Policy brief
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Water, sanitation, and hygiene policy in the time of COVID-19

In brief

- Investing in water, sanitation, and hygiene (WASH) is a no-regret policy for developing countries in the fight against COVID-19. According to numerous studies, for every $1 invested, the return in terms of healthcare savings, reduced time off work, and increased national productivity is between $2-4 for water and $5-9 for sanitation.
- This is particularly true for fast-growing and dense developing cities. Of the approximately 30 major global epidemics in world history, including the latest COVID-19 pandemic, four were in the last 30 years and all were started and rapidly spread within urban areas.
- This brief outlines several policy options for the WASH sector response to COVID-19. Recommendations for the short-term include conducting rapid assessments of community-level disease transmission and WASH capacity, promoting improved sanitation behaviour through public messaging, and immediate expansion of low-cost handwashing facilities.
- Over the medium-to-long term, recommendations include incentivising households to connect to WASH infrastructure through subsidies and loans, establishing independent regulators to oversee performance, and making concerted international efforts to scale investments in the WASH sector.

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Background

Water, sanitation, and hygiene (WASH) are often the first line of defence against infectious disease outbreaks, such as the ongoing COVID-19 pandemic. According to the World Health Organisation (WHO), "Frequent and proper hand hygiene is one of the most important measures that can be used to control the spread of COVID-19."[1]

For many developing countries, however, weaknesses in the WASH sector put millions of lives at greater risk to COVID-19. In Kenya, only half of the population has access to safe water, while less than a third are connected to proper sanitation.[2] In the Democratic Republic of Congo, less than half of health facilities have reliable supplies of soap that could allow basic protection for staff on the frontline.[3] These weaknesses are particularly important for dense urban areas. Without active investment to improve the WASH sector in developing cities, the world is much more likely to see prolonged and repeated pandemics, either through reinfection or new and more deadly diseases.

Lockdowns and social distancing have largely focused on controlling COVID-19 by limiting contact between individuals. But these policies are much more difficult to implement in low-income contexts, and might even pose elevated health or economic risks. 50-80% of workers in developing cities are in the informal economy: they cannot work from home and they have few safety nets to support them through a lengthy crisis.[4] Even if they can stay at home, more than half of Africa's urban population live in informal settlements that are characterised by over-crowding, limited access to public health infrastructure, and heavy contamination of the environment.[5] These factors not only make it economically challenging to support sustained shutdowns, but they make the rapid transmission of COVID-19 all the more likely.

Much is still unknown about the appropriate policies for different countries. Yet it is evident that COVID-19 measures must be context-driven and responsive both to health and economic consequences.[6] [7] As lockdowns are

1. World Health Organization & United Nations Children's Fund (UNICEF). (2020). "Water, sanitation, hygiene and waste management for COVID-19: technical brief, 03 March 2020", World Health Organization: Geneva.
2. World Bank (2020), "Providing sustainable sanitation and water services to low-income communities in Nairobi", World Bank: Washington DC.
3. World Bank (2020), "Tackling COVID-19 (Coronavirus) with water, sanitation and hygiene in DRC", World Bank: Washington DC.
4. International Labour Organization (2018), "Women and men in the informal economy: A statistical picture", 3rd ed. Geneva, Switzerland: ILO.
5. World Bank (2013), "Harnessing urbanisation to end poverty and boost prosperity in Africa", World Bank: Washington DC.
6. Alon, T, M Kim, D Lagakos and M Van Vuren (2020), "How should policy responses to the COVID-19 pandemic differ in the developing world?", IGC policy paper.
7. Haas, A, A Khan and A Khwaja (2020), "Policymaking in uncertain times. Smart containment with active learning", IGC policy brief.

relaxed, and business, travel, and social activities resume, it is also clear that there will be an increasing need for safe interaction between individuals from different households.

One of the best ways that policymakers can prepare for and respond to pandemics is to invest in core public health infrastructure before, during, and after a crisis. For developing countries, investing in WASH is a no-regret policy: decisions taken now to improve these public health systems are going to be worth it regardless of the uncertainty around COVID-19 and which scenarios materialise.[8]

In the face of COVID-19, policymakers must be able to leverage quick and effective solutions targeted at emergency WASH expansion, as well as improved sanitation practice. However, many countries face long-standing institutional challenges that are not always amenable to emergency response. In this brief, we outline short- and medium-to-long-term policy options for the urban WASH sector that can be targeted across components of infrastructure delivery, institutional governance, and financing and funding.

Short-term policy recommendations are:

- Use data to rapidly assess community disease transmission and WASH capacities;
- Provide clear and actionable messages to improve sanitation practices;
- Rapidly deploy low-cost facilities to improve access to handwashing with soap (HWWS).

Medium-to-long-term policy recommendations are:

- Use incentives, such as subsidies and loans, to increase take-up of clean water connections;
- Establish and support independent regulators to ensure fair pricing and service quality;
- Funding for WASH infrastructure should come from a combination of taxes, tariffs (user fees), and transfers (aid).

What we know about WASH and COVID-19 transmission

Current evidence indicates that COVID-19 is predominantly transmitted through respiratory droplets passed either directly via close unprotected contact between an infected and a susceptible individual, or indirectly

8. Dercon, S (2020), "No-regret policies for the COVID-19 crisis in developing countries", Centre for Global Development.

when contaminated hands touch the mucosa of the mouth, nose, or eyes.[9] Contaminated hands may also transfer the virus from one surface to another, further facilitating indirect transmission.[10] Frequent and proper hand hygiene is therefore considered to be one of the most important control measures for preventing infection with COVID-19 both in community and healthcare settings.

Evidence on WASH policies for mitigating health crises

COVID-19 is a novel disease so the evidence for mitigation is inevitably limited. There are presently no high-quality studies for the impact of improved WASH practices on COVID-19. However, there is substantial evidence from past trials that clean water and handwashing with soap (HWWS) reduces the prevalence of respiratory infections.[11] Evidence from SARS, the closest known model for COVID-19, shows that HWWS interventions were effective nine out of ten times in reducing transmission across many community settings.[12]

It is important to note that improvements in WASH also bring vast co-benefits. The OECD estimates that 10% of the global disease burden could be prevented through WASH improvements.[13] This is supported by evidence from across the developing world showing that improvements to water supply reduce the prevalence of diseases such as diarrhoea, cholera, schistosomiasis, typhoid, and dysentery, and lead to dramatic improvements in life quality and expectancy. HWWS has been shown to reduce the risk of diarrhoeal disease, currently the leading cause of death among children under five in sub-Saharan Africa, by up to 42%.[14] In Sri Lanka, investments in water infrastructure were the key factor behind a fall in infant mortality from 141 per 1000 in the 1940s to 13 per 1000 in 2000.[15]

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9. We are consistently learning more about the transmission and environmental triggers of COVID-19 as new evidence comes to light. Neither airborne nor waterborne spread has been reported for COVID-19, and these are not believed to be drivers based on the available evidence. The virus that causes COVID-19, SARS-CoV-2, has been detected in a viable state in both human stool and faeces, suggesting faecal or urine transmission may be possible, although no studies have demonstrated this as yet. This would have important implications for low-income settlements in developing countries, where there is generally very poor sanitation and heavy associated contamination of the environment.
10. Otter J, C Donskey, S Yezli, S Douthwaite, S Goldenberg, and D Weber (2016), "Transmission of SARS and MERS coronaviruses and influenza virus in healthcare settings: The possible role of dry surface contamination", Journal of Hospital Infection, 92(3): 235–250.
11. Rabie, T and V Curtis (2006), "Handwashing and risk of respiratory infections: A quantitative systematic review", Tropical medicine & international health, 11(3): 258-267.

Aiello, A, R Coulborn, V Perez and E Larson (2008), "Effect of hand hygiene on infectious disease risk in the community setting: A meta-analysis", American Journal of public health, 98(8): 1372-1381.

Ashraf, N, E Glaeser and G Ponzetto (2016), "Infrastructure, incentives, and institutions", American Economic Review, 106(5): 77-82.
12. Fung, I and S Cairncross (2006), "Effectiveness of handwashing in preventing SARS: A review", Tropical medicine and international health, 11(11): 1749-1758.
13. OECD (2011), "Benefits of investing in water and sanitation: An OECD perspective", OECD: Paris.
14. Curtis, V and S Cairncross (2003), "Effect of washing hands with soap on diarrhoea risks in the community: A systematic review", The Lancet, Infectious Diseases, 3(5): 275-281.
15. Soares, R "On the determinants of mortality reductions in the developing world", National Bureau of Economic Research, Working Paper.

Evidence on WASH policies for mitigating economic and social harm

COVID-19 has brought to light the full weight of economic damage that can be caused by health crises. Estimates have suggested that under a worst-case scenario where global income per person falls by 20%, the number of extreme poor could increase by 420 million, wiping out decades of gains in the fight against poverty.[16]

Even before the COVID-19 pandemic, poor health stemming from ineffective WASH facilities has been a significant poverty trap for low-income households, reducing productivity at work, using up hard-earned savings on healthcare expenses, and stunting child development. The World Bank estimates that in a typical year, poor sanitation costs most African countries between 1-2% of national income, and 4-6% for South Asian countries.

According to numerous studies by the World Bank, the WHO and the UN, the cost-benefit ratios for water and sanitation investments are such that for every $1 spent, the amount returned in terms of increased national productivity, decreased time off work, and healthcare savings is $2-4 for water and $5-9 for sanitation.[17] This makes improvements to water and sanitation among the most cost-effective government interventions.

Short-term policy options for COVID-19

Use data to rapidly assess community disease transmission and WASH capacities

Localised information on disease transmission, available WASH facilities, and the determinants of hygiene, even if rapidly gathered, could be instrumental for the effectiveness of COVID-19 interventions. With information in hand, policymakers can assess what resources are needed, for how long, and where they could be best targeted.

Where estimating disease transmission with extensive case confirmation is not possible, lower-cost and scalable data solutions may be appropriate. These can include the detection of COVID-19 in wastewater (sewer systems) and/or faecal sludge (onsite sanitation systems),[18] as well as

16. Sumner, A, C Hoy and E Ortiz-Juarez (2020), "Estimates of the impact of COVID-19 on global poverty", UNU-WIDER, April, 800-9.
17. World Health Organization (2012), "Global costs and benefits of drinking-water supply and sanitation interventions to reach the MDG target and universal coverage", World Health Organization: Geneva.
18. Ahmed, W, N Angel, J Edson, K Bibby, A Bivins, J O'Brien, P Choi, M Kitajima, S Simpson, J Li, B Tscharke, R Verhagen, W Smith, J Zaugg, L Dierens, P Hugenholtz, K Thomas and J Mueller (2020), "First confirmed detection of SARS-CoV-2 in untreated wastewater in Australia: A proof of concept for the wastewater surveillance of COVID-19 in the community", Science of The Total Environment, 138764.

serosurveys[19] to understand community-level infection history.[20]

WASH facilities and typical sanitation practices can be assessed using pre-collected censuses, and administrative and/or household surveys data. Where these sources are poorly representative of certain communities, governments could consider rapid assessments using alternative sources such as remote-sensing data in the case of facilities, and citizen-generated or phone-surveys for both facilities and behaviour.[21] [22] For example, World Bank researchers have used high-resolution satellite imagery to predict the likelihood of WASH infrastructure given the spatial characteristics of slums in Dhaka, Bangladesh.[23]

Finally, data collection could also be targeted towards identifying and reducing water waste (see Case Study 1 for an example from Cape Town). Many cities lose more than half of their piped water supply to leakages, costing them substantial resources estimated to be upwards of $400 million each year across Africa, and preventing safe water from reaching essential users in times of crisis.[24] Although fixing leaks will be difficult in the short-term (most piped water systems have decades-old infrastructure), governments can start now on gathering data to improve water management.

Using data to reduce water waste in Cape Town

In Cape Town, efforts to monitor and identify infrastructure gaps, such as pipe conditions and major leaks, have helped the city to reduce its water consumption by 50% in just three years following major droughts starting in 2015. This was largely facilitated by rapid reforms in the city's approach to data. The city made concerted efforts to digitise and frequently update daily administrative data, which resulted in vastly improved leak detection and pipe replacement. Data was also made visible to the public through communications campaigns, such as #everydropcounts, and public assessments of household consumption. In this way, citizens could rally around a collective effort to reduce consumption.

19. Quoted from the WHO: "Serosurveys involve the collection and testing of serum (or proxy such as oral fluid) specimens from a sample of a defined population over a specified period of time to estimate the prevalence of antibodies against a given pathogen."
20. Bryant, J, A Azman, M Ferrari, B Arnold, M Boni, Y Boum, K Hayford, F Luquero, M Mina, I Barraquer, J Wu, D Wade, G Vernet and D Leung (2020), "Serology for SARS-CoV-2: Apprehensions, opportunities, and the path forward". Science Immunology, 5(47).
21. Byrne, J (2018), "Know your city: Slum dwellers count", Know your city.
22. Vogel, K, R Goldblatt, G Hanson and A Khandewal (2018), "Detecting urban markets with satellite imagery", IGC Working Pape C-89448-INC-1.
23. Mimmi, L, C Borja-Vega, A Patel, T Bhan, H Lee, M Mundt, T Soukop and J Kolomaznik (2018), "Predicting deprivations in housing and basic services from space: A pilot study in slums of Dhaka, Bangladesh", Working paper.
24. United Nations Environment Programme (2008) "Every Drop Counts: Environmentally Sound Technologies for Urban and Domestic Water Use Efficiency", UNEP: Nairobi.

Provide clear and actionable messages to improve sanitation behaviour

There is an extensive literature documenting the challenges of improving sanitation practices. The difficulty often lies in finding the right kind of message and the appropriate delivery method to truly change and sustain behaviour, whilst also maintaining value for money. However, in recent years, new health experiments have reported positive effects of messaging on handwashing behaviour,[25] as well as other sanitation-related practices.[26] Under these circumstances, it has been demonstrated that awareness campaigns targeted at specific determinants of sanitation behaviour can offer cost-effective and powerful means to lower the transmission of infectious disease.

The following key lessons have been identified across the health and behavioural sciences literatures, and should be considered for urban health campaigns during COVID-19:

- **Messages must be clear and actionable:** The most effective campaigns often emphasise a few core messages rather than giving long lists of "dos and don'ts". This not only creates clear priorities, but it is also far easier for residents to internalise and action. It is important that governments provide support to ensure expected behaviour can be met as messaging that cannot be actioned can cause further stress and anxiety.
- **Environmental changes are powerful cues:** Outbreaks are an opportunity for the rapid formation of new social norms, such as HWWS or touching elbows rather than shaking hands. This is because fear, and the associated elevation of risk perception, can be powerful behavioural determinants.[27][28] This should be adapted over time because although fear may be a quick way to create new behaviour, it may not be the best way to sustain behaviour without appropriate campaigns.[29] In this regard, messaging should remain informed by behavioural sciences and changing local norms and conditions.
- **Scale is important:** It is important that whole communities, rather than

25. Biran, A, W Schmidt, K Varadharajan, D Rajaraman, R Kumar, K Greenland, B Gopalan, R Aunger and V Curtis, (2014), "Effect of a behaviour-change intervention on handwashing with soap in India (SuperAmma): A cluster-randomised trial", The Lancet Global Health, 2(3): e145-e154.
26. J Tidwell, A Gopalakrishnan, S Lovelady, E Sheth, A Unni, R Wright, S Ghosh and M Sidibe (2019), "Effect of two complementary mass-scale media interventions on handwashing with soap among mothers", Journal of health communication, 24(2): 203-215.
27. Caruso, B, M Freeman, J Garn, R Dreibelbis, S Saboori, R Muga, and R Rheingans (2014), "Assessing the impact of a school-based latrine cleaning and handwashing programme on pupil absence in Nyzana Province, Kenya: A cluster randomized trial", Tropical Medicine and International Health, 19(10): 1185-1197.
28. Judah, G, R Aunger, W Schmidt, S Michie, S Granger, S and V Curtis (2009), "Experimental pretesting of hand-washing interventions in a natural setting", American Journal of Public Health, 99(S2): S405-S411.
29. Czerniewska, A and S White (2020), "Hygiene programming during outbreaks: A qualitative case study of the humanitarian response during the Ebola outbreak in Liberia", BMC public health, 20(1): 154.

just single individuals, change their sanitary habits. Community-based awareness-raising initiatives are likely to be more relevant than initiatives targeted at individuals. Mass media, such as text-messaging or radio, can offer further scalability at potentially lower costs per person.[30]

- **Campaigns need buy-in from local communities:** Without buy-in from local communities, mass public health campaigns are unlikely to succeed. It is critical that WASH campaigns are tailored to the realities and priorities of communities and that local leaders help to ensure effective dissemination (see Case Study 2 for an example from Sierra Leone).

Public messaging during health crises: Lessons from Sierra Leone

One of the major challenges during the Ebola outbreak was the spread of misinformation and a general lack of trust in public officials leading the response.[31] As a result, many Sierra Leoneans delayed taking up preventative behaviour and were also reluctant to report new cases in their communities, leading to further spread of Ebola.[32]

The government rectified this by supporting research to understand transmission risks and behaviour better, and by engaging with respected community leaders to disseminate trusted health messages.[33] For example, religious leaders were used to promote safe burial practices in the case of Ebola.

Today, these lessons are being applied to COVID-19 as Sierra Leone has successfully marshalled respected local female leaders, religious figures, and radio celebrities to disseminate factual and culturally-sensitive health messages to curb the pandemic.[34]

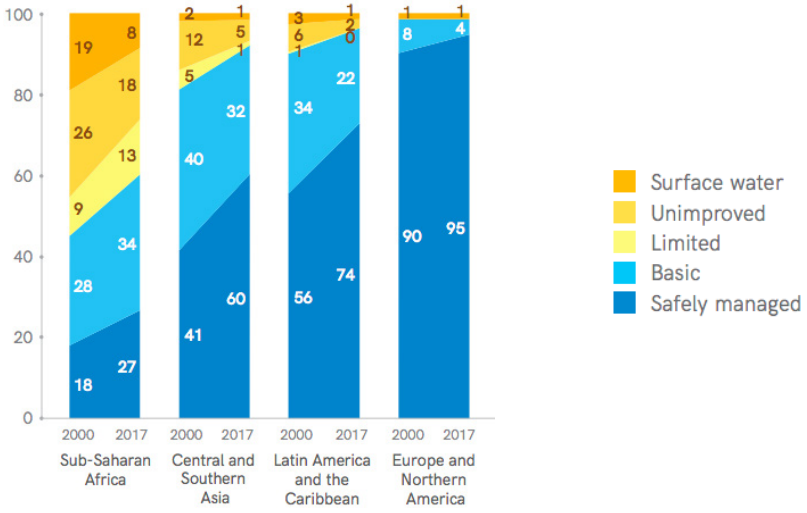
These lessons indicate that guidelines may need to be flexible and adaptive to reflect local conditions. Policymakers might consider context-specific adaptation of international guidelines and/or national strategies, as well as iterative changes to messaging over the course of the outbreak as community perceptions and transmission dynamics change. This should be supported by communication with local leadership to monitor community sentiments and the capacities to action expected behaviour with available local resources.[31]

30. Schmidt, W and V Curtis (2011), "Respiratory and hand hygiene in an influenza pandemic. UK Department of Health", Scientific Evidence Base Review.
31. Tilton, A (2020), "Tackling the COVID-19 infodemic to get public health messages heard", Options.
32. Yamanis, T (2020), "Clear, consistent health messaging critical to stemming epidemics and limiting coronavirus deaths", The Conversation.
33. Tilton, A (2020), "Tackling the COVID-19 infodemic to get public health messages heard", Options
34. Pilling D (2020) "*Africa's COVID-19 response is a glimpse of how things could be different*", Financial Times

Rapidly deploy facilities to improve access to handwashing with soap (HWWS)

Access to water and sanitation infrastructure is often severely limited in low-income countries, with many households relying on shared sources with intermittent supply and high costs. Under these conditions, the amount of water consumed per capita per day often falls well below the basic agreed threshold of 20 litres. Figure 1 below, emphasises the inequalities in available water technologies between different parts of the world.

Figure 1: Access to different water technologies by region over time.



Source: UNICEF and WHO (2017)[35]

Lockdown measures and their associated impacts on travel and household budgets are likely to create acute challenges in access to water and sanitation. At the same time, for many households, collecting water, travelling to and from communal waterpoints and waiting in line, poses a transmission risk. Simply instructing people to wash their hands with soap in settings where the infrastructure cannot support this will not impact transmission and may exacerbate fear. In turn, if citizens do not feel safe or physically able to collect and transport water, they may choose to stick with more accessible but far more unsanitary alternatives such as shallow wells.

In delivering water and sanitation in normal times, policymakers often have to make difficult trade-offs between easy-to-implement technologies such as water tankers or boreholes, and higher-quality technologies such as piped water. While the former may be faster and more affordable in the short-term, they fail to deliver the strongest long-term public health,

35. UNICEF (2017), "Progress on household drinking water, sanitation and hygiene, 20000-2017", UNICEF: New York.

economic, social, and environmental benefits. The latter, on the other hand, are more cost-effective in the long-term, but require complex infrastructure and significant up-front investments. Striking this balance will remain a critical part of long-term WASH policy. However, in the short-term, it is most important that policymakers leverage quick and low-cost methods for expansion.

Water tankering (i.e. delivering water by trucks) is a common way that countries distribute water during the initial phase of an emergency. Tankering is popular because it does not require new construction and usually at least some areas of cities are serviced by water trucks in normal times. But even water trucks can be an expensive and complex logistical service for many cities.[36] Across many developing countries, WASH solutions will need to include technologies that can be deployed rapidly and at very low cost.

During the Ebola outbreak, Ghanaian health officials installed plastic water containers nicknamed "Veronica buckets" across the city. These are simple and low-cost solutions, providing a critical means for handwashing and safe wastewater disposal, despite the absence of running water.[37] Similar policies could include deploying temporary facilities and supplies such as soap stations and alcohol-based hand sanitizers. In doing so, policymakers should look to prioritise critical user groups, such as healthcare facilities, schools, vulnerable communities, and strategic urban locations (e.g. shopping malls, markets, and informal settlements).

Figure 2: A 'Veronica bucket' handwashing station at Sierra Leone airport.

Source: CDC Global, Flickr

36. World Health Organization (2013), "Delivering safe water by tanker", World Health Organization: Geneva.
37. Pilling, D (2020), "Africa's COVID-19 response is a glimpse of how things could be different", Financial Times

Water providers may also consider approaches to more efficiently source and deploy parts for maintenance and refurbishment, as well as how to enhance staff productivity. This may be in the form of targeted training, provision of protective equipment, and productivity salary supplements to compensate for the additional workload and risk.[38]

Medium-to-long-term policy options for COVID-19

Even with quality infrastructure in place, without institutions to incentivise demand and regulate supply over the long-term, citizens often continue with the informal systems that shape much of the urban fabric in developing cities.[39] Research experiments from Bangladesh suggest that purely supply-led models rarely work when it comes to sanitation. It is only when demand and incentives are combined with the appropriate 'hardware' interventions, that you see dramatic improvements in hygiene practices.[40]

Use incentives, such as subsidies and loans, to increase take-up of clean water connections

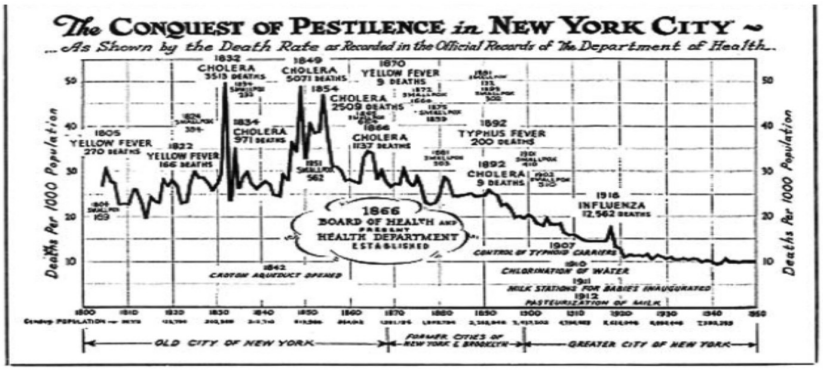
Most European and American cities did not have good sources of clean water when they were first afflicted with global cholera pandemics in the early 19th century. The issue led to thousands of deaths, but inspired political support for massive investments in water and sewer related infrastructure, which have helped make these cities much healthier.

In 1842, New York opened the Croton Aqueduct, a large-scale system that distributed water to Manhattan. Yet as Figure 3 shows, it was not the aqueduct on its own that led to a meaningful reduction in death rates. In fact, the 1849 Cholera outbreak was even deadlier than its predecessor in 1832. The reason death rates remained high was because poor New Yorkers did not connect to the new water system. Connection fees were expensive, and just as in sub-Saharan Africa today,[41] poorer individuals chose to avoid paying the fees.

38. World Bank (2020), "WASH (Water, sanitation, hygiene) and COVID-19", World Bank: Washington DC.
39. Ashraf, N, E Glaeser and G Ponzetto (2016), "Infrastructure, incentives, and institutions", American Economic Review, 106(5): 77-82.
40. Guiteras, R, J Levinsohn and A Mobarak (2015), "Sanitation subsidies. Encouraging sanitation investment in the developing world: A cluster-randomized trial", Science, 22(348): 903-6.
41. Survey data on approximately three million peri-urban citizens in Zambia has shown that in 2005, four in every five people surveyed lived close to utility networks, yet the majority were not actually being served by them.

Blume, S, D Nordmann, D Schäfer and R Werchota (2015), "Closing the last mile for millions: Sharing the experience on scaling up access to safe drinking water and adequate sanitation to the urban poor", Eschborn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

Figure 3: Timeline of New York city's mortality rate, which sharply dropped with the provision of clean water in the 19th century



New York City's Department of Health shows the timeline of the city's mortality rate, which sharply dropped with the provision of clean water in the nineteenth century.

New York City Department of Health and Mental Hygiene

Source: New York City Department of Health and Mental Hygiene.

New York was an example of the 'last mile problem', an all-too-common reason why the benefits of WASH systems fail to materialise in practice. To overcome this, governments have to incentivise connections, and they typically do this using financial means such as subsidies, fines, or pay-as-you-go loans (where large-scale subsidies are prohibitively expensive). The use of loans can be a highly cost-effective policy, as poor unconnected households typically already pay 4-10 times more per unit of water than they would from the public utility simply because they cannot afford the upfront connection costs.42 In Nyeri, Kenya, the utility has subsidised connection fees to $35, only half of which has to be funded upfront; 94% of residents now have access to piped water.[43] The use of these financial incentives has a strong economic rationale because water and sanitation is a public good: individual decisions create public, as well as private, benefits.[44]

It is worth noting the downsides of financial incentives: subsidies are expensive and may lead to public waste, while fines require effective enforcement and may offer scope for extortion. Loans can be useful to finance up-front connection fees where governments cannot afford large-scale subsidies, but these can be institutionally complex. Nevertheless, we

42. Banerjee, S. and Morella, E. (2011) "Africa's Water and Sanitation Infrastructure: Access, Affordability and Alternatives", World Bank
43. Heymans, C., Eberhard, R., Ehrhardt, D. and Riley, S. (2016) "Providing Water to Poor People in African Cities Effectively: Lessons from Utility Reforms", World Bank.
44. Ashraf, N, E Glaeser and G Ponzetto (2016), "Infrastructure, incentives, and institutions", American Economic Review, 106(5): 77-82.

should remain conscious of the potentially massive public benefits: it is estimated that the introduction and take up of clean water technologies was responsible for 43% of the reductions in mortality observed in major American cities between 1900 and 1936.[45]

Independent regulators should ensure fair service quality and pricing

Poor regulation of WASH can lead to large variations in service quality and pricing. It is often necessary to separate the role of regulators and operators so as to ensure impartial and effective oversight. As a set of priorities during COVID-19, independent regulators can look to:

1. **Enforce rules regarding tariff levels and service quality** – e.g. by structuring tariffs so that wealthier users cross-subsidise poorer users.
2. **Oversee rapid infrastructure expansion** – setting clearly defined targets based on good data and realistic financial plans.
3. **Formalise and regulate alternative service providers** – where legal recognition would provide greater investment security and improved access to finance.

Accessibility issues can also be exacerbated by poor coordination. It is important that national policy clarifies and legally mandates the various responsibilities of federal and local governments.[46] Many countries might then look to set-up dedicated authorities to coordinate WASH policy. [47]

It is also critical that WASH policies are well-linked to other parts of the urban system. In particular, land rights are needed to ensure utilities can legally supply households, property taxes are typically needed to fund the ongoing maintenance and repair of infrastructure, and urban planning is needed to ensure infrastructure is correctly put in place in advance of settlement. Evidence shows that retrofitting infrastructure after settlement has already occurred can be up to three times more expensive.[48]

Funding for WASH infrastructure should come from a combination of taxes, tariffs (user fees), and transfers (aid)

Since the public benefits of WASH far out-weigh the benefits derived by individual consumers, large-scale public investments are usually needed to

45. Cutler, D and G Miller, G (2005), "Water, water, everywhere: municipal finance and water supply in American cities", National Bureau of Economic Research, Working paper.
46. Haas, A and S Wani (2019), "Urban governance institutions. Policy options for fast-growing cities", IGC policy brief.
47. See the example of Senegal's National Sanitation Office here: Heymans, C, R Eberhard, D Ehrhardt and S Riley, (2016), "Providing water to poor people in African cities effectively: Lessons from utility reforms", World Bank.
48. Abiko, A, L Cardoso, R Rinaldelli, and H Haga (2007), "Basic costs of slum upgrading in Brazil", Global urban development magazine.

ensure appropriate provision at the city level. However, high up-front costs for project development, combined with limited public budgets, means governments often have to take difficult decisions both in raising finance for infrastructure investments, and in implementing pricing policies that can affordably and sustainably fund operations.

There are three major financing costs to consider when it comes to water and sanitation systems – infrastructure, connections, and maintenance. These costs are typically funded by three sources – taxes, tariffs (user fees), and transfers (aid). Larger-scale trunk infrastructure is usually funded through public finance such as taxes and aid transfers, maintenance is funded through user fees, and individual connections to the system are funded through some combination of both.

COVID-19 presents a massive challenge to all of these sources of infrastructure financing. Fiscal and international budgets have significantly tightened, and numerous policy demands will have to compete for public finances. At the same time, taxes and user fees will drop substantially as national incomes fall and households defer payments or switch to alternative providers.

Given the scale and urgency of the investments needed, as well as the global burden of disease, COVID-19 has made it evident that the global community needs to come together to invest in WASH across the developing world. This is particularly important for fast-growing cities where the time imperative for infrastructure is absolutely critical, but the up-front costs often delay investment from taking place. Without international support to shoulder the burden of investment, developing cities could end up locked into ineffective systems that are extremely costly to replace at later dates.

Near-term financing and funding of infrastructure will therefore likely require increased transfers from central government or international bodies. This is particularly true if the circumstances call for subsidising water connections. Other options cities have increasingly used include concessional loans from development partners, collaboration agreements with the private sector in the form of Public Private Partnerships, and subsidy instruments such as blended finance.[49] Such models can complement initial capital spending or expansion, and may bring technical know-how to projects. However, they by no means guarantee long-term efficiency and financial sustainability.

Over time, as urban incomes rise, an increasing share of public investments could be financed through a combination of local taxes and user-fees.

49. Heymans, C, R Eberhard, D Ehrhardt and S Riley, (2016), "Providing water to poor people in African cities effectively: Lessons from utility reforms", World Bank.
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Property taxes played a vital role in financing the WASH infrastructure of Western cities in the 19th century, as incomes increased and land values sky-rocketed, and developing cities are increasingly recognising the importance of these taxes.[50] Research from informal settlements in Brazil shows that a $1/m² government investment to service land with water infrastructure increases the landowners land value by $3-11/m²; it is only fair that the government recoups some of this land value increase through taxation.[51]

Sierra Leone, has recently renewed efforts to enhance property tax receipts, even despite COVID-19, in the hope that they can continue to invest in improved WASH and other services.[52] For most developing cities, however, raising any taxes at this time is likely to be politically infeasible. Moreover, with low-incomes and relatively new systems, property tax is unlikely to be a sufficient source of finance on its own. User fees present similar political challenges given COVID-19, although as economies recover, the right user fee structure can still represent an important source of maintenance funding. For example, many developing cities already implement block-tariff systems which cross-subsidise the poor. These systems make costs very low for an initial basic amount of water, before increasing unit prices on water consumed beyond this amount.

As with all infrastructure, the key is to build WASH facilities in the right place, at the right time, and using the right technologies. This requires credible cost-benefit analysis, based on forecasts of demand and whether and how local taxes or user-fees can support long-term cost-recovery of infrastructure and operations.

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