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Redistributing risk management responsibilities to achieve the Sustainable Development Goal (SDG) for safely-managed drinking water in rural Bangladesh

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This policy paper summarises the journal article: Fischer, A. et al. (2020). Risky respconsibilities for rural drinking water institutions: The case of unregulated self-supply in Bangladesh. Global Environmental Change, 65 (102152).

Highlights:

1. The success of rural Bangladesh achieving the Millennium Development Goal (MDG) 7 of improved drinking water access was largely funded by household investments in shallow tubewells.
2. The SDG 6.1 to ensure safely-managed and reliable drinking water to all households, schools and healthcare facilities by 2030 requires new service models and policy approaches that shift focus from 'increasing access' to 'managing risks'.
3. A threefold decline in real costs[1] of tubewells between 1982 and 2017 increased the affordability of water access for rural households.
4. Between 2012 and 2017, we estimate that the installation of unregulated private water points outpaced the scale of publicly funded water points at a rate of 45 to 1.
5. Since 2005, the number of tubewells has doubled resulting with up to nine million new privately managed water points.
6. There is no evidence of widescale testing for privately installed water points. Our survey only found publicly funded water points had been tested.
7. The market demand from households is showing signs of shifting towards preferences for electric pumps linked to small piped networked and reverse osmosis plants managed by private and unregulated service providers.
8. Risks of exposure to arsenic and other contaminants could be increasing without testing of newly installed water points and monitoring of piped networks.
9. By networking rural waterpoints in exclusive service areas, service delivery companies can be regulated to ensure water risks and responsibilities are effectively allocated.
10. Changes to the service model will require the government to assume a new role as regulator and to shift policy targets to include not only improved access but also safe and reliable service delivery.

Policy context

Expanding global goals to deliver safely-managed rural drinking water for all, and monitoring multiple water quality and reliability indicators, have revealed gaps in the drinking water sector's performance. The 2019 Joint Monitoring Program (JMP) report on progress of household drinking water, sanitation and hygiene identified that there has been significant progress to reduce the number of people without improved access to 785 million. However, when measuring factors of safety and reliability, the number of people without adequate services increases to 1.9 billion, nearly a quarter of the world's population. Given the scale of the global financing needs for rural drinking water services is estimated at USD 37.6 billion per year[2] and each country has varying sources of finance, policy makers will continue to need new ways to leverage domestic and consumer investments to amplify impact of public spending.

Countries, including Bangladesh, have seen their hard-won gains of achieving nearly universal improved infrastructure access being redefined by these additional policy goal definitions. While issues of water safety and supply reliability have long been present, our research across Bangladesh's rural drinking water sector has identified how the drive to reach universal improved access may have overlooked unintended consequences of household investment into individually managed water points and therefore increased uncertainty of water safety.

Finding one

Rural drinking water infrastructure growth is driven by households, delivered by the private sector, largely unmonitored, and unregulated by the government.

The number of tubewells in Bangladesh have more than doubled since the last national inventory in 2005. Since the 2005 national water testing campaign, we estimate that upwards of nine million additional tubewells were privately installed by unregulated service providers. In 2018, the total national stock of tubewell infrastructure was estimated at over 18 million water points (Figure 1).

Rural drinking water services in Bangladesh have therefore shifted into a self-supply model. This model allocates responsibility to manage the risks directly to individuals and households.

Households do not directly invest in water quality testing, a cost which represents between one and three percent of the installation cost. Most water points installed by the government are reported to have been tested at installation. The water point owner and user memories of water quality test results are not reliable and the red or green paint used to signify water quality in the mid-2000s has largely faded.

Increased uncertainty of water quality and safety. National modeling for arsenic and diarrheal disease exposure is based on infrastructure coverage and density per household figures from the 2000s. If infrastructure has doubled without being tested to comply with water quality standards, the risk factor for the population will have changed. The significant growth in the total number of water points implies a need to rerun the national exposure estimates.

While the success in achieving the MDG drinking-water goals was largely enabled by household investment in new infrastructure, **it is unlikely the SDGs will be achieved without government regulation**. Enhancing the national, regional, and service-level monitoring systems is underway but critical to effectively detect risks and changes in demand, as well as manage accountable delivery of services.

Finding two

The same consumer preference for on-premises services which drove the market saturation of shallow tubewells is transitioning towards demand for electric pumps and small piped systems.

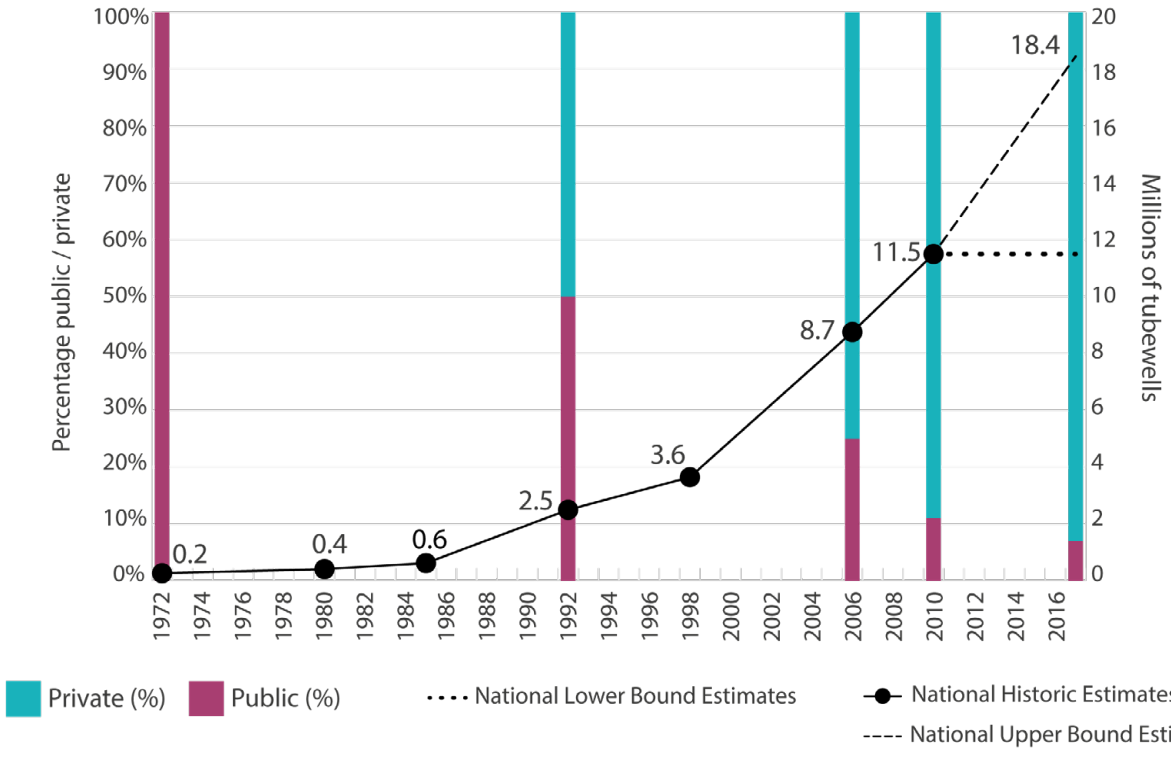

Figure 1: The exponential rate of growth was driven by increasing participation of private households (from Fischer et al. 2020)

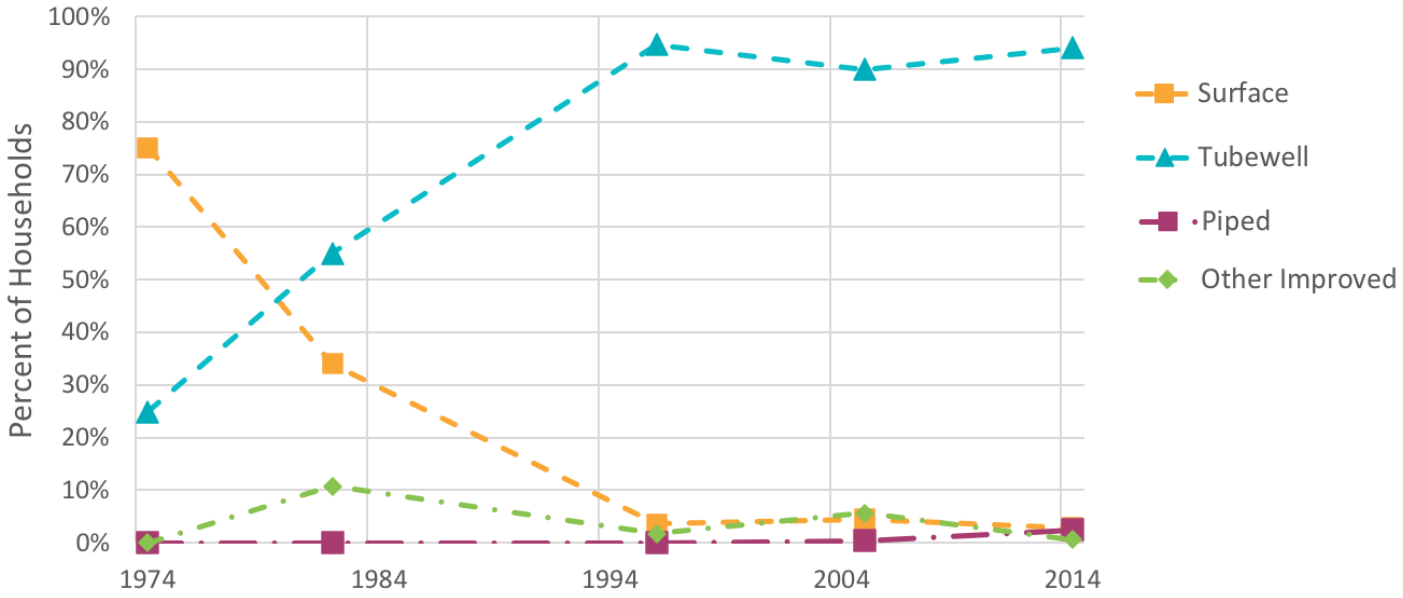

Figure 2: Rural households reliance on tubewells for drinking water shifted in the 1980s, before the expotential growth of tubewell infrastructure starting in early 2000s (from Fischer et al 2020)

The tubewell-to-people ratio has fallen from 400 to two since 1970. The rates of change suggest that infrastructure coverage has reduced the household-to-infrastructure ratios from 400 in 1970 to under two households per water point in 2018. However, the transition to tubewells as the main source of drinking water occurred in the 1980s while the growth of tubewells increased exponentially after the discovery of widespread naturally occurring arsenic in the aquifer system. Household surveys do not pick up the continued change of rural drinking water sector infrastructure. The growth revealed a rapidly changing density of tubewells, going from one per village to one per neighborhood to one tubewell for every two households. We noted that this increase of infrastructure coverage occurred in villages and areas across the country, even those that historically had significantly lower infrastructure access. After the past decade of growth rates for households, we believe that rural markets in Bangladesh will soon approach a point of saturation. The boom period of household investment into tubewells may be coming to an end.

Rural households demand for on-premises services while infrastructure preferences are transitioning from handpumps towards small piped networks. Results from interviews with over 3,700 water point owners suggests that household-driven growth is linked to shifting preferences for piped or in-premises services. Out of the over 3,700 water points we surveyed, 60% of the tubewells installed between 2006 and 2016 were located inside four-walled structures and 10% were electric pumps.

70% fall in cost of installing shallow tubewells since 1980. Inventories from rural and coastal Bangladesh show that rates of growth in infrastructure are similar, however water quality risks are different. The cost of installing tubewells and handpumps in 2018 has declined by 70 % since 1980 when adjusted to 2018 in real terms. This suggests that although the cost of tubewells has increased since the 1980s, households would perceive that costs as lower relative to other goods. This has made tubewells and handpumps affordable for households.

Infrastructure transitions are unique moments for reallocating responsibility and managing risks in new ways. As households shift investment towards more convenient electric pumps, there is an opportunity for government to play a new and active role as a regulator of rural services, standardize water quality testing and monitoring for all new installations with service providers, and incentivise performance-based service providers. This is particularly critical as electric pumps start to be installed at larger scales as they impact larger numbers of users and draw greater volumes of water from the aquifer.

Policy recommendations

The 1998 National Water Policy in Bangladesh was designed around a public mandate to increase access to infrastructure, not to ensure the sustainable delivery of safe and reliable services. The 1998 policy was written before the exponential growth of privately-financed tubewells shifted rural households away from reliance on publicly-provided water points. The next policy reform process has an opportunity to not only recognize the role of households in rural systems but also create new policy instruments to incentivise private investments in ways which blend public-private finance and help mitigate water safety and supply reliability risks. This reflects the priorities embedded within SDG 6.1. The Government of Bangladesh is positioned to be a global leader and innovator addressing the risks facing rural households by shifting their role toward one of a regulator and co-investor.

Recognise drinking water risks facing rural households and redistribute responsibilities:

1. Position government agencies to shift their responsibility away from provision of infrastructure, and instead towards the role of regulator to ensure safe and reliable delivery of services and sustainable utilisation of resources.
2. Transfer risk management responsibility away from individual households into shared and accountable services at appropriate scales.
3. Transfer responsibility to local governments to be the lead agency in ensuring operational compliance and coordination aligned to a national policy, planning and regulation.
4. Structure sector finance strategies to shift current household capital investments away from self-supply towards ongoing operational investments and regulated service providers.
5. Increase the responsibility of tubewell drillers and market vendors as a formal regulated service provider.
6. Establish an interagency mechanism or independent platform to coordinate the multi-sectoral and multiple stakeholders, including donors, NGOs and the private sector, to realise large efficiency gains and increased transparency with more accountable outcomes.

Enhance all levels of national information systems:

1. Invest in systematic and repeated mapping of infrastructure investments, functionality, reliability and service coverage.
2. Establish a transparent reporting system for water quality tests for public and multi-user water systems. Information should be designed to support independent regulatory agency with compliance and national reporting.
3. Create an SDG water innovation fund to pilot and test new monitoring technologies and software platforms to enhance national expertise with specific attention to rural services and the transitions to electric pumps.
4. Design national monitoring of infrastructure to link regulatory data around water quality with permit compliance and ongoing reporting of operational and financial data by service delivery companies.

Sustain performance-based service delivery models through blended public and private finance:

1. Enable government funding mechanisms to blend household and private sector funding.
2. Enable public and private funds to adjust to consumer preferences for delivery of safe and reliable water services directly to their households.
3. Enable regulated at-scale service providers to also serve or accommodate the needs of public schools and healthcare facilities where public finance remains critical.
4. Pilot performance-based service delivery models for safely-managed drinking water to attract global funds.

Footnotes:

1 - Costs which are adjusted for inflation to real 2017 prices using World Bank deflators and the World Bank Official exchange rate.

2 - Hutton, G., Varughese, M., 2016. The Costs of Meeting the 2030 Sustainable Development Goal Targets on Drinking Water, Sanitation, and Hygiene - Summary Report.

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