

Considerations on equity in management of end stage kidney disease in low- and middle-income countries

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Short title: Equity in provision of kidney replacement therapy

Abstract

Achievement of equity in health requires development of a health system in which everyone has a fair opportunity to attain their full health potential. The current large country-level variation in the reported incidence and prevalence of treated end-stage kidney disease indicates the existence of system-level inequities. Equitable implementation of kidney replacement therapy (KRT) programs must address issues of availability, affordability, and acceptability. The major structural factors that impact equity in KRT in different countries are the organization of health systems, overall healthcare spending, funding and delivery models, and nature of KRT prioritization (transplantation, hemodialysis, or peritoneal dialysis, and conservative care). Implementation of KRT programs has the potential to exacerbate inequity unless equity is deliberately addressed. In this paper, we summarize discussions on equitable provision of KRT in low- and middle-income countries and suggest areas for future research.

Key words: equity; kidney replacement therapy; end-stage kidney disease; social justice; ethical framework; reimbursement

Introduction

According to the World Health Organization (WHO), equity in health is an ideal state in which everyone has a fair opportunity to attain their full health potential. Inequity is said to be present when there avoidable, unfair, or remediable differences exist among groups of people, however defined.¹

This definition recognizes that there could be differences in the nature of healthcare and its delivery as long as they can be justified in that they do not lead to differences that systematically affect certain groups of people. Equity can be horizontal, i.e., equal treatment of equals leading to equivalent outcomes, or vertical, i.e., unequal but fair treatment where inequality and/or need exists, administered according to a fair process. The latter must be defined by differences in the needs of populations which guide allocation based upon appropriate consideration of the principles of social and distributive justice (from each one according to ability, and to each one according to need), including concern for the vulnerable and the worse off, and a balance between utilitarianism (prioritization of interventions that provide the greatest overall health benefit to the greatest number of people, even though some may be disadvantaged) and libertarianism (freedom of choice and individual judgment with minimal state or social interventions). Additional details are presented in **Table 1**.

Current status and considerations on equity in end-stage kidney disease

Equitable implementation of a health service such as kidney replacement therapy (KRT) requires consideration of availability, affordability, and acceptability. The decision of whether or not to set up KRT is driven by needs and demands from the public in relation to the local environment and context, in order to ensure equitable service delivery for all patients. In the following paragraphs, we explore which elements contribute to or hinder equity in access to end-stage kidney disease (ESKD) care and propose potential solutions or areas of research to promote equity.

Availability

Global inequity in provision of KRT is reflected in the large differences in the country-level prevalence of different KRT modalities.²⁻⁵ In fact, the commonly accepted metric of country-level ‘prevalence of ESKD’ reflects prevalence of *treated* ESKD, highlighting the between-country

inequities in access to KRT. Low- and middle-income countries (LMIC) often lack financial, logistic, and labor force capacity to provide KRT at scale. Simply making KRT available does not address accessibility, which is driven by personal, family, geographic as well as societal factors. The lack of professionals trained to provide KRT is driven by a number of factors and is addressed elsewhere.⁶

Financing and organization of health systems has a major bearing on equitable access to KRT in individual countries. Countries can be broadly grouped into three categories in terms of financing of KRT: a) predominantly public system; b) mixed public/private system; and c) predominately private, market-oriented system.

Low-income countries are often characterized by a low participation of the public sector, with market forces determining access to KRT and leading to a high incidence of out-of-pocket (OOP) expenditure. The picture is more mixed in middle-income economies, whereas in high-income countries KRT is funded almost exclusively through public funds.⁷ At lower ranges, there is an almost linear relationship between the gross domestic product (GDP) of a country and KRT prevalence. However, some important differences can be noted even between countries with equivalent wealth status, suggesting that variations in implementation policies also impact ESKD care delivery. For example, although Colombia and Mexico have comparable GDPs between 5,000 and 8,000 USD, the proportion of government expenditure as a percentage of total expenditure on health varies, being 75% in Colombia and 52% in Mexico.^{8,9,10} These discrepancies are also evident in other regions. With similar income, the percentage of total expenditure on health in South Africa (40%) is significantly lower than in Thailand (75%). Thailand and Colombia have successfully implemented universal access to KRT, while access remains restricted for populations in Mexico and South Africa. As a result, OOP costs as a percentage of total spending on health are significantly lower in Colombia (15%) and Thailand (11%), in comparison to South Africa (30%) and Mexico (40%)⁸⁻¹⁶ (**Table 2**). Some examples of the impact of the type of national health care system on access to ESKD treatment are presented in more detail in this section and are summarized in **Table 2**⁸⁻¹⁹ and **Table 3**^{10,13,20-34}. Anecdotal reports have described informal insurance mechanisms such as charity, informal credit, and microfinancing for

funding KRT in LMIC. While these mechanisms reduce financial burdens for some time, they do not fully address all costs, and might add to inequity.

Funding models determine dialysis availability

Industry is often the driver of ESKD care provision, especially dialysis in LMIC. It makes all necessary investments to establish care in return for an agreed return on investment, i.e., private-public partnerships (PPP). Limited data are available on the impact of such models on equity. In a study from India, introduction of free hemodialysis (HD) at point of care delivered by a private provider under PPP led to year-on-year increase in uptake but was marked by poor outcomes with over 60% dropping out within 6 months. Males outnumbered females among those accessing dialysis by 3:1.³⁵ A particular feature of PPP dialysis delivery models is a decline in utilization of peritoneal dialysis (PD). For example, such models have decreased PD utilization in Latin America.³⁶ In Mexico, this model has resulted in a considerable decrease in PD utilization in the social security health sector, with a significant increase in HD expenditures.^{37,38} PD was the treatment of choice (>90%) under the Mexican Institute for Social Security (IMSS),³⁹ whereas the increasing capacity of private HD units established in PPP caused a shift to HD as a first option.²⁶ As a consequence, the number of patients on PD declined to 59% of the dialysis population, at a higher cost (estimated at \$15,000 USD per patient per year) to the public sector.³⁷ In Brazil, private industries provide the bulk of KRT, resulting in higher utilization of HD than PD (93% vs 7% of prevalent dialysis patients). Between 2003 and 2016, the percentage of patients on PD in Brazil declined from 10.8% to 6.9%.⁴⁰ In Colombia, KRT is provided as part of a suite of services that include promotion of kidney health, chronic kidney disease (CKD) prevention, free choice of KRT, and mandatory outcome reporting.⁴¹ Even here provision of dialysis by the private sector led to a decline in the proportion of PD patients from 36.7% to 27% over the last decade.⁴⁰ Charity organizations have tried to solve the availability issue using different approaches,⁴²⁻⁴⁵ but it is unclear whether or not such approaches result in transparent, equitable, and sustainable access to KRT.

One way by which some countries have attempted to achieve equity in access to KRT in the face of shortages is through rationing,^{46,47} i.e., restricting access of some people for whom this treatment may

be potentially useful. Rationing can be introduced at the level of the policymakers, health systems managers, clinicians-providers, or individual patients. Several models of rationing have been proposed, using a mix of evidence-based inputs (disease epidemiology, population and health system characteristics, comparative cost-effectiveness, and impact on outcomes), process changes leading to demand and supply side strategies to regulate access.⁴⁸ To achieve optimal outcomes, such rationing schemes require stewardship and need continuous monitoring to assess their impact on equity and efficiency of KRT.

The impact of geography on availability

Major geographic inequities have been described from almost all LMIC, with those living in urban areas enjoying an advantage. Navigating vast distances between neighborhoods and dialysis facilities is compounded by lack of sufficient and affordable transportation, infrastructure, and overpopulation in the larger cities. In Brazil, 50% of the dialysis population is concentrated in three highly urbanized southern states: Sao Paulo, Rio de Janeiro, and Minas Gerais, whereas access to KRT among those living in the rural north is very low. Not surprisingly, 63.5% of Brazilian nephrologists are located in the states with the larger proportion of dialysis patients.⁴⁹ As a consequence, a decentralized approach to KRT is critical. Investing in the education of local people to perform basic aspects of care would benefit the broad community and increase equity. Training programs tend to be overspecialised and do not always deliver knowledge relevant for the prevalent circumstances. This may exacerbate inequity as well-trained personnel migrate to big cities or abroad to be able to apply their new skills. Training programs, such as those delivered through ISN's programs, should support the use of locally available material and expertise rather than introduce complex technical procedures that requires external expertise and drain funds to foreign providers rather than supporting local economy. Preference should be given to hands-on clinical training, preferably within the physician's own region, to increase the relevance and utility of the training to the physician's home country and to reduce costs and the risk of "brain drain."⁵⁰

In terms of sustainability and efficiency, the value of on-line training to enhance knowledge and skills of health workers on management with advanced CKD including ESKD and its impact on inequity

needs to be assessed. In the short term, such programs should increase awareness and support prevention. In the mid-term, they should allow improved quality of therapeutic interventions in well-defined cases, e.g., KRT for acute kidney injury. In the long term, they should be able to participate in advocacy and governance to facilitate comprehensive care for the patient with ESKD in collaboration between industry, research groups, clinical experts, and patient groups.

Use of digital technologies has great potential in contributing to equitable dissemination of knowledge to healthcare professionals and delivery of quality care to patients, from prevention and care of early stage CKD to management of patients with ESKD. When developing such e-health devices, one should take care that the tools align with the actual need of the target group, rather than create new needs.⁵¹ Caution should be taken to ensure that these tools reach the ones with the worst access to health care to prevent them getting even more disadvantaged.⁵² Overall, available evidence on e-health applications directly oriented towards CKD patients is inconclusive.⁵³ Evaluation and certification of patient-oriented apps might prove difficult for several reasons.⁵⁴

Affordability

In LMIC, affordability is clearly a major issue contributing to inequity. The WHO estimates that a minimal health care spending per person of 271 USD (range 74-984 USD), or allocation of 7.5% (2.1-20.5%) of GDP on health care is required in order to meet the health-related Sustainable Development Goals.⁵⁵ As GDP is not equitably distributed across the population, inequities in health care access can result even when a sufficient average budget per capita is achieved.

It has been estimated that about 188 million people experience catastrophic health expenditure annually as a result of kidney diseases across LMIC, the greatest of any disease group.⁵⁶ OOP costs are highest in the poorest countries. In most, if not all LMIC, the yearly cost of KRT per capita substantially exceeds the GDP making it cost-ineffective by definition.^{2,57} Mere availability of dialysis, without sustainable funding models, leads to the financial bankruptcy of families, often without the commensurate expected health benefit.⁴ This is more problematic in settings where cultural beliefs

enforce that everything possible should be done to save a life. Optimization of equity requires that if KRT is provided, locally appropriate funding models are developed to eliminate all possible sources of unreasonable OOP expenditure. Successful models have been implemented in LMIC such as Colombia and Thailand.^{31,41} In many countries, allocating sufficient funds to appropriate healthcare programs is more a political than a financial decision. For example, with a higher proportion of GDP allocated to public health, Colombia with a lower GDP has achieved universal access to KRT, whereas Mexico has not, despite a higher GDP but lower allocation to public health. As result, KRT-related OOP expenses are much lower in Colombia.^{7,10,11,58}

Ideally, sustainable KRT care models should be coupled with essential prevention, primary/secondary health care services, and access to essential medicines.^{2,59} KRT modalities should be prioritized in such a manner as to promote equity. Kidney transplantation, despite being the cheapest option with greatest health benefits to the most who receive it, is poorly established in many LMIC.⁶⁰ Similarly, health technology assessment has repeatedly shown that PD is cheaper than HD to the health system while providing equivalent health benefits, but PD is not prioritized either because of lack of understanding of these principles or pressures from interest groups. In some countries, PD is expensive because of the need to import foreign-made consumables, compounded by imposition of import duties and unofficial charges. All these costs are passed on to the consumer which is not always the case for infrastructure costs associated with HD.⁶¹ These data have repeatedly shown that local manufacturing of PD bags brings down costs. Lack of well-designed health economic studies have also perpetuated the myth of lower cost of HD in many LMIC. A recent study from India showed that the total cost of HD to the system was 4 to 8 times higher than previously estimated reports, making it far more expensive than PD, contrary to the currently accepted narrative that PD is more expensive than HD.⁶² Finally, supportive care services, increasingly considered integral to holistic ESKD care delivery, are almost non-existent in LMIC.⁶³

Some of the costs incurred with HD flow partially back to the community as payment for goods and services. The overall cost to the society goes down through increased local manufacturing that

prevents drain of economic means to other countries and creation of local jobs. As such, setting up KRT may indirectly contribute to social justice.

Affordability depends not only on “how to get more money” (revenue) but also about “how to spend the money.” The latter requires consideration of governance and organizational factors. Some countries, such as Thailand, undertook a dedicated in-depth health technology assessment of the needs and possibilities with regard to ESKD care before making decisions on how to implement an KRT program.⁶⁴ When dialysis cannot be provided to all individuals, guidelines based on a transparent decision making, taking into account the individual patient’s circumstances, should be developed to optimize use of this limited resource. In South African state hospitals, dialysis is only offered to those who are eligible, and consent to, receiving a transplant when offered.²⁹ In Thailand, a patient with ESKD can be treated for free by PD, whereas those who decline the offer and choose HD will not get financial support.^{3,31}

Acceptability

Acceptability implies consideration of ethical and societal standards. The WHO specifically warns against “vertical health silos,” whereby basic needs of the population are neglected while implementing expensive health care technologies.⁶⁵ It is a matter of debate whether KRT should be developed in regions where access to essential health services is limited, since it likely exacerbates overall health inequity. However, it can be argued that in absence of oversight, the private sector will identify this market gap and introduce/expand KRT, especially dialysis. This will exacerbate inequity even more amongst those with ESKD since a proportion will always have the financial means to access KRT whereas the poor will end up even worse off on account of having incurred catastrophic OOP expenses.

Making appropriate decisions that address all issues that help proper allocation of resources and eliminate inequity in KRT delivery requires continuous access to data and ongoing research. Registries provide this important service. It is imperative that all countries allocate resources for data collection

and quality monitoring. In addition to standard treatment-related parameters, registries should collect data on parameters of discrimination (e.g., social, education, gender, ethnicity, migrant status, place of residence) and comorbidity to ensure that the system does not exacerbate inequities. **Table 4** lists additional knowledge gaps that need to be addressed through context-specific research.

Conclusion

Whereas provision of care for patients in LMIC is a challenge in itself, it becomes even more difficult when considerations of equity are taken into account. Prevention strategies should be installed as a first measure as they yield the most cost-benefit on individual and societal levels. When implementing a KRT program, we should be vigilant to avoid increasing disparity in well-being between groups. The actual data to make evidence-based decisions on if, when, how, and by whom KRT programs should be implemented are lacking, and research in that area is urgently needed.

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Tables

Table 1. Examples of differences in vision on equity of care for patients with end-stage kidney disease between different theoretical frameworks

	Egalitarian	Utilitarian	Libertarian
Availability			
Should preventive care for ESKD be present?	Yes, on the condition that it is provided in a way that decreases disparity for the risk of ESKD and poor living conditions between groups; it should be taken into account that prevalence of ESKD itself is distributed unequally between groups	Yes, if there is proof that this improves health more than other health strategies	Yes, provided it does not interfere with personal freedom and responsibility
Who should organize the preventive care?	Preferably the government, to ensure equality; Non-governmental organizations are acceptable if they ensure equality	The structure that can provide preventive care with the optimal cost-benefit ratio	Every person or structure should have the right to organize this if they are willing to do so
Should KRT be present?	Yes, on the condition that it is provided in a way that decreases disparity between groups for the risk of ESKD and of poor living conditions	Yes, if it there is proof that this improves health more than other health strategies	Yes, provided it does not interfere with personal freedom and responsibility
Who should organize KRT?	Preferably the government to ensure equality; non-governmental organizations are acceptable if they ensure equality and for-profit organizations should be avoided	The structure that can provide preventive care with the optimal cost-benefit ratio	Every person or structure should have the right to organize this if they are willing to do so
How should access to KRT be organized?	Restrictions in access are acceptable when clear rules on who can and who cannot apply are provided; differences in access purely based on group membership are unacceptable	Restrictions in access are acceptable if based on cost-utility differences between individuals or groups	Everyone who can afford it should have access
Affordability			
How should financing of ESKD care be organized?	Distributive justice (obligatory insurance organized by the government): everybody should contribute according to his/her ability; everybody should receive what he/she needs to maintain good health	By the system that maximizes cost-benefit: – when maximization at individual level is intended, probably a private insurance system – when maximization at society level is intended, probably a distributive justice system	Commutative justice (private insurance): everybody has the individual responsibility to ensure financing of his/her health care costs
Acceptability			
Should impact on non-kidney disease aspects be taken into account?	Yes, health care interventions should always be assessed in the broad context of improving general well-being; accordingly, impact on other disease conditions and on social aspects (e.g. education) should be taken into account	Cost benefit can be calculated at different levels: – the individual patient: is strategy A better than strategy B? – across disease states: does managing disease A vs. disease B add more cost/benefit? – at society level: what is the societal cost of managing a disease (opportunity costs)?	At the individual level, the choice to balance between different options is up to the informed patient (shared decision making); at the society level, there is no obligation for an individual to take into account the potential impact of his/her treatment decisions on others

ESKD, end-stage kidney disease; KRT, kidney replacement therapy

Table 2. Health system-related economic data of selected countries and impact on KRT provision

	Colombia ^{8,10,11}	Mexico ^{9,11}	South Africa ¹²⁻¹⁴	Thailand ^{15,16}	India ¹⁷⁻¹⁹
Per capita gross national income (USD)	5,890	8,610	5,430	5,950	1,790
Per capita health expenditure:					
USD	402	462	464	256	64
% of GNI	6.8	5.4	8.3	4.5	3.9
% of Public expenditure	18.5	10.4	10.2	11	12.3
Health care budget:					
% Public	76	52	40	76	26
% Private	24	48	60	24	74
% Out-of-pocket	15	40	30	11	68
Type of health system	Predominantly public	Mixed public-private	Mixed public-private	Mixed public-private	Predominantly private
Universal access to KRT	yes	no	no	yes	no
Restrictions on access	no	yes	yes	yes	yes
KRT registry	yes	Transplant only	yes	HD and PD only	no
ESKD prevention program	yes	no	no	no	no
CKD registry	yes	no	no	no	no

KRT, kidney replacement therapy; USD, United States dollars; GNI, gross national income; ESKD, end-stage kidney disease; CKD, chronic kidney disease; HD, hemodialysis; PD, peritoneal dialysis

Data from *The World Bank*^{8,9,12,15,17}, *World Health Organization*^{11,14,16,18}, *Guerrero R, et al.*¹⁰, *Mills A, et al.*¹³, and *Gupta I, et al.*¹⁹

Table 3. Examples of health care systems and their financing

Country	Health Care System and Financing Details
Colombia	<p>Until the early 1990s, the Colombian health system was made up of three sub-sectors: 1) Social Security scheme offered to formal sector workers; 2) private health insurance for those able to afford it; and 3) a tax-based financing system for those without health care insurance. In 1994, the system changed to the current two major health insurance schemes: a) a <i>contributory regime</i>, which is mandatory for formal workers and those with the capacity to pay; b) a <i>subsidized regime</i> for the unemployed, informal sector workers, and the poor.¹⁰ The contributory regime is financed by an income-based payroll tax paid partly by employees and partly by employers, whereas the subsidized regime is financed mainly by taxation. People are free to buy additional private health insurance on top of the contributory one. Teachers in public schools and universities, the military and police officers, and workers of the national oil company still have special health care schemes. The Fondo de Solidaridad y Garantía (FOSYGA) pools all payroll-based contributions for health as well as other public sources earmarked for the health sector. In 2007, the government established a high-cost sub-account, managed by a non-governmental organization (Cuenta de Alto Costo, CAC), to pool and redistribute risk retrospectively for catastrophic conditions such as ESKD, HIV, hemophilia, and some other diseases across the entire population.²⁰ The main health care purchasers are ‘Entidades Promotoras de Salud’ (EPS), which are similar to health maintenance organizations. EPS manages a package of a mandatory health plan, which includes dialysis and kidney transplantation, and public health activities such as screening for certain diseases like hypertension, diabetes, and chronic kidney disease. Although EPS can either provide services directly or contract private or public providers, the private sector dominates health care provision in Colombia, accounting for two-thirds of health expenditure by EPS in 2012. Under both the contributory and subsidized regimes, members are allowed to choose the EPS of their preference, which results in EPS competing for enrollees, and providers competing for inclusion in EPS networks. This is more evident in the more densely populated urban areas where competition exists between different EPS, but not in rural and underserved areas where it is less profitable for EPS to set up.¹⁰ Access to KRT in Colombia is universal, and with the implementation of CAC, the prevalence of treated ESKD increased from 445.3 pmp in 2007 to 671.5 pmp in 2016.²¹ However, some disparities are evident between the contributory and the subsidized regime. In 2016, there were 32,786 patients on KRT, with 61% being in the contributory regime. The patients in the subsidized scheme were under-represented in all types of KRT and especially in kidney transplantation (only 18.6%).²⁰ In spite of its success, CAC has been criticized by its lack of transparency of reporting the financing of KRT, the equal access to treatment and the assessment of health outcomes, and its strong emphasis on KRT rather than prevention.²²</p>
Mexico	<p>Health services in Mexico are provided through a variety of sub-systems. The largest of these is the Instituto Mexicano del Seguro Social (IMSS), which provides health care services for formal workers in the private sector. The Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado (ISSSTE) provides similar services for federal government employees. The military and the national oil company have their own health care schemes. Other key institutions include the network of Servicios Estatales de Salud (SHS), for those without employment linked insurance. After the introduction of Seguro Popular (SP) in 2004, publicly-funded health insurance extended to 50 million Mexicans who were previously uninsured. Prior to SP, these individuals only had access to SHS for a fee.²³ Health insurance in the social security schemes is funded through payroll contributions by the employer and the employee, with an additional federal allocation from general taxation. Financing of SP is based on a tripartite structure which includes contributions from three sources: the federal government, state governments, and the beneficiary. The social contribution is a fixed allocation per family, which is funded entirely by the federal government. The second element is the co-responsible contribution between the federal and state</p>

	<p>governments to redress the differences in the level of development among states. The third component is the family contribution, which is progressive and redistributes family income.²⁴ The SP divides personal health services into an essential package of primary and secondary-level interventions, which are provided in ambulatory settings and general hospitals, and a package of high-cost tertiary-level interventions financed through the Fund for Protection against Catastrophic Expenditures (Fondo de Proteccion contra Gastos Catastroficos, FPGC).^{24,25} Patients and families belonging to IMSS or ISSSTE and those with private insurance have universal access to KRT. SP does not cover ESKD treatment, except for kidney transplantation in children <18 years of age. Patients without social security must pay from their own resources for KRT, which limits their access. As a consequence, many patients refuse dialysis, eventually abandon their treatment, or lose their kidney grafts because sustaining KRT becomes unaffordable.²⁶ This results in marked disparities between the insured and uninsured population, and in 2015, KRT incidence and prevalence rates in the population with vs without social security were 281 and 1,357 vs. 130 and 200 pmp, respectively.²¹ In spite of the success of SP in expanding health insurance coverage to close to 84% of the Mexican population, its existence has been questioned by the new Federal authorities, and so is the access to KRT coverage for more than half of the Mexican population.</p>
South Africa	<p>Private insurance, the so-called medical schemes, is a key element of the financing system. Initially, there were few schemes restricted to formal workers. Over time, many open schemes have developed, allowing anyone to join provided they can pay. Most care for private insurees is provided by the private supplier sector. Private general practitioners are widespread in urban areas, and private for-profit hospitals are available in the major cities and provincial capitals. Prices in the private sector are prohibitive for the majority of the population, resulting in major inequities in the health care resources used by different population groups.¹³ To promote financial access to public sector health care services for vulnerable groups, user fees have been removed for all public sector primary care services. However, outside these services, patients face substantial fees at public sector hospitals. An analysis of the South African public-private mix demonstrated substantial inequities in health financing. Sixteen percent of the population is covered for all health care in the private sector, and a further 21% of the population uses the private sector with out-of-pocket basis mainly for primary care but are likely to be entirely dependent on the public sector for tertiary care such as KRT. The remaining 64.2% of the population is entirely dependent on the public sector for all types of health care services, including KRT.¹³ Between 2013 and 2015, the prevalence of treated ESKD increased from 167 pmp to 189 pmp, mainly due to the increased numbers of patients accessing dialysis in the private sector. In the public sector, the prevalence of KRT remained stable around 72 pmp over the last 25 years, so the disparity in access to KRT continued to increase.²⁷ Initially, rationing of patients for dialysis was based on informal criteria concerning eligibility for kidney transplantation. In 1997, the National Department of Health consolidated the criteria in use to develop a formal national policy. However, of all patients with ESKD assessed over a 15-year period, only 47% were actually accepted for KRT. The likelihood of acceptance into the program was significantly biased in favor of patients who were employed, married, white, and younger. Almost 60% of patients were denied KRT because of social factors related to poverty.²⁸ Recently the Accountability for Reasonableness guidelines have been adopted by the health authorities of the Western Cape government. They include a novel three-tiered hierarchy of priorities, based on the likelihood of best outcomes. Although the model's success ensured that all ideal candidates received treatment, it failed to completely eliminate inequity, and only 25% of all ESKD patients assessed were accepted for KRT.²⁹ Patients in rural areas are underserved as a result of the lack of facilities and geographical barriers. The expenses attributable to the HIV/AIDS epidemic at least partially contribute to the low level of provision of KRT compared with similar upper-middle-income countries.</p>
Thailand	<p>Extension of health insurance coverage has been pursued in Thailand since 1975. In 1975, low-income households were covered under the publicly funded Low-Income Card (LIC) scheme. Government employees and their dependents were covered with the establishment of the Civil Servant</p>

	<p>Medical Benefit Scheme (CSMBS) in 1978. In 1981, a publicly subsidized Voluntary Health Card (VHC) scheme was initiated by the Ministry of Public Health to cover the non-poor informal sector. Later in 1990, the Social Security Scheme (SSS) was established to provide mandatory coverage for formal sector private employees. The major sources of funds are from general taxation, followed by direct out-of-pocket payment, social health insurance, and private insurance premiums.³⁰ In 2001, universal health care coverage (UHC) was implemented. The UHC scheme incorporated the existing LIC and VHC schemes, and extended coverage to the 30% previously uninsured population. All three groups are covered under a single fund financed by general taxation, while the CSMBS and the SSS still operate their own schemes.³⁰ The initial UHC did not include KRT because of budget impact reasons and only beneficiaries of the CSMBS and the SSS, representing 25% of the Thai population, had access to KRT. Advocacy by nephrologists and civil society seeking equity in access to dialysis led to the development of the “PD First” policy and marked a turning point in ESKD care in Thailand. Initially, full reimbursement for PD was provided. However, if there was any contraindication to PD, HD costs could also be fully reimbursed. If a patient started with PD, but because of any medical or social problems with the therapy required shifting to HD, the costs would continue to be fully reimbursed. The indications for shifting to HD were set up by the Nephrology Society of Thailand and regional committees are authorized to make the decisions. Over time, the policy has been revised and patients who started HD before launching the policy are now also fully reimbursed. However, those who elect to start HD since the launch of the policy must pay the cost of the treatment.³¹ The PD First policy has been successfully implemented, with an increase of the incidence and prevalence of treated ESKD from 68.34 pmp and 419.9 pmp in 2007 to 249.06 pmp and 1,072.9 pmp in 2013, respectively. By 2015, the percentage of UHC patients on PD was 60%. The budget of the PD First policy has increased gradually to more than 220 million USD in 2017.³¹</p>
India	<p>All forms of KRT are available in India but are largely restricted to big cities and private-sector hospitals. Public-sector hospitals are overburdened with the dialysis requirement of patients with acute kidney injury and do not have the infrastructure to support chronic outpatient dialysis.³² Few people have access to health insurance, and discontinuation of dialysis is high due to excessive out-of-pocket costs, which are often substantially higher than monthly income, resulting in catastrophic health expenditure.^{33,34} As part of its agenda to achieve UHC by 2022, the Indian government has committed to establishing at least one eight-station dialysis unit in each of its 688 districts and is offering free HD to people living below the poverty threshold. To realistically meet this demand, care models with low-cost dialysis machines and non-physician health workers will need to be developed.³³</p>

ESKD, end-stage kidney disease; HIV, human immunodeficiency virus; KRT, kidney replacement therapy; pmp, per million population; AIDS, autoimmune deficiency syndrome; PD, peritoneal dialysis; HD, hemodialysis

Data from Guerrero R, et al¹⁰, Mills A, et al.¹³, Cuenta de Alto Costo Bogota²⁰, Saran R, et al²¹, Lopera-Medina et al²², OECD²³, Frenk J, et al²⁴, Seguro Popular²⁵, Garcia-Garcia G, et al²⁶, Davids M, et al.²⁷, Moosa MR, et al.²⁸, Moosa MR, et al.²⁹, Equitap³⁰, Cheungsaman P, et al.³¹, Kumar V, et al.³², Essue BM, et al.³³, and Bradshaw C, et al.³⁴

Table 4. Gaps in knowledge and need for further research

Questions to Address	Process
What proportion of the total health care budget can a country spend on ESKD care relative to the desired level of health status, available technology, and costs without enhancing inequity?	Health science evaluation
What is the economic and societal return of money invested in KRT care by way of promoting local manufacturing and creating jobs, skills, trade and knowledge?	Societal and economic evaluation
What is the best way of comparing HD and PD in terms of their impact on equity of care provision and how can this be implemented?	Health technology assessment
What are the minimal essential requirements to safely implement a transplantation program in an equitable way in LMICs?	Scientific medical evaluation, systematic review, Delphi
Which models are in use for implementation of ESKD care in LMIC; what were the results; which factors (modifiable and non-modifiable) determined success or failure and their impact on equity? (Consider governmental vs. external programs, public vs. private, prevention vs. curing, mixed models)	Systematic review, epidemiology, health care sciences
Is there inequity in access to provided care and outcome based on gender?	Systematic review; epidemiology

ESKD, end-stage kidney disease; KRT, kidney replacement therapy; HD, hemodialysis; PD, peritoneal dialysis; LMIC, low- and middle-income countries