

ARSENIC CRISIS WORSENS

Vinay Chand, October 2003

Dhaka Community Hospital estimates that up to one person dies from arsenic ingestion once every 3 minutes. Even if they overstate the rate of deaths in Bangladesh, when casualty figures in West Bengal are taken into account it is obvious that arsenic in well waters of East and West Bengal is taking a heavy toll in fatalities and a far bigger manifestation is that millions of people now suffer horrific effects to some degree or other. Assuming a far more conservative death rate, less than one-fifth that of the hospital, still puts the fatality rate of the two Bengals together at over 100,000 people every year and that represents a catastrophe by any standard.

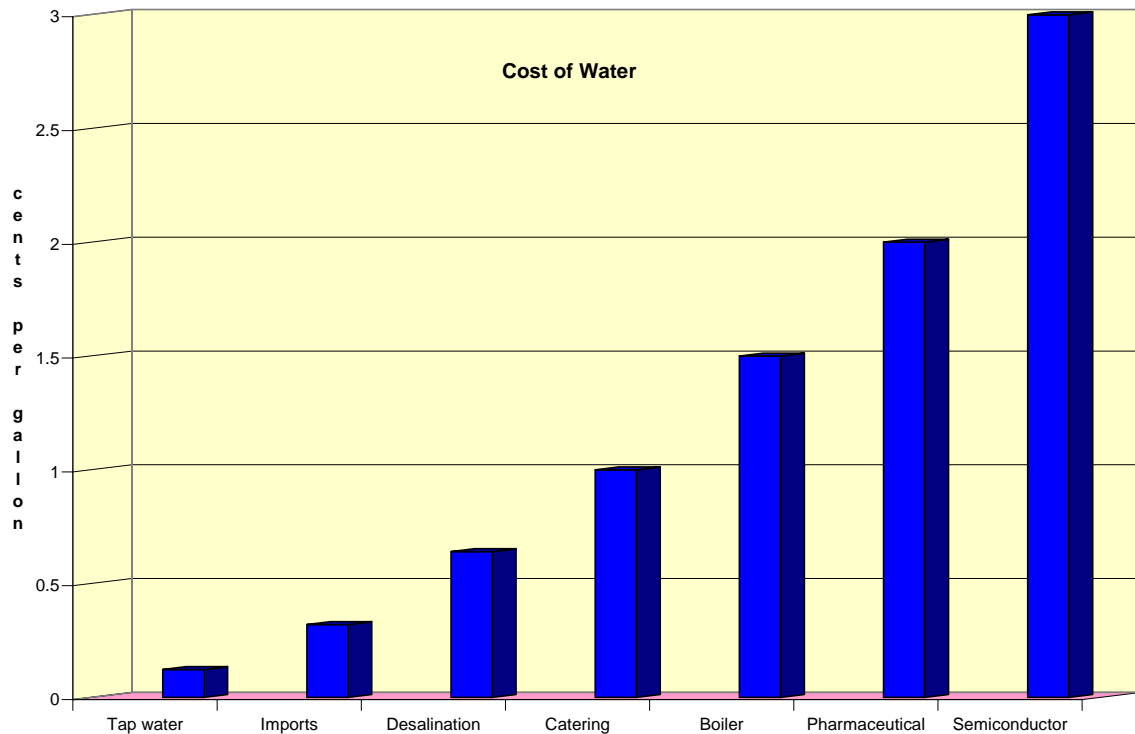
The problem came to light in 1967 and most observers agree that the number of wells infected has been growing. How much the increase is due to more affective measurement or to an increase in numbers of wells contaminated is difficult to be accurate about. What is agreed is that the numbers of wells declared and estimated as contaminated is increasing. There is a growing sense of alarm as the scale of the catastrophe unfolds, alarm that has led to intense debate within the scientific and health community as well as response from those seeking to do something about it.

Action started in earnest only some seven years ago, much of it in the form of ambulance action to physically help the suffering and study the effects. A number of countries have given assistance to measure arsenic content at wells and to mark those that exceed WHO standards as dangerous. Kits to measure contamination are now more readily available. There has also been assistance to study the origins of the catastrophe with many learned articles ascribing blame variously to microbial action and lowering of groundwater levels due to an excessive number of wells being dug for entirely well intentioned reasons but without sufficient regard to the consequences.

The trouble is that simply warning villagers their wells are contaminated and dangerous and unfit to drink from is not always effective without giving them an alternative source. And while it is necessary to care for the casualties, it does nothing to stop the problem spreading. There is a dire need to give villagers alternative sources for water and here international and national action can only be described as woefully inadequate. Millions, if not tens of millions are suffering or in danger and over half a million may have died during the seven years that have elapsed and this is not reflected in the way the task is being approached.

It is not easy to find a cheap alternative to drinking water from contaminated wells. Surface water is so heavily and dangerously contaminated by bacteria that if anything, it is more dangerous to drink than arsenic. Digging deeper wells has been suggested but this may simply transfer the problem to a new level at a high cost. Harvesting rain water is the latest candidate solution attracting enthusiastic activists but is fraught with problems and is unlikely to be possible without expensive filtration.

As always it all boils down to money. The world is used to drinking cheap water and as long as there is abundant water available requiring only minimal treatment, the cost is mainly delivery systems and is under 0.1 of a cent per gallon. But this situation is becoming rarer all over the world. Rising levels of contamination and drinking water shortage are raising costs all over the world. In the way of an illustration, desalination leads to water costs between 0.6 and 1.4 cents per gallon, catering outlets pay one cent per gallon, boiler water costs 1.5 cents per gallon, pharmaceutical industry has to pay 2 cents and the semiconductor industry 3 cents per gallon for near absolutely pure water.



The cost depends on what has to be removed and how it is delivered. For the last seven years a lot of well meaning NGOs and funding agencies have been looking for a cheap solution. They have done so with much enthusiasm even if lacking in technical expertise. In a situation such as the one in Bengal, there is no end of unproven schemes and ideas and together with many enthusiastic amateurs, they have become a major impediment to effective action. In reality, there is no proven cheap way of removing arsenic from contaminated wells and to advocate bottled water is akin to saying “what have they no bread, let them eat cake”. If there were a cheap solution available, the most technically advanced water companies in the world would have used it to clean arsenic contaminated water in the USA.

Technical expertise on water purification has been developed over centuries and is at its highest level where there is a need for it. The semiconductor industry needs the purest water aside from specialist hospital wards and those supplying expertise have been refining known main technologies (filtration, activated carbon, de-ionisation, UV lamps, ozone and Reverse Osmosis) and using them often in combination to achieve desired re-

sults. But water purification technology is in its infancy in developing countries and only at a basic level in the public sector which caters for municipal water supply generally from fairly good feed water.

Donors set up a \$40 million World Bank administered facility in Bangladesh and money is released to the Bangladesh national certification institute (BCSIR) to validate claims, in line with standard World Bank procedures. The Institute, in turn is advised by Consultants from Ontario chosen under the project procedure and has slowly been sifting through the myriad claims. The project had to be extended from 3 years to five because only a minority of the funds had been used which in itself is an indication of the weakness of the procedure adopted. A lot depends on the level of expertise at the Institute, which is low in this case and how much their advisers have competence in advanced water purification rather than municipal water treatment. However, existence of the programme has led to donors not taking additional measures and we are all waiting for results.

The procedure leads to a preliminary vetting of claims to eliminate unsubstantiated ones and hopefully a short list of technologies emerges that should be further considered. It is less than clear how the Institute is going to move from this on to coming to some sort of decision and altogether unconsidered as to what happens then. No money is provisioned for buying and testing equipment, costs are left to vendors. This casts doubt on the use of the entire \$40 million procedure since vendors always had the option of testing equipment in the field in India if they were not allowed to do so in Bangladesh.

At the same time, there are various reports of unverified field tests for some technology providers who have either found backing from their Governments or invested their own funds. Clearly, a lot of people are attracted by the challenge and believe that they can tackle the problem. But there is no overall master plan on tackling the issue of alternative water or removal of arsenic from contaminated water. The Asian Development Bank is about to send a Mission to take stock of the situation, which hopefully will consider a way beyond the bureaucratic quagmire but if it is at all in keeping with what has happened thus far, is more likely to add to the confusion. At the very earliest we are probably over two years away from an agreed solution.

The task is actually quite obvious, namely, there has to be a solution that: removes arsenic to below WHO limits; is sustainable with a finite cost; with minimal recurrent foreign exchange expenditure and implementable at well head level. Then there has also to be consideration of keeping water clean once it has been purified and a delivery system from wells to homes. Not only is there no agreed system capable of achieving the above, none has been designed or is under consideration. To the two years minimum time for this to happen must be added seven years or more that will be required to reach all contaminated wells under sub optimal conditions. So we are probably ten years and tragically another half million to million deaths away if the problem is tackled resolutely by technical experts capable of steering through the fog of claims and enthusiastic amateurs who are having a go. We have not even started the ten year countdown and no action underway promises to do so by itself.

In the absence of a road map the scale and intensity of the problem is actually increasing. More wells are being found to be contaminated in West Bengal and Bangladesh and those suffering from this slow killer are growing in numbers. Reports indicate substantial contamination in other Indian states such as Bihar and Uttar Pradesh. Professor Dipankar Chakraborti of the School of Environmental Studies at Jadavpur University, in Kolkata says that a large proportions of the half a billion people living on the plain from northern India to the delta region of Bangladesh could be at risk. And because the poison only builds up slowly in the body, every year of extra exposure increases the total damage.

There are also reports of the same problem throughout the region: Pakistan, Thailand, Myanmar, China, Vietnam and Cambodia have all discovered that they have contaminated wells. We do not know the extent of contamination in these countries but with more wells being dug and water table levels falling, the situation is predictably worsening. Perhaps one could assume the following: In most of the afflicted areas, few people drank groundwater until a few decades ago. As surface water from rivers and lakes have become increasingly polluted, however, people all over the world need to start using ground water. And some wells contain little arsenic, some contain more and some contain very much. So, in most countries where ground water is found in rocks or in sediment, Arsenic will be present in larger or lesser quantity.

There are reports coming from other regions. That is not surprising given the fact that arsenic is the twentieth most common element in nature, a common substance. We may find that it is far more common than we thought and time may lead to leeching into water supplies all over the world.

At present, there are probably five million contaminated wells in the region. If one of the proven solutions (proven through tests at leading independent labs) were used there would be a direct cost of over 10 billion dollars. No one in authority appears to appreciate this, instead they are searching for an elusive \$100 million solution, for which the only evidence of existence is blind faith. With economies, the final cost can be lowered well below the 10 billion but will bear no resemblance to the \$100 million.

The two technologies that the author knows can remove arsenic and arsenite to below WHO levels have their strengths and disadvantages. They are by use of activated alumina compounds available off the shelf but with a recurrent expense for consumables or membrane distillation, moving from development to commercialisation. There are other ways that are suited to municipal levels but not to village well head level and these include use of iron fillings, coagulation and filtration. There may also be variants of the two.

The alarming thing is that decisions have been left to people ill equipped to make them under the false assumption that there are a large number of readily available solutions and so there can be a beauty parade and the winner chosen on cost criteria. If this had been the case, even in the imperfect world we live in, solutions would have been implemented years ago.