Status, policies and perspectives on farm waste and environment management in India

International Workshop on National Action Plan on Antimicrobial Resistance for Developing Countries
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Environmental spread of AMR: need for greater focus

- AMR – ‘One Health’ issue encompassing humans, animals, agriculture and the environment

- The Global Action Plan adopted by the WHO in 2015, recognizes the need to contain the environmental spread of resistance
  - Awareness
  - Generation of evidence based standards and guidance
  - Secretariat Action specified

- National Action Plans are initiating efforts to address the environment issue
  - Developed countries: focus on research and environmental monitoring
  - Developing countries: focus so far on bio-security and infection, prevention and control

- Need for greater global guidance; better articulation of how countries should move ahead

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Sources of antibiotic residues and resistant bacteria reaching the environment

**Sources**
- Animal farms
  - Poultry, dairy, pig, fish farms
  - Feed mills
  - Slaughter houses
  - Processing units
- Healthcare Settings
  - Hospital sewage
  - Waste from veterinary hospitals
- Domestic Settings
  - Disposed/ unused antibiotics
  - Domestic sewage
- Pharmaceutical/ Research/ Manufacturing
  - Discharge effluents

**Contributors**
- Solid and liquid waste
  - Antibiotic residues
  - Antibiotic resistant bacteria
- Largely liquid waste
  - Active Pharmaceutical ingredients (APIs)

**Types of waste**
- Antibiotic Residues and Resistant Bacteria

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The environmental linkages to AMR

Source: Environmental Health Perspectives, 2012; 120(9), 1221-1229
Waste disposal practices at poultry farms (1/2)

• Observations based on CSE visit to poultry farms in Haryana and stakeholder inputs

• Disposal methods followed
  – Largely solid waste
  – Litter and manure is mostly spread on agricultural fields
  – Litter and manure sometimes used directly in aquaculture farms

• No–limited biosecurity measures; variations across different farm types
Smart moves of a deadly microbe

As a microbe become resistant, it influences other microbes present in the gut of the chicken and then those in the environment, making them resistant to a wide range of antibiotics.

Antibiotics routinely given at low doses for faster growth and to prevent diseases. This results in antibiotic-resistant bacteria.

Resistance transfers to other bacteria through horizontal transfer of genes.

Resistant bacterial infections have become increasingly common. Doctors are concerned that some antibiotics no longer work to treat sick people.

Antibiotics and resistant bacteria in the gut. The rest become resistant.

Reservoir of resistant bacteria increases.

Resistant bacteria and antibiotics pass on to farm workers, meat plant workers and general people.

Consumer encounters resistant bacteria while handling meat and eating undercooked meat.

Antibiotics present in farm waste also cause resistance in the microbes present in the waste.
Observations based on a CSE study in West Bengal and inputs from stakeholders from other states

- Largely liquid waste

- Fate of untreated wastewater from aquaculture farms
  - Discharged into canals from which the water was sourced
  - Reused in broodstock ponds
  - Released into agricultural fields
  - Let out in sewage drains
Waste management practices at fish farms (2/2)

- Effluent Treatment System (ETS) is largely missing
- No framework for freshwater culture
- Solid waste, including expired antibiotics and chemicals are disposed by burying in pits
- Other factors contributing to environmental pollution
  - Agricultural lands converted for aquaculture purpose
  - Farm registration a lesser priority
  - Minimal supervision by concerned officials
Pharmaceutical pollution and AMR (1/2)

- India, China—hubs of pharmaceutical manufacturing
- Hyderabad, the centre of bulk drug manufacturing industry in India
- Several case studies have highlighted the impact of antibiotic pollution in the environment
  - Non-compliance with environmental regulation; implementation gaps
  - Wastewater discharged into the domestic sewage network without any treatment
  - High pharmaceutical concentrations in the water samples tested
  - Lakes in vicinity of pharmaceutical manufacturing hubs affected by direct dumping of pharmaceutical waste
Pharmaceutical pollution and AMR (2/2)

Effluent pollution in Musi River in Hyderabad, a major pharmaceutical manufacturing hub; Copyright: Nordea Asset Management 2016

Chemical pools in lakebed at Kazipally lake, Hyderabad; Picture Copyright: Nordea Asset Management 2016
Key gaps in policy and standards (1/3)

- **Current effluent standards not suitable to address AMR**
  - General waste water standards there as per E(P) Rules do not cater to AMR
  - Standards for slaughter house or pharmaceutical industry are confined to summary parameters such as the BOD, suspended solids, oil and grease
  - No specific standard on antibiotics present
  - Standards do not adequately address the issue bacterial load either
Key gaps in policy and standards (2/3)

- Waste from farms is not considered polluting enough; hence monitoring not mandated
  - Farms considered a part of agriculture than industry
  - No specific standards exist for wastewater discharge from aquaculture
  - Poultry farm bio-security guidelines developed by CPCB (such as on siting criteria, waste disposal) do not factor-in monitoring; not pushed for enforcement by states
Key gaps in policy and standards (3/3)

- No provisions related to handling of expired drugs
  - No Extended Producer Responsibility (EPR) for pharmaceutical industry in India

- No surveillance or monitoring of waste from pharmaceutical industry, intensive animal farm, hospitals for antibiotic residue or resistant bacteria
Way ahead: Research and Awareness (1/4)

- Develop programme for coordinated research and evidence generation for environmental spread of AMR
Way ahead: Infection Prevention and Control (2/4)

- Good farm management practices should be followed to control infection and stress among the flock

- Bio-security guidelines for poultry, aquaculture, dairy should be developed, improved and applied to all farms

- Capacity of small farmers must be enhanced so that they can comply with the guidelines
Way ahead: AMR Surveillance (3/4)

- Develop framework and monitor AMR in farm waste and environment
  - enhance capacity and infrastructure for monitoring waste from food animal production settings

- The annual monitoring report should feed into the integrated AMR surveillance report to guide policies on antibiotic use and management of farm waste and environment
Way ahead: Controlling waste from pharmaceutical industry, animal and aquatic farms (4/4)

- Recognize wastewater discharge from pharmaceutical industry, livestock and aquaculture as a trade effluent
  - Recognize these as polluting activity
  - Necessary modifications in law

- Set standards for antibiotics in all trade effluents at below detection limits

- Develop criteria and enforce suitable management of solid waste from poultry and livestock farms
Thank you!

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