

Can water quality of tubewells be assessed without chemical testing?

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Arsenic is one of the major pollutants found in aquifers on a global scale. The screening of tubewells for arsenic has helped many people to avoid drinking from highly polluted wells in the Bengal Delta (West Bengal and Bangladesh). However, there are still many millions of tubewells in Bangladesh yet to be tested, and a substantial proportion of these are likely to contain excessive arsenic. Due to the level of poverty and lack of infrastructure, it is unlikely that the rest of the tubewells will be tested quickly. However, water quality assessment without needing a chemical testing may be helpful in this case. Studies have found that qualitative factors, such as staining in the tubewell basement and/or on utensils, can indicate subsurface geology and water quality. The science behind this staining is well established, red staining is associated with iron reduction leading to release of arsenic whilst black staining is associated with manganese reduction (any release of arsenic due to manganese reduction is sorbed back on the, yet to be reduced, iron), whereas mixed staining may indicate overlapping manganese and iron reduction at the tubewell screen. Reduction is not uniform everywhere and hence chemical water quality including dissolved arsenic varies from place to place. This is why coupling existing tubewell arsenic information with user derived staining data could be useful in predicting the arsenic status at a particular site. Using well location, depth, along with colour of staining, an assessment of both good (nutrients) and bad (toxins and pathogens) substances in the tubewell could be provided. Social-network technology, combined with increasing use of smartphones, provides a powerful opportunity for both sharing and providing feedback to the user. Here we outline how a simple digital application can couple the reception both qualitative and quantitative tubewell data into a centralised interactive database and provide manipulated feedback to an individual user. This technology has the potential to reach more than 50 million people in the Bengal delta and can play an effective role in arsenic mitigation and water quality assessment in similar geological terrains.