

Measuring farm-level antimicrobial use in low- and middle-income countries as part of implementation research projects

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4th AACTING Conference, 02/02/2024, Vienna, Austria



INTERNATIONAL
CENTRE FOR
**ANTIMICROBIAL
RESISTANCE**
SOLUTIONS

AACTING



Herd level antimicrobial consumption in animals
Collect | Analyze | Benchmark | Communicate

ICARS is...

- An international organisation working in partnership with governments in LMICs to develop and test context-specific solutions for AMR.
- Providing **funding and expertise** across the One Health sector.
- Danish-initiated (2018), now an independent self-governed organisation (2021), attracting funding from member states as well as foundations.

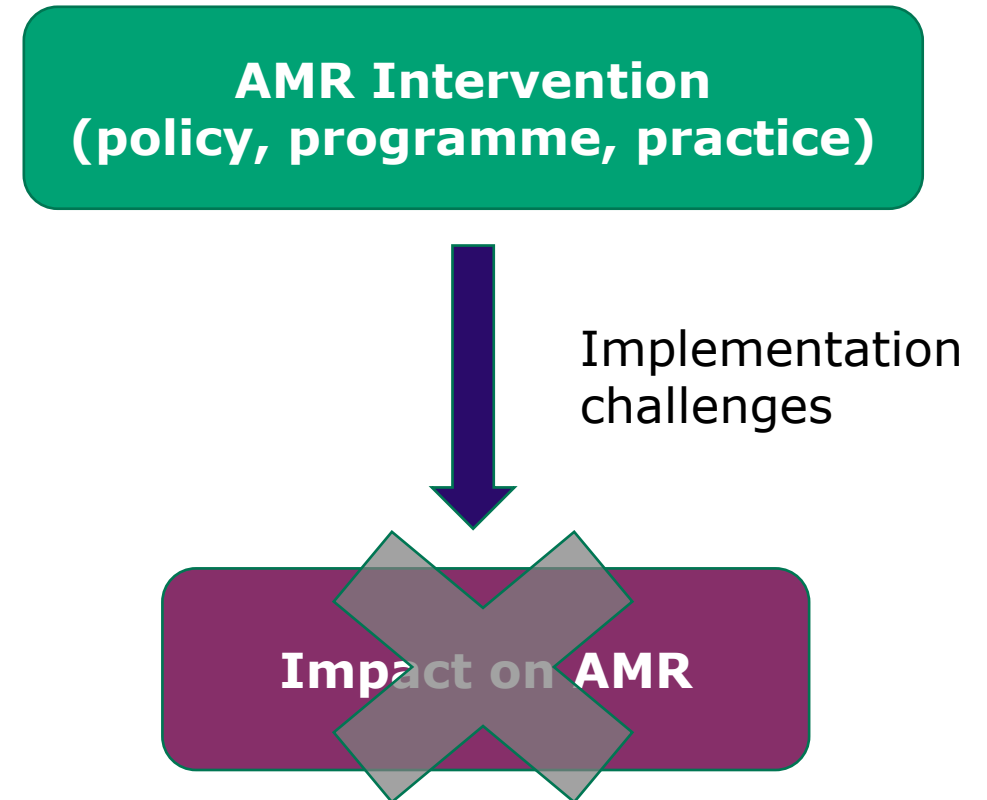
Our mission is to partner with LMIC ministries and research institutions to **co-develop and test cost-effective, context-specific AMR solutions** with potential for **scale-up**, building on National Action Plans, and informed by **intervention and implementation research**.



Why is implementation research important?



- Examines how to ensure interventions lead to their expected effect
- Improves delivery, quality and effectiveness of health services
- Considers contextual factors that impact intervention success and uptake



¹Peters DH, et al. *BMJ* 2013; **347**: f6753.

²Bauer MS et al. *BMC Psych* 2015; 3(1), 32.

Why is implementation research important?



Pulling Together to Beat Superbugs

Knowledge and Implementation Gaps in Addressing Antimicrobial Resistance



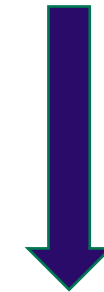
October 2019

”

Efforts to address AMR... have been complicated and are compromised by the low level of implementation, the fragmentation of interventions... There is an urgent need to address these knowledge and implementation gaps.¹

“

**AMR Intervention
(policy, programme, practice)**



Implementation
solutions

Impact on AMR

¹Peters DH, et al. *BMJ* 2013; **347**: f6753.

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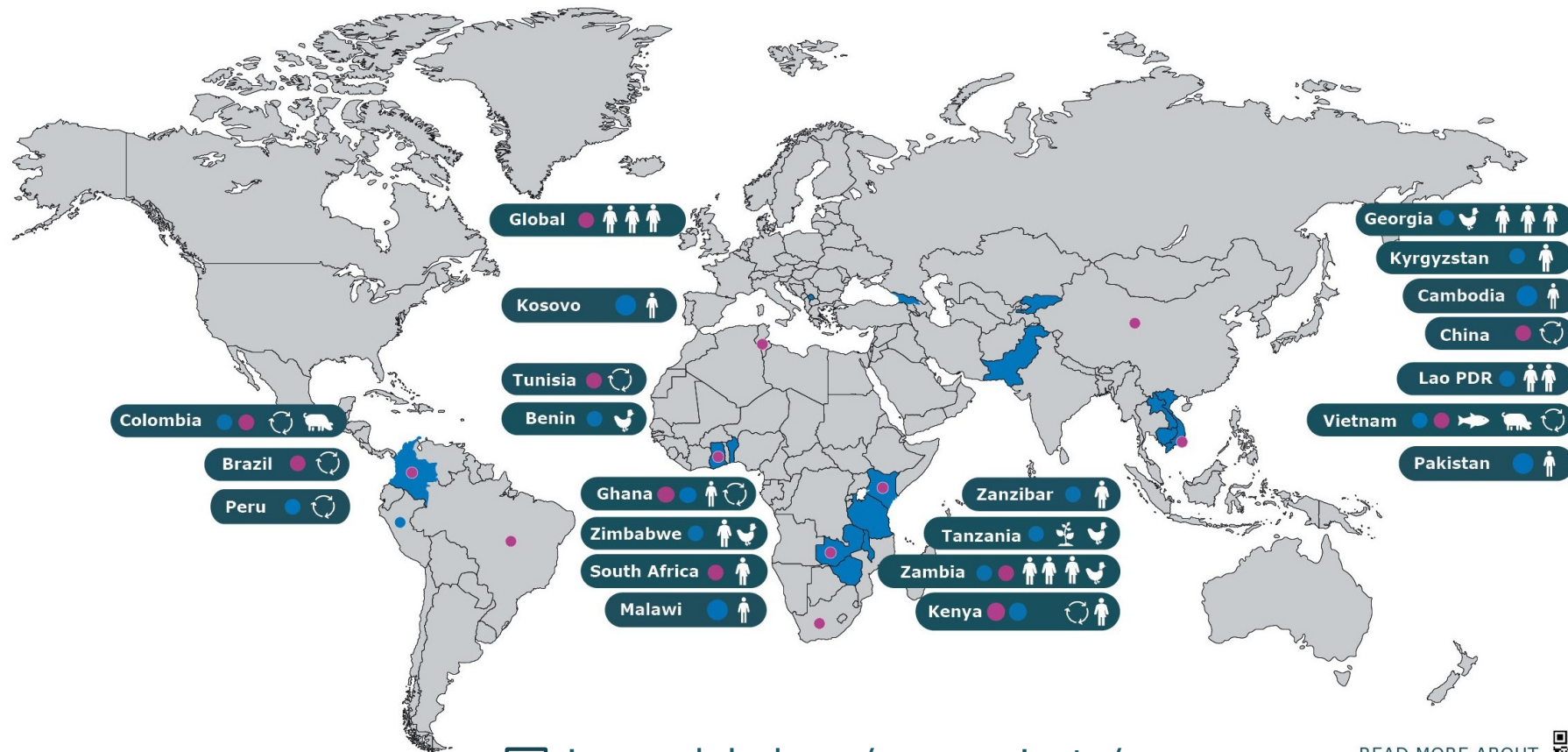
41
Projects

21 Countries &
territories

ICARS-funded
Co-developed between
ICARS and LMIC
ministries to tackle a
specific AMR challenge
and contribute to NAP
implementation.

Co-funded
Developed with funding
partners and local
research institutes
to generate evidence
and advance AMR
mitigation nationally
and globally.

One Health 
Environment 
Animal 
Human 
Aquaculture 



Georgia: Getting prepared for a ban of antimicrobial growth promoters (AGPs)

Context

Using AGPs is the norm in large commercial broiler farms. The government is preparing a ban on AGPs.

Research question

Can farmers maintain profitability without using AGPs, if they also improve their practices? Which practices? What are drivers and barriers for changing these practices?

Partners

Ministry of Environmental Protection and Agriculture
State Laboratory of Agriculture
Farmers, veterinarians, economists, social scientists

Main study design

Randomized controlled trial



Zimbabwe & Zambia: Farmer Field Schools (FFS) to reduce antimicrobial use

Context

Inadequate biosecurity and non-prudent AMU in small to medium scale broiler farms.
Frequent presence of antimicrobial residues in meat.

Research questions

Do farmers attending FFS improve their biosecurity, reduce AMU and meat residues?
Is it a sustainable solution? Should it be scaled up and, if yes, how?

Partners

Departments of Veterinary Services
Universities
Medicines Control Agencies
Farmers, veterinarians, economists, social scientists
FAO

Main study design

Before / after



Tanzania: Optimizing vaccination and biosecurity in poultry production

Context

High AMU
Limited use of bacterial vaccines
Sub-optimal biosecurity in small/medium poultry farms

Research questions

How can bacterial vaccination and biosecurity be optimised? What are the current challenges for viral vaccine effectiveness on farms?

Partners

Tanzanian Ministry of Livestock and Fisheries
Sokoine University of Agriculture
Ministry of Agriculture Irrigation, Natural Resources and Livestock in Zanzibar
Zanzibar Livestock Research Institute

Main study design

Cluster randomized controlled trial



What do we measure?

- **Antimicrobial use**
- Knowledge, attitudes and practices
- Production parameters
- Biosecurity scores
- Antimicrobial residues
- Costs, investments, benefits
- Behaviour change
- AMR
- Vaccine implementation



Different contexts, challenges and solutions



Georgia



Zimbabwe

Challenges encountered (1)

- Limited expertise/experience in farm-level AMU data collection and analysis
- Scarcity of baseline AMU data to support sample size calculations
- A potentially high proportion of farmers might leave the study before the end of it



Case example: Zimbabwe

- The aim is to observe a 30% reduction in AMU
- Need to be able to measure a 20% reduction
- Paired sample size calculation
- **No previous AMU estimate** in poultry in Zimbabwe
 - Study found in Nigeria (Jibril. *et al.*, 2021)
 - mean of 28 mg/kg/week
 - SD calculated at 14.36 mg/Kg/week
- Correlation between pre and post measurements: 0.3
 - 73 farmers needed
- **Risk of up to 50% reduction in farmer attendance**
 - → 150 farmers to enroll

[BMC Vet Res. 2021 Jul 2;17\(1\):234. doi: 10.1186/s12917-021-02938-2.](#)

Association between antimicrobial usage and resistance in Salmonella from poultry farms in Nigeria

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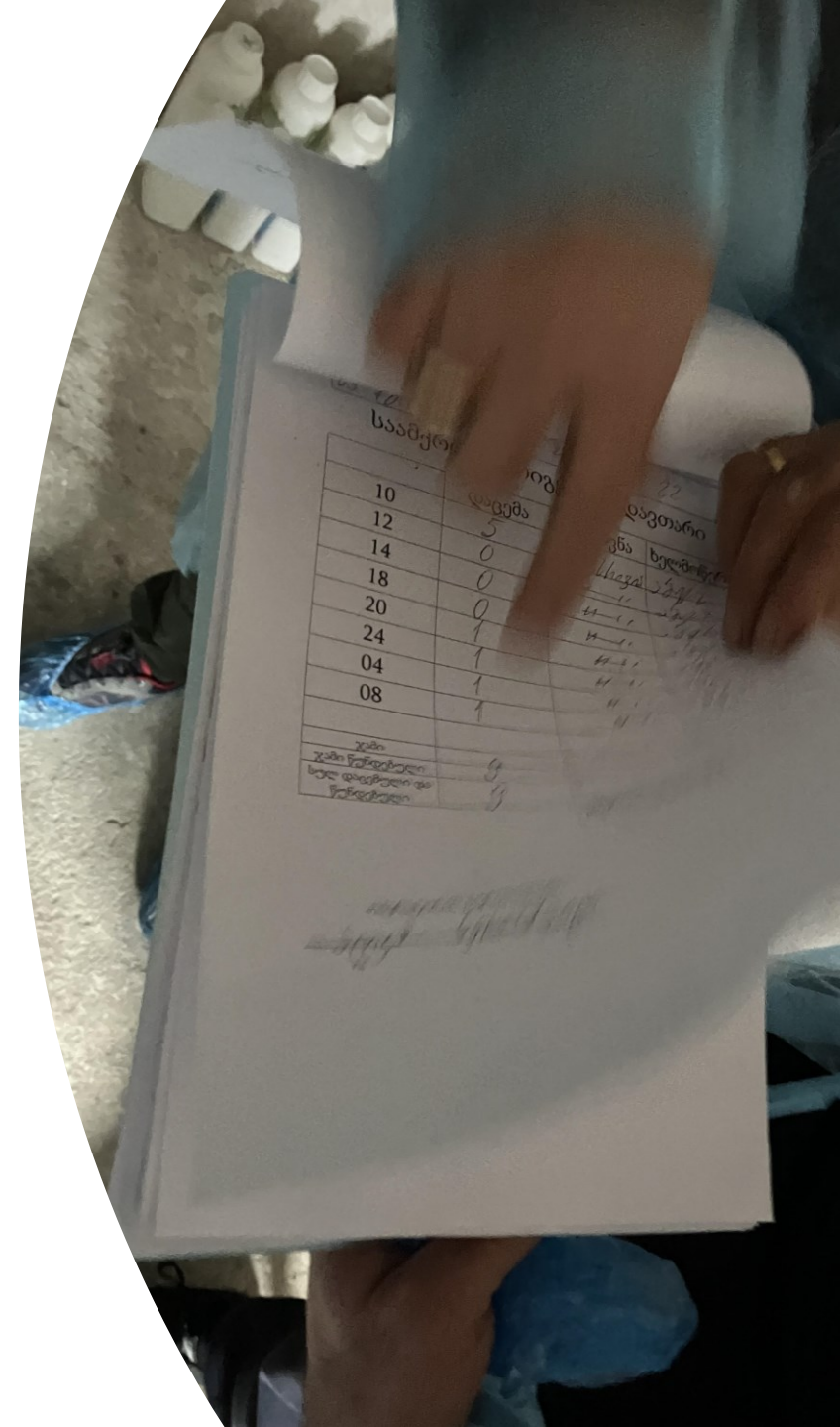
Affiliations [+ expand](#)

PMID: 34215271 PMCID: [PMC8254292](#) DOI: [10.1186/s12917-021-02938-2](#)

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Challenges encountered (2)

- Poor farmer knowledge on antimicrobials
- Resource-intensive, logistical challenges
- Inconsistent record keeping, requiring a close follow-up at farm level
- Use of substandard and falsified drugs
- Frequent sale and use of antimicrobials without prescriptions
- Absent or inaccurate feed labels on antimicrobial content
- Sale of animals at different ages throughout the production cycles





Solutions proposed

- Work with local teams who know the context
 - “Farmers will use the antibiotic bins for something else”
 - “There is a fasting period before Easter, so chicken production will decrease at that time”
- Capacity building / technical support
- Keep protocols simple, collect only the necessary data
- Test feed for antibiotic presence (qualitatively / quantitatively)
- Adapt the AMU indicator to available data sources
- Pilot-test protocols

Conclusion

- AMU is an essential outcome variable of implementation research projects
- Multiple factors challenge AMU data quantification in farms in LMICs
- Need for a solid understanding of the context
- Some solutions applicable for research studies but not monitoring systems
- ICARS-supported projects to fill important knowledge gaps on AMU in LMICs



Thank you for your attention!



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