NATIONAL CONCLAVE ON FOOD

Animal and environmental aspects of AMR

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Antimicrobial resistance (AMR) – antibiotic resistance (ABR) – in particular, arises when bacteria survives exposure to an antibiotic that would normally kill them or stop their growth.
How does AMR develop?

- AMR accelerates by *antibiotic misuse and overuse* in both humans and animals
- AMR spreads through *food, contact* and *environment*
- *Low dose of antibiotics for longer durations* favour emergence of resistant bacteria
  - *growth promoter* or *disease prevention* at sub-therapeutic levels in food animal production settings
- At a cellular level, resistance is acquired through *mutations* or *transfer of genetic material* from other bacteria
Health implications of AMR

- AMR leads to:
  - Greater spread of infectious diseases
  - Difficulty in treating common infections
  - Uncertainty in success of high-end procedures
  - Longer hospital stays and more expensive treatments

- Can have **huge health** and **economic impact** on individuals and nations

- Can also **impact food safety, nutrition security, livelihood** and **growth**

Post-antibiotics world: By 2050, estimated to lead to 10 million deaths and lost output worth US $100 trillion globally
AMR is a One-Health Issue

Addressing human side of the AMR problem well understood; actions initiated

Lesser focus on animal and environmental aspects of AMR; has gradually gained attention at global and national platforms
India-big on food from animals

Key sectors

**Poultry**
- Broilers (meat)
- Layers (eggs)

**Cattle**
- Cattle for milk
- Cattle for meat

**Pigs**
- Pig meat (pork)

**Sheep**
- Milk

**Goats**
- Milk
- Meat

**Fisheries**
- Brackish-water (fish meat)
- Freshwater (fish meat)

Species Population in millions (as per 19th Livestock Census, 2012)

<table>
<thead>
<tr>
<th>Species</th>
<th>Population in millions</th>
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<tbody>
<tr>
<td>Cattle</td>
<td>190.0</td>
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<tr>
<td>Sheep</td>
<td>65.07</td>
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<tr>
<td>Goat</td>
<td>135.2</td>
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<tr>
<td>Pigs</td>
<td>10.3</td>
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<tr>
<td>Poultry</td>
<td>729.2</td>
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Meat production (% share); as per DADF Annual report 2016-17
Why focus on animals?

- India, one of the largest producers of food-animal derived products such as meat, milk, eggs etc.
- Growing demand of protein sourced from animals; Steeplly rising industrial animal farming to meet this demand
- Large-scale use of chemical inputs (e.g., antibiotics) in such intensive farming systems
- Inadequate farm biosecurity and sanitation at farm levels
- Antibiotics used as a substitute for better hygiene and sanitation

Food animal production- a key contributor to AMR emergence and spread
Key practices of antibiotic use in animals

- **Unregulated availability** of antibiotics (OTC, online sale, import)
- Use of **antibiotics labelled for use in humans**, including critically important ones
- **Non-therapeutic antibiotic use** in animals (e.g., disease prevention, growth promotion); **withdrawal periods not followed**
- **Feed premixed with antibiotics** used for improving growth (e.g. Colistin, Ciprofloxacin, Tetracycline, Furazolidone)
- **Lack of farmer knowhow; weaker extension services**
Observations from CSE studies

- **Antibiotics in honey, 2009**
  - Residues of multiple antibiotics found in honey

- **Antibiotic residues in chicken meat, 2014**
  - Residues of multiple antibiotics (fluoroquinolones and tetracyclines) found in chicken meat

- **Antibiotic use and waste management in aquaculture, 2016**
  - Indiscriminate antibiotic use in fisheries and inadequate waste management highlighted to policymakers

- **Antibiotic misuse in fast food industry, 2017**
  - Double standards of global fast food multinationals highlighted as no commitments to eliminate antibiotic use in supply chains exist for India

FSSAI notified standards for residual antibiotics in honey (2014) and in meat, milk, egg etc. (2018). Recent standards seems to allow colistin use in food-animal production.
Key policy gaps(1)

- **Use of Antibiotic growth promoters (AGPs)**
  - AGPs in feed continue to be used and are marketed freely/online. No checks, no prescription required; no labelling norms; no control on antibiotic mixed.
  - All that is available presently is a DADF advisory that does not encourage the use of antibiotics in feed/feed premix for animals. This is not mandatory.
  - Bureau of Indian Standards (BIS) recommends not using antibiotics with systemic action as AGPs in feed, but this is not mandatory; no progress over last several years from BIS sectional committee.
  - European Union banned the use of all AGPs in 2006.
  - In recent past, other countries like China, South Africa, Bangladesh, Brazil have also banned use of colistin as a growth promoter in animal feeds.

National Action Plan calls for restricting antibiotics in animal feed; its import, direct distribution, online sale, labelling – action still awaited.
Key policy gaps (2)

- Use of antibiotics for disease prevention

  - No regulations to check routine preventative use of antibiotics in animals, including critically important ones

  - European Parliament approved a ban on preventive mass medication in animals; actionable from 2022

India’s National Action Plan calls for restriction and phase-out of non-therapeutic antimicrobial use in animals – action still awaited
Key policy gaps (3)

• Tracking antibiotic use in humans and animals
  - No country-wide data on antibiotic use in food animals and humans
  - Denmark, Netherlands, Sweden have long running established programmes to track antibiotic use

• Others
  - Limited actionable framework for farmer/veterinarians to ensure judicious antibiotic use
  - Freshwater culture remains largely unregulated
  - Existing policies/guidelines on fisheries focused largely on export

Process for online monitoring of antibiotics in human and veterinary sector initiated by drug regulator in 2017 – action still awaited
What needs to be done?

- Ban/phase off antibiotic use for growth promotion and mass disease prevention
- Restrict antibiotics in feed and feed supplements
- Restrict animal use of critically important antibiotics for humans
- Ensure stringent control on import of antibiotics and feed supplements
- Develop an integrated surveillance system to monitor antibiotic use and resistance trends in humans and animals
- Check unregulated availability of antibiotics
- Develop low cost diagnostics such as “Pond Health Cards”, along lines of Soil Health Cards, for farmer assistance in fisheries sector
**Why focus on environment?**

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<tr>
<th>Non-point Sources</th>
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<tr>
<td>Rivers, Reservoirs</td>
<td>Animal farms and factories</td>
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<td>Groundwater</td>
<td>Healthcare Settings</td>
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<td>Agricultural soil</td>
<td>Domestic waste</td>
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<td>Pharmaceutical Mnf./R&amp;D</td>
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<td>Farms – poultry, dairy, pig, fish etc.</td>
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<td>Feed mills</td>
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<td>Slaughter houses Processing units</td>
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<td>Hospital sewage</td>
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<td>Waste from vet. /settings</td>
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<td>Disposed/unused antibiotics</td>
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<td>Domestic sewage/Sewage treatment plants</td>
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<td></td>
<td>Discharge effluents</td>
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<td>Common effluent treatment plants</td>
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- Environment – a complex reservoir of AMR determinants
- Untreated effluent discharge from antibiotic manufacturers, domestic settings, healthcare settings, food-animal production settings are key sources
- Traditional sewage treatment plants acting as a AMR hot-beds
- Antibiotic use in crops, a route for antibiotic residues into environment
AMR linkages between human, animal and environment

Main sources

**Human consumption**
- Via antibiotic residues and resistant bacteria in human waste, expired/discard antibiotics

**Poultry, aquaculture, dairy farms, slaughter houses, processing units and feed mills**
- Via antibiotic residues and resistant bacteria in waste

**Environment**
- Via consumption of food/undercooked meat, handling of animals/meat

**Human exposure to antibiotics and resistant bacteria**
- Via prescription or self-medication

**Veterinary clinics, hospitals, labs**
- Via antibiotic residues and resistant bacteria in waste

**Pharmaceutical manufacturing and research units**
- Via antibiotic active pharmaceutical ingredients in effluents
Practices of waste disposal in farms and factories: CSE observations

- **Waste from poultry farms**
  - Mostly spread on agricultural fields; sometimes used as fish feed
  - Solid waste, including expired antibiotics disposed by pit-burials

- **Waste from aquaculture farms**
  - Discharged into canals or agricultural fields
  - Reused in broodstock ponds
  - Let out in sewage drains

- **Waste from pharma manufacturing hubs (Baddi, Himachal Pradesh)**
  - Solid waste given to scrap dealers to dump or burn them in open
  - Effluents are injected into bore wells dug in ground at night, released into nearby rivers or nallahs or released during monsoon
Antibiotic resistance in poultry environment: CSE study

• Study conducted across 4 key states of India

• High multidrug resistance (MDR) found in poultry environment in two key bacteria of public health significance: *E. coli* and *K. pneumoniae*

• MDR is moving from farms to agricultural fields in case of *E. coli.*
Poultry litter is rich in antibiotic resistant bacteria and un-metabolized antibiotics

The common practice of using untreated poultry litter as manure in agricultural land is transferring bacteria that are resistant to multiple antibiotics.
Key policy gaps

• Improper waste disposal from farms and factories
  - No specific standards exist for wastewater discharge from farm and factory settings, in view of AMR
  - No routine surveillance or monitoring of waste from pharmaceutical industry, intensive animal farm, hospitals for antibiotic residue or resistant bacteria
  - No provision for handling of expired drugs
  - Limited mandatory provisions for farm hygiene and waste management; limited supervision/monitoring of farm waste

Draft standards for antibiotic residues in pharmaceutical effluent and CETPs being developed—work in progress
What needs to be done?

- Greater leadership role of the environment regulators to develop ABR-centric environmental regulations
  - Consider antibiotics in the environment as a hazardous chemical, which should not be present in any trade effluent. Develop environmental standards for residual antibiotics
  - Weave extended producers responsibility into the roles of pharma manufacturers
  - Re-prioritize pollution causing potential of farm sectors
  - Explore less risky litter/manure management approaches such as biogas generation; prohibit land application of untreated litter
  - Ensure proper composting for treatment of litter/manure under very high level of supervision
Implementation of the National Action Plan on AMR

- Animal-environment dimension of AMR has got much needed attention in the Indian National Action Plan (NAP) on AMR

- All issues highlighted/discussed here find important mention in the NAP-AMR

- Delhi Declaration on AMR is a testimony to inter-ministerial consensus

- Multiple ministries (Ministry of Agriculture, Ministry of Environment) must come on board strongly to address this issue
Importance of State action

- Health, food, agriculture, environment, animal husbandry, fisheries are all state subjects
- Implementation of NAP-AMR will remain weak, unless states come forward
- States have the most important role to play to ensure effective action on the ground
- States must develop their respective multi-sectoral State Action Plans to contain AMR
CSE’s work on animal and environmental aspects of AMR
Thank you

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