

FOCUS

Is Arsenic Contaminating our Ground Water?

by Dr Aftab Alam Khan and Dr Kazi Matin Ahmed

The latest occurrence of severe Arsenic contamination in ground water however has been reported from the Indian State of West Bengal which lies along the western border belt of Bangladesh. The severity of the problem has generated concern among the environmental and public health personnel.



Is this water safe to drink?

INCIDENTS of Arsenic (As) contamination in ground water, and the subsequent suffering of people from Arsenic poisoning, have been reported from many parts of the world. All the three stages of clinical manifestation like dermatitis, keratosis, melanosis, hyperkeratosis, gangrene in the limbs and malignant neoplasm have been reported by those who have been drinking arsenic contaminated water.

Major incidents of Arsenic contamination have occurred in Taiwan, Langnera (North Mexico), Antofagasta (Chile) and Monte Quenado (Argentina). Some minor incidents have also occurred in Poland, parts of the USA, Canada, Hungary and Japan. Arsenic and black-foot diseases in Taiwan, and dermatological manifestations related to Arsenic in Chile are quite well-known.

The latest occurrence of severe Arsenic contamination in ground water however has been reported from the Indian State of West Bengal which lies along the western border belt of Bangladesh. The severity of the problem has generated concern among the environmental and public health personnel. Since the Arsenic-contaminated areas lie just on the other side of the border with Bangladesh and there are similarities in geological and hydrogeological conditions, there remain possibilities of Arsenic-contamination in Bangladesh ground water as well. A number of press reports have so far been published although no factual evidence has been put forward.

Very recently an International Conference on Arsenic contamination in ground water held at the School of Environmental (SES), Calcutta, created wide publicity about the severity of Arsenic contamination in six districts of West Bengal. The affected districts are Chabbish-Parganas

(South and North), Nadia, Murshidabad, Maldah and Burdwan.

The total affected area in the six districts covers about 34,000 sq km, having a total population of 30 million. At present more than one million people of 37 administrative blocks of 405 villages/wards are drinking Arsenic contaminated water and more than two hundred thousand people have shown Arsenic skin lesions, which is a late manifestation of Arsenic toxication.

All the three stages of clinical manifestation due to Arsenic toxicity have been observed in the people of the affected villages. It is vehemently feared in the conference that the region inside Bangladesh on the other side of the border is also affected. But no steps have so far been taken by the government to investigate the matter scientifically. So the authors have felt the need to make it public for creating awareness and to combat the situation of possible Arsenic contamination in the aquifers along the western border belt of Bangladesh.

Sources of Arsenic in Ground Water

Normally the concentration of Arsenic in natural water is very low. But in recent years this level has become relatively high in different parts of the world. Considering the toxic and carcinogenic nature of Arsenic, the World Health Organisation (WHO) has recently lowered the maximum permissible limit of Arsenic in drinking water from 0.05 mg/l to 0.01 mg/l. The main source of Arsenic in natural water, especially ground water, is geological.

Arsenic is a semi-metal and the name is derived from Greek name arsenikon, originally applied to the mineral Orpiment (As₂S₃). The most common Arsenic-bearing minerals are Pyrite, Arsenopyrite, Realgar, Orpiment and Tennantite, in the earth's near surface zones. Their subsequent leaching through mine drainage, seepage and subsurface flow of water along a suitable hydraulic gradient results in mineral dissolution which eventually increases the concentration of Arsenic in water.

The other possible sources of Arsenic in water are insecticides and fertilizer used for agricultural practice, and indiscriminate disposal of untreated industrial waste into water bodies. Ore roasting and other mining activities are also found to be associated with the occurrence of Arsenic contamination in certain parts of the world.

Source of Arsenic Contamination in Ground Water of West Bengal
The Arsenic-contamination problem in West Bengal constitutes the biggest Arsenic-calaminity in the world reported so far. At the beginning, the source of Arsenic was thought to be the tubewell strainer, pesticides, insecticides, fertilisers used in high quantity and Arsenic containing materials dumped locally during the last world war.

However, it has been observed recently by the study group of the School of Environmental Studies that surface water and the ground waters up to 30-40 feet depth do not show Arsenic-contamination. This clearly indicates Arsenic-containing fertilizer or insecticides are not the sources. Usually tubewells having 70 to 200 feet depth contain Arsenic. At a higher depth of 200 to 450 feet Arsenic is not noticeable at the beginning of installation of the well, but it becomes contaminated in the course of time.

The Public Health Directorate of West Bengal reported that 9 tubewells of depth 70-200 feet in Nadia were free from Arsenic in the beginning, but later 7 became contaminated by Arsenic. This is a clear indication of excessive withdrawal of ground water and subsequent leaching and seepage. Untreated and unplanned industrial waste disposal can pollute both surface and near surface ground water in and around an industrial belt.

Arsenic Contamination of Ground Water in Bangladesh
The exact situation of Arsenic contamination in ground water in the western border belt of Bangladesh is

not known. No definite analytical result is available to any organisation. However, news came in some national dailies that 130 bottles of water samples were sent to the Bangladesh University of Engineering and Technology (BUET) laboratory for analysis. But nothing is known about the analytical results. It is also not known whether the laboratory is experienced in Arsenic analysis or not, and what is the level of accuracy of their analysis.

Some newspaper reports also mentioned the Department of Public Health Engineering (DPHE) laboratory at Rajshahi and quoted different concentration level of Arsenic in Bangladesh ground water. We don't know the level of accuracy of analysis of the laboratory, and it was not mentioned in the report whether the results were reproducible or not.

However, the western border districts of Bangladesh, especially the southern region is very vulnerable to Arsenic-contamination. The sediments on both sides of the border have the same depositional history and geological environment. This region is broadly known as the Ganges Delta.

The sediments deposited in the delta belong to the same source. The subsurface regional gradient is to the south of southeast. The aquifers (water bearing formations) of the contaminated zone and that of the region within Bangladesh are probably connected hydraulically.

The mineralogical constituents of the sediments deposited in the Ganges delta may be the same as well. The flow of surface water should also follow the regional gradient. Considering all the above facts, it can be concluded certainly that the ground water of the region along the southwestern border belt of Bangladesh is highly vulnerable to Arsenic contamination.

What We Should Do?
In order to determine the exact situation of ground water in the border belt of Bangladesh, a study group consisting of Hydrogeologists, Water Supply Engineers, Environmental/Analytical Chemists and Public Health Experts should be formulated. The group should carryout in-depth investigation. The study group must analyse sediments and water samples of the aquifers connected hydrogeologically with that of the contaminated region.

Random sampling, i.e. without considering the regional ground water flow pattern, may lead to erroneous conclusions. Therefore, any programme of sampling for analysis should consider the hydrogeology on both sides of the international boundary. This could be achieved by establishing a linkage between the study group at the School of Environmental Studies, Jadavpur University, Calcutta, and the Bangladesh study group.

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The Budget and Development A PRO-POOR PERSPECTIVE

by Asrarul Islam Chowdhury

Chronic poverty is a cruel kind of hell; and one cannot understand how cruel that hell is merely by gazing upon poverty as an object.

— Denis Goulet (*The Cruel Choice*, 1971)

THE Institute for Development Policy Analysis and Advocacy of Proshika has arranged a seminar focusing on the Budget and Poverty Alleviation which starts today at the ICMA auditorium. The main discussant will be Dr Atiur Rahman, Senior Research Fellow of BIDS. The present narrative will try to briefly "focus" on dominant features of the seminar.

Poverty alleviation has been questioned, analysed, dissected, rejected and elevated not only by politicians, but also academics from various fields, poets, signers, social Organizers and finally, concerned individuals throughout both Bangladesh and other developing and developed countries. Thousands of pages have been documented with an intention of informing people about the severity and consequences of poverty. In fact, unfortunate as it may seem, many people have benefitted from the selling of poverty ("The Development Set" poem in Lords Poverty). Yet poverty seems to perpetuate and carry on creating more and more disparity among the haves and the have nots. Keeping the present Budget in mind, the above mentioned seminar intends to focus on poverty alleviation and also try to find out ways in breaking this intellectual dilemma.

Our Politicians and also those of other developing countries claim that poverty alleviation and poor's participation is at the forefront of their development agenda. Recently, in March, at the World Social Summit at Copenhagen, The Honourable Premier of Bangladesh, Begum Khaleda Zia had welcomed other Head of States to put people at the forefront of development. She also said that Bangladesh is employing her resources in ensuring peoples' participation and bring women into the development picture, especially through primary education. The Honourable Finance Minister, Saifur Rahman, in the present Budget has also mentioned that poverty alleviation is the prime target of the Government and also stressed that poverty is an interplay of various factors which have to be ensured in order to make such a programme a success. Unfortunately, in reality, facts and figures do not converge.

Within the limited scope of the present discussion, let us just focus on education. On the basis of last year's Budget, 44.4 per cent of Revenue Budget was allocated for primary education. The respective figures for South Korea and Indonesia were 84 per

cent and 79 per cent. Moreover, most of our education expenses are directed at paying for salaries and other infrastructural expenses. We have failed to employ more resources for developing qualitative facets of primary education. Another disparity is mentionable, we talk about universal primary education. However, distribution of allocation is not acceptable at all. According to two studies conducted during 92-93 period in 1990-91, on average, we spent Tk 532 for one primary school student. The figures for Government Madrasa and Cadet College students for that year are striking, Tk 4,273 and Tk 40,300 respectively. Starting from the top to the bottom of the hierarchy, all will acknowledge the

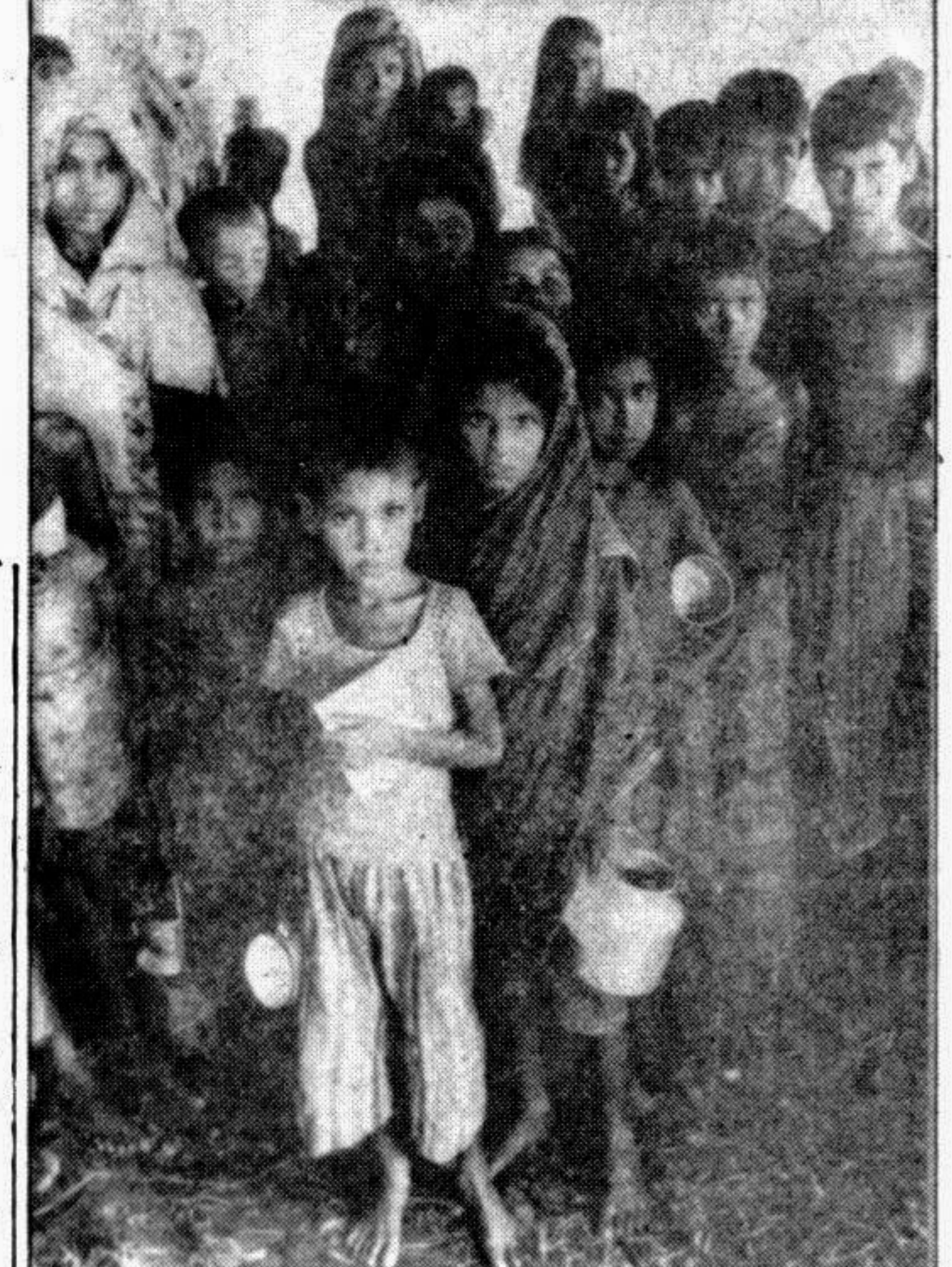
Government will try to harness price hikes of essential commodities. We have to ensure this wish of the poor as their marginal propensity to consume is extremely high and this is the class who know "how cruel, chronic poverty can be".

According to Dr Atiur Rahman, who will present the key-note paper in today's seminar except Grameen Bank, most NGOs are oblivious about agricultural development. It is true that as most of our people live in rural areas, we should channel resources to this sector, because, in doing so, other benevolent features will surface. We also know that urban poverty is more severe than its rural counterpart. Nevertheless, NGOs, in general,

Has anyone asked them what they think of the Budget?



And they are in millions...



fact that education is a must if we want to make development meaningful. However, if this type of inequality in distribution of funds persists, it will just carry on bringing out our "hypocritical" attitude towards development.

A prime feature of today's seminar is people's participation in the development process. We who term people as poor are those who are on the have side and not the have nots. It is we who draw poverty lines, and "classify" them, such as hard core poor, marginal poor and so on. We talk about the poor in our speeches, focus on their helplessness both at national and international fora, but forget to take their views, what they are thinking about and how they view say, the Budget and other issues. Group focus discussion is one extremely important facet of the above mentioned seminar. The most important feature that come out is that most of the poor people link the Budget to fixation of prices. They think of the budget as the time when prices of commodities will change. They also hope that

Various growth models developed in the fifties and sixties have focused on "trickle down" development, i.e. the fruits of development will "trickle down" from the upper to the lower hierarchy. Sadly, this notion has failed. We should think about how we can bring the people in the development process. If we talk about peoples' participation, we should also talk about what they are thinking and try to learn from their indigenous methods of survival, rather than be conducted by what consultants say. Because "Chronic poverty is a cruel kind of hell, and one cannot understand how cruel that hell is merely by gazing upon poverty as an object". This is what the above mentioned seminar, from a broad perspective, intends to establish.

Being Illiterate — A Way to Escape Tribal and City Aristocracy

by Namtip Aksornkool and Nikolay Ulanov

YASMEEN'S family, from Balochi tribe, was frantic. Their boy had eloped into the desert with a Pashto girl. With the girl's family wildly furious, the affair escalated into an intertribal crime. A week later, when police found and separated the couple, the girl had to stay in custody, while the boy went home.

Indignant Pashtos threatened to kill the youngsters unless given a fair compensation. Arbitrators heard the demand for two lakh rupees and two girls to clear the disgrace. Indecisive, Yasmeen's father wept, a humiliating sight for a man in this macho-dominated culture. Impatient Pashtos then kidnapped the girls themselves from the boy's tribe.

With intolerant Pashtos and Balochis crowded behind his back, the father caved in to pressure. In a province where only two women in a hundred are literate, his Yasmeen seemed the prime choice to settle the dispute. With a well-paying job and a Master's degree, she could make a good bride, particularly for the bus driver who was already bracing up for the wedding rites.

A week later, when asked what she felt about her father's act and the possible mismatch with the candidate for a husband, Yasmeen shuddered. "I would die," she said, "He is illiterate." Yasmeen's father cringed, too. Still tearful, he offered Batool, Yasmeen's fourteen-year old sister, a mere ninth-grade pupil. Batool cried for days. Her father's heart broke up and he offered ten lakh rupees and no girl.

No sooner was the offer out than the Pashtos arrived in full regalia. Pashto warriors are at their most impressive when they are threatening-tall, turbaned, Kalashnikovs over the shoulder. It was a show of force but no war broke out. The final compromise was to marry Batool off at a later date. The mission accomplished, the men sat to feast while sobbing women and the child were left to their own devices.

This episode is only a prelude to the survival stories of educated women in Balochistan and elsewhere in Pakistan. Back in Lahore in late November 1993, Begum Fareeda S, a member of Punjab established feudal family, discarded the case as trivial. "Doesn't it happen all the time in the desert? They are illiterate, savage." Begum might find it hard to admit but the same savagery is commonplace in the midst of her



own class. At 25 years of age, when she joined the Punjab Social Services Board, Sabida looked withering. With dark circles under her eyes, drooping lips, and in her mourner's clothes she was the picture of despair. At 15, a carefree schoolgirl, she was engaged to Ahmed her cousin. Theirs looked like an ordinary prearranged affair, with one exception. Ahmed had been diagnosed for a deadly blood disease, and destined to die young.

A lavish wedding did take place, however. Sabida's grandmother herself put her foot down. Hurried to keep the lineage pure and the wealth within the family, she didn't care that Sabida would soon be left widowed.

The blow came in Geneva where Ahmed expired in a matter of days. Sabida returned to her celebrated family in Lahore. Living in seclusion, she vowed to devote her life to Ahmed. Merciless and true to their unspoken protocol, Sabida's grandmother and uncle insisted she marry Ahmed's brother, another

case of the same disease. This time, Sabida's father refused and promised to let her do as she wished. But doing as you wish requires enormous will in the tradition-bound Lahore. It's not until she ran into Shaheen Atiq-ur-Rehman, a social worker and herself a member of the ruling class, that Sabida regained her ability to resist.

In their joint education project for girls in Tehsil Hafisilabad, Sabida and Shaheen made 26,000 women literate over the past 18 months — a track record. But in a country where only 35 per cent of the people are illiterate, their achievements seem insignificant.

"Life is good," says Sabida, "I'm satisfied." Time and time again, her grandmother suggests a union between Sabida and her brother-in-law. "I won't be surprised if in a year or so, he would marry another girl," Sabida mentions casually. "They just want to put me back in the house."

Still suffering from migraines brought by

the conflict, Sabida has learned to cope in her defiant act, with Shaheen's help. The two women consider themselves lucky. Millions of Pakistani women suffer in silence. Some go mad. Others turn to the streets.

Pakistan ranks lowest among the nine countries which have the largest illiterate population. According to the report at the World Summit on Education for All (New Delhi, 16-17 December), its primary schooling coverage rate is close to the bottom rung among the 87 developing countries.

Authorities seem optimistic. The 1992 National Education Policy set an extremely ambitious goal of giving primary education to all children by the year 2002.

Many fear the goal might again prove over-ambitious. According to Dr Gafour, Director of the National Education and Training Commission, the goal is realistic if only the focus is put on rural women.

Relevance is key. While Balochistan is using the textbook which is uniform for all countries, Shaheen favours a new approach. "We've learned that basics come first. Whatever we're offering must be immediately relevant to the learner. If girls spend days keeping goats, we'd rather give them texts on everything related to goats." And this ranges from toddler to goat disease to marketing the product.

Life does change, even in the tradition-bound Pakistan. As women timidly welcome literacy, the burden of producing materials has grown. Today, in UNICEF and UNESCO workshops young women and men from Pakistan are working together — a social anomaly for this country. With fifty curricular units to their credit, the team seems to have the gained momentum to launch a bigger project in non-formal primary education.

Their units look like a patchwork encyclopedia — The Confident Woman, Fodder Growing, Chicken Disease, Dairy Farming, Personal Hygiene, Who Am I Loans and Saving, Women and Law, and Community Development.

It remains to be seen whether the ideas of the cycle work. It certainly is a trial and effort. Whatever the outcome, women like Yasmeen and Sabida find the education they offer more meaningful than the cruel trade-offs from the tribal and city aristocracy. UNESCO