Social and economic determinants of pediatric health inequalities: the model of chronic kidney disease

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Purpose of this review is to deal with priorities and strategies to significantly tackle inequalities in the management of pediatric diseases in low–middle-income countries. This issue has become a focal point of epidemiological and public health, with special reference to chronic nontransmissible diseases. We will provide our readership with an essential overview of the cultural, institutional, and political events, which have occurred over the last 20 y and which have produced the current general framework for epidemiology and public health. Then the most recent epidemiological data will be evaluated, in order to quantify the interaction between the medical components of the disease profiles and their socioeconomic determinants. Finally, a focus will be added on models of pediatric chronic kidney diseases, which are in our opinion amongst the most sensitive markers of the interplay between health and society. Collaborative, pediatrician-initiated, multicentre projects in these fields should be given priority in calls for grants supported by public agencies. The involvement of a critical mass of those working in the “fringes” of pediatric care is a final, essential mean by which significant results can be produced under the sole responsibility and research interest of centers of excellence.

The main purpose of this review is to attempt to answer an ever more relevant question: Which priorities and strategies could and should be adopted by pediatricians in order to significantly tackle inequality and inequity in the management of pediatric diseases in low–middle-income countries. This issue has become a focal point of epidemiological and public health, due to the many unmet needs and rights of pediatric populations worldwide with special reference to chronic non transmissible diseases (1,2).

The focus here is not, therefore, on providing a further detailed review of what has and is still being published on this subject. Instead, with an eye to the future, we outline the development of some suggestions which hinge on the following three steps:

- (i) An essential overview of the cultural, institutional and political events which have occurred over the last 20 y

and which have produced the current general framework for epidemiology and public health;

- (ii) A brief evaluation of the epidemiological data which have been accumulating mainly over the last 10 y, in order to quantify and qualify the interaction between the strictly medical components of the disease profiles and their socioeconomic, cultural, and institutional determinants;
- (iii) A focus on model scenarios of pediatric chronic diseases, specifically chronic kidney disease, which are the most sensitive markers of the interplay between health and society.

GENERAL FRAMEWORK

“The last two decades have brought revolutionary changes in global health...”: an important paper summarizes the radical impact of the globalization process (3). Being principally driven by economic, institutional, and political actors and variables, globalization has transformed the role, the terms of reference, and the perspectives of the world of health. **Table 1** shows a synoptic and chronological view of the key events.

The report on the global burden of diseases (GBD) from the mid-nineties closely followed the World Bank reports, which declared that health systems had become economically too important and societally too critical to be left exclusively in the hands of a specialized agency such as the World Health Organization. In parallel with this important evolution of the epidemiological approach to health planning, in the early '90 the creation of the World Trade Organization represented the institutional expression of the directed impact of trade criteria and agencies in the area of services delivery. The economic and technological components of health should be regulated according to norms, which are independent from those which govern the relationships between individuals and peoples, such as, at country level, the competences of national governments and of their constitutions.

The highly conflicting Doha clause, which recognized that public health interests could justify exceptions to the World Trade Organization rules with respect to patents, must be accountable to the World Trade Organization tribunal (4,5).

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Table 1. Actors and events of the two decades which transformed health

1994	World Trade Organization
1996	First reports on the Global Burden of Disease
2000	Millennium Development Goals (MDG)
2001	The Doha clause
2008	The Social Determinants of Health
2010	Recurrent debates on Universal Health Coverage as the most promising formula for “global health”
2011	The Non Communicable Diseases program adopted by UN
2015	A Sustainable Development Goals framework appears better attractive than the “old” MDG

The GBD-based epidemiology became instrumental in mapping the health needs, which were then adopted by the Millennium Development Goals. Goals which are failing, however, to fulfill the promises with appropriate investments. This gap between commitment and reality coincides closely with the economic-income profiles of the countries and therefore with their capacity to provide health coverage. The massive private involvement in the health sector, either in the name of solidarity, or as a public-private-partnership has become a highly ambivalent protagonist of global scenarios, as it makes the absence of national health plans and commitments appear “sustainable” in some low-middle-income countries (6–8).

The publication of the final report of the Commission on Social Determinants of Health (9), which formally underlines the dominant role played by socioeconomic conditions in causing diseases, as well as their unsustainable burden, coincides with the explosion of the financial crisis, the implications of which, in terms of the dramatic and global increase in inequalities, are too well known and well documented to be further underlined here (10).

In this scenario, the causes and the implications of the partial but significant failures of the Millennium Development Goals have become clear, as well as the methodological limitations and flaws of the GBD representation of the health status of the world. A brand new and importantly revised series of reports from the core group(s), who are the protagonists of the global epidemiological accountability on health, provide the informative support for the two most recent developments in the scenarios in [Table 1](#):

- The “discovery” certified and adopted by the UN that nontransmissible chronic diseases play a dominant global role, both from the point of view of their epidemiological relevance and the challenge they impose on the availability of strategic (institutional, even more than economic) resources to allocate specifically in low-middle-income countries (11);
- The accentuation and the generalization of the debates on what should be a generally valid formula (Universal health coverage) is the most recognized acronym to be adopted globally to assume sustainability to the new development goals (12).

THE EPIDEMIOLOGICAL SCENARIOS

Materials and Methods

According to the general objectives of the review, rather strict criteria have been adopted for the selection of the pertinent literature.

Against the general framework provided by few very recently published major documents and studies (leaving aside reports of public or private actors and agencies), search and retrieval were restricted to:

- Studies with a partial focus, at least, on pediatric age problems and diseases;
- The specific mention, in the title and/or in the text, of the key terms defining sociodeterminants of health/diseases, with a special attention given to inequality/ies and inequity/ies;
- Reports with data not only from global statistics, but from individual countries, were scrutinized;
- Only a few of the most representative studies covering high-income countries were selected, while all studies coming from low-middle income countries were considered;
- Because of the specific competence and the direct involvement of the authors, pediatric chronic kidney diseases were selected as a suitable model of noncommunicable chronic diseases.

The operational definitions of the variables explored in the review are as follows:

- Inequality: through socioeconomic indicators, it defines the distribution of a population into various strata (mostly quintiles), which assign individuals to a better off (quintile 1) or progressively unfavorable status (quintile 5);
- Inequity: corresponds most directly to a value definition, as it describes how resources and accessibility to goods which are fundamental rights (e.g., health care) are distributed in a population, according to the criteria which try to bridge (or worsen) the gaps documented in the inequality quintiles.

The General Framework

Four reports (13–16) have been chosen as highly representative of the enormous amount of data, models, propositions, and controversies produced mainly over the last 3 y in order to accompany, provoke, and discuss the transition into what is called the post-2015 era, with its most likely Sustainable Development Goals.

The report by the GBD groups (13) on the evolution of pediatric mortality in the populations ≤ 5 y of age in 188 countries between 1990–2013 deserves priority not only for the unique richness of its data, but because of the key methodological and public health messages which are provided:

- Information sources to describe and compare pediatric populations have become progressively more reliable

to allow for useful comparisons, across homogeneous groups of populations;

- The historical trends are globally suggestive of a possible positive progress, but the enormous variability of mortality data between countries foresees that country-specific and targeted programs should be developed;
- This need is even more important if well qualified and group-attributable socioeconomic conditions are taken into account, besides data on education and income levels which define the quintiles;
- The noncommunicable diseases appear increasingly important also in low-middle-income countries and are preferred targets for improvements.

The second paper proposed for its general methodological implications (14) is about adult populations, but introduces two issues which are certainly critical for pediatric chronic diseases. The collection and critical analysis of epidemiological data must aim:

- *Firstly*, not solely nor principally at describing the past-present situation but at making prospectively documented deductions for a defined future;
- *Secondly*, at adopting “avoidability”, in the planning of public health research, which would meet the challenges of inequality, inequity, sustainability, central to this report.

It is necessary to highlight how the authoritative groups who sign the report strongly underline the dramatic scarcity of field and country-based studies, where both medical and nonmedical variables are prospectively collected. This would allow for a truly informative evaluation of chronic conditions, which are by definition highly dependent on factors strictly linked to inequality/inequity, such as accessibility to care, living conditions, or the daily experiences of vulnerable groups.

The other two papers (15,16) must be quoted here not only because of their scientific-policy weight, but because they illustrate in great detail the connections and the concrete implications of the frameworks where epidemiological data must be placed to provide its full informative content, and to guide effective planning and research choices.

Epidemiological Reports Focused on Inequality/ies/Inequity/ies in Pediatric Populations

The material pertinent to our theme has been grouped with the purpose of documenting:

- The degree and quality of data availability in international reports;
- The specific profile of “regional” reports on the health status of children, respectively in low income countries, in Brazil and China, as examples of emerging national economies and in model high-income countries.

In view of the substantial comparability of the approach adopted in the studies (mostly epidemiological elaborations on administrative data sources), as well as of the consistency of the results, the presentation of the data is concentrated in the essential data summarized in the Tables, with broader comments in the Discussion section.

Only six reports (Table 2) have been found, over a period of 8 y, which have explored the relationship between the mortality data and nonmedical determinants (with the exception of the national survey reported by Barros *et al.* (17), which describes the distribution of interventions across quintiles). The consistent finding that mothers’ education weighs as much as (or more) than estimates of income (based on mean country data) mirrors the data available for the management of acute diseases. None of the studies allows for the specific quali-quantification of the care and mortality burden attributable to chronic diseases.

Table 2. Large multinational reports on pediatric inequalities/inequities

Reference	Population/country	Source of data	Years covered	Main findings
(23)	54 countries	Household survey	1990–2006	<ul style="list-style-type: none"> • Quali-quantification of the gaps of coverage for key health interventions between poorest and wealthiest quintiles • The widest differences documented for maternal and newborn areas
(24)	Sub-Saharan Countries	A country-specific database	2000–2006	<ul style="list-style-type: none"> • Under five mortality rates inversely correlate with levels of nutrition, external resources, and per capita income
(25)	157 countries	Censuses and nationally representative surveys	1970–2009	<ul style="list-style-type: none"> • More than 50% of the child mortality reduction over the long period of observation not attributable to equality-accessibility of health services but to better mother education
(17)	54 countries	National surveys	2000–2008	<ul style="list-style-type: none"> • The coverage of 12 maternal and child health interventions between poorest and richest quintiles consistently and significantly larger for richest quintiles in each Country
(13)	188 countries	Survey, census, vital registration, sample registration datapoints	1990–2013	<ul style="list-style-type: none"> • Especially in sub-Saharan Africa, rising income and maternal education are documented as the most important determinants of a significant reduction of child mortality
(26)	31 countries	Household surveys, databases	2000–2012	<ul style="list-style-type: none"> • In each country, higher under five mortality rates are significantly higher and inversely correlated with a composite coverage index

Data taken from refs. (13,17,23–26).

The epidemiological profiles found for individual low-income countries (Tables 3 and 4) are mostly from sub-Saharan African countries (Table 3).

The model case of Bangladesh (Table 4) is of specific interest because of the results of interventions aimed at correcting (with encouraging results) the inequity component of care, in a country otherwise known for dramatic structural inequalities.

The case of Vietnam (18) (Table 4) appears also puzzling and worrying. Officially no longer a low-income country, with development indicators which are highly promising and a “history” of national solidarity, it is facing the widening of an inequity gap in terms of maternal health care utilization, which is specifically evident against ethnic and vulnerable groups.

Field and *ad hoc* studies are essential in these countries, both to surrogate the unavailability of reliable administrative data sources, and to explore the heterogeneous and complex spectrum of the factors which cause and maintain inequality/inequity and make sustainability a pure play of chance.

The few country-centred reports confirm the main GBD and other international reports in underlying that the positive global trends are far from being applicable to all countries, where improving or worsening outcomes are intertwined with the instability of the general country conditions.

Brazil (Table 5) could certainly be considered a special and significant case, as there is a long series of reports documenting the difficulty of intervening to overcome gaps in inequalities

and inequities measured in health. As a whole, Brazil remains one of the countries with extreme and polarized levels of inequality, with extensive exclusion of fragile populations.

The only report available so far from a country like China (19), which has been the protagonist of dramatic and rapidly evolving socioeconomic transformations, is consistent with the expectations for a country which has taken decisions almost exclusively motivated by and compatible with economic considerations and measures.

The problem of the dramatic exacerbation of inequality/inequities also in high-income countries following the emergence of the crisis, has been documented in so many national, regional, global reports not to need specific quotations. The few studies listed in Table 6 are the results of a selection meant simply to give an idea of the degree of consistency of the findings across the spectrum of the health systems; with the exception of Sweden (where the problem is rather restricted and specific), all countries document and recognize also in such sensitive areas like the mother–child health, the risk (and the practice) of further marginalization of the already fragile populations, through the variety of obstacles imposed to their right of accessibility to care.

Overall, the substantial absence of well-conducted and representative studies focusing specifically on the documentation of how the inequalities and inequities impact the quality of care and the outcome of chronic diseases is somehow surprising.

Table 3. Reports on inequalities/inequities in pediatric populations in Sub-Saharan Africa countries

Country	Reference	Topics	Main findings
Malawi	(27)	Equity in health and healthcare in Malawi: analysis of trends	<ul style="list-style-type: none"> Along the successive Demographic and Health Surveys of 1992, 2000, and 2004, most of the selected indicators have documented and quantified an accentuation of the already wide pro-rich inequities
Ghana	(28)	Inequities in maternal and child health outcomes and interventions in Ghana	<ul style="list-style-type: none"> Significant inequities are observed in many of the selected child and maternal health outcomes and interventions
Ghana	(29)	Socioeconomic determinants and inequities in coverage and timeliness of early childhood immunization in rural Ghana	<ul style="list-style-type: none"> A further important gap is documented across urban/rural, socioeconomic and educational divides
Uganda	(30)	Timeliness of childhood vaccinations in Kampala Uganda: a community-based cross-sectional study	<ul style="list-style-type: none"> Strategies to improve vaccination practices among the poorest are necessary to improve timeliness of vaccinations
Nigeria	(31)	The long walk to universal health coverage: patterns of inequities in the use of primary healthcare services in Enugu, Southeast Nigeria	<ul style="list-style-type: none"> Documentation of gender, educational, and socioeconomic status inequities in the use of primary health care services

Data taken from refs. (27–31).

Table 4. Reports on inequalities/inequities in pediatric populations in Bangladesh and Vietnam

Reference	Source of data	Years covered	Main findings
(32)	Nationally representative Demographic and Health Survey data	1993–2011	<ul style="list-style-type: none"> Under five mortality rates correlates with inequities (gender, education, family planning, and immunization) improved considerably after a comprehensive program on education and microcredit favoring agricultural and economic development
(33)	Household survey in five districts	2008, 2010	<ul style="list-style-type: none"> A quasi experimental pre-post comparison study on the influence of a project to provide services at community level in three districts (control data in two other districts) More equity in health care utilization obtained
(18)	Viet Nam's Multiple Indicator Cluster Survey	2006, 2010–2011	<ul style="list-style-type: none"> Inequities in maternal health care utilization have increased, especially along ethnic lines and vulnerable groups

Data taken from refs. (18,32,33).

Table 5. Reports on inequalities/inequities in pediatric populations in Brazil and China

Reference	Population/ country	Source of data	Years covered	Main findings
(34)	Brazil	Three epidemiological data sets	1982–1993	<ul style="list-style-type: none"> • New public health interventions in a poor, northwestern area of Brazil, initially reach those of higher socioeconomic status and only later the poor, resulting in an increase of inequities
(35)	Brazil	Census data	1995–1996	<ul style="list-style-type: none"> • Relevant child health differences are associated with the spatial concentration of poverty (more in urban than in rural environment)
(36)	Brazil	Publicly available sources at the Brazilian Ministry of Health and Institute of Geography and Statistics	1998–2000	<ul style="list-style-type: none"> • Income disparities and illiteracy rates are negatively associated with life expectancy
(37)	Brazil	Data from 5,561 municipalities	1996–2004	<ul style="list-style-type: none"> • Family Health Program (FHP) has an important effect on reducing the infant mortality rate
(38)	Brazil	Data from 2,601 municipalities	2000–2005	<ul style="list-style-type: none"> • Mortality under 5 y for diarrhea and lower respiratory tract infections reduced by FHP
(39)	Brazil	Data from 5,507 municipalities	1991–2000	<ul style="list-style-type: none"> • Child health policies have been more effective in reaching the better off than the worst off • Under five mortality rates decreased thanks to a reduction among the better off
(40)	Brazil	Data from 2,853 municipalities	2004–2009	<ul style="list-style-type: none"> • The Bolsa Familia Program (a conditional cash transfer program), which transfers cash to poor households, decreases under five mortality rate
(41)	Brazil	Data from 27 Brazilian States	2000–2009	<ul style="list-style-type: none"> • The Gini index of inequalities is negatively associated with life expectancy • The FHP is instead positively associated with life expectancy
(42)	North-eastern Brazil and Colombia	Survey of a multistage probability sample of people (2,163 in Colombia and 2,167 in Brazil)	2011	<ul style="list-style-type: none"> • Documented inequities in primary, outpatient, emergency care and preventive activities • Neither an insurance scheme enrollment in Colombia nor a segmented system in Brazil, with a significant private component, significantly improve equity
(19)	China	Data from three national survey	2003, 2008, 2011	<ul style="list-style-type: none"> • Major inequities persist between the health care available in poor rural areas and that delivered in more affluent cities

Data taken from refs. (19,34–42).

The Scenario of Pediatric/Chronic Renal Diseases

The sequence of presentation of data is reversed in this section, to reflect the substantial epidemiological invisibility in low–middle-income countries of pediatric chronic conditions, and among them of the model condition of chronic kidney disease.

The reference framework is provided (Table 7) by data published over the last few years in high-income countries, which is difficult to compare because of the quali-quantitative heterogeneity of the populations, as well of the study designs and instruments: from *ad hoc* registries, to databases with uncertain representativeness, to surveys, to larger–smaller cohorts. The main message is clear: populations which are already fragile because of their ethnic or socioeconomic conditions are also discriminated against in terms of their accessibility to chronic kidney disease treatment. It is interesting to note that the impact of such discrimination on the quali-quantitative outcomes (from burden of the disease to mortality) is not a direct explicit concern. Neither the issues of “avoidability” nor of targeted interventions receive consideration. The data in Table 7 documents well the role of kidney diseases as a model of the degree and the implications of the invisibility of chronic pediatric diseases in low–middle-income countries as it is exemplified by chronic kidney diseases. The information available is patchy, the designs

of the studies and the quality of the data are hardly controlled, and the data on discrimination are roughly presented, but hardly explored with respect to avoidable causes.

The mention of a prospective well-documented cohort in Nicaragua (detailed results and comments are in their publication phase) is meant mainly to reiterate that a chronic pediatric condition must be allowed to become visible with the specificity of the related unmet needs, risk conditions and outcomes in order to produce even minimally reliable data.

DISCUSSION AND CONCLUSIONS

It is widely accepted that the area of maternal and child health is the first, most critical, and most sensitive instrument in measuring the unmet needs and their changes, for better or for worse, of societies. The consistent findings of the review are summarized as follows:

- (i) The economic indicators of inequalities are definitely important variables, but they fail to quantify-qualify adequately the gradients of health conditions existing across extremes. The socio cultural-educational context of the mother is a far more precise descriptive and prognostic marker.

Table 6. Inequalities/inequities in pediatric populations in high-income countries

Reference	Population/ country	Source of data	Years covered	Main findings
(43)	United States	National Survey of Early Childhood Health, a nationwide household survey	2000	<ul style="list-style-type: none"> Comparing with whites, hispanic and black children are more likely to be uninsured, less often referred to specialists and parents do significantly fewer telephone calls to doctors'
(44)	United States	Data from 1990 Census and 1992–1994 Vital Statistics for selected US metropolitan areas	1990–1994	<ul style="list-style-type: none"> Infant mortality rate depends not only on racial inequities but also on segregation in poor urban areas
(45)	United States	Data from five nationally representative Data Sources	1999–2005	<ul style="list-style-type: none"> Relevance of income and education disparities versus infant mortality, health status, activity limitation, sedentary behavior
(46)	United States	Statistics from Center for Disease Control and Prevention	2005	<ul style="list-style-type: none"> Racial differences (white vs black, hispanic, asian-pacific, american indian native) in neonatal and postneonatal mortality, birth defects, SID, etc..
(47)	United States	National Survey of Children's Health	2003–2004	<ul style="list-style-type: none"> Disparities in health status, oral health, mental health care; overweight/obesity, uninsurance for African Americans, Latinos, American Indian/Alaska natives
(48)	United Kingdom	Thirty-six prospective and retrospective observational studies	1994–2011	<ul style="list-style-type: none"> Low-birth weight, infant mortality, prematurity births significantly worse for inhabitants of deprived areas
(49)	United Kingdom	WHO World Mortality Database	1970–2008	<ul style="list-style-type: none"> Noncommunicable chronic disease mortality in young people in United Kingdom is very high compared with other European Countries Social determinants are considered the main reason of these disappointing data
(50)	United Kingdom	Review article		<ul style="list-style-type: none"> Throughout childhood and adolescence poor access to health sources for those who need most
(51)	New Zealand	New Zealand Health Information Service	2003–2007	<ul style="list-style-type: none"> Health inequities in between Maori and Non-Maori children
(52)	Australia	Data from local statistics	2003–2009	<ul style="list-style-type: none"> Well documented relationship between ambulatory care sensitive conditions and socioeconomic disadvantage
(53)	Sweden	Database of statistics of the Child Health Care Unit in Uppsala and Swedish national registers	1998–2006	<ul style="list-style-type: none"> Lower rates of participation in parental groups for low-income and immigrant mothers

Data taken from refs. (43–53).

- (ii) The variation in country policies in terms of healthcare investments is another factor of primary importance, which could aid in determining whether and to what extent the impact of inequalities could be reasonably corrected in terms of equity. The increasingly wider use of this term in policy plans and in bioethical discourses is not matched, in practice, by substantial interventions.
- (iii) The interplaying gaps between inequalities and inequities are very similar in their mechanisms and evaluations across the spectrum of low–high-income countries, beyond the obvious differences in terms of baseline levels of socioeconomic indicators and resources.
- (iv) Chronic pediatric conditions have been shown to be exposed to the additional severe risk of epidemiological invisibility, causing them to remain in an orphan status with respect to their need for introduction into health care systems, despite, or because of, their related burden.
- (v) The case of the chronic kidney diseases, which has been explored as a model condition, is by no means alone. The wide and orphan range of disabilities is certainly a

further priority (20), but other chronic pediatric disorders, from cancer to rheumatic diseases, are now seen as essential components of health care, also in many deprived countries (21,22).

Substantial and original investment in pediatric research in low-income countries and in middle-income countries should not produce basic research as seen in western countries, rather it should be used to plan and develop projects, conceived and implemented as advanced research programs of the transferability of care strategies. Breaking away from their role as “death events” or indicators of disease burdens, children with chronic conditions should become visible as real histories, which are systematically translated into pragmatic prospective “cohort studies”. The inclusion criteria for patients in clinical research projects must include, with the same level of importance, essential medical information as well as information regarding non-medical variables, which are necessary to qualify the chronic histories of children in terms of inequality and inequity. Simple, well-planned translational research projects targeted to chronic childhood diseases should be a priority for pediatric teams, with

Table 7. Reports on inequalities/inequities in pediatric chronic kidney disease (CKD)

Reference	Country	Population	Source of data	Years covered	Main findings
High-income countries (54–62)					
(54)	Thirty-two European countries	786 million inhabitants, with a pediatric population (age < 18 y) of 158 million	Survey questionnaire, ESPN/ERA-EDTA and ERA-EDTA Registries	2008	<ul style="list-style-type: none"> The rates of pediatric Kidney Transplantation (KTx), distribution of donor source and time on waiting list vary considerably between European countries Role of transplantation programs, pediatric priority policy and financial resources
(55)	Thirty-two European countries	786 million inhabitants, with a pediatric population (age < 18 y) of 158 million	Survey questionnaire, ESPN/ERA-EDTA registry	2008	<ul style="list-style-type: none"> Considerable variations exist in the percentages of prevalent pediatric RRT populations with functioning renal transplants across Europe The percentage of functioning transplants is strongly associated with the gross domestic product
(56)	Thirty-five European countries	Children aged 0–14 y from a general population of almost 130 million children from 37 European countries	ESPN/ERA-EDTA Registry database, online survey, the World Bank database	2007–2011	<ul style="list-style-type: none"> Inequalities exist in the provision of pediatric RRT throughout Europe, most of which are explained by differences in country macroeconomics: the youngest patients are particularly disadvantaged Higher RRT rates in wealthier countries and in countries where patients pay less out-of-pocket money for healthcare
(57)	United States	8,452 incident pediatric end-stage renal disease (ESRD) patients (<21 y)	The United States Renal Data System	2000–2009	<ul style="list-style-type: none"> Racial disparities in transplant access worsen as pediatric patients transition into young adulthood Socioeconomic status does not explain all of the racial differences in access to kidney transplantation
(58)	United States	8,053 incident pediatric ESRD patients (<18 y)	The United States Renal Data System	2000–2009	<ul style="list-style-type: none"> There are significant racial/ethnic disparities in access to LD preemptive transplant, both for blacks and hispanics
(59)	United States		Review article		<ul style="list-style-type: none"> Black children experience significantly reduced access to transplant compared with white children National allocation policies have mitigated racial differences in pediatric deceased donor kidney transplant (DDKT) access. However, disparities in access to DDKT are stark for minority emerging adults, who lose pediatric priority allocation. Even after adjustment for insurance status and neighborhood poverty, disparities persist
(60)	Nine Canadian provinces	843 patients less than 18 y old who started RRT	A national pediatric ESRD disease database	1992–2007	<ul style="list-style-type: none"> Aboriginal children are less likely than white children to receive a kidney transplant from a living donor or a transplant from any donor and waiting time to first transplant is longer
(61)	Australia and New Zealand	823 patients less than 18 y old who started RRT	The Australia and New Zealand Dialysis and Transplant Registry (ANZDATA)	1990–2011	<ul style="list-style-type: none"> Caucasian recipients are more likely to have kidney diseases that could be diagnosed early or progress slowly, have fewer HLA mismatches and are less sensitized Caucasian patients are most likely to receive any transplant, due largely to disparities in live donor transplantation Indigenous patients are least likely to receive a transplant from a live donor or a pre-emptive transplant
(62)	Netherlands and Belgium	179 children <19 y old on chronic dialysis	Questionnaires, medical records	2007–2011	<ul style="list-style-type: none"> There are important disparities between children on chronic dialysis with parents from Western European origin and those from non-Western European origin Compared to Western patients, non-Western patients more often are treated with hemodialysis (HD) instead of peritoneal dialysis (PD) Before renal transplantation, non-Western patients are on dialysis for a longer time than Western patients

Table 7. Continued on next page

Table 7. Continued

Reference	Country	Population	Source of data	Years covered	Main findings
Low-income countries (63–66)					
(63)	Iran (Ishafan)	268 children less than 19 y old hospitalized for CKD	Retrospective analysis of medical record data, single center experience	2001–2011	<ul style="list-style-type: none"> • Accessibility to dialysis (HD or PD) in 3/4 of cases and to renal transplantation in 1/3 of cases (mostly from nonrelated living donors)
(64)	Guatemala	1,545 patients from birth to less than 20 y seen by the Pediatric Nephrology Clinic	Registry of the only existing pediatric nephrology center (Guatemala City)	2004–2013	<ul style="list-style-type: none"> • Prevalence and incidence of ESRD are lower than in other countries and the majority of the reported cases comes from the metropolitan areas, which suggests poor access to diagnosis and disparity in access to health care
(65)	Nigeria (Enugu)	64 patients aged 5 mo to 16 y who required RRT	A 5-y observational retrospective study, single center experience	2008–2013	<ul style="list-style-type: none"> • Low accessibility rate to RRT, even lower dialysis acceptance, almost limited to PD and very poor accessibility to renal transplantation • Predominant role of financial constraints
(66)	Morocco	2,066 patients (children and adults) undergoing dialysis in 39 centers	Multicentric descriptive cross-sectional study	2012	<ul style="list-style-type: none"> • Small children considered not eligible for dialysis or transplantation and lack of financial resources to perform adequate dialysis • Children have more difficult access to RRT more than adults
Montini et al., 2015 (personal data)	Nicaragua	309 children with CKD	Prospective cohort	2005–2013	<ul style="list-style-type: none"> • Since 2001 a cooperative project between the pediatric nephrology units of Milan, Italy, and Managua guarantees the payment for the basic exams and medications, training programs for doctors and nurses, hemodialysis, living-donor transplantation, a CKD prevention program, information technology programs • Educational and social factors are determinants of health status

RRT, renal replacement treatment.

the active presence of nonmedical actors as well as of the families of the children, in order to assure continuity of care.

Inequality/ies and inequity/ies should become part of the care programs as comorbid conditions, with a decisional weight similar to that generated by a genetic/biochemical test, which modifies a specific risk profile of a child within a diagnostically homogeneous group.

The need for this translational approach must be faced with a flexibility-creativity of methods to be adapted to the expected variability of the settings of life and care. Accordingly, pediatric research should contribute through field projects which tackle the real epidemiology of the communities where inequalities and in-equity are a permanent comorbid condition. The often underlined insufficient responsiveness and/or compliance to purely medical interventions needs to be reversed into projects where collaborative, targeted, nonoccasional interventions are planned, and implemented nonmedical actors and strategies are activated.

Scientific-professional societies play a critical role, by fostering this integrated approach to chronic diseases. A post-2015 agenda must include chronic pediatric conditions as a measure of a concrete commitment to the contribution to the promotion of equity. Maps of priorities in different regions and countries should stimulate and accelerate implementation strategies.

Collaborative, pediatrician-initiated, multicentre (national, regional, international) projects in this field should be given priority in calls for medium–long-term research grants supported by public agencies, in order to integrate and balance the impact of ongoing trends which favor private initiatives. Initiatives which, by definition, carry the unfortunately risk of maintaining nonequitable policies of care.

The Sustainable Development Goals agenda (whose definition is still in progress) should be considered an important opportunity to facilitate and expand the approach to pediatric chronic diseases, representing a difficult but progressively successful cultural investment devoted to disease-related conditions in the youngest age groups.

The involvement of a critical mass of those working in the “fringes” of pediatric care is a final, essential means by which significant results can be produced; this cannot be the sole responsibility and research interest of centers of excellence.

The “evidence” supporting a choice in this direction is there. At the end of the day, pediatric research should become a protagonist even in making such evidence accessible to our future generations, who are so easily and equally marginalized in real economic and political terms.

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