Scaling up improved access to clean water in Africa

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Introduction

In September 2015, heads of state from all around the world adopted the 2030 Agenda for Sustainable Development, an ambitious plan of action for "people, planet and prosperity", with 17 Sustainable Development Goals (SDGs) and 169 targets. Drinking-water, sanitation and hygiene are covered in SDG6 targets 6.1 and 6.2, as well as in other SDGs covering disaster risk reduction, education, health, nutrition, poverty and gender. Recognizing the basis of drinking-water for human survival as well as all its many health and socio-economic benefits (Hutton, 2012), target 6.1 for drinking-water states "By 2030, achieve universal and equitable access to safe and affordable drinking water for all".

In transitioning from the Millennium Development Goals to the SDGs, different rungs on the water service ladder should be noted. First, the new term 'basic' drinking-water refers to an improved water source (as per MDG water indicator), provided collection time is not more than 30 minutes for a round trip, including queuing. Hence, especially in Africa where 17% of rural households source their water from greater than 30 minutes roundtrip (a much higher proportion than other regions), the achievement of the 'basic' water service level already represents a challenge for the African continent. Note also that the 'basic' water service level is monitored as part of the poverty SDG, indicator 1.4.1, as well as the target service level for schools (indicator 4.a.1) and healthcare facilities. Second, the indicator for Target 6.1 is the "Proportion of population using safely managed drinking water services". 'Safely managed drinking water' is defined as "From an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination". Hence, this service level for water is significantly higher than the 'basic' water service level, and an even greater challenge for the African continent.

The latest report of the WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply, Sanitation and Hygiene (2019) shows Africa to be trailing other regions in terms of access to safely managed water supply (27%) and basic water (61%). The report also notes the very significant inequalities, with rural areas (45%) having roughly half the coverage of urban areas (84%) for basic water supply, and other sub-national inequalities by region or by province. Recent JMP reports for schools (2018) and healthcare facilities (2019) show that major challenges remain in institutional access to water in sub-Saharan Africa, with only 51% of healthcare facilities with at least basic water and 47% of schools without basic water access.

The aim of this paper is to present updated cost-benefit numbers for achieving universal access drinking-water supply to African households from 2018 to 2030, to enable comparison of drinking-water with other development interventions included in the Copenhagen Consensus Center's Africa initiative. Access is defined as what water source is actually used by households. The analysis focuses on basic drinking-water as defined by WHO/UNICEF in the Joint Monitoring Programme's latest biennial report (WHO/UNICEF 2019). This is partly due to the lack of coverage data on the 'safely managed' service level, but also, from an equity perspective, the presentation of cost and cost-benefit results for 'basic' access brings greater attention to those being left behind and focuses policy makers' and financiers' attention on achieving basic access for all.

Methods

Global costing and cost-benefit studies have previously estimated the costs of achieving the SDG targets 6.1 and 6.2 (Hutton and Varughese

[53] The previous reports (Hutton 2015, 2018, Hutton and Varughese, 2016) this study draws on were based on work done while the author was employed by the World Bank.

2016) and the economic returns of water supply (Hutton and Haller 2004, Hutton 2012, 2015, 2018, Whittington et al 2008). This current study draws on the same methodology as these past studies, in particular the previous Copenhagen Consensus Center study (Hutton 2015) with figures updated to 2018 values. The costing methodology is described fully in Hutton and Varughese (2016).

In the model are included 53 African countries, with results presented for sub-regional as well as regional levels (see Appendix[54]). Cost-benefit ratios for Africa and its sub-regions are weighted by country population size receiving the interventions.

Given that coverage estimates of 'safely managed' drinking-water were not available for 46 out of the 53 African countries in the latest JMP report (WHO and UNICEF, 2019), only 'basic' drinking-water access was modelled in this current cost-benefit study. Households are considered to have a 'basic' drinking water service when they use water from a household piped water supply, collected rainwater, or a protected community source such as a well, spring and borehole within 30 minutes roundtrip, including queuing [55]. The intervention in this study assumes only protected wells are provided at the community level.[56] 'Basic' access is an important step in the service ladder towards 'safely managed water supply', where further health benefits, convenience and time savings are possible.

Key input variables were updated, including unit costs of water services and GDP per capita (to 2018 prices), while drinking-water coverage was updated to the latest numbers for 2017 (WHO and UNICEF, 2019). All results are presented by rural and urban areas, and nationally. Incremental costs were estimated as the full costs of providing access to a basic source within a 30-minute roundtrip to households currently without access. Capital costs, programme costs, capital maintenance and annual operations costs were included, modelled for a 12-year period from 2018 to 2030. Future costs and financial benefits were discounted to the present period at 5% per annum.

A large range of economic and social benefits can result from improved drinking-water services. The benefits included in this study relate to both health benefits[57] and time savings of reduced time spent collecting water, as previously described (Hutton 2015, 2018). A reduction of 34% in diarrheal cases and deaths is assumed, when moving from unimproved to improved community water sources, taken from a meta-analysis (Wolf, Prüss-Üstun et al, 2014). Due to lack of credible Africa-wide data, many previously documented benefits were excluded (water reuse value, property value, non-use values and other educational benefits beyond those estimated under health and time savings).

Results

Figure 1 shows the benefit-cost ratios (BCRs). It indicates an overall BCR of 6.4 for Africa for basic drinking-water, varying between 5.0 and 7.7 across sub-regions. Rural water supply has a higher BCR of 9.1, varying from 7.1 to 10.8 across sub-regions. Urban water supply has an overall BCR of 4.5, varying from 3.9 to 6.6 across sub-regions.

[54] http://www.amcow-online.org/index.php?option=com_content&view=article&id=117&Itemid=57&lang=en

[55] In terms of water source type, the previous definition of 'improved' water is the same as 'basic' water, except that the latter requires that the total collection time is 30 minutes or less for a roundtrip. This definition varies from the MDG definition in that the latter did not include criteria for collection time.

[56] 50% of unserved population receives a protected community borehole/tubewell and 50% of unserved population receives a protected dug well.

[57] Including financial savings related to seeking less health care, savings related to productive time losses from disease, and savings related to reductions in premature mortality (valued at 1.3 times the GDP per capita for each avoided year of life lost).

FIG 1. BENEFIT-COST RATIOS OF PROVIDING BASIC DRINKING WATER IN AFRICA, BY SUB-REGION

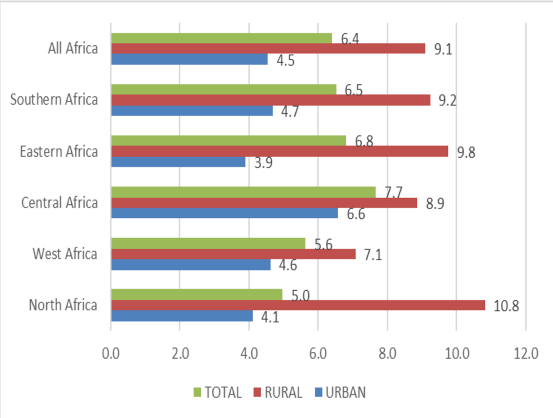


Table 1 provides the total costs and benefits for Africa and by sub-region. The total costs for Africa are US$ 65 billion, or roughly US$ 6 billion per annum. Given all costs need to be included in the calculation of the BCR, these numbers all cost categories, with an approximate split of 50/50 across capital/capital maintenance and annual operations costs over the 12-year period. However, these different costs are likely to be financed in different ways, with different financing mixes (between public sector, charities and communities or households) by country and by local context.

TABLE 1. COSTS AND BENEFITS FOR PROVIDING BASIC DRINKING WATER IN AFRICA, BY SUB-REGION, FROM 2018 TO 2030 (USD BILLION)

Costs

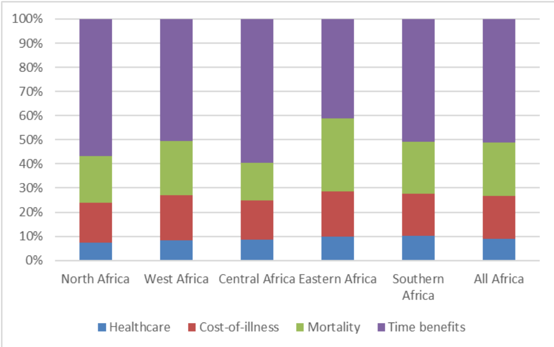
Sub-region	Urban	Rural	Total
North Africa	7	1	8
West Africa	6.4	4.4	10.8
Central Africa	3.9	3.6	7.5
Eastern Africa	10.8	10.7	21.5
Southern Africa	10.3	7	17.3
All Africa	38.4	26.7	65.1

Benefits

Sub-region	Urban	Rural	Total
North Africa	28.7	11.3	40
West Africa	29.4	31.4	60.8
Central Africa	26	31.7	57.6
Eastern Africa	42.2	104.1	146.3
Southern Africa	48.4	64.3	112.7
All Africa	174.6	242.7	417.3

The total benefits for Africa are US$ 417 billion, or roughly US$ 35 billion per annum, for basic drinking-water. These values could be a significant underestimate of the true benefits of basic drinking-water supply, due to many benefits being omitted. Time benefits account for roughly half of total valued benefits, varying 40% to 60% between sub-regions. The financial savings from avoided healthcare account for approximately 10% of the included benefits, with the remaining 40% from monetized value of economic benefits (22% from valued lives and 18% from valued time from less morbidity).

FIG 2. (%) BREAKDOWN OF BENEFITS BETWEEN TIME SAVING AND DIFFERENT HEALTH ECONOMIC CATEGORIES



Discussion

This study has confirmed that drinking water supply and sanitation both generate high economic returns to society, with returns exceeding costs by at least 4 times across all areas and sub-regions, and averaging 6.4 across the African continent. The study showed that economic returns varied between different sub-regions of the world. This variation is partly expected due to different relative price levels of water services, and different capacity to benefit (such as existing disease rates). The variation is also likely to be due to weak data for some regions and countries (e.g. unit costs of services, time savings from closer water source).

Several aspects could not be easily modeled in such a large area study of the African continent, and need to be considered in interpreting the results. First, there are many practices around management of water which affects its safety when used for drinking, food preparation and other hygiene purposes. The seasonal availability and access cost will lead to various compensating behaviors which affect the potential health benefits, both negatively (e.g. recontamination related to poor storage practices) and positively (e.g. household water treatment, when sensitized to health risks). Second, in household self-supply and in programme implementation, different service levels will be chosen than 'basic'. In urban areas especially, expectations and needs for higher service levels will mean that municipalities will encourage water utilities to expand their networks, such as through regulation or subsidies. Where piped water does not yet reach household or is unreliable or poor quality, households might be willing to pay for vendor-supplied water and in many cases bottled water, often faced with little other choice. Hence, the eventual costs are likely to be higher than those included here. On the other hand, many of these solutions also have higher health benefits, time savings and other benefits compared with basic water supply. Third, the costs and benefits included reflect a part of the picture, but in reality there will be additional costs such as interest costs for capital costs financed by borrowing, additional programme costs in hard-to-reach communities and additional capital costs in water scarce regions (needing deeper wells). However, the benefits included are likely to underestimate the full social, economic and peace benefits of populations having at least a basic access to water supply.

There remain many challenges to scaling up drinking-water supply in Africa, among them water scarcity (both seasonal and all-year-round) and further changes in rainfall patterns induced by climate change. Also, competition for water among its competing uses, in particular agriculture, and pollution of both underground and surface water sources from human activities reduces the supply of clean water. Also, the costs even of basic water supply is challenging for many communities to cover, and the lack of public funds allocated to water supply, in particular rural water. Also, as has proven, there are many logistical and behavioural challenges in maintaining and sustaining water services.

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Appendix: Sub-regions of Africa

North Africa: Algeria, Egypt, Libya, Morocco, Tunisia

West Arica: Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Liberia, Mali, Niger, Sao Tome and Principe, Sierra Leone, Togo

Central Africa: Cameroon, Central African Republic, Chad, Congo, DR Congo, Equatorial Guinea, Gabon

Eastern Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Sudan, Uganda, United Republic of Tanzania

Southern Africa: Angola, Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Zambia, Zimbabwe