

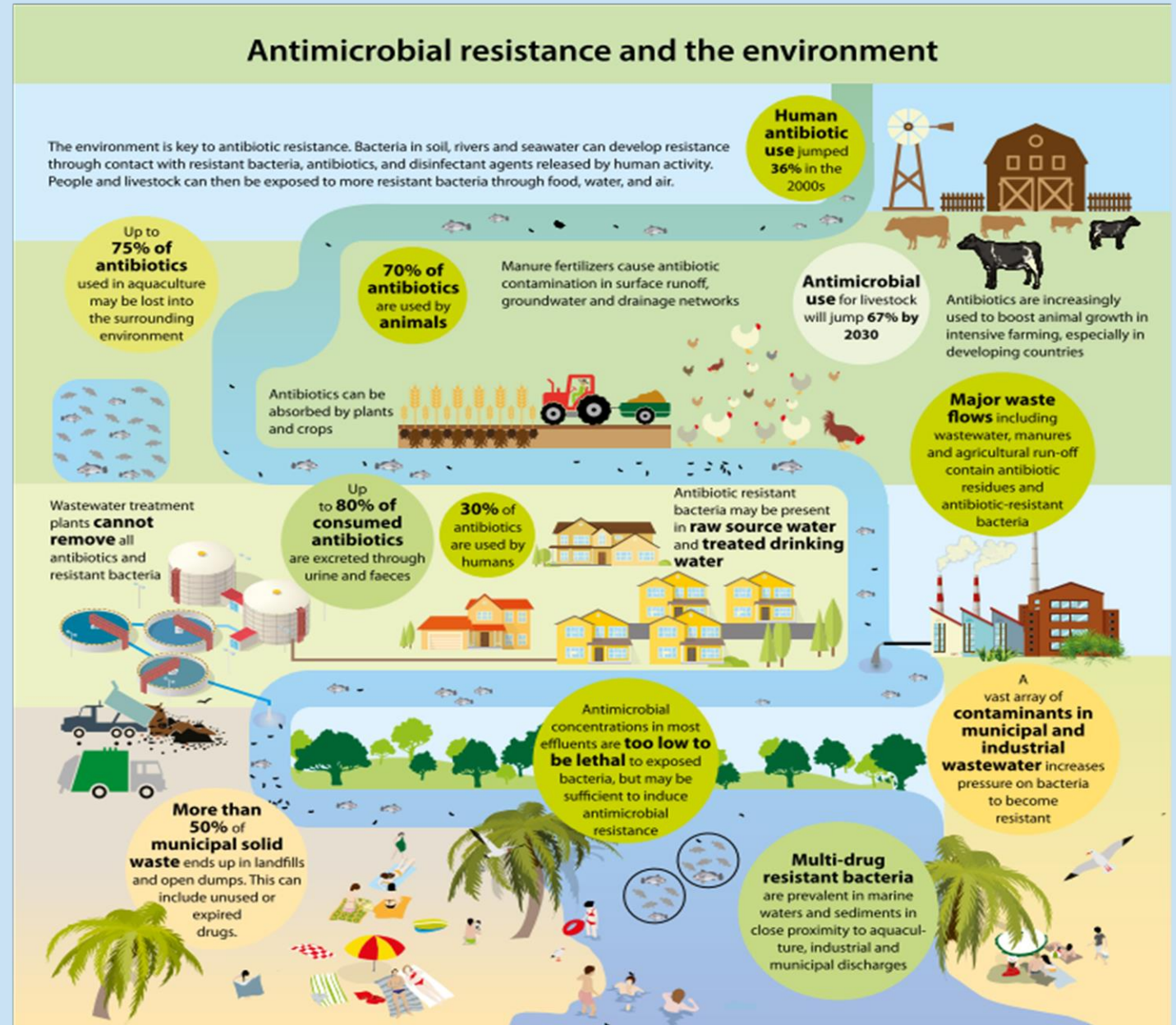


**UNDERSTANDING ANTIMICROBIAL
RESISTANCE IN NEW ZEALAND
- AN INTEGRATIVE APPROACH**

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Foote

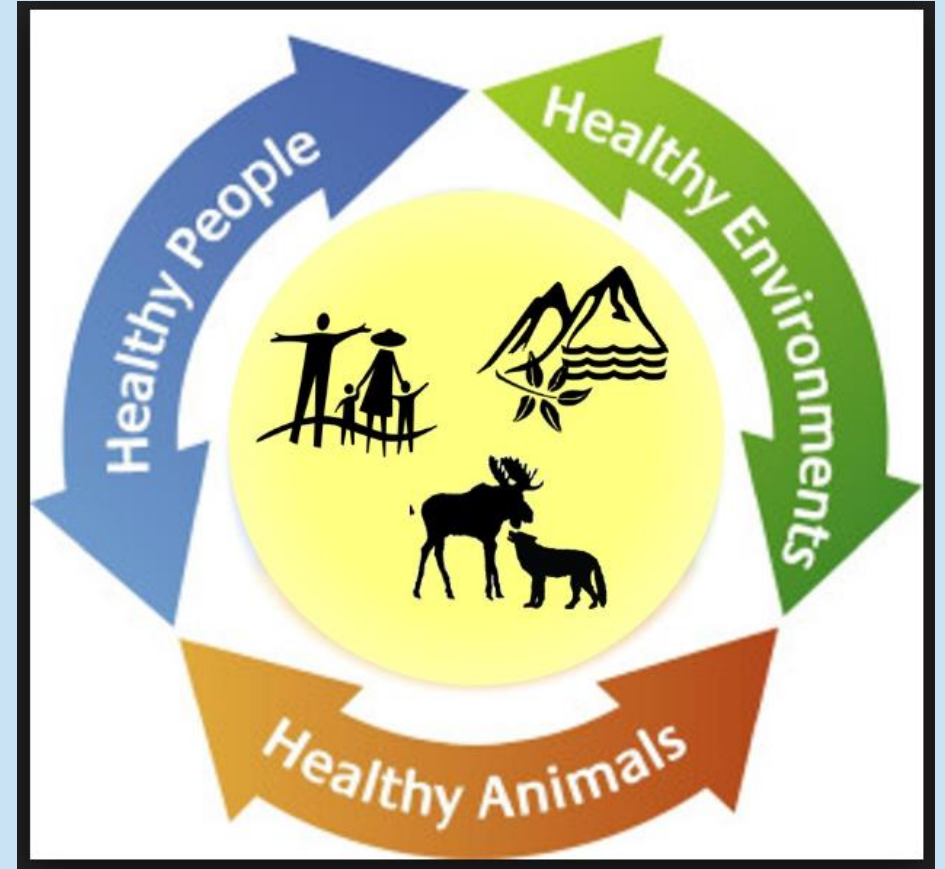
AMR IS COMPLEX

- Many factors involved in AMR
 - human
 - animal
 - environment
- Integration is lacking
- Systems view is needed



RESEARCH AIMS

- To bring together human, animal and environmental health dimensions of AMR in NZ
- To model stakeholder understandings of the structure of the AMR system
 - * focus on feedback loops

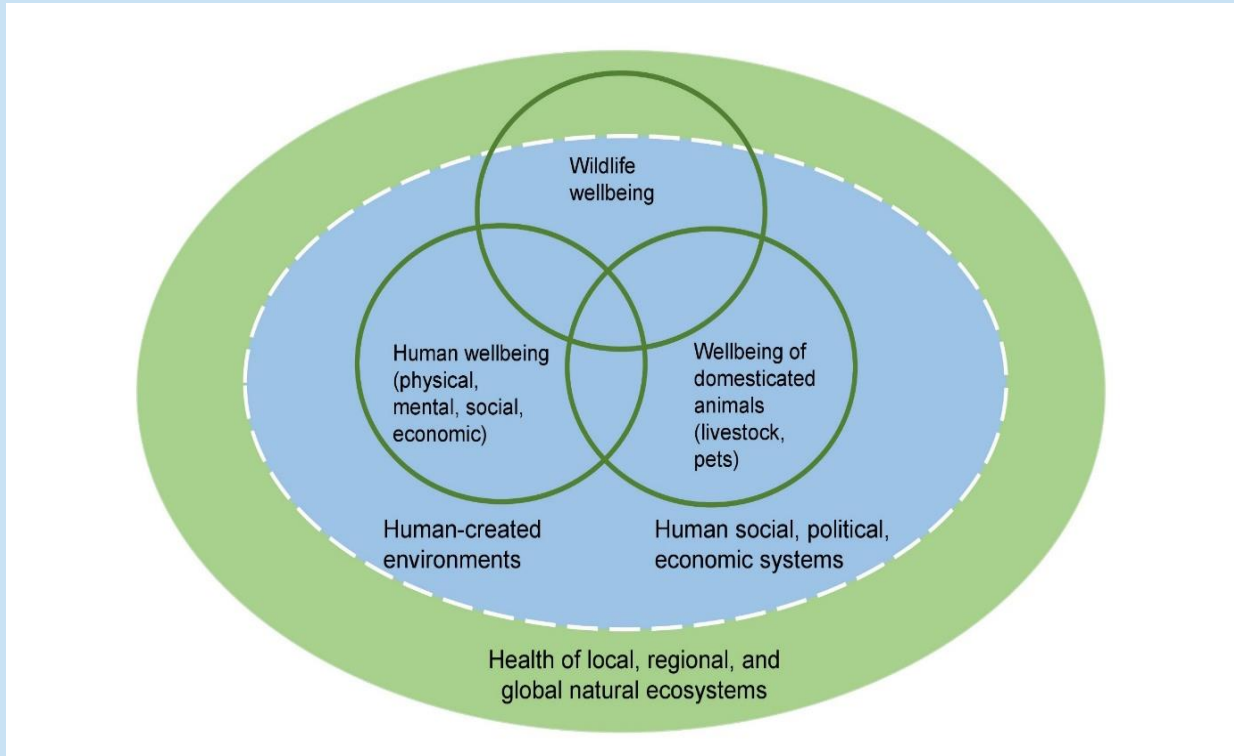


ONE HEALTH AND ECOHEALTH

- EcoHealth principles:
 1. Systems thinking
 2. Transdisciplinarity
 3. Knowledge → action

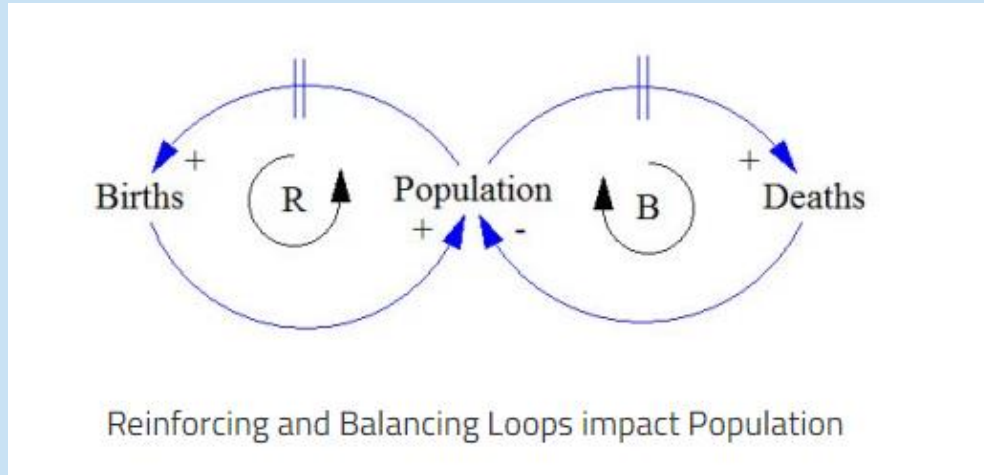
"Once we see the relationship between structure and behaviour, we can begin to understand how systems work, what makes them produce poor results, and how to shift them into better behaviour patterns."

- Donella Meadows, pioneering systems thinker



*One Health/ EcoHealth integrating framework.
Acknowledgments to Patricia Priest and Alex Macmillan*

METHODS



<https://systemsandus.com/2012/08/15/learn-to-read-clds/>

“Causal loop diagrams ... describe the circles of cause and effect that take on a life of their own.”

	Human	Animal	Environment
Academic/ Research			
Policy			
Community/ Advocacy			
Industry			
Clinical			

Sampling Framework

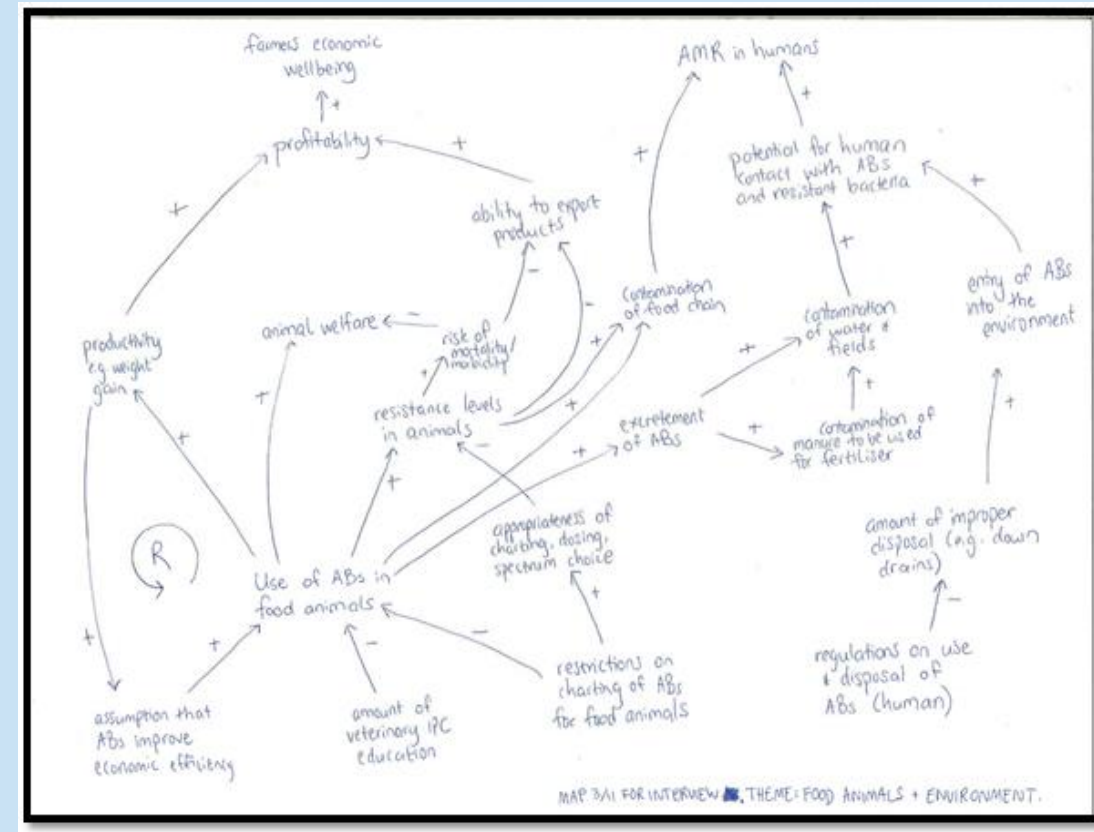
Criterion and chain sampling was used to identify and recruit participants who are experts in each cell, related to AMR.

- Participatory system dynamics to build a qualitative model of AMR in New Zealand
 - In-depth semi structured interviews
 - Cognitive mapping
 - Causal loop diagrams

RESULTS

	Human	Animal	Environment
Academic/ Research	-ESR -Clinical director, microbiology -Clinical microbiologist -School of Pharmacy -ID physician	-Veterinary academic -Veterinary epidemiologist	-School of Pharmacy -Ecologist -Landcare Research, systematics -Microbial geneticist -Horticulture
Policy	-Ministry of Health -PHARMAC	-MPI -NZVA	-Politician
Community/ Advocacy	-Consumer advisor	-Federated Farmers	-Politician
Industry	-Medicines NZ -Pharmaceutical company	-AGCARM -Poultry Industry Association -Veterinary epidemiologist -Federated Farmers	-Horticulture -AGCARM
Clinical	-IPC nurse -Infectious Disease Physician -GP -Antimicrobial pharmacist -Clinical director, microbiology -Clinical microbiologist	-Rural vet -NZVA -Poultry Industry Association	-Wildlife vet

27 interviews with 31 participants



Cognitive map example

AB use in food animals
Public pressure/ industry influence/
political will to act

collaboration

water quality

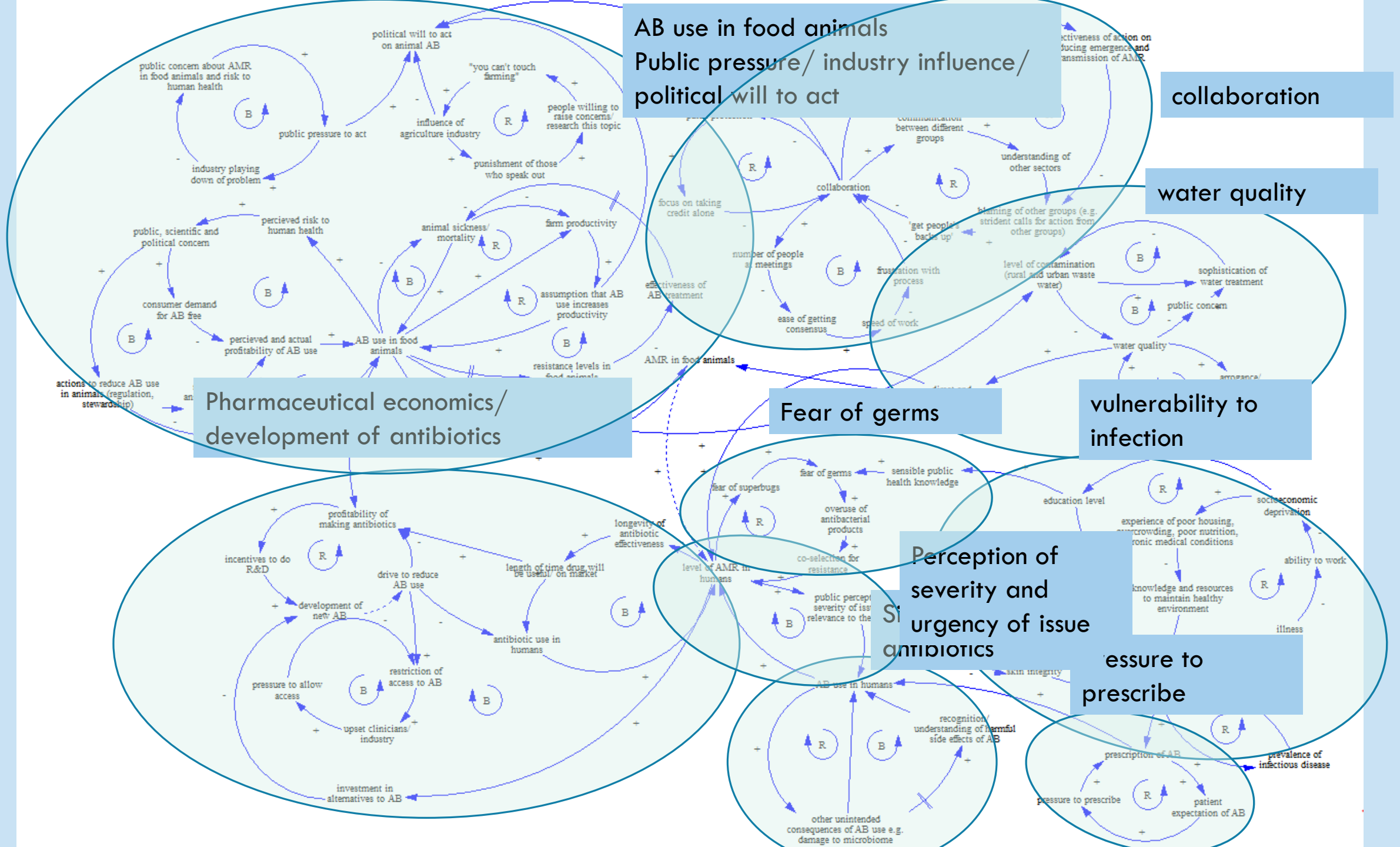
Pharmaceutical economics/
development of antibiotics

Fear of germs

vulnerability to infection

Perception of severity and urgency of issue
ANTIBIOTICS

pressure to prescribe



EXPECTED IMPACT AND FUTURE RESEARCH

- Impact: first participatory SD model integrating human, animal and environmental aspects of AMR.
- Future research:
 1. Triangulate stakeholder model with literature
 2. Stakeholder workshops to refine and agree on model
 3. Quantitative model - to test leverage points and better understand system



Image Credit: The New York Academy of Sciences

REFERENCES



<https://www.deviantart.com/sarinasunbeam/art/The-Antibiotic-Resistance-585612096>

Royal Society Te Apārangi. Antimicrobial Resistance - Implications for New Zealanders. Evidence Update. Expert Advice Paper.; 2017.

World Health Organisation. Global Action Plan on Antimicrobial Resistance. Geneva: World Health Organisation; 2015

O'Niell J. Tackling drug-resistant infections globally: Final report and recommendations. 2016.

Thomas MG, Smith AJ, Tilyard M. Rising antimicrobial resistance: a strong reason to reduce excessive antimicrobial consumption in New Zealand. The New Zealand medical journal [Internet]. 2014 2014/05//; 127(1394):[72-84 pp.].

Zinsstag J. Convergence of Ecohealth and One Health. EcoHealth. 2012;9(4):371-3.

Charron DF. Ecohealth research in practice - innovative applications of an ecosystem approach to health. Ottawa : International Development Research Centre ; New York : Springer; 2012.

Meadows D. Thinking in Systems: A Primer. London: earthscan; 2009. p. 1 -2.