39th WEDC International Conference, Kumasi, Ghana, 2016

ENSURING AVAILABILITY AND SUSTAINABLE MANAGEMENT
OF WATER AND SANITATION FOR ALL

Revisiting MDGs in view of accessibility with particular attention to distance: examples in Eastern Africa

A. Cassivi, E.O.D. Waygood & C.C. Dorea (Canada)

BRIEFING PAPER 2502

Data from WHO and UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation show that 91% of the worldwide population have access to an improved source of water in 2015. However, this indicator does not reflect the definition of water access considering distance to the source. This is an important factor to take into account considering that 42.5% of the world population don't have access to water on their premises in 2015. This study examined accessibility data from the JMP by taking distance into account for 5 Eastern African countries. As reported by JMP, 72,6% of these countries population have access to an improved water source while our analysis revealed that this figure falls to 58,5 % when considering distance in the access criterion. To achieve universal and equitable access to safe and affordable drinking water for all, as desired in the new Sustainable Development Goals, this impact must be considered to ensure reasonable access to water.

Introduction and background

Year 2015 marks the end of the Millennium Development Goals (MDG) established in 2000 and the start of the Sustainable Development Goals (SDG) that will extend until 2030. Target 7C of the MDG was to halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation. The target was said to be met as the proportion of the world population with access to water was reported to have increased from 76% to 91%. However, this may only be true if the time to acquire the water is ignored. Considering that the definition of access to water by the WHO and UNICEF Joint Monitoring Programme (JMP) includes measures of quality, quantity, and distance, the question remains what the percentage of the population with access to water would be if a more holistic measure (e.g. quality and distance) were used.

Following the previous objective (7C of the MDG), the SDG target is: By 2030, achieve universal and equitable access to safe and affordable drinking water for all. If one considers safe to be an improved water source, and affordable to relate to the time costs of accessing the water, it is clear that this goal requires the data to be analysed with respect to those two components, and not solely the first (improved water sources).

WHO and UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation ensures the follow-up of progress towards the established goals. According to their definition, access to safe drinking water must respond a few characteristics: the source must be at less than 1 kilometre from the home, it must be possible to get at least 20 litres per persons per day and it must meet the guideline for drinking water quality (WHO, 2003). In spite of this definition, the indicator chosen to measure access to water by WHO and UNICEF was the proportion of the population using an improved drinking water source. Thus, only quality is being taken into consideration, while quantity and distance or time are ignored. To measure the progress towards the goal 7C, JMP uses household datasets from the UNICEF Multiple Indicator Cluster Surveys and USAID Demographic and Health Surveys program that contain in particular the proportion of the population using improved water sources but also other variables related to water such as: the time needed to fetch water, which usually makes the trip, the location of the source, the availability of water and technologies used to ensure water quality. Despite the availability of such information, the indicator chosen

to measure the progress towards the MDG goal 7C did not include the time to the water source nor the quantity of water consumed per day per person, but only if the water was an improved source. Moreover, as suggest by Bain et al. (2012) the quality of the source is not even assured in an improved water source. Consequently, one could suggest that the indicator does not reflect the definition of access to water provide by the JMP. This is reflected in Dar and Khan's article (2011), where it was argued that the target was inadequately defined and measured.

Considering that 42.5% of the world population do not have access to water on premises, we are particularly concerned by this large segment of the population who must fetch water for their survival. By applying concepts from transportation modelling to issues surrounding distance to source and water quantity we can assess the influence of these components on drinking water accessibility.

Objective

The objective of this study was to estimate the progress in water accessibility by taking the distance into consideration.

Methodology

Data from the UNICEF Multiple Indicator Cluster Surveys and the USAID Demographic and Health Surveys program were used. These surveys contained different questions, but only the household data were selected because that is the unit used to measure the target by JMP. Data from these surveys are representative and available for over 90 countries worldwide, mostly developing countries. Here the last available country datasets of five Eastern Africa countries were studied at the national scale : Burundi (2010), Comoros (2012), Ethiopia (2011), Kenya (2009) and Uganda (2011). Through this research, IBM SPSS Statistics version 23 was used to conduct statistical analysis for different variables. In a way to estimate the progress in water accessibility with the distance, models were created with this data. To ensure realistic comparison, JMP official data were used (JMP, 2015).

Results and discussion

The target 7C of the Millennium Development Goals was said to have been met at the world scale in 2015 (ONU, 2015). However, the target was not met in every country, and particularly not in African countries. Indeed, only 23% of East African countries achieved the target to halve the proportion of the population with access to an improved water source (Ethiopia, Malawi and Uganda). Among East African countries, 63.2% of the population had access to an improved water source in 2015 against 38.2% in 1990. Despite this progress, if we consider water accessibility, the proportion of the population who gained access to an improved water source on premises is less impressive with 12.1% in 2015 against 7% in 1990 (ONU, 2015). Accordingly, in 2015, 87.9% of the population of East Africa needed to fetch water, whether they used an improved source or not. The types of source of water used by five African countries are shown in Figure 1.

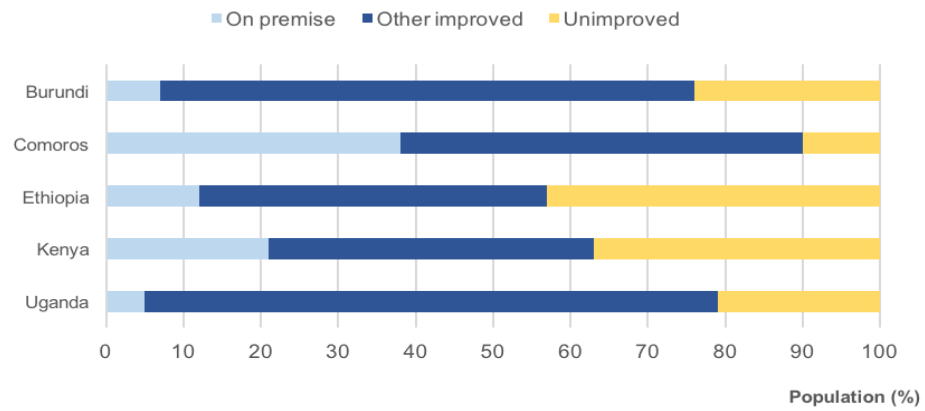

Figure 1. Proportion of the population using an improved drinking water source.

Data source: JMP 2015

Time lost

By taking into consideration only the households needing to fetch water, the results shown in Figure 2 present the duration of time reported for accessing water in Burundi, Comoros, Ethiopia, Kenya and Uganda. Three of these countries (Ethiopia, Kenya, Uganda) had a median time of 30 minutes for the water-fetching trip. That is important as, according to the JMP definition of access to water, the source must be situated at less than 1 km from home. At a walking speed of 4 km/hour, a 2 km round trip, without queuing at the tap, could be made within 30 minutes. As queuing time data is not available, we assumed that round-trips at 30 minutes or less would be considered "accessible" by JMP's definition. Therefore, for these three countries, 50% of the population still lack an accessible water source. For the other countries (Burundi and Comoros), the medians of the distribution are respectively 25 minutes and 20 minutes. As shown in Figure 2, the quartiles represent the distribution of the population with respect to the time required to fetch water. We can note that, for two countries (Ethiopia and Uganda), the last quartile starts at 60 minutes, which means that ¼ (25%) of the population still need more than 1 hour to get water.

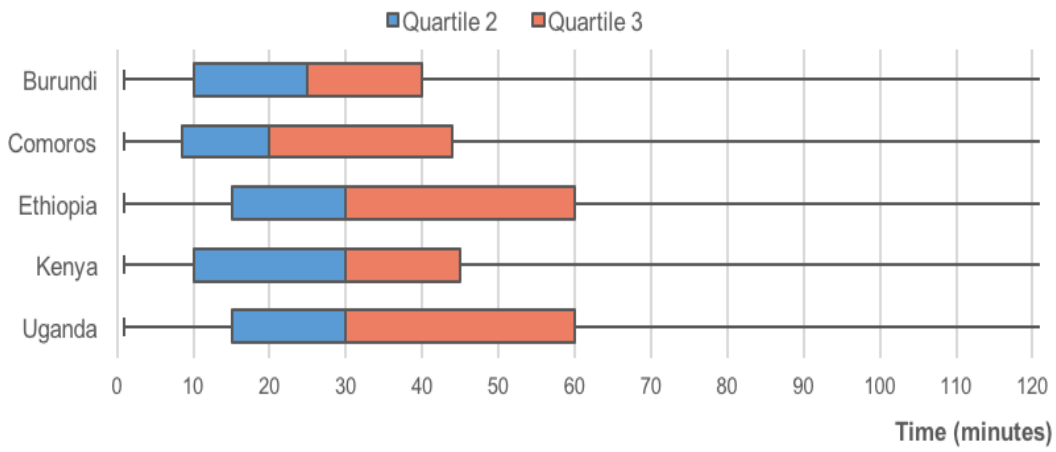

Figure 2. Time to get water (round-trip)

Data source: JMP 2015

Likewise, Cairncross (1999) suggest that when the water source is located farther than a 30 minutes round-trip, the quantity of water consumed would decrease with the time increment. According to the JMP definition of access to water, each household member should have at least 20L per day for drinking, cooking and personal hygiene. This, distance is an important factor to estimate the quantity of water possibly consumed. To ensure a realistic representation of the drinking water situation around the world, it's necessary to take the distance to the source into consideration. Indeed, time costs and energy expenditure are associated to the task of fetching water and as the current Sustainable Development Goals for 2030 specifically mention affordability, this concept must be taken into account. Indeed, trips to the water source, often done by women or children, constitutes time lost at the expense of other activities and also a cost that call into question the affordability of water.

As shown by Devi and Bostoen (2009), adding the quantity and the distance to the type of source in the same indicator to measured progress leads to a decrease of the proportion of the population with access to water. Effectively, adding the 30 minutes round-trip distance to the proportion of the population using an improved water source results in a major change in the progress of the Millennium Development Goals. By taking distance into account in the measure of water accessibility, the result shows an overestimation of the proportion of the population with access to water. The figure 3 expose the proportion of the population with access to an improved water source compared to the proportion of the population with access to an improved water source within 30 minutes of the house. First, the proportion of access to improved water according to JMP (2015) was compared with our estimations (model 1) and after they both were compared with the access to improved sources within 30 minutes. Model 1 corresponds to the proportion of the population with access to an improved water source recalculated with the survey available. The results may differ from the proportions published by JMP in 2015, as they extrapolated the last available data. This model was made to

ensure a realistic base for model 2 which represent the population with access to an improved source within 30 minutes. Thus, these two models could be analysed and compared together.

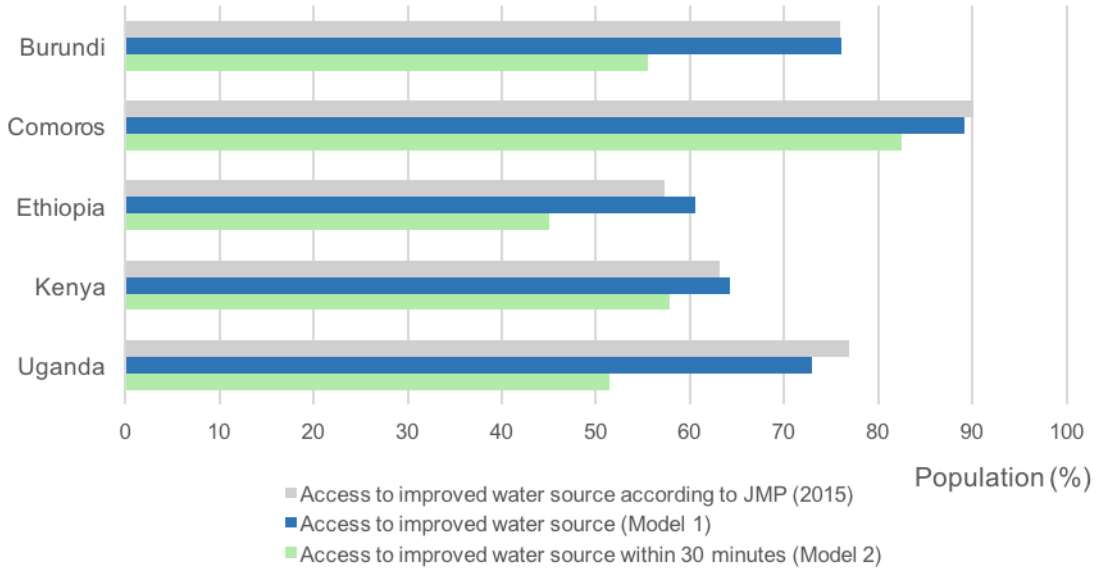

Figure 3. Impact of the distance on access to water

Data source: DHS Program - USAID

The indicator choice clearly influenced the proportion of the population with access to water. For these five countries, the mean coverage for the proportion of people with access to an improved source is 72,6% (JMP 2015 and Model 1). By adding the 30 minutes distance component, the proportion of this population with access to water decreased to 58,7%. Each country comparison of accessibility confirmed the resulting overestimation related to the indicator used to measure the progress of the Millennium Development Goals. The biggest difference in the proportion is seen in Uganda with an overestimation of 21,4%. Of course, the proportion of the population with access to an improved water source was also used to count the starting coverage of access to water. The use of this indicator therefore reflects the overall coverage of access to water. Thus, to ensure a representative achievement of the actual definition of access to water the indicator must be changed and the data recalculated since the beginning.

Conclusion

Despite the importance of distance and water quantity on life quality, these factors aren't taken into consideration in the indicator used to measure the progress of the Millennium Development Goals. Moreover, it seems that this indicator does not represent the definition of access to water given by WHO and UNICEF Joint Monitoring Programme. The cost of time lost for this task is noteworthy and must be included in the indicator to ensure universal accessibility to water in the next decades. Furthermore, the quantity of water should also be considered in the indicator. The challenge facing the new Sustainable Development Goals is to address this problem. It is not enough to add "improved" sources countries to ensure a water access, access to a sufficient quantity of water at appropriate distances from their residence must also be considered.

Acknowledgements

The authors would like to thank Institut Hydro-Québec en environnement, développement et société (Institut EDS) for their financial support.

References

DAR, O.A. and KHAN, S.K. 2011 *Millennium development goals and the water target: details, definitions and debate.* Tropical Medicine and International Health Vol 16, No 5, pp.540-544.

DEVI, A. and BOSTOEN, K. 2009 *Extending the critical aspects of the water access indicator using East Africa as an example.* International Journal of Environmental Health Research Vol 19, No 5, pp.329-341.

CAIRNCROSS, Sandy 1999 *Trachoma & Water.* Community Eye Health Vol 12, No 32, p.58-59.

JAMES, W.P.T. and SCHOFIELD, E.C. 1990 *Human energy requirements. A manual for Planners and Nutritionists.* Oxford University Press: New-York.

SOULE, R.S. and GOLDMAN, R.F. 1972 *Terrain coefficients for energy cost prediction.* Journal of Applied Physiology Vol 32, No 5, pp.706-708.

ONU 2015 *Objectifs du Millénaire pour le développement: Rapport 2015.* Organisation des Nations Unies. Département des affaires économiques et sociales de l'ONU.

WHO 2003 *Domestic Water Quantity, Service Level and Health.* World Health Organization. WHO Document Production Services: Geneva.

JMP 2015 WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation. www.wssinfo.org

WHITE, Gilbert F., BRADLEY, David J. and White, Anne U. 1972 *Drawers of Water. Domestic Water Use in East Africa.* The University of Chicago Press: Chicago and London.

Contact details

Alexandra Cassivi
École supérieure d'aménagement du territoire et de développement régional
Université Laval, Québec, QC, Canada
Tel: +1 418 803 9591
Email: alexandra.cassivi.1@ulaval.ca

Caetano C. Dorea
Département de génie civil et de génie des eaux
Université Laval, Québec, QC, Canada
Tel: +1 418 656 7763
Email: caetano.dorea@gci.ulaval.ca
www.gci.ulaval.ca/caetanodorea

E. Owen D. Waygood
École supérieure d'aménagement du territoire et de développement régional
Université Laval, Québec, QC, Canada
Tel: +1 418 656 2131 p.3740
Email: owen.waygood@esad.ulaval.ca
www.esad.ulaval.ca/personnel/professeurs/owen-waygood.html