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Equity in water and sanitation: Developing an index to measure progressive realization of the human right

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ABSTRACT

We developed an index to measure progressive realization for the human right to water and sanitation. While in this study we demonstrate its application to the non-discrimination and equality component for water, the conceptual approach of the index can be used for all the different components of the human right. The index was composed of one structural, one process, and two outcome indicators and is bound between −1 and 1, where negative values indicate regression and positive values indicate progressive realization. For individual structural and process indicators, only discrete values such as −1, −0.5, 0, 0.5, and 1 were allowed. For the outcome indicators, any value between −1 and 1 was possible, and a State's progress was evaluated using *rates of change*. To create an index that would allow for fair comparisons between States and across time, these rates of change were compared to *benchmarked rates*, which reflect the maximum rates a State can achieve. Using this approach, we calculated the index score for 56 States in 2010 for which adequate data were available and demonstrated that these index scores were not dependent on factors such as achieved level of coverage or gross national income. The proposed index differs from existing measures of inequality as it measures rate of change and not level of achievement, and thus addresses the principle of progressive realization that is fundamental to human rights.

Introduction

The United Nations General Assembly and United Nations Human Rights Council adopted resolutions in 2010 recognizing water and sanitation as a single human right (United Nations General Assembly, 2010a,b). As a result, States are responsible and legally accountable to use the maximum resources available to ensure that universal access to "sufficient, safe, acceptable, physically accessible and affordable water" is progressively realized for all, without discrimination, as outlined in the United Nations Committee on Economic, Social and Cultural Rights General Comment No. 15: The Right to Water (CESCR, 2003). Existing indicators (United Nations, 2008; Roaf et al., 2005) focus on monitoring State implementation of, and compliance with, this human right, and can be used to identify deficiencies that need to be resolved. While in general, these indicators measure the *level* to which water-related goals are fulfilled (e.g. the proportion of the population with access to improved water), in the context of human rights, a State's compliance with the right to water is not determined by the *level of achievement* of water-related goals. Rather, a key concept in the human rights framework is the principle of *progressive realization* (CESCR, 2003), which is drawn from the International Covenant on Economic, Social and Cultural Rights (United Nations General Assembly, 1966). This principle recognizes that States may be constrained by prior conditions and resources available, and therefore compliance is attained when a State shows that it has "taken steps", or made progress, towards realizing universal access (CESCR, 1990; Sepulveda, 2003). The importance of the principle of progressive realization was re-affirmed by the international community in the recent Rio 20+United Nations Conference on Sustainable Development with the declaration "We commit to the progressive realization of access to safe and affordable drinking water and basic sanitation for all, as necessary for poverty eradication, women's empowerment and to protect human health . . ." (United Nations General Assembly, 2012). Accordingly, to assess progress, indicators need to reflect *rates of change* and not simply levels of attainment. These rates of change then need to be compared to *benchmarked rates* to provide a dimensionless index for fair comparison.

Within the human right to water, several dimensions must be considered. From General Comment 15 (CESCR, 2003), the adequacy of water needs to be addressed through examination of the availability, accessibility, quality, and affordability of water. However, from the perspective of a human rights-based approach, one must also consider dimensions such as equality and non-discrimination, accountability, and participation. A State's progress

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should be assessed in all dimensions of the right to water. In this study, we focus on equality and non-discrimination as the sample dimension upon which the methodology is developed. Equality and non-discrimination was chosen as the focus of this study because these concepts are fundamental principles of human rights, with General Comment 15 specifically prohibiting "discrimination on the grounds of race, colour, sex, age, language, religion, political or health status . . ." (CESCR, 2003), among other axes of difference. The focus on inequality is also the result of observed inequalities in access to safe water within and across States. As an example, the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) Joint Monitoring Programme (JMP) for Water Supply and Sanitation reported that, as of 2010, for 35 countries representing 84% of the population in sub-Saharan Africa, 89% as compared to 35% of the richest and poorest wealth quintiles, respectively, had access to an improved water source (JMP, 2012a).

Indices within the water and sanitation field to measure inequality include the Concentration Index (Cullis and van Koppen, 2007; Kirigia and Kirigia, 2007; PAHO, 2007; Wang et al., 2012), which is based on the Lorenz Curve and measures inequality in the distribution of safe water and sanitation access, and the recently proposed Index of Equality Betterment (Satterthwaite, 2012a), which measures the total improvement needed to achieve equality. While both the Concentration Index and the Index of Equality Betterment describe existing inequalities, neither index measures rate of change, thus neither index addresses the principle of progressive realization. Recently, rates of change have been proposed as a tool to measure progress, with Fukuda-Parr and Greenstein (2010) presenting a methodology comparing the rate of change of target indicators in periods before and after the adoption of the Millennium Development Goals. Gap Analyses measures using rates of change have also been suggested by Satterthwaite (2012a) to provide information on the general trends of each country. However, neither of these proposed methodologies allows the progress made by each State to be compared against each other and across time.

Accordingly, the general objective of this study was to develop a methodology to quantify a State's progressive realization of the human right to water. We used the equality and non-discrimination component for water to develop a methodology which can be applied to other components of the right to water and sanitation and we used indicators that assessed both a State's achievement of human rights obligations that have an immediate nature (e.g. the obligation to take immediate action; the obligation not to discriminate) and a State's progress towards achieving equitable access. The specific objectives of this work were to: (1) identify indicators for which there are existing global data sets that measure State efforts and outcomes relevant to the non-discrimination and equality component of the right to water; (2) assess rates of change for selected indicators; (3) define the benchmark against which the State's progress will be compared; and (4) synthesize an overall index that will allow for comparison of progressive realization across time and among States.

Materials and methods

Definition of equality

In this study, we define equality as the absence of disparities in the access to improved water between, but not limited to, urban and rural residency, wealth quintiles, gender, ethnicity, religion, health status, and sexual orientation. Specifically, we use the concept of substantive equality and not formal equality. Substantive equality does not mean that all persons receive equal treatment; rather, States are required to treat vulnerable and marginalized groups differently to ensure an equitable outcome (Satterthwaite, 2012b). "Affirmative action" and the re-distribution of resources are sometimes necessary to address those who are indirectly discriminated against (Satterthwaite, 2012b). This differs from formal equality, in which all persons are treated the same, and thus is unable to adequately address situations of indirect discrimination. While substantive equality is sometimes used interchangeably with the term 'equity' in the field of water, sanitation, and hygiene, of these two terms, substantive equality is the only human rights concept reflected in human rights treaties. In the development of our methodology to assess State progress, we propose an equity index (see below, Conceptual approach to constructing the equity index), with the understanding that the term "equity" refers to substantive equality.

Data sources

Data on the proportion of rural and urban populations with access to improved water and on the proportion of the total population with access to an improved source and to a piped connection were obtained from JMP Country Files (JMP, 2012b). JMP Country Files compile water and sanitation-related information derived from nationally representative surveys including the Demographic and Health Survey (DHS), Multiple Indicator Cluster Surveys (MICS), Living Standards Measurement Study (LSMS), and World Health Survey (WHS), as well as national census data. In addition, we accessed household recoded survey data from DHS (DHS, 2012) to calculate the proportion of each wealth quintile with access to improved water. The 2012 Global Annual Assessment of Sanitation and Drinking-Water (GLAAS, (WHO, 2012)) provided data for 74 developing countries on the percentage of the drinking water budget targeted to the poor as well as on drinking water policies or strategies.

Calculation of improved water access by wealth quintiles

DHS surveys provide information at the household level on drinking water source type, rural or urban location, and classify households into wealth quintiles based on ownership of specific assets (DHS, 2012). We calculated the proportion of the population in each rural and urban wealth quintile with access to each water source type using STATA 12 (Stata Corp., College Station, TX) and *svy* commands to account for survey stratification, clustering, and sampling weights. Within each rural and urban wealth quintile, the proportion of the population with access to improved water was calculated by taking the sum of the proportions of the water source types categorized as improved by JMP. An improved water source is defined as public tap, standpipe, tubewell, borehole, protected dug well, protected spring, rainwater, and piped water into dwelling, yard, or plot (JMP, 2012a). We considered open wells and semi-protected wells to be unimproved source types as they are not protected from outside contamination.

Conceptual approach to constructing the equity index

The Equity Index (EI) provides a single value between −1 and 1 which evaluates a State's progress in realizing substantive equality for the right to water. The index itself is the uniformly-weighted average of three components: Structural Index (SI), Process Index (PI), and Outcome Index (OI), as given by:

$$\text{Equity Index (EI)} = \frac{1}{3}\text{SI} + \frac{1}{3}\text{PI} + \frac{1}{3}\text{OI}, \quad (1)$$

where the Structural Index is the average of structural indicator indices ('SIN's), the Process Index is the average of process indicator indices ('PIN's), and the Outcome Index is the average of outcome indicator indices ('OIN's).