

Bangladesh Environmental Technology
Verification – Support to Arsenic Mitigation
(BETV-SAM) Program

Water Safety Planning and Arsenic Removal
Technologies

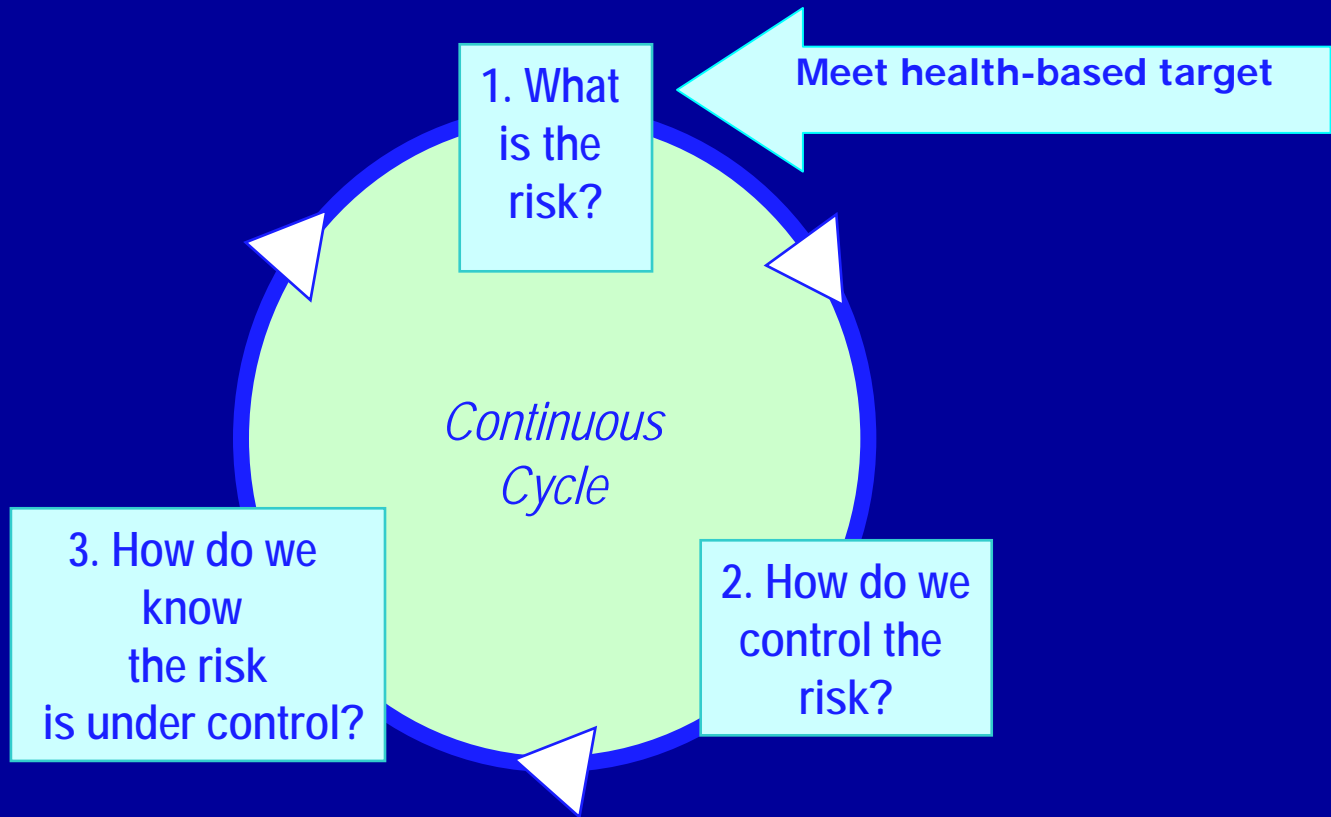
What are 'water safety plans'?

WSP is a management plan to secure drinking-water safety from water source to the point of consumption through continuous monitoring and preventive maintenance of water supply systems

WSP is a management tool to identify:

- Risks
- How can we control the risks?
- How can we monitor the means of control?
- How do we know the risk are under control?

Water Safety Plan (WSP)



Water safety plans: Approach

- Traditional approaches of testing are a quality control approach
 - Too little too late
 - Remedial rather than preventive
- Water safety plans are a quality assurance approach
 - Preventive rather than remedial
 - Provide more comprehensive approach to securing water safety (from source through system to point of use)

Objectives of WSP

- To prevent contamination of source water;
- To treat the water to reduce or remove contamination that could be present to the extent necessary to meet the WQ targets; and
- To prevent recontamination during storage distribution and handling of drinking-water.

ETV-AM and BETV-SAM Project Verification Activities

Verification activities:

4 ARTs received provisional verification for deployment
in Bangladesh under ETV-AM:

3 Household ARTs:

1 Community-scale ART:



MAGC-
ALCAN



READ-F



SONO
45-25



SIDKO

WSP for Arsenic Removal Technologies (ARTs)

- Based on the WHO Guideline (Ref: **Guideline for Drinking Water Quality, Third Edition, Volume 1, 2004**) and formats used in Bangladesh for other WSPs technology-specific WSPs were developed for MAGC-ALCAN, READ-F, SONO 45-25, SIDKO by BETV-SAM and endorsed by DPHE. These are available at ITN website.
- The WSPs are the framework documents
- Appropriate implementation tools were developed for the various stakeholders at the local level:

WSP for ARTs (Cont.)

- **Government:** monitoring and surveillance, analysis of water samples, etc.
- **NGOs:** to provide training and support to end-users and caretakers, collect and analyse water samples, monitor the effectiveness of WSPs, etc.
- **End-users:** for arsenic motivation and awareness, ART operation and maintenance, hygiene, etc.

Pilot Project for WSP of ARTs

Introduction

- BETV-SAM carried out the pilot project to:
 - test an approach for implementing the WSP for verified ARTs in rural Bangladesh.
 - identify under close monitoring the requirements for, and difficulties in, implementing the WSP.
 - make recommendations to DPHE and other sector partners for WSP in similar projects.

Pilot Project for WSP of ARTs (Cont.)

Objectives

- Test the process of incorporating WSP into the current ARTs deployment and document lessons learnt for future scale-up.
- Assess the appropriateness of the WSPs for ARTs in context of Bangladesh. Validate and verify and recommend necessary modifications
- build the capacity of the stakeholders involved including implementers, communities, caretakers and Local Government.

Pilot Project for WSP of ARTs (Cont.)

Project Area

- The WSP pilot project was carried out in two DART project unions:
 - i) Masumdia union of Bera upazila, Pabna district and
 - ii) Nabipur West union of Muradnagar upazila, Comilla district.
- There are two control unions: Ruppur union of Bera Upazila and Dhamgar union of Muradnagar Upazila

Pilot Project for WSP of ARTs (Cont.)

Implementation Strategies

- WSP was viewed as an integral part of the ART deployment process.
- Capacity building in terms of knowledge and skills of the implementing NGOs
- Assess the capacity of the technology to deliver safe water in the field conditions (technical, social, cultural, etc.).

Pilot Project for WSP of ARTs (Cont.)

Implementation Strategies (Cont.)

- Strong monitoring, evaluation and documentation mechanism was included.
- For sustainable operation of ARTs, the availability of filter media in the local market at affordable price is an essential. Private sector or the proponents have a vital role to play. This was outside the scope of the project because of its short duration

Pilot Project for WSP of ARTs (Cont.)

Project Activities

- **WSP delivering capacity building**
 - Development of WSP Implementation tool
 - TOT on WSP for DPHE, OCETA and DART NGO staff
 - Orientation to Village WSP committee, Ward WATSAN Committee and UP.
 - ARTs technology specific training to users on O&M, Hygiene and WSP
 - Handing over pictogram and demonstration of use to the users.

Pilot Project for WSP of ARTs (Cont.)

Project Activities (Cont.)

- **Institutional Development**
 - Establishing Village WSP Committee
 - Strengthening the Ward Union WatSan Committee
 - Establishing WSP monitoring unit in OCETA
 - Establishing Local and Central Coordination Committee

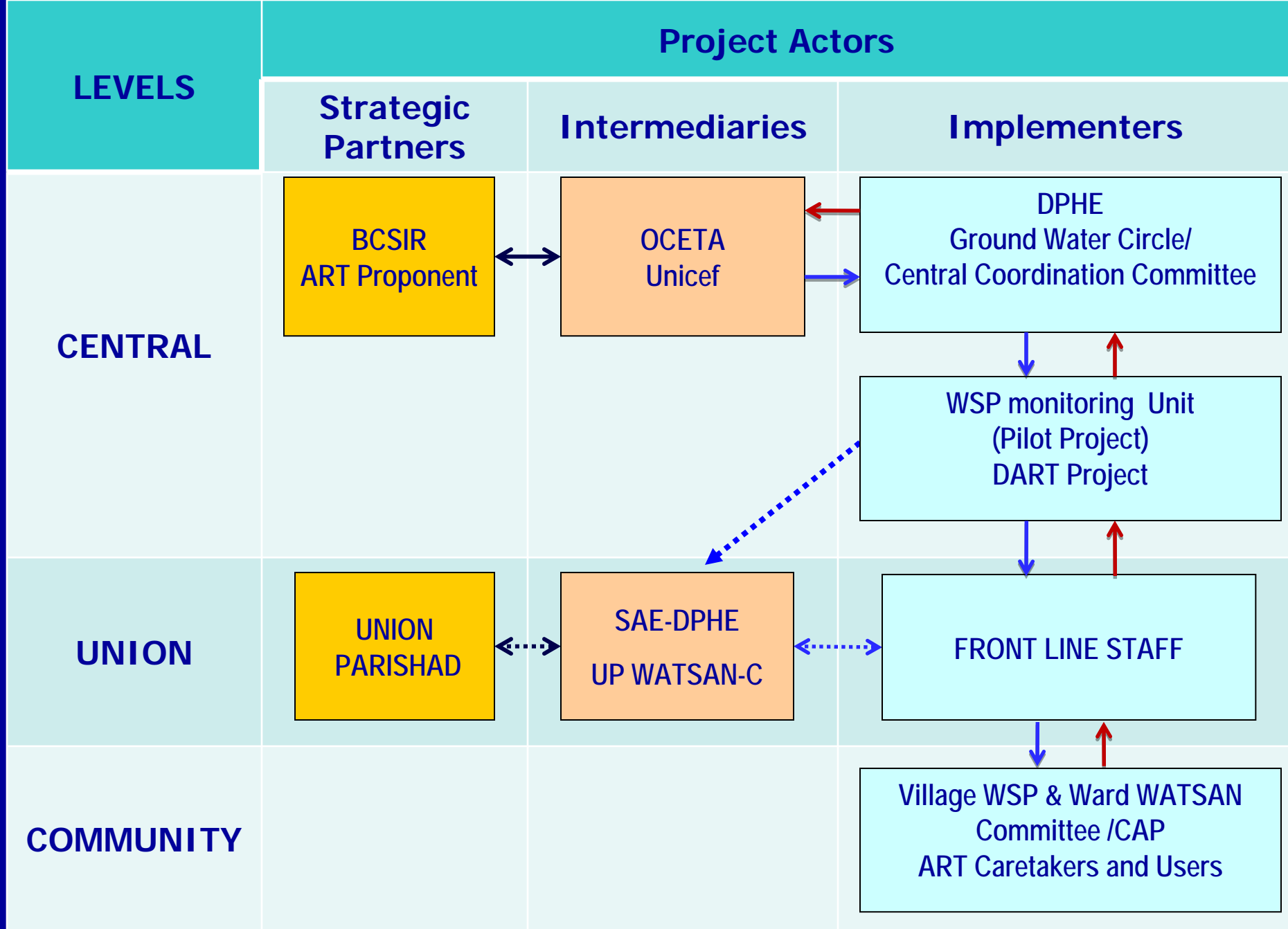
Pilot Project for WSP of ARTs (Cont.)

Project Activities (Cont.)

- **Monitoring Evaluation and Documentation**
 - Help gather the lessons for replication and scaling up of WSP of ARTs
- A MIS was formulated and consist of :
 - monitoring, information flow
 - analysis and corrective action-taking mechanisms,
 - evaluation and documentation of lessons learned.

Monitoring and Evaluation Tools

SI No.	Monitoring and Evaluation Tools	Responsibility	Monitoring frequency
i.	Baseline survey	OCETA and Partner NGO	Start of Pilot Project
ii.	ART user satisfaction survey	Users	Weekly
iii.	Village level Monitoring Format	Partner NGO & Village WSP committee	Monthly
iv.	Ward Monitoring Format	Partner NGO & Ward WATSAN committee	Monthly
v.	Union monitoring Format	Partner NGO & Union WATSAN committee	Monthly
vi.	Quarterly monitoring Report	WSP Monitoring Unit & endorse by UP	Quarterly
vii.	Final Survey and End of Project (EOP) Evaluation	Independent third party	End of Project



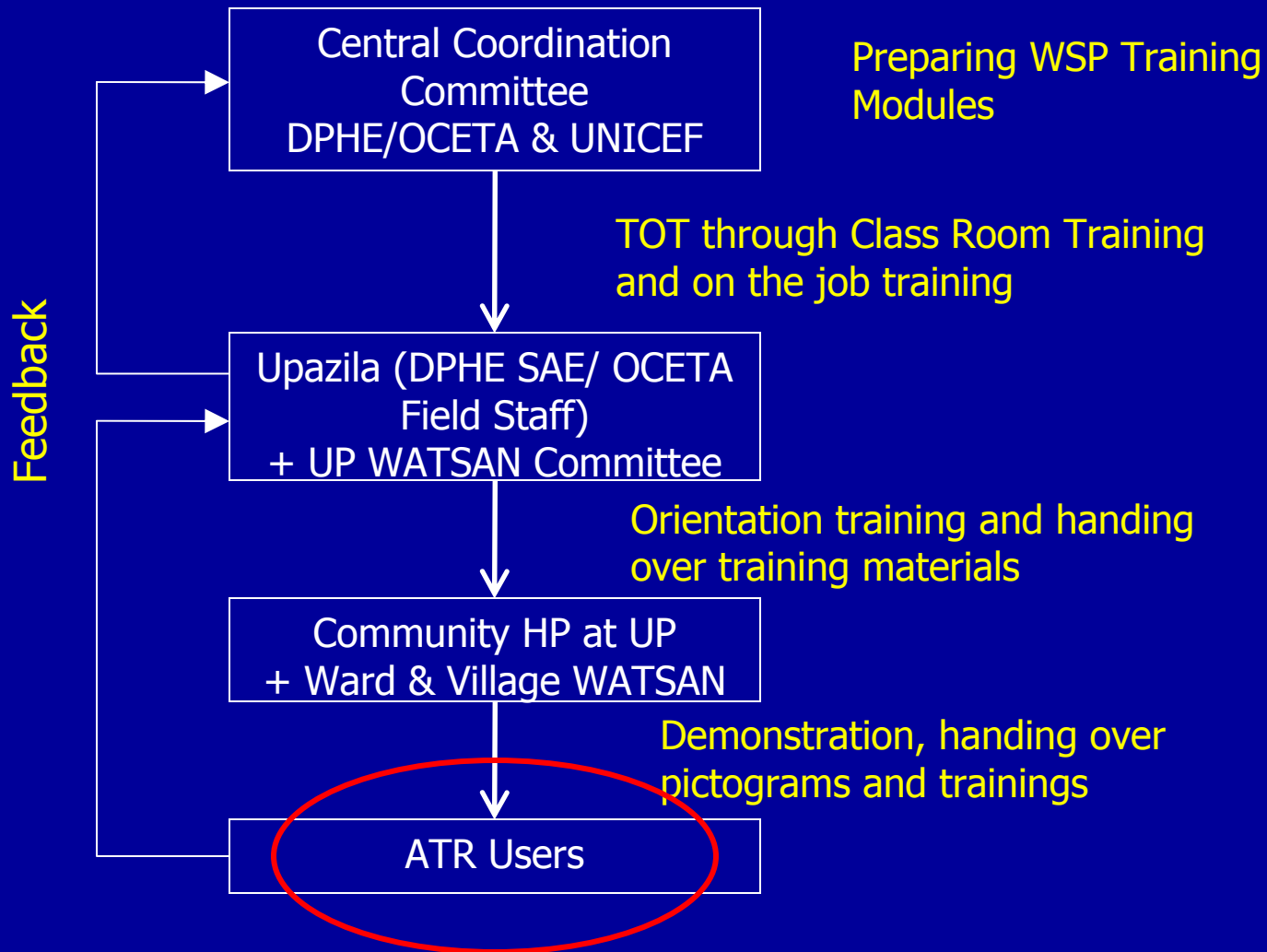
Legend: \longrightarrow Direct flow of information $\cdots\cdots\longrightarrow$ Indirect flow of information

Evaluation of the Pilot Project on WSP for ARTs

Answering Four Basic Questions

1. Is the WSP delivery mechanism effective ?
2. Does WSP contribute to improving water quality ?
3. Have the users changed behavior ?
4. Can this model be scaled up ?

Q 1. Is the WSP delivery mechanism effective ?

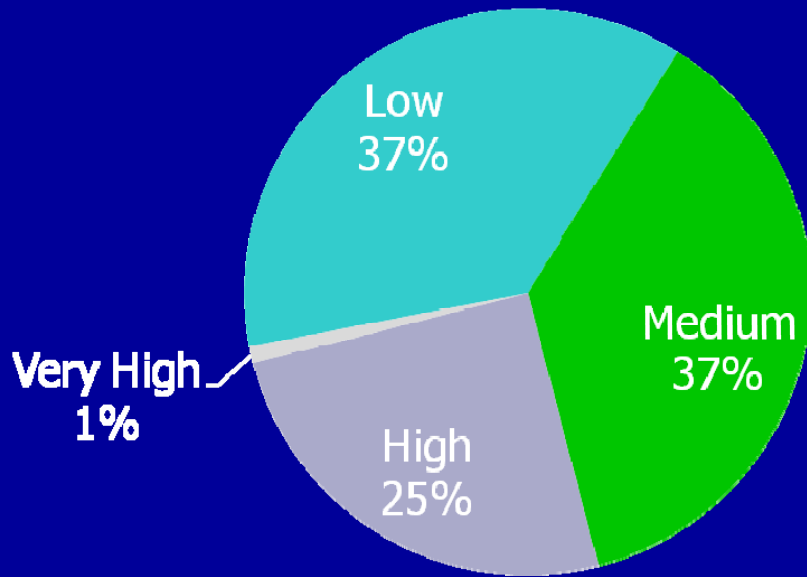


WSP Indicators – Sanitary Risks

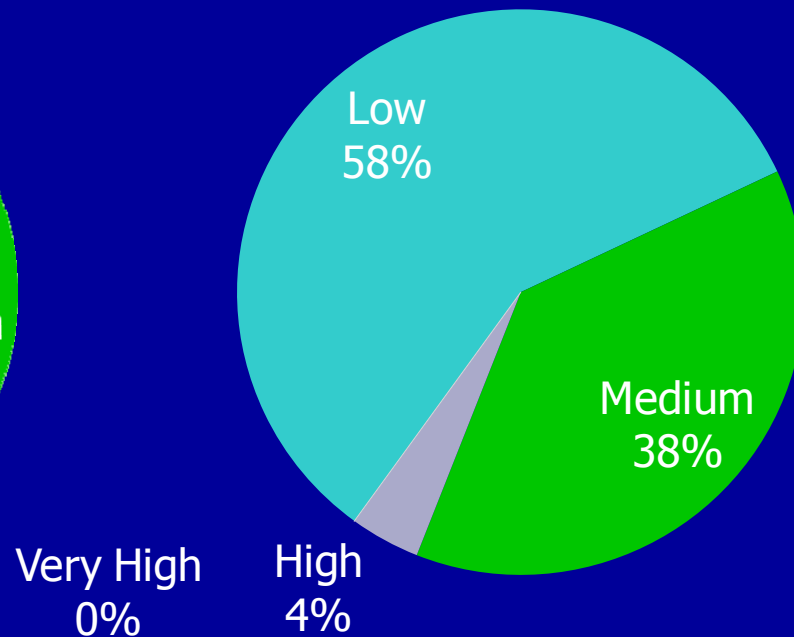
- Sanitary risk includes: tubewell cleanliness, platform, waste water drain, distance of latrine, cleanliness and maintenance of ARTs, **media lifetime (highest risk)**, etc. (following WHO guideline for WSP)
- Levels of sanitary risks:
 - Low
 - Medium
 - High
 - Very High

Comparing Sanitary Risks

Control Area



Pilot Area



WSP Indicators – In house

Control Area (ART deployment)

WSP Indicators	Always done	Sometimes done	Never done
Keep food and water pots covered	89%	11%	0%
Keep water pots clean	86%	14%	0%
Keep water pots covered	76%	23%	1%

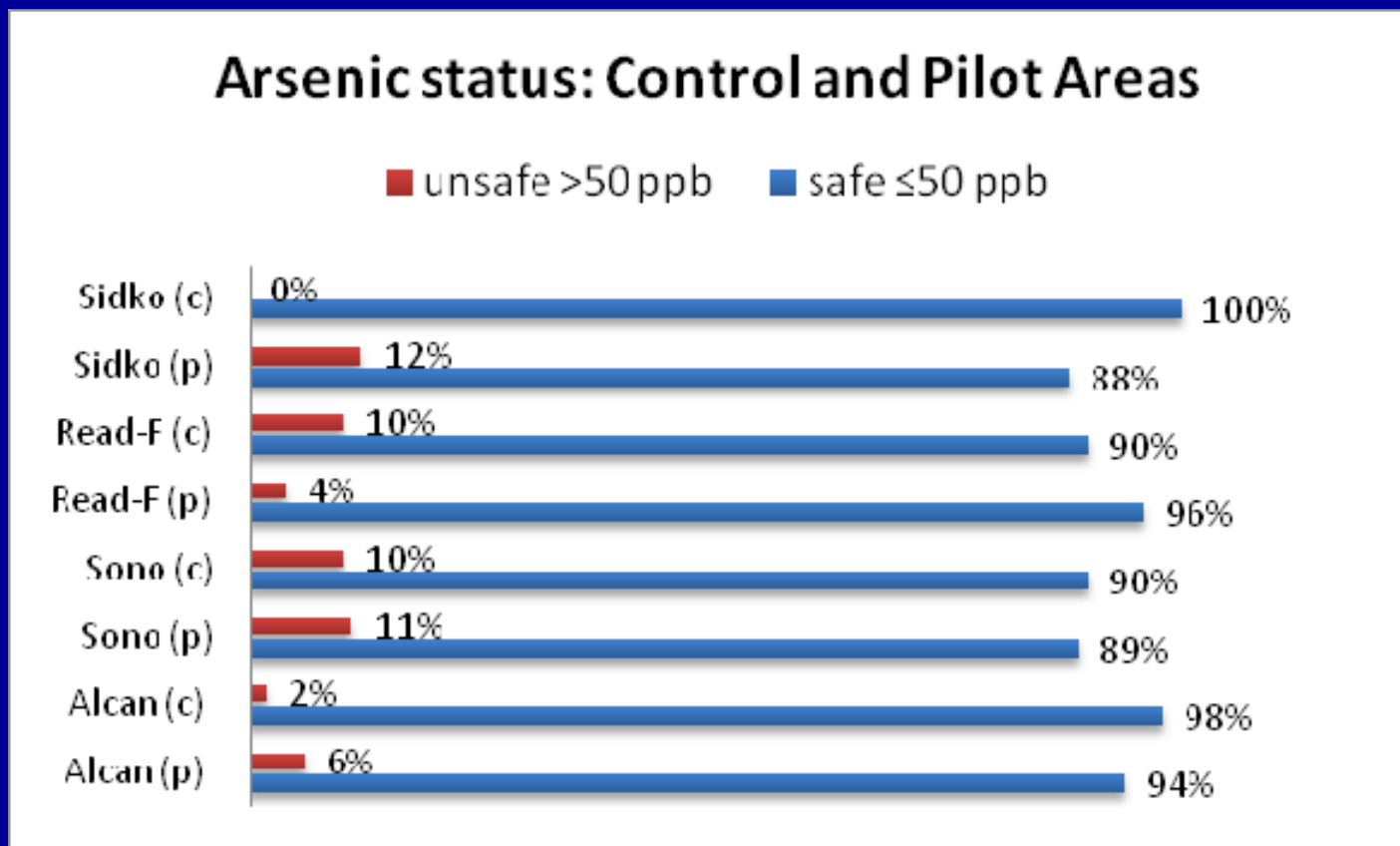
Project Area (ART and WSP)

WSP Indicators	Always done	Sometimes done	Never done
Keep food and water pots covered	97%	3%	0%
Keep water pots clean	96%	4%	0%
Keep water pots covered	88%	13%	0%

Answer 1: WSP Delivery mechanism is effective

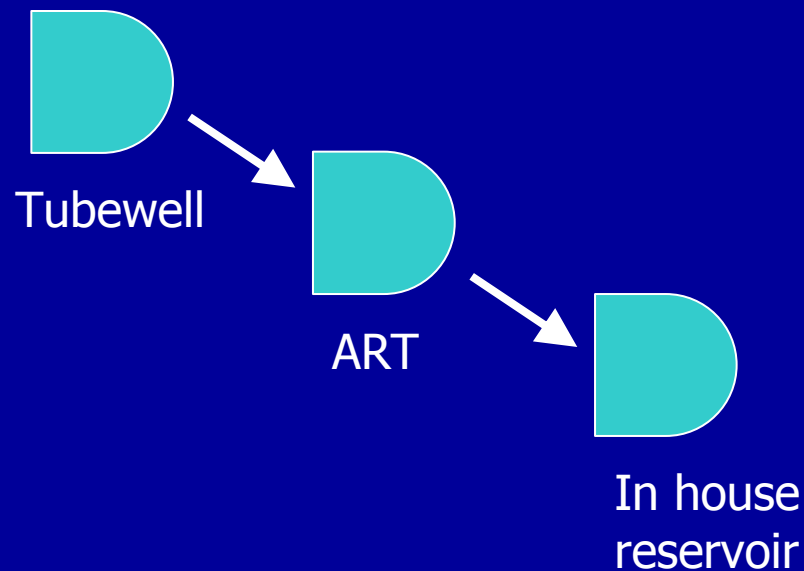
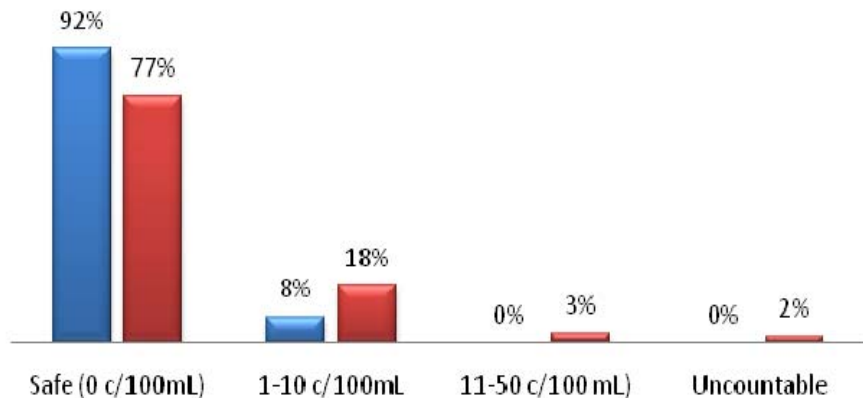
Q 2. Does WSP contribute to improving water quality (arsenic and microbial)?

- Baseline survey in November 2008 showed a 96% removal of arsenic in all ARTs
- Validity of most of the ART filter media has expired and thus reduced arsenic removal capacity



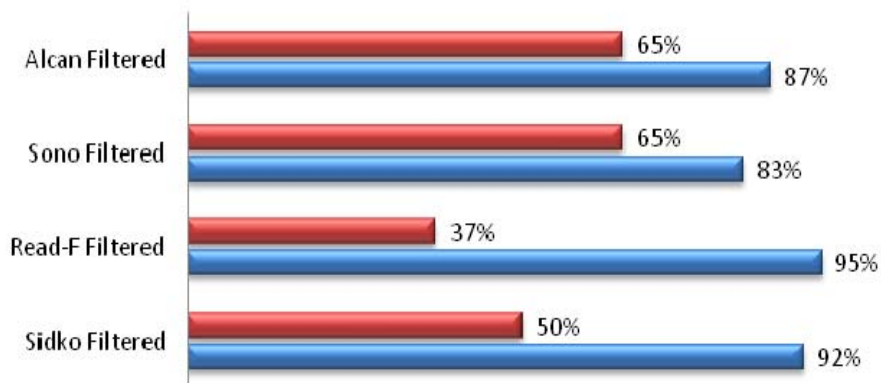
Microbial status: Quality comparison

■ All TW (pilot) ■ All TW (control)



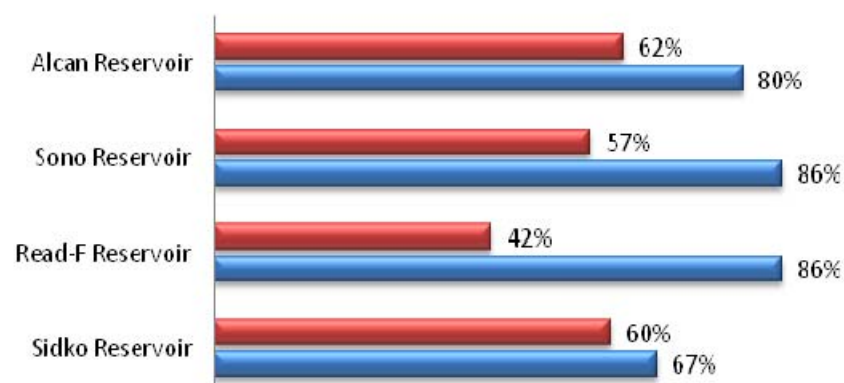
All filtered water comparison

■ Control area ■ Pilot area



All reservoir water comparison

■ Control area ■ Pilot area



Answer 2:

- **ATRs are technically viable**

- **ARTs removes arsenic. However the capacity decreases when filter life time is exhausted**
- **Microbial quality improves but need further improvements in in-house water storage management**

Q 3. Have the users changed behavior? (KAP method)

Some Community Responses (PRA)

- Treated water will be again contaminated if good practices are not maintained – all efforts with ART is then lost!
- Safe water is arsenic and microorganisms free
- Distribute filters to every affected households
- By trainings people are more receptive to WSP messages
- Keeping surroundings of Tubewell and ARTs clean
- Use of water from ARTs for drinking and cooking increased

KNOWLEDGE

ATTITUDE

PRACTICE

Answer 3: There are indications of behavior change

Q 4. Can this model be scaled up?

- Technically the model is sound and can be scaled up.
- WSP is generally effective and with some improvements this can also be scaled up.
- BUT socio-economic and institutional issues need to be addressed

Answer 4: Can be scaled up but some issues need to be addressed

Issues to be addressed for scaling up (1)

- **Affordability is a major limiting factor**
 - 81% users monthly income below Taka 10,000 and most of them find the cost too high!
- **Focus on targeting arsenic affected tubewells and the poor**
 - Updating screening and mapping of arsenic affected tubewells
 - Subsidy mechanism should be target oriented
- **Provide institutional development support**
 - Ensure CONTINUITY of this pilot
 - Gradually mainstream WSP into existing and new projects
 - Knowledge sharing
 - Monitoring and evaluation

Issues to be addressed for scaling up (2)

- Private Sector Participation should be market driven
 - Remove investment distortion (e.g. certification time)
 - Prices of ARTs are distorted – they are not market tested. Project is the only buyer but sellers (ART proponents) are not directly connected to the market
 - ARTs need technical improvements, strong R&D needed
 - Ensure after sales services
 - Establish Regulatory Framework.