



Food and Agriculture
Organization of the
United Nations



World Organisation
for Animal Health



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Country Experience in Implementing Tricycle Project



INDONESIA

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Regional Workshop on Interpretation of AMU/AMR data to Improve
Evidence-Based Decision-Making in Asia and the Pacific

Bangkok, 18-19 November 2025



Background:

- Multisector activities influence the AMR burden, making **coordinated and collaborative action across sectors essential for effective control**.
- The WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR) uses ESBL-producing *E. coli* **as a key indicator organism because it is widespread, easy to detect, and strongly reflects antimicrobial use and resistance gene dissemination**. Monitoring this organism offers an effective early warning of emerging AMR issues across sectors.”
- This pilot project was implemented in some countries such as **Ghana, Pakistan, Malaysia, Madagascar, Senegal and Indonesia**.
- As a starting point, participating countries are required to implement at least **Working Packages 1–3 out of the 7 total Working Packages**.

Objectives:

The objectives of this surveillance are to:

- 1. Establish an integrated surveillance system** to monitor ESBL-producing *E.coli* in three main areas: Human, animal (food chain), and the environment across member states;
- 2. Establish a simple and standardized method** to isolate and monitor ESBL-producing *E. coli*; to compare the prevalence of ESBL-producing *E. coli* in each of the three sectors among member states; and
- 3. Establish a longitudinal system** to assess the effect of intervention.



ESBL-producing *E. coli*: Tricycle Project in Indonesia

The ESBL Tricycle pilot project served as a model for **Indonesia's National AMR Surveillance System** using a **One Health** approach

Working Packages

1

Surveillance in humans

2

**Surveillance in the food
chain**

3

**Surveillance in the
environment**

Implementation Research



Conducted in Jakarta,
the capital city of
Indonesia



October 2018 -
December 2019



Ethical approval

Parties involved

- Ministry of Health
- Ministry of Agriculture
- Ministry of Environment



SUMMARY OF THE SAMPLE CHARACTERISTICS

Table 1
Characteristics of the samples and ESBL-producing *E. coli* identification across sectors.

| Variable | Human sector | | Animal sector/food chain | Environment sector |
|-----------------------------------|--------------------------------------|-------------------------------|----------------------------|---|
| | Pregnant women | Bloodstream infection patient | | |
| Sample | rectal swab | blood culture | broiler cecum | river surface water |
| Number of samples | 100 | 116 | 240 | 119 |
| Sampling sites | 1 Primary Health Care (PHC) Facility | 2 hospitals | 6 markets/ slaughterhouses | 3 up/midstream sites, 6 markets/ slaughter houses, and 3 downstream sites |
| Sampling time | 10 months | 14 months | 10 months | 10 months |
| Epidemiology data | yes | yes | yes | no |
| Laboratory | NIHRD* | Hospital Lab and NIHRD | DIC** | CRDEQL*** |
| Primary culture | MacConkey and MacConkey+CTX | Bactec | MacConkey+CTX | TBX and TBX + CTX |
| <i>E. coli</i> identification | indole test | Vitek-2 | indole test | indole test |
| ESBL identification+ confirmatory | DDST**** | Vitek-2 | DDST**** | DDST**** |

*The Research Laboratory for Infectious Diseases, NIHRD, Jakarta **Disease Investigation Center Subang, West Java, ***the Centre for Research and Development of Environment Quality Laboratory, Banten, ****Double Disk Sinergy Test.



RESULTS

| Sectors | Total Numb of samples | ESBL-producing E. coli |
|-------------|--------------------------------------|--|
| Humans | A. Hospital 14,682 samples | A. Hospital The proportion of ESBL-producing E. coli was 57.7% among the total E. coli-induced bloodstream infections. |
| | B. Community 100 samples | B. Community 40% (40/100) of pregnant women were healthy, indicating that 4 out of 10 pregnant women were E. coli ESBL carriers. |
| Food Chain | 240 cecums of broiler | 67.1% (161 out of 240 broilers) |
| Environment | 119 samples | <ul style="list-style-type: none">❖ All samples collected contained ESBL-producing E. coli with varying concentrations and ratios<ul style="list-style-type: none">- concentrations: log 2.8 - 7.3 CFU/100 mL- Ratios: 4.2% - 30.2%❖ The proportion of ESBL E.coli varies between seasons:<ul style="list-style-type: none">- Dry season: 9.5% – 16.5%- Rainy season: 5.9% – 30.6% |

Challenges and limitations

Several challenges were encountered during its implementation...

Environmental Sector Engagement

AMR has not yet been prioritized as a program area within the Ministry of Environment and Forestry, limiting engagement and resource allocation from the environmental sector.

Operational and Human Resource

Constraints in human resources at the hospital level, combined with the **extensive number of questions in the survey instrument**, resulted in incomplete questionnaire responses.

Laboratory Capacity

- **Several antibiotics required for ESBL** confirmatory testing were **not available in Indonesia**
- **Not all participating laboratories possessed the capacity** to conduct the full range of examinations outlined in the project protocol.

Coordination and Data

- **The bureaucratic complexity** of inter-ministerial coordination
- **Data** available for statistical analysis **were limited**



Recommendations

1. **Ensure the recruitment of pregnant women** reflects local demographic distribution, given the surveillance-oriented design of the study.
2. **Distribute food chain and environmental sample collection evenly** across all months to better capture temporal variation.
3. **Simplify the questionnaire**, as recommended in the updated guidelines, to improve completeness of responses.
4. **Expand participation** to laboratories under the Ministry of Health and provincial governments that have sufficient capacity to meet project requirements.
5. **Modify the confirmatory testing protocol** based on antibiotic disk availability in Indonesia.
→ Use amoxicillin–clavulanic acid as an alternative to cefotaxime–clavulanic acid.

1. Provide **policy guidance** to AMR program stakeholders across sectors.
2. **Continue** to the next working package and **expand the study to additional provinces** to assess the national AMR burden and establish a baseline for AMR control planning.
3. **Develop the project** into an ongoing surveillance system to ensure updated data and enable evaluation of AMR program progress and interventions.
4. Incorporate this surveillance approach into **routine AMR control activities**.
5. **Use the prevalence of ESBL-producing E. coli** across all sectors as a key indicator for monitoring and reducing AMR.



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Thank you..