One Health approaches to data analysis and visualization for policymaking & advocacy

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Policy Cycle for AMR

- **Formal policy cycle** documentation consists of National Action Plans, Programme documents, Annual Reports and Situational Assessments. These were sourced for their use of data, analysis and visualisation.

- **Governance** for One Health policymaking show two types of policymakers:
  - **Strategic policymakers**: sit on high level, national committees, and may include Ministers and high-level officials. These policymakers may not necessarily have a health/science background.
  - **Technical policymakers**: members of technical committees that inform national committees and strategic policymakers. The policymakers may influence strategic policymaking and are likely to have a specialist background relevant to understanding AMR in human or animal health.
Current State of AMR Policymaking

• Annual or biennial reporting is a key aspect of country policy literature, as recommended by WHO, FAO, and OIE; however, regular policy reporting is absent in most countries.

• There is only limited use of data analysis and visualisation in the available policy literature, indicating a likely weak link between policymaking and use of data, including surveillance data.

• Data analysis and visualisations, where used, are focused on technical policymakers, rather than strategic policymakers.

• Available academic studies are key components situational assessments, which can be considered as key policy documents.

• Compared to the analysis of AMR, there is more limited analysis of data about antimicrobial consumption and use.

With many countries about to refresh their National Action Plans, there are opportunities to improve data analysis and visualisation for One Health policymaking.
The Value of Regional Approaches for Policymaking & Advocacy

• Most information on interventions and best practices for AMR cascade ‘top-down’ from the global to the national level, suggesting there may be little room for LMIC to shape the global agenda.

• Regional initiatives may help to enable LMIC voices to inform national, regional and global AMR policy.

• WHO WPRO framework of One Health as a ‘system’ provides a useful organising framework of areas of common policy interest across countries (diagram right)

Antibiotic resistance happens when bacteria change and become resistant to the antibiotics used to treat the infections they cause.

1. Antibiotics are given to patients, which can result in drug-resistant bacteria developing in the gut.
2. Antibiotics are given to food producing animals and crops, leading to animals developing drug-resistant bacteria in their gut.
3. Drug-resistant bacteria reach humans through food, the environment (water, soil, air), or by direct human-animal contact.
4. Drug-resistant bacteria spread to other patients through poor hygiene and unclean facilities.
5. Drug-resistant bacteria spread to the general public.
6. Patient attends hospital or clinic.

Source: WHO WPRO 2017
### Outputs
- Increased awareness and understanding
- Training and professional education
- Strengthened veterinary services
- Monitoring antimicrobial use
- Surveillance for AMR
- Research on AMR and antimicrobial use
- IPC in human healthcare
- Good animal health and management practices
- WASH and immunization
- Optimized antimicrobial use and regulation
- Legislation and regulations to prevent environmental contamination
- Estimated resource needs and economic case
- Coordinated efforts, priorities and incentives
- More investment in relevant R&D

### Outcomes
1. Improved awareness of AMR and behaviour change among policy-makers, farmers, veterinary and health workers, food industry, general public
2. Strengthened knowledge and evidence base used for policy and practice decisions
3. Reduced incidence of infection in health facilities, farms and communities as well as reduced environmental contamination, due to effective prevention
4. Optimized use of antimicrobials in human and animal health, with growth promotion phased out
5. Increased R&D on new medicines, diagnostics, vaccines and other inventions. Sustainable investments

### Impact Goals
- Reduced levels and slower development of resistance
- Continued ability to treat infectious diseases with effective and safe medicines
- Reduced impact of infectious diseases on human and animal health and economic development
One Health ‘Systems View’ for AMR Policy and Goals

Objective: Optimise and regulate antimicrobial use; increase R&D for new medicines and other interventions

Objective: Optimise consumption and use in human populations

Objective: Reduce spread of resistance through animal population

Objective: Reduce spread of resistance through food, environment or human-animal contact

Objective: Optimise consumption, with use in growth promotion phased out

Objective: Reduce spread through community mechanisms

Objective: Reduce incidence of infection in health facilities

Objective: Reduce spread to general population

Overarching Goal: slow development of resistance, reducing impact on human-animal health and economic development

Adapted from WHO WPRO 2017 and WHO FAO OIE 2019.
Surveillance System

Sale, consumption and use of antimicrobials. Monitor R&D pipeline.

Monitor consumption and use in human populations

Monitor spread of resistance through health facilities

Overarching Goal: slow development of resistance, reducing impact on human-animal health and economic development

Monitor consumption and use in animal populations

Monitor spread of resistance through animal population

Spread through community mechanisms

Monitor the spread of resistance

Antibiotics are given to food producing animals and crops

Animals develop drug-resistant bacteria in their gut

Drug-resistant bacteria reach humans through food, the environment (water, soil, air) or by direct human-animal contact

Drug-resistant bacteria spread to the general public

Adapted from WHO WPRO 2017 and WHO FAO OIE 2019.
Dashboard Development

Recommend that a regional platform prototype be developed with an initial focus on:

- Collation and organisation of existing regional data and research based on a One Health ‘systems’ approach, focusing on common policy interests and future national action planning needs.
- Leading development of a country-regional platform prototype populated using synthetic data focussed on antimicrobial resistance, consumption and use. The prototype could also be used to demonstrate to countries how existing methods can be strengthened, how new surveillance collections can be established, and how new technologies can be used at country and regional levels to improve surveillance approaches.
- Consistent with the systems approach, developing technical guidance about ‘business process’ mapping to support systems orientation of the next iteration of national action plans to establish, strengthen, extend or innovate within their surveillance systems.
- **Data Sharing:** data sharing templates be developed. A starting point is the development of points for a joint business case which demonstrates the principles of ‘mutual benefit’ and strengthening of data systems and analysis.
Frameworks and Models for Data Sharing

Data sharing requires governance structures, strategies and agreements to be in place for health data, which can be usefully underpinned by collaboration focused on ‘mutual benefit’.

- National (and therefore regional) challenges about sharing data are likely to include the availability of data, lack of agreed governance and use of data for policy, as well as data sharing beyond borders.

- Mapping data sources and reporting data analysis can contribute to understanding where data activities can be strengthened; where there are gaps and innovation possibilities; and how agreements can create joint activities of mutual benefit over time.

Recommendations:

- Regions and countries could collaborate to create regional data governance mechanisms, data strategy, and regional plans focusing on mutual benefits, including, for example, improving institutional and operational capacity.

- As a starting point, agreements about data sharing require a full understanding of the types of data to be shared, including public and private data sources, so that the appropriate stakeholders can be included, and appropriate data-sharing agreements can be reached. Data mapping exercises may represent activities with mutual benefit between regional and country actors.

- Mapping may also help to identify data challenges, as well as opportunities for capacity building for better data, improved governance and use of data for policy, and further data sharing opportunities, which can be anticipated and incorporated into data-sharing agreements.
Typology of Data

Regional and Global Data Sharing

National Data System for AMR

Survey Data

Regulatory Data

Surveillance Data including public and private hospitals and laboratories

Commercial Data including private hospitals and pharmaceutical data

Public and Public-Private Data Sharing Agreements
Steps recommended for developing data-sharing negotiations and agreement:

- Make the joint business case for data sharing
- Establish the purpose and agree on data-sharing principles
- Establish governance
- The Agreement (Template Available)

Data Sharing: Principles and Governance

Data Sharing Principles:
For AMR-related data sharing, there is a broad range of possible data, including public and private (commercial) data, individual data and data which may be non-identifying, such as data about pathogens, rather than patients.

Data sharing principles are an important underpinning to any data-sharing agreement and should include discussion about:

- the purpose for sharing data;
- the level of detail in the data;
- the environment in which the data will be stored and released;
- who is accessing the data; and
- what will be made public.

Data governance is crucial to the ongoing success of a data-sharing agreement:

- Data governance includes creating a policy environment for knowledge to be extracted from data respecting technical, legal and policy requirements; and may include a focus on transparency, data linkages, data access and integration, and terminology and exchange standards.
- Some countries identify roles and responsibilities within their surveillance system, for example, data custodians. Others identify governance mechanisms, including technical groups and steering committees, which have a role in the governance of data-sharing agreements.
- Data strategies may house data governance mechanisms responsible for ensuring that agreement about data sharing and use is reached; that data is shared as agreed; and that reciprocal benefits, such as improving institutional and operational capacity, are provided.
Important: Innovation is Key

Surveillance is a key area of attention for improvement within most countries’ existing national action plans.

Many countries noted the need to establish or strengthen existing national AMR surveillance.

However, many also reported the intention to extend or innovate surveillance into the future.

Case Study

Zambia published its National Action Plan in 2017, and has since published a set of prioritised activities in 2019; and released an integrated antimicrobial resistance surveillance framework in 2020.

The surveillance framework was developed by a country expert group, to focus on surveillance of AMR in the human-health sector, the food-animal sector and the environment. Importantly, the framework uses a short- and long-term phased approach to implementing surveillance activities, with

- **Phase 1** (zero–three years; short-term): Surveillance activity initiated in the first three years;
- **Phase 2** (four-five years; medium-term): Surveillance activity initiated after three years; and
- **Phase 3** (greater than five years; long-term): Surveillance activity initiated after five years.
Research and innovation is also an important concept in the national action plans of most countries, with a strong link to improving surveillance.

Analysis of country national action plans also revealed a broader focus research and innovation (example right), including

- the development of research plans or programmes;
- implementation of innovations to improve surveillance activities;
- R&D activities, such as ‘drawing in’ international collaboration for medicine, diagnostic and vaccine development.

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<th>OBJECTIVES</th>
<th>STRATEGIC INTERVENTIONS</th>
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| 5.1 Map current funding and promote the use of innovative investment channels for AMR research | 5.1.1. Assess available AMR funding mechanisms
5.1.2. Conduct needs assessment and develop a priority framework for AMR funding
5.1.3. Promote the use of innovative investment channels for AMR research funding |
| 5.2 Incorporate AMR research at advanced education institutions | 5.2.1. Support AMR researches in universities and relevant research institutes |
| 5.3 Encourage research and development of technical expertise on antibiotic alternatives | 5.3.1. Encourage research in and the development of alternatives to antibiotics |
| 5.4 Invest in advanced diagnostic and pharmaceutical techniques for AMR research and development | 5.4.1. Invest in advanced diagnostic and pharmaceutical techniques for AMR research and development |
Thank You!