Food Systems and Antimicrobial Resistance

CSE Webinar – on the 'DEVELOPMENT AGENDA'

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Antimicrobial Resistance (AMR) – the 'Silent Pandemic' unlike Covid-19

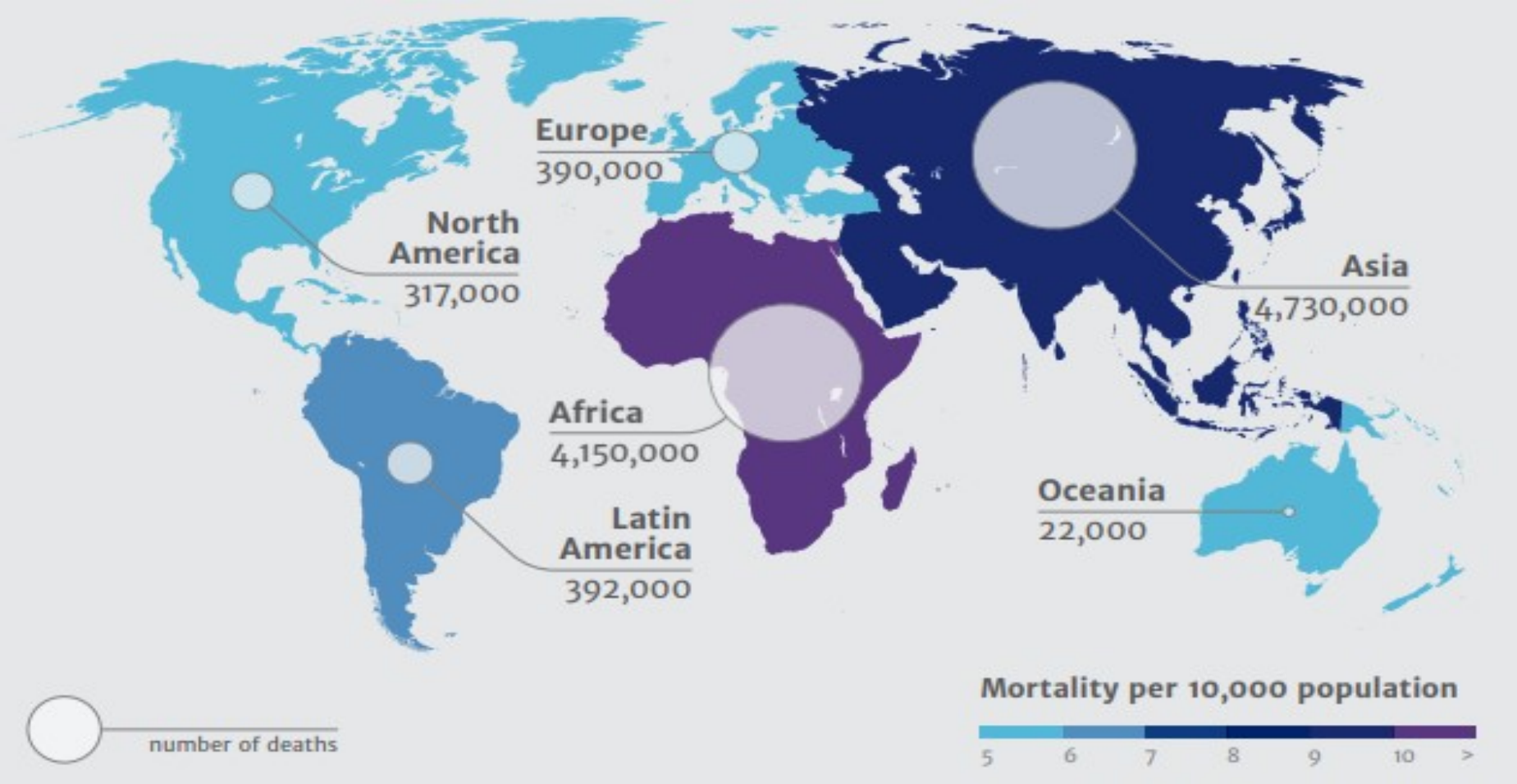
- **Antibiotics are becoming ineffective** to treat even common infections and saving lives. Treatment options are reducing. **Those considered last-resort are also failing**.

- **This is due a phenomena called AMR – in particular antibiotic resistance, which is growing across the world, but silently.** Therefore, people are less aware despite being affected; despite the grave threat it poses to humanity. **That's why – this awareness week!**

- Antibiotic resistance mainly happens because of use of antibiotics. Bacteria can become resistant when exposed to antibiotics. **Therefore, the more antibiotics we use, the more we lose. They are a global 'public good' but continually misused and overused** and are responsible for steep rise in resistance.

- Resistant bacteria can pass between and among humans, animals, plants and environment. **Impact therefore is much beyond just human-health. It is about health of animals, plants and therefore impacts food productivity, livelihood, economy and development.**

Estimated 10 million lives per year at risk by 2050, if no action taken; About 90 per cent in Asia and Africa



- **Presently - 700,000 deaths globally every year estimated due to resistant infections**

Source: Review on AMR, 2016

High estimated losses to economy and development; low-income countries to be impacted most

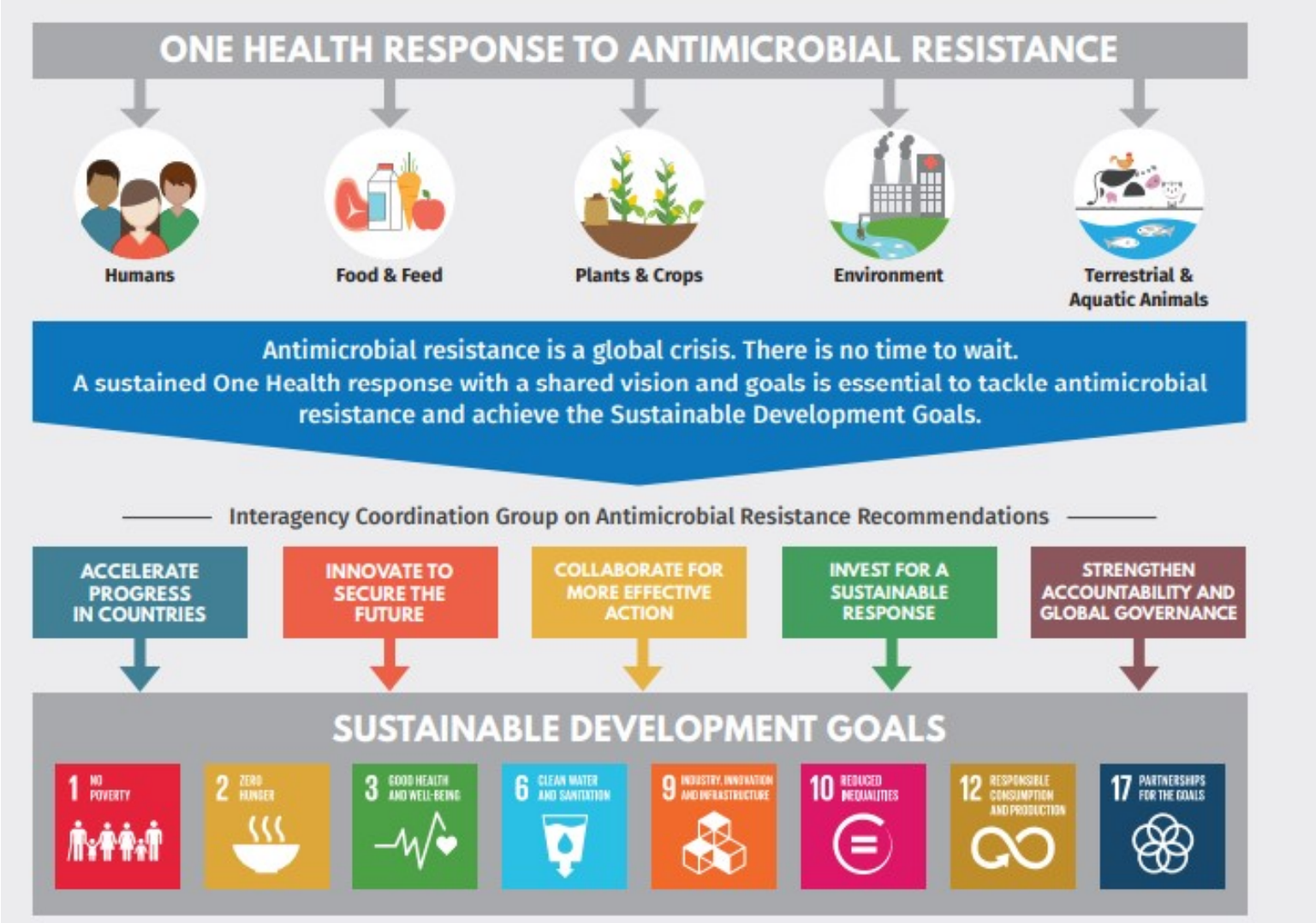
In a high-impact scenario

- The world will lose **3.8 percent of its annual GDP by 2050**, with an annual shortfall of $3.4 trillion by 2030
- **Livestock production** in low-income countries would decline the most, with a possible **11 percent loss** by 2050
- An additional **24 million people** would be forced into **extreme poverty** by 2030. Most of the increase would occur in low-income countries

The same analysis shows that the recommended investments made to contain AMR **will yield high returns**

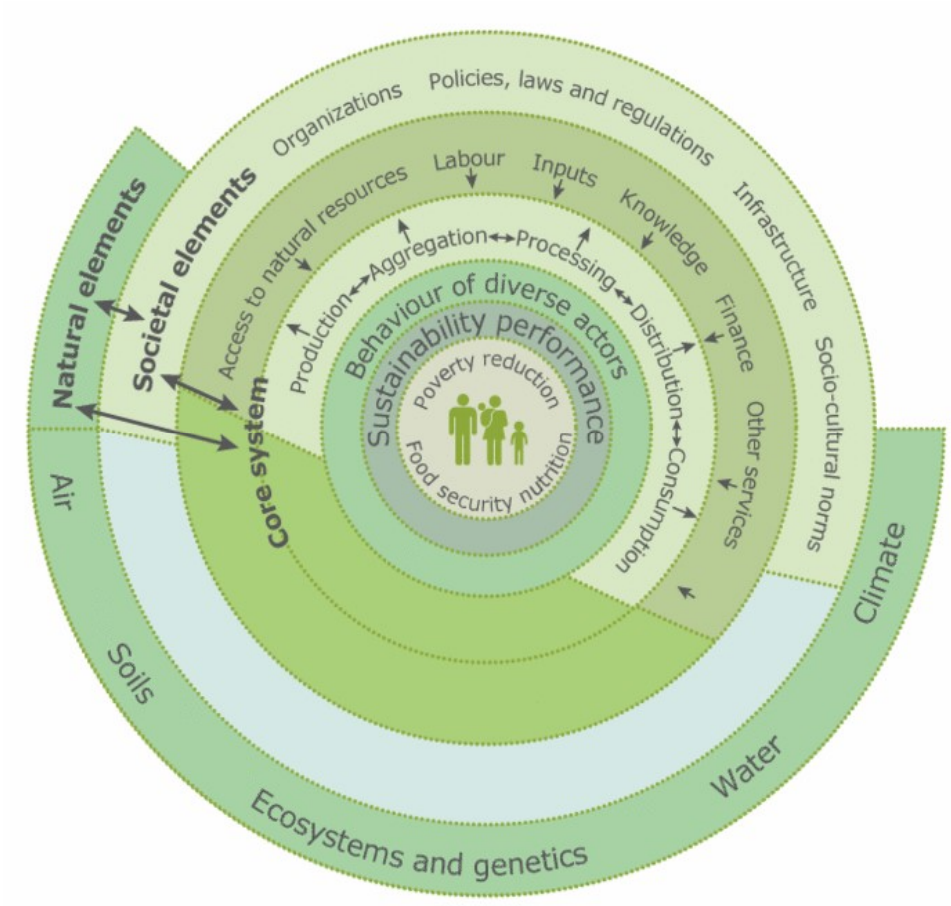
Source: Drug-Resistant Infections: A Threat to Our Economic Future, World Bank Group

AMR can derail attainment of several SDGs, including those linked with food



Source: No time to wait: Securing the future from drug-resistant infections, IACG Report, 2019

Food systems, its elements and interactions



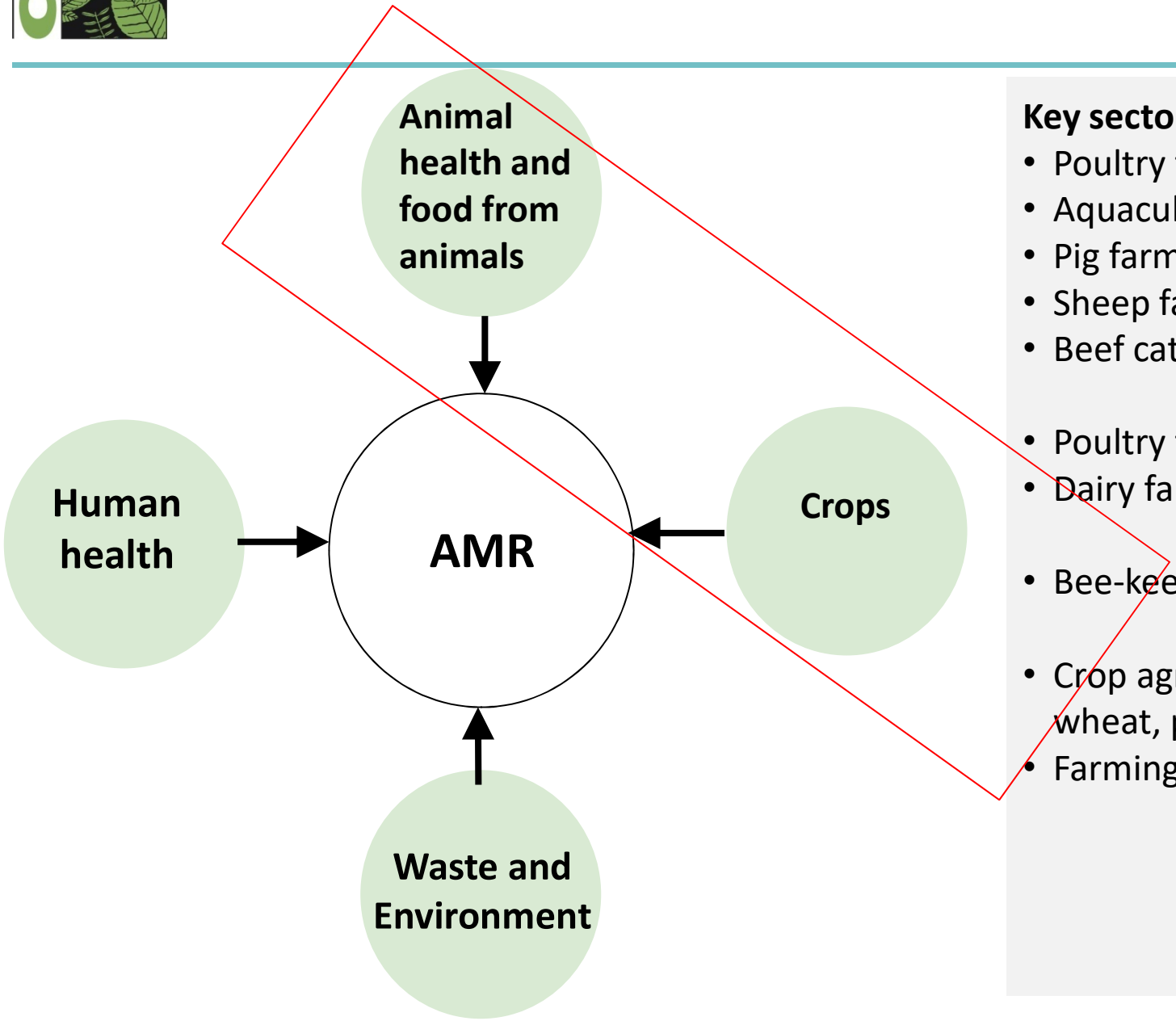
The food systems wheel

- Food systems encompass the entire range of actors and their interlinked value-adding activities involved in the **production, aggregation, processing, distribution, consumption and disposal of food products** that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded.

- It is composed of **sub-systems (e.g. farming system, waste management system, input supply system, etc.)** and interacts with other key systems (e.g. energy system, trade system, health system, etc.).

Source: FAO, https://www.fao.org/3/ca2079en/CA2079EN.pdf

Food production systems – key driver for AMR



Key sectors

- Poultry farming for meat
- Aquaculture for fish meat
- Pig farming for meat
- Sheep farming for meat
- Beef cattle for meat

- Poultry farming for eggs
- Dairy farming for milk

- Bee-keeping for honey

- Crop agriculture (rice, wheat, pulses, fruits etc.)
- Farming for animal feed

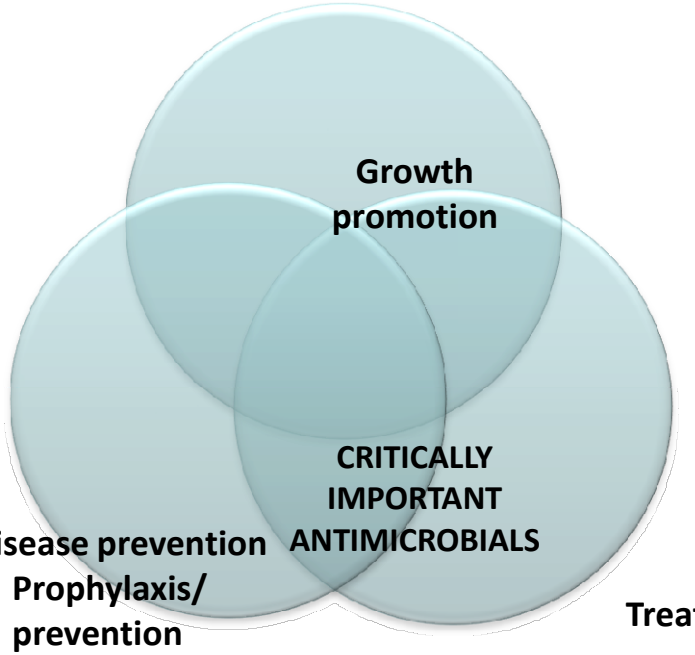
Indiscriminate antibiotic use in food animals; critically important antibiotic for humans commonly used in animals

PROPHYLAXIS/PREVENTION

- Antimicrobials administered to an individual or group of animals with no clinical sign of a disease
- Often done routinely/intermittently

METAPHYLAXIS/CONTROL

- Antimicrobials administered in therapeutic doses to a group of animals wherein one or more animals are infected but others do not show clinical signs.
- Acts as a treatment for those who are ill but preventive for others



GROWTH PROMOTION

- Use of antimicrobials to increase the rate of weight gain or efficiency of feed utilization
- Routinely used at a mass scale through feed at sub-therapeutic doses

Disease prevention

- Prophylaxis/ prevention
- Metaphylaxis/ control

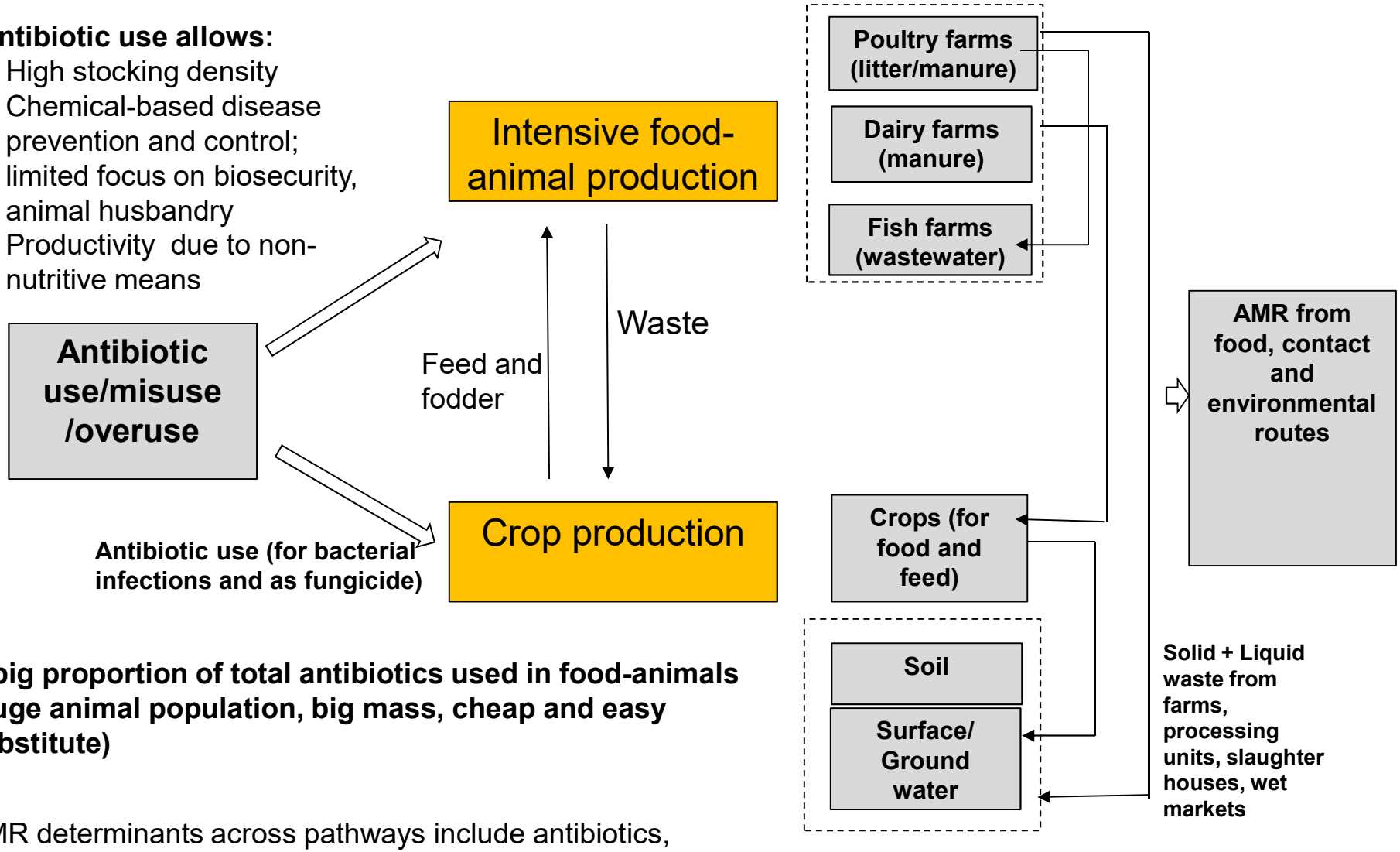
TREATMENT

Use of antimicrobials at therapeutic dose to treat an infectious disease having clinical signs and/or symptoms

Antibiotic misuse/overuse use fuels intensification which accelerates AMR through multiple pathways; big proportion of antibiotics used in food-animals

Antibiotic use allows:

- High stocking density
- Chemical-based disease prevention and control; limited focus on biosecurity, animal husbandry
- Productivity due to non-nutritive means



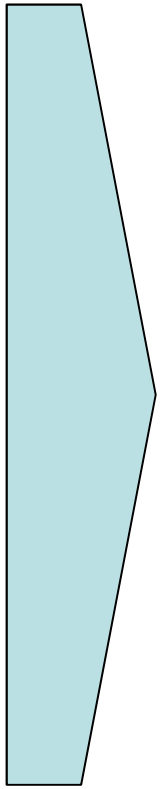
A big proportion of total antibiotics used in food-animals (huge animal population, big mass, cheap and easy substitute)

AMR determinants across pathways include antibiotics, resistant bacteria and genes that can confer resistance

Source: CSE analysis

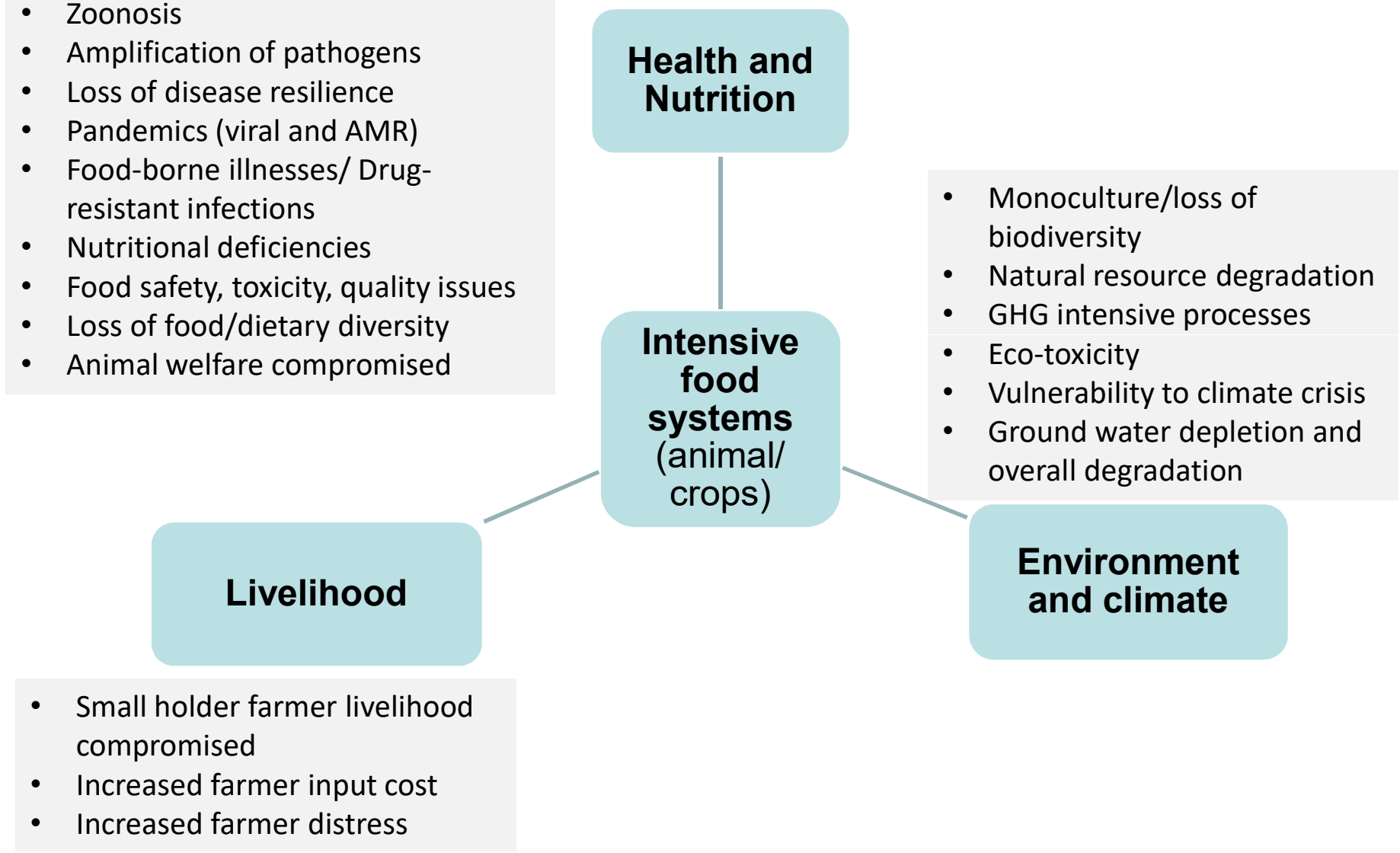
Drivers and characteristics of intensive animal farming

- Growing food demand (protein, animal protein)
- Growing population
- Growing incomes / purchasing power
- Urbanization
- Changing food/diet habits, evolving taste
- Less people, land to grow food
- Political mandate - for exports, livelihood opportunities
- Availability of inputs - machines, feed, drugs and chemicals



- Large-scale units with **high stocking density** of animals/birds/fish
- **Genetically selected similar breeds** for productivity (not disease resilience)
- Kept under **confined conditions** and in **close proximity**; **limited focus on animal husbandry**
- **Dependence on commercial feed**, inputs (also known as animal feeding operations, factory farms)
- Often **geographically concentrated**; vertically integrated by large players; involves contract farming
- Industrial systems but considered agriculture; can bypass required regulatory attention

But intensive food systems are not sustainable; negatively impact health, livelihood and environment and climate

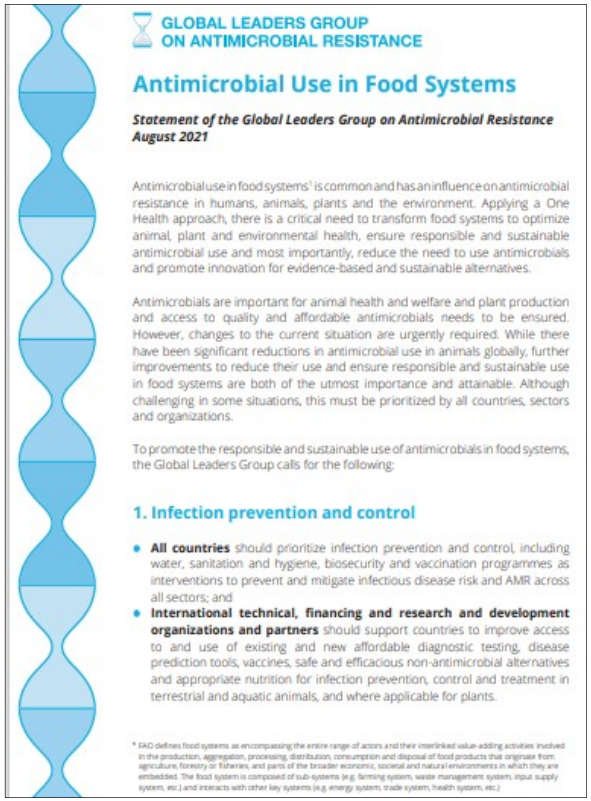


- Zoonosis
- Amplification of pathogens
- Loss of disease resilience
- Pandemics (viral and AMR)
- Food-borne illnesses/ Drug-resistant infections
- Nutritional deficiencies
- Food safety, toxicity, quality issues
- Loss of food/dietary diversity
- Animal welfare compromised

- Monoculture/loss of biodiversity
- Natural resource degradation
- GHG intensive processes
- Eco-toxicity
- Vulnerability to climate crisis
- Ground water depletion and overall degradation

- Small holder farmer livelihood compromised
- Increased farmer input cost
- Increased farmer distress

Global momentum building up on the importance of transforming food systems/transition to sustainable food and agriculture in view of SDGs (and containing AMR)



GLOBAL LEADERS GROUP
ON ANTIMICROBIAL RESISTANCE

Antimicrobial Use in Food Systems

Statement of the Global Leaders Group on Antimicrobial Resistance
August 2021

Antimicrobial use in food systems[1] is common and has an influence on antimicrobial resistance in humans, animals, plants and the environment. Applying a One Health approach, there is a critical need to transform food systems to optimize animal, plant and environmental health, ensure responsible and sustainable antimicrobial use and most importantly, reduce the need to use antimicrobials and promote innovation for evidence-based and sustainable alternatives.

Antimicrobials are important for animal health and welfare and plant production and access to quality and affordable antimicrobials needs to be ensured. However, changes to the current situation are urgently required. While there have been significant reductions in antimicrobial use in animals globally, further improvements to reduce their use and ensure responsible and sustainable use in food systems are both of the utmost importance and attainable. Although challenging in some situations, this must be prioritized by all countries, sectors and organizations.

To promote the responsible and sustainable use of antimicrobials in food systems, the Global Leaders Group calls for the following:

1. Infection prevention and control

- **All countries** should prioritize infection prevention and control, including water, sanitation and hygiene, biosecurity and vaccination programmes as interventions to prevent and mitigate infectious disease risk and AMR across all sectors; and
- **International technical, financing and research and development organizations and partners** should support countries to improve access to and use of existing and new affordable diagnostic testing, disease prediction tools, vaccines, safe and efficacious non-antimicrobial alternatives and appropriate nutrition for infection prevention, control and treatment in terrestrial and aquatic animals, and where applicable for plants.

[1] FAO defines food systems as encompassing the entire range of actors and their interlinked value-adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded. The food system is composed of sub-systems (e.g. farming system, waste management system, input supply system, etc.) and interacts with other key systems (e.g. energy system, trade system, health system, etc.)

Statement on antimicrobial use in food systems by the One-health Global Leaders Group on AMR (2021)

STATEMENT

Secretary-General's Chair Summary and Statement of Action on the UN Food Systems Summit

العربية | 中文 | Español | Français | Русский

23 September 2021

Inclusive and Transformative Food Systems Nourish Progress to Achieve Zero Hunger

Rich or poor, young or old – every person in the world needs to eat. Safe and nutritious food provides not only life and health, but hope. Every day, billions of people harvest, process and transport food to market and to our homes. Consumers make choices of what to eat, based on what is available and accessible. This daily activity touches us all, and underpins our cultures, our economies and our relationship with the natural world. Women, often the backbone of food systems, and young people, provide fresh hope for transformative food systems that bring us together as families, communities, and nations in harmony with nature.

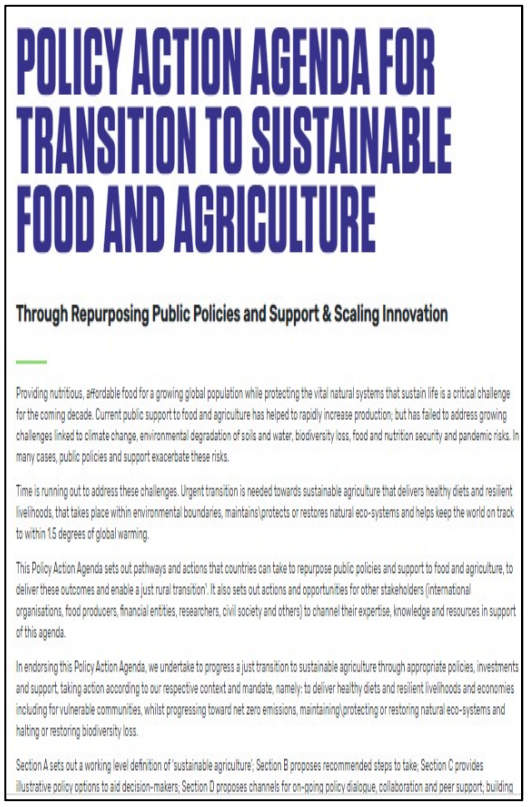
As we entered the Decade of Action to achieve the Sustainable Development Goals (SDGs) by 2030, many of the world's food systems were fragile and not fulfilling the right to adequate food for all. Hunger was on the rise again. Three billion people – almost half of all humanity – could not afford a healthy diet. Malnutrition in all its forms – including obesity – was deeply entrenched, leading to a broad range of negative health, education, gender, and economic impacts. Drivers of food insecurity and malnutrition – including conflict, climate extremes, and economic volatility – are further exacerbated by poverty and high levels of inequality.

The COVID-19 pandemic put these worrying trends in overdrive. Up to 811 million people in the world faced hunger in 2020 – a 20 per cent increase in just one year. Over 41 million are on the doorstep of starvation.

The crisis brought on by the pandemic is unfolding against a planetary crisis that is threatening our climate and life as we know it. Food production and local producers are increasingly vulnerable to the adverse impacts of climate change. The latest report by the IPCC shows that under all scenarios, temperatures above 1.5°C and 2°C above pre-industrial levels will be exceeded during the 21st century unless global greenhouse gas emissions are cut by half in the coming decade.

At the same time, recent reports have found that food systems are contributing up to one-third of greenhouse gas emissions, up to 80 per cent of biodiversity loss and use up to 70 per cent of freshwater. However, sustainable food production systems should be recognized as an essential solution to these existing challenges. It is possible to feed a growing global population while protecting our planet.

Secretary-General's Chair Summary and Statement of Action on the UN Food Systems Summit (2021)



POLICY ACTION AGENDA FOR TRANSITION TO SUSTAINABLE FOOD AND AGRICULTURE

Through Repurposing Public Policies and Support & Scaling Innovation

Providing nutritious, affordable food for a growing global population while protecting the vital natural systems that sustain life is a critical challenge for the coming decade. Current public support to food and agriculture has helped to rapidly increase production, but has failed to address growing challenges linked to climate change, environmental degradation of soils and water, biodiversity loss, food and nutrition security and pandemic risks. In many cases, public policies and support exacerbate these risks.

Time is running out to address these challenges. Urgent transition is needed towards sustainable agriculture that delivers healthy diets and resilient livelihoods, that takes place within environmental boundaries, maintains/protects or restores natural eco-systems and helps keep the world on track to within 1.5 degrees of global warming.

This Policy Action Agenda sets out pathways and actions that countries can take to repurpose public policies and support to food and agriculture, to deliver these outcomes and enable a just rural transition'. It also sets out actions and opportunities for other stakeholders (international organisations, food producers, financial entities, researchers, civil society and others) to channel their expertise, knowledge and resources in support of this agenda.

In endorsing this Policy Action Agenda, we undertake to progress a just transition to sustainable agriculture through appropriate policies, investments and support, taking action according to our respective context and mandate, namely: to deliver healthy diets and resilient livelihoods and economies including for vulnerable communities, whilst progressing toward net zero emissions, maintaining/protecting or restoring natural eco-systems and halting or restoring biodiversity loss.

Section A sets out a working level definition of 'sustainable agriculture'; Section B proposes recommended steps to take; Section C provides illustrative policy options to aid decision-makers; Section D proposes channels for on-going policy dialogue, collaboration and peer support; building

Policy action agenda for transition to sustainable food and agriculture, COP26 2021

In summary…

- **Intensive food systems are chemical-dependent. Antibiotics (and other chemicals) have played a big role in fueling food-animal systems**
- **Food production (with increasing proportion from intensive / industrial systems) has grown substantially over decades; the need to continue this steep growth is further highlighted to feed the growing population (~10 billion by 2050)**
- **But it is also clear that such systems are not sustainable. They have helped on productivity but their negative impacts on public health/nutrition, livelihood, environment and climate crisis are evident.**
- **So, the status quo if persists will be detrimental overall. Clearly, the world will have to find sustainable ways to produce food. The food systems need to be transformed.**

The Big task is to produce more with less chemicals, less resources and how it could be done (in different parts of the world)

But there are several questions as well…

- Despite such high food production, a big part of the world is still under-nourished, starving or overweight. How much of this is also about the quality of food, about nutrition security?
- How much of the problem is really about food production? A big part of food produced is wasted. What about problems in food distribution? And about a holistic response focusing on livelihood of small farmers and protection of environment?
- Is the demand for proteins real or created? And how much from animals?
- How much of the chemical/antibiotic use is unnecessary at its first place or which can be avoided with basic prevention and stewardship approaches?

More questions…

- What about consumption? How much can be addressed by just making slight shifts in consumption (by geographies/people with higher per capita meat consumption?
- Is the solution more about going back to basics (agro-ecological practices) or use of innovation and technology or both? What is sustainable intensification?
- Different countries are at a different levels of intensification. Aren't those with less of overall food production from intensive systems (such as India), stand a better chance to unlearn and move towards sustainable production practices and yet produce enough good quality food?

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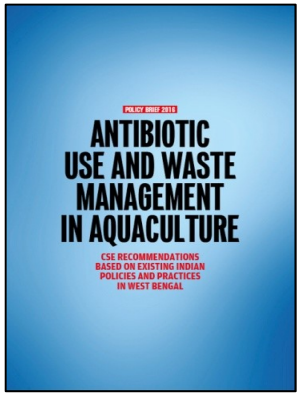
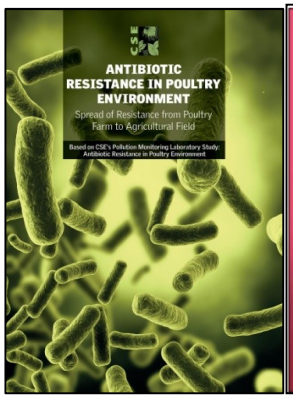
CSE's work on food systems and environment in India

Antibiotics in honey, 2010

Antibiotic use in poultry, 2014



Antibiotic use in aquaculture, 2016



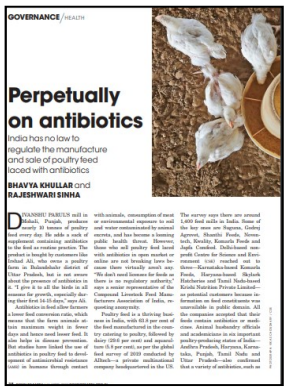
AMR in poultry environment, 2017

Antibiotic use in fast food supply chain, 2017

Disposal of pharma manufacturing waste, 2017

Antibiotic use in crops, 2019

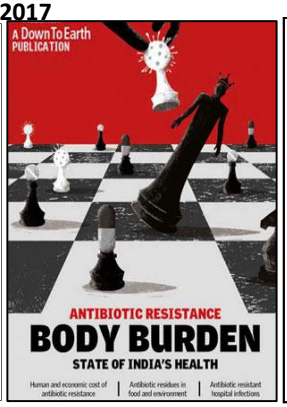
Disposal of unwanted drugs, 2019



Antibiotic use in feed, 2020

Antibiotic use in fast food supply chain, 2020

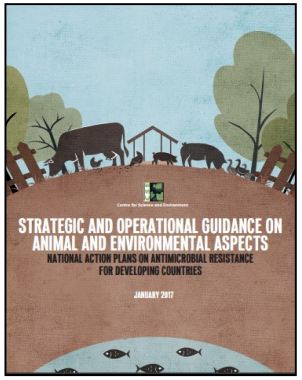
Antibiotic use in dairy, 2020



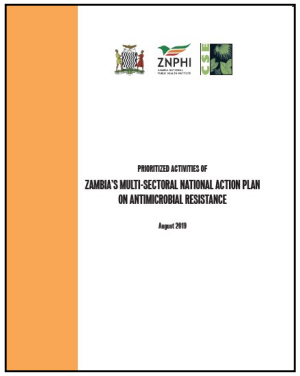
Body Burden, 2020

Use of ethnoveterinary medicines in dairy sector, 2021

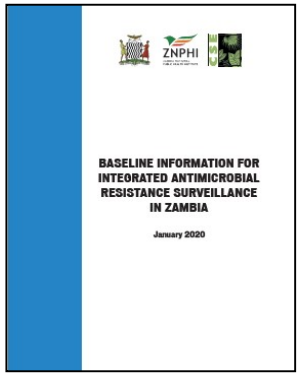
CSE's global work on food systems and environment



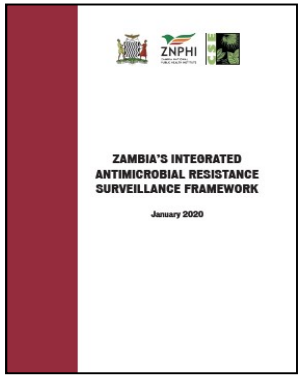
Strategic guidance for NAP for developing countries, 2016



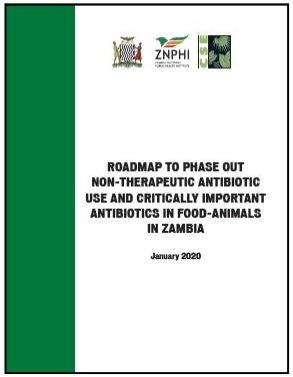
Prioritized NAP-AMR (Zambia, 2019)



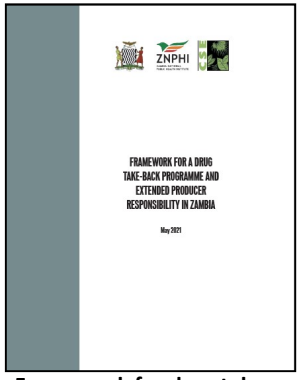
Baseline information for Integrated AMR surveillance (Zambia, 2020)



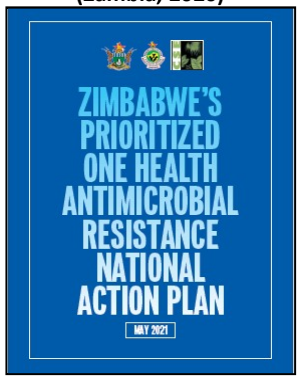
Framework for Integrated AMR surveillance (Zambia, 2020)



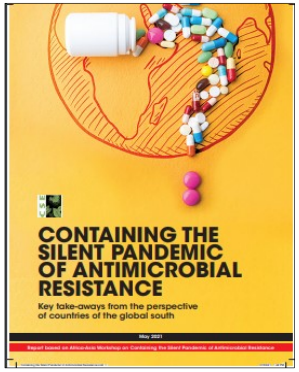
Roadmap to phase out antibiotic misuse in food-animals (Zambia, 2020)



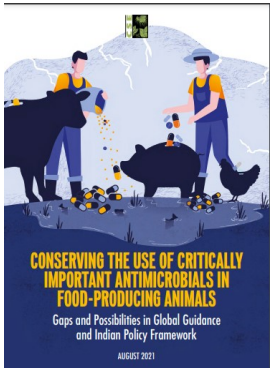
Framework for drug take-back and EPR (Zambia, 2021)



Prioritized NAP-AMR (Zimbabwe, 2021)



Containing the silent pandemic of AMR (2021)



Conserving the use of critically important antimicrobials (2021)