AMR linkages with waste from farms and factories
CSE Webinar – on the ‘ENVIRONMENTAL AND PREVENTION AGENDA’
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Drivers of Antimicrobial Resistance (AMR)

- Animal health and food-animal production
- Human health
- Crops
- Waste and Environment

AMR
### Structure of the Environmental AMR Problem

<table>
<thead>
<tr>
<th>Point Sources</th>
<th>Non-point Sources</th>
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<tbody>
<tr>
<td><strong>Farms</strong></td>
<td><strong>Rivers, Reservoirs</strong></td>
</tr>
<tr>
<td>Waste from:</td>
<td>Groundwater</td>
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<tr>
<td>• Animal farms – poultry, dairy, pig, fish etc.</td>
<td>Agricultural soil</td>
</tr>
<tr>
<td>• Agriculture farms</td>
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<tr>
<td><strong>Factories</strong></td>
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<tr>
<td>Effluents from:</td>
<td></td>
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<tr>
<td>• Pharma manufacturing</td>
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<td>• Feed mills</td>
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<td>• Slaughter houses</td>
<td></td>
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<tr>
<td>• Processing units (meat, dairy)</td>
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<tr>
<td>• Effluent treatment plants</td>
<td></td>
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<tr>
<td><strong>Households/Community</strong></td>
<td><strong>Healthcare Settings</strong></td>
</tr>
<tr>
<td>Effluents from:</td>
<td>• Hospital sewage</td>
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<tr>
<td>• Effluents from Sewage treatment plants</td>
<td>• Waste from veterinary care settings</td>
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<tr>
<td>• Disposal of unused, expired drugs</td>
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</tbody>
</table>

- Three AMR determinants (antibiotic residues, resistant bacteria, antibiotic resistance genes) travel across multiple sectors
- Nature of waste and AMR determinants varies across sectors and local context
Globally, where do we stand today? (1/2)

- Environment still gets least attention compared to human and animal sectors.

- Scientific community actively engaged and building evidence on different aspects (e.g., genes, bacteria, antibiotics)/waste streams (e.g., hospital waste, sewage, manure).

- The UNEP recently roped-in to work along with the WHO-FAO-OIE Tripartite. Developing a report on environmental impacts of AMR.

- More traction on the need to address environmental AMR, in particular waste from hotspots like pharma industry in global advocacy/policy/trade/economic discussions (e.g., G7, Global Leaders Group on AMR). Pharma industry through AMR Industry Alliance also in the picture.
Globally, where do we stand today? (2/2)

- But still, guidance/SOPs/frameworks to help nations on policy development/surveillance/capacity building/research agenda is missing (e.g., waste management, discharge limits for different waste streams)

- Integration/linkages between AMR with WASH (importance of clean water, sanitation) still less discussed/advocated for, and so is the importance of prevention

- Despite a recognition that there is enough evidence/understanding to act and to not allow emerging evidence and/or complexity of the issue as a barrier for immediate action
At the country level, where do we stand today? (1/2)

- Environmental AMR in varying degrees is part of most National Action Plans
  - indicates **need, desire, stakeholder consensus** to address the issue
  - aligns with **overall mandate of preventing chemicals into environment**
  - focuses on multiple aspects - **surveillance, waste management, biosecurity** but still not as much as required on prevention and WASH
  - However, existing waste management policies/standards are **largely not AMR-centric**
At the country level, where do we stand today? (2/2)

- However, there is very limited on-the-ground progress seen so far
  - Lack of dedicated funding within the overall limited funds for AMR
  - Limited know-how and capacity due to absence of global guidance, complexity and cross-cutting nature of the issue
  - Environmental AMR issue so far is over-dependent on surveillance which is resource-intensive and technically demanding. The importance of achievable and cost-effective aspects of prevention (less use, less waste, less resources to clean up) are overlooked
Low- and middle-income countries have challenges but also an opportunity

- It is clear from the progress so far that the issue of environmental AMR needs more financial and technical resources. It may also take quite a lot of time to be in control of the situation unless we do things differently.

- LMICs cannot afford to pollute first and then spend huge amount of money to clean up. They cannot afford the increased treatment cost due to AMR. They cannot afford the livelihood and economic losses.

- Besides there is a big challenge of producing more food, challenge of hygiene and sanitation.

- They have to find solutions which are cost-effective, technically less demanding and relevant in their local context.

- The good part is that most of the agriculture is still not intensive (as compared to developed countries) and the pharma manufacturing industry is limited to few countries. So they have a chance to leap-frog and do things the right way.
First of all, we must prioritize and invest in the environmental AMR agenda (both at global and national level) as part of a true One-Health action. This includes more research, evidence, documentation, advocacy, funding, capacity and action.

• Focus on prevention
  – Prevention at farms (less disease, less use, less pollution, less clean up): biosecurity, clean water, alternatives, good animal husbandry practices, vaccination. Need to find a way to continue to produce more food with less chemicals, food systems which are less-intensive
  – Prevention at factories: better process controls, better monitoring

• Focus on better Water, Sanitation and Hygiene (WASH)
Way ahead

• Manage waste well
  – AMR-centric approach (bacteria, genes and antibiotics) in waste streams
  – Low-cost effective waste management technologies/approaches
  – Farm waste is a resource from the point of view of efficiency, circularity. It saves costs, helps prevent environmental contamination but most importantly, supports agro-ecological practices based on livestock, crop integration and effective use of manures as fertilizers

• Build capacity

• Develop and implement a research agenda based on what we know and what we do not know. Identify hotspots

• Develop policy, set standards/discharge limits for hot-spots, monitor, publish results, engage with industry
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CSE’s work on food systems and environment in India

- Antibiotics in honey, 2010
- Antibiotic use in poultry, 2014
- Antibiotic use in aquaculture, 2016
- AMR in poultry environment, 2017
- Antibiotic use in fast food supply chain, 2017
- Disposal of pharma manufacturing waste, 2017
- Antibiotic use in feed, 2020
- Disposal of unwanted drugs, 2019
- Antibiotic use in fast food supply chain, 2020
- Antibiotic use in dairy, 2020
- Body Burden, 2020
- Use of ethnoveterinary medicines in dairy sector, 2021

CSE: Centre for Science and Environment
CSE’s global work on food systems and environment

- Strategic guidance for NAP for developing countries, 2016
- Prioritized NAP-AMR (Zambia, 2019)
- Baseline information for Integrated AMR surveillance (Zambia, 2020)
- Framework for Integrated AMR surveillance (Zambia, 2020)
- Roadmap to phase out antibiotic misuse in food-animals (Zambia, 2020)
- Framework for drug take-back and EPR (Zambia, 2021)
- Prioritized NAP-AMR (Zimbabwe, 2021)
- Containing the silent pandemic of AMR (2021)
- Conserving the use of critically important antimicrobials (2021)