Enter the dragon: a Chinese epidemic of chronic kidney disease?

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Enter the dragon: a Chinese epidemic of chronic kidney disease?

In the past decade we have witnessed the remarkable development of China, which is now challenging the economic superiority of western Europe and the USA. The country that gave us the compass, gunpowder, and printing has already overtaken the USA and Europe in steel and energy consumption, mobile phone use, and car sales, and it is projected to surpass the USA's gross domestic product by 2018, and consumer spending by 2023.[1] Unfortunately, not all aspects of economic development are good. Increasing affluence can be accompanied by increasingly unhealthy diet and obesity, which have reached epidemic proportions in developed countries and are the main driving forces behind the increased prevalence of diabetes and hypertension,[2] and consequently the high prevalence of chronic kidney disease in the USA,[3] UK,[4] and other developed countries.[5]

Nationally representative surveys of chronic kidney disease prevalence such as the US National Health and Nutrition Examination Survey[3] or the Norwegian Health Survey of Nord-Trøndelag County[5] have not been available for China until now. In *The Lancet*, Luxia Zhang and colleagues[6] present the results of the first comprehensive study exploring the prevalence of chronic kidney disease in China using a complex survey methodology, which enables nationally representative inferences to be made. The results are noteworthy for many reasons. The number of Chinese citizens with chronic kidney disease (adjusted prevalence 10·8%, 95% CI 10·2–11·3; equivalent to 119·5 million people) dwarfs the number in the USA (26·3 million people[3]), which was thought to have the highest prevalence of chronic kidney disease until now (table). Most patients in China classified as having chronic kidney disease were diagnosed because of the presence of albuminuria (adjusted prevalence 9·4%, 95% CI 8·9–10·0), with few because of an estimated glomerular filtration rate (eGFR) of <60 mL/min per

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	USA	China
Number of people with chronic kidney disease (% of population)	26·3 million (13·1%)	119·5 million (10·8%)
Prevalence of chronic kidney disease types (%)[3,6,7]		
1	1·78%	5·70%
2	3·24%	3·40%
3 (a and b)	7·69%	1·60%
4	0·35%	0·10%
5	..	0·03%
5d	0·18%	..
Underestimates or overestimates	3a is likely inflated. High skeletal muscle mass might lead to overestimate	True persistent microalbuminuria might be less prevalent
Incidence of end-stage renal disease	362·4 cases per 1 million people per year. Rate of increase slowing[7]	80 cases or more per 1 million people per year,[8] with likely exponential acceleration
End-stage renal disease mortality rate	204·9 per 1000 patient-years[7]	..
Socioeconomic disparities	High rates in underserved communities	High rates in rural areas
Age and sex disparities	Increasing rates with age and in women (might be overestimated)	Increasing rates with age and in women (might be overestimated)
Ethnic origin disparities	Chronic kidney disease and end-stage renal disease are 2–4 times more common in African Americans and other minorities	Mostly unknown, different disease constellations by ethnic origin
Renal replacement therapy	Third highest prevalence of CKD-5D/T worldwide	Disproportionately rare, but frequency rapidly increasing
Cost of end-stage renal disease	US$39·46 billion per year in public and private spending[7]	..
Main cause	Diabetes mellitus (roughly 50%) and hypertension (roughly 25%)[7]	Unknown, diabetes mellitus is probably a major contributor
Number of kidney transplantations[7]	17 413 per year	..
Public health implications	Large financial burden. High rate of hospital admittance	Uncertain, much the same burden as USA expected
Timing of start of dialysis	Tends to be early (eGFR 10–15 mL/min per 1·73 m^2). Low protein diets or keto-analogues used much less to slow chronic kidney disease progression	Tends to be late (eGFR <10 mL/min per 1·73 m^2). Replacement renal therapy alternatives more likely than in USA—eg, dietary intervention or uraemic toxin modulation

eGFR=estimated glomerular filtration rate. CKD-5D/T=stage 5 chronic kidney disease dialysis or transplantation.

***Table:* Chronic kidney disease epidemics in the USA and China**

1·73 m^2 (1·7%, 1·5–1·9), even with equations that might underestimate eGFR.[9] Notwithstanding the potential role of albuminuria as a more reliable marker of kidney injury than equations based on serum creatinine concentration, this high number could still be an overestimate (because only one measurement was used to classify individuals), or—as the investigators suggest—a result of the recent economic boom in China leading to a high prevalence of early phases of chronic kidney disease, with later stages (ie, low eGFR and end-stage renal disease) expected to increase years later. If the authors are correct, their results portend a substantial public health problem for China, because the health-care resources needed to care for patients with advanced chronic kidney disease increase exponentially.

This prospect seems even more daunting if one considers another important finding—the geographical variation and difference between rural and urban prevalences of chronic kidney disease in China.[6] Patients in rural areas were less educated, had poorer control of hypertension, less awareness of diabetes, and a higher prevalence of albuminuria than did patients from urban areas. Thus, in the near future a large number of patients might need renal replacement therapy in areas where the current health-care system is ill-equipped to provide such care.

Zhang and colleagues' results have some limitations. The classification of chronic kidney disease using the cutoffs recommended by the US Kidney/Dialysis Outcome Quality Initiative[10] results in inclusion in the early stage categories of a large number of patients who might not have true kidney disease, especially because the Modification of Diet in Renal Disease Study formula underestimates GFR in patients with normal kidney function.[9] Aside from the practical consequences of classification of healthy patients as having a serious disease, such overestimation might also result in unnecessarily pessimistic predictions about increasing prevalences of chronic kidney disease and end-stage renal disease. Uncertainties about the ideal time to start dialysis (early *vs* late[11]), and the risk of mortality in people with chronic kidney disease from different ethnic groups in China (in the USA, African-Americans with chronic kidney disease have significantly lower mortality and higher incidence of end-stage renal disease than do white people[12]) also compound difficulties of estimating future dialysis burden. Thus, follow-up studies should be done to confirm the findings, to better understand the country-specific forces driving chronic kidney disease and, most importantly, to determine if the prevalence of chronic kidney disease and the proportion of patients with decreased eGFR will increase further in China.

Despite its limitations, the study by Zhang and colleagues could provide an early warning that offers a unique opportunity to politicians and health-care regulators in China, and other rapidly emerging economies, to devise a proactive strategy that addresses the effect of increasing prevalence of chronic kidney disease on the future needs of their populations.

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