

Motivation

Global water and sanitation infrastructure challenge

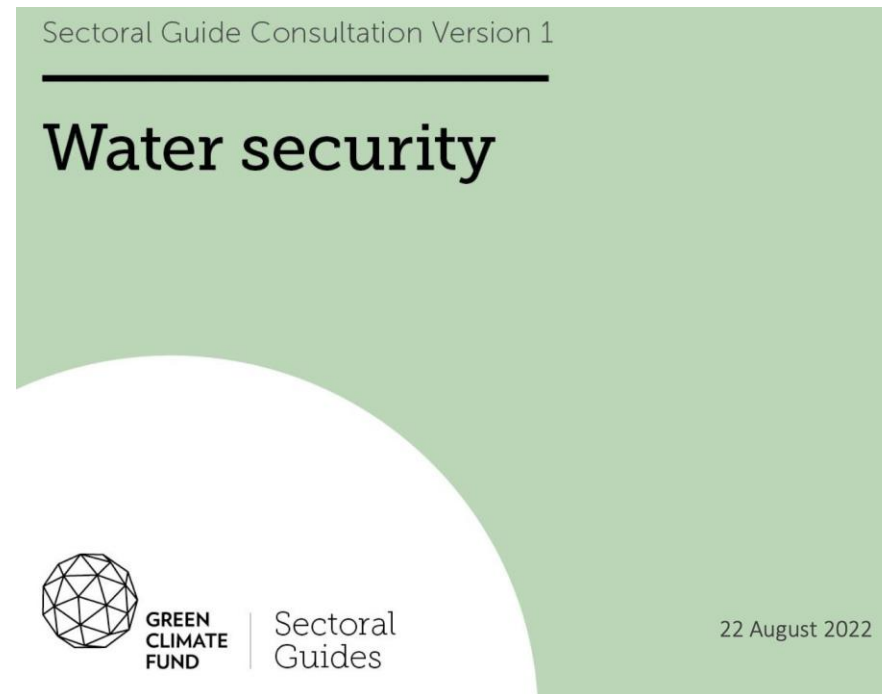


“Safe and affordable water and sanitation for all by 2030”

~ 100 billion USD/year

Financing the transition to resilient WSS

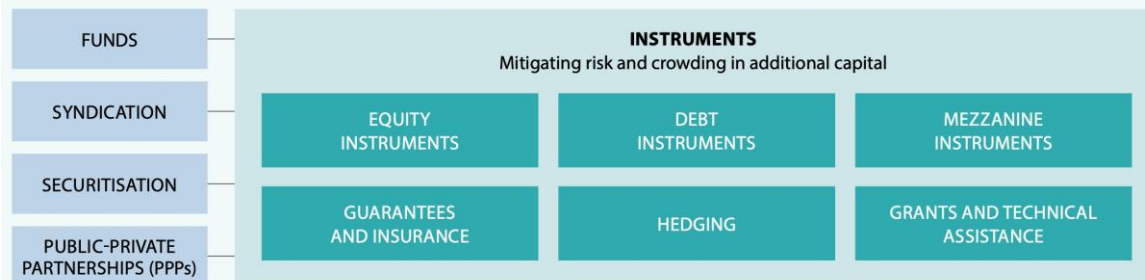
Innovative finance



Innovative finance

Figure 1. **BLENDED FINANCE MECHANISMS AND INSTRUMENTS**

Structure and/or intermediation of instruments to mobilise private capital

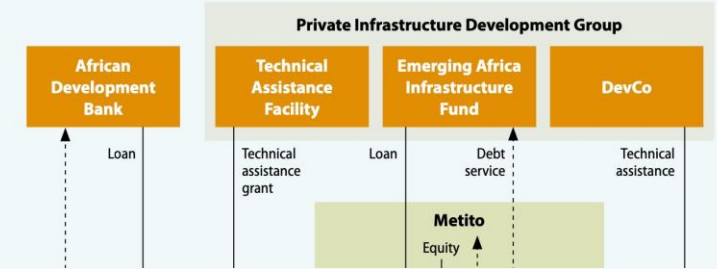


Source: OECD (2018)

KIGALI BULK WATER SUPPLY

The challenge:

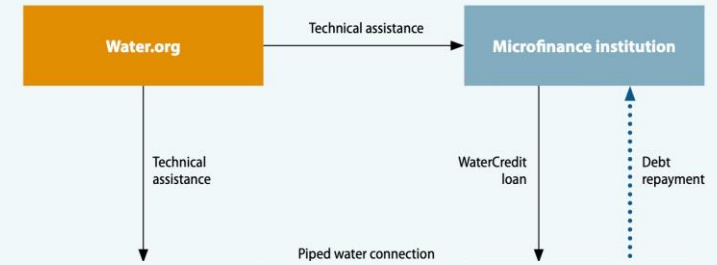
- Increasing access to piped water supply in Kigali, the capital city of Rwanda in a context of rapid urbanisation, population growth, and strained infrastructure



WATER CREDIT: MICROFINANCE SANITATION LOANS TO EXPAND ACCESS TO SANITATION IN INDIA

The challenge:

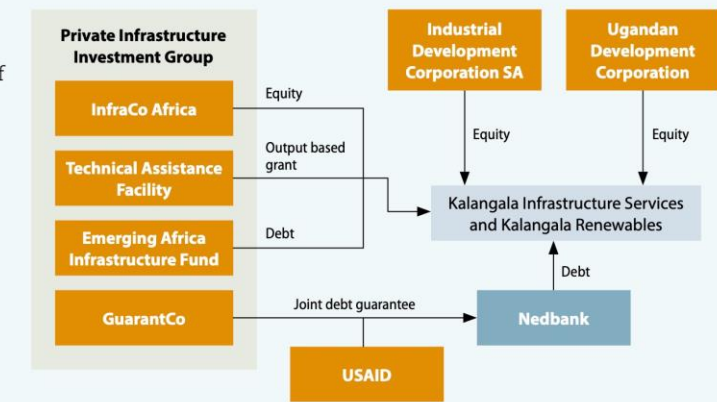
- Making the population of India open defecation free.
- Incentivising eligible households to invest in toilet construction and access to water supply.
- Addressing up-front cash reserves gap for construction of toilets.



KALANGALA INFRASTRUCTURE SERVICES

The challenge:

- Improving basic infrastructure and access to water in the town of Kalangala.
- Bugala Island was previously one of Uganda's poorest districts, and had a prevalent potable water shortage.



Source: OECD (2019)

Motivation

Global water and sanitation infrastructure challenge



“Safe and affordable water and sanitation for all by 2030”

~ 100 billion USD/year

Getting prices right and collecting revenue

Motivation

Arrears undermine utilities financial sustainability

Revenue from bill payments...

- Direct funds for O&M
- Stable revenue stream to attract debt finance for capital replacement, system upgrades, and service expansion

In the past... Threat of disconnection → Bill payment

Motivation

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Revenue from bill payments...

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Magnitude of the problem is unknown but...

- South Africa: households owed municipal governments 40 billion Rand (about 4 billion USD) (Szabo and Ujhelyi 2015)
- Kampala and Nairobi: ~60% of residential customer accounts have arrears

Motivation

Why do households not pay their bills on time?

- Affordability
- Forgetfulness/procrastination
- Beliefs about others' payment behavior
- Protest (water should be free, service is poor, etc.)
- Lack of knowledge or salience of disconnection enforcement
- Lack of awareness about the cost of infrastructure provision

Question: In the absence of a credible threat of disconnection, what can policy makers do to compel on-time, full bill payment?

Literature

- Student loan repayment and forgiveness (Kuan et al., 2025; Catherine and Yannelis, 2023)
- Tax payment – largely HIC-focused with some exceptions (Collin et al., 2024; Mascagni and Nell, 2022)
- Utility bill payment
 - Rothenback et al. (2023) – psychological commitment and removing payment friction (Namibia)
 - Coville et al. (2023) – face to face engagement; threat of disconnection; landlords (Kenya)
 - Tonke (2024) – water conservation campaign (Namibia)
 - Szabo and Ujhelyi (2015) – customer education campaign (South Africa)

Study Design and Methods

Logistics

- Inclusion criteria
 - Residential customers
 - Arrears between 500-5000 KSH (4.25 to 42.50 USD) as of June 2022
 - Single account associated with phone number
- Randomly sample customers from NCWSC billing records and assign to treatment and control groups (5k treatment, 5k control)
- Pre-screening, consent, and acknowledgement of one-time nature of forgiveness via phone
- Customers enrolled from treatment group until budget exhausted – final sample n=867 treatment accounts

Ethics and pre-registration

- American Economic Association's registry for randomized trials (AEARCTR-0009598)
- NACOSTI (Ref No. NACOSTU/P/13/8073/406)
- University of South Carolina's Institutional Review Board (Pro00121799).

Study Design and Methods

Identification

- ATE - difference in means post treatment
- Difference-in-difference with 6 months of pre-treatment data

Outcome variables

- Pay any amount in the prior month (0/1) (*payany*)
- Pay the total current amount due (0/1) (*current*)
- Total amount of arrears, monthly (continuous) (*arrears*)

Plausible mechanisms

- (+) Good will effect (Szabo and Ujhelyi, 2015)
- (+) Shortening the distance to the goal (Hull 1932; Kivetz et al. 2006)
- (--) Strategic default

Results: Some basics at baseline

- Mean water use 14 m³/mo.
- Number of payments in the past 6 months ~2
- Number of full payments in the past 6 months ~2
- ~90% aware of arrears
- ~70% reported having trouble paying their bills

Results: Reasons for non-payment

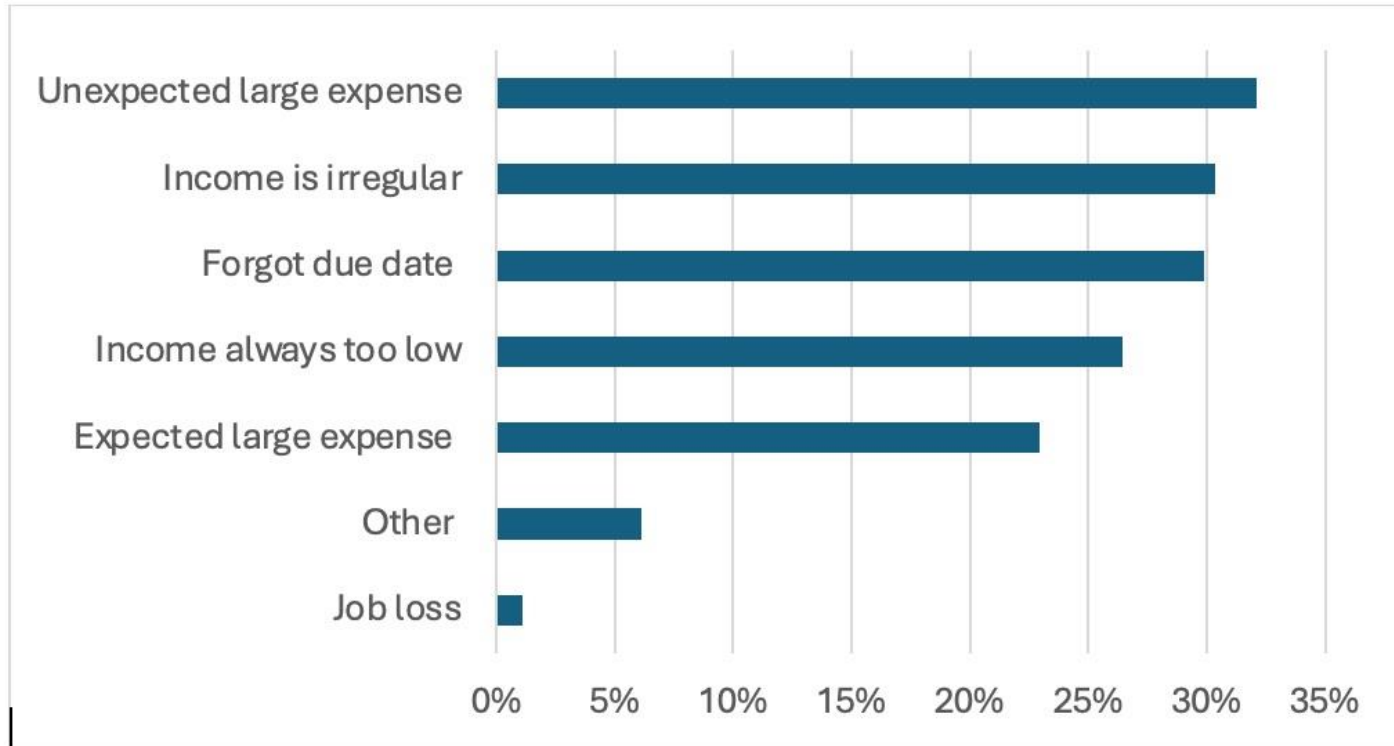
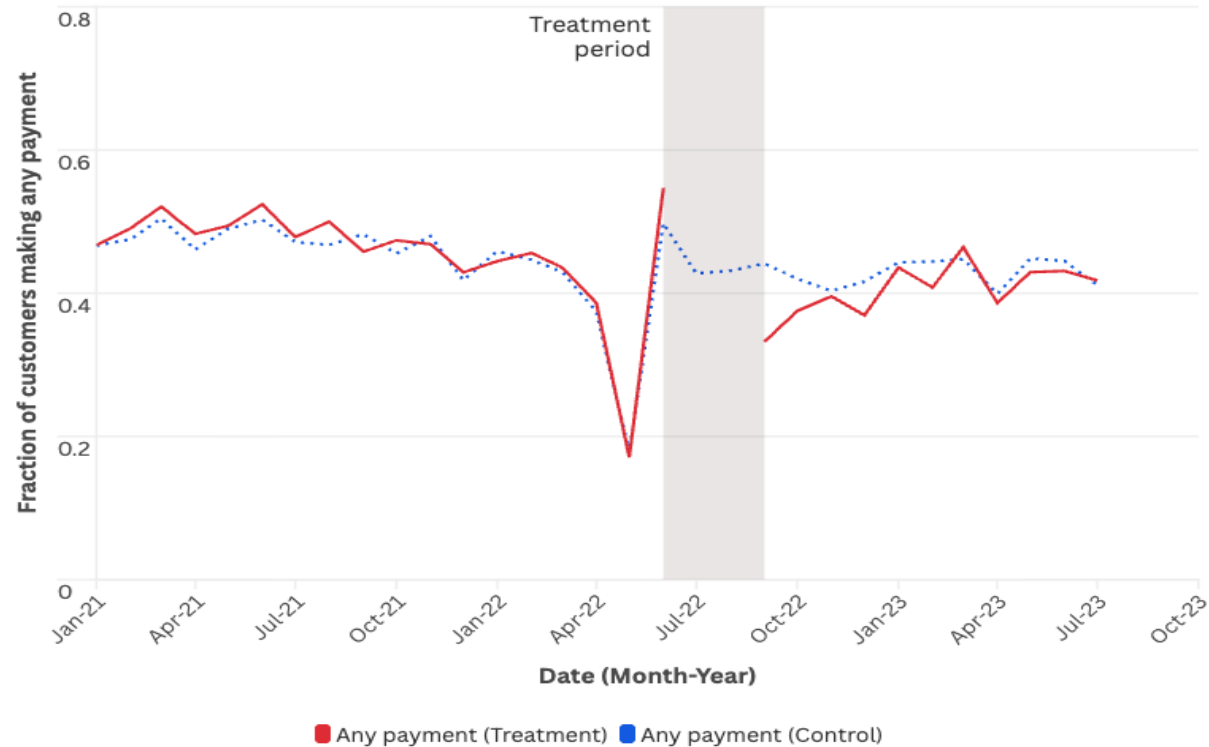


Figure 1. Reasons customers had trouble paying their bills (n=636).

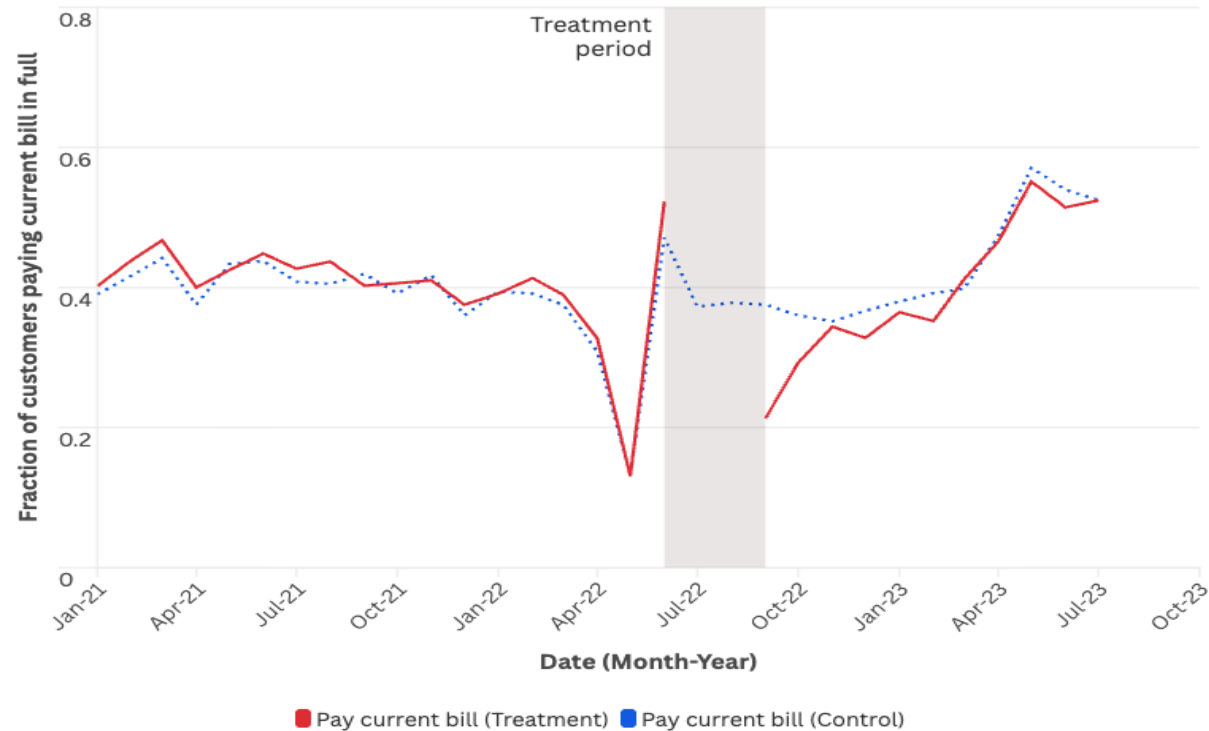
(Note: Customers were allowed to select multiple reasons.)

Results: Make any payment



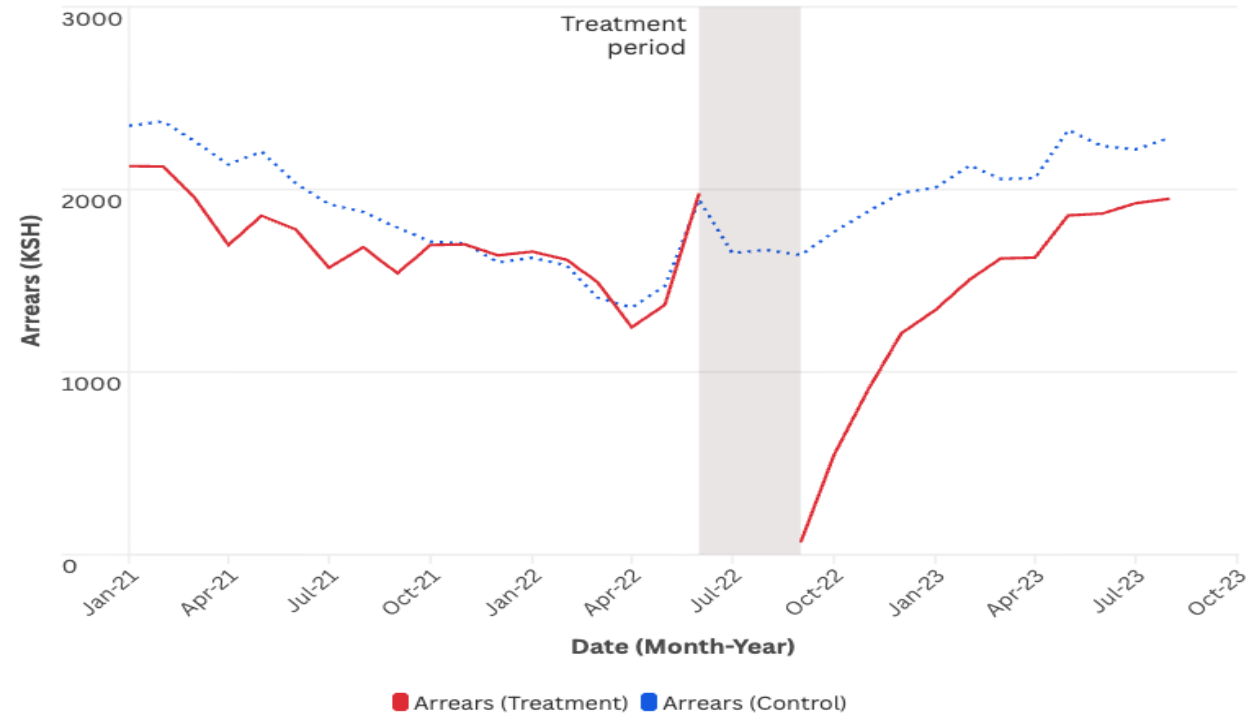
Make any payment	Pre	Post	Diff (Post-Pre)
(# times in past 6 months)	(a)	(b)	(c)
Treatment	2.24(0.049)	1.92 (0.051)	-0.32 (0.07)***
Control	2.32 (0.02)	2.27 (0.023)	-0.05 (0.03)
Diff (T-C)	-0.08 (0.056)	-0.35 (0.058)***	-0.27 (0.08)***

Results: Pay in full



Pay bill in full (# times over past 6 months)	Pre (a)	Post (b)	Diff (Post-Pre) (c)
Treatment	2.19 (0.049)	1.83 (0.048)	-0.36 (0.068)***
Control	2.26 (0.021)	2.22 (0.022)	-0.045 (0.03)
Diff (T-C)	-0.07 (0.059)	-0.39 (0.057)***	-0.31 (0.079)***

Results: Accumulated arrears



Arrears accumulated in past 6 months (Ksh)	Pre (a)	Post (b)	Diff (Post-Pre) (c)
Treatment	29 (217)	1749 (113)	1720 (244)***
Control	-214 (72)	459 (59)	674 (93)***
Diff (T-C)	-243 (194)	1289 (149)***	1046 (244) ***

Discussion and conclusion

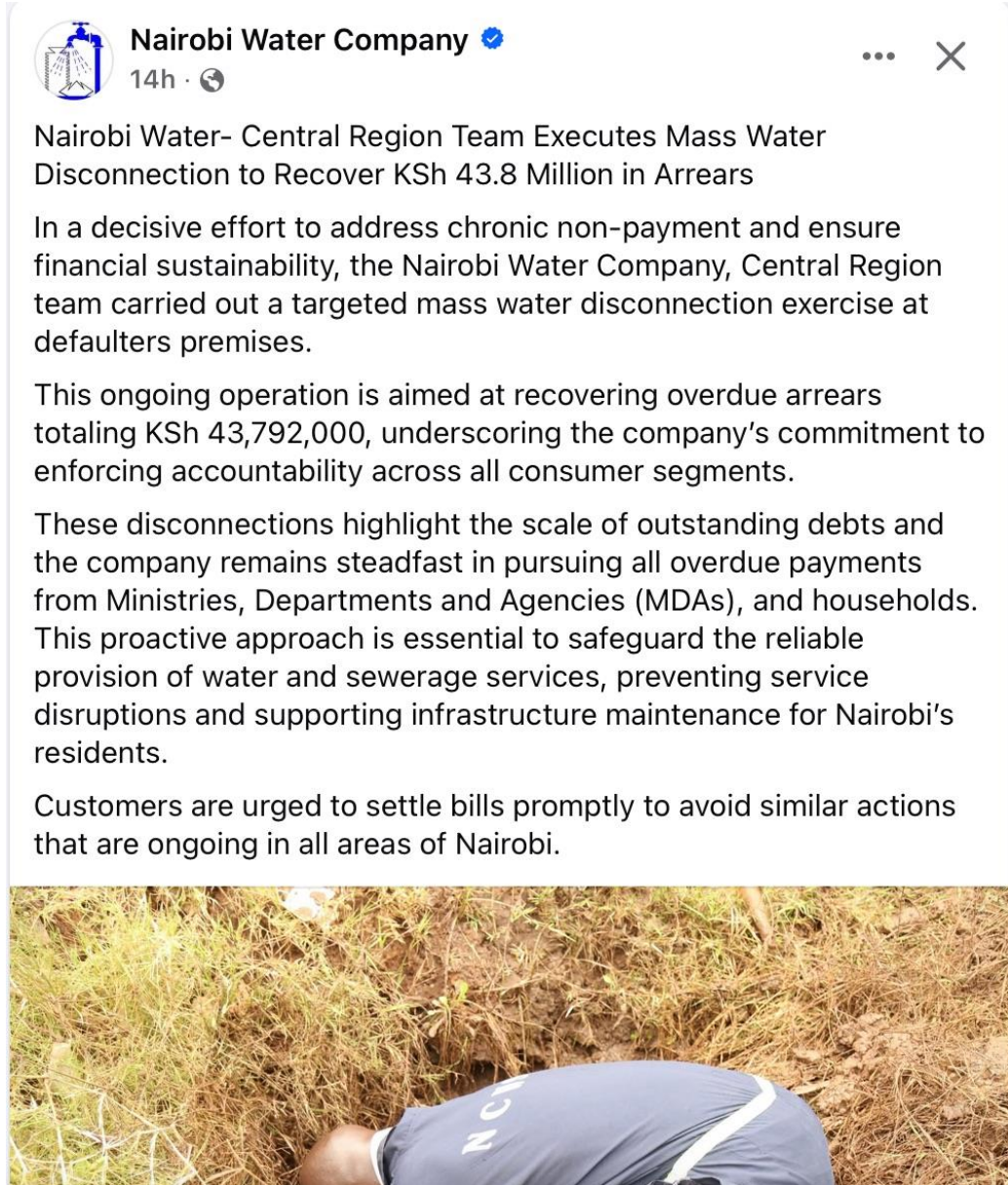
- Main results: One-time, unconditional arrears forgiveness made bill payment worse across our 3 outcome measures. Effect attenuates when we expand to 8 months post treatment.
- Mechanism: likely strategic default, but alternative mechanisms be trust in service provider, tacit acknowledgement of (un)affordability, salience.
- Conditional arrears forgiveness based on regular payment behavior may be more effective.

Remaining question...

In the absence of a credible threat of disconnection, what can policy makers do to compel on-time, full bill payment?

Questions and comments:

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Nairobi Water Company 14h · 🌐

Nairobi Water- Central Region Team Executes Mass Water Disconnection to Recover KSh 43.8 Million in Arrears

In a decisive effort to address chronic non-payment and ensure financial sustainability, the Nairobi Water Company, Central Region team carried out a targeted mass water disconnection exercise at defaulters premises.

This ongoing operation is aimed at recovering overdue arrears totaling KSh 43,792,000, underscoring the company's commitment to enforcing accountability across all consumer segments.

These disconnections highlight the scale of outstanding debts and the company remains steadfast in pursuing all overdue payments from Ministries, Departments and Agencies (MDAs), and households. This proactive approach is essential to safeguard the reliable provision of water and sewerage services, preventing service disruptions and supporting infrastructure maintenance for Nairobi's residents.

Customers are urged to settle bills promptly to avoid similar actions that are ongoing in all areas of Nairobi.

