ASSESSING THE EFFECTS OF COVID-19 ON ACCESS TO WATER, SANITATION, AND HYGIENE IN USAID HIGH PRIORITY AND STRATEGY-ALIGNED COUNTRIES

Country Deep Dive Report - Rwanda

FEBRUARY 2021

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Country Deep Dive Supplementary Report - Rwanda

FEBRUARY 2021

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

CBEHPP	Community-Based Environmental Health Promotion Programme
CHC	Community Health Club
COVID-19	Coronavirus Disease 2019
CRS	Catholic Relief Services
DHS	Demographic and Health Survey
DRC	Democratic Republic of the Congo
FEPEAR	*Forum des Exploitants Privés des Systemes d'Eau er Assainissement* (Association of Private Water and Sanitation System Operators)
GDP	Gross Domestic Product
GWC	Global WASH Cluster
IMF	International Monetary Fund
IPA	Innovation for Poverty Action
JICA	Japan International Cooperation Agency
JMP	Joint Monitoring Program of UNICEF and WHO
LMIC	Low-to-middle income country
MFI	Microfinance Institution
MICS	Multiple Indicator Cluster Survey
MIS	Malaria Indicator Survey
MOPDD	Malaria and Other Parasitic Diseases Division of the Rwanda Biomedical Center Ministry of Health
NGO	Non-governmental organization
OD	Open defecation
RMIS	Rwanda Malaria Indicator Survey
SKU	Stock Keeping Unit
SME	Small-to-Medium Enterprise
SMS	Short Message Service (Text Message)
SWA	Sanitation and Water for All
VIP	Ventilated Improved Pit
WASAC	Water and Sanitation Corporation
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization

EXECUTIVE SUMMARY

In May 2020, the United States Agency for International Development (USAID) tasked the Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability (WASHPaLS) project with assessing the effects of the novel Coronavirus Disease 2019 (COVID-19) on access to water, sanitation, and hygiene (WASH) services and products in USAID high priority and strategy-aligned countries.[1] The assignment sought to characterize the current state of affairs and to forecast near-term trends (6–18 month) that could assist governments, donors and implementers prepare an informed response to the WASH-related impacts of the pandemic.

We pursued two lines of inquiry. The first is a set of "deep dives" in seven countries (the Democratic Republic of the Congo (DRC), Ghana, Kenya, Mozambique, Nepal, Rwanda, and Senegal) selected to reflect a spectrum of geographic, cultural, and vulnerability characteristics. The deep dives consisted of interviews with key informants (WASH product and service providers, government officials, donors, and WASH program implementers), as well as SMS-based surveys of over 3,000 randomly selected individuals (in all countries save Nepal). The second line of inquiry is development of an econometric model linking income changes to WASH outcomes, relying on Demographic and Health Surveys and Multiple Indicator Cluster Surveys, constructed using data from the 28 USAID high priority and strategy-aligned countries, to generate WASH outcome forecasts for those same countries.

The magnitude of COVID-19's economic shock varies widely across countries. Countries with heavy reliance on tourism and remittances suffered comparatively more, as did those countries where the government response resulted in more extensive or longer-duration movement restrictions that took larger tolls on economic activity. For the full analysis that combines results of the seven deep dives with the econometric analysis, we direct readers to the WASHPaLS COVID-19 WASH Synthesis Report. This report presents the detailed findings of the deep dive for Rwanda.

The Government of Rwanda acted very quickly in response to the onset of COVID-19, putting in place one of the most stringent lockdowns in Africa, with border closure, restrictions on public transport and internal movement, and a stay-at-home order from March 21 to May 4, followed by nighttime curfew. Rwanda exhibited the largest decline in mobility of any of the countries we examined as part of our deep dive analyses, as well as sustaining those declines for the longest duration. Respondents to our SMS surveys reported that COVID has had a major effect on their incomes: about 29 percent reported losing their job and another 40 percent reported earning less money. Among the 41 percent that ran a non-farm business, 27 percent closed their business. These reported income and job losses are second only to Kenya among the six African countries where we conducted surveys. The Rwandan government did not issue a formal water tariff relaxation policy, though it did launch a fund to support affected businesses through subsidized loans from commercial banks and microfinance institutions (MFIs), and credit guarantees, targeting small and medium enterprises (SMEs) and hard-hit sectors such as the hospitality industry.

Our topline findings, by subsector, are as follows:

[1] Our analysis proceeded on the hypothesis that COVID-19's direct health consequences in terms of morbidity and mortality would ultimately be far outweighed by the pandemic's economic shock, based in part on predictions of an epidemiological model for the World Health Organization's African region published in May (Cabore et al. 2020).

WATER SUPPLY – CURRENT STATUS

1) Urban residents are more likely than rural residents to report that the pandemic has made water access more difficult. Overall, households in Rwanda reported pandemic-linked water access difficulties comparable to those of the other deep dive countries we surveyed. We identified two key factors that made water access more difficult for urban residents: first, much of the population in Kigali and other urban centers rely on public standpipes, and were anxious about queuing in tight quarters; second, economic pressure may have forced a shift away from bottled water and treated water vended in 20 L containers and forced consumers to rely even more heavily on standpipe sources.

2) Rwanda's national utility, supplying mainly urban populations, suffered revenue losses during the strict lockdown period but does not appear to be facing imminent service suspensions. The Rwandan government did not issue a free water directive as part of its pandemic response measures, but WASAC still saw a decline in revenue as collections declined during the country's strict movement restriction period.

3) Rural and small-town providers, more vulnerable than WASAC, suffered financial and operational challenges during the lockdown period, including supply chain difficulties. Unlike WASAC, the association of private water providers, whose members operate in eight Rwandan districts, reported that private providers resorted to personnel furloughs and are facing diminished performance due to reduced maintenance.

SANITATION – CURRENT STATUS

4) We did not uncover clear evidence of major declines in sanitation product and service sales as compared to the pre-pandemic period. Urban and rural residents that responded to our surveys did not report increased difficulties in procuring latrine-related products, nor did we learn of significant declines from NGO implementers, but we caution that we did not interview value chain actors directly.

SOAP – CURRENT STATUS

5) Self-reported handwashing levels are high in Rwanda during the pandemic period.

6) We found little evidence of persistent or widespread shortages of soap and other hygiene products. At the same time, we note that the affordability of soap does appear to have declined, insofar as the ratio of spending power to prices dropped as household income losses have mounted. There are reports of sporadic localized price increases.

7) Inadequate availability of water could impede sustained handwashing behavior change. On-premises water supply is limited in Rwanda, and thus poses an obstacle for sustaining behavior change gains.

NEAR-TERM FUTURE TRENDS

8) We do not anticipate COVID-19 to result in significant water service declines relative to pre-pandemic baselines. In Kigali, WASAC, was unable to fully meet demand prior to the onset of COVID-19. Strict lockdown measures reduced household incomes, which has led to bill payment defaults and revenue losses for WASAC. Nevertheless, we do not anticipate long-term viability or performance challenges stemming from the pandemic. Broadly, suspensions of water services do not appear to be an immediate risk, but rural water service providers are more financially vulnerable than the national utility, and should be monitored.

9) We expect demand for sanitation products and services to track economic conditions. Unlike water supply, for which extended financial difficulties can result in both sudden and extended performance declines by providers, consumer demand for sanitation commodities, installation services, and tank and pit desludging did not face severe demand declines, and should recover as economic activity rebounds.

10) We are cautiously optimistic that the pandemic may have brought about a social norms shift with respect to handwashing. We foresee few immediate crises with respect to hygiene product supplies and general availability in Rwanda, though we note that inadequate quantities of supplied water, essential for handwashing, remain a chronic infrastructure problem in the country.

1. INTRODUCTION

Between June and October 2020, the United States Agency for International Development (USAID) Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability (WASHPaLS) project conducted a rapid assessment and forecasting analysis of the effects of the novel Coronavirus Disease 2019 (COVID-19) pandemic on access to WASH services and products in USAID high priority and strategy-aligned countries. The central question we sought to answer was:

> ***How will the COVID-19 pandemic (and resulting economic crisis) affect access to water supply services, sanitation services and products, and hygiene products across the WASH high priority and aligned countries, and how will these effects vary by subsector, geography, and provider type?***

We proceeded on the assumption that direct health effects of the pandemic in USAID high priority and strategy-aligned countries would be exceeded by the economic shock of measures taken to contain the pandemic (restrictions of movement, closures of business, disruptions of supply chains, and so forth).[2]

On 4 May 2020, the Global WASH Cluster (GWC) and Sanitation and Water for All (SWA) released an advocacy document entitled "Mitigating the socio-economic impacts [of COVID-19] on the Water, Sanitation, and Hygiene (WASH) Sector," which predicted the following trends:

- decline in access to and increase in prices for WASH commodities and services due to rupture in global supply chains caused by restrictions or no movements of goods and essential consumables (e.g., fuel, chemicals), affecting continuity of services;
- decline in the financial viability of WASH services due to loss of revenue and subsidies, and income loss by households, limiting ability to pay for WASH commodities and services;
- decline in national government's ability to deliver WASH services, affecting social cohesion, leading to tension and instability;
- diversion and deprioritization of domestic funding away from the WASH sector, due to loan payment defaults; and,
- shift in donor funding from existing WASH commitments and priorities, resulting in a significant reduction in the overall funding of [the WASH] sector" (Sanitation and Water for All and Global WASH Cluster 2020).

Our assessment was intended to provide both a snapshot of current WASH access conditions and forecasting of near-term trends. To inform our analyses, we found it useful to investigate the degree to which the GWC/SWA predictions played out in practice. The predictions also helped us formulate a set of hypotheses prior to commencing activities (Table 1).

We sought to test the hypotheses and predictions noted above through two main activities:

[2] COVID-19 is likely to cause the first increase in global poverty in two decades, pushing some 100 million people into poverty and 50 million into extreme poverty in 2020, with an estimated 23 million going into extreme poverty in sub-Saharan Africa (Mahler et al. 2020). As we describe herein, the economic shocks of COVID-19 were experienced immediately and profoundly by high priority and strategy-aligned countries, and have persisted even as some of these countries have inched back toward pre-pandemic conditions of economic activity.

1. a "deep dive" into seven countries, consisting of interviews with hundreds of key informants and SMS-based consumer surveys of 500-750 respondents per country (with the exception of Nepal); and
2. construction of an econometric model to forecast changes in access to water and sanitation access from income losses, using Demographic and Health Survey (DHS) and Multiple Indicator Cluster Survey (MICS) data.

This report focuses on results for the deep dive activity. Details on the econometric model can be found in the WASHPaLS COVID-19 WASH Synthesis Report.

Table 1: Pre-specified hypotheses

Water Supply	Sanitation	Hygiene
Service provider revenues will decline because of 1) government policies regarding tariff collection, 2) consumer interpretation of those policies, and 3) reduced ability-to-pay by consumers	Fragile sanitation value chains (with respect to both excreta containment and management) in urban and peri-urban areas will be most highly impacted. There will be increased stress on working capital and cash flows, profitability, and investment capacity	Wholesale costs of soap will rise, a function of the reduced buying power of local currency as well as disrupted supply chains.
Supply chains for key commodities will be disrupted	Consumer spending could shift away from sanitation leading to: a) slower rate of improved toilet adoption in OD/ Limited households and b) reversion to OD in case of unaffordability of pit emptying services	Consumer spending on these products may decline as assets are diminished, with priority spending directed at food and other immediate family needs, but that these spending declines may be partially offset by widespread campaigns to wash hands to prevent COVID infection.
The degree of operational and financial challenges faced by water service providers will vary considerably by modality and target population. The "in-betweeners" will be the most heavily affected; larger utilities will gain donor attention, and rural self-supply will be largely unaffected. Smaller providers, informal sector actors, and centralized community systems will have less "safety net"		There have been supply chain disruptions in most countries, particularly those which are net importers of hygiene products or product components. Compounded by limited mobility due to lockdowns or curfews and panic buying from wealthy consumers, supply chain disruptions could lead to product shortages.
Rural populations who rely on self-supply will see far less dramatic access effects. Supply chains for pump parts and maintenance will be affected, but given the already high failure rates of rural water infrastructure, rural populations generally rely on multiple water sources		

2. METHODS AND DATA

Given the time frame for this analysis, we elected to conduct a detailed investigation into a subset of USAID's high priority and strategy-aligned countries. We selected seven countries for deep dive analysis based on their representation of a spectrum of geographic, cultural, and vulnerability characteristics, as well as the confidence in our ability to secure interviews with key informants identified via snowball sampling. The seven countries are Democratic Republic of the Congo (DRC), Ghana, Kenya, Mozambique, Nepal, Rwanda, and Senegal (*Figure 1*).

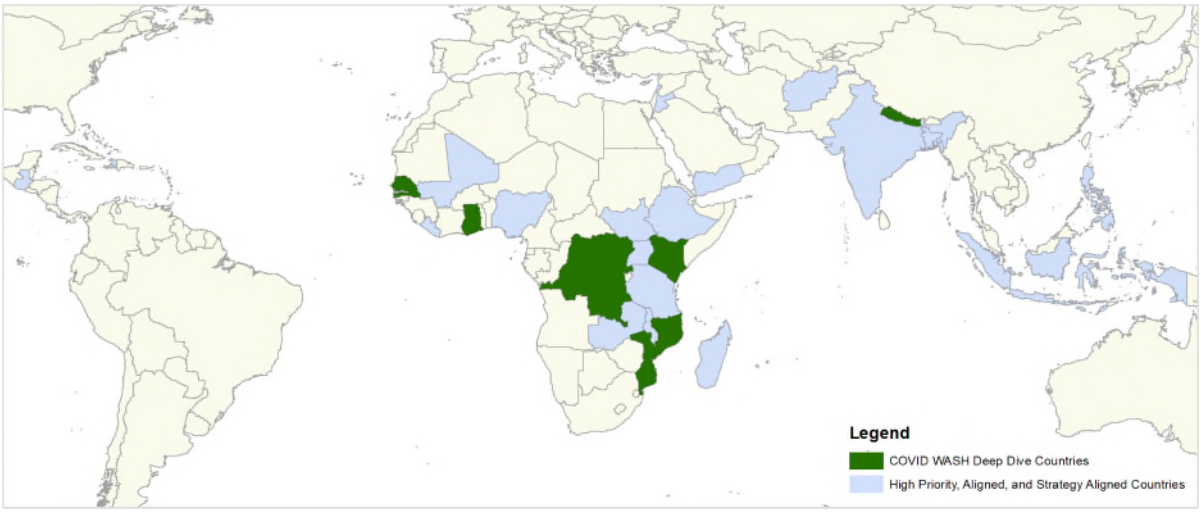

Figure 1. Highlighted countries are USAID high priority and strategy-aligned countries, with the deep dive countries in green.

Our preparatory work for the Rwanda deep dive began with a desk review of the country's COVID-19 status, the government response, and pre-pandemic WASH indicators, and the institutional responsibilities for different elements of WASH provision, which included:

- an overview of the key actors and institutions participating in water and sanitation service provision, including the distribution of legal and regulatory responsibilities,
- consultation of most recent UNICEF/WHO Joint Monitoring Program (JMP) data, UNICEF Multiple Indicator Cluster Survey (MICS), USAID Demographic and Health Survey (DHS) for the country,
- consultation of publicly available government response trackers and vulnerability estimates for the country,
- examination of import/export numbers for soap and chlorine, and
- web searches for news stories and public reports on WASH in the context of the pandemic.

2.1 KEY INFORMANT INTERVIEWS

We conducted semi-structured interviews of 14 key informants via phone or videoconference in Rwanda, following pre-set interview guides for service providers, government regulatory and oversight officials, private sector actors, and program implementers. The purpose of these interviews was twofold: first, to secure macro-level insights from well-positioned observers (essential during a period in which in-country visits were rendered impossible) and second, to hear directly from suppliers of WASH products and services regarding their present and anticipated financial and operational challenges. The interviews complemented our consumer surveys, which we conducted by Short Message Service (SMS)

questionnaires sent to mobile phones. The interviews provided a depth of information that is not possible to gain from a short SMS questionnaire. We also hoped that the interviews would contribute to predictions of future trends and help us to make sense of differences we observed between countries.

Our key informant interviewees included (see **Error! Reference source not found.**:

- government officials, including policymakers and regulators
- operators of water supply systems
- producers and distributors of hygiene products (mainly soap)
- implementers of donor-funded WASH programs
- multilateral and bilateral donors and implementers

2.2 SMS CONSUMER SURVEYS

In addition to the key informant interviews, we conducted cross-sectional SMS surveys of at least 500 respondents per deep dive country (with the exception of Nepal, where SMS surveying is not yet routinely executed). We contracted the mobile-based research firm GeoPoll to conduct the surveys, using an instrument of our design (see Appendix 2).

SMS surveying is an extraordinarily efficient means of collecting consumer information. With formal access to mobile subscriber databases consisting of millions of people in each of the African deep dive countries, GeoPoll was able to secure SMS survey responses from a sample with geographic and age distributions representative of the broader population of each country. Our survey could be easily read and filled out with a basic feature phone (non-smartphone), and was offered to potential respondents incentivized by a modest offer of top-up credit. The survey contained modules on employment and migration, water supply, sanitation, and handwashing. The instrument consisted of 33 questions, with skip patterns that meant that a respondent typically saw on the order 20-25 questions. In Rwanda, we offered the surveys in English, French, and Kinyarwanda. The SMS survey in Rwanda was administered from 29 September to 12 October 2020.

We note that our SMS survey respondents, by virtue of their possession of a charged cell phone and the technical ability to fill out a survey, were likely a biased sample of the broader populations of our deep dive countries. Cell phone ownership is estimated to be 10% lower among women than among men in low-to-middle-income countries (LMICs)[3], which we attempted to address by setting a 50-50 gender split quota for survey results. We consider it likely for respondents to have an elevated wealth and educational status than those who do not own a functional phone. Nonetheless, we consider these biases to be small enough to make using the SMS surveys extremely useful, given the relative ease of deploying them.

Only 3 of 2,829 Rwandan respondents refused the initial offer of phone credit in return for filling out the survey, and 19 percent filled the survey to completion. The sample of respondents was broadly representative of Rwanda. We had a range of ages, with 36 percent ages 15-24, 53 percent ages 25-40, and 11 percent over 40. Our target was to have an even 50/50 gender split, but in the end 44 percent of the respondents were female. Respondents were geographically dispersed in a manner representative of the broader population, with 23 percent in Kigali, 17 percent in Southern province, 21 percent in Western, and 19 percent in both Eastern and Northern provinces. Twenty-nine percent of the respondents were urban residents.

[3] GSM Association (2019). The Mobile Gender Gap Report.

3. RWANDA CONTEXT

3.1 PRE COVID-19 WASH COVERAGE

According to the 2017 Rwanda Malaria Indicator Survey (RMIS), 79 percent of Rwandan households had access to an improved water supply source, with a 95 percent vs. 74 percent rural-to-urban split (Rwanda MOPDD and ICF 2017). Notably, nearly a third of Rwandans relied on public standpipes, with an even higher fraction (41 percent) in Kigali.

The RMIS reports 65 percent of Rwandans relying on improved sanitation, 46 percent in urban areas and 71 percent in rural areas. However, the report separates out the 49 percent of urban Rwandans who reported use of shared toilet facilities, most of which would be classified as improved. Though the RMIS distinctly refers to the shared facilities as "unimproved," its subcategories include "flush/pour flush to piped sewer system, flush/pour flush to septic tank, flush/pour flush to pit latrine, ventilated improved pit (VIP) latrine, and pit latrine with slab" (RMIS 2017). A detailed breakdown of Rwanda's water and sanitation service modalities are provided in *Table 2*.

Table 2. Summary of WASH Data from the 2017 MIS. (Rwanda MOPDD and ICF 2017)

Indicator	Overall (%)	Urban (%)	Rural (%)
Proportion of population with access to improved water source	79	74	95
Sources of Improved Water			
Piped water (including into dwellings, yard/plot, neighbors, and public tap/standpipe)	12	48	2
Public standpipe	29	28	29
Tube-well/ borehole	1	1	1
Protected springs	33	12	38
Protected dug well	2	0.4	2.6
Others (Bottled water, protected springs, tanker truck and cart with small tank, and rainwater collection)	2	4	1.5
Sources of Unimproved Water			
Unprotected springs	14	3	17
Unprotected wells	1	0.1	1
Surface water	6	1	7
Proportion of population with access to improved sanitation (with shared facilities excluded)	65	46	71
Proportion of population with access to improved sanitation (with shared facilities included)	95	81	84
Open Defecation	2	1	2.3

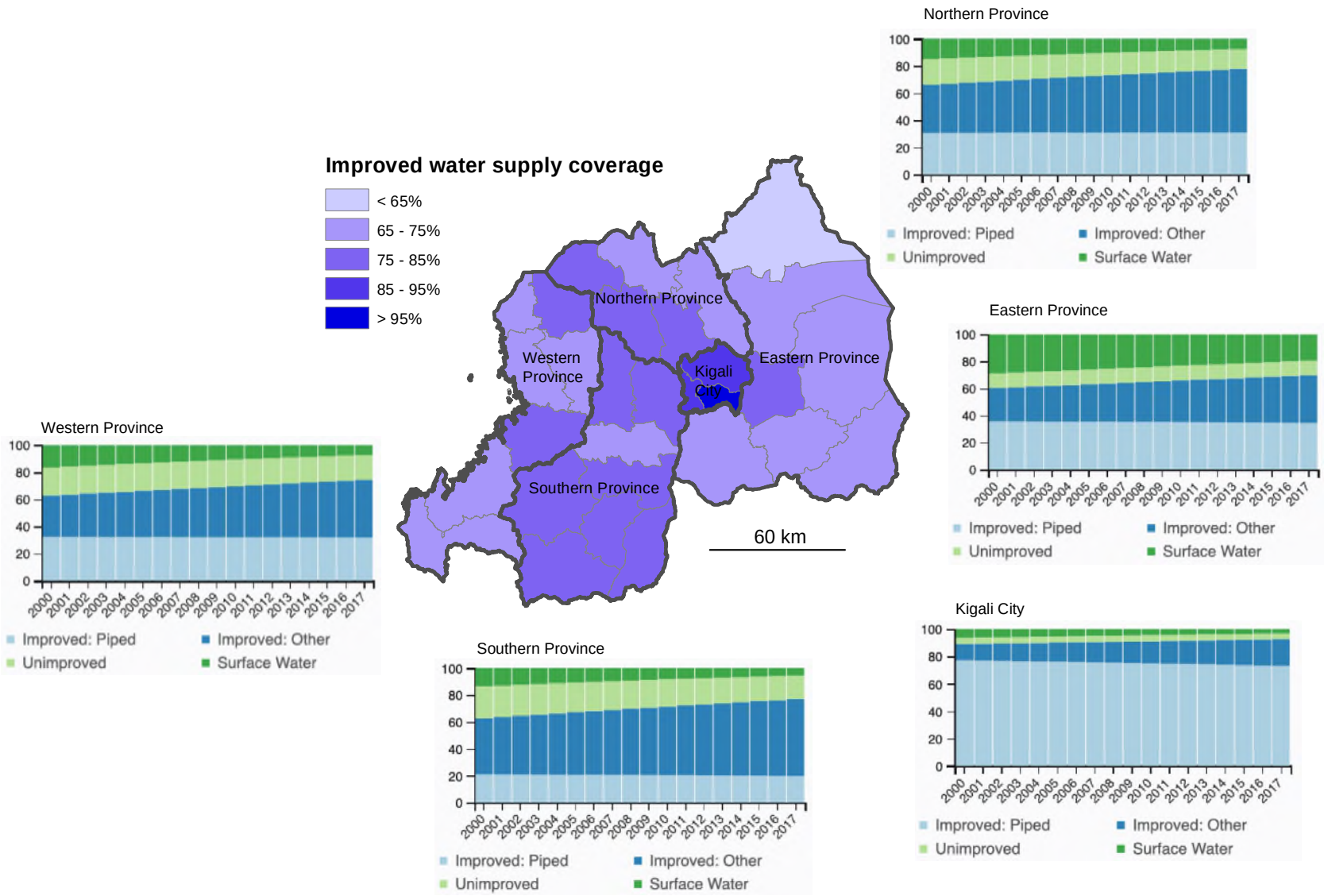

Figure 2. Spatial distribution of improved water supply in 2017, by district as estimated by Deshpande et al. 2020 (map) and 2000-2017 trends for each province drawn from interactive maps made available at https://vizhub.healthdata.org/lbd/wash.

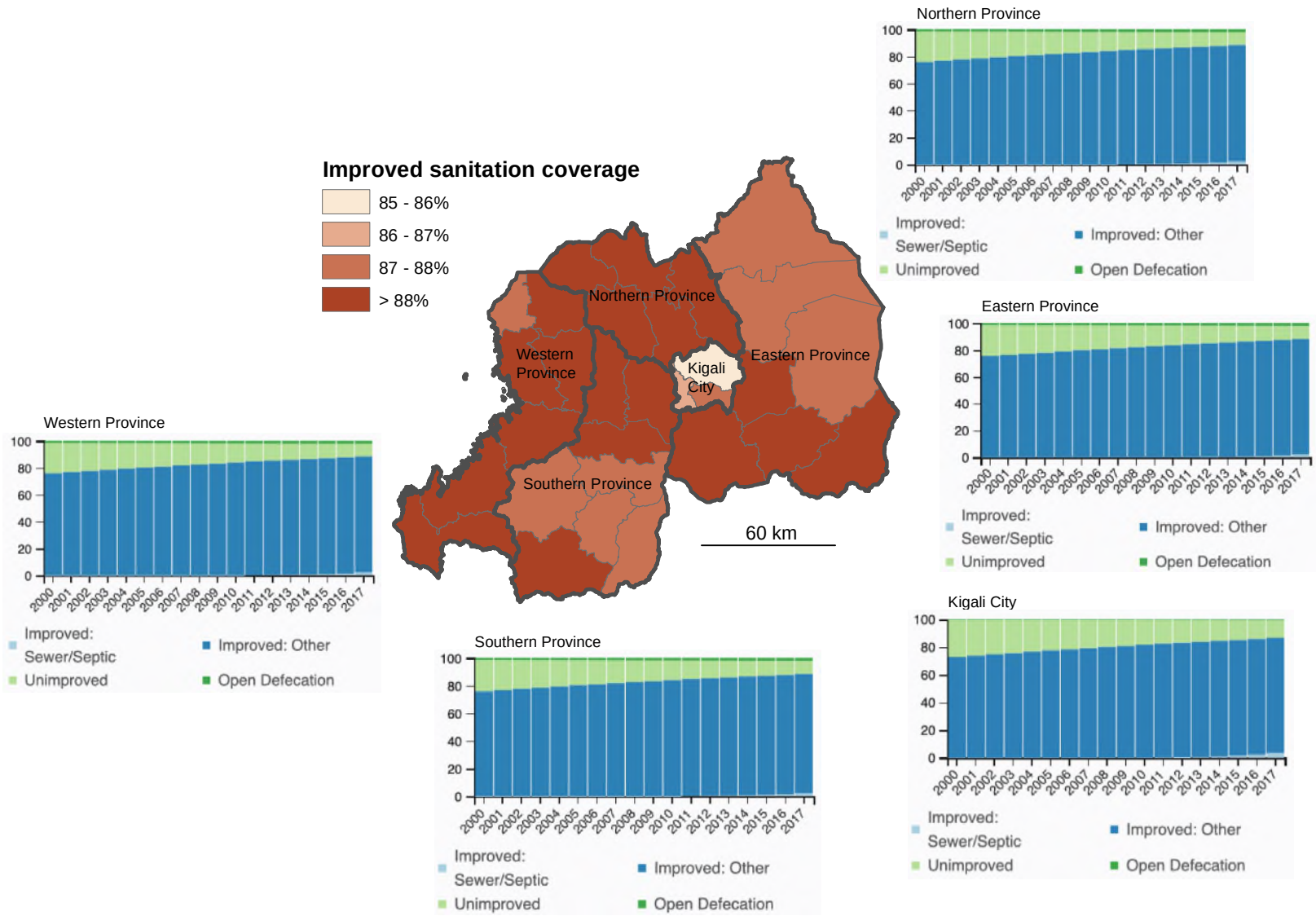

Figure 3. Spatial distribution of improved sanitation in 2017, by district as estimated by Deshpande et al. 2020 (map) and 2000-2017 trends for each province drawn from interactive maps made available at https://vizhub.healthdata.org/lbd/wash.

Improved water access has been steadily improving in Rwanda, with clear gradual upward trend in all provinces between 2000 and 2017 according to Deshpande et al. (2020) (Figure 2). As of 2017, 16 of Rwanda's 30 districts had greater than 75 percent improved water access, with Kigali's three districts all above 90 percent.

The estimated temporal trend in improved sanitation is similar to that for water supply, though with very little regional variation (with a district in Kigali with the minimum estimated value at just under 86 percent, and remaining districts between 86 and 88 percent (Figure 3). These estimates correspond to a consideration of shared facilities as reported in the RMIS as *improved* sanitation.

The most notable aspect of Rwanda's pre-COVID-19 WASH situation is the frequency with which consumers are forced to spend significant time to secure their water supply. Even among the urban population, nearly one of five households (17 percent) reported needing more than 30 minutes round-trip, and fully half of rural households did. Only four percent of rural households reported the presence of a water supply source on the premises of their home (or the home of a neighbor) (*Table 3*).

Table 3. Travel time to water supply sources in Rwanda. (Rwanda MOPDD and ICF 2017)

Time to obtain drinking water (round trip)	Overall (%)	Urban (%)	Rural (%)
Water on premises (including water piped to a neighbor)	14	53	4
Less than 30 minutes	42	31	46
30 minutes or longer	44	17	50
Don't know/missing	0.4	0.1	0.5

3.2 COVID-19 SITUATION AND GOVERNMENT RESPONSE

As of mid-October, Rwanda had recorded a total of approximately 4,900 confirmed cases of COVID-19, corresponding to roughly 380 confirmed cases per million inhabitants, and 32 confirmed deaths.

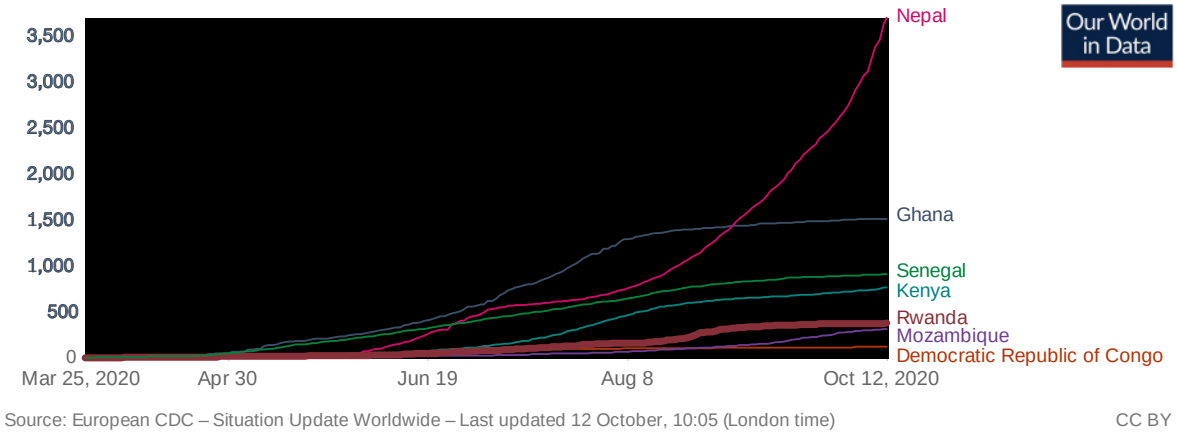

Figure 4. Cumulative confirmed COVID-19 cases per million people. Rwanda highlighted in bold. Source: Our World in Data.

The government of Rwanda acted very quickly in response to the arrival of COVID-19, putting in place one of the most stringent lockdowns in Africa, with border closure, restrictions on public transport and internal movement, and a stay-at-home order from March 21 to May 4, followed by nighttime curfew (from 20h00 to 05h00). The Surgo Foundation estimates that Rwanda's mobility decline, an indicator of

the cessation of economic activity, was more than double the African average.[4] Our own analysis of Google Mobility data is offered in *Figure 5*, and makes clear that Rwandans exhibited the largest decline in mobility (and most time spent in residential settings) of any of the countries we examined as part of our deep dive analyses, as well as sustaining those declines for the longest duration. Commercial flights resumed in August, but following an increase in COVID-19 transmission in Kigali, two major markets were closed for 14 days, public transportation between the capital and other districts was prohibited, the nighttime curfew temporarily lengthened, and public offices mandated to work at a further reduced capacity to reinforce social distancing.[5] The country resumed most business operations as of November 2020, including restaurants, hotels, shops and tourism operations, though bars remain closed.

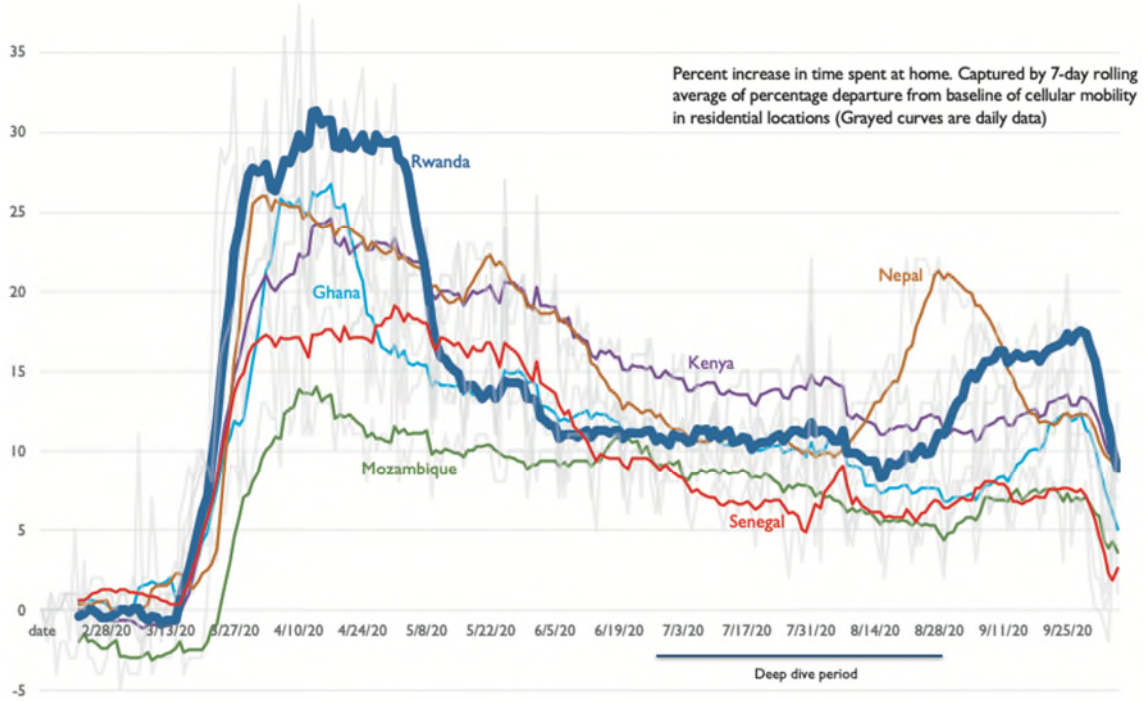

Figure 5. Percent departure from baseline mobile phone mobility, residential category, February to early October 2020. Periods of our SMS survey and deep dive interviews are noted. Rwanda is highlighted in bold. The higher the value, the more time the cell phone user spends at home (and less time at commercial, industrial, or other non-residential locations) relative to baseline. Source: Google COVID-19 Community Mobility Reports.

The Rwandan government did not issue a formal water tariff relaxation policy, though it did launch a fund to support affected businesses through subsidized loans from commercial banks and microfinance institutions (MFIs), and credit guarantees, targeting small and medium enterprises (SMEs) and hard-hit sectors such as the hospitality industry.[6] Rwanda received a disbursement of US$109 million from the International Monetary Fund (IMF) under its Rapid Credit Facility Instrument in early April 2020, with an additional US$111 million in IMF support in June 2020.[7]

[4] https://precisionforcovid.org/africa

[5] https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#S

[6] https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#S

[7] https://www.poverty-action.org/sites/default/files/Rwanda-RECOVR-Survey-Analysis-July-2020.pdf

3.3 THE COVID-19 ECONOMIC SHOCK

The IMF estimates that COVID-19 will lead to "revenue shortfall" of 2.8 percent of GDP in Rwanda, and that the cost of the government's pandemic Economic Recovery Plan will amount to another 3.3 percent of GDP.[8] The World Bank projects 2 percent growth in GDP in 2020, still positive, but a 7.4 percent decline in growth as compared to the Bank's 2019 estimate.[9]

The RECOVR phone survey of nearly 1,500 randomly selected households conducted by Innovation for Poverty Action (IPA) in June found that more than 50 percent reported having to reduce food consumption in the previous week, and almost 80 percent said that they had to deplete savings to pay for food, healthcare, or other expenses.[10]

Our own SMS surveys of more than 500 respondents per country across six countries asked how employment and income had changed due to the pandemic. Respondents in Rwanda surveyed in October reported that COVID has had a major effect on their incomes: about 29 percent reported losing their job and another 40 percent reported earning less money (*Figure 6*). Among the 41 percent that ran a non-farm business, 27 percent closed their business. These reported income and job losses are second only to Kenya among the five other countries we examined as part of our SMS surveys. The economic pain affecting respondents to our SMS surveys in Rwanda show a pronounced urban/rural split, with 57 percent of urban respondents reporting loss of either employment or income, as compared to 74 percent of rural respondents.

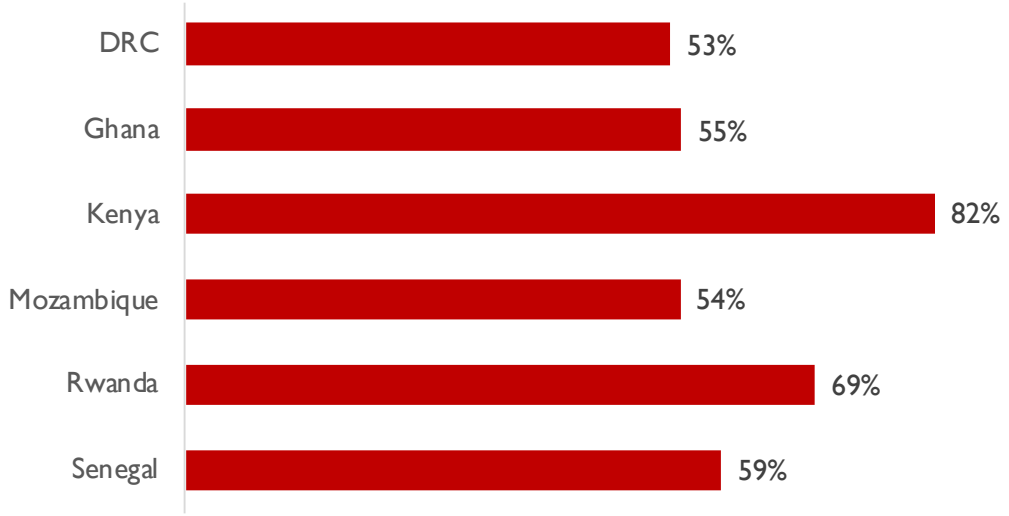

Figure 6. Percentage of respondents answering, "I lost my job" or "I earn less money" to the question, "How has COVID-19 changed your employment?" Source: our own SMS surveys, conducted in August 2020 (except for Rwanda, which was conducted in October 2020).

[8] https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#S

[9] https://www.worldbank.org/en/publication/macro-poverty-outlook/mpo_ssa

[10] https://www.poverty-action.org/sites/default/files/Rwanda-RECOVR-Survey-Analysis-July-2020.pdf

4. FINDINGS

4.1 WATER SUPPLY – CURRENT STATUS

There is a wide urban-rural split in consumer-reported COVID-19-induced water access difficulties during the pandemic.

Our SMS survey asked: *"Has COVID-19 made it more difficult to get your drinking water?"* Twenty-nine percent said COVID-19 has made it more difficult.

The most commonly reported reason for water access becoming more difficult was having less money to pay for it (35 percent of those reporting difficulty). Longer travel to obtain water was reported by 33 percent of those reporting difficulty. Among the subset who said getting drinking water became more difficult, 74 percent answered "Yes" to the question, *"In the past week, was there a day when you couldn't get enough water to meet your household's needs?"* This subset is 24 percent of the entire surveyed sample. We do not know how much higher this share is than pre-pandemic.

The 15 percentage point split between urban and rural fractions reporting water access difficulties (40 percent in urban vs. 25 percent in rural) is the biggest gap we observed amongst the countries for which we conducted deep dive analyses (Figure 7). The rural fraction reporting difficulty is, along with Ghana, the lowest among the deep dive countries, while the urban fraction is, along with Kenya, the highest.

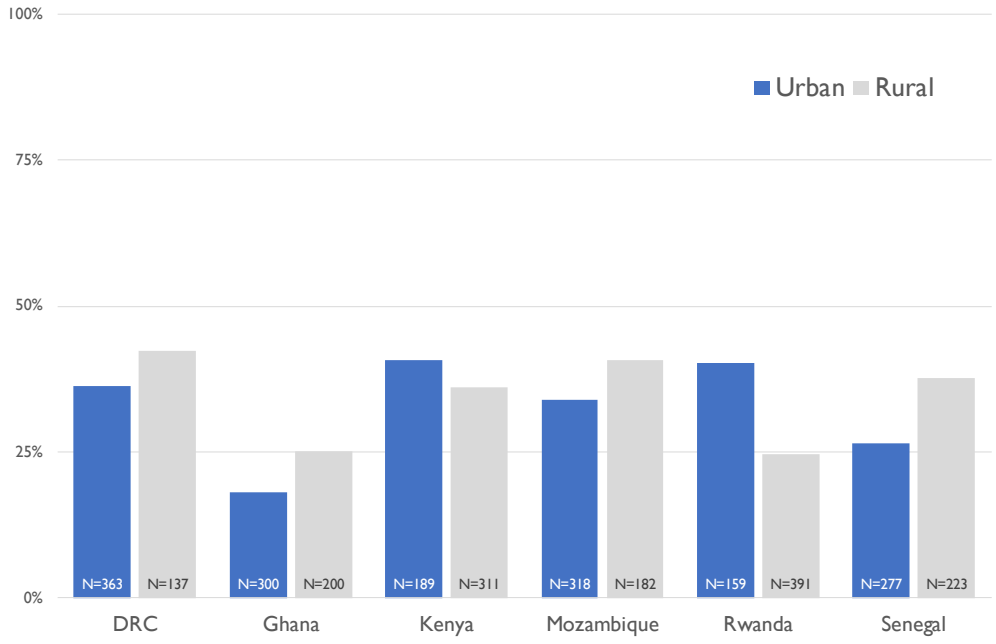

Figure 7. ***Percentage of respondents answering "Yes" to the question, "Has COVID-19 made it more difficult to get your drinking water?"*** Source: our own SMS surveys, conducted in August 2020 (except for Rwanda, which was conducted in October 2020). Sample sizes for each country segment shown at the base of the columns.

Our surveys also sought information on the factors underlying water access problems. Those who responded in the affirmative to the question, *"Has COVID-19 made it more difficult to get your drinking*

water?" were then asked a series of questions of how they accessed drinking water before and after the onset of the pandemic. The results of those questions appear in

Figure ***8***.

DRC

	Rural N=74	Urban N=108
Piped connection	0	0
Cart vendor	-9	2
Bottled water/sachet	-2	0
Tanker	9	2
Well	-2	2
Rainwater	-2	0
River/pond	3	-2
Spring	2	-4

Mozambique

	Rural N=74	Urban N=108
Piped connection	4	11
Cart vendor	0	-1
Bottled water/sachet	0	1
Tanker	1	-2
Well	3	0
Rainwater	0	-3
River/pond	7	0
Spring	-15	-6

Ghana

	Rural N=50	Urban N=54
Piped connection	4	-2
Cart vendor	-2	6
Bottled water/sachet	-14	-6
Tanker	4	-4
Well	6	2
Rainwater	-4	-2
River/pond	4	6
Spring	2	0

Kenya

	Rural N=112	Urban N=77
Piped connection	-20	-14
Cart vendor	-5	-12
Bottled water/sachet	-6	3
Tanker	-1	8
Well	9	5
Rainwater	6	6
River/pond	19	3
Spring	-2	1

Rwanda

	Rural N=96	Urban N=64
Piped connection	-5	6
Cart vendor	-11	-9
Bottled water/sachet	-4	-13
Tanker	0	-3
Well	5	8
Rainwater	7	2
River/pond	7	8
Spring	1	2

Senegal

	Rural N=84	Urban N=73
Piped connection	1	-3
Cart vendor	4	-7
Bottled water/sachet	-5	3
Tanker	-1	-1
Well	0	5
Rainwater	5	4
River/pond	-4	1
Spring	0	-3

Figure 8. Heat map depicting percentage point changes in reported water service modality, pre-COVID-19 vs. at present, among those responding "Yes" to the question, "Has COVID-19 made it more difficult to get your drinking water?"

A detailed display of how Rwandan consumers reported their change in drinking water supply source is provided in Appendix 3. Among those experiencing water access difficulties, the most notable pattern is a shift away from cart vendors in both urban and rural settings, as well as a dramatic shift away from bottled water in urban settings. We hypothesize that this change is driven by the economic shock borne by urban consumers, forcing them to public standpipes, wells, and even surface waters. We also note, however, that according to the 2017 RMIS (*Table 2*), vended water in carts and tankers represented only 4 percent of urban population in Rwanda. These findings suggest that prior to the onset of the pandemic, more urban Rwandans chose to purchase bottled water as their main drinking water source than is reflected in the RMIS, possibly reflections of mistrust in the quality of utility-delivered water and the intermittency of piped water services.

It is also important to keep in mind that over 75 percent of Kigali households reside in informal settlements, where much water supply is delivered through public standpipes (Bower et al. 2020, 2019). We suggest that some of the reported water access difficulties among urban respondents could be linked to concerns of these populations around queuing for water, particularly in narrow access pathways.

Elevated household demand from those households with piped water connections in homes and compounds placed pressure on service to other customer segments.

One of our key informants reported that elevated household demand linked to improved hygiene was exacerbating water access problems in informal settlements, health care facilities, and at public standpipes. We could not independently confirm this, though we note that the Japan International Cooperation Agency (JICA) reported that one element of its support to the national water utility, WASAC, was to procure storage tanks and contract with private tanker operators to fill them at emergency water supply locations.

WASAC suffered revenue declines, but did not report widespread acute service failures, and continued to employ staff at full salary, including those deemed non-essential who were homebound during the lockdown.

Prior to the pandemic, WASAC was unable to meet water demand in Kigali, with production capacity at approximately 187,000 m^3/day and estimated area-wide demand at 290,000 m^3/day.[11] One of our key informants reported that WASAC was forced to ration water back to two days per week in some parts of its service area in Kigali, a situation compounded by limited household storage. (The soon-to-be-completed Kigali Bulk Water Supply Project (consisting of a water treatment plant, well fields, and pump station, conveyance, and reservoirs) will expand production by 40,000 m^3/day, reducing Kigali's water supply gap by about a third.)

We received reports that WASAC's total revenue shortfall between March and July was on the order of US$3 million, but we could not confirm this with the utility itself. Our interviews with key informants consistently pointed to revenue pressure (despite the fact that the government did not institute a tariff holiday, as was common in other countries in which we conducted deep dive analyses). The revenue decline was driven largely by significant drops in water use by commercial establishments (factories and hotels among them), and to a lesser extent by reduced collections from domestic consumers who missed payments due to income shocks. The government also instructed all water suppliers not to shut off service to those customers in arrears, which led to increases in non-revenue water distributions.

As the movement restrictions eased through the summer, WASAC saw recoveries in revenue, tracking the broader economic rebound.

The private water system operators, who together claim to supply more customers than the national utility, reported a more dire picture.

According to the Association of Private Water and Sanitation System Operators, FEPEAR (Forum des Exploitants Privés des Systemes d'Eau er Assainissement), which represents 17 rural and small-town water system operators in eight Rwandan districts, revenue losses and performance problems were driven by movement restrictions that prevented personnel from travelling to the field.

In contrast to WASAC, FEPEAR members reported severe difficulties in covering operating expenses, including the suspension of personnel salaries, whereby some staff continued to work as "volunteers" in the hope that pay would resume after restrictions were lifted.

Supply chain issues did not affect water supply services for existing WASAC customers, but they did slow service expansions for a time, and appeared to be a greater problem for private operators.

WASAC imports 90 percent of its chemicals, but it maintained a six-month strategic stock, and thus did not suffer performance challenges during the lockdown period. However, WASAC did report that delays in importing hardware slowed system expansions. JICA has committed to assist WASAC with procurement of coagulants and as well as materials for repair of conveyance systems.

FEPEAR expressed more concern about supply chains for hardware, which local suppliers were having trouble procuring from their sources in China and Dubai. Chemical disinfection by FEPEAR member suppliers is rare, so chlorine availability was not reported as a concern.

4.2 SANITATION – CURRENT STATUS

[11] https://www.wasac.rw/fileadmin/user_upload/kigali_network.pdf

In comparison to their responses with respect to water supply, participants in our SMS survey reported modest pandemic-related difficulties around sanitation (both onsite containment and desludging). Across all surveyed countries, between eight and 19 percent reported trouble buying installing or upgrading latrines, and between six and 11 percent reported difficulties with desludging (see *Figure 9*).

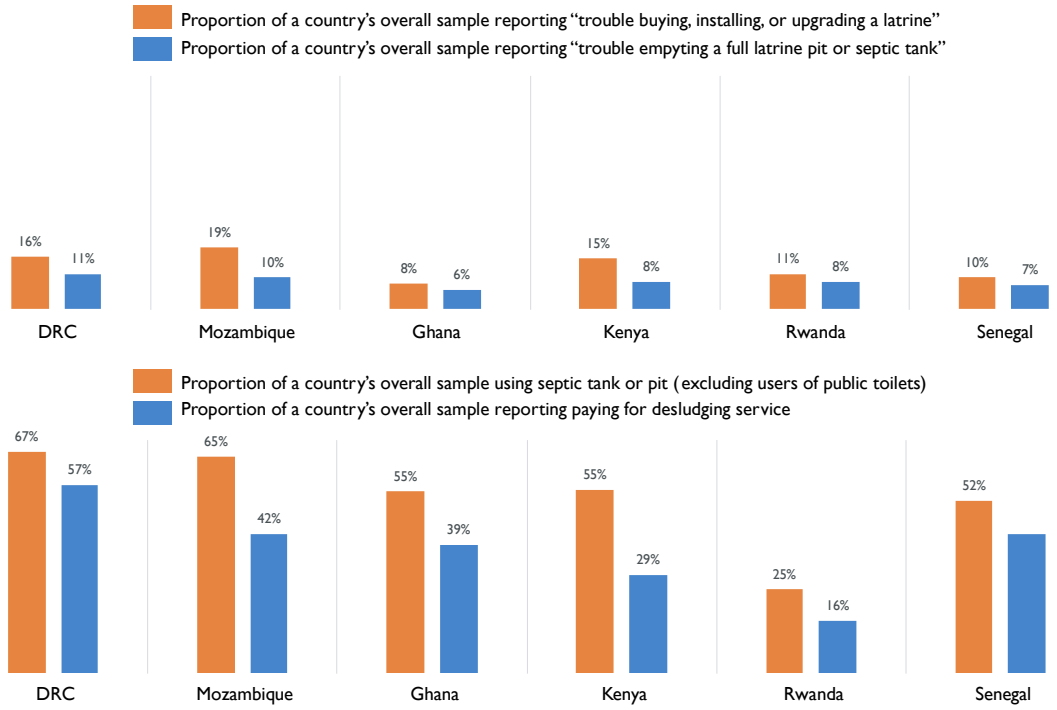

Figure 9. Indicators of sanitation service difficulties reported by respondents to our SMS surveys. N = 500+ participants per country.

In Rwanda, 11 percent of the SMS survey respondents reported having trouble buying, installing, or upgrading latrines, and 8 percent reported trouble emptying a full latrine pit or septic tank (Figure 9). Among those reporting difficulty with purchase, installation, or upgrades of latrines, "I cannot afford it" was the reason given by 54 percent of respondents (data not shown).

As compared to water supply, our SMS surveys of consumers indicate only marginal change in reported sanitation access.

The most notable result of our SMS surveys with respect to sanitation are slight rural shifts away from public toilets, though we see an increase in reported use in shared sanitation (independent of public toilets, which we cannot explain) (*Figure 10*).

Given that sanitation is not sensitive to sudden operational disruptions as can happen with water supply systems (with the exception of piped sewer service, whose profile matches that of piped water supply, but which is enjoyed by an exceedingly small fraction of the populations under study), it is not surprising that consumer reports of sanitation service changes are comparatively modest.

DRC	Rural N=201	Urban N=493
A private one at home	5	0
One I share	-3	0
A public community toilet	1	0
None	-3	-1

Mozambique	Rural N=211	Urban N=375
A private one at home	2	4
One I share	-2	-3
A public community toilet	0	1
None	0	-2

Ghana	Rural N=253	Urban N=356
A private one at home	1	1
One I share	-1	-1
A public community toilet	1	1
None	-1	0

Kenya	Rural N=283	Urban N=465
A private one at home	1	-1
One I share	-2	-1
A public community toilet	2	2
None	-1	0

Rwanda	Rural N=391	Urban N=159
A private one at home	-4	-3
One I share	4	7
A public community toilet	0	-5
None	0	1

Senegal	Rural N=225	Urban N=282
A private one at home	4	6
One I share	-3	-3
A public community toilet	0	-1
None	0	-2

Figure 10. Heat map depicting percentage point changes in reported sanitation level, pre-COVID-19 vs. at present in all deep dive countries. Magnitude of change is captured both by the color and the number in a particular cell. For example, the proportion of urban Rwandan respondents to who reported reliance on a public community toilet dropped by 5 percentage points, and those reporting reliance on a shared household toilet increased by 7 percentage points.

We did not uncover clear evidence of major declines in sanitation product and service sales as compared to the pre-pandemic period.

One of our key informants reported that sales of latrine interfaces (both plastic and concrete) as well as installation services "had taken a big hit," as they are viewed as major, long-term investments that must be delayed during a period of household economic pain. At the same time, USAID's Isuku Iwacu program[12] reported that they did not detect sanitation product demand decreases during the immediate pandemic response period, even though inspections of toilet installation facilitated through the program were halted during that time.

Isuku Iwacu did, however, report that the focus of its eight district sanitation centers—integrated sales, training, and demonstration sites—had begun to shift focus to promotion, production and distribution of hygiene products, including both soap and hand sanitizer. Similarly, soap was described as an elevated priority of USAID's Gikuriro program, a central element of which has been the establishment of 3,200 Community Health Clubs (CHCs) and the government of Rwanda's Community-Based Environmental Health Promotion Programme (CBEHPP).[13]

In assessing the pandemic economic shock's effects on sanitation product and service provision, we note, however, that we did not directly interview any sanitation value chain actors in Rwanda, so these findings reflecting only modest impacts must be read with some caution.

4.3 HANDWASHING – CURRENT STATUS

The pandemic has caused a significant positive shift in handwashing behavior.

Before the pandemic, despite high awareness levels about the importance of handwashing with soap, only 2 percent of rural households and 13 percent of urban households had a handwashing facility with both water and soap available (National Institute of Statistics of Rwanda, 2015). While laundry soap is among the top 20 non-food purchases made by Rwandan households and accounts for 1.5 percent of expenditure at an aggregate level (National Institute of Statistics of Rwanda, 2010/11) in some rural

[12] The Isuku Iwacu program, a USAID-funded, supply-side effort to accelerate sanitation product and service delivery, has established 8 district-based sanitation centers covering a catchment area with 300,000 customers. These integrated centers are positioned at market locations and managed by private sector federations who competed for the opportunity run them, and include showrooms, trainings for technicians and artisans, demonstration sites for public, sales points, and information about wholesalers. Desludging businesses are also featured at the centers.

[13] Ministry of Health of Rwanda. Roadmap for CBEHPP. Kigali: Ministry of Health, Environmental Health Desk, 2010.

areas, its use is prioritized for laundry, dish-washing, and bathing, as opposed to handwashing—possibly because soap is considered an expensive item (Ntakirutimana, 2020).

Handwashing has increased dramatically since the pandemic. About half (57 percent) of our SMS survey respondents report that neighbors wash hands with soap "much more" than before COVID-19, and another 31 percent reported neighbors washing hands with soap "a bit more." Our findings are consistent with those from a recent telephone survey conducted among nearly 4,900 respondents in June 2020 by Finmark Trust, in which 87 percent reported washing their hands more often (Finmark Trust, 2020). Observers attribute this positive shift in behavior to the government's extensive promotion of handwashing as critical in the fight against COVID-19, and its decision to make hand-wash stations and sanitizers compulsory in all public places (World Health Organization, 2020). Churches, bus stations, market places, and all commercial establishments are required to have a handwashing station or provide a sanitizer at the point of entry. Compliance with the regulation varies, however, with instances of violations reported by national media outlets (Bishumba, 2020).

For those who cannot afford soaps, several development agencies, non-profits, and private organizations have set up free handwashing stations and distributed free soap in large quantities (Nkurunziza, 2020; Ministry in Charge of Emergency Management, 2020; Mutangashuro, 2020; Private Sector Federation, 2020; World Vision, 2020; Enable, 2020; Buningwire, 2020).

Stringent lockdowns at the onset of the pandemic and sporadic lockdowns thereafter severely limited mobility and access to soap

Even as reported handwashing behavior has increased, more than half (58 percent) of the Rwandan respondents to our SMS surveys reported that it is more difficult to obtain soap post-COVID-19, as compared to only 25 percent who report that it is easier. This fraction reporting increased difficulty in soap access post-COVID-19 was the highest among the countries for which we conducted deep-dive analyses, and the only case in which the majority of respondents reported soap access getting more difficult.

As we noted above, Rwanda implemented some of the strictest lockdown measures in Africa. Retailers in rural areas depend on markets in Kigali, which is the central trade district, for a regular supply of consumer goods. The lockdown of urban markets, therefore, limited the distribution of soap to rural areas. The Gikuriro program reported: *"Rural areas ultimately depend on the Kigali market, and people have to travel to the district-level markets for goods. For six weeks, it was a strict lockdown. So we don't know how they would have managed to get goods from the district centers during those six weeks."*

Based on anecdotal observations, key informants we interviewed noted in rural areas an increase in home-based production of liquid soap for self-consumption and sale within the community/village since the start of the pandemic. Localized supply could be alleviating distribution challenges to some extent, but the lockdown introduced some constraints. One small manufacturer in Kigali told us that *"For two months (March and April), we stayed at home; we did not venture out at all, not even to sell our soaps."*

While manufacturers and importers report not changing prices, consumers report higher prices of soap, plausibly due to lockdowns disrupting distribution to district-level markets

The market is dominated by multi-purpose bar soap (wrapped or unwrapped, 600gm-1kg) and toilet soap cakes (wrapped, 90gm-225gm). Overall, 150g of soap retails at an average price of RF 690 (USD 0.70) based on analysis of more than 15 different SKU[14] sizes and brands of both cake and bar soaps. Liquid soap is preferred in public places and commercial establishments (Mbabazi, 2020).

[14] Stock Keeping Unit is used to track product inventory is a unique identifier of product characteristics such as manufacturer, brand, style or category, color, and size.

Local manufacturers (including Sulfo Industries, the dominant market player), merchandisers, and traders of imported soaps, reported not raising prices, which we confirmed with interviews with key informants who are not value chain actors. However, respondents to the Finmark Trust survey reported a nine percent increase in the price of soaps between April and May 2020 (Finmark Trust, 2020). This could be due to temporary supply constraints in rural areas owing to a ban on inter-province travel and moto-taxi services from March through June, as part of the nation's stringent lockdown measures (Bower, 2020). While essential movement was permitted to purchase hygiene products, the lockdown severely reduced the flow of goods and passengers at a national level. Mobility restrictions, coupled with the increased demand for soaps during this period, may have resulted in shortages at district-level markets and, thus, impacted the prices of soaps. As a countermeasure, government authorities across the district, sector, and national levels issued public directives for local businesses to freeze the prices of essential commodities, and are also penalizing businesses that violate the directive (Taarifa Rwanda, 2020).

Manufacturers and importers are facing increased transit times for shipments of raw materials and soaps from neighboring countries, mainly Kenya and Uganda due to border closures and political tensions, but nonetheless, the overall availability of soaps has not been affected.

Soap is now widely available in both urban and rural areas in Rwanda.

Imported soaps, primarily from Uganda and Kenya, account for 60 percent of Rwanda's soap market (Gathani, 2013; The Observatory of Economic Complexity, 2018), Local soap manufacturers also rely on imports for their key raw materials, palm oil and its by-products (i.e., stearin and palm fatty acid) and caustic soda from Indonesia, Kenya, Saudi Arabia, and India.

In the wake of the pandemic, mandatory COVID-19 testing of truck drivers at the points of entry at borders with Kenya, Uganda, and Tanzania has resulted in lengthy cross-border delays. Total transit times for goods to reach their destinations have more than doubled (from 4-7 days to up to 15 days) (Munda, 2020). In addition, political tensions between Rwanda and Uganda since February 2019 until as recently as June 2020 often create disruptions (Biryabarema, 2019; Musisi, 2020). Despite these delays and political tensions, imported soaps are not in shortage in the Rwandan market. Ugandan soaps also continue to find their way into Rwanda through Kenyan or Tanzanian importers. Similarly, our key informants report that while manufacturers are facing similar delays in transit times for raw materials, the availability of raw materials is not a challenge.

Key informants report that raw material prices, linked with global prices of palm oil and chemicals, saw a marginal increase during the peak months of March and April but did not have any impact on retail prices of mass-market soap brands. However, small-scale manufacturers may be more adversely affected by cross-border mobility restrictions; one small-scale manufacturer of liquid soap with whom we spoke, who would usually travel by themselves to Kenya to procure raw materials directly at a reasonable price, had to instead purchase their raw material in May from traders in Rwanda at a 40 percent higher price because borders remained closed except for freight transport trucks (Iribagiza, 2020). While this manufacturer increased their retail price by 20 percent during this period, overall, soaps by small-scale manufacturers are still considerably cheaper than mass-market soap brands.

While there is an increase in the supplier base of hand-sanitizers since the pandemic, sanitizers remain significantly more expensive than soaps and are considered a premium item.

Hand sanitizers are significantly more expensive than bar or toilet soaps. As an example, a 500ml of Sulfo Industries' hand-sanitizer, under the brand-name of Sante, is priced at RF 5,000, while its 225g toilet soap of the same brand-name is available at RF 400.

Hand-sanitizers were not commonly used in Rwanda before the pandemic. In mid-March, when the pandemic first surfaced in Rwanda, and the government began to urge citizens to wash or sanitize their hands regularly, there was a shortage of hand-sanitizers in the local markets. In response to the increasing demand, several local distilleries and other small- and large-scale enterprises began producing and selling alcohol-based hand-sanitizers (Bizimungu, 2020). At the same time, there was a surge of fake hand-sanitizers in the market, containing harmful ingredients such as methanol (Kagire, 2020; Rwanda Food and Drugs Authority, 2020).

Despite an increase in demand and an expanded supplier base, hand sanitizers remain an expensive product, unaffordable for a large majority of the population, and in fact, witnessed a sharp increase in prices (almost two times higher) in March 2020 (Tasamba, 2020). According to a local manufacturer, alcohol price increased by 70 percent while the price of packaging material went up five-fold in late March (Bizimungu, 2020).

Inadequate availability of water could impede sustained handwashing behavior change.

One of our key informants suggests that the lack of water and an insufficient number of handwashing stations in public places may be limiting the practice of regular handwashing. As we highlight in *Table 3*, on-premises water supply is limited in Rwanda, and thus poses an obstacle for handwashing. *"In some places, you have to walk 1-3km to get water in small quantities, so they have to prioritize it for cooking and other purposes. Handwashing regularly is not possible."*

"The lines are long and not only are the washing stations few, but there is no constant water flow. It has been challenging, and we expect it to get worse now that the number of people has gone up" – a youth volunteer at Nyabugogo Taxi Park (Bishumba, 2020)

Key informants we interviewed do expect that a higher percentage of households would now opt for handwashing facilities on-premises and practice regular handwashing post-pandemic, but warn that limited access to water could constrain long-term behavior change.

5. FUTURE WASH ACCESS TRENDS IN RWANDA

Rwanda's COVID-19 responses has drawn praises for its speed and coordination, and its rates of infection and morality remain among the lowest in Africa.

5.1 WATER SUPPLY

The economic effects of COVID-19 have clearly placed stress on WASAC, and our SMS surveys reveal high levels of pandemic-driven drinking water access difficulties in Rwandan urban settings. At the same time, our key informant interviews have not yielded evidence of widespread service disruption past the pre-COVID-19 challenges faced by the utility to meet urban demand. While there have not been dedicated financial rescue packages directed at WASAC as part of the international donor response to COVID, we do not anticipate Rwanda's urban water supply challenges will be significantly compounded by the pandemic. Indeed, the country's most significant immediate water supply concern is the inability of existing infrastructure to meet demand, some of which will be addressed by the Kigali Bulk Water Supply project.

Based on our interviews, the pandemic's economic shock appears to have hit rural and small-town providers quite hard, though rural respondents to our SMS surveys did not report the same degree of water access difficulties that urban respondents did (perhaps a function of the comparatively large fraction of rural populations relying on protected springs, which should not have been affected by the pandemic economic shock). We do not anticipate widespread water supply system failures in rural and small-town Rwanda, but we do suggest attention be paid to non-WASAC providers, as they are clearly less financially resilient.

5.2 SANITATION

Based on interviews with NGO managers of sanitation programs, we foresee no immediate risks to these value chains in the immediate term, and expect the market to track economic conditions more generally.

5.3 SOAP

This subsector is probably the most difficult to forecast, largely because the changes in handwashing behavior that are indicated by our SMS surveys are to our knowledge unprecedented. Though there are indications of a modest decline in self-reported handwashing following an easing of concern regarding COVID-19 in low-income countries, we have no historical precedent on which to base an assumption that the decline will continue rather than the change in behavior becoming entrenched as a durable social norms shift.

What we deem likely is that soap will become more affordable to consumers in response to income recovery from the COVID-19 shock. Whether increased consumer spending power will result in increased soap sales (or returns to premium brands at rates that restore the margins of manufacturers) is uncertain; indeed, it certainly is possible that handwashing behaviors will decline again as the pandemic recedes. We do not see declines in soap access outside of the affordability challenges of reduced incomes.

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APPENDIX 1 - LIST OF KEY INFORMANTS

Below we list the organizational affiliations of those key informants we interviewed. We interviewed multiple respondents at several institutions.

Category	Organization
Donor	JICA
Donor	World Bank
NGO	Catholic Relief Services
NGO	SNV
NGO	WaterAid
NGO / USAID Program	Gikuriro (CRS)
NGO / USAID Program	Isuku Iwacu (SNV)
Service Provider	WASAC (Water and Sanitation Corporation)
Service Provider (Association)	FEPEAR
Value Chain Actor	Iwacu Soap
Value Chain Actor	Mount Meru Soyco
Value Chain Actor	Sulfo Industries

APPENDIX 2 - SMS SURVEY INSTRUMENT

English Version

Q #	Q Name	English	Skip Pattern
NA	Opt-In-Incentive	GeoPoll: Reply 1 to answer questions on Coronavirus and earn #TOPUP# ! No cost to reply. For help reply HELP	1 = BirthYear HELP = Help
NA	Help	GeoPoll is a global network of people shaping their community by answering short surveys. Free to respond. Reply STOP to Opt-Out. Visit GeoPoll.com for info	1 = BirthYear STOP = Refusal
NA	Refusal	Thank you for your time, you will be removed from today's survey. For more information or to register for future surveys please visit GeoPoll.com	End poll declined
NA	Ineligible	You are ineligible for this survey. For more information on Coronavirus prevention visit who.int	End poll ineligible
	Language	Which language do you wish to proceed with? 1)English 2)French 3)Kinyarwanda	1 = BirthYear [English] 2 = BirthYear [French] 3 = BirthYear [Kinyarwanda]
1	BirthYear	In what year were you born? Reply with a four-digit number like 1980.	1900-1919 = Ineligible 1920-2005 = Gender 2006-2020 = Ineligible
2	Gender	Are you male or female? Reply with 1 or 2. 1)Male 2)Female	1-2 = ADM-1

Q #	Q Name	English	Skip Pattern
3	Province	What Province do you currently live in? Reply with a number. 1)Kigali 2)Southern Province 3)Western Province 4)Northern Province 5)Eastern Province	Any response = Urban/Rural
4	Urban/Rural	Do you live in a urban or rural area? Reply with 1 or 2. 1)Urban area 2)Rural area	1 = Migrate 2 = Employment
5	Migrate	Has COVID-19 and the lockdown led you to move to a new home? 1)Yes - Within my city/town 2)Yes - Outside of my city/town 3)No - I still live in the same place	1-3 = Employment
6	Employment	Has COVID-19 changed your employment? 1)No - It is the same 2)Yes - I earn less money 3)Yes - I lost my job 4)Yes - I got a new job 5)Yes - I earn more money	1-5 = Business1
7	Business1	Before COVID-19, did you run a business (not a farm)? Reply with 1 or 2. 1)Yes 2)No	1 = Business2 2 = WaterChange

Q #	Q Name	English	Skip Pattern
8	Business2	How has COVID19 affected your business? 1)More income 2)No change 3)Income dropped a little 4)Income dropped a lot 5)I closed my business	1-5 = WaterChange
9	WaterChange	Has COVID-19 made it more difficult to get your drinking water? Reply with 1 or 2. 1)Yes 2)No	1 = WaterChangeHow 2 = Toilet
10	WaterChangeHow	How is it more difficult to get your drinking water? 1)I have less money to pay for it 2)Prices are up 3)It is harder to find 4)I must travel further to get it	1-4 = PreWaterSupply
11	PreWaterSupply	Before COVID-19, how did you get your drinking water? 1)Piped connection 2)Well 3)Bottled water/sachet 4)Tanker 5)Cart vendor 6)Rainwater 7)Spring 8)River/pond	1 = PipeDetails 2 = WellDetails 3 = BottlewaterDetails 4 = CurrentWaterSupply 5 = VendorDetails 6 - 8 = CurrentWaterSupply
12	PipeDetails	Where is the pipe that you use? Reply with 1 or 2. 1)In my home or compound 2)I must walk to it	1-2 = CurrentWaterSupply
13	WellDetails	Where is the well that you use? Reply with 1 or 2. 1)In my home or compound 2)I must walk to it	1-2 = WellDetails2

Q #	Q Name	English	Skip Pattern
14	WellDetails2	How do you get your water from the well? 1)With a handpump 2)With a diesel pump 3)With a rope and bucket 4)Not sure/other	1-4 = CurrentWaterSupply
15	BottlewaterDetails	Has getting bottled or sachet water changed since COVID arrived? 1)More expensive 2)Less expensive 3)Harder to find 4)Easier to find 5)No change	1-5 = CurrentWaterSupply
16	VendorDetails	Has buying water from vendors changed since COVID arrived? 1)More expensive 2)Less expensive 3)Harder to find 4)Easier to find 5)No change	1-5 = CurrentWaterSupply
17	CurrentWaterSupply	How do you get your drinking water now? 1)Piped connection 2)A well 3)Bottled water/sachet 4)Tanker truck 5)Vendor 6)Rainwater 7)Spring 8)River	1-8 = WaterService
18	WaterService	What else makes getting water difficult now? 1)Fewer hours per day of service 2)Problems take longer to be fixed 3)I am afraid of waiting in a queue 4)No change	1-4 = WaterShort

Q #	Q Name	English	Skip Pattern
19	WaterShort	In the past week, was there a day when you couldn't get enough water to meet your household's needs? Reply with 1 or 2. 1)Yes 2)No	1-2 = Toilet
20	Toilet	Before COVID arrived, what kind of toilet did you use? 1)A private one at home 2)One I share with a few other households 3)A public community toilet 4)None	1-4 = Toilet2
21	Toilet2	What kind of toilet do you currently use? 1)A private one at home 2)One I share with a few other households 3)A public community toilet 4)None	1-3 = Toilet3 4 = Handwashing
22	Toilet3	Does the toilet you use most of the time include a septic tank or pit? 1)Yes 2)No 3)Not sure	1 = PitEmptying1 2-3 = Handwashing
23	PitEmptying1	Do you pay someone to empty your latrine pit or septic tank when it is full? Reply with 1 or 2. 1)Yes 2)No	1 = PitEmptying2 2 = Upgrade
24	PitEmptying2	Since COVID arrived, have you had trouble emptying your full latrine pit or septic tank? 1)Yes 2)No - I haven't tried to empty it 3)Pit/tank not yet full	1 = PitEmptying3 2-3 = Upgrade
25	PitEmptying3	How has emptying your latrine pit or septic tank changed since COVID arrived? 1)I cannot afford it 2)The service is no longer available in my area 3)Other	1-3 = Upgrade

Q #	Q Name	English	Skip Pattern
26	Upgrade	Since COVID arrived, have you had trouble buying, installing, or upgrading a latrine? 1)Yes 2)No 3)Did not try to buy/install/upgrade since COVID arrived	1 = Upgrade2 2-3 = Handwashing
27	Upgrade2	How has buying, installing, or upgrading a latrine changed since COVID arrived? 1)I cannot afford it 2)I cannot find anyone who is selling what I need 3)Other	1-3 = Handwashing
28	Handwashing	Do you notice your neighbors and friends washing their hands with soap more often than before COVID-19? 1)Much more 2)A bit more 3)The same amount 4)Less	1-4 = Handwashing2
29	Handwashing2	How do you usually wash your hands? 1)With water 2)With water and soap 3)With water and sand/ash/other	1-3 = Handwashing3
30	Handwashing3	Since COVID arrived, has it become easier or more difficult for your family to obtain any kind of soap to wash hands? 1)Easier 2)Harder 3)About the same	1 = Handwashing4 2 = Handwashing5 3 = Close-out-Incentive
31	Handwashing4	What has made it easier to obtain soap for handwashing? 1)Lowered prices 2)Free give-aways 3)Other	1-3 = Close-out-Incentive

Q #	Q Name	English	Skip Pattern
32	Handwashing5	What has made it harder to obtain soap for handwashing? 1)Higher prices 2)Shops ran out of it 3)Shops don't sell it 4)Shops selling it have closed	1-4 = Close-out-Incentive
NA	Close-out-Incentive	GeoPoll: Thank you! You will receive #TOPUP# airtime credit within 2 days. For more information on Coronavirus prevention visit who.int	

APPENDIX 3 - SANKEY DIAGRAM FOR WATER SUPPLY MODALITY CHANGES

The Sankey figure presented below illustrates the change in water service type resulting from the COVID-19 pandemic, as reported by respondents of the SMS surveys. At left of the figure is the reported breakdown of supply modalities pre-COVID, and at right is the reported breakdown at the time the survey was administered. Modalities are arrayed vertically in decreasing levels of water service. Upward sloping curves from left to right indicate an increase in service level, and downward sloping curves indicate a decrease in service level. The steeper the curve, the more dramatic the service level change. Numbers within the columns refer to the total number of respondents reporting a particular service modality either pre-COVID (at left) or at present (at right). We note, in addition to those reporting movement away from piped systems, the comparatively large number of respondents who reported corresponding increases in service level, particularly to piped connections within walking distance (possibly due to increased provision at emergency distribution sites).

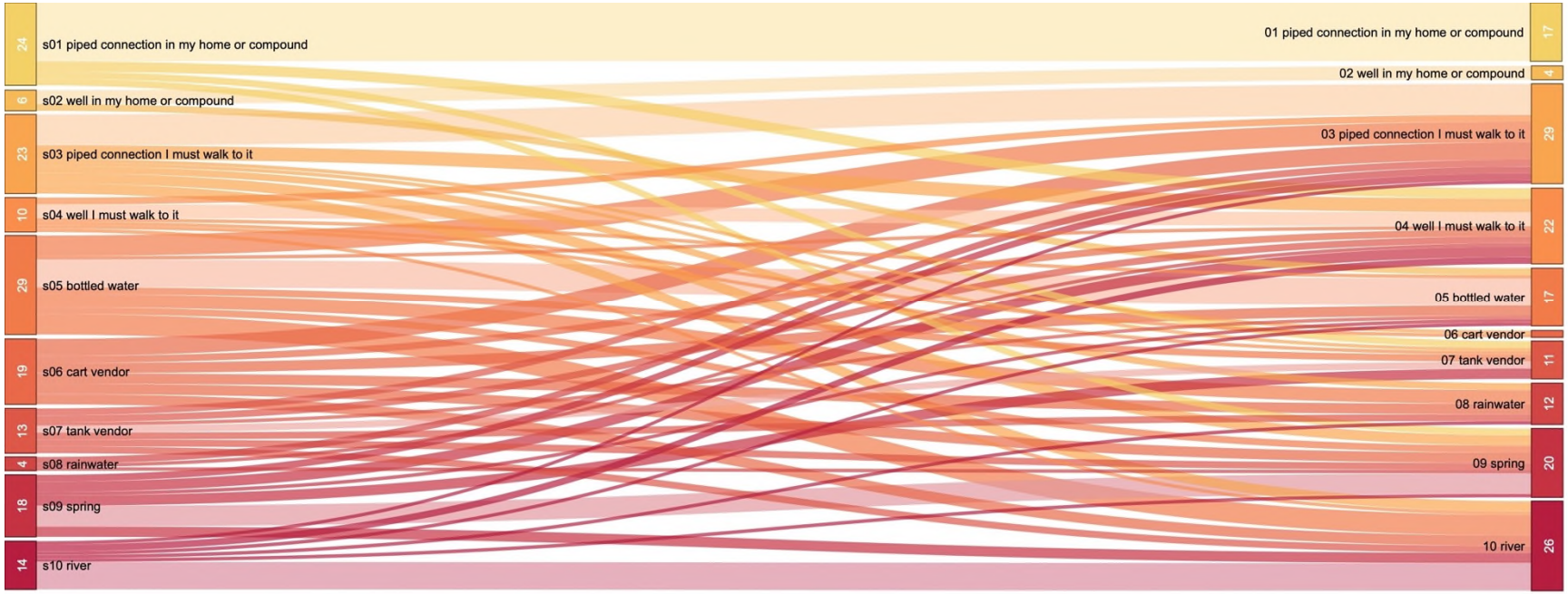

Figure 11. Rwanda Sankey diagram. Water modality changes reported by respondents to our SMS survey in Rwanda among the subset of respondents who reported pandemic-driven water supply difficulties.

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