



# Kidney health in the context of economic development

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The coronavirus disease 2019 global pandemic has disrupted every economy in the world. Now, more than ever, universal health coverage is needed to protect the world’s most vulnerable individuals, who are not only at very high risk of virus-related disability or death but also of falling into poverty owing to catastrophic health-care spending.

“Out-of-pocket costs for health care remain exorbitantly high in many countries, despite the introduction of UHC”

The 17 Sustainable Development Goals (SDGs) adopted by the United Nations in 2015 aim to end poverty and hunger, combat inequalities within and among countries, build peaceful, just and inclusive societies, protect human rights, promote gender equality and ensure that the planet and its natural resources are protected<sup>1</sup>. All SDGs are interconnected, but SDG 3 specifically addresses health and well-being. SDG 3 aspires to reduce mortality associated with non-communicable diseases through prevention and adequate management, and promotes universal health coverage (UHC) as an approach to improve access to quality health care and personal financial protection. However, a buoyant economy is crucial for enacting these targets, along with the motivation to distribute resources equitably.

Indicators of economic development over the last three decades (1990–2017) show substantial economic growth across all income levels<sup>2</sup>. Using World Bank Income classifications, the gross domestic product (GDP) increased by 168% in high-income countries (HICs), 309% in middle-income countries (MICs) and 142% in low-income countries (LICs) (FIG. 1). Other measures of economic development also show improvement, such as the literacy rate among adult females (aged ≥15 years), which increased from 62% to 83% in MICs and from 37% to 54% in LICs, and remained stable at 99% in HICs.

Importantly, measures of health service delivery have improved along with economic growth<sup>3</sup>. For example, the number of physicians per 1,000 population increased by 28% (from 2.2 to 3.1) in HICs, by 19% (from 1.1 to 1.4) in MICs and by 58% (from 0.15 to 0.34) in LICs. The amount of GDP spent on health care per capita also increased across all economic regions between 2000 and 2017. This spending increased by 121% (from US\$2,396 to \$5,284) in HICs, by 315% (from \$65 to \$270) in MICs and by 181% from (\$16 to \$45) in LICs. However, we must ask whether this increased spending has had any impact on the prevalence of chronic kidney disease (CKD) or disability-adjusted life years (DALYs).

Ranked 12<sup>th</sup> in the list of leading causes of death, CKD accounted for 15.8 deaths per 100,000 people in 2016 and mortality is steadily increasing<sup>4</sup>. CKD is also associated with substantial morbidity, contributing to 38,712,460 (2%) of all DALYs in 2016. The prevalence of CKD (rate per 100,000 population) increased by 44% in HICs, 50% in MICs and 14% in LICs between 1990 and 2017 (FIG. 1). Therefore, despite increased health-care expenditure and economic growth, CKD burden continues to rise in HICs and MICs. MICs with large populations (such as India and China) carry the highest burden of DALYs due to CKD<sup>5,6</sup>, owing to an increasing prevalence of type 2 diabetes mellitus, hypertension, obesity and ageing. The increased health expenditure in HICs and MICs reflects an investment in treatment for advanced CKD (for example, hospital dialysis), rather than investment in disease prevention. A recent review highlighted the urgent need to re-prioritize investment in primary prevention (such as diet and lifestyle interventions); cost-effective secondary prevention (for example, angiotensin-converting enzyme inhibitors) and more support for comprehensive conservative (that is, non-dialytic) care for very frail and very elderly individuals. However, further studies of the cost-effectiveness of preventive interventions are needed to guide policy<sup>7</sup>.

Economic development is strongly associated with out-of-pocket health-care costs, as evidenced by an analysis of these costs between 2000 and 2017<sup>2</sup>. LICs had the highest proportion of out-of-pocket costs for health care, which increased by 1.6% (from 49.9% to 51.5%) whereas MICs, despite having a similar starting point, sustained the largest decrease (–8.4%; from 44.7% to 36.3%) (Supplementary Fig. 1). The decrease in catastrophic spending on health care for MICs is likely a combination of both overall income growth and extension of UHC. Accordingly, HICs incurred the lowest average out-of-pocket cost contribution, which decreased by 2.5% (from 16.1% to 13.6%). This financial scenario of high out-of-pocket spending in low-resource settings represents a double hit for individuals with

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<https://doi.org/10.1038/s41581-020-00376-1>

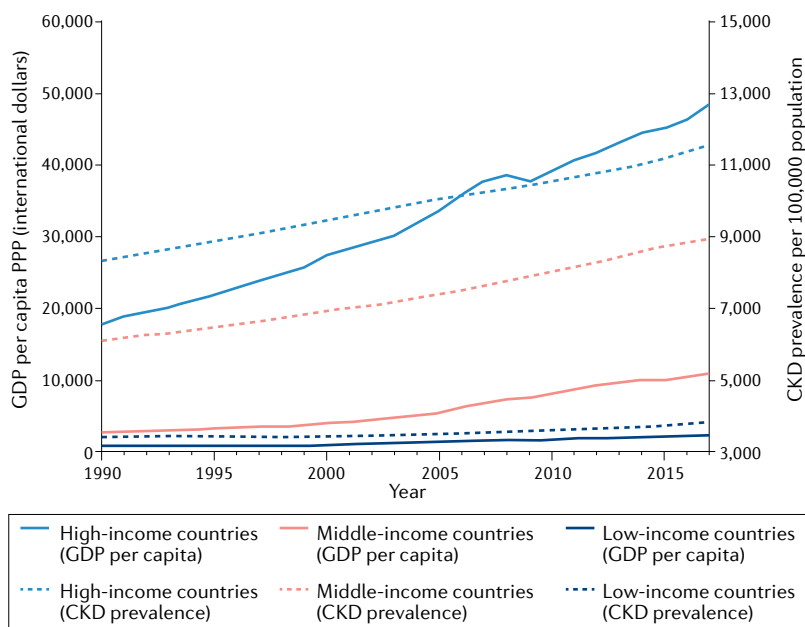
“ governments must ... protect the population against the financial risks associated with CKD ”

chronic diseases such as advanced CKD, which is over-represented among people of social and economic disadvantage<sup>5</sup>. Not only are household incomes often reduced because patients and family caregivers might be less able to work, but their expenditure increases owing to the costs of medication, medical appointments and tests<sup>8</sup>. Several studies highlight that out-of-pocket costs are particularly problematic for people with CKD<sup>9</sup> and have resulted in patients forgoing medicines or discontinuing dialysis treatment.

Analysis at a country level shows that catastrophic health-care spending (that is, out-of-pocket costs for health care that exceed >10% of total spending) affected almost 20% of the population in China and 17% of the population in India<sup>10</sup>. This spending is greater than that observed in most LICs, such as Malawi (4%) and Burkina Faso (3%), and is driven not only by the greater availability of health care in MICs but also the higher costs of that care. A useful way to examine the presence of catastrophic spending is to plot the UHC service coverage index (on a scale of 0–100) by the proportion of the population with catastrophic spending on health care. The UHC service coverage index reflects essential health service coverage within a country, including among disadvantaged members of the population. This index

includes services for reproductive, maternal and child health, infectious and non-communicable diseases, and service capacity and access. Using representative countries from each economic region, the data highlight the substantial burden of health care to individuals and families, even in the presence of UHC<sup>10</sup> (Supplementary Fig. 2). Of note, despite having a relatively high UHC index, in some HICs, such as Switzerland, Greece and USA, a considerable proportion of the population (20%, 17% and 5%, respectively) still experience catastrophic health-care expenditure (Supplementary Fig. 2).

In summary, over the past two to three decades, many countries have experienced substantial economic growth, which has allowed increases in health-care expenditure and improved health workforce capacity. At the same time, the prevalence and burden of CKD has increased, particularly in MICs, and might be underestimated in LICs owing to under-diagnosis and under-reporting. Out-of-pocket costs for health care remain exorbitantly high in many countries, despite the introduction of UHC. As the coronavirus disease 2019 global pandemic threatens some of the progress made in terms of health and economic gains, governments must remember the SDGs and put in place health financing systems that protect the population against the financial risks associated with CKD. Such systems are those that limit out-of-pocket costs and are accessible locally through primary care.



**Fig. 1 | Trends in gross domestic product per capita and chronic kidney disease.** The graph shows gross domestic product (GDP) per capita and chronic kidney disease (CKD) prevalence per 100,000 population in high-income, middle-income and low-income countries, 1990–2017. GDP per capita is presented in international dollars, using a standard purchasing power parity (PPP) index that allows comparison between different markets.

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#### Competing interests

The authors declare no competing interests.

#### Supplementary information

Supplementary information is available for this paper at <https://doi.org/10.1038/s41581-020-00376-1>.