Policy Brief

Self-supply for safely managed water: To promote or to deter?

For centuries, households have survived and thrived relying on simple, self-supplied drinking water sourced mainly from ground water that is self-financed and self-managed by individual households. With proper point-of-use treatment such as boiling or filtering, alongside appropriate source protection, self-supply may provide households with safely managed water. However, since domestic groundwater use is often unregulated and unmonitored, several risks may be present. These risks, in both rural and urban areas, include faecal contamination, seasonal variability and over-extraction. With the demand for safe drinking water ever increasing, should self-supply water be promoted or deterred? If so, what is the role of government and other stakeholders in ensuring a sustainable future for drinking water supply combined with groundwater conservation?

A THIRD OF INDONESIA'S POPULATION USES SELF-SUPPLY AS THEIR DRINKING WATER

We present findings and recommendations from a synthesis of a review of current regulations, national data analysis and ongoing self-supply research data analysis in selected districts in Indonesia.


Dug well depth measurement


Water sample preparation for *E. coli* detection


Water sample collection from a well using rope and bucket

The target of Sustainable Development Goal (SDG) 6.1 on safely managed drinking water aims to ensure the right to safe and affordable water for all, thereby fulfilling the SDG Goal of the human right to access to safe water. However, in Indonesia only 12 per cent of households currently have such access[1].

In reaching this Goal, the focus has primarily been on increasing the coverage of piped water, which is the 'gold standard' for drinking water, especially in urban areas. Currently, only 20 per cent of Indonesia's households have access to piped water, with only half of those households using it at their main source of drinking water[2].

However, 37 per cent of Indonesia's households (approximately 100 million people) use self-supply, which is a is self-financed and self-managed water source accessed by an individual household that originates mainly from shallow or deep groundwater. These water source s are perceived to have a relatively high level of safety, reliability and convenience as well as low operational costs. In rural areas, self-supply is the main source of drinking water (43 per cent). In urban areas, while only 30 per cent of the population use it as a source of drinking water, two thirds of the population (66 per cent) use self-supply as a secondary water source for other domestic purposes[3].

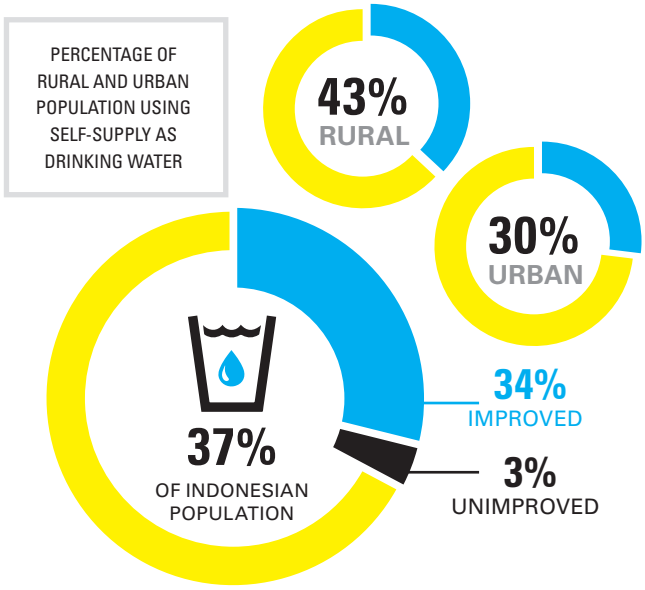
SDG 6 defines safely managed water as drinking water that comes from an improved source, is accessible on-premises, available when needed and free from contamination. Can self-supply support the SDG target? If so, to what extent?

CAN SELF-SUPPLY WATER SOURCES BE CONSIDERED SAFELY MANAGED?

Of the 37 per cent of Indonesian households that are using self-supply as their main drinking water, 15 per cent use protected wells and 19 per cent use boreholes. With both being improved sources, this potentially fits the definition of a safely managed water services (subject to quality and availability). A further 3 per cent use unimproved sources in the form of unprotected wells[3].

In general, the quantity and continuity of groundwater is reliable and available when needed in most areas in Indonesia, although some areas experience intrusion and groundwater depletion. From a monthly survey conducted in Bekasi during a one year period, households were satisfied with the availability of their groundwater more than 95 per cent of the time[4].

1 Ministry of Health, "Studi Kualitas Air Minum Tahun 2020", https://www.litbang.kemkes.go.id/hasil-skam-rt-sebagai-baseline-data-kualitas-air-minum-aman/ accessed on 7 April 2022
2 Bappenas,"Arah Kebijakan Pembangunan Air Minum Dan Sanitasi Untuk Pemenuhan SDGs Di Indonesia", Presentation for Environmental Engineering Masters Program Kickoff Webinar, June 7 2021, Universitas Indonesia
3 Data Badan Pusat Statistik 2021, processed by Bappenas
4 Priadi, Cindy; Putri, Gita L.; Jannah, Qanza N.; Maryati Sri; Afriana Anita; Pratama Mochamad Adhiraga; Foster Tim, Willetts Juliet, Longitudinal Study of Multiple Water Source Use in Bekasi, Indonesia: Implications for Monitoring Safely-Managed Services, forthcoming



Water quality constitutes a third criterion for a safely managed water service. Groundwater as the main source of self-supply is generally preferable to surface water but is nevertheless also vulnerable to contamination. From approximately 300 samples of self-supply water sources from Bekasi and Metro City, 60 and 72 per cent respectively were found to contain *E. coli* [5]. These findings are in line with national data where 7 out of 10 household drinking water sources showed signs of faecal contamination as measured by *E. coli* [1]. Simple water treatment methods such as boiling were found to

5 Genter, F., Putri, G. L., Pratama, M. A., Priadi, C. R., Willetts, J., & Foster, T. (forthcoming). Microbial contamination of groundwater self-supply in urban Indonesia: Assessment of sanitary and socio-economic risk factors, forthcoming

Transitioning to safely managed water services: risks and opportunities of self-supply for vulnerable populations


Borehole water sample collection from a household

Between 2019-2021, the University of Technology Sydney, Universitas Indonesia, Universitas Muhammadiyah Metro and UNICEF, in partnership with the Ministry of National Development Planning (Bappenas), carried out research focussing on self-supplied water sources. Approximately, 300 household samples from self-supply water sources were analysed from Bekasi and Metro City during both the rainy and dry seasons. The findings showed widespread faecal contamination affecting around two-thirds of self-supply water sources tested. The following key factors associated with faecal contamination and household preference were identified.

KEY RESEARCH FINDINGS: FACTORS ASSOCIATED WITH FAECAL CONTAMINATION IN GROUNDWATER

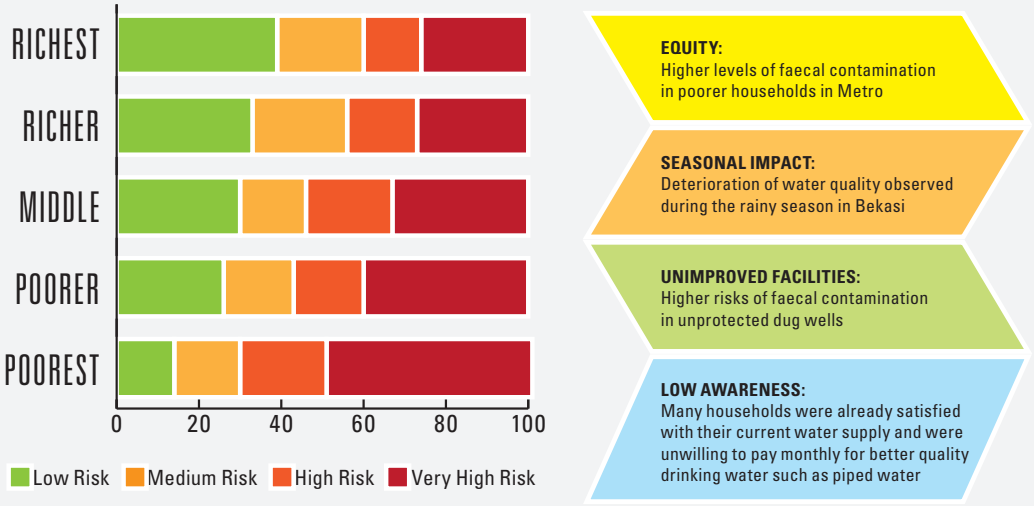


Figure: E.coli risk classification of self-supply by wealth quintiles in Metro[5].

significantly reduce high levels of contamination from 22 per cent to 6 per cent, but did not eliminate it[6].

Given it is possible for self-supply to meet the criteria of safely managed water, the government needs to widen the scope of the water provision strategy to formally include this service model. In what situation, then, should self-supply be either promoted or deterred? Where self-supply is used, how can risks be reduced?

BENEFITS AND RISKS OF SELF-SUPPLY

Formally including self-supply in the safely managed water strategy requires a careful consideration of the benefits and risk of using self-supply.

Given the large number of self-supply users, transitioning some of these users to safely managed water through optimizing their self-supply source might be more feasible and realistic than shifting millions of households to piped water.

To achieve this, point of use water treatment as well as safe handling and storage should be key priorities. While contamination in groundwater may exist, simple household treatments such as boiling and filtering may significantly reduce associated risks.

In general, self-supply incurs lower costs to households than piped water and bottled/refilled water. However, there are situations where piped water might be more efficient and, overall, a more cost-effective solution. This could include urban, densely populated areas or areas with a significant concentration of high-rise housing.

Aside from its benefits, self-supply poses several health and sustainability risks. In Indonesia, there is currently widespread use of onsite sanitation. Groundwater contamination from onsite sanitation may pose significant health risks to households, especially vulnerable populations.

Groundwater itself is also a water resource that is often overlooked. In many municipalities, structured conservation plans are non-existent. Although there are a few regional and local regulations in place for groundwater use permits, there are significant governance challenges. No permit is needed for domestic use of groundwater.

There is no professional certification mandated for service providers and no regular/structured monitoring by regulatory authorities to prevent groundwater exploitation. Currently, responsibility is placed on households to ensure monitoring.

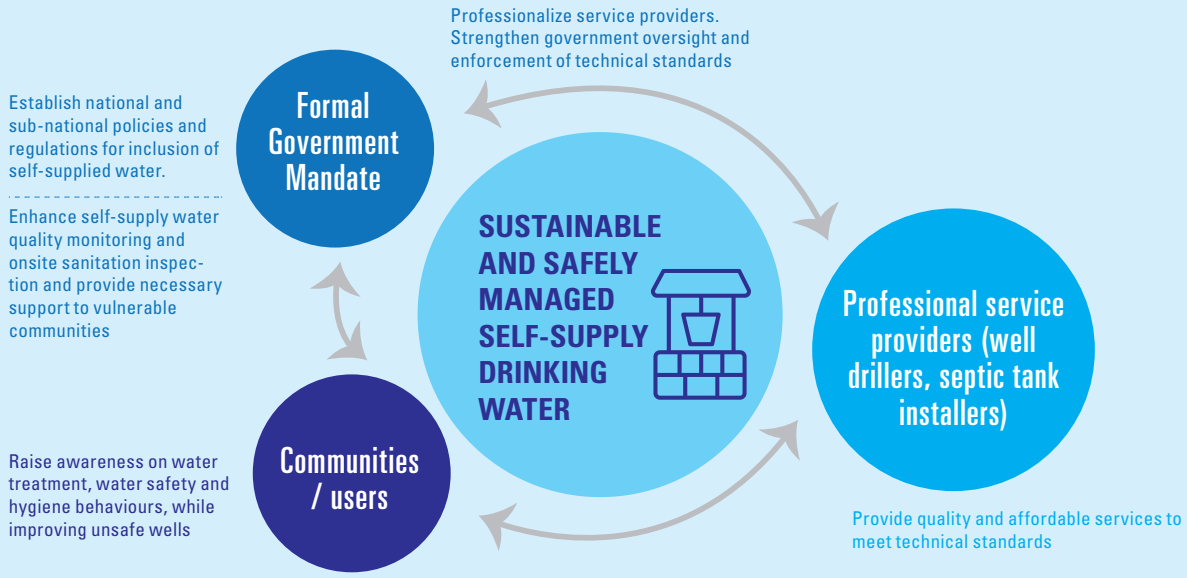
This could create a situation of over-extraction posing significant risks to the sustainability of groundwater. An increasing population driving higher water usage - simultaneously with the impact of climate change on water resources - would further exacerbate pressure on these resources. A robust and feasible plan is needed to maintain continuous access to a safely managed water supply, especially for vulnerable populations, until investments in piped water supply can be made.

TOWARDS SUSTAINABLE AND SAFE SELF-SUPPLY WATER

Groundwater management in general and self-supply management specifically, should be formally included in national and regional legal and planning instruments ranging from regulations, water safety plans and water

6 Ghaudenson, R., Priadi, C. R., & Foster, T. (2021). Effectiveness of Groundwater Boiling as Household Water Treatment in Metro and Bekasi Cities, Indonesia. E3S Web of Conferences, 277, 04002. https://doi.org/10.1051/E3SCONF/202127704002

ACTIONS NEED TO BE TAKEN TO ACHIEVE SAFELY MANAGED SELF-SUPPLY DRINKING WATER



provision strategies. A safely managed water roadmap should also include sustainable plans for self-supply use.

The government must prioritize supporting current groundwater users towards a safely managed self-supply. An early priority should be transitioning unprotected wells to protected wells or boreholes. The government should also support the financing of self-supply, especially for vulnerable populations and rural areas with no other water supply options.

It is imperative that the government has adequate oversight to ensure safe access to this basic service. In the short-term, self-supply management can be commenced by establishing groundwater permits and monitoring systems for households. This may be integrated with the building construction permit (IMB -Izin Mendirikan Bangunan) and the Clean and Healthy Living Behaviour Program (PHBS-Perilaku Hidup Bersih Sehat).

Monitoring water quality at point of use and awareness raising should also be part of the government's mandate. This can be supported by the development of household water quality testing kits and affordable water treatment options while strengthening water quality monitoring capacities across Indonesia. Having a national water quality monitoring strategy, with adequately equipped laboratories and skilled personnel, will be important steps towards making self- supply water safely managed. Thus, there is a need for adequate financing of decentralized water quality monitoring systems from national government and non-government actors (e.g. private sectors) to enable local government, community and individuals to regularly monitor water quality.

As self-supply and onsite sanitation are intrinsically linked, formalising private sector actors in both sectors - including civil contractors, borehole drillers, pump producers, septic tank installers and septage sludge collectors - is a necessary step. Professional certification and socialization of regulations in relation to both self-supply and onsite sanitation should be coordinated by the government. Additionally, monitoring of onsite sanitation facilities needs to be enhanced by scaling up inspection tools in order to minimize cross-contamination of self-supply water by unsafe sanitation facilities.

In the longer term, local and regional governments should establish scientific evidence for policies supporting self-supply, consisting of baseline and future projections of groundwater quality and availability. Sustainability risks due to potential over-extraction, climate impacts on water availability and groundwater contamination, among others, must be clearly addressed and mitigated. Future decisions on the use of self-supply will need to consider local and regional environmental conditions and be supported by a clear regulatory framework.

Overall, the short and long-term benefit and risks of various water supply service models must be simultaneously considered in order to establish a healthy and sustainable pathway towards safely managed water for all.

Written by: Cindy R Priadi, Gita Lestari Putri, (Universitas Indonesia), Tim Foster, Juliet Willetts (University of Technology Sydney) and Mitsunori Odagiri (UNICEF Indonesia) with invaluable inputs from Kannan Nadar (UNICEF Indonesia), Nur Aisyah Nasution and Adila Muthi Yasyfa (Bappenas). The work was supported by the Australian Government and the UNICEF Core Fund.

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World Trade Center 2, 22nd floor
Jl. Jenderal Sudirman Kav. 31, Jakarta 12920, Indonesia
Tel.: +62 21 5091 6100 | Email: jakarta@unicef.org
Donation Hotline: +62 21 8066 21001 | www.unicef.or.id