William A. Ghali MD MPH, Lawrence W. Svenson BSc, Sofia Ahmed MD MMSc, Brenda R. Hemmelgarn PhD MD, for the Alberta Kidney Disease Network

Race differences in access to health care and disparities in incident chronic kidney disease in the US

Kira Evans[1,2], Josef Coresh[1,2], Lori D. Bash[1,2], Tiffany Gary-Webb[4], Anna Köttgen[1,2], Kathryn Carson[1,2] and L. Ebony Boulware[1,2,3]

Stack et al. BMC Nephrology 2014, 15:185
http://www.biomedcentral.com/1471-2369/15/185

BMC Nephrology

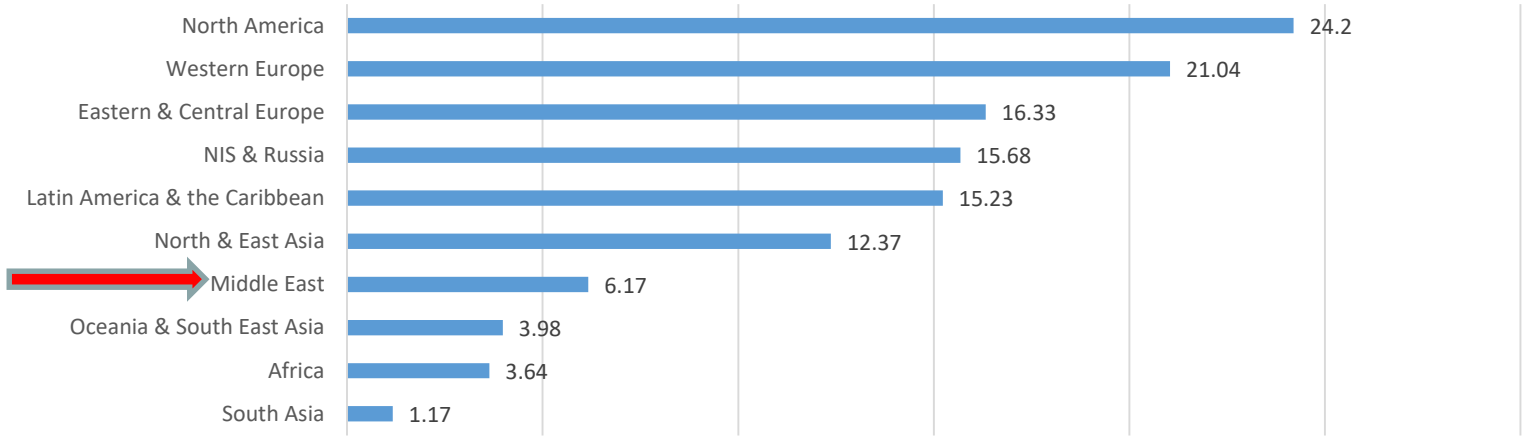
RESEARCH ARTICLE Open Access

Prevalence and variation of Chronic Kidney Disease in the Irish health system: initial findings from the National Kidney Disease Surveillance Programme

Austin G Stack[1,2,3,6*], Liam F Casserly[1,2], Cornelius J Cronin[1,2], Tetyana Chernenko[2], Walter Cullen[2], Ailish Hannigan[2], Rajiv Saran[3], Howard Johnson[4], Gemma Browne[5] and John P Ferguson[2]

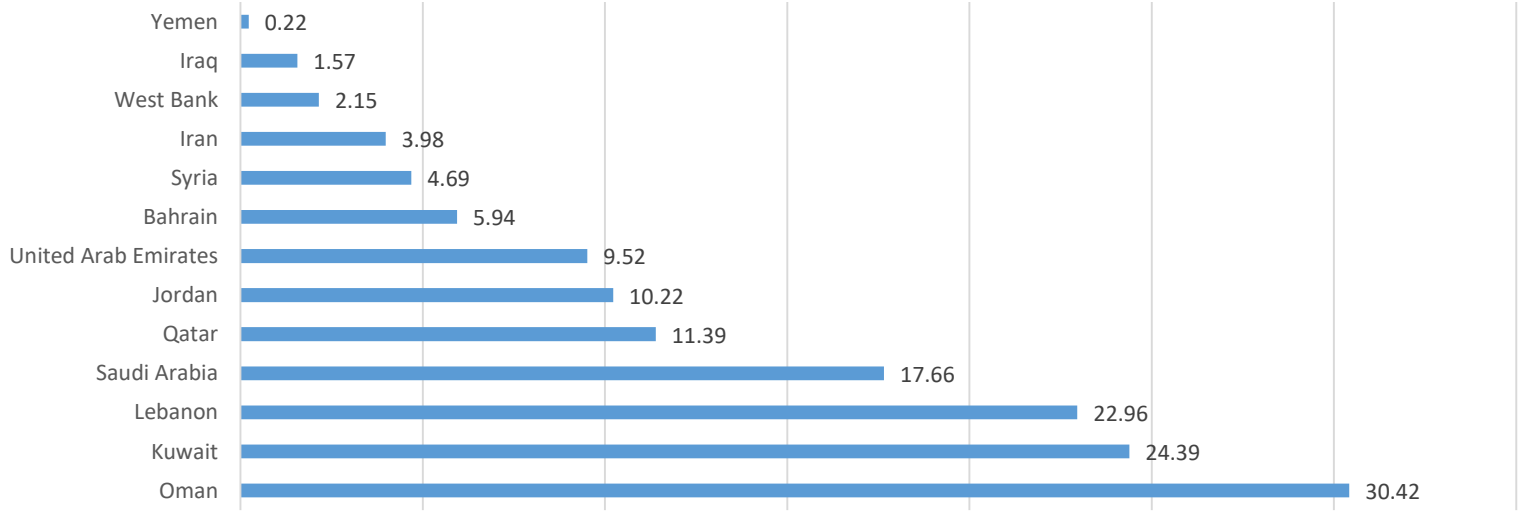
ISN CLOSINGTHEGAPS CKD INITIATIVE

Variability in workforce Nephrologists distribution pmp

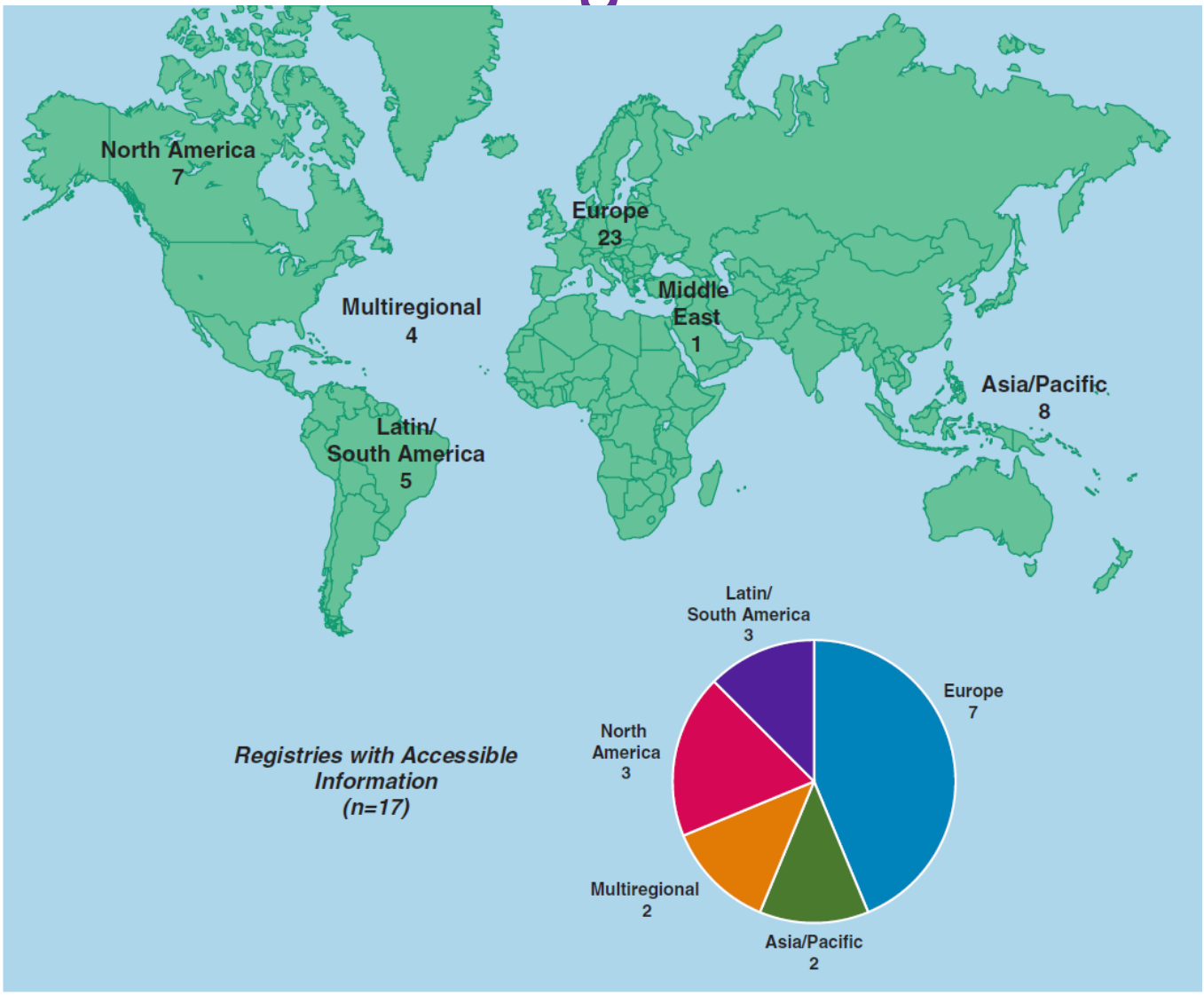


Nephrologists distribution, pmp: How countries compare within Middle East

Middle East



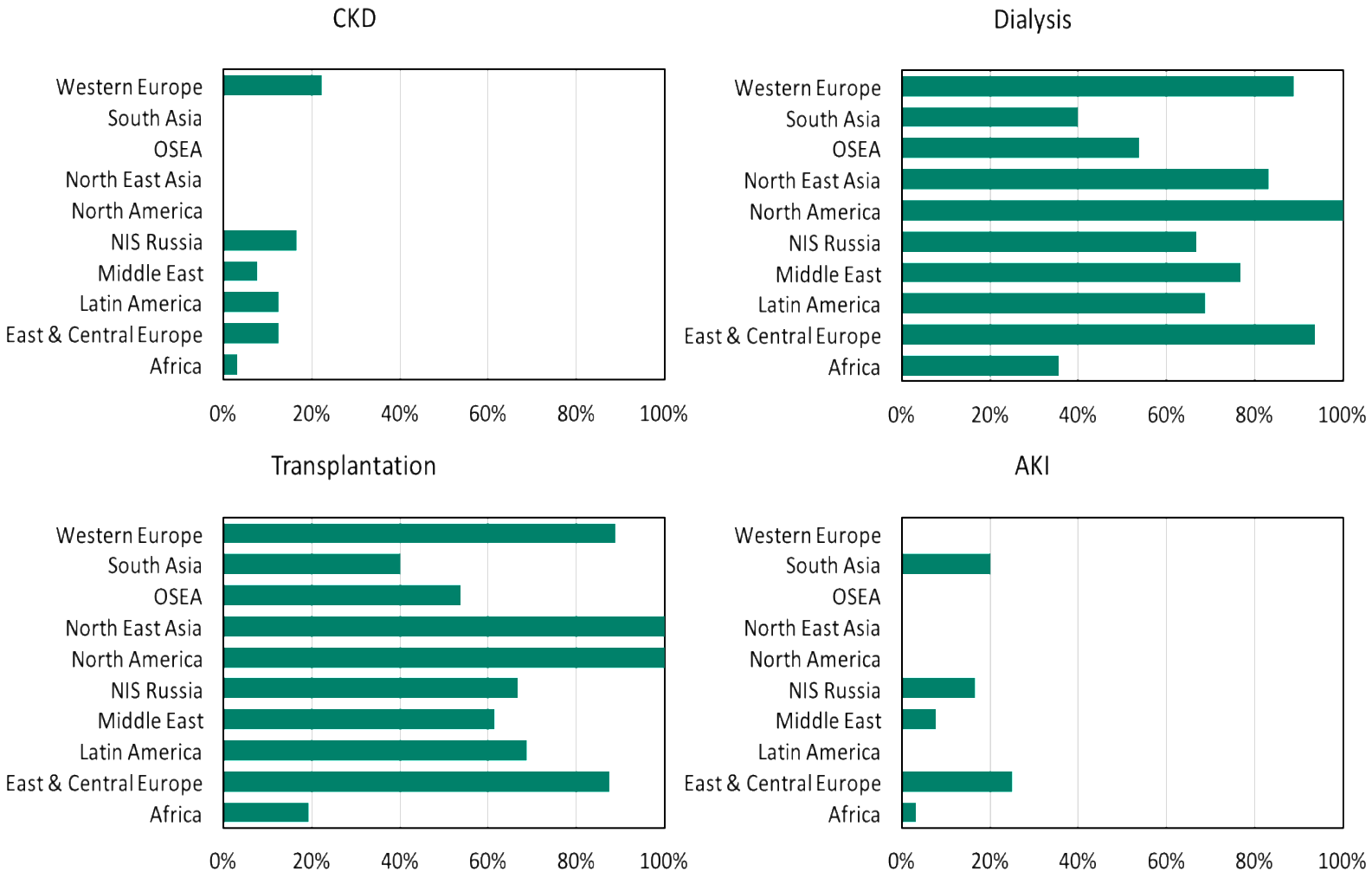
There are few Renal Registries around the world



Liu et al BMC Nephrol 16:31, 2015

ISN CLOSINGTHEGAPS CKD INITIATIVE

GKHA: Variability in the Availability of renal registries for CKD, Dialysis, Tx and AKI around the world:



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 prevention
  - in integrating with national and international NCD management strategies

- Need for better understanding and unified advocacy approach to CKD

Universal Health Coverage :
#3 Sustainable Development Goals

- The United Nations Sustainable Development Goals that all UN Member States have agreed to try to achieve Universal Health Coverage by 2030.

- This includes
  - financial risk protection,
  - access to quality essential health-care services and
  - access to safe, effective, quality and affordable essential medicines and vaccines for all

World Health Organization

WHAT DO YOU NEED TO GET, BE AND STAY

HEALTHY?

CAN YOU GET HELP FROM A WELL-TRAINED HEALTH WORKER?

CAN YOU GET TREATMENT THAT HELPS YOU GET BETTER, AND IS SAFE?

CAN YOU GET THE MEDICINES AND OTHER HEALTH PRODUCTS YOU NEED?

WHO WILL PAY FOR IT?

ARE THERE POLICIES IN PLACE TO MAKE QUALITY SERVICES AVAILABLE TO EVERYONE, EVERY TIME?

DOES YOUR GOVERNMENT HAVE THE INFORMATION IT NEEDS TO MAKE THE RIGHT DECISIONS ABOUT THE WHOLE SYSTEM?

THE WORLD HEALTH ORGANIZATION IS WORKING AROUND THE WORLD SO THAT ALL PEOPLE AND COMMUNITIES RECEIVE THE QUALITY SERVICES THEY NEED, AND ARE PROTECTED FROM HEALTH THREATS, WITHOUT SUFFERING FINANCIAL HARDSHIP.

THAT'S WHAT WE CALL

UNIVERSAL HEALTH COVERAGE

WWW.WHO.INT/UHC

Six components of Universal Health Care

1. **Health financing** – funding mechanisms for CKD and AKI care (incl RRT)
2. **Service delivery and safety -** infrastructures for kidney care
3. **Health workforce** – essential for CKD and AKI care
4. **Essential medications and technology access (medicines and RRT technologies)** - availability, reach, and access
5. **HIS and statistics** – information systems, registries, surveillance systems
6. **Governance and policies** – frameworks, guidelines, position papers, etc

Screening for CKD: Challenges and Opportunities

“There is often naïve enthusiasm for screening.”

- Professor Daniel Levy

Harvard School of Public Health

Why screening is often less helpful than expected

Unrealistic expectations
- theory
- biased observational data

Toll
- costs and consequences of needing to screen everyone

False + and False Neg tests
- unnecessary testing
- missed opportunities

Lack of benefit in Target Population
- ineffective or sub-optimally effective intervention

Screening : positives and negatives

- Patient Perspective
  - Early detection
  - Early institution of delay strategies
  - Preparation for RRT
    - Living donor outreach
    - Home based dialysis therapies
  - Prolonged anxiety and uncertainty
  - Poor outcomes if no resources

- Societal Perspective
  - Burden of disease known
  - Planning of health care resources and workforce
  - Advocacy for resources
  - Prolonged anxiety re: costs of expensive care and resource utilization
  - Poor outcomes if no resources

Wilson-Jungner principles: applicability to screening for CKD

	Developed countries		Developing countries	
	General population	Case finding	General population	Case finding
1. Condition should be an important health issue	✓	✓	✓	✓
2. There should be effective treatment for patients with recognized disease	✓	✓	✓	✓
3. Facilities for diagnosis and treatment should be available	✓	✓	✗	Not universal
4. There should be a recognizable latent or early stage	✓	✓	✓	✓
5. There should be a suitable test	✓	✓	✓	✓

Wilson JMG, Jungner F , 1968

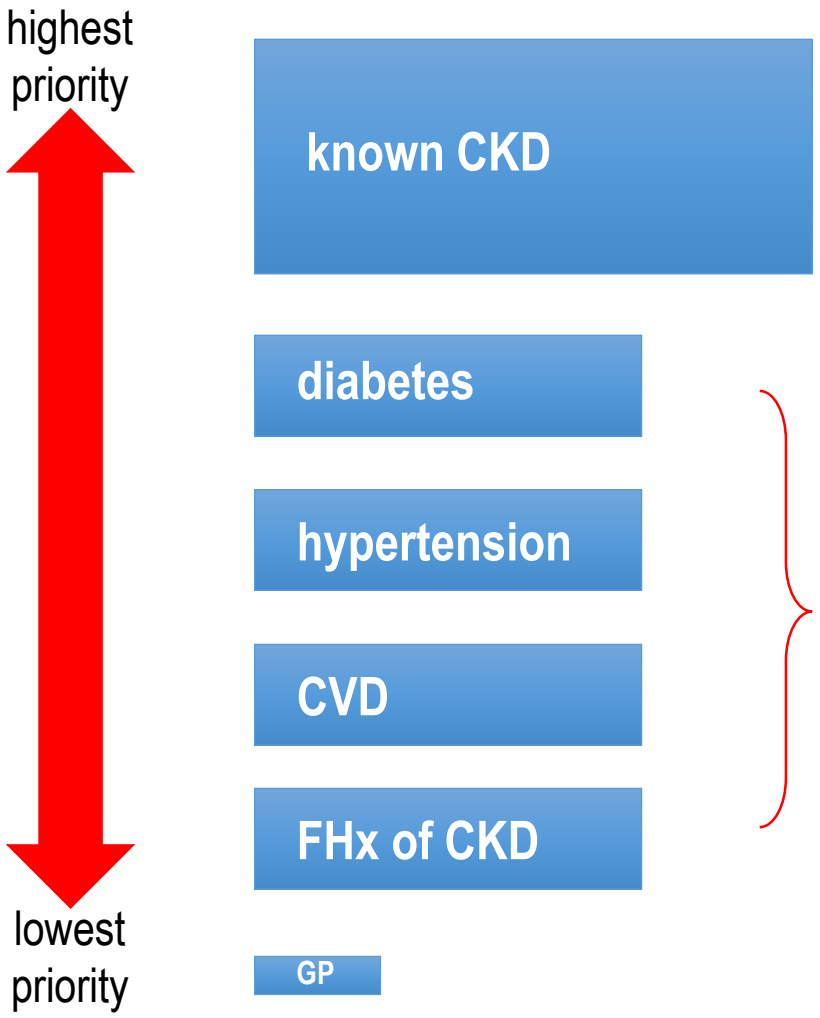
Wilson-Jungner principles: applicability to screening for CKD

	Developed countries		Developing countries	
	General population	Case finding	General population	Case finding
6. The test should be acceptable to the population	✓	✓	✓	✓
7. The natural history of disease should be understood	✗	✓	✗	✗
8. There should be an agreed policy on whom to treat as patients	✓	✓	✓	✓
9. The cost of case finding (including diagnosis and treatment of patients diagnosed) should be economically acceptable	✗	✓	✗	?
10. Case finding should be a continuing process	Feasibility uncertain	Feasible	Not feasible	Feasibility uncertain

Wilson JMG, Jungner F , 1968

Focus on patients at the highest risk

"case-finding" rather than screening



- link to KDDC + other ISN programs
- partnerships with other specialists

- case finding in high risk pop'n makes sense
- build CKD expertise among primary care MDs?
- or non-physicians?

- data doesn't currently support GP screening

*CKD: Current State of Screening and Unanswered Questions

- Targeted screening (case finding) of high risk populations is recommended
  - *What is the status across the globe for screening and surveillance?*
  - *Optimal strategies for targeted screening are unclear*

- Population based screening:
  - not been shown to be cost-effective when only prevention of ESRD considered
  - ? be cost-effective when screening is based on albuminuria and prevention of CKD related CVD considered

- Primary care involvement and use of electronic health records is key to early detection
  - *How do we classify case identification by EMRs and other strategies and would it specifically replace GP CKD screening?*
  - *What is the feasibility of using theses systems across the globe?*

**adapted from ISN Global Kidney Health Summit WG July 2016*

CKD Screening: Current Gaps

- Regional and international estimates of CKD prevalence and incidence are limited, especially for LMIC ?
- Optimal strategies are to engage primary care providers in early detection of CKD (targeted high risk screening) ?
- What is the variability in estimation of eGFR (and ACR) by ethnic groups? *(i.e. the ancestry coefficient in the eGFR equation)*
- Should screening include albuminuria and hematuria in combination ?

**adapted from Vancouver Global Kidney Health Summit WG*

Opportunities and challenges

- Increase awareness of the importance of early CKD for health.
- Awareness will lead to better screening and consequently to better prevalence and incidence data.

- What are the opportunities and challenges of collaborative studies?
  - *Disadvantaged population eGFR epidemiology study (DEGREE; Ben Caplin UK; universal protocol to assess kidney function in disadvantaged populations);*
  - *iNET CKD: International CKD cohort studies network; and*
  - *H3 (Study of CKD in Africa)*

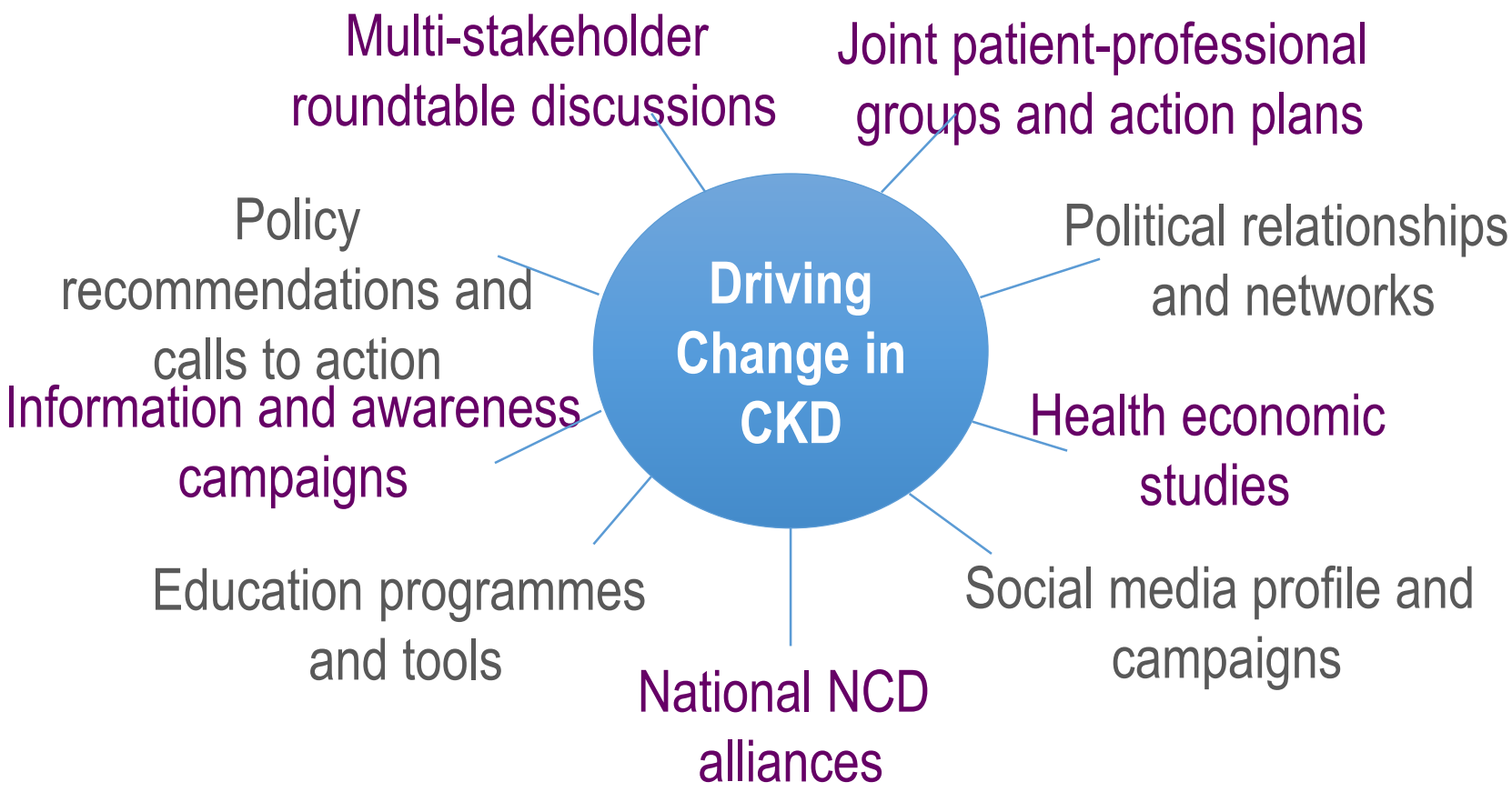
- Global consortia, including the CKD Prognosis Consortium:
  - Use to share information about optimal study design, analysis and reporting
  - Plans for collection of better data in the future

**adapted from Vancouver Global Kidney Health Summit WG*

Diversity of the human condition

- Culture
- Resources
- Access to care
- Access to education
- Perspectives
  - Patients
  - Providers
  - Funders

Advocacy in CKD :What can we learn from other disease groups?



International Society of Nephrology

Summary: Is there a global need for Screening for CKD?

- CKD is a global problem
  - Prevalent: variation in data and estimates problematic
  - Multiplier of risk for common conditions (CVD, DM)
  - Morbidity and mortality significant
  - Variations in Care and Access to care exist
    - Within and between countries
- Known high risk groups for CKD growing around the world

- Advocacy efforts re CKD suggest the need for more data
  - Challenges and opportunities for international collaboration
  - Country relevant contexts

- Targeted case finding (not general screening) & strategy for facilitating access to appropriate resources is needed now