Effectiveness and Reliability of Arsenic Field Testing Kits: Are the Million Dollar Screening Projects Effective or Not?

MOHAMMAD MAHMUDUR RAHMAN[§], DEBAPRIYO MUKHERJEE[$], MRINAL KUMAR SENGUPTA[§], UTTAM KUMAR CHOWDHURY[§], DILIP LODH[§], CHITTA RANJAN CHANDA[§], SHIBTOSH ROY[@], MD. SELIM[@], QUAZI QUAMRUZZAMAN[@], ABUL HASNAT MILTON[¥], S. M. SHAHIDULLAH[¥], MD. TOFIZUR RAHMAN[¥] AND DIPANKAR CHAKRABORTI*[§],

§ School of Environmental Studies, Jadavpur University, Calcutta, India,
$ Central Pollution Control Board, Calcutta, India,
@ Dhaka Community Hospital, Baro Moghbazar, Dhaka, Bangladesh and
¥ NGO Forum for Drinking Water Supply & Sanitation, Lalmatia, Dhaka, Bangladesh

The exposure of millions to arsenic contaminated water from hand tube wells is a major concern in many Asiatic countries. Field kits are currently used to classify tube wells as delivering arsenic below 50 μg/L (the recommended limit in developing countries) as safe, painted green or above 50 μg/L, unsafe and painted red. More than 1.3 million tube wells in Bangladesh alone have been tested by field kits. A few million US dollars have already been spent and millions are waiting for the ongoing projects. However, the reliability of the data generated through field kits is now being questioned. Samples from 290 wells were tested by field kits and by a reliable laboratory technique to ascertain the reliability of field kits. False negatives were as high as 68% and false positives up to 35%. A statistical analysis of data from 240 and 394 other wells yielded similar rates. We then analyzed 2866 samples from previously labeled wells and found 44.9% mislabeling in the lower range (<50 μg/L) although mislabeling was considerably reduced in the higher range. Variation of analytical results due to analysts and replicates were pointed out adopting analysis of variance (ANOVA) technique. Millions of dollars are being spent without scientific validation of the field kit method. Facts and figures demand improved, environmentally friendly laboratory techniques to produce reliable data.