FACT SHEET

Antimicrobial resistance (AMR):
A major challenge for the aquaculture industry in Bangladesh

What is antimicrobial resistance (AMR) and why is it a problem?

AMR occurs when microorganisms are able to resist the inhibition or killing effects of medicines that are used to treat the infection they cause.

Inappropriate use of antibacterials is driving the development of AMR

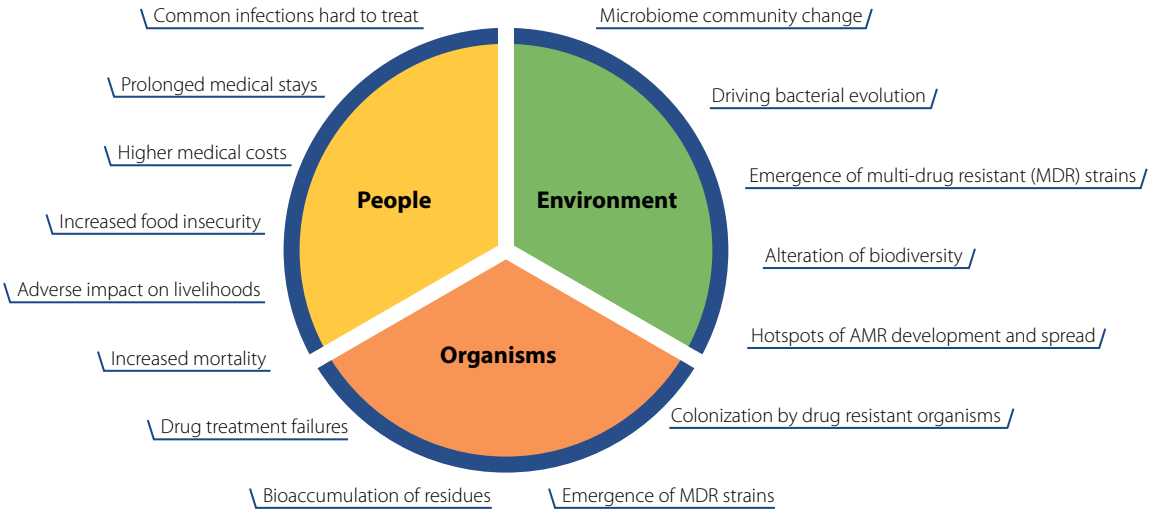

Figure 1. Demonstrating the consequences of AMR for the health of humans, animals and their shared environment.

Antimicrobial use (AMU) in Bangladesh aquaculture

Antibiotics are being used to prevent and treat diseases in aquatic organisms in Bangladesh despite many major prevalent diseases not being caused by bacteria, such as white spot syndrome virus (WSSV) in shrimp, epizootic ulcerative syndrome (EUS) in many finfish and tilapia lake virus (TiLV) in tilapia.

Antibiotics only treat bacterial infections

Total of 21 antibiotic compounds are used in aquaculture[1]

Erythromycin (52%) and Oxytetracycline (44%) are commonly used to treat fish diseases[2,3]

Majority of shrimp hatcheries use antibiotics and disinfectants[4]

A shrimp hatchery on average uses **80 kg of antimicrobials** per production cycle[5]

Lack of diagnosis, knowledge and a clear understanding of the risk factors associated with AMU may lead to the development of AMR pathogens.

How AMR can emerge, persist and transmit in aquaculture?

Use of antimicrobials and agrochemicals can promote the development of AMR.

Resistant bacteria can easily spread through animal-environment-human interfaces

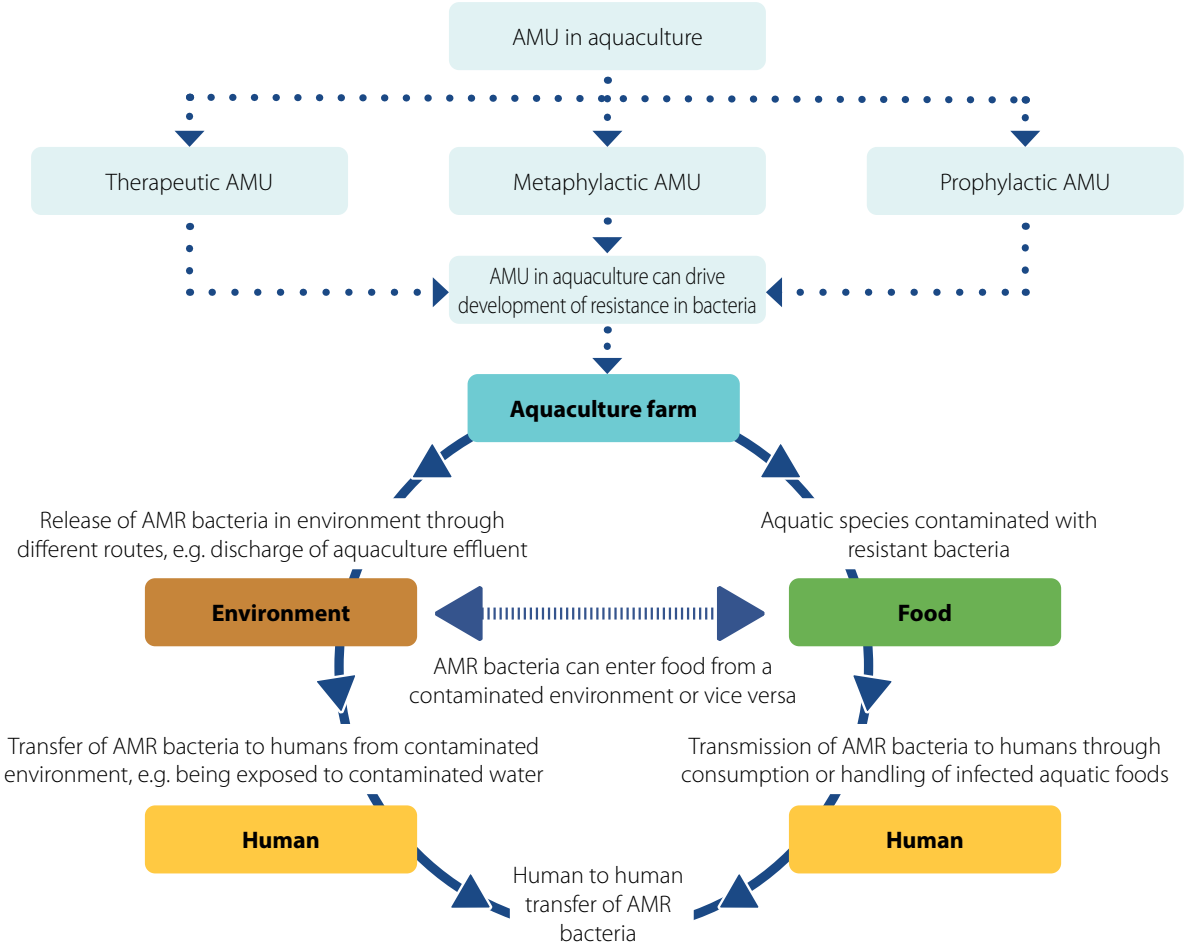

Figure 2. AMU and spread of AMR bacteria from aquaculture to aquatic organisms, the environment and humans.

Contributing factors of AMR

AMR is particularly of concern to low- and middle-income countries because of the following[6,7,8]:

- Poor control of antimicrobial sale and use
- Limited public health care facilities
- Poor knowledge and awareness of antimicrobial use
- Weak disease surveillance system and diagnostics
- Increasing demand for food production
- Deficient environmental protection policies

What is needed to reduce AMU and AMR in aquaculture

Embedding a One Health approach into aquatic food production could help to tackle the AMR burden. One Health in aquaculture is a multisectoral and transdisciplinary approach that recognizes the interconnection of the health and well-being of humans, farmed organisms and their shared environment.

- Better management practices at all steps of fish production
- Surveillance and early detection of diseases
- Improved farm hygiene, biosecurity and quarantine measures
- Use of specific pathogen-free seeds
- Alternative solutions to antibiotics, such as probiotics, prebiotics, autogenous vaccines, immunostimulants, etc.
- Strengthening governance related to AMU and AMR in aquaculture
- Greater AMR awareness campaigns among farmers, regulators, veterinarians, consumers, etc.

Our work to address AMR in Bangladesh aquaculture

In an effort to reduce AMU and AMR in Bangladesh's aquatic food systems, WorldFish teamed up with the Centre for Environment, Fisheries and Aquaculture Science (Cefas), the Animal and Plant Health Agency (APHA) from the UK government, the Fleming Fund, the Food and Agriculture Organization (FAO) and the University of Exeter. These organizations are working closely together with national competent authorities, research institutions, farmers and other stakeholders to understand AMU, promote AMR awareness, develop AMR surveillance for aquaculture and build personal capacity for AMR testing in labs.

1. The UK FAO Reference Centre for AMR (UKRC) and WorldFish are supporting laboratory capacity building to undertake AMR surveillance of fish and shrimp samples from wet markets and aquaculture farms in Bangladesh.
2. Funded by the Official Development Assistance (ODA) aid program of the UK government, WorldFish and Cefas recently completed a project called Embedding One Health to Support Aquatic Food Production during COVID-19. One aim of the project was to support AMR surveillance capability and develop educational tools to promote One Health aquaculture in Bangladesh.[9]
3. WorldFish was the implementing partner of two UK-funded research projects on the microbial dynamics of disease within Bangladeshi aquaculture and on the disease management practices on farms and in hatcheries. An AMR workshop funded by the UK Economic and Social Research Council under the cross UK Research Council's Tackling Antimicrobial Resistance program was held on February 12–13, 2019, in Dhaka, Bangladesh.
4. WorldFish is supporting the Fleming Fund's Grant and Fellowship Program in Bangladesh, which aims to contribute to the overall effort to support Bangladesh's AMR strategy in aquaculture by developing a series of standard operating procedures for sample collection, processing and AMR testing.[10]
5. ILRI, IFPRI, IWMI and WorldFish will jointly implement the "One CGIAR Initiative on Protecting Human Health Through a One Health Approach" on AMR issues in Bangladesh aquatic food systems over the next 3 years.

Purpose

This fact sheet is to provide up-to-date information supported by scientific evidence on the importance of AMU and AMR in aquatic food systems of Bangladesh to support all relevant stakeholders to engage in interventions and actions to minimize AMU and promote One Health initiatives through responsible and sustainable aquaculture practices.

For further information

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Acknowledgments

This research was conducted as part of the CGIAR Research Program on Fish Agri-Food Systems (FISH) led by WorldFish and as part of the CGIAR initiative Protecting Human Health Through a One Health Approach, which are both supported by contributors to the CGIAR Trust Fund (https://www.cgiar.org/funders/).

Citation

This publication should be cited as: Rheman S, Delamare-Deboutteville J and Mohan CV. 2022. Antimicrobial resistance (AMR): A major challenge for the aquaculture industry in Bangladesh. Penang, Malaysia: WorldFish. Fact Sheet: 2022-02.

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