Research needs for household level treatment to remove arsenic and fluoride in drinking water in SE Asia

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Terms of Reference

• To visit four countries of southeast Asia and make an assessment of the research and development needs for HH level treatment to mitigate the effects of arsenic and fluoride

• To identify suitable institutions

• Assist those institutions to develop and undertake research proposals
Outline

1 Framework for analysis
2 Country Situations
3 Conclusions
Framework for Analysis

- Geographic Extent
- Exposed Population
- Water Culture / Patterns of Water Use
- Government Policy
- Research Capacity / Existing Research
- Research Needs
Country Situations

• Fluoride

• Arsenic
  - Viet Nam
  - Myanmar
  - Cambodia
  - Laos
Viet Nam - Arsenic
Viet Nam

• Geographic extent
  – Red River
  – Mekong

• Exposed Population -
  – Estimates up to 10 million
  – considerable uncertainties
  – exposure
Viet Nam

• Water Culture -
  - large number of private wells in Red River with use of Iron Reduction Plants common
  - greater reliance on community wells and surface water in Mekong?

• Government Policy
  - includes use of Household Treatment
  - Standards 10ppb urban / 50ppb rural
Viet Nam

- Research Capacity
  - high capacity with high quality lab facilities

- Existing Research and Development
  - Arsenic treatment/removal including IRPs
  - Sludge Disposal
Viet Nam

- Household Treatment
  - Red River area highly suitable for HHT research and development
  - Field Trials of existing HHT systems - Iron Reduction Plants
Myanmar - Arsenic
Myanmar

- **Geographic extent**
  - well defined problem in Irrawaddy
  - mapping well advanced

- **Exposed Population**
  - currently estimated to 3.4 million
  - uncertainties in size of population and degree of exposure
Myanmar

- **Water Culture** -
  - high iron a major impediment to use of groundwater
  - culture of mixed water use

- **Government Policy**
  - *de facto* standard of 50 ppb
  - HH surface water treatment high priority
  - niche for HH treatment arsenic fluoride
Myanmar

- Research Capacity
  - high capacity and high quality laboratories

- Research Needs
  - Field trials HHT of surface waters (planned UNICEF MoH)
  - Identification of niche areas suitable for HH treatment
  - Small scale field trials
Cambodia - Arsenic
Cambodia

• Geographic extent
  – Mapped areas of arsenic - ~ 1600 villages in six provinces (Mekong Floodplains)
  – blanket testing in arsenic affected areas well advanced

• Exposed Population -
  – currently estimated to be 70-300 thousand
  – uncertainties in size of population and degree of exposure
Cambodia

- **Water Culture** -
  - community and private wells
  - high iron a major impediment to use of groundwater
  - culture of mixed water use - surface, rain, well

- **Government Policy**
  - 50ppb standard
  - HH treatment for As currently not high priority
  - niche for HH treatment arsenic?
Cambodia

- **Research Capacity**
  - Limited, no high quality laboratory

- **Research and Development**
  - HHT of surface waters (CWP trials)
  - Increase university capacity
  - Identifications of niche areas, small trials
Laos - Arsenic

- **Geographic Extent**
  - very small areas (2 villages)
  - low concentrations (max 120ppb)

- **Exposed Population**
  - hundreds maybe thousands

- **Research Needs**
  - problem definition
• Significant arsenic contamination in Viet Nam, Myanmar and Cambodia

• HH Treatment for arsenic mitigation
  – Viet Nam most suitable
  – Myanmar and Cambodia – niche application
  – Laos - problem definition

• High iron/taste/smell is a major impediment to provision of safe water
• Microbial contamination still most significant issue in Myanmar and Cambodia
• HH treatment and safe storage of SURFACE water promising approach
• Multiple Barriers for best safety