

A single number for advocacy and communication—worldwide more than 850 million individuals have kidney diseases

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SHORT SUMMARY

On a world scale the total number of individuals with chronic kidney disease (CKD), acute kidney injury (AKI) and those on renal replacement therapy (RRT) exceeds 850 million, a truly concerning figure that is twice the estimated number of people with diabetes worldwide and >20 times higher than the number of individuals affected by acquired immune deficiency syndrome (AIDS)/human immunodeficiency virus (HIV) worldwide. Thus kidney diseases are one of the most common diseases worldwide.

CKD is now an unquestionable global public priority [1, 2]. Even though the prevalence of CKD and its impact on health has been mainly studied in economically developed countries, the burden of this disease is even greater in developing countries [3, 4]. In 2016, this disease was 13th on the list of causes of death on a world scale [5] and in 2040 it is expected to be the 5th leading cause of years of life lost [6]. In 2010, 2.6 million individuals were receiving some form of kidney replacement therapy worldwide, but an almost equal number might have died during the same year because of a lack of access to dialysis and transplantation [7]. This scenario contrasts with that of other major chronic diseases, such as cardiovascular diseases and respiratory diseases, whose effects on mortality are declining [8].

In spite of this recent recognition of the adverse impact of CKD on health outcomes, awareness of the magnitude and the risks of this condition remain low at the population level. As a result, kidney disease has been largely overlooked by health authorities and governments in most countries [9]. Even in the USA, a 2016 survey [10] showed that CKD awareness in the community is substantially lower as compared with that of other chronic diseases such as hypertension and diabetes [11].

Kidney diseases cover a wide spectrum of diseases with diverse aetiologies, clinical courses and functional severity, from AKI to the various CKD stages from Stage 1 to Stage 5 and include end-stage kidney disease, which demands chronic dialysis and renal transplantation. Several countries have now produced rich, articulated and very detailed CKD statistics. However, the degree of complexity of these statistics is such that they are not easily used for communication with the public and with decision makers. The differentiation of CKD into stages and the separate consideration of the epidemiology of patients on RRTs (dialysis and transplantation) are fundamental in professional and scientific terms but are too complex to serve as a basis for broad-based communication. AKI, related to basic public health challenges, continues to be an important cause of entirely preventable deaths throughout the developing world. Survivors are at increased risk of developing CKD. Fragmentation of discussion by framing these conditions separately leads to the

Table 1. The global dimension of kidney diseases in 2017

CKD Stages 1–5	843.6 million
Individuals with AKI	13.3 million
Individuals on RRT	3.9 million
Total	860.8 million

removal of focus from the importance of the health burden imposed on the society by disruption of normal kidney function. A simplification effort is needed if we are to increase awareness of the extent of the magnitude of kidney diseases on a global scale. Producing a single, absolute number of individuals affected by kidney diseases will effectively convey to the interested parties the large and growing relevance of the problem.

Kidney diseases: statistics for communication and advocacy

Producing simple, immediately understandable statistical figures is fundamental for helping to draw attention to unaddressed public health issues by governments and health authorities and to increase awareness at the community level [12]. The international diabetes community has had significant success in leveraging increased awareness and support by identifying and utilizing a single figure that conveys the global burden of diabetes, a figure that is independent of the type and severity of diabetes [13]. Other examples include depression [14, 15], Alzheimer's [16] and breast cancer [17]. Thus it is of great importance to have a similar metric to express the burden of kidney diseases across the globe.

With this background in mind, the ASN, ERA-EDTA, and ISN in 2017 convened a group charged with producing a simple global estimate of the number of individuals affected by kidney disease, irrespective of aetiology, chronicity, severity or treatment modality. A group of experts representing these societies met twice in face-to-face meetings and held three teleconferences to discuss a pragmatic approach to determining this single number to truly convey the essence of the epidemic facing the global community.

The single number: assumptions, key-studies and calculations

The setting date for calculation was the year 2017. In this year, the world population (rounded off to the first decimal) was 7.6 billion [18].

We assumed an equal distribution of the world population between males and females and a homogeneous and stable prevalence of CKD among different parts of the world. The estimate was based on figures reported in the systematic review by Mills *et al.* [19]. This review collated 33 studies published between 2006 and 2013 reporting gender- and age-specific prevalence of CKD in representative population samples in 32 countries including high income (18 countries) and low and middle income (14 countries). The global prevalence of CKD in this review was 11.1% (10.4% among men and 11.8% among women), which is tantamount to an absolute global number of individuals with CKD of 843.6 million (prevalence \times world population, 11.1% \times 7.6 billion).

To calculate the total number of individuals with AKI worldwide, the estimates made by Lewington *et al.* [20] were adopted. Since data on AKI in low- and middle-income countries are extremely limited [21], Lewington *et al.* [20] assumed that the AKI incidence in these countries is the same as that in high-income countries. Overall the resulting figures were 2 million/year in high-income countries and 11.3 million/year in low- and middle-income countries, which translates into a global estimate of 13.3 million cases of AKI/year.

Finally, the total number of individuals treated with RRT worldwide (3.9 million) was estimated by data reported in the systematic review by Liyanage *et al.* [7]. For this calculation, the growth rate of the RRT population was assumed to be equal to that observed in the ERA-EDTA and US (United States Renal Data System) dialysis registries in the years 2010–14, which was 4.5%. Furthermore, it was assumed that the RRT population would grow at the same rate as the world population (i.e. 8.75% between 2010 and 2017). The number of patients on RRT given by Liyanage *et al.* [7] for 2010 is 2.618 million. A 4.5% growth per year in a stable world population would result in 3.562 million in 2017. Additional correction for the growth of the world population (from 7 to 7.6 billion, i.e. 8.57%) then gives a number of 3.868 million, rounded off to 3.9 million.

All in all, the sum of individuals with CKD, AKI and those on RRT (Table 1) gives a figure exceeding 850 million, a truly concerning figure that is twice the estimated number of people with diabetes worldwide (422 million in 2014) [22] and >20 times higher than the number of individuals affected by AIDS/HIV worldwide (36.9 million in 2017) [23]. Thus the data have identified that kidney diseases are one of the most common diseases worldwide.

CONCLUSION

Even though pragmatic estimates of the global burden of kidney diseases based on a single number have already been made [2], this number rests on data of various qualities and on approximations and demands some assumptions. The three societies plan to update the number on a regular basis, thus allowing monitoring of the global burden of kidney diseases over time. Awareness of the global burden of diseases is a prerequisite for acceptance by the community, policymakers and public health groups that leads to commitment to institution of public health approaches that will improve health outcomes.

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AUTHORS' CONTRIBUTIONS

K.J.J., C.K. and R.L. made the literature search and set the methodology for calculating the 'single number' and finally produced it. C.Z. (ERA-EDTA President) wrote the first draft of the article that was then revised by K.J.J., C.K. and R.L. and by the leadership of the ISN (V.J. and, in particular, Adeera

Levin—Past President, who also gave an important contribution in the initial phases of the joint project) and the ASN (M.R. and Mark Okusa, past-President of ASN). All authors approved the final version of the manuscript.

CONFLICT OF INTEREST STATEMENT

None declared.

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