What are the messages from Havelock North to date?

Graham McBride[1]

Water New Zealand Drinking Water Workshop

19 September 2017

"The Way Forward after Havelock North"

New ideas for ensuring safe drinking-water

[1] National Institute of Water & Atmospheric Research, Hamilton, NZ

NIWA
Taihoro Nukurangi

In a nutshell

Three main issues

1. Communication
2. The importance of system understanding and maintenance
3. Understanding risk assessment

Enquiry → Understand associated technical issues in all three

For example

1. Develop a common understanding among all parties of at least an outline of key technical details (e.g., predominance of zoonoses, potential pathogen sources, leaching to groundwater…)

2. ‘Know your catchment’ and its history (use the web)

3. Consider all six steps of a (quantitative or qualitative) risk assessment

Risk assessment: six steps

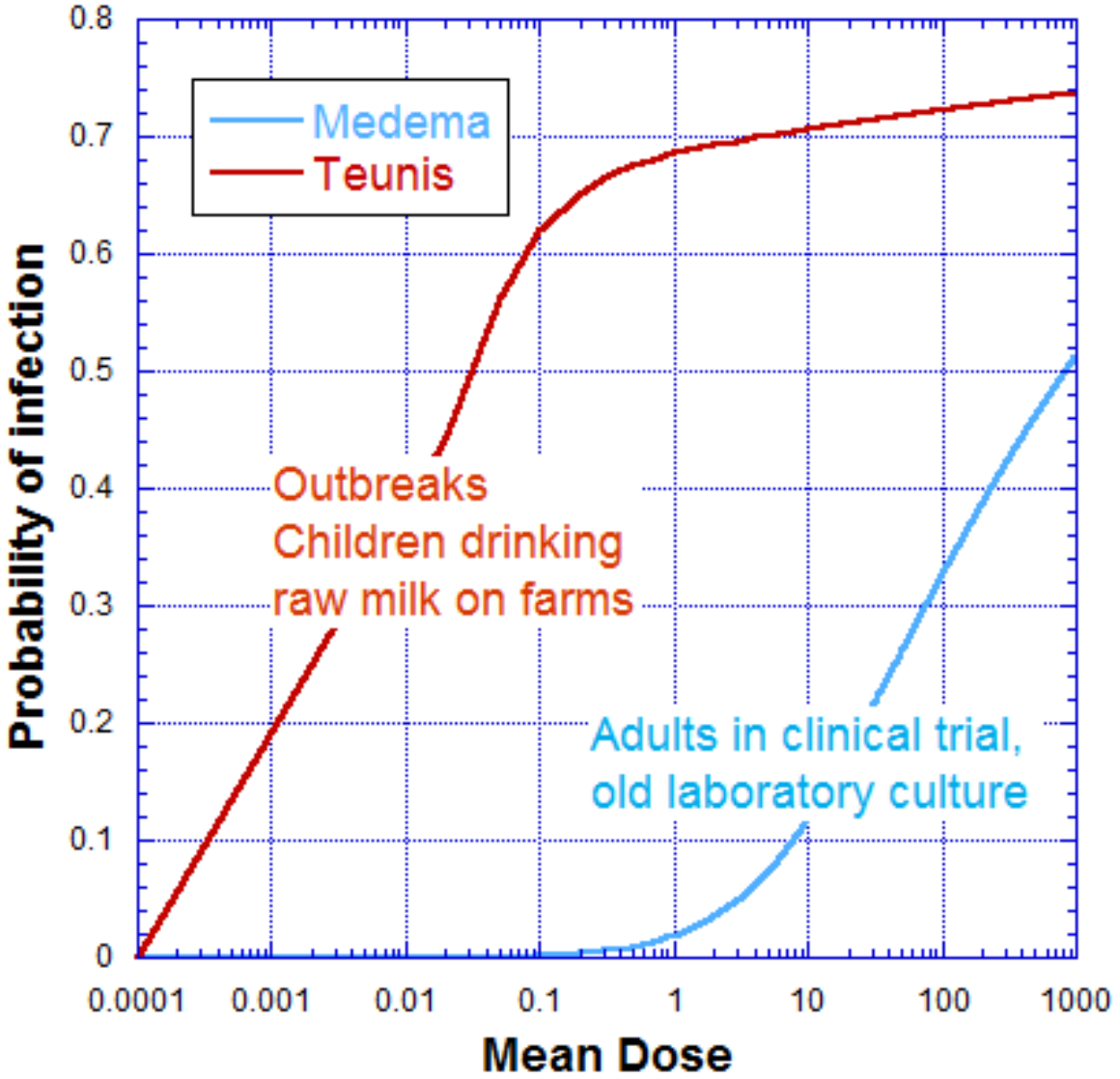
a) Set the risk context
b) Identify hazards (i.e., potential pathogens, including animal sources)
c) Examine exposure to those pathogens
d) Select appropriate dose-response relationships
e) “Calculate” numeric *or* qualitative risk profiles
f) Communicate the risks and associated uncertainties (including ‘traffic lights’)

A perfect storm

How did it happen?

- Heavy antecedent rainfall
- Large quantity of close-by faecal material, young stock?
- Inadequate oversight of drinking water delivery systems
- Equipment maintenance
- Failure to understand risks posed by animal wastes (cf. human wastes)?
- “Dirty dairying” takes the focus of other sources (subconscious?)
- Highly virulent *Campylobacter* strains? (by inference)

There’s more than one dose-response function



The beat goes on: Endemic patterns dominate (usually)

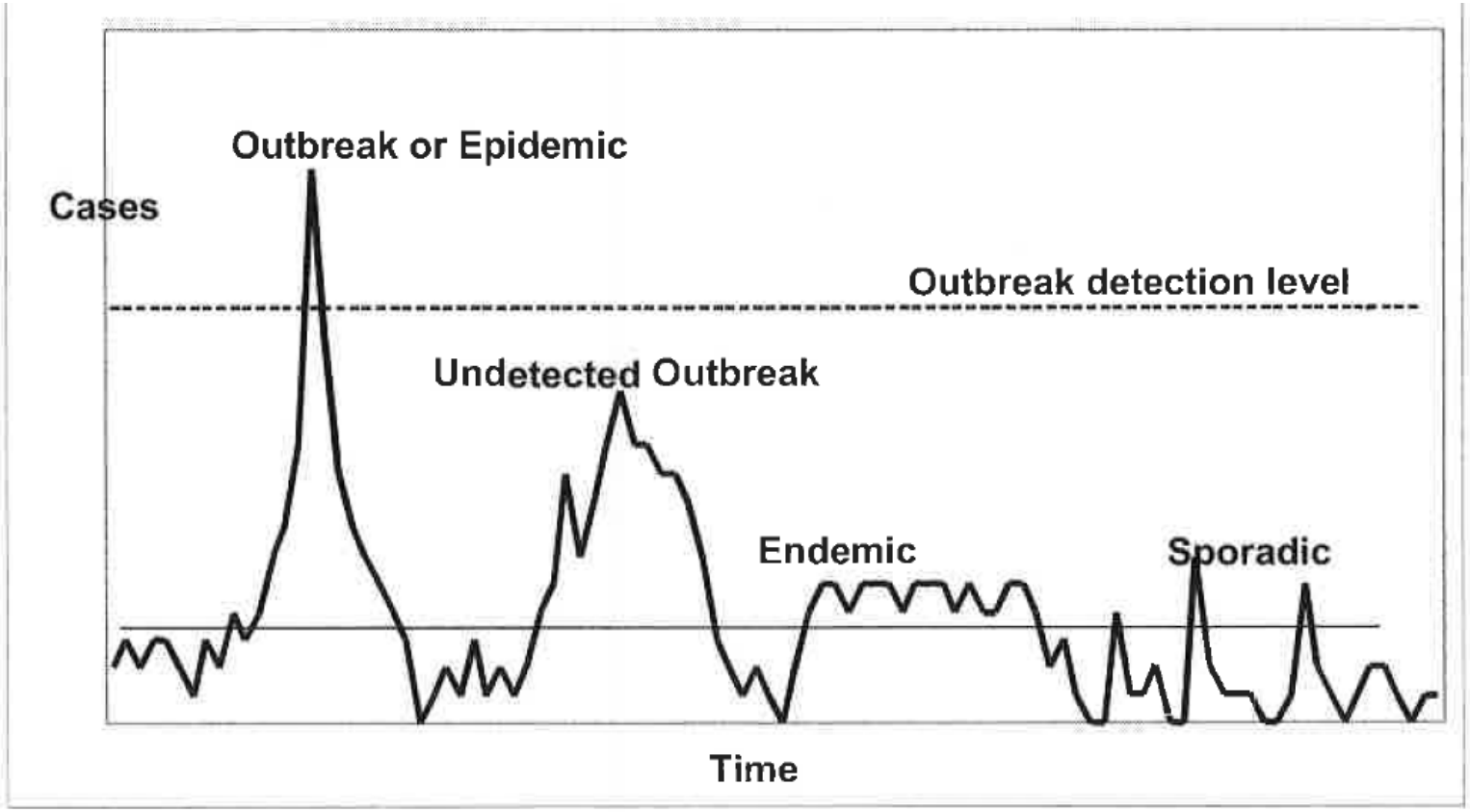
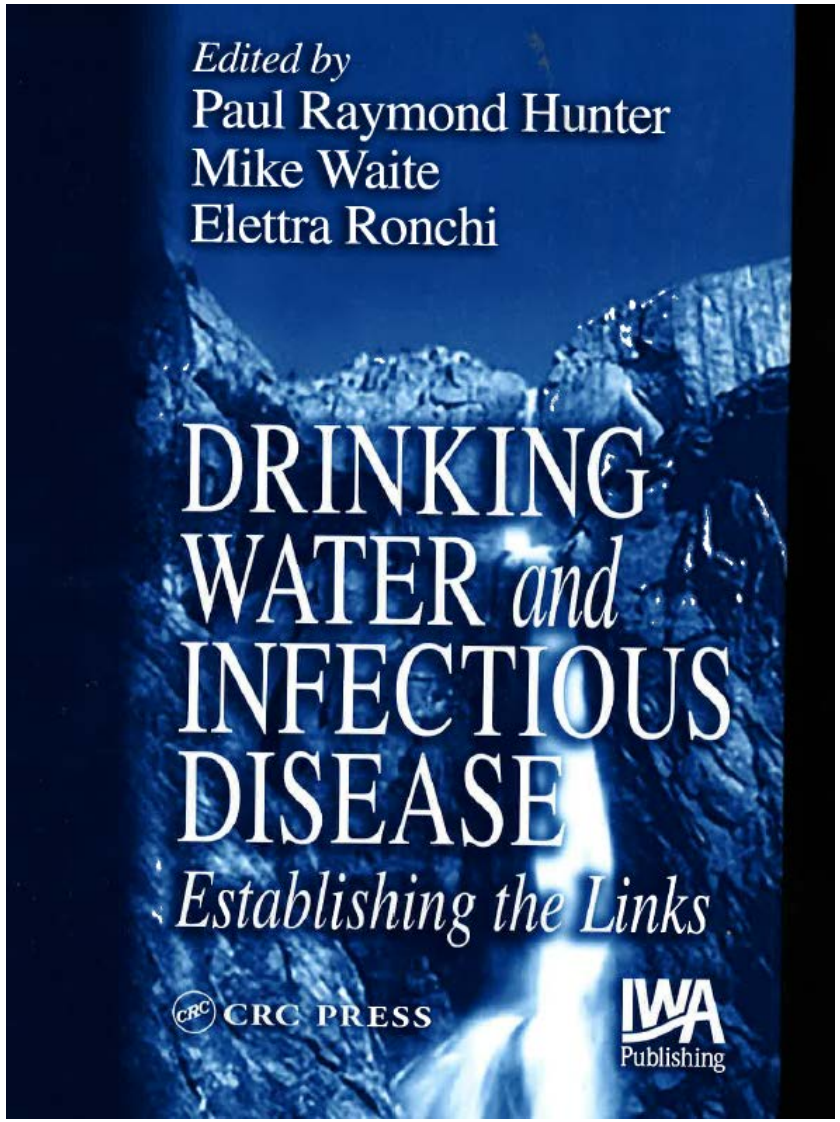


Figure 10.4. Epidemic versus endemic disease (adapted from Frost *et al*. 2003).

The beat goes on: Endemic patterns dominate (usually)



So (usually)

"… probably the vast majority of waterborne disease burden arises outside of detected outbreaks"

Bartram, J.

Campylobacter ecology models

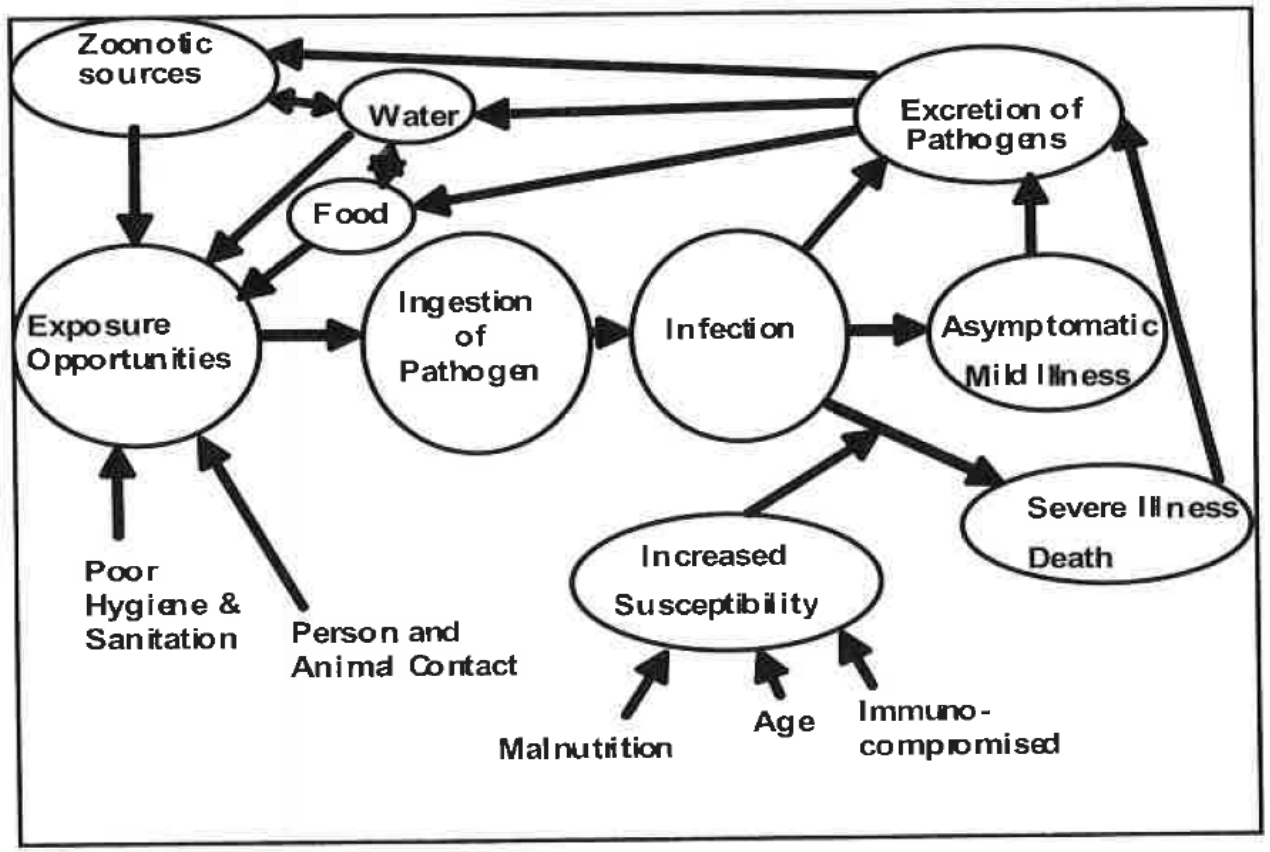


Figure 10.2. A disease model for *Cryptosporidium*.

Campylobacter ecology models

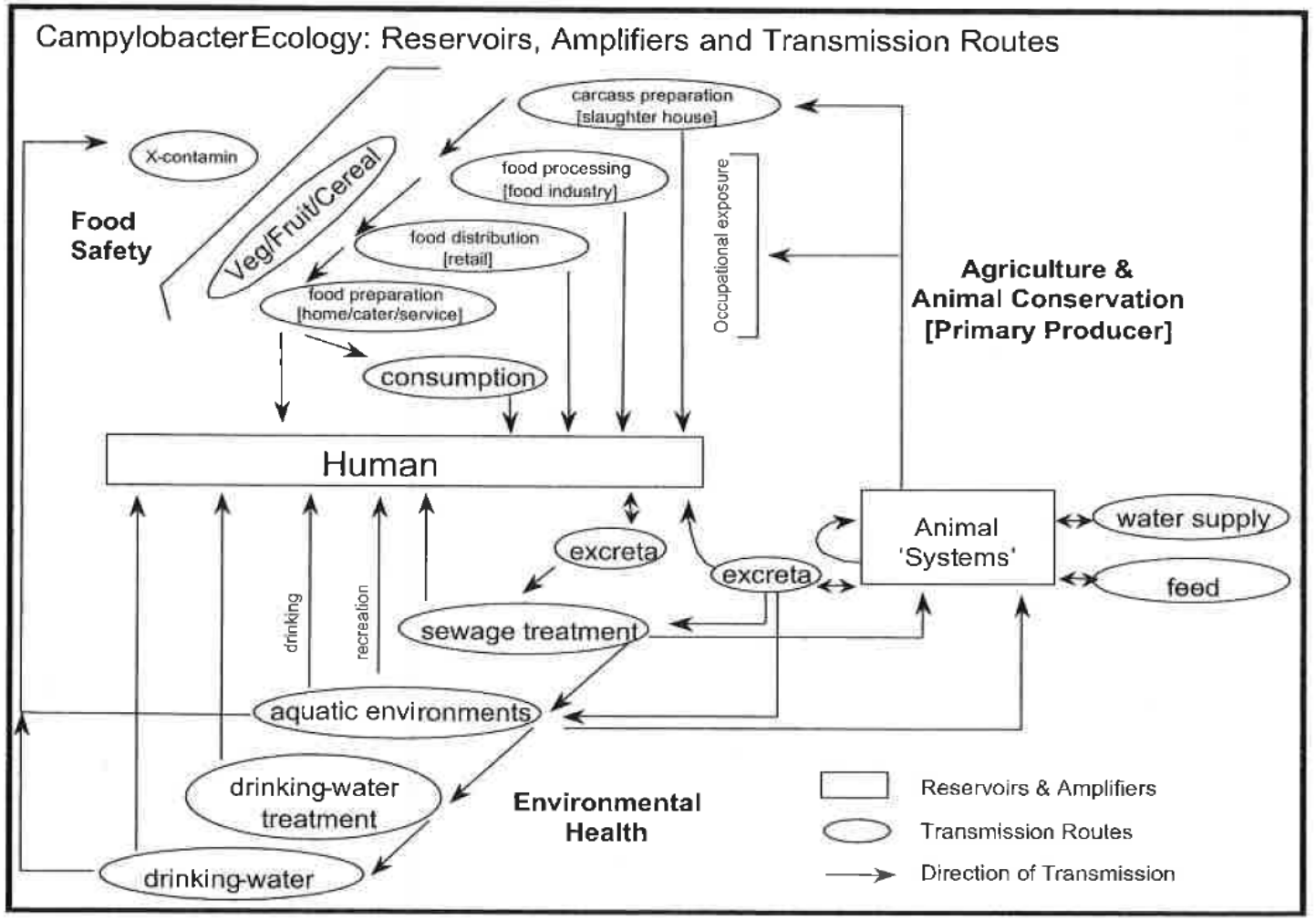
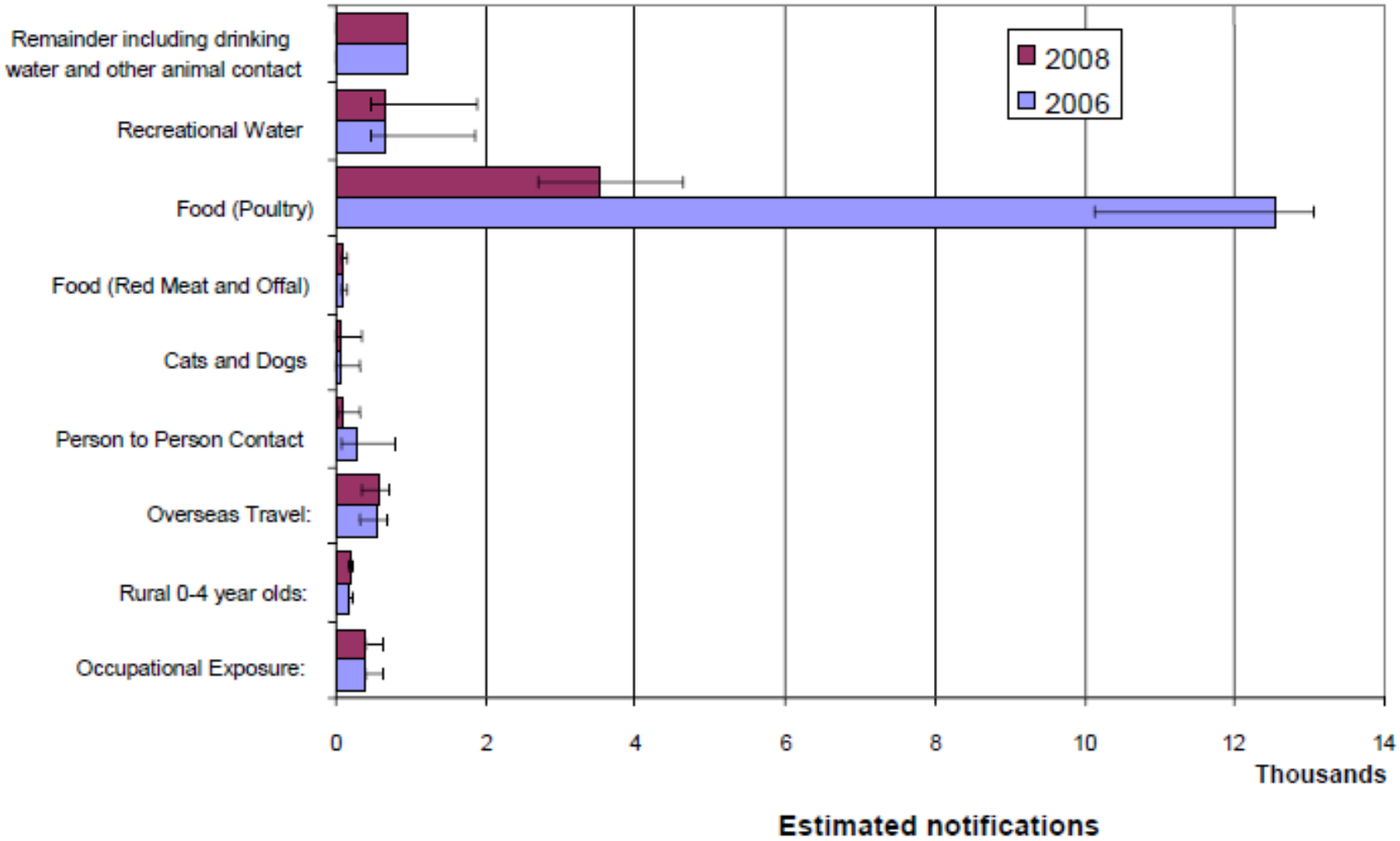


Figure 10.3. A risk model for *Campylobacter* (from New Zealand Ministry of Health and Dr A. Hudson, Environmental Science Research).

Campylobacter and the Environment
Examining the link with public health



http://www.foodsafety.govt.nz/elibrary/industry/examining-link-with-public-health/index.htm

Climate change

Can expect, on average

- more intense rainfall
- increased temperatures
- more frequent pathogen contact with food, animals and humans

So, can expect increasing reported rates of zoonoses*

- McBride, G.B.; Tait, A.; Slaney, D. (2014). Projected changes in reported campylobacteriosis and cryptosporidiosis rates as a function of climate change: a New Zealand study. *Stochastic Environmental Research and Risk Assessment 28*: 2133–2147.

Conclusions

Always remember

- Communicate
- Understand risk assessment
- System maintenance importance
- There is no room for complacency
- Strains of the same species can have very different virulence