

“MASS ARSENIC POISONING OF RURAL BANGLADESH – HEALTH IMPACT AND COMMUNITY BASED OF PATIENT MANAGEMENT AND SAFE DRINKING WATER OPTIONS – DCH EXPERIENCE”

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Presented by

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OPENING COMMENTS

The purpose of this presentation is to highlight and share some of the important field experiences that Dhaka Community Hospital observed and learned while dealing with arsenic affected villagers and implementing various safe water options. This paper further highlights the impending calamity of arsenic contaminated water on food chain and soil.

BANGLADESH SCENARIO

- 147,450 Square Kilometer
- 906 persons per Square Kilometer



Bangladesh

WATER SOURCES

- 30000 miles of major river and many thousands of canals Criss-crossing the country.
- Thousands and thousands of water bodies like ponds, lakes and lagoons.
- Thousand years culture of Dug-well for drinking and household use.
- Annual Rainfall 2000mm to 2500mm/Year.
- Easy availability of ground aquifer water in most of the areas (in wet seasons).

PROBLEM STATEMENT

- Increase population, demand of land use leads to pollution encroachment and reduction of water bodies (Rivers, Lagoons, Ponds and Canals).
- Large scale withdrawal from rivers by upstream countries making surface water scarcity in dry season (Nov – April).
- Leads to further drying up of canals and tributaries fed by mother rivers.
- Ever increasing demand leads to large scale extraction of Groundwater.
- Reduction of water table and poor recharge of deeper aquifer.
- Arsenic in drinking and cooking water.
- Food chain and soil contamination emerging as mega calamity.



Dried River



Dried Lagoon

WATER USE PATTERN OF BANGLADESH

- 90% Groundwater extracted is used for irrigation and extraction is increasing every year as surface water bodies are drying up due to neglect and encroachment
- Only 5% – 10% Groundwater for drinking, domestic and industrial use.
- Major non-consumptive surface water use are for fisheries, communication and salinity management.

MAGNITUDE OF UNPRECEDENTED HEALTH DISASTER FACING MANKIND DUE TO GROUNDWATER ARSENIC CONTAMINATION

- Ganges – Brammaputra Delta alone is risking more than 100 million of People of Bangladesh, India and Nepal.
- In Bangladesh above 20-30 million are affected and 60 to 70 millions are at risk.
- Thousands are suffering from “Arsenicosis” and a large number will die from it (1 in 10 may die from arsenic related disorder as experts suggested) No National Prevalence Survey in conducted.
- There is no known cure except arsenic free safe water.

HIGHLIGHTING DHAKA COMMUNITY HOSPITAL INVOLVEMENT WITH THIS NATIONAL CALAMITY

- First in-depth survey by DCH 1998. 500 Villages in 29 District (Random selection in highly affected areas)
- Total 8,18,924 people examined and thousands are diagnosed with skin and other health problems.
- Out of 62782 Tube-wells, 52% Tube-wells arsenic level above 0.05mg per liter by field kits (WHO standard 0.01mg per liter).
- Another Study suggest
- Tested 1,45,000 Tube-wells in India, and 52,000 Tube-well in Bangladesh
- 48.7% above 10ppb, 23.8% above 50ppb; Bangladesh – 43% above 10ppb and 30% above 50ppb
- 133,000 people screened for skin pigmentation in India – 9.83% positive (in affected areas)
- Bangladesh ratio 19,000 screened for skin problems – 19.8% positive (in affected areas)
- Repeated measurement of Tube-well water between 3 to 7 years suggest increase in arsenic concentration.

HIGHLIGHTS OF SIX INTERNATIONAL CONFERENCES AT DCH

- In 1998 Arsenic Contamination is Hydrogeological problem and it is only the tip of the iceberg
- Community sustainable safe water options and long-term water management policy and affordable use of surface and rainwater
- 2nd conference '1998-1999'- The problem of Arsenic pollution grown beyond drinking water
- 3rd Conference '2002' – need for Uniform arsenicosis case definition and Management Protocol.
- 4th Conference asked to implement a national policy and action plan
- 5th Conference '2004' – Concern regarding indiscriminate installation of Tube-well and monitoring of all deep tub-wells since 1997 and also expressed concern regarding arsenic removal filters without proper scientific evaluation, as permanent solution
- 6th Conference expressed grave concern regarding the emerging problem of soil and environment pollution and food chain contamination

ALL THESE ACTIVITIES OF DCH PROMOTED ACTION PROGRAMME BY NATIONAL GOVERNMENT AND INTERNATIONAL AGENCIES

- By 2002 – government declared that 30% of Sub-district of Bangladesh the aquifer water highly contaminated with arsenic
- 60 to 70 million people are at risk 20 million are drinking arsenic contaminated water
- Govt. of Bangladesh formed national expert committee on arsenic and who developed National Arsenic Mitigation Policy and Action Plan and approved by the government
- DCH initiated its own Chronic Arsenic Case Management System and started to diagnose and treat case of “Arsenicosis”
- 2002 Government of Bangladesh and DCH presented the case definition and case management protocol in the International Conference and a conference organised by government of Bangladesh
- WHO in 2004 and 2005 discussed and formulated the Case Definition and Management protocol in its regional consultative meeting and published a field guideline in 2005

SOME MAJOR POINTS OF BANGLADESH NATIONAL ARSENIC MITIGATION POLICY

- Regular monitoring of all tube-well including irrigation wells
- Give preference to surface water over groundwater as water (safe) source
- Capacity at community level for proper installation, operation and management of mitigation options
- Arsenic removal technology shall not be marketed without proper testing and validation from Bangladesh Scientific and Industrial Research Institute and submit the report to panel of experts for verification
- Assess Impact of groundwater withdrawal on deep aquifer
- Guideline to protect arsenic safe aquifer
- Training of all health workers for identify and manage “Arsenicosis” – according to developed protocol.
- Arsenic in ground water used for irrigation may also affect agriculture and food chain

MITIGATION ACTIVITIES OF DHAKA COMMUNITY HOSPITAL

- Community Based safe water models using surface, rainwater and Dug-well as sources
- Management of “Arsenicosis” case with free Medical and Surgical Treatment

HEALTH ISSUE

FACTORS SUGGEST TO AGGRAVATE ARSENICOSIS

- Type of arsenic and level of exposure
- Body immunity and genetic configuration
- Nutritional status and food habit
- Low hemoglobin level may exacerbate ill effects

COMMON MANIFESTATIONS OF ARSENICOSIS

- Skin pigmentation, melanosis and leuco-melanosis
- Keratosis and Hiperkeratosis
- Skin Ulcers and dry gangrene
- Cancer of skin, U.bladder, Lungs etc.



Skin Lesions



Keratosis



Cancer



Gangrene

OTHER SIGNS AND SYMPTOM AS EXPERIENCED BY HEALTH WORKERS (DCH)

- Out of 16000 patients
 - Chronic Broncolities and Bronchiectasis 30.7%,
 - Burning sensation of Skin 20.4%
 - Congestion of conjunctive 2.3%
 - Non pitting edema 1.7%

Other Emerging Health Problems as suggested by researchers

- Adverse relationship between arsenic level and intelligence in young children?
- Adverse affect on fetus
- Low birth weight
- Obstructive airway diseases in young adult and children

MANAGEMENT OF ARSENICOSIS

- Arsenic free safe water
- Dietary Supplement and anti-oxidant fruits/vegetables/protein is important along with application of ointment (5 – 20% Urea and salicylic)
- Complicated cases like skin cancer, ulcer, gangrene needs specialized medical and surgical management
- Social Economic and Physical rehabilitation.
- Mass community awareness and support to develop community based rehabilitation system.

MAJOR PROBLEMS OF “ARSENICOSIS” MANAGEMENT

- Lack of knowledge information and training for case detection and management by field workers
- Poor community motivation for safe water use complicated by physical nature of arsenic in water (tasteless, colorless and odorless)
- Socio-economic hazards due to ill-conceived idea about “Arsenicosis”
- Poor Resource allocation for rehabilitation and treatment
- Indiscriminate installation of Tube-well both private and public sector
- Even after introduction of policy and action Plan



FOOD CHAIN AND SOIL CONTAMINATION - CONCERNS EXPRESSED IN VARIOUS DCH CONFERENCES

- 1998, 2nd DCH conference the DCH Key note paper Prof. Rahman suggested “Research needed to understand effect on food chain and soil.
- In 2005 DCH conference, Dr. Chakraborti of SOES informed that 3200 tube-wells in 200 square kilometers are pumping 6 tones of arsenic on the surface
- Paper from Dept. Soil in Dhaka University suggested arsenic on irrigated soil may reach 5kg per Hector per year. Research in loss of production and food chain contamination.
- Study from Cornell University suggested per capita exposure of inorganic arsenic in rice is 32 times higher in Bangladesh than USA

To understand relation between soil pollution and food chain contamination further research is urgently needed as it has tremendous health and socio-economic impact on nations like Bangladesh.

DHAKA COMMUNITY HOSPITALS INVOLVEMENT WITH COMMUNITY BASED SUSTAINABLE OPTIONS FOR ARSENIC SAFE DRINKING AND COOKING WATER

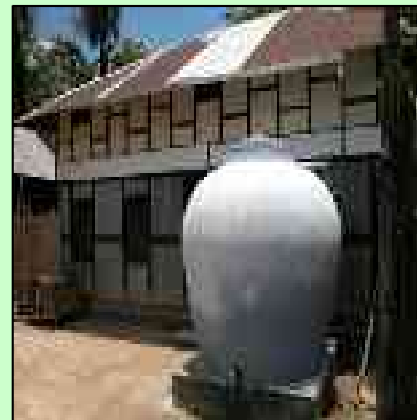
- The natural sources of river, pond and rainwater and Dug-wells are encouraged by DCH as water sources.
- Community participation and its support for options and site selection is important for sustainable programme
- Simple construction protocol for Dug-well, rainwater harvesting and sand filter
- Implementation procedures using locally available knowledge and resources with current sanitary knowledge
- Simple Safe maintenance procedure and devices



Dug-well



P/RSF



Rainwater Harvesting



Idara

TOTAL DCH SAFE WATER OPTION TILL TODAY

- A total of 350 Safe dug-wells
- 1132 Rain water harvesting unites
- 22 Sands filter from ponds
- 06 Sands filters from river

PROBLEM FACED WITH

- **Dug-well, R/PSF and Rainwater**
- Lack of communication and community motivation for development and maintenance of alternate water sources. Poor resource allocation by agencies leads to a) difficulty in developing locally available facilities to b) monitor water quality and maintenance protocol c) site selection and community participation programme
- Bacterial Contamination

RECENT DCH EXPERIENCE WITH SAFE OPTIONS

Dug-well (Improved Dug-well)

- June/July 2 months – 20 Dug-wells – 21 days chlorination
- Bacteria count rises above unacceptable levels after 3rd week
- Chlorinate after 21 days is satisfactory
- Sand boiling of Dug-well both vertically and laterally due to poor site selection
- Below 15ft. The Diggers feel exhausted, digging and correct building process may be compromised (lack of fresh air etc)
- Limitation of expert supervisions during Dug-well construction and lack of modern equipments
- Idara appears more promising than “Kua” (from maintenance community coverage and distribution point of view)
- **Sand Filter** – Promising, wherever there is a water source like pond and river
- **Rainwater** – It is very promising needs more resource allocation and motivation for rainwater harvesting.

PROBLEM FACED WITH OTHER OPTION

Deep Tube-well

- How deep is deep?
- How to ensure proper sinking and stop cross contamination
- Water quality measurement (for other toxins)
- Re-chargeability of deep aquifer and its affect on environment
- Deep Aquifer will sustain for How Long?

Arsenic filters

- Testing its efficacy – not transparent
- Regular maintenance and water quality monitoring
- Sludge disposal – still remains a major issue

Shallow “Safe” Tube-wells

- Unpredictability of safety
- Continuous monitoring
- Dry Season Problems

RECOMMENDATION FOR COMPREHENSIVE SAFE WATER SUPPLY

- Rational and balanced use of all water sources
- Active support with resource allocation and nationwide motivation for safe use of abundant rain, surface and dug-well water
- Indiscriminate extraction of groundwater must be stopped and effective regulatory mechanism for proper groundwater use
- Short term emergency measures like water filters should be carefully and scientifically evaluated and selected before marketing (sludge management, affordable technology from maintenance must be properly documented)
- Resource allocation for training in case detection, treatment and rehabilitation
- Regional co-operation for equitable distribution of river water – as this issue is vital for total water and environment protection of regional countries

**WATER IS NOT ESSENTIAL FOR LIFE, IT
IS LIFE (JIBON)**



THANK YOU