From words to action: measuring health inequalities to “leave no one behind”*

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ABSTRACT Health equity is a guiding principle for public health action. Its noble purpose is to build healthier, sustainable societies that are also more just and inclusive. This is reflected in the global commitment to “leave no one behind”, expressed in the 2030 Agenda for Sustainable Development, although none of the Agenda’s 169 targets focuses on reducing health inequalities, either conceptually or quantitatively. Recognizing the urgency to go beyond words and move forward decisively in the design and implementation of pro-equity social and health policies at both the local and global levels, this special report reviews the conceptual and methodological framework for tackling health equity. Concepts and methodology are explicitly linked in a practical proposal that promotes the analytical use of subnationally disaggregated administrative data to inform decision-making in that area. This report concludes by proposing the need to institutionalize the measurement, analysis, and monitoring of social disparities in health to create effective national capacity to act on the social and environmental determinants of health and ensure accountability in the commitment to “leave no one behind” on the road to sustainable development, universal health, and social justice.

Keywords Health equity; health status disparities; social determinants of health; social theory; epidemiological measurements.

Equity in health—a state of complete absence of unjust inequalities in health opportunities for people and groups caused by historically or socially determined circumstances—is a societal value: an aspirational, virtuous quality with a central role in social decision-making, the conduct of civilized life, the identity of peoples and their institutions, and the promotion of population health (1). And this societal value is acquiring a high profile on the current political agenda, from the local to the global levels. In fact, the commitment to “leave no one behind” that is at the heart of the 2030 Agenda for Sustainable Development is, in essence, a call to social equity, which includes, of course, equity in health (2).

The fact that equity has, nowadays, become the guiding principle of health policy action seems to be the result of a dual imperative, judging by the weight of accumulating evidence. On the one hand is a moral mandate—inequity offend our sense of social justice—and, on the other, political necessity—because inequity threatens governability and democratic legitimacy (3-12). Building and strengthening institutional capacities for accountability based on the principle of equity in health—the idea of “leaving no one behind”—thus becomes a priority.

The high visibility of equity principles throughout the Sustainable Development Agenda—referenced directly in one of its 17 goals (Goal 10: Reduce inequality within and among countries)—is welcome; however, it is also at odds with the absence of conceptually or quantitatively explicit demands for a steady reduction of social health inequalities in the Agenda’s 169 targets and their more than 230 indicators (2).

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This special report reviews the conceptual and methodological framework for measuring health inequalities, and proposes that, from a practical and operational standpoint, systematic measurement—that is, monitoring social inequalities in health (both health outcomes and access to health)—is essential for advancing with equity toward sustainable development and generating credibility for the global commitment to “leave no one behind”.

CONCEPTUAL BASES OF MEASURING AND MONITORING HEALTH INEQUALITIES

The most explicit and direct conceptual and theoretical basis for measuring health inequalities is the ‘social determinants of health’ (SDH) model proposed by the Commission on Social Determinants of Health (CSDH) of the World Health Organization (WHO) in its 2008 Final Report (Figure 1) (13). This conceptual framework, in turn, is based on and inspired by a series of previous analogous models; notably, the classic ‘determinants of health’ model by Dahlgren and Whitehead (1991) (14) and the ‘social production of health’ model by Diderichsen and Hallqvist (1998) (15), which highlight the key role of historical-political context and social position in the generation, transmission, and perpetuation of inequalities in populations’ health and well-being (16). More recently, in 2018 the Commission on Equity and Health Inequalities in the Americas published an analogous conceptual framework, more in line with the Sustainable Development Goals, which highlights the environmental determinants of health—including climate change and the determinant role of cultural structures—and underscores ethnicity, ongoing colonialism, structural racism, and the role of intersectionality and human rights in opportunities for the collective enjoyment of a dignified life (17-18).

Of particular importance in the SDH conceptual model is social position, which plays a crucial explanatory role. Social position is a construct that captures a fundamental ecological characteristic of any social organization: the social gradient; i.e., the hierarchical organization of a society’s members. Social position is reflected by a number of possible representations, including income, education, occupation, gender, ethnicity, and other dimensions that are proxies for social determinants. According to the current conceptual model, social position determines the distribution of health and well-being in the population, mediated by what are termed proximate or intermediary determinants, including material circumstances, social cohesiveness, human behavior, genetic inheritance, and, notably, the organization of health systems and services at every level. In turn, social position itself is determined by what are called distal determinants—which Marmot, paraphrasing Rose (19), rightly identifies as “the causes of the causes” (13)—or structural determinants, since they appertain directly to the forces and systems of society that determine the distribution of power, wealth, resources, and prestige and that ultimately must undergo positive change to achieve the equitable, inclusive, and healthy society to which we all aspire.

Aligned with the determinants-of-health model, the axiological basis for measuring health inequalities is underpinned by the current eco-epidemiological paradigm (20-21): the set of models and values which—recognizing the presence of multiple levels of organization (from the microcellular to the macrosocial) and their complex web of multi-causal interaction—form a coherent structure for understanding and explaining observable reality and provide a rationale for the public health policies and interventions proposed to improve this observed reality, going beyond the obsolete paradigm of risk factors, centered exclusively on a single level: the individual (and very often, on a single attribute—human behavior—and therefore, on a single intervention: behavioral change). A more detailed review of the axiological and epistemological issues related to measuring health inequalities can be consulted in the references section (22).

In order to conceptualize the measurement of health inequalities, at least five other supporting arguments must be taken

![FIGURE 1. Conceptual model of the social determinants of health](source: compiled by the authors, based on references 13 and 16.)
into account. One is that the concepts of “health inequalities” and “social determinants of health” are inextricably linked; that is, they are inseparable. As highlighted by the Final Report of the CSDH, health inequalities can only be eliminated through action on the social determinants of health (13, 17). Expressed conversely, the population impact of any action on the social determinants of health (by definition, intersectoral action) can only be gauged by finding a non-trivial reduction in health inequalities.

Secondly, consistent with the social production of health model and the SDH conceptual framework, health inequalities are a consequence or effect of social inequalities; in other words, all health inequalities (or the ones important for public health) are social inequalities in health.

Thirdly, it is not possible to measure inequities in health with scientific rigor (i.e., with an assurance of validity and replicability); it is only possible to measure health inequalities. Specifically, health inequalities are defined as observable differences in health between two or more socially determined groups. These differences can be objectively measured based on the simple and unambiguous observation of relevant data (for example, infant mortality is higher in poor children than in rich children). Inequities in health, on the other hand, are not measurable; they are judged. More specifically, inequities in health are based on an ethical judgment regarding observed health inequalities. Therefore, in order to determine whether an observed health inequality constitutes a health inequity, it must be judged as unjust—a subjective assessment that identifies the situation as arbitrary, unnecessary, and avoidable (for example, is it fair that infant mortality is higher in poor children than in rich children?) (23).

A fourth argument, related to the previous one, concerns the intrinsic impossibility of normatively pre-establishing a gold standard or predefined threshold for what is inequitable: It is up to each society and each historic moment to define which kinds of health inequality constitute an affront to its collective sense of social justice and, consequently, to qualify them as representing inequity in health. Such choices on the part of a society are mediated by its particular level of aversion to inequality, an important latent attribute that is also historically determined.

Finally, the fifth argument that we consider important to present here regards action: identifying inequity in health (which, as there has been explained, is an act of moral assessment) should necessarily be accompanied, under the same moral imperative, by a committed decision to take action on that inequity in health, and to remedy the unjust situation. Denouncing inequity should thus generate political incidence for equity and social justice.

**METHODOLOGICAL BASES OF MEASURING AND MONITORING HEALTH INEQUALITIES**

As in every scientific proposal, the methodological-analytical foundation of health inequality measuring and monitoring flows out of—and is subject to—a conceptual model: the SDH framework, which, as has been shown, is a multilevel causal model whose central characteristic is social position as a determinant of the distribution of population health and well-being.

Essentially, the basic methodological approach encompasses two simple steps: 1) comparing the state of health of two or more socially defined population groups; and 2) expressing that comparison in a specific, standard, summary metric of health inequality. This summary metric can either express a gap (the difference between two and only two social groups, usually extreme opposites) or a gradient (the magnitude of health inequality across the entire social hierarchy), and can either be absolute (expressed in the same units of the state of health variable) or relative (dimensionless, indicating only disproportionality).

From a more operational standpoint, the methodological approach can be expanded to three basic steps based on a set of available data. The data set can comprise ecologically aggregated data or can be an individual database. These data necessarily have to capture three basic dimensions: social, demographic, and health. The social variable—the proxy social determinant—will be used to reproduce social hierarchy in the analysis; the demographic variable, to capture the size of social position groups (population weighting); and the health variable, to analyze its distributive inequality in the population. The three instrumental steps are to: 1) reproduce the social hierarchy, creating a scale of relative social position; 2) analyze the distribution of health on this social position scale; and 3) summarize this analysis of the distribution of health on that social gradient by calculating standard metrics of health inequality, as appropriate. Note that, like the conceptual model, the methodological model’s start point is social position. This centrality of the social position to explain and quantify the production of inequality in population health cannot be ignored.

Figure 2 summarizes these three central elements in the conceptualization of the analytical approach to measuring health inequalities. Everything stems from social position: The hierarchy or social gradient is constructed by using the available social variable to rank the data panel from the position of greatest social disadvantage to that of least disadvantage. This is why the social variable (the proxy social determinant) is called the equity stratifier. WHO/PAHO has proposed an acronym to evoke the range of possible equity stratifiers: PROGRESS, described in Figure 2 (24). This completes the first of the three steps.

There are three options for analyzing the distribution of health on this social position scale (the second step), which are by no means mutually exclusive. The first is to opt for abridging the social distribution into quantiles (usually quintiles) and calculating the magnitude of the health indicator (i.e., the weighted average) for each of the social position groups thus created (the quintiles). Alternatively, analysts could adopt their own classification of categorical or nominal social variables (those having no inherent pre-established order) such as, for instance, identity stratifiers like ethnicity, gender, sexual orientation, or territory. Then again, they could use the unabridged distribution, in which case they would have another two options for analyzing health distribution on the social gradient: One is to use statistical regression techniques to model the absolute health gradient; the other is to create a curve of the concentration or distribution of disproportionality between social position and burden of disease (analogous to the Lorenz curve, which is very popular in econometrics for estimating income inequality with the Gini coefficient). These last two options are methodologically more sophisticated, and also more precise—a very important attribute when monitoring.

The third and last step—to summarize health inequality with a standard metric—flows from the analytical path followed in the previous step. When working with quantiles, the Kuznets
Special report Mújica et al. • Monitoring inequalities in health in the 2030 Agenda

FIGURE 2. Analytical basis for the measurement of health inequalities

1. Quintile partition: Absolute and relative Kuznets indices (absolute and relative health inequality gaps)
2. Regression lines: Slope index of inequality (absolute health inequality gradient)
3. Concentration curves: Health inequality concentration index (relative health inequality gradient)

Source: prepared by the authors.

indices are calculated, i.e. the absolute health inequality gap and the relative health inequality gap, which are, respectively, the arithmetic difference and the ratio of the values of the health indicator corresponding to the extreme quantiles (e.g., the lower and upper quintiles) of the abridged social distribution (omitting information on the median quantiles). By running a regression of health rates on social position, the slope index of inequality (SII) or angular index of inequality is calculated, which measures the steepness of the regression line and, as such, expresses the magnitude of health inequality associated with the existing social inequality in the same units as the health variable (e.g., excess mortality or lack of coverage). A regression of this type—a very powerful statistical technique—should be able to capture two ubiquitous phenomena in the analysis of social inequalities in health: one is heteroscedasticity, the lack of homogeneity of variance (i.e., non-constant variance), inherent to the different population sizes of the social groups. The other is asymptoticity, or lack of linearity in the relationship between health and social factors (especially income), which reflects the ubiquitous law of diminishing returns or marginal utility. This is resolved by including two necessary methodological sophistications: a weighted least squares regression, and an asymptotic (logarithmic-exponential) transformation of the data, as appropriate. In the context of monitoring, progress towards equity is assessed with a diagonalization of the concentration curve (i.e., when the CI tends toward zero). The last two cases invoke the principle of statistical efficiency, which calls to use all the available data upon computing a summary metric.

The proposed analytical approach, with the three instrumental steps described, consists of: 1) generating a scale of relative social position; 2) analyzing the distribution of health as it relates to social position; and 3) summarizing this analysis by calculating standard metrics of health inequality. This approach has been implemented in the PAHO Equity Explorer (EqEx), a computational tool based on MS Excel (25), and a detailed description of the method is available in an illustrated step-by-step guide (26).

Figure 3 shows an example—using real data—that applies these concepts to measuring inequalities in infant mortality on a social gradient defined by the unmet basic needs (UBN) index among the 94 municipalities (out of 125) in the Department of Antioquia, Colombia, that registered deaths of children under 1 year old in 2015. This analysis is based on administrative data in the public domain compiled in the Social Protection Comprehensive Information System (known by its Spanish acronym: SISPRO) and extracted by the Observatory for Health Inequality Measurement and Equity Analysis (ODES) of the Ministry of Health and Social Protection (MSPS) of Colombia (27).

In the Department of Antioquia, at the end of the Millennium Development Goals (MDG) period in 2015, notable inequalities...
FIGURE 3. Inequalities in infant mortality in the intermunicipal gradient defined by satisfaction of basic needs. Department of Antioquia, Colombia; 2015

Social gradient of health inequality

Population gradient by UBN

Kuznets absolute gap: 5.75 [5.11, 6.40]
Kuznets relative gap: 1.75 [1.94, 1.88]
Slope index of inequality: -9.42 [-13.32, -5.52]
Health inequality concentration index: -14.3 [-18.0, -10.6]

Note: computed by the authors, based on references 26 and 24.
were found in infant survival (MDG 4) among the 94 municipalities, according to their UBN levels. Between the quintiles of municipalities having the highest and lowest UBN there was an excess mortality equivalent to nearly 6 (5.75) infant deaths per every 1,000 live births (the absolute health inequality gap). The risk of dying for children in the quintile of municipalities with the highest UBN was almost twice (1.75 times) as high as in the quintile of municipalities with the lowest UBN (the relative health inequality gap). If the entire social gradient, as defined by the UBN, is taken into account (that is, all of the municipalities and not only those from the extreme quintiles) and, in addition, the size of each municipality’s population of live births is considered, the regression analysis shows a pattern of inequality congruent with marginal exclusion (of the quintile with the highest UBN) and a more intense excess of mortality: nearly 6 (5.75) infant deaths per every 1,000 live births (the absolute health inequality gap). In the conceptualization of the analytical approach to measuring social health inequalities, the process of identifying strategic interventions to advance equity in health, and for monitoring the impact that ongoing population health interventions can have (or not have). Although the process of monitoring social health inequalities is known to be complex and not very intuitive—and, for this reason, the creation, consolidation, and support of institutional analytical capabilities for their development to generate pro-equity policies is also difficult—there is a growing social demand, as well as a growing institutional commitment, to effectively mitigate the profound social inequities in health that, unfortunately, characterize the Region of the Americas (12). Furthermore, clearly there is now a healthy conceptual, methodological, and even instrumental consensus (thanks to the available computing power) on how to measure and, in general, how to approach health inequalities (24-26, 28-31), and as a recognition of the subjectivity implicit in the very process of quantifying inequalities (32).

In conclusion, the measurement of health inequalities has its axiological basis in the social determinants of health multilevel model and the eco-epidemiological paradigm. It is essential to recognize the social production of health inequities to redeem the primacy of equity as a societal value and as a guiding principle of health policy action. This recognition is even more important in order to generate accountability regarding the commitment to leave no one behind on the road to sustainable development and universal health. This commitment demands developing professional competencies and institutional capacities to measure and analyze social inequalities in health; institutionalizing the monitoring of health inequalities as a sovereign exercise of the first essential public health function (i.e., health situation assessment); and generating (both at the sectoral and intersectoral levels) pro-equity political incidence...
such as, for instance, the virtuous transformation of resource allocation towards health equity and social justice.

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De la retórica a la acción: medir desigualdades en salud para “no dejar a nadie atrás”

RESUMEN

La equidad en salud es un principio rector de la acción en salud pública –cuyo noble propósito es construir sociedades más saludables y sostenibles y, al mismo tiempo, más justas e inclusivas. Ello se refleja en el compromiso mundial por ‘no dejar a nadie atrás’ que preside la Agenda 2030 para el desarrollo sostenible, aunque en ninguna de sus 169 metas se establezca ni conceptual ni cuantitativamente la reducción de desigualdades en salud. Reconociendo la urgencia de trascender la retórica y avanzar consecuentemente en la formulación y puesta en marcha de políticas sociales y de salud pro-equitativas –de lo local a lo global–, en este informe especial se revisan las bases conceptuales y metodológicas para el abordaje de la equidad en salud, se vinculan explícitamente en una propuesta instrumental y práctica que promueve el uso analítico de los datos administrativos disponibles desagregados subnacionalmente para informar la toma de decisiones en esa dirección, y se concluye planteando la necesidad de institucionalizar la medición, análisis y monitoreo de las desigualdades sociales en salud para crear efectivamente capacidades nacionales para actuar sobre los determinantes sociales y ambientales de la salud y rendir cuentas sobre el compromiso de no dejar a nadie atrás en el camino hacia el desarrollo sostenible, la salud universal y la justicia social.

Palabras clave

Equidad en salud; disparidades en el estado de salud; determinantes sociales de la salud; teoría social; mediciones epidemiológicas.

Da retórica à ação: mensurar as desigualdades em saúde para “não deixar ninguém atrás”

RESUMO

A equidade em saúde é um princípio norteador da ação em saúde pública cujo propósito nobre é edificar sociedades mais saudáveis e sustentáveis e, ao mesmo tempo, mais justas e inclusivas. Isso está refletido no compromisso mundial de “não deixar ninguém atrás” que guia a Agenda 2030 para o Desenvolvimento Sustentável, apesar de nenhuma das 169 metas estabelecer de forma conceitual ou quantitativa a redução das desigualdades em saúde. Reconhecendo a urgência de transcender a retórica e avançar na formulação e implementação de políticas sociais e de saúde pró-equitativas do nível local ao global, são revistas as bases conceituais e metodológicas para a abordagem da equidade em saúde, vinculadas explicitamente em uma proposta instrumental e prática que promove o uso analítico dos dados administrativos disponíveis desagregados ao nível subnacional para subsidiar a tomada de decisão. Em conclusão, faz-se necessário institucionalizar a mensuração, análise e monitoramento das desigualdades sociais em saúde para efetivamente estabelecer capacidades nacionais para atuar nos determinantes sociais e ambientais da saúde e prestar contas quanto ao compromisso de não deixar ninguém atrás no rumo ao desenvolvimento sustentável, saúde universal e justiça social.

Palavras-chave

Equidade em saúde; disparidades nos níveis de saúde; determinantes sociais da saúde; teoria social; medições em epidemiologia.