National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Country experience

Burden of Foodborne Diseases in the Netherlands

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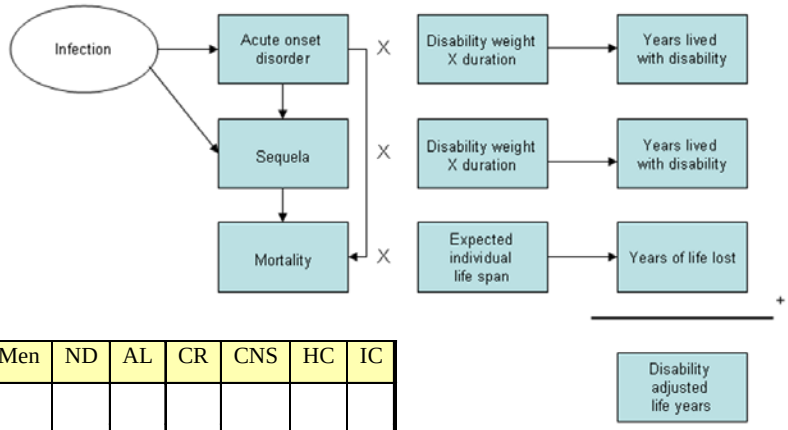
Background

- Highly industrialized, densely populated country with high food safety standards
- FBDs still have substantial public health and economic impact
- Empirical approach (to generate evidence) for informing policy
- Performed by the RIVM yearly since 2008 under mandate of MoH
- Standard panel of 14 enteric pathogens



Metrics and health effects

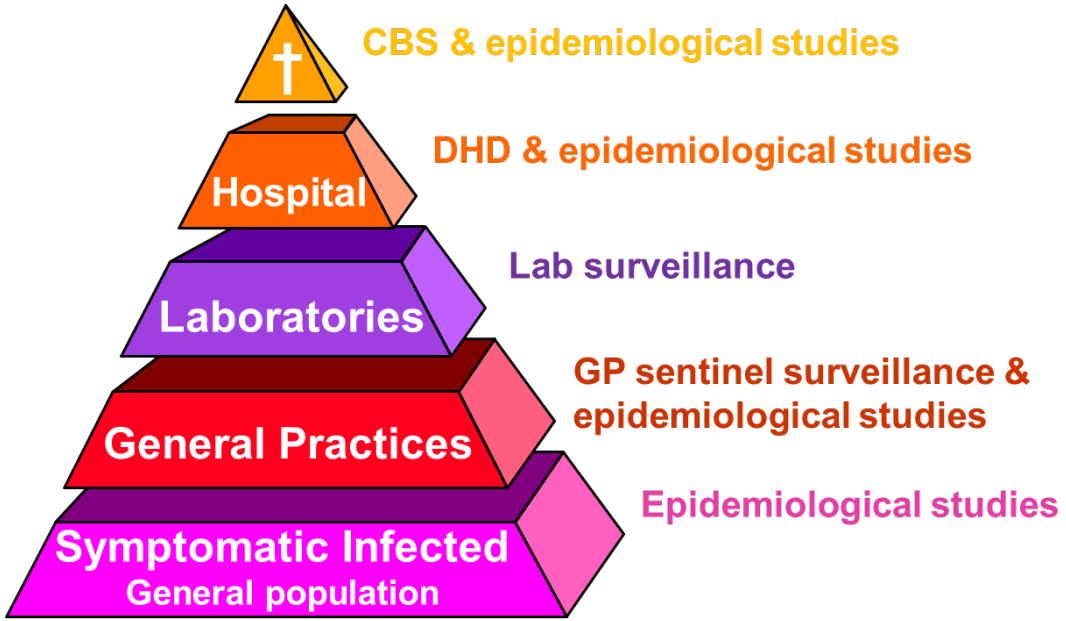
	Pathogen	D*	GE	GBS	ReA	IBD	IBS	HUS	ESRD	Hep	Men	ND	AL	CR	CNS	HC	IC
Infectious gastroenteritis	*Campylobacter* spp.	X	X	X	X	X	X										
	STEC O157	X	X					X	X								
	Salmonella spp.	X	X		X	X	X										
	Norovirus	X	X														
	Rotavirus	X	X														
	Cryptosporidium spp.	X	X														
	Giardia lamblia	X	X														
Toxin producers	*B. cereus* toxin		X														
	C. perfringens toxin	X	X														
	S. aureus toxin	X	X														
Systemic infections	*L. monocytogenes*																
	- perinatal	X									X	X					
	- acquired	X									X	X	X				
	Hepatitis-A virus	X								X							
	Hepatitis-E virus	X								X							
	Toxoplasma gondii																
	- perinatal	X												X	X	X	X
	- acquired													X			

BoD measured in DALYs

CoI (€) includes healthcare costs, costs for the patient and caregivers (e.g. travel, external care), productivity losses

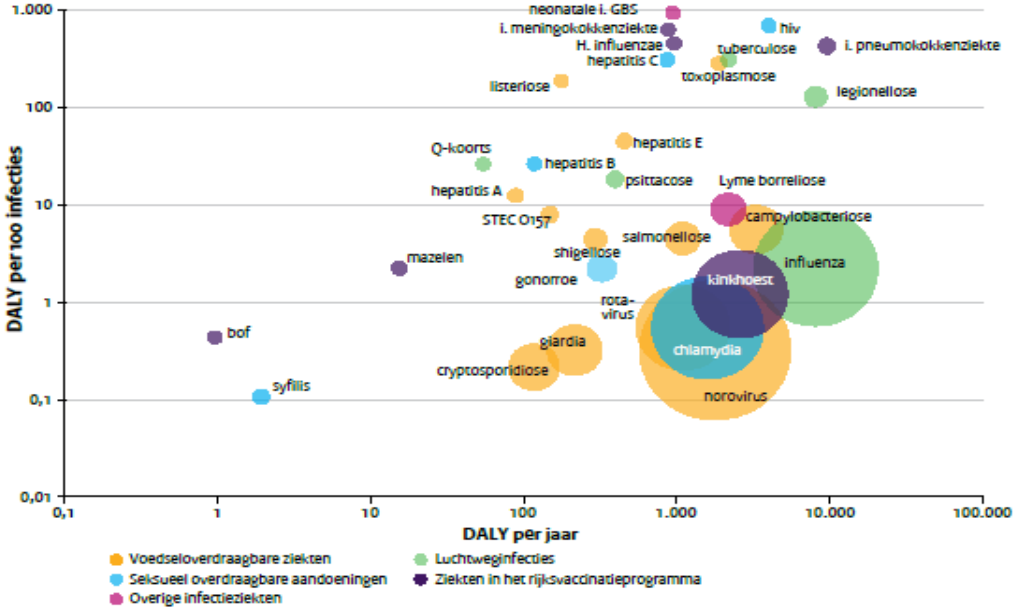
Data sources

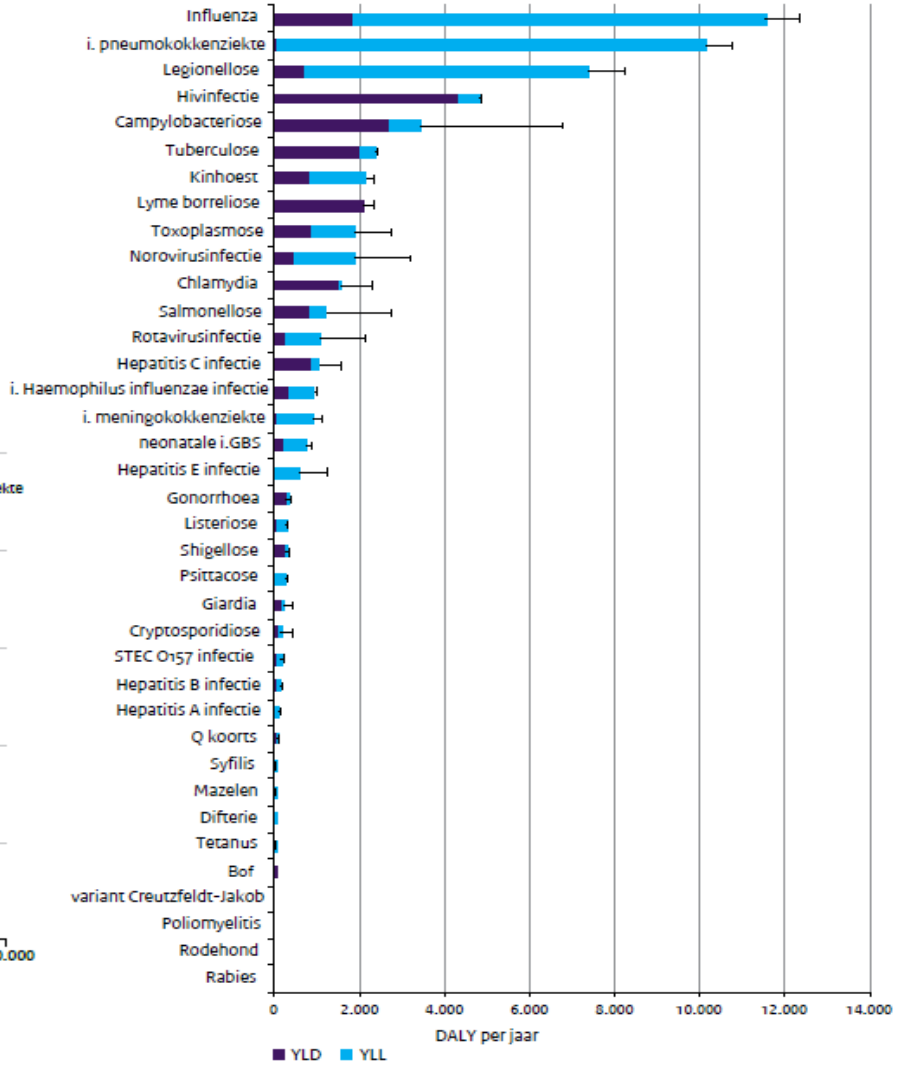
- *N*: Incident cases
  Surveillance / studies
- *t*: Duration of disease
  Scientific literature / own data
- *w*: disability weight
  Scientific literature / GBD
- *D*: mortatlity
  Statistics Netherlands
- *e*: life expectancy at the age of death
  Statistics Netherlands



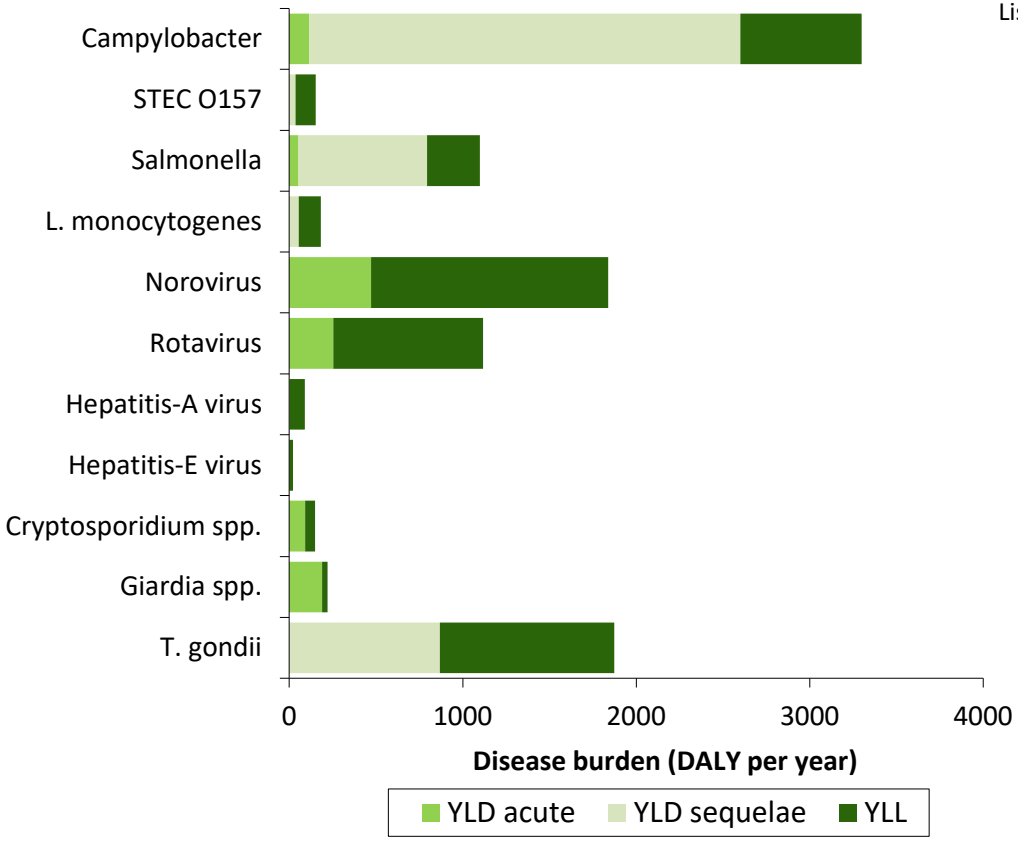
$$YLD = \sum_{all\ diseases} N \times t \times w \qquad YLL = \sum_{all\ diseases} D \times e$$

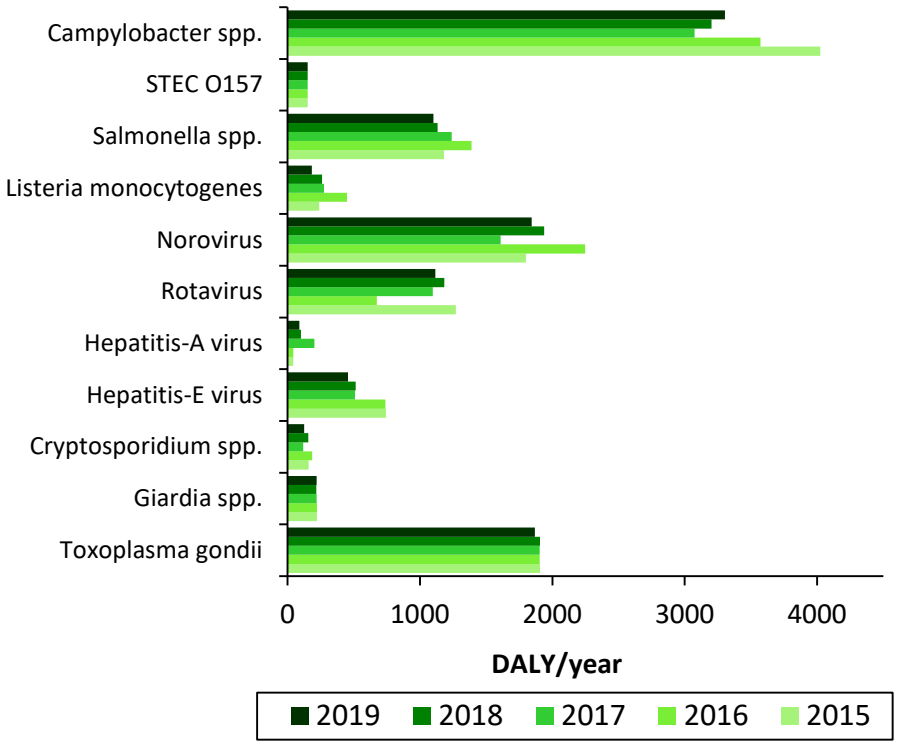
Staat van infectieziekten *in Nederland 2019*





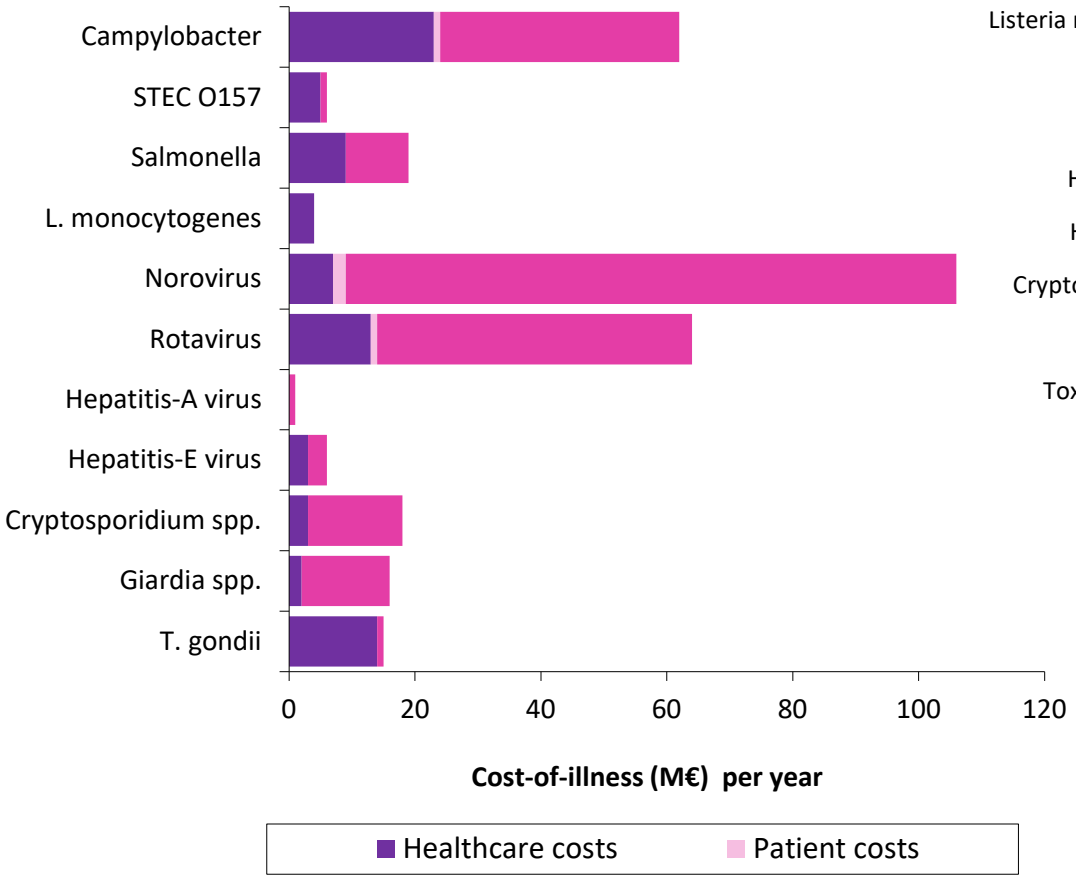
BoD 2019

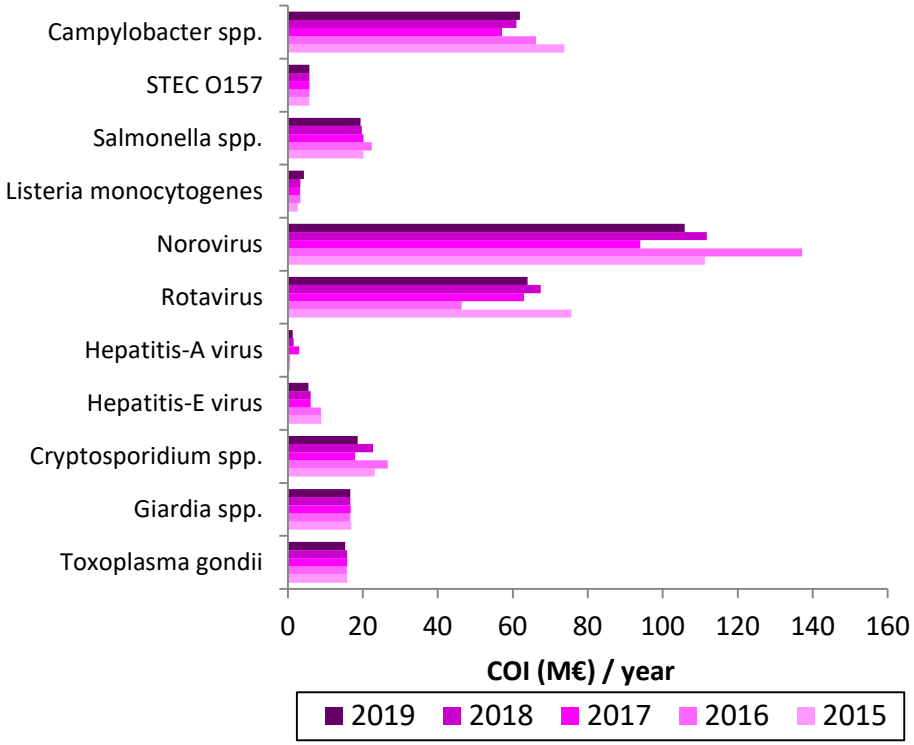




11,000 (4200 FBD) DALYs

CoI 2019





€ 423 (174 FBD) million

Attribution

Table 8 Attribution of the mean estimated number of incident cases, fatalities, disease burden and cost-of-illness of foodborne disease[a] to the major transmission pathways in the Netherlands, 2019

Main pathway	Food	Environment	Human	Animal	Travel	Total
Number of incident cases (per year) [b]	647,000	193,000	516,000	82,000	133,000	1,570,000
Number of fatal cases (per year) [b]	84	41	68	21	31	245
Disease burden (DALY, undiscounted) [b]	4,200	2,200	2,200	1,000	1,300	11,000
Disease burden (DALY, discounted (1.5%)) [b]	3,400	1,800	2,000	910	1,100	9,100
Cost of illness (M€, undiscounted) [c]	197	75	118	33	44	467
Cost of illness (M€, discounted (4%)) [c]	174	62	117	30	41	423

a) Due to the 14 pathogens included in this study
b) Presented numbers are rounded: ≥ 100,000 to three significant numbers (e.g. 123,256 = 123,000); between <100,000 and ≥10 to two significant numbers (e.g. 1,325 = 1,300) and <10 to 1 significant number (e.g. 0.0023=0.002). The presented numbers are estimates that rely on annual surveillance data being corrected for: i) coverage (where applicable); ii) underdiagnosis and underreporting; and iii) under-ascertainment (i.e. being sick without requiring medical help).
c) Costs are expressed in 2017 euros and in million € (M€).

Table 9 Attribution of the mean incidence, fatalities, disease burden and cost-of-illness of foodborne disease[a] to food group in the Netherlands, 2019

Food groups	Beef & Lamb	Pork	Poultry	Eggs	Dairy	Fish& shellfish	Produce	Beverages	Grains	Other foods	Humans& animals	Total
Number of incident cases (per year) [b]	108,000	44,000	54,000	21,000	54,000	52,000	38,000	15,000	39,000	121,000	101,000	647,000
Number of fatal cases (per year) [b]	9	9	16	5	7	8	6	2	3	5	12	82
Disease burden (DALY, undiscounted) [b]	530	740	940	200	300	290	270	74	120	220	430	4,100
Disease burden (DALY, discounted (1.5%)) [b]	410	510	810	180	250	250	230	66	110	200	370	3,400
Cost of illness (M€, undiscounted)[c]	30	25	26	7	17	15	12	4	10	28	25	197
Cost of illness (M€, discounted (4%)) [c]	25	16	23	7	15	13	11	4	9	27	23	174

a) Due to the 14 pathogens included in this study
b) Presented numbers are rounded: ≥100,000 to three significant numbers (e.g. 123,256 = 123,000); between <100,000 and ≥10 to two significant numbers (e.g. 1,325 = 1,300) and <10 to 1 significant number (e.g. 0.0023=0.002). The presented numbers are estimates that rely on annual surveillance data being corrected for: i) coverage (where applicable); ii) underdiagnosis and underreporting; and iii) under-ascertainment (i.e. being sick without requiring medical help).
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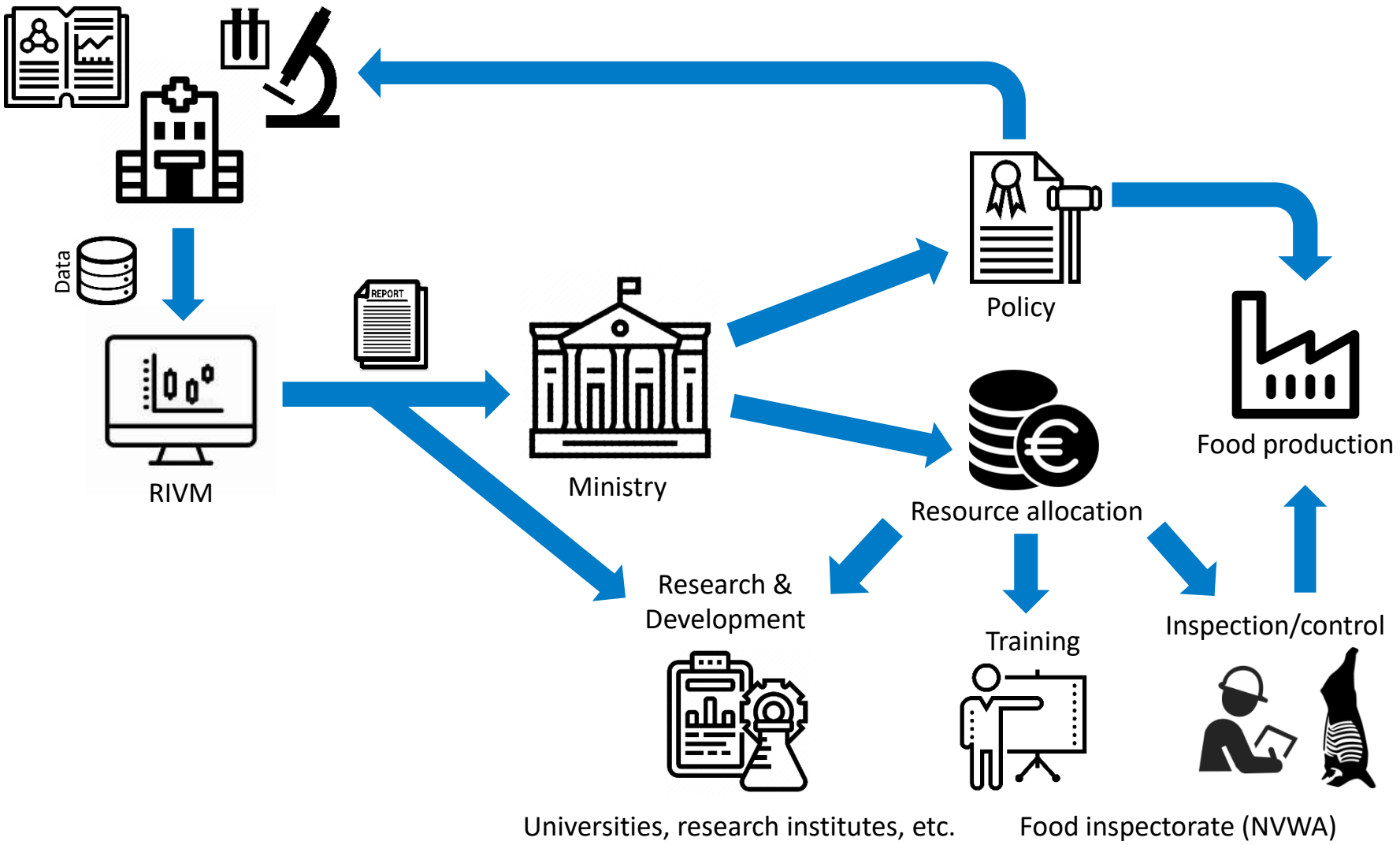

Data
REPORT
RIVM
Ministry
Policy
Food production
Resource allocation
Research &
Development
Training
Inspection/control
Universities, research institutes, etc.
Food inspectorate (NVWA)

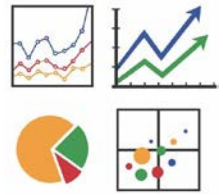
From data to action (examples)

- Process hygiene criterion in poultry meat
- Resource allocation for research
  - *Toxoplasma* source attribution → interventions on raw beef (Opsteegh et al. 2011 Int J F Microbiol 150: 103-114)
  - *Campylobacter* genotyping & source attribution → role of the environment (Mulder et al. Water Res. 2020 Dec 15;187:116421)

- Resource allocation for inspection/control
  - Risk-based → *Listeria* in processing plants

- Resource allocation for education
  - target groups (VMT Food Events)

- Monitor trends and generate hypotheses
  - Input for scientific community at large



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Thank you!

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