Implementation of Water Safety Plan for a piped water supply system in India

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Outline

• Water supply in urban India
• What is a Water Safety Plan?
• Water supply in Nagpur
• Nagpur Water supply scheme
• Risks
• Steps taken to ensure water safety
• Performance Indicators
• Future of Water Safety in India
Water supply in urban India

Proportion of people with access to piped water supply

- Overall Urban: 83.2%
- Non-poor: 95.9%
- Urban poor: 47.2%

NFHS –III, Ministry of Health & Family Welfare 2005-06
What is a Water Safety Plan?

- **Identifies** hazards, **assesses** risks from catchment to consumer
- **Mitigates** risks through control measures

WHO, 2004
Water supply in Nagpur

- 217 km² (85 sq. miles)
- 2.5 million population
- 80% coverage
- 225,000 connections
- 586 MLD treated water
- 50% non-revenue water
- 60% population < 135 lpcd
- 4-24 hours supply

Nagpur Environment Status Report, 2011
Risk – Unauthorized access at intake point
Risk - Unregulated dosing of chemicals at WTP
Risk - Ageing infrastructure and lack of proper planning

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Risk - Recontamination as a result of intermittent supply

John et al., 2013
**Risk - Unsafe storage and handling**

<table>
<thead>
<tr>
<th>Question asked</th>
<th>Yes answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is storage design for dipping?</td>
<td>88%</td>
</tr>
<tr>
<td>Do they use dipper with short/ no handle?</td>
<td>67%</td>
</tr>
<tr>
<td>Is the vessel accessible to children?</td>
<td>58%</td>
</tr>
<tr>
<td>Do they pour back excess water?</td>
<td>43%</td>
</tr>
<tr>
<td>Does the storage vessel lack a lid?</td>
<td>17%</td>
</tr>
<tr>
<td>Is the inside of the vessel hard to clean?</td>
<td>13%</td>
</tr>
<tr>
<td>Are there signs of dirt around the opening?</td>
<td>11%</td>
</tr>
</tbody>
</table>

*Unimproved storage, poor handling habits, unsafe extraction could be a pathogen entrance route.*
Steps taken to ensure water safety - Infrastructural

- **Repair and upgradation** of existing system
  - Longer supply hours, improved water quality
- **Standard Operating Procedures (SOPs)**
  - Streamlined operation, more accountability

Horizontal Directional Drilling (HDD)
Steps taken to ensure water safety - Institutional

- Increased communication with external agencies
- External auditing of water treatment plants
- Registering illegal connections
- Inclusion of low-income areas
- Awareness program – in English and regional language.
## Performance Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Before WSP</th>
<th>After WSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage of Water Supply connections</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>Per capita supply of water (in lpcd)</td>
<td>&lt;135</td>
<td>200</td>
</tr>
<tr>
<td>Percentage of metered connections</td>
<td>65%</td>
<td>85%</td>
</tr>
<tr>
<td>Extent of Non-Revenue Water</td>
<td>60%</td>
<td>15%</td>
</tr>
<tr>
<td>Continuity of water supply (in hours/day)</td>
<td>2-6</td>
<td>12-24</td>
</tr>
<tr>
<td>Efficiency in redressal of customer complaints in 24 hrs</td>
<td>&lt;50%</td>
<td>80%</td>
</tr>
<tr>
<td>Operating cost recovery in water supply services</td>
<td>65%</td>
<td>to be determined</td>
</tr>
</tbody>
</table>
Future of Water Safety in India

• Little control over catchment in developing countries

• 90% of the risks exist within the distribution system and at point-of-use

• Integration of WSP and existing benchmarks

• Some components have to be modified for intermittent supply
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