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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 - Kenya

FEBRUARY 2021

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ACRONYMS AND ABBREVIATIONS

ADM-1	First administrative level
CLSG	Conditional liquidity support grant
CLTS	Community-Led Total Sanitation
COVID-19	Coronavirus Disease 2019
DHS	Demographic and Health Survey
DMM	Delegated management model
DRC	Democratic Republic of the Congo
GWC	Global WASH Cluster
JICA	Japan international Cooperation Agency
KES	Kenyan Shilling
KIWASCO	Kisumu Water and Sanitation Company
KIWASH	Kenya Integrated Water, Sanitation, and Hygiene Project
KPLC	Kenya Power and Lighting Company
KWAHO	Kenya Water and Health Organization
LIA	Low income area
LMIC	Low-to-middle-income country
MAWASCO	Mathira Water and Sanitation Company
MBS	Market-Based Sanitation
MICS	Multiple Indicator Cluster Survey
MOWASSCO	Mombasa Water Supply and Sanitation Company
NAWASCO	Nanyuki Water and Sanitation Company
NAWASSCO	Nakuru Water and Sanitation Services Company
NYEWASCO	Nyeri Water and Sanitation Company
OD	Open defecation
PPE	Personal protective equipment
SMS	Short Message Service (Text Message)
SWA	Sanitation and Water for All
THIWASCO	Thika Water and Sewerage Company
VAT	Value-added Tax
WASPA	Water Services Provider Association
WASREB	Water Services Regulatory Board
WHO	World Health Organization
WSTF	Water Sector Trust Fund
WSUP	Water and Sanitation for the Urban Poor

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 Kenya.

The COVID-19 pandemic control measures instituted by the government of Kenya resulted in restrictions on mobility that were sustained for longer periods than other countries we investigated, likely serving to compound significant losses that the Kenyan economy suffered from major pandemic-related declines in both tourism and remittances. Respondents to our SMS surveys reported that COVID was devastating for their incomes, with almost half (47 percent) reporting losing their job and another 35 percent reporting earning less money. Among the 50 percent that ran a non-farm business, 42 percent closed their business. Kenyan water service providers (WSPs) were required by the government to provide tariff-free water to low-income areas (LIAs), including previously unserved areas, and to reconnect disconnected customers. This intervention has caused considerable financial pressure on WSPs.

Our topline findings, by subsector, are as follows:

WATER SUPPLY – CURRENT STATUS

1) Some 38 percent of Kenyans report pandemic-linked difficulties in drinking water access, a proportion comparable to other USAID high priority and strategy-aligned countries we investigated. These numbers occur despite the Kenyan government's commitment to sustaining supply for vulnerable populations during the initial pandemic movement restriction measures,

[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).

and are likely linked to the more pronounced reported economic distress in Kenya than we observed in other USAID high priority and strategy-aligned countries.

2) Reported losses in piped service in Kenya among both urban and rural respondents are the highest we observed across the countries we analyzed. Comparing the pre- and post-COVID-19 periods, there was a 14 percentage point decline in piped water service stated as the primary source of drinking water among urban respondents who report pandemic-linked water access difficulty, and a 20 percentage point decline among rural respondents (again, despite the government's stated commitment to sustain service to vulnerable groups).

3) Both large and small water service providers have suffered major losses due to tariff holidays and elevated production associated with both free provision and emergency water provision measures. Smaller providers are particularly vulnerable, making clear the need for efficient distribution of rescue funds to operators other than the largest urban utilities.

SANITATION – CURRENT STATUS

4) Consumers do not report significant declines in sanitation service attributable to the pandemic, but some do report difficulties in accessing products and services because of income shocks. Across every sanitation service modality, there was no more than a 2 percentage point change reported between the pre-pandemic period and the present. However, 15 percent of respondents reported difficulty in buying, installing, or upgrading latrines, and of those, 84 percent attributed the difficulty to affordability in the current circumstances.

5) Financially-stressed households have deprioritized the purchase of new sanitation facilities and deferred pit emptying services. Providers of onsite containment inputs as well as de-sludging services reported dramatic sales declines during the first several months following movement restrictions, resorting to cost-cutting measures and other coping strategies to endure their losses.

HANDWASHING – CURRENT STATUS

6) Consistent with a number of studies, self-reported handwashing behavior is very high during the pandemic period.

7) We found no evidence of persistent or widespread shortages of soap and other hygiene products, and found multiple examples of both soap prices and availability remaining constant. 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 income losses have mounted.

NEAR-TERM FUTURE TRENDS

8) Given the scale of interest from development partners as well as commitment by the government, we do not anticipate that Kenya's better managed water service providers will suffer from significant performance problems due to revenue losses from the free water directive; their growing debt burden is the more pressing concern. Widespread service disruptions were avoided during the full national lockdown imposed in the first three months of the pandemic, in no small part because the Kenyan government directed the national electric utility not to disconnect water service providers (which allowed pumps to continue functioning). This continuity of service occurred despite delays in the disbursement of committed World Bank assistance (now anticipated to proceed in early 2021). Of greater concern is the accumulation of arrears, since the government electricity directive for water supply is only with regard to disconnection; the charges remain in effect.

9) There are encouraging signs of financial recovery by the best performing providers. While not anywhere near pre-COVID-19 levels, cost recovery is on the increase among the better managed water supply systems (mostly mid-to-large providers). The situation of the smaller providers and more poorly managed systems, however, is less clear, and their financial picture remains bleak.

10) Effects on non-piped water access in rural settings are likely to be less pronounced, though the downtime of systems employing deep lift handpumps could increase if the declining revenues limit the resources available to operators for regular maintenance. At the same time, however, it is worth remembering that even in pre-pandemic circumstances, handpumps recover only on the order of 10% of the operating costs (McNicholl et al. 2019).

13) 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 should recover if and when economic activity rebounds. If the economic recovery is more prolonged and there are delays in consumers ability to service, replace and/or repair their latrines, we may see a reversion to open defecation.

14) 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 Kenya.

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 inability to pay for or suspension of loans; 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 served to help 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 of 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 HHs 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 the Democratic Republic of the Congo (DRC), Ghana, Kenya, Mozambique, Nepal, Rwanda, and Senegal (*Figure 1*).

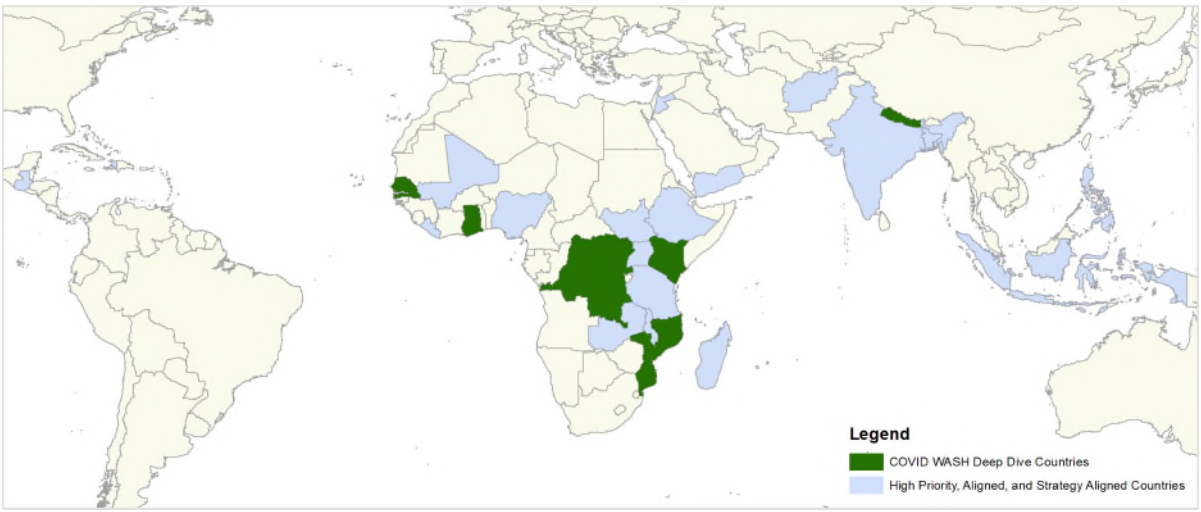

Figure 1. Highlighted countries are USAID high priority and strategy-aligned countries, with the deep dive countries in green.

Our preparatory work for the 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.

We consulted the USAID Mission in Kenya for guidance and recommendations on key informants. In anticipation of difficulties in reaching selected key informants and our interest in interviewing last-mile product and service providers, we employed "snow-balling" by requesting initial key informants for introductions or contact details (e.g. requesting NGOs and value chain actors for the contacts of their partners).

2.1 KEY INFORMANT INTERVIEWS

We conducted semi-structured interviews of 22 key informants via phone or videoconference in Kenya. 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 Appendix 1):

- national and local government officials, both policymakers and regulators,
- operators of water supply systems,
- providers of sanitation products (latrine inputs) and services (pit/tank emptying, fecal sludge transport, and waste management),
- producers and distributors of hygiene products (mainly soap)
- implementers of donor-funded WASH programs, and
- multilateral and bilateral donors and implementers (such as the World Bank, UNICEF, DfID, JICA, and others).

We developed interview guides for each key informant group. Questions for local and national government officials aimed to confirm national-level policy responses with respect to wat/san service provision, including mandates on tariffs, to hear senior-level perspectives on the extent of financial and operational challenges faced by service providers and the access challenges faced by consumers, and to get introductions to other key actors who could offer meaningful information, particularly regional and local water service providers themselves. For WASH products and service providers, we focused on if and how provision of water, sanitation service and product delivery had been disrupted by the economic consequences of pandemic. We conducted nearly all key informant interviews via internet teleconference, complemented with selected in-person meetings following social distancing and masking protocols.

2.2 SMS CONSUMER SURVEYS

In addition to the key informant interviews, we conducted cross-sectional SMS survey of at least 500 respondents per deep dive country. We contracted the mobile-based research firm GeoPoll to conduct the survey on our behalf, 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 we analyzed, 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 instrument consisted of 33 questions, with skip patterns that meant that a respondent typically saw on the order 20-25 questions. In Kenya, we offered the surveys in English.

Our survey contained modules on employment and migration, water supply, sanitation, and handwashing. Under 1 percent of respondents refused the initial offer of phone credit in return for filling out the survey, and 50 percent filled the survey to completion during the latter half of August 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.

The surveys ran from 12 to 20 August 2020, and to achieve the target sample of each subgroup (by age, gender, and region) we collected the 748 surveys we analyze here. The sample of respondents was broadly representative of Kenya. We had a range of ages, with 31 percent ages 15-24, 44 percent ages 25-40, and 25 percent over 40. By design, around half (48 percent) of the respondents were female. Also by design, respondents were geographically dispersed, with 10 percent in Nairobi and less than 5 percent in each of the other 46 counties. 58 percent were urban residents.

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

3. KENYA CONTEXT

3.1 PRE COVID-19 WASH COVERAGE

According to the UNICEF/WHO Joint Monitoring Programme, 68 percent of Kenya's population had access to an improved water supply source and 51 percent had access to improved sanitation as of 2017, though the Kenyan census data indicates considerable regional variation (see Figure 2).

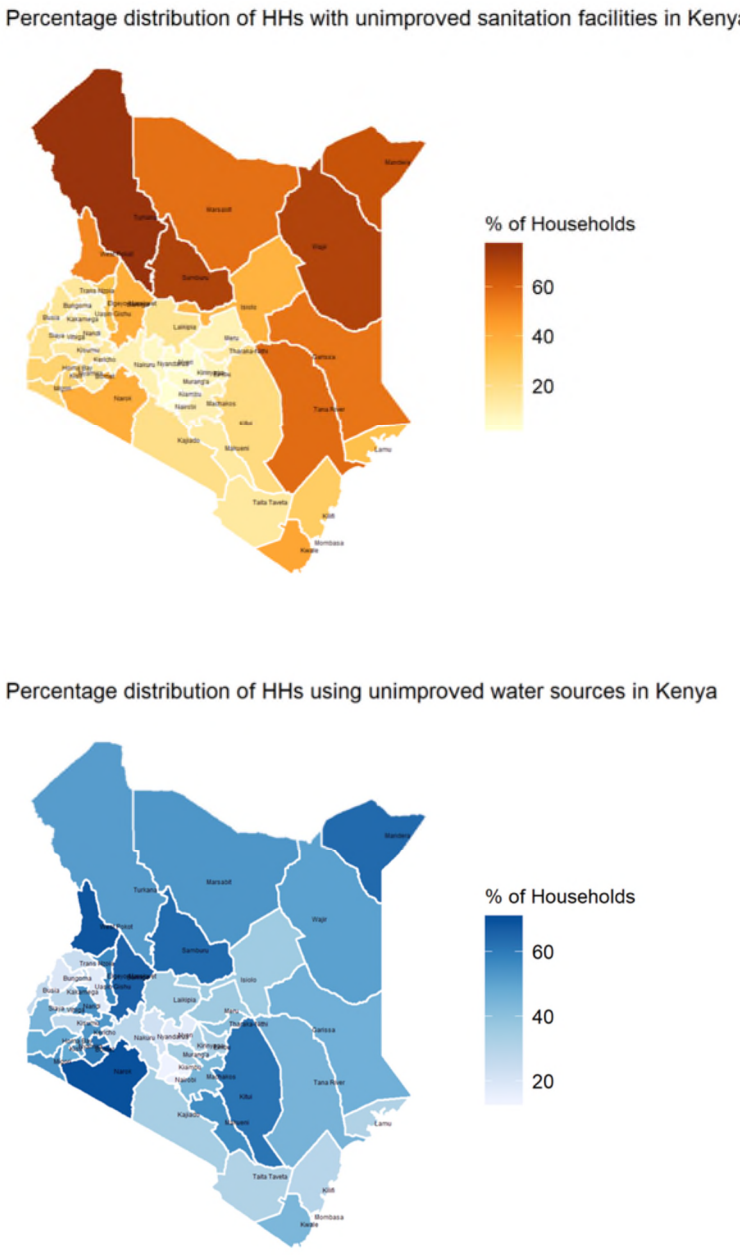

Figure 2. Proportions of households lacking access to improved sanitation (top) or improved water supply (bottom), by District. Source: Kenya National Bureau of Statistics, 2019.

Figure 3 illustrates national trends for improved water and sanitation in Kenya between 2000 and 2017, as estimated by Deshpande et al. (2020) using a geostatistical model, with improved water access increasing steadily across Kenya between 2000 and 2012, but with a leveling off and modest decline through 2017. At the same time, they find a steady decline in open defecation between 2007 and 2017, in parallel with an increase in unimproved sanitation and a more modest increase in piped sewer.

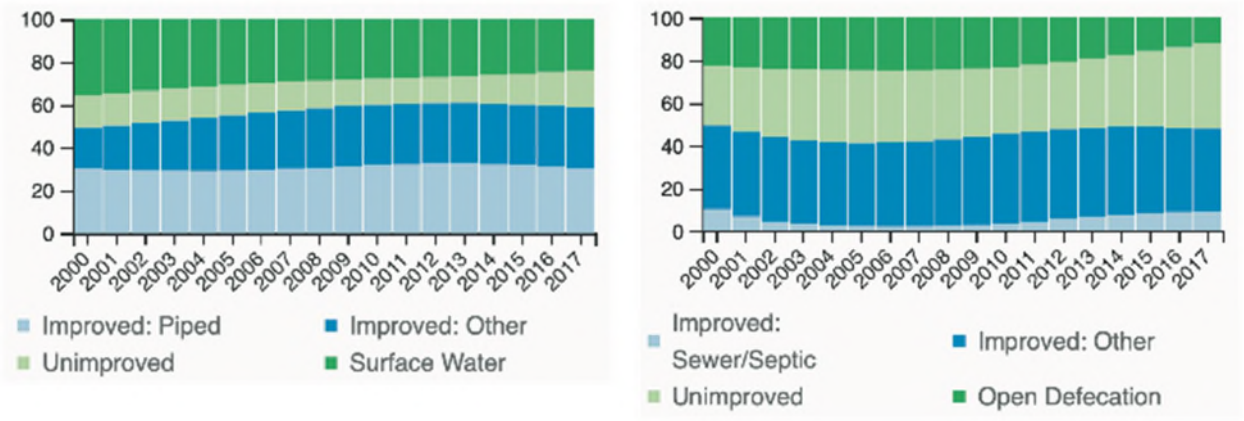

Figure 3. Trends in improved water access (left) and sanitation access (right) as estimated by Deshpande et al. 2020. Plots are drawn from interactive maps made available at https://vizhub.healthdata.org/lbd/wash

The most recent Demographic and Health Survey (DHS) or Multiple Indicator Cluster Survey (MICS) was the 2014 DHS, with summary results offered in *Table 2*:

Table 2. Summary of WASH Data from the 2014 Demographic and Health Survey (DHS).

Indicator	Percentage (%)
Proportion of population with access to improved water source	71.3
Sources of Improved Water	
Piped water (including into dwellings, yard/plot, neighbors, and public tap/standpipe)	43.6
Tube-well/ borehole	6.3
Bottled water	1.9
Protected well	7.6
Rainwater collection	3.7
Proportion of population with access to improved sanitation	52.8
Types of Improved Sanitation Facilities	
Flush/ pour flush to: i) Piped sewer system, ii) Septic tank, iii) Pit latrine, iv) other	17.0
Ventilated improved pit latrine	15.6
Pit latrine with slab	19.8
Proportion of population where place for handwashing was observed	33.6
Urban	42.7
Rural	27.1

According to the 2014 DHS, nearly 44 percent of Kenyans reported being served by a piped connection, of which roughly a third is via a public tap or standpipe. Roughly three times more urban residents (46

percent) than rural residents (15 percent) report being served by a piped connection into their dwelling or plot. Tube-wells/boreholes provide the main reported source of drinking water to 6.3 percent of the Kenyan population, though with another big urban-rural split (with 3.8 percent of the urban population reporting it as the principal source, as compared to 8 percent of the rural population).

On the sanitation side, improved sanitation also exhibited a strong urban-rural split, with 76 percent of urban residents reporting access vs 36 percent of the rural populations. 18 percent of the urban population was served by either sewered sanitation or pour-flush to a septic tank, as compared to less than 1 percent of the rural population. Reported open defecation in urban areas is 11 percent, approximately a third of that reported in rural areas (31 percent).

As of 2014, thirty-four percent of households in Kenya had an observable place for washing hands (*Table 2*), corresponding to 42 percent of urban and 27 percent of rural households. Fewer share of households (80 percent of urban and 70 percent of rural) have water available than soap (89 percent of urban and 83 percent of rural) at their hand-washing facility. Regional variations were considerable, with ranging from 56 percent of DHS survey respondents in Central province to 17 percent in Nyanza province.

3.2 COVID-19 SITUATION AND GOVERNMENT RESPONSE

As of mid-October, Kenya had recorded a cumulative total of approximately 42,000 confirmed cases of COVID-19, corresponding to roughly 770 confirmed cases per million inhabitants, and 766 confirmed deaths. Cumulative confirmed cases and deaths have increased much more modestly than in other deep dive countries since the beginning of August (see *Figure 4*).

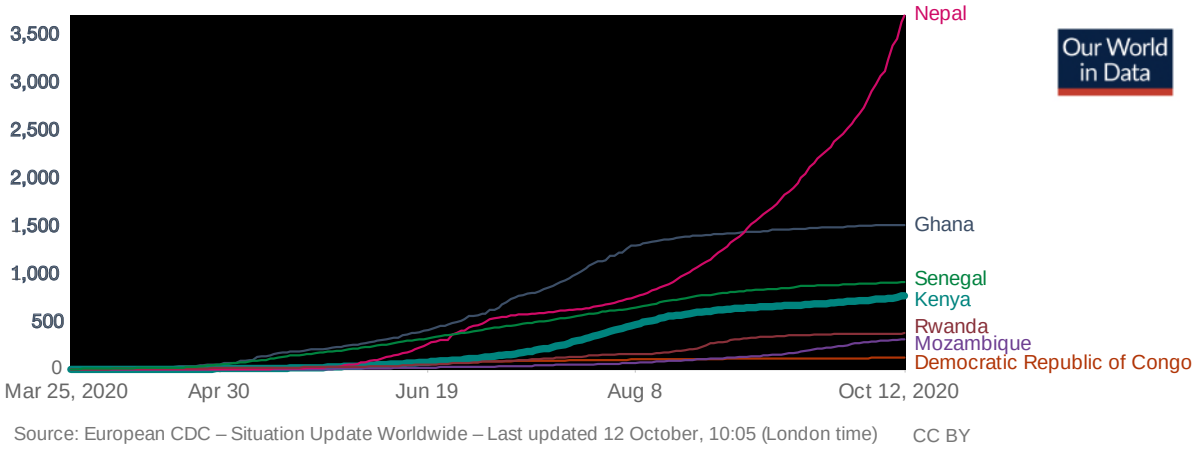

Figure 4. Cumulative confirmed COVID-19 cases per million people. Kenya highlighted in bold. Source: Our World in Data.

The main movement restrictions instituted by the Kenyan government were:

- lockdown of Nairobi Metropolitan areas and Mombasa county from 6 April to 7 July, lock down of Kilifi and Kwale counties from 6 April to 6 June. Mandera county lock down from 22 April to 7 July. Lock down of Eastleigh (LIA in Nairobi) and Mombasa city from 7 May until 6 June
- domestic flight suspension from 25 March to 15 July
- international flights suspension from 25 March to 1 August (with the exception of cargo and government-chartered flights)
- curfew from 17h00 to 05h00 from 27 March to 7 July, and adjusted to 21h00 to 04h00
- school closings on 15 March, expected to continue through January 2021.

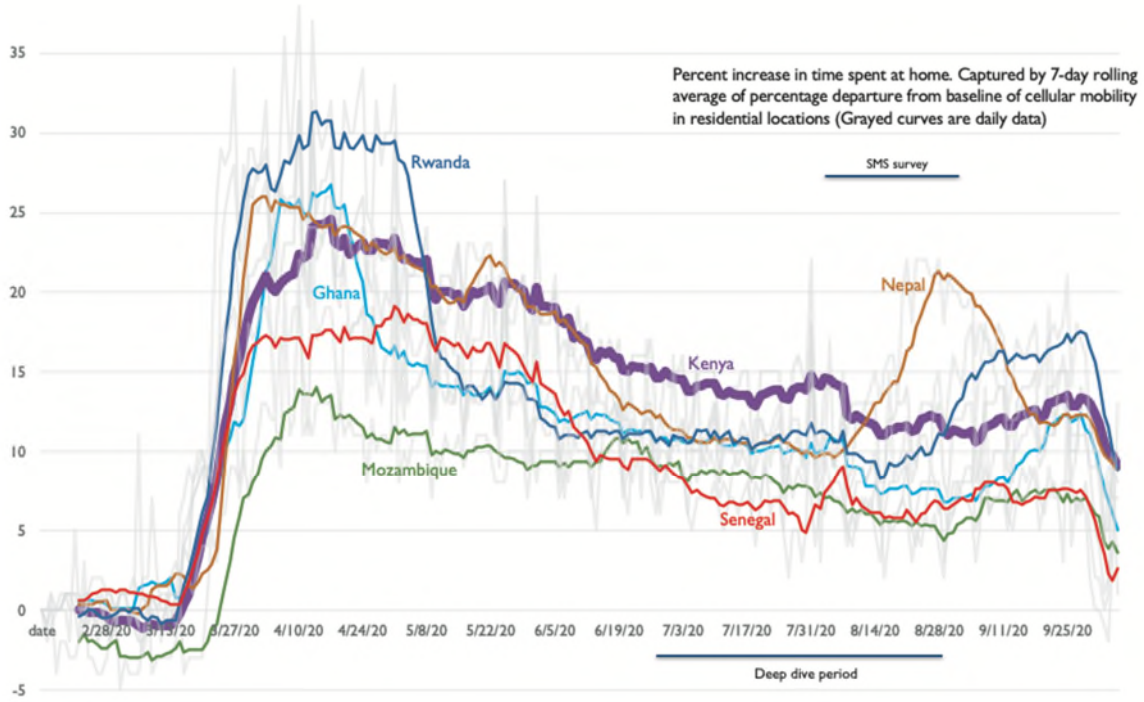

Figure 5. Percent departure from baseline mobile phone mobility, residential category, February to early October 2020. Periods of our SMS survey and deep dive interviews are noted. Kenya is highlighted in bold. The higher the value, the more time the cell phone user spends at home (and less time at commercial,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

These restrictions correspond to restrictions on mobility (and consequent increases time spent at home) that were sustained for longer periods than other countries we investigated (see *Figure 5*). From May to August, the reductions on movement from the home in Kenya were five to 8 percentage points higher than the other countries we tracked, likely serving to compound significant losses that the Kenyan economy suffered from major declines in both tourism and remittances. Taken together, this is suggestive of a longer period of economic shock.

Kenyan water service providers (WSPs) also were subject to government directives, including:

- free water service provision to low-income areas (LIAs), including previously unserved areas
- no disconnection of non-paying customers
- reconnection of disconnected customers
- establishment of additional water points in LIAs (via tanker delivery)
- installation of handwashing stations in public areas.

The government's economic measures included

- reduction the individual and corporate tax rates
- reduction of VAT from 16 percent to 14 percent
- immediate disbursement of the KES 1 Billion from the Universal Health Coverage budget towards the recruitment of additional health workers to provide support in the management of the spread of COVID-19

3.3 THE COVID-19 ECONOMIC SHOCK

Our SMS surveys (N=748) asked respondents about how their employment had changed due to the pandemic. Respondents reported that COVID was devastating for their incomes. Almost half (47 percent) reported losing their job and another 35 percent report earning less money. Among the 50 percent that ran a non-farm business, 42 percent closed their business. There was overlap in job losers and business closures, so 53 percent of respondents either lost a job or closed a business.

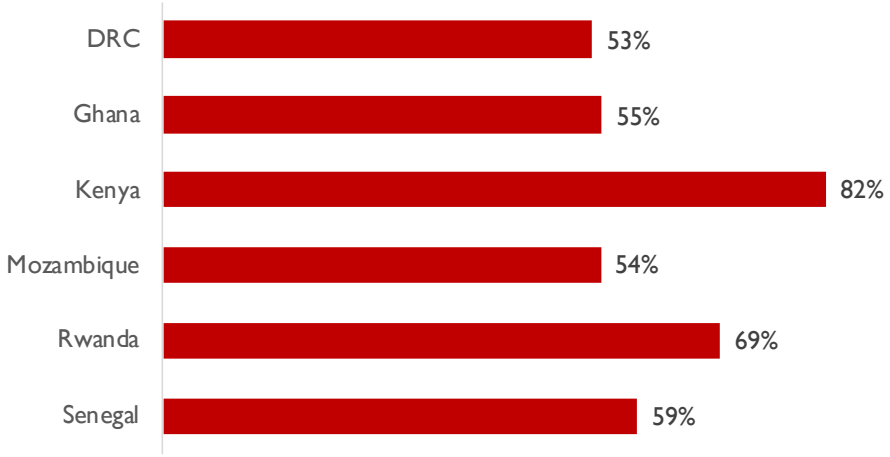

Figure 6. Combined percentage of responses to the question "How has COVID-19 changed your employment?" being either "I lost my job" or "I earn less money." Source: Our own SMS consumer survey via GeoPoll, October 2020 for Rwanda and August 2020 for all other countries. N = 500+ per country.

Respondents to our SMS survey in Kenya indicated a considerably higher level of economic hardship than in the other countries we analysed (Figure 6). Results from the Kenya COVID-19 Economic Tracker (World Bank et al. 2021), a separate, high quality, longitudinal survey of enterprises and households in Siaya county of Nyanza province, indicate a recent dramatic recovery in reported wages, but also reveal a steady downward trend in enterprise operations (*Figure 7*).

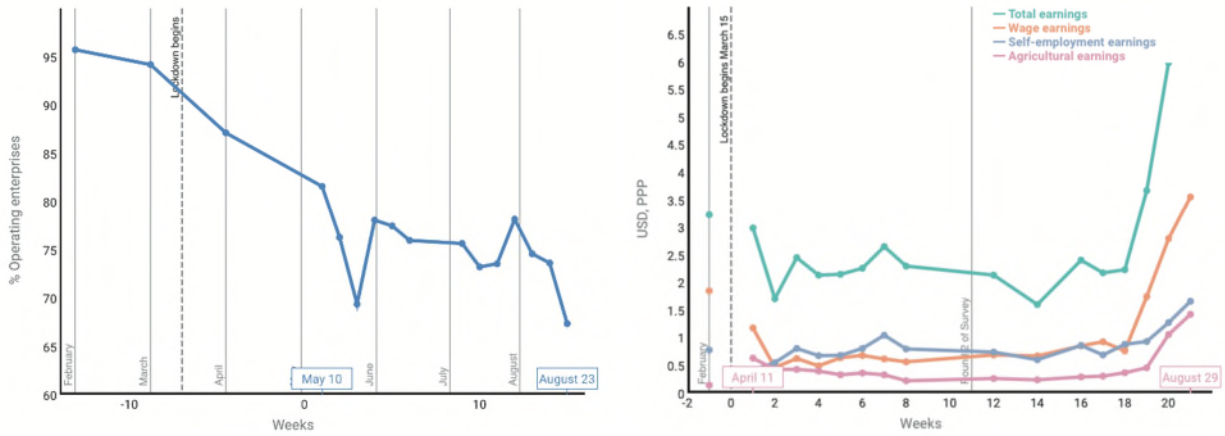

Figure 7. Percentage of surveyed enterprises reported operating (left) and trends in surveyed household earnings (right) for Siaya county, Nyanza Province, as part of the Kenya | COVID-19 Economic Tracker. The tracker conducted 15 weekly waves of 400-1200 enterprise surveys per week and 21 weekly waves of 600-1500 household surveys per week.

4. FINDINGS

Below we present findings by WASH subsector, combining results of SMS surveys with our interviews with key informants. The SMS surveys capture effects reported by consumers, while the key informant interviews focus largely on supply-side impacts (i.e., changes in supply of services and performance of service providers).

4.1 WATER SUPPLY – CURRENT STATUS

Though the Kenyan government has mobilized major resources to insuring both continuity of water supply services and expansion of emergency supplies, consumers report comparable COVID-19 related water supply difficulties to other countries we analyzed.

To meet the government's free water directives targeting LIAs, 70 WSPs (out of the 87 under regulation and members of the Kenyan Water Services Providers Association (WASPA), installed nearly 500 storage tanks ranging in size from1.5-10m³ connected to public standpipes supplying free water, as well as over 6,500 hand washing points throughout the country, mobilizing over 90 water tankers. The Water Services Regulatory Board (WASREB) estimates that 40 percent of Kenya's urban population reside in low-income informal settlements, the main constituent of the LIA category.

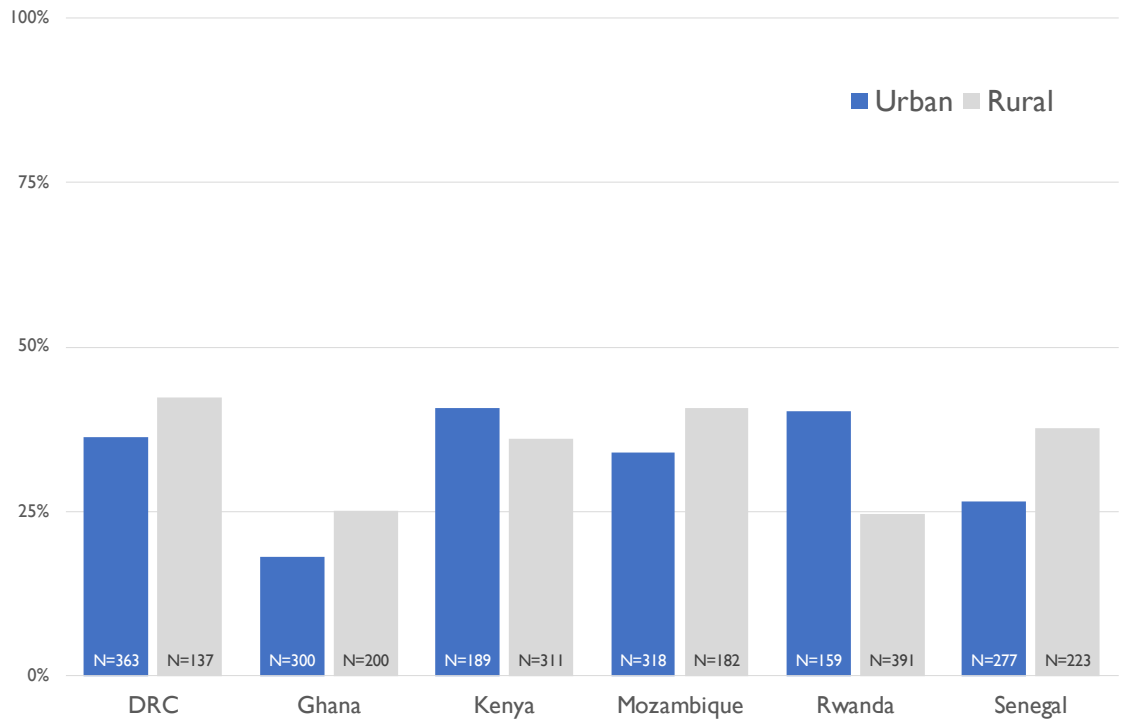

Figure 8. Percentage of respondents answering "Yes" to the question, "Has COVID-19 made it more difficult to get your drinking water?" Source: our own SMS surveys, conducted in August 2020 (except for Rwanda, which was conducted in October 2020). Sample sizes for each country segment shown at the base of the columns.

Though these measures are very likely to have substantially reduced water stress for vulnerable Kenyans during a period of public health and economic crisis, the Kenyans responding to our SMS survey report comparable levels of COVID-related water access difficulties to those in other surveyed countries (see *Figure 8*). In our survey, we asked *"Has COVID-19 made it more difficult to get your drinking water?"* 39

percent responded that it had. This share was higher among job losers (48 percent) than among job keepers with no income loss (23 percent). Job keepers who lost income were in between (32 percent).

The most common reason identified for water being more difficult to access is having less money to pay for it (45 percent). Higher prices (22 percent) and longer travel time (21 percent) were the next most common reasons.

Among the subset who said getting drinking water became more difficult, 83 percent answered "Yes" to *"In the past week, was there a day when you couldn't get enough water to meet your household's needs?"* This subset is 32 percent of the full sample, though we do not know how much higher this share is than pre-crisis.

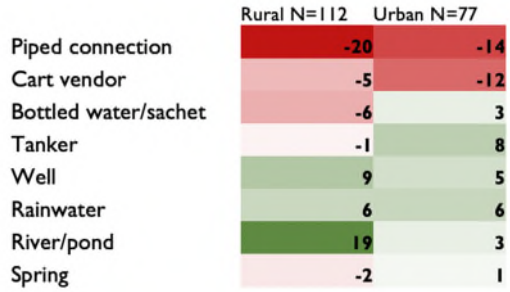

Figure 9. Percentage point change in reported water service modality after the onset of COVID-19 in Kenya among those who reported more difficulty obtaining drinking water.

The heatmap in *Figure 9* indicates how rural and urban consumers who reported water access difficulties saw their mode of water supply service change after the onset of the pandemic. There is a notable decline in reported piped supply across both urban and rural contexts, as well as a decrease in supply via cart vendors, particularly among urban consumers. For rural consumers, a dramatic increase in reliance on surface waters post-onset of COVID-19 was reported; meanwhile, urban consumers reported an increase in reliance on tanker water, a likely function of the emergency measures instituted by Kenyan WSPs in response to the government directive. A detailed display of how consumers reported their change in drinking water supply source is provided in Appendix 3.

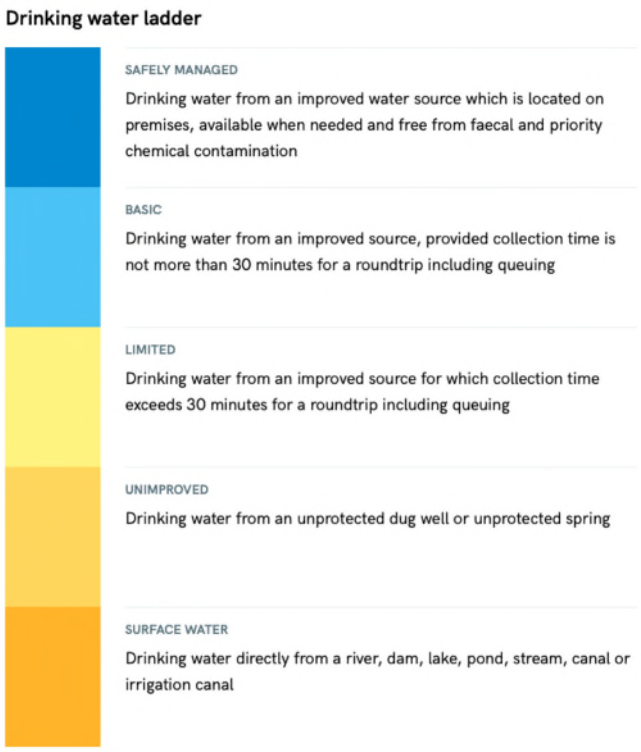

Figure 10. The UNICEF/WHO JMP drinking water ladder. https://washdata.org/monitoring/drinking-water

In the aggregate, if our SMS survey results are valid nationwide, over 6 percent of Kenyans (nearly 3.2 million people) fell below the JMP "Basic" level of water supply service as a result of COVID-19 (Figure 10). This is the largest effect in both absolute and percentage terms among all the deep dive countries we investigated as part of this assessment.

Larger and mid-sized operators are under enormous financial pressure.

The COVID-19 economic shock has exacerbated the financial challenges Kenyan water utilities were already facing linked primarily to governance problems. The Kenyan government's directive requiring free water for LIAs, combined with associated increases in domestic demand and decreases in commercial and industrial demand (which were never exempted from tariff, and thus represented a further financial loss), resulted in enormous financial stress on different WSPs. (For example, in Nakuru County, 80

percent of the revenue collected by the local utilities is collected from 20 percent of the customer base - the industrial segment.)

As of July 2020, the government's LIA-targeted initiatives were estimated to cost 300 million KES (USD 2.8 million) per month, corresponding to a 17 percent increase in WSP expenses over pre-COVID-19 budgets. At the same time, monthly revenue collection efficiency dropped 64 percentage points, from 94 percent (1.6 billion KES / USD 14.8 million) before COVID-19 to 30 percent (479 million KES / USD 4.4 million) in April 2020. This decline is attributable not only to the supply of water tariff-free to specified vulnerable areas, but also to the tariff holiday being interpreted by all customers as applying to them as well. Widespread economic distress (as well as social distancing concerns around in-person meter readings by supplier personnel) made the collection of revenue by tariff holiday-exempted customers difficult.

These estimates of the burdens on water system operators are reinforced by in-depth financial stress tests conducted by the USAID-funded Water Sanitation and Hygiene Financing (WASH-FIN) program, employing a tool developed by the World Bank. The stress test was conducted in June 2020 on three WSPs: Nyeri Water and Sanitation Company (NYEWASCO), Mathira Water and Sanitation Company (MAWASCO) and Thika Water and Sewerage Company (THIWASCO). WASH-FIN found revenue collection efficiencies declining from anywhere from 45 percent to 65 percent from pre-pandemic levels in April 2020, as well as an increase in expenses of up to nearly 20 percent; further, it forecast that MAWASCO and THIWASCO alone could require USD 1.5 million to sustain operations through October in the absence of mitigating actions (maximizing revenue collections, extreme internal cash preservation, asset liquidation, debt restructuring, long-standing debt collection, and delaying electricity bill payments).

An additional assessment conducted by WASH-FIN and WASREB on five WSPs estimates that the cost of emergency measures for informal settlements alone average 7 million KES (USD 65,000) per WSP over a four month period, which if extrapolated to Kenya's 87 regulated utilities would require over 610 million KES (roughly USD 5.7 million) through October 2020; this does not account for the utility's other significant projected revenue losses (WASH-FIN and WASREB, *COVID-19 Update 2: Rethinking the Role of Water Service Providers in Informal Settlements,* June 2020).

Committed international assistance to the WASH sector is significant. The World Bank will support the water sector with approximately USD 75 million, USD 60 million of which are grants and the remaining USD 15 million are performance-based loans (conditional liquidity support grants), intended initially to be made available from May to November 2020. The grants are to be disbursed by the Water Sector Trust Fund (WSTF) in consultation with WASREB, which advises on the determination of payment amounts, conducts independent verification of WSP performance, and supports WSTF's reviews of WSP business continuity and emergency response plans. While committed, no funds were disbursed in 2020, with the first payments expected in early 2021.

The Japan International Cooperation Agency (JICA) contributed over USD 400,000 in chlorine and coagulant to cover three months of need for nine WSPs (Embu, Meru, Mavoko, Kilifi Mariakani, Nakuru, Ruiru Juja, Eldoret, Nyahururu and Kisumu).

Another important development is the government directive to the national electric utility, Kenya Power and Lighting Company (KPLC), to refrain from disconnecting WSPs for non-payment, even as they continue to accumulate arrears. Electricity constitutes a major component of service provider costs, ranging from 30 to over 60 percent for the five utilities investigated by WASH-FIN (COVID-19 Update 3: Electricity Costs for Water Service Providers, August 2020).

Smaller water providers are also under considerable financial pressure.

To assess the effect of COVID-19 economic shocks on smaller providers, we interviewed five "master operators" in Kisumu operating under a delegated management model (DMM)[4]. The government's targeted policy to provide free water and to not disconnect customers, combined with consumer income losses, reduced their revenues significantly. Four of the five master operators reported customers delaying their payments or ceasing them altogether, with 40 to 50 percent revenue declines (even as consumption has increased), putting them in precarious position vis-à-vis KIWASCO and forcing their own cost cutting, such as delaying payments to their own staff. In addition, and unsurprisingly, the operators reported declines on the order of 80 percent) in demand for new connections. None reported supply chain issues, save difficulties accessing PPEs (masks, hand-sanitizers) at the very beginning of the crisis.

Interestingly, the one master operator we interviewed whose customers are outside of the informal settlements did see an increase in revenue on the order of 15 percent.

According to the master operators, the household demand increase they've witnessed was attributable to the lockdown restrictions, as well as to increased handwashing. Meanwhile, demand from commercial customers declined by roughly by half.

The master operators reported keeping their prices fixed during the pandemic period, as the bulk rates they pay to KIWASCO were unchanged.

UNICEF reported providing water storage tanks (5m^3) as well as financing kiosk repairs as part of its pandemic response, and reported no issues with regard to sourcing equipment (as they either had maintained stocks or were able to find needed supplies locally). UNICEF did, however, report delays in the delivery of the chlorine disinfectant, and noted that some small and medium sized utilities had contacted them for chlorine procurement support. UNICEF suggested that some WSPs could fail to meet drinking water quality standards as a result. This concern was reinforced by WASPA, which cited supply chain issues for disinfectant as well as flocculants (specifically polyacrylamides).

4.2 SANITATION – CURRENT STATUS

Our SMS surveys of consumers indicate only marginal change in reported sanitation access.

	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

Figure 11. Percentage point change in reported sanitation modality after the onset of COVID-19 in Kenya.

No form of sanitation access changed after the onset of the pandemic by more than two percentage points. That very few SMS survey respondents reported changes in sanitation service modality is understandable 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).

This short-run good news is matched by a medium-term concern. Almost a third of respondents (31 percent have a septic tank or latrine pit and pay someone to empty it. Among this group, 20 percent have not been able to afford emptying since the onset of COVID-19 and another four percent say the

[4] The DMM model relies on small private enterprises to expand network connection; customers pay for the conveyance and excavation of the trenches to connect to the network, and the "master operator" serves as an intermediary with the regional water service provider, KIWASCO under a bulk supply tariff. The DMM resells to household and commercial customers, water kiosks and public taps in both formal and informal settlements (specifically, Nyalenda and Obunga)

pit emptying service is no longer available. While the number reporting that emptying services are not available is small, it is possible that low incomes have reduced demand for emptying services, which then reduced supply.

Multiple Actors within the Fecal Sludge Value Chain Face Acute Pressures

We were able to interviewed two vacuum ("exhauster") truck operators in Kisumu who provide emptying services to both households and institutional customers (including hotels, restaurants, schools, churches, and businesses). They reported an instant decline in demand for emptying services from the industrial sector following the onset of COVID-19, as they were the first to suffer from the lockdown and travel restrictions.

For households, the need of pit-emptying services has increased (with people staying at home, which leads to an increased usage of sanitation facilities), but at the same time ability-to-pay has declined (with job losses and a shifting of spending priorities to immediate essentials, such as food). The decline in demand was extreme, declining seven-fold in some instances.

The operators have not changed their pricing: prices remained around 3000 KES (approximately USD 28) per trip. One operator hesitated to increase price in the face of lower demand and the potential loss of more customers, with clients searching for lowest cost alternatives to empty their tanks.

The main operational change the operators reported was installing a 20L water tank on all exhauster trucks and encouraging payment through the mobile money (which has generated some delay in customers payments).

The operators did not face difficulties accessing PPE, even though the prices were high at the beginning of the pandemic (as they returned to affordable prices progressively from 900 to 300 KES (USD 8.30 to USD 2.77) for disinfectant). They reported no issues with personnel. The only external assistance they reported receiving was at the onset of COVID-19 when the Kisumu Wastewater Association partnered with two local sugar producers (Kibos and Mumias) to manufacture and supply sanitizers and disinfectants to all the sanitation service providers registered by the KIWASCO.

We also interviewed three formal manual emptying groups in Kisumu (Gasia Poa, Obunga Stars and Busy bee); one mechanized emptier in Malindi, and one formal manual emptying group (Kalamaki) in Nakuru. All reported to have been adversely affected by the COVID-19 crisis and by the government's restrictions and regulations.[5]

According to the manual emptiers, customers are mainly low-income earners dependent on informal business activities that have been adversely affected by the COVID-19 economic disruptions, and many of their customers have experienced a decline or loss in income. They note tenants relocating to rural areas to escape the harsh economic conditions in urban areas. The consequences have been a 75 percent decline in pit-emptying frequency: before COVID-19 they used to empty, on average, 12-20 pits per month, now they empty 4 pits per month.

In addition to the decline of prices, operational expenditures have increased to respect the hygiene directives due to COVID19: they have to buy more PPE and hand-sanitizers than before. One operator

[5] "Formal pit emptiers" are registered and licensed by a municipality to conduct pit-emptying services and dispose of fecal waste collected in authorized fecal sludge treatment plants. Manual pit emptiers remove sludge from the toilet using a bucket fitted with a long handle and transferred into plastic barrels that are then transferred onto a pickup truck for transportation to a disposal site. Mechanized manual emptiers remove sludge using a motorized pump, hosepipe, metallic barrels positioned on trucks.

increased its water consumption by more than threefold during COVID19; some also reduced the number of staff working on an emptying job in order to maintain social distance.

To cope with all these challenges, different strategies have emerged. The emptiers reported reducing their prices by 30 to 35 percent, save one, which has not changed prices, instead providing partial emptying that most households can afford. The mechanized emptier in Malindi decreased his price by 40 percent, leading to decrease in workers' salaries (of 50 percent for the mechanized emptiers). All the groups reported providing preventative emptying for customers that cannot afford the full cost of emptying. To recover the low prices charged among customers without the financial capacity to pay the full cost, one operator increased the price on customers they perceived to have a higher ability and willingness-to-pay for services. In Kisumu, the emptying groups renegotiated transportation costs with the pickup truck owners, One reduced the number of people emptying the pit from 10 to 4 to reduce employee expenditure while others requested landlords to provide water, soap, and sanitizers prior to emptying the facility as well as to create awareness in areas of operation that minimize the social stigma associated with COVID-19. For yet another, a measure employed was to work on sewer connections, such as unblocking hotels sewers.

None of the emptying groups reported received any financial assistance from actors in the sector.

Acute Economic Pain Hampered Sales of Sanitation Commodities

We interviewed Sanergy and Sanivation as sanitation commodity suppliers in Nairobi and Naivasha, respectively. Sanergy installs urine diverting dry toilets (UDDTs) in residential areas and container-based indoor toilets in the urban informal settlements of Mukuru kwa Njenga, Mukuru kwa Reuben, and Mathare, as well as removal of fecal sludge from the community. They train informal pit emptiers (as well as providing PPE) to accelerate licensing and acceptance of the groups.

Sanivation designs, builds, and operates waste management facilities that transforms fecal sludge into biomass fuels ("Super Logs" and "Super Balls") for industrial and household use in Nairobi, Naivasha and Nakuru. Its customers include pharmaceutical, food production, manufacturing, and textile industries.

Movement restrictions in mid-March halted Sanergy's toilet installation activities due to the inability to access its areas of operation. They installed no toilets in March and April, as compared to an average of 100 toilets per month before COVID-19. Resumption of toilet installation started in May, accompanied with additional operational costs (mostly associated with purchasing PPE). In addition to movement restrictions, the curfew also constrained waste collection. The economic shock affecting consumer incomes resulted in 50 percent revenue declines for existing services as well as reducing demand for new toilet installation. There were temporary supply chain issues with inputs such as plastic waste containers and concrete-based materials (since the plastic containers were repurposed for hand washing, increasing the prices and demand while reducing the supply).

To address these challenges, Sanergy reorganized its activities to be executed during the permitted hours. To accommodate their customers, they renegotiated and developed new payment plans: customers pay reduced monthly service charges with longer payment periods. Sanergy did not increase their prices, but anticipates that it will be a necessity at some point.

Sanivation experienced a delay and shortage of the supply of saw dust and molasses used as binding agents to fabricate Super Logs, a consequence of the travel and transport restrictions as well as mandatory COVID-19 testing for truck drivers at the borders. Meanwhile, though demand for Super Logs by the hospitality, pharmaceutical and textile industries declined, it increased dramatically among food industry customers, eventually pushing beyond Sanivation's production capacity.

Neither company has received any financial assistance, nor have they experienced personnel shortages linked to COVID-19 infections.

Effects on Community-Led Total Sanitation (CLTS) and other hygiene promotion activities appear modest.

All of the organizations we interviewed involved in implementation and/or support of CLTS and hygiene promotion activities (UNICEF, the Kenya Water and Health Organization [KWAHO], the USAID-supported KIWASH program, and WorldVision) reported ceasing operations at some point because of movement restrictions. Most resumed activities when lockdowns were eased, but social distancing rules stayed in place, limiting gatherings to no more than 10 people. UNICEF and WorldVision reported that latrines construction through the CLTS were not significantly affected because in those programs households relied largely on local materials (UNICEF, WorldVision); only KWAHO reported a slight delay in toilet construction because of slowdown in cement delivery. KWAHO also reported a post-COVID decline in latrine construction because sanitation dropped as a priority in household budgets.

4.3 SOAP – CURRENT STATUS

WorldVision and KWAHO both reported increases in soap demand and use, consistent with widely reported perceptions of a handwashing social norms change revealed by our SMS surveys. At the same time, we note that Kenyan respondents to our surveys were more than three times more likely to report soap access getting more difficult than getting easier, the greatest disparity among the six countries we surveyed (*Figure 12*). (Rwanda was the only other country in which more respondents reported soap access getting difficult than getting easier or staying the same.)

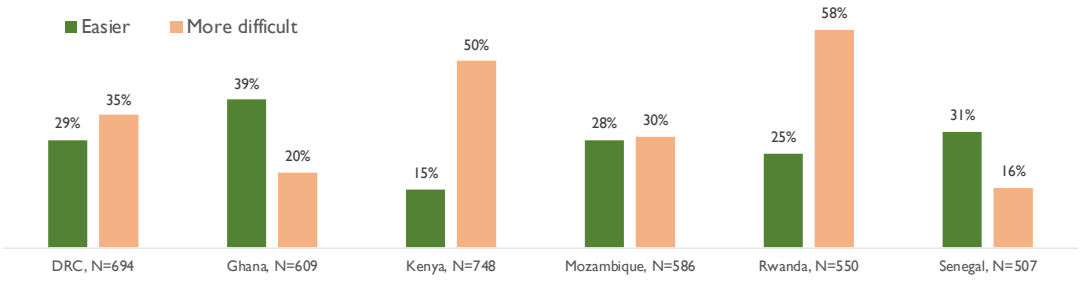

Figure 12. WASHPaLS SMS survey response to the question, "Since COVID arrived, has it become easier or more difficult for your family to obtain any kind of soap to wash hands?" Fractions reporting "no change" are not displayed, but in each case equal the remainder to reach 100%.

We were able to interview local manufacturers of soap and hand sanitizers based in Nakuru. One produces hand soap, and has incorporated production of sanitizers as well in response to COVID-19, while another operates a small enterprise that has been manufacturing soap and supplying the Nakuru Water and Sanitation Company (NAWASCO), Nakuru county government offices, hotels, training institutions and households.

One reports that the demand for hand soap and sanitizer increased three-fold at the onset of COVID-19 in March, and reported increasing prices by 20 percent in response to increases in the costs of inputs.

By contrast, the second suffered as institutional demand cratered with the closure of her clients' business activities and increased competition from new entrants into the market. Her sales had dropped by half, from 200 to 100 liters of soap per month over a period of two months.

Seventy-nine percent of the respondents to our SMS surveys who reported increased difficulty accessing soap (corresponding to 38 percent of the respondents overall) pointed to increased prices as the reason, though the best available consumer information suggests that bar soap prices have not risen in

Kenya (perhaps even dropping slightly), based on over 17,000 household phone interviews in Siaya county, Nyanza province, in a series of 21 weekly surveys between the beginning of April and the end of August (*Figure 13*).

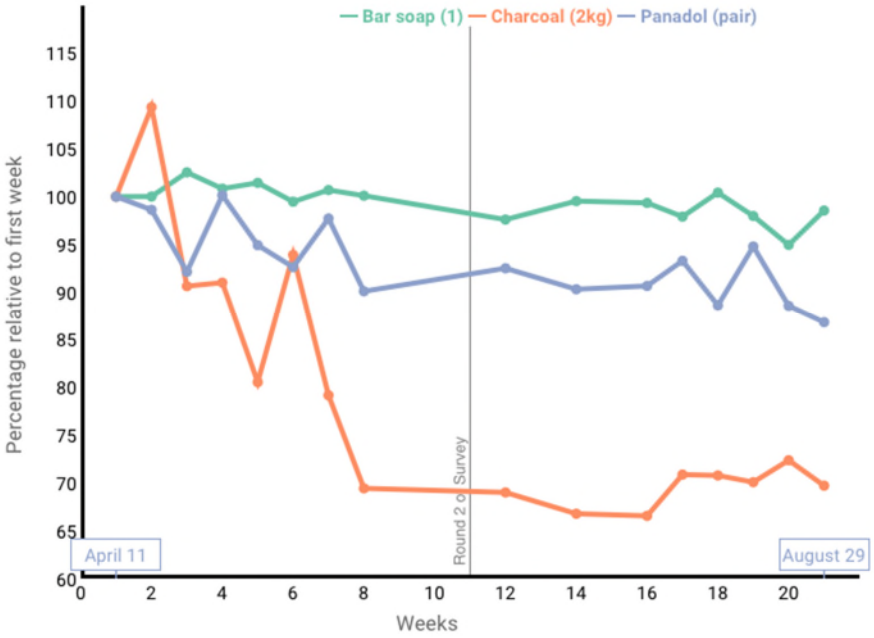

Figure 13. Prices of selected non-food items reported by households contacted as part of the Kenya \| COVID-19 Economic Tracker. Prices are expressed as a percentage of the value reported in the survey's first round in April.

While some of this discrepancy may be a function of regional (or rural-urban) variation, we suggest that what households in our SMS surveys reported as higher prices actually refers to declines in soap affordability; relative to a sharp decline in income, a stable price trajectory (as depicted in *Figure 13*) would be perceived as an increase in its cost.

5. FUTURE WASH ACCESS TRENDS IN KENYA

5.1 WATER SUPPLY

We see no indication that large urban water service provision will suffer in the near-term, given the commitments of the World Bank to help support Kenya's water sector. Disbursement has been lagging, but our interviews with key informants indicate no immediate operational risks. The more significant concern is the financial position of the providers, whose debt burden (particularly with regard to unpaid electricity bills) is growing.

The situation facing smaller providers is more tenuous. This is a subsector that should be closely monitored in the next 6-12 months. International donor and sovereign government assistance will be even slower to reach smaller system operators, and the magnitude of that assistance relative to the shortfalls incurred is likely to be lower for the smaller providers as well.

With respect to non-piped rural systems (those employing deep-lift handpumps or mechanized pumps feeding overhead tanks and, in turn, standpipes), deferred maintenance stemming from losses of revenue or exhaustion of operating cash reserves should, in theory, mean that their performance will decline. We note two caveats: first, prior to COVID-19, water supply schemes employing boreholes have not been demonstrated to regularly capture large portions of their operating costs; second, our interviews did not uncover any reports of non-piped rural system failures linked to the pandemic (though we expect that the frequency of effects of deferred maintenance still might require some time to be manifested – hence the need for vigilance.

5.2 SANITATION

Overall, our findings indicate that many sanitation businesses are reeling under the economic strains caused by the pandemic. Nonetheless, in the medium term, MBS programs and sanitation enterprises hope for a partial recovery once door-to-door sales and promotional events resume and economic conditions increase affordability and consumer willingness-to-pay for latrine inputs as well as pit emptying; we expect desludging businesses to recover as households regain financial stability and their corporate clients resume business.

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 and echoed by our interviews with value chain actors 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 generally, 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 is uncertain. We do not see declines in soap access outside of the affordability challenges of reduced incomes; indeed, soap prices remain stable.

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APPENDIX 1 - KEY INFORMANTS

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

Category	Organization
Central Government	Water Services Regulatory Board (WASREB)
Local Government	Water, Environment, Energy & Natural Resources, County of Nakuru
Multilateral Institution	UNICEF
NGO	Afya Uzazi - Nakuru
NGO	Dandorra Transform League
NGO	Kenya Water and Health Organization (KWAHO)
NGO	RHYCO
NGO	Sanergy
NGO	Sanivation
NGO	Umande Trust
NGO	World Vision
NGO	WSUP (Water and Sanitation for the Urban Poor)
Service Provider	"Master operators" - via KIWASCO
Service Provider	Busy Bee – Manual Pit Emptiers Kisumu
Service Provider	Gasia Poa – Manual Pit Emptying
Service Provider	Kalamaki Pit Emptiers Nakuru
Service Provider	Kisumu Waste Water Association
Service Provider	Obunga Stars – Mechanized Pit Emptiers Kisumu
Service Provider (Association)	Water Service Provider Association (WASPA)
USAID Program	KIWASH (DAI)
USAID Program	WASH-FIN (Tetra Tech)
Value Chain Actor	Anserer Limited Nakuru Sanitizers

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
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	ADM-1	What county do you currently live in? Mombasa Kwale Kilifi Tana River Lamu Taita-Taveta Garissa Wajir Mandera Marsabit Isiolo Meru Tharaka-Nithi Embu Kitui Machakos Makueni Nyandarua Nyeri Kirinyaga Murang'a Kiambu Turkana West Pokot Samburu Trans Nzoia Uasin Gishu Elgeyo-Marakwet	Any response = Urban/Rural

Q #	Q Name	English	Skip Pattern
		Nandi Baringo Laikipia Nakuru Narok Kajiado Kericho Bomet Kakamega Vihiga Bungoma Busia Siaya Kisumu Homa Bay Migori Kisii Nyamira Nairobi	
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

Q #	Q Name	English	Skip Pattern
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
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

Q #	Q Name	English	Skip Pattern
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
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

Q #	Q Name	English	Skip Pattern
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
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
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 the comparatively large number of respondents who reported moving from piped service, either to their home or nearby, to "river," in addition to a significant decline in reported use of cart vendors, split fairly evenly between those moving up on the ladder (to nearby standpipes – possibly those operated by water service providers on an emergency basis) and those moving down to surface water.

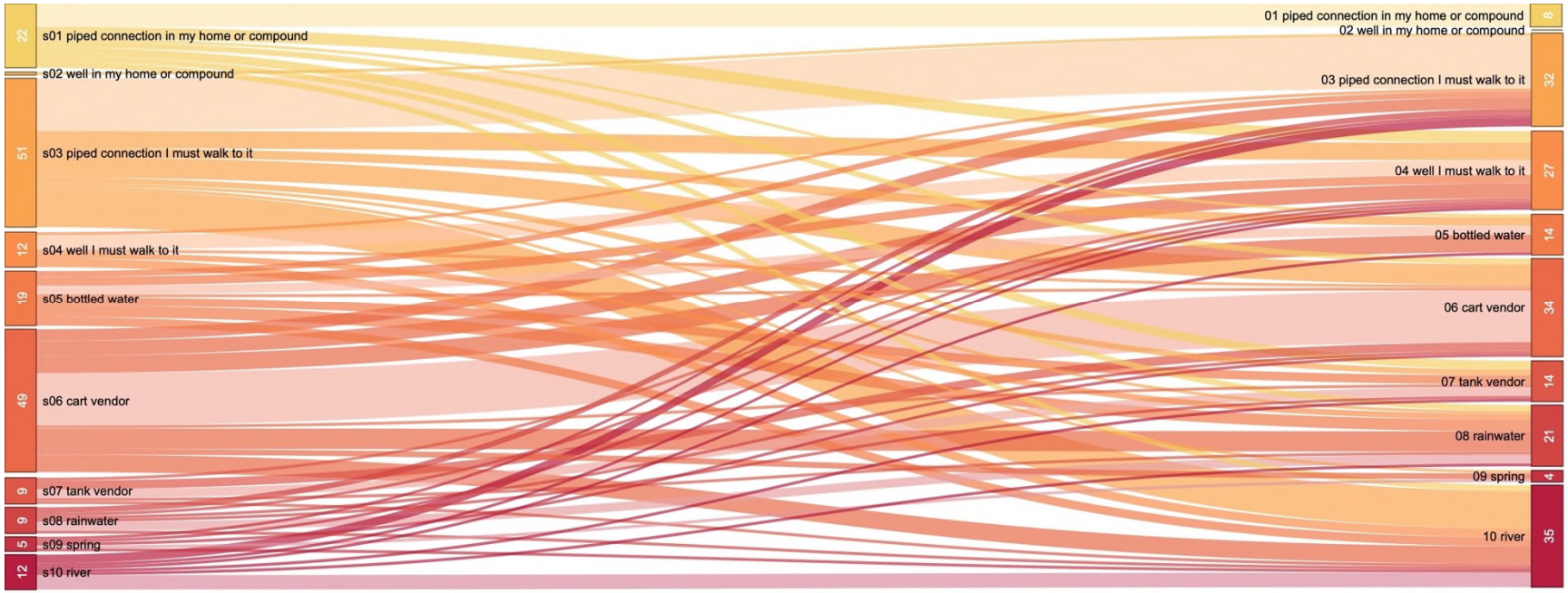

Figure 14. Sankey diagram: water modality changes reported by respondents to our SMS survey in Kenya among the subset of respondents who reported pandemic-driven water supply difficulties.

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