3 Food safety outcomes

Key points

- Intermediate indicators of regulatory outcomes, such as changes in food control practices, have shown an increased knowledge of and improved practices in food handling since implementation of the Food Safety Standards.
- Most attempts to measure the outcomes from food safety regulation focus on the incidence of food-borne illness, as evidenced by notifications and outbreak data.
- In Australia in 2008, there were 25 000 notifications of illnesses that are commonly transmitted by food.
  - The Northern Territory recorded the highest rates of these illnesses (per person) while Western Australia and Tasmania recorded the lowest rates, although not all cases of these illnesses were caused by food-borne transmission.
  - Campylobacteriosis (15 500 cases) was the most frequently notified illness.
- New Zealand reported 6693 notifications of campylobacteriosis in 2008 but different reporting systems complicate comparisons with Australia.
- In 2007, there were 149 food-borne outbreaks in Australia — as a result 2300 people were affected, over 260 people were hospitalised and five people died.
  - The Northern Territory recorded the highest rate of outbreaks (per person) while South Australia and Western Australia reported relatively low rates.
  - The majority of people hospitalised were in New South Wales.
  - All five fatalities were recorded in Victoria.
- In New Zealand, 89 outbreaks, affecting 1206 people, were reported in 2008.
- It is difficult to use outcomes data to draw conclusions on the performance of food safety regulation. The main reasons are that:
  - data on notifications is severely under-reported and the inherent variability of outbreak data makes it difficult to identify any trends over time
  - linking food-borne illness data to food safety regulation is problematic because of a range of other factors which affect food safety outcomes.
- Outcomes data is most useful at identifying the types of food and preparation areas at highest risk. When used with current and intermediate indicators, it provides a broad context for benchmarking different approaches to food safety regulation.

Food safety regulation exists for a purpose — to reduce food-related illness and its impact on individuals, families the community and economy. Poor food safety outcomes can lead to greater use of health sector resources and lower workforce productivity. Outcome measurement potentially provides a systematic way of monitoring and evaluating the overall effectiveness of regulation. Measuring food safety outcomes should deliver findings that governments, regulators and businesses can use to adapt, improve, and become more effective at managing food safety.

In considering the most appropriate indicators to assess outcomes from food safety regulation, it is important to recognise the multiplicity of influences on both narrow and broader interpretations of what constitutes safe food or the protection of public health. Knowing what would have happened in the absence of food safety regulation (the counterfactual) and isolating the impact of that regulation from other non-regulatory determinants of food safety outcomes is problematic. For example, it is difficult to assess the impact of regulation against non-regulatory factors such as a company's individual effort to manage food safety to maintain viability, market share and reputation, changes in food processing techniques and changes in consumer tastes over time. Regulatory arrangements can also influence the reporting of outcomes, as distinct from the underlying patterns.

The inherent attribution difficulties are magnified when the definition of safe food is broadened to include the promotion of good health and when potential indicators of success or failure include longevity and trends in conditions linked to food consumption (such as obesity, diabetes and heart disease). Most attempts to measure the outcomes from food safety regulation focus on the incidence of food-borne illness (or food poisoning). This is most commonly measured using data on notifications and outbreaks of food-related illnesses (section 3.2). An alternative approach is the use of intermediate indicators.

3.1 Intermediate indicators

Intermediate indicators are checks of the effectiveness of regulation at an intermediate stage or between regulatory requirements and outcomes of regulation. In relation to food safety, intermediate indicators are changes in food control practices which can impact positively or negatively on outcomes. The use of intermediate indicators for food safety regulation is in line with the key objective enunciated in the COAG Food Regulation Agreement of providing safe food *controls* for the purpose of protecting public health and safety.

Food controls cover all aspects of food handling, preparation, cooking, storage and transport that combine to determine the condition of food consumed by the public.

The legally enforceable protocols that direct food control practices in Australia are contained in the Australia New Zealand Food Standards (ANZFS) Code developed by Food Standards Australia New Zealand (FSANZ). The aim is to provide a nationally consistent set of food safety requirements for food businesses. New standards relating to food safety practices, premises and equipment were introduced between 2001 and 2003 by FSANZ in relation to:

- the skills and knowledge of food handlers and their supervisors
- specific food handling controls for certain steps in the production chain
- having a system to recall unsafe food
- the health and hygiene of food handlers
- the cleaning, sanitation and maintenance of equipment and the premises
- the suitability of the food premises and equipment.

FSANZ established an evaluation program to assess the impact of the new standards on food handling knowledge and practices in food businesses. FSANZ justified its focus on intermediate indicators of food safety outcomes in these terms:

> At the time of introduction of the Food Safety Standards, it was decided that FSANZ would evaluate their impact. It was acknowledged that it was not possible to measure the effect of implementing the Standards on the end objective of setting those Standards – the protection of public health and safety. This is because the external influences on public health and safety as a whole are so complex and influenced by many external factors that a measured change to the level of health and safety of a given population group cannot generally be attributed to a single influence, a single agency or action by an agency, such as a change in food regulatory measures. Therefore, evaluation of the Standards was conducted under the assumption that a measure of any improvement in the food safety knowledge of food businesses and the food handling practices carried out by food businesses would consequently impact on the incidence of food poisoning. (FSANZ 2008a)

The impact of the new standards was assessed by FSANZ by comparing responses to a national food handling survey (comprising a telephone component to measure food safety knowledge and awareness and an observational component to measure actual on-site food handling practices) conducted prior (in 2001) and subsequent (in 2007) to the introduction of the new standards. According to FSANZ, the results demonstrate '… increased knowledge of safe food handling and improved food handling practices since the implementation of the Food Safety Standards.' (FSANZ 2008a). For example, the results showed that in 2007 (compared with 2001) more businesses:

- knew the correct storage temperature for chilled food
- knew the correct temperature for holding hot food

- knew the correct temperature and time for safely cooling food
- knew when chemical sanitisers should be used
- had temperature probes that were more frequently used
- checked that potentially hazardous food was received at a safe temperature
- had improved their storage practices for chilled food
- monitored cooking temperature
- improved their protection of food from contamination
- provided appropriate hand washing facilities for staff
- used commercial dishwashers and hot water glass washers.

FSANZ also commented that, in general, greater knowledge and safer food handling practices were identified in businesses that directly supply to or manufacture food for high-risk businesses such as hospitals, nursing homes or child care centres, large businesses, businesses with a food safety program, Victorian businesses, and those in which English was the main language spoken at the business. Further, the survey results found that the staff of businesses with a Food Safety Plan had better food handling knowledge and practices (chapter 6).

Despite improvements, FSANZ stated that at least 10 per cent of food businesses failed to:

- check the temperature of potentially hazardous food upon delivery
- cool food within the specified time and temperature limits
- protect stored chilled food from contamination in the cool room
- supervise displays of ready-to-eat food
- dispose of leftover displayed food
- provide warm running water for hand washing
- supply single use towels for hand drying
- ensure staff wash and dry their hands correctly
- maintain clean premises
- contact a pest control company or have a pest control program.

There were also gaps in knowledge about the storage temperature of chilled food, holding temperature of hot food, cooling times and temperatures for cooked food, hand contact with ready-to-eat food (such as bread and ham) and correct cleaning and sanitising temperatures (FSANZ 2008a).

3.2 Food-borne illness

Food-borne illness has a significant impact on individuals, families, the community and economy (box 3.1).

Box 3.1 The cost of food-borne illness

Cost to consumers

For consumers, food-borne illness means enduring the physical discomfort of the symptoms (and in some cases long-term health issues) as well as costs associated with medical expenses and time off work both for the sufferers and carers. Poor food safety outcomes can also reduce consumer confidence in food safety and affect consumer eating habits.

Cost to government

All levels of government face significant cost from food-borne illness. In Australia, each case of food-borne illness which involves a medical consultation, hospitalisation or pathology test costs the government through the Medicare rebate. The government also faces the expense of investigating sporadic cases and outbreaks as well as any follow-up action required. Further, there are costs associated with lost productivity and its impact on government revenue.

Cost to industry

Food-borne illness costs industry through employee absence and can be extremely expensive for the food business identified as causing the illness. These costs can include loss of sales from both closure and lower levels of consumer confidence, loss of stock from withdrawals or recalls, costs associated with re-establishing goodwill and market share, increased insurance premiums, bankruptcy and prosecution. There can also be flow-on effects to whole industry sectors and to Australia's international reputation as a supplier of safe food.

Quantifying the cost of food-borne illness in Australia

The Department of Health and Ageing established OzFoodNet in 2000 to improve the surveillance of foodborne diseases which included estimating the burden of foodborne illness. In 2005 a report by Hall, Kirk, OzFoodNet and the Department of Health and Ageing estimated that 5.4 million cases of foodborne disease occur each year in Australia. The report also found the annual effects of foodborne gastroenteritis to be considerable resulting in 1.2 million people visiting the doctor, 300,000 prescriptions for antibiotics and 2.1 million days of work lost every year.

In 2006, a sister report by Abelson, Forbes and Hall (prepared for the Department of Health and Ageing*)* estimated the cost of these 5.4 million cases of foodborne illness to be about $1.25 billion a year, comprising productivity and lifestyle costs ($770 million), premature mortality costs ($230 million) and health care service costs ($220 million).

Source: Abelson et al. (2006); Hall et al. (2005); Department of Health and Ageing (sub. 20, p. 1).

Trends in the incidence of food-borne illness are most commonly measured using surveillance data on notifications and outbreaks of food-related illnesses and food safety recalls.

Notification arrangements

All jurisdictions have public health legislation that requires medical practitioners and/or pathology laboratories to report cases of illness that are important to public health. Surveillance data on notifications can be used to monitor trends in the incidence of food-borne illness over time. The most common illnesses transmitted by food include campylobacteriosis, salmonellas, shigellosis, listeriosis, typhoid, shiga toxin producing *E coli.* (STEC) and haemolytic uraemic syndrome (HUS).

However, food-borne transmission is only one of the routes by which humans are exposed to pathogens; other routes include water, animal contact and person to person contact. According to OzFoodNet, just under 90 per cent of salmonellosis infections and around 75 per cent of campylobacteriosis infections are acquired through food-borne transmission. These rates can vary across geographical areas. For example, a number of the salmonella cases in the Northern Territory have been attributed to environmental factors and/or person-to-person contact, rather than food-borne sources (CDCNT 2006 and CDCNT 2009). Also, the proportion of cases which are food-borne are estimated to be lower in New Zealand — around 60 per cent for both pathogen types — but differences in reporting systems complicates comparisons between the two countries.

Food-borne illness could be overstated in some notifications statistics as some notified cases may have been infected from non-foodborne sources, such as infected animals or people. However, the reliability of notifications data as an indicator of food-borne illness is more likely to be questioned on the grounds of underreporting. It is estimated that less than one per cent of cases of food-borne illness are captured in existing notification schemes in Australia and overseas (FSANZ 1999). There are a number of reasons for this including:

- not all food-borne illnesses are notifiable. There are over 200 different types of illness that may be transmitted by food but only a few are notifiable to health departments (OzFoodNet 2005). Further, there are differences in reporting systems between jurisdictions — of particular significance, campylobacteriosis is not notifiable in New South Wales
- food-borne illnesses which are notifiable are also underreported. In Australia it is estimated that for every notification of salmonellosis and campylobacteriosis there are about 7 and 10, respectively unreported cases in the community

(OzFoodNet 2005). The main reason for this is that the short duration and mild nature of many food-borne illnesses means that most of those affected are unlikely to visit a doctor or report the incident to their local health authority

- even if those affected seek medical help, it is difficult to determine the cause of a reported illness. Generally, the attribution is based on the subjective opinion of the notifying physician without a microbiological demonstration of a food-borne pathogen nor epidemiological evidence to support the attribution.

While the Commission presents data on notifications of food-borne illness in Australia and New Zealand, because of the data concerns discussed above the Commission does not attempt to attribute causation to any differences.

Reported notification of food-borne illness in Australia

In Australia in 2008, there were 25 000 notifications (or 152 notified cases per 100 000 population) of illnesses commonly transmitted by food. The most frequently notified were campylobacteriosis (15 500 cases), salmonellosis (8300 cases) and shigellosis (800 cases) (table 3.1).

In 2008 by jurisdiction, the Northern Territory (423 notified cases per 100 000 population) and South Australia (177 notified cases per 100 000 population) reported the highest rates of illness commonly transmitted by food (not all of the notified cases would have been transmitted by food). Apart from New South Wales (where campylobacteriosis is not notifiable), Western Australia and Tasmania had the lowest rate of notified cases — 133 and 137 notified cases per 100 000 population, respectively.

By pathogen type, the highest reported rate of campylobacteriosis was recorded in South Australia at 124 cases per 100 000 population in 2008. Salmonellosis was reported most frequently in the Northern Territory — 497 cases or 226 cases per 100 000 population. Again, the Northern Territory reported the highest rate of shigellosis at almost 80 cases per 100 000 population (table 3.1).

Table 3.1 Illness commonly transmitted by food, Australia — 2008

Number of cases and notification rate per 100 000 population

		NSW[a]	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	***Aus***
Campylobacteriosis	no.	nn	5 774	4 821	1 993	1 829	474	257	381	**15 529**
	rate	nn	109.0	112.7	124.4	84.5	95.1	116.8	110.7	**107.8**
Salmonellosis	no.	2 261	1 651	2 047	661	855	206	497	132	**8 310**
	rate	32.5	31.2	47.8	41.3	39.5	41.4	226.0	38.3	**38.9**
Shigellosis	no.	109	136	97	137	169	3	175	3	**829**
	rate	1.6	2.6	2.3	8.6	7.8	0.6	79.6	0.9	**3.9**
Listeriosis	no.	34	11	12	1	8	1	0	1	**68**
	rate	0.5	0.2	0.3	0.1	0.4	0.2	0.0	0.3	**0.3**
Typhoid	no.	43	32	18	2	8	0	1	0	**104**
	rate	0.6	0.6	0.4	0.1	0.4	0.0	0.5	0.0	**0.5**
STEC/VTEC	no.	19	11	37	38	0	0	0	0	**105**
	rate	0.3	0.2	0.9	2.4	0.0	0.0	0.0	0.0	**0.5**
HUS[a]	no.	17	4	7	2	0	0	1	0	**31**
	rate	0.2	0.1	0.0	0.1	0.0	0.0	0.5	0.0	**0.1**
Total	**no.**	**2 483**	**7 619**	**7 039**	**2 834**	**2 869**	**684**	**931**	**517**	**24 976**
	rate	**35.7**	**143.9**	**164.6**	**177.0**	**132.6**	**137.3**	**423.4**	**150.2**	**152.0**

nn not notifiable. [a] Haemolytic uraemic syndrome.

Source: Department of Health and Ageing, Australian Government, National Notifiable Diseases Surveillance System, http://www9.health.gov.au/cda/Source/Rpt_2_sel.cfm, accessed 25 August 2009.

At the same time as Australian jurisdictions were progressively adopting uniform food safety arrangements, between 2001 and 2008, notification rates across the three major pathogen types were relatively stable. In Australia:

- notification rates for campylobacteriosis declined from 126 cases per 100 000 population in 2001 to 108 notified cases per 100 000 population in 2008
- over the same period notifications of salmonellosis ranged from 35 to 45 notified cases per 100 000 population
- shigellosis notifications ranged from 2.2 to 3.9 notified cases per 100 000 population (table 3.2).

Table 3.2 **Trend in illness commonly transmitted by food, by state**

2001 to 2008, notification rate per 100 000 population

	2001	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
NSW								
Campylobacteriosis	nn	nn	nn	nn	nn	nn	nn	nn
Salmonellosis	25.2	31.9	27.9	32.0	32.2	30.2	37.1	32.5
Shigellosis	2.0	1.3	0.9	1.4	2.0	1.1	1.0	1.6
Vic								
Campylobacteriosis	114.4	103.1	113.6	127.9	120.8	111.7	122.0	109.0
Salmonellosis	22.9	25.7	26.4	22.6	29.1	27.2	36.1	31.2
Shigellosis	2.0	1.4	1.0	1.4	2.0	1.5	1.8	2.6
Qld								
Campylobacteriosis	109.1	104.3	100.8	105.3	110.5	97.0	106.1	112.7
Salmonellosis	60.6	72.0	57.4	71.8	65.0	66.1	56.6	47.8
Shigellosis	2.9	2.5	1.4	1.7	2.0	2.4	2.1	2.3
SA								
Campylobacteriosis	176.6	164.4	172.7	127.7	135.9	160.8	169.5	124.4
Salmonellosis	40.4	34.0	29.2	34.2	37.9	36.4	55.5	41.3
Shigellosis	2.2	1.7	2.1	3.6	3.1	2.4	4.2	8.6
WA								
Campylobacteriosis	136.5	111.4	101.2	97.8	121.6	94.5	99.7	84.5
Salmonellosis	44.2	37.6	31.4	32.0	39.8	38.8	47.0	39.5
Shigellosis	4.1	6.6	5.7	5.6	7.7	6.3	4.9	7.8
Tas								
Campylobacteriosis	143.5	128.0	131.9	126.8	156.7	122.3	144.5	95.1
Salmonellosis	34.5	35.1	30.8	24.9	62.1	39.0	45.4	41.4
Shigellosis	1.3	0.2	0.8	0.6	1.0	0.6	0.6	0.6
NT								
Campylobacteriosis	143.1	104.3	136.0	105.9	124.0	124.4	136.3	116.8
Salmonellosis	196.2	164.0	181.0	191.5	191.9	190.9	246.1	226.0
Shigellosis	53.6	51.7	66.5	57.4	95.5	59.3	81.0	79.6
ACT								
Campylobacteriosis	133.1	113.4	125.0	115.7	122.1	120.6	120.4	110.7
Salmonellosis	23.8	29.4	24.6	30.5	28.5	39.8	31.5	38.3
Shigellosis	1.9	0.0	0.9	0.6	2.1	0.6	0.0	0.9
Australia								
Campylobacter	**125.5**	**113.0**	**116.2**	**116.2**	**121.0**	**111.1**	**120.3**	**107.8**
Salmonella	**36.2**	**40.0**	**35.2**	**39.0**	**41.3**	**39.9**	**45.4**	**38.9**
Shigellosis	**2.9**	**2.6**	**2.2**	**2.6**	**3.6**	**2.6**	**2.9**	**3.9**

nn not notifiable.

Source: Department of Health and Ageing, Australian Government, National Notifiable Diseases Surveillance System, http://www9.health.gov.au/cda/Source/Rpt_2_sel.cfm, accessed 25 August 2009.

However, by jurisdiction, notification rates varied considerably, with no clear trends over the eight year period. For example:

- in Tasmania campylobacteriosis increased from 122 notified cases per 100 000 population in 2006 to 145 notified cases per 100 000 population in 2007 and then decreased significantly to 95 notified cases per 100 000 population in 2008
- notifications of salmonellosis in Queensland fell from 72 cases per 100 000 population in 2002 to 57 cases per 100 000 population in 2003 before increasing again to 72 cases per 100 000 population in 2004
- in South Australia shigellosis notifications more than doubled in 2008 — 4.2 notified cases per 100 000 population in 2007 compared with 8.6 notified cases per 100 000 population in 2008 (table 3.2).

Reported notification of food-borne illness in New Zealand

The New Zealand Food Safety Authority's 2008 Annual Report, *Concerning Food-borne Disease in New Zealand,* summarises a number of illnesses which could potentially be food-borne conditions. These are listed in table 3.3. Again, it is important to note that the data reflect the number of cases of the illness and not the mode of transmission. For example, cryptosporidiosis, while potentially a food-borne condition, is more likely transmitted from a variety of sources, including people, animals and water.

Similar to Australia, campylobacteriosis is the most frequently reported illness that can be transmitted by food in New Zealand. In 2008, there were 6693 cases or 157 cases per 100 000 population of campylobacteriosis. This was significantly lower than the number of cases reported in recent years. The decline in incidence can partly be attributed to a concerted government and industry effort from late 2007 to reduce the key risks associated with campylobacteriosis in the poultry meat industry (chapter 9).

Giardiasis and salmonellosis were the second and third most frequently reported food-borne illnesses in New Zealand in 2008. The reported rate of salmonellosis has fallen considerably over the past few years in New Zealand — from 65 cases per 100 000 population in 2001 to 32 cases per 100 000 population in 2008. While the reported rate of giardiasis fell between 2001 and 2006, it then subsequently increased in 2008 (table 3.3).

Table 3.3 Illnesses commonly transmitted by food, New Zealand

2001 to 2008, number of cases and notification rate per 100 000 population

		2001	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Campylobacteriosis	no.	10 145	12 494	14 790	12 213	13 836	15 873	12 778	6 693
	rate	271.5	334.3	395.7	326.8	337.6	379.3	302.2	156.8
Cryptosporidiosis	no.	1 208	975	817	612	889	737	924	764
	rate	32.3	26.1	21.9	16.4	21.7	17.6	21.9	17.9
Gastroenteritis[a]	no.	940	1 087	1 025	1 363	557	931	622	690
	rate	25.2	29.1	27.4	36.5	13.6	22.5	14.7	16.2
Giardiasis	no.	1 603	1 547	1 570	1 514	1 231	1 214	1 402	1 662
	rate	42.9	41.4	42.0	40.5	30.0	29.0	33.2	38.9
Hepatitis A	no.	61	106	70	49	51	123	42	91
	rate	1.6	2.8	1.9	1.3	1.2	2.9	1.0	2.1
Listeriosis	no.	18	19	24	26	20	19	26	27
	rate	0.5	0.5	0.6	0.7	0.5	0.5	0.6	0.6
Salmonellosis	no.	2 417	1 880	1 401	1 081	1 382	1 335	1 274	1 346
	rate	64.7	50.3	37.5	28.9	33.7	31.9	30.1	31.5
Shigellosis	no.	157	112	87	140	183	102	129	113
	rate	4.2	3.0	2.3	3.7	4.5	2.4	3.1	2.6
VTEC/STEC	no.	76	73	104	89	92	87	100	128
	rate	2.0	2.0	2.8	2.4	2.5	2.1	2.4	3.0
Yersiniosis	no.	429	476	439	420	407	487	502	509
	rate	11.5	12.7	11.7	11.2	9.9	11.6	11.9	11.9

[a] Cases of gastroenteritis from a common source or food-borne intoxication such as staphylococcal.

Sources: NZFSA (2006-08); Population and Environmental Health Group (2001–2008).

Food-borne outbreaks

Outbreaks, defined as a situation in which two or more people experience a similar illness after eating a common food or meal, are another measure of the prevalence of food-borne illness. Outbreak data are generally more reliable than notifications data because outbreaks are more likely to be reported and investigated than sporadic cases even though there is evidence that sporadic cases cause far more illness than do recognised outbreaks.

In 2007 there were 149 food-borne outbreaks or 0.7 outbreaks per 100 000 population reported in Australia. Nearly 2300 people were affected, over 260 people were hospitalised and five people died as a result of these outbreaks.

The Northern Territory recorded the highest rate of outbreaks — over two outbreaks per 100 000 population, significantly higher than the national average of 0.7 outbreaks per 100 000 population. Conversely, relatively low rates of food-borne outbreaks were recorded in South Australia and Western Australia — both recording about 0.4 outbreaks per 100 000 population in 2007. The majority of people affected (36 per cent) and hospitalised (70 per cent) were in New South Wales. All five fatalities in 2007 were recorded in Victoria (although in the three preceding years Victoria recorded no fatalities associated with food-borne outbreaks) (table 3.4).

Table 3.4 **Food-borne outbreaks, summary statistics — 2003 to 2007**

	NSW	*Vic*	*Qld*	*SA*	*WA*	*Tas*	*NT*	*ACT*	***Aus***
Number of outbreaks									
2003	29	20	30	1	8	1	7	3	**99**
2004	43	21	27	17	2	1	2	5	**118**
2005	19	27	32	6	5	6	2	5	**102**
2006	44	21	28	7	5	1	3	3	**115**[a]
2007	53	36	32	6	9	5	5	3	**149**
Outbreaks per 100 000 population									
2003	0.43	0.41	0.79	0.07	0.41	0.21	3.53	0.93	**0.50**
2004	0.64	0.43	0.71	1.11	0.10	0.21	1.01	1.55	**0.59**
2005	0.07	0.54	0.81	0.39	0.25	1.24	0.99	1.54	**0.50**
2006	0.64	0.41	0.69	0.45	0.24	0.20	1.45	0.91	**0.56**
2007	0.77	0.69	0.77	0.38	0.43	1.01	2.33	0.88	**0.71**
Number of people affected									
2003	521	499	311	6	182	22	110	35	**1 686**
2004	635	550	254	153	119	57	14	294	**2 076**
2005	246	808	292	163	198	205	9	51	**1 972**
2006	496	293	403	65	92	9	26	27	**1 411**
2007	829	642	406	115	171	55	26	46	**2 290**
Hospitalisations									
2003	29	27	28	1	7	2	4	7	**105**
2004	45	37	20	10	0	0	2	2	**116**
2005	24	40	69	5	13	10	1	4	**166**
2006	65	18	23	8	4	2	5	1	**126**
2007	187	39	19	0	16	2	3	0	**266**
Fatalities									
2003	1	1	2	0	1	0	0	1	**6**
2004	0	0	0	2	0	0	0	0	**2**
2005	1	0	3	0	0	0	0	0	**4**
2006	0	0	0	0	0	0	0	0	**0**
2007	0	5	0	0	0	0	0	0	**5**

[a] The total includes three outbreaks across multiple states.
Source: OzFoodNet (2003–2007).

Although investigators could not identify a specific food vehicle in 40 per cent of outbreaks, contaminated seafood was identified as the most common food vehicle for an outbreak. However, the most number of people affected and hospitalised resulted from outbreaks where mixed foods were identified as the food source. Fresh produce, eggs and desserts were also identified as high risk foods (table 3.5).

Table 3.5 **Outbreaks by food source, Australia — 2007**

	Number of outbreaks	*Number of people affected*	*Number hospitalised*
Seafood	20	117	7
Mixed foods	13	550	151
Egg-containing dish	11	129	15
Dessert	9	124	23
Meat and meat products	7	46	3
Fresh produce	7	186	13
Poultry	5	41	1
Water	4	85	3
Beverage	3	16	2
Dips	2	77	10
Egg-based sauce/dressing	2	31	9
Pasta	2	34	0
Sushi	2	35	5
Cheese	1	10	0
Sandwich	1	6	0
Unknown	60	803	24
Total	**149**	**2 290**	**266**

Source: OzFoodNet (2007).

Restaurants were the most likely setting for an outbreak to occur. In 2007, 57 outbreaks or 38 per cent of all outbreaks were sourced to a restaurant. The majority of people affected by food outbreaks was also sourced to restaurants — of the 2290 people affected by a food-borne outbreak in 2007 the majority (31 per cent or 714 people) were affected by restaurant food. Bakeries, commercial caterers and takeaway businesses were also relatively high-risk settings for outbreaks (table 3.6).

Over the past five years, the number of reported outbreaks has ranged from 100 to 150 a year (or between 0.5 and 0.7 outbreaks per 100 000 population), with no clear trend evident. The number of people affected by food-borne outbreaks was highest in 2007 (2290 people affected) and lowest in 2003 (1411 people affected). Hospitalisations were also highest in 2007 (266 people hospitalised) and lowest in 2003 (105 people hospitalised). Over the same (2003 to 2007) period, the number of fatalities recorded from food-borne outbreaks ranged from no deaths in 2006 to six deaths in 2003 (table 3.4).

At the jurisdictional level, there has been considerable volatility in outbreak data annually. For example:

- in Tasmania, there were six reported outbreaks in 2005 compared with one outbreak in 2004 and 2006
- in South Australia, there was one reported outbreak in 2003 compared with 17 outbreaks in the following year
- in New South, there were 187 hospitalisations for food-borne outbreaks in 2007, compared with only 65 in the previous year
- in Victoria, 808 people were affected by food-borne outbreaks in 2005 compared with only 293 people affected in 2006
- in the ACT, 294 people were affected by food-borne outbreaks in 2004 compared with only 35 people affected in the previous year (table 3.4).

Outbreak data by food source and setting is collected for each jurisdiction, however numbers are small and standard errors too high for analysis.

Table 3.6 **Outbreaks by preparation setting, Australia — 2007**

Setting prepared	*Number of outbreaks*	*Per cent of total outbreaks*	*Number of people affected*	*Per cent of total people affected*
Restaurant	57	38	714	31
Private residence	17	11	134	6
Takeaway	15	10	152	7
Commercial caterer	12	8	285	12
Aged care facility	10	7	107	5
Primary produce	9	6	79	3
Institution	6	4	108	5
Bakery	5	3	413	18
Camp	4	3	85	4
Other	4	3	84	4
Unknown	3	2	94	4
Commercial manufacturer	3	2	17	1
Cruise/airline	1	1	8	0
Hospital	1	1	4	0
Fast food restaurant	1	1	4	0
Grocery store/delicatessen	1	1	2	0
Total	**149**	**100**	**2 290**	**100**

Source: OzFoodNet (2007).

In New Zealand, the number of reported food-borne outbreaks ranged from 74 in 2007 to 183 in 2005, with no clear trend evident. The number of people affected was highest in 2008 when there were 89 food-borne outbreaks affecting over 1200

people. The main food types that could be identified in the 2008 outbreaks were seafood and meat (tables 3.7 and 3.8).

Table 3.7 **Food-borne outbreaks, New Zealand — 2003 to 2008**

	Number of outbreaks	*People affected*
2003	144	638
2004	116	630
2005	183	753
2006	146	909
2007	74	611
2008	89	1 206

Source: Population and Environmental Health Group (2003–2008).

Table 3.8 **Outbreaks by food source, New Zealand — 2008**

	Number of outbreaks[a]	*People affected*
Seafood	14	227
Meat	10	122
Fish	9	29
Rice/noodles/pasta	8	75
Poultry	7	94
Fresh produce	6	88
Eggs	4	38
Infected food handler	3	67
Sandwich/burger	3	15
Pulses	2	24
Dairy	2	4
Flour	1	67
Honey	1	22
Water	1	4
Unspecified	3	324
No source identified	35	238
Total	**89**	**1 206**

[a] More than one outbreak source was listed in some outbreaks.

Source: Population and Environmental Health Group (2008).

Food recalls

Food recalls are actions taken to remove from sale, distribution and consumption foods that may pose an unacceptable risk to consumers. Data collected on food recalls can be used to identify problems occurring in the food industry as well as informing food businesses which hazards are occurring most frequently. FSANZ

coordinates and monitors food recalls within Australia. Recalls occur in consultation between state and territory authorities and a sponsor who is usually the product's supplier, for example, the manufacturer or the importer (FSANZ 2009d).

Food recall data in Australia is published only at the national level. In 2008 there were 51 recalls. The majority of products were recalled for foreign matter, microbiological, and labelling reasons (table 3.9). Recalls can be initiated as a result of reports referred from a variety of sources — manufacturers, wholesalers, retailers, medical practitioners, government agencies and consumers — but many are initiated by food companies themselves. In 2008, the majority of recalls occurred because of company testing or consumer complaint (table 3.10).

Table 3.9 **Number of recalls by reason, Australia — 2001 to 2008**

	Micro biological	*Foreign matter*	*Chemical*	*Labelling*	*Processing faults or deterioration*	*Other*	***Total***
2001	22	14	16	9	2	2	**65**
2002	26	6	13	8	4	1	**58**
2003	26	10	8	40	2	0	**86**
2004	19	10	3	34	4	0	**70**
2005	14	10	4	23	4	5	**60**
2006	18	18	3	23	5	1	**68**
2007	22	14	3	13	1	1	**54**
2008	15	16	4	12	2	2	**51**

Sources: 2001 to 2007 data from FSANZ (2009c); 2008 data provided by FSANZ.

Table 3.10 **Recalls by initiation source, Australia — 2001 to 2008**

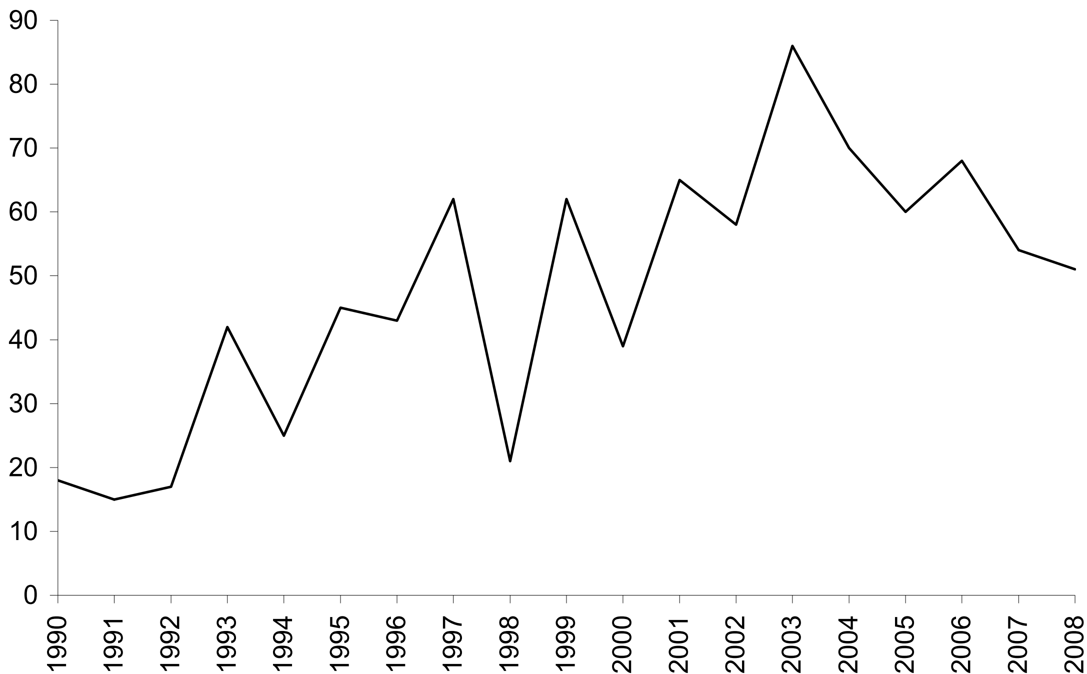
	Company testing	*Government testing*	*Consumer complaint*	*Other*	***Total***
2001	11	24	23	7	**65**
2002	14	22	19	3	**58**
2003	27	34	22	3	**86**
2004	11	18	35	6	**70**
2005	11	16	30	3	**60**
2006	16	16	31	5	**68**
2007	20	7	22	5	**54**
2008	21	5	20	5	**51**

Source: Data provided by FSANZ (unpublished).

Between 1990 and 2003, the number of food recalls was generally upwards trending, but since 2003 there has been a noticeable downward trend in the number of food recalls (figure 3.1). However, there has been considerable variation in the

number of recalls recorded annually. Of particular significance, the introduction of more stringent food labelling requirements (relating to allergens) in 2002 coincided with a sharp rise in the proportion of recalls caused by labelling problems. The number of recalls resulting from labelling problems increased from 8 recalls in 2002 to 40 recalls in 2003 but has since been declining steadily (table 3.9).

Figure 3.1 **Number of food recalls, Australia — 1990 to 2008**



Data sources: 2001 to 2007 data from FSANZ (2009d); 2008 data provided by FSANZ.

Since 2001 there has been a steady decline in the number of recalls for chemical reasons (from 16 recalls in 2001 to 4 recalls in 2008). Over the same period, the number of recalls for microbiological, foreign matter and processing faults or deterioration remained relatively stable (table 3.9).

In recent years, there has been a gradual shift away from the share of total recalls initiated by government testing towards recalls initiated by company testing. In 2001, 37 per cent of recalls were initiated by government testing and 17 per cent from company testing. By 2008 the share of recalls from government testing had fallen to 10 per cent and the share of recalls from company testing had increased to over 41 per cent (table 3.10).

In New Zealand, food recalls are co-ordinated by the New Zealand Food Safety Authority (NZFSA). The NZFSA has been collecting data since 2001. In 2008 there were 17 food recalls in New Zealand, the majority for foreign matter or allergen reasons.

Between 2001 and 2008 the number of food recalls in New Zealand ranged from 11 in 2002 to 36 in 2003. As in Australia, after December 2002, when mandatory warning statements on labels for food allergens were introduced, there was a sharp increase in the number of recalls due to allergens, but since 2005 recalls relating to allergens have fallen significantly (table 3.11).

Table 3.11 **Number of food recalls, New Zealand — 2001 to 2008**

	Microbiological	*Foreign matter*	*Allergen*	*Quality*	*Chemical*	***Total***
2001	8	9	1	2	2	**22**
2002	0	8	1	0	2	**11**
2003	3	7	21	2	3	**36**
2004	8	7	12	0	2	**29**
2005	4	1	16	0	0	**21**
2006	5	10	6	2	3	**26**
2007	6	7	6	1	0	**20**
2008	4	7	5	0	1	**17**

Source: NZFSA (2009h).

3.3 Outcomes and regulation

It is difficult to draw conclusions on the performance of food safety regulation from outcomes data.

Firstly, there are data limitations. Notifications of food-borne illness are severely underreported — only a few food-borne illnesses are notifiable and many cases of foodborne illness, although notifiable (such as salmonellosis) are unreported because of their short duration and mild nature. Food-borne disease outbreaks and food recall statistics are more likely to be accurately investigated and reported. However, with relatively small numbers, the data are subject to considerable annual variability making it difficult to identify trends over time.

Secondly, notwithstanding data limitations, it is usually impossible to link changes in outcomes with particular regulatory changes. Even attributing better or worse performance to whole regulatory regimes is dubious. A higher incidence of food safety incidents might reflect better reporting due to better management by the regulators. In addition, there is a broad range of factors which make it difficult to isolate the impact of regulation from other non-regulatory determinants of food safety outcomes. These include a company's own efforts to manage food safety in order to maintain viability and reputation, changes in production processes, changing demographic characteristics, cultural shifts in food preferences and the

settings in which they are consumed, general economic conditions and variations in seasonal weather conditions.

Finally, outcome indicators have been criticised for being backward-looking. For example, it can be argued that outcome indicators give no information about how well food safety is currently being managed. Indeed, it is not unusual that investigations into an outbreak or recall reveal that the company previously had a good food safety record.

At best, the data provide the regulator with an indication of the types of foods and preparation areas where there are higher risks and regulation may need to be more focussed. For example, food-borne outbreak data in Australia in 2007 found that:

- the Northern Territory had a significantly higher risk of an outbreak (per 100 000 population) than any other state and territory in Australia
- most outbreaks were caused by contaminated seafood
- most people were affected from contamination of mixed foods
- fresh produce, eggs and desserts were also high risk foods
- restaurants were the most likely preparation setting for an outbreak
- most people were affected by food prepared by a restaurant, bakery, commercial caterer or takeaway food outlet.

The limited usefulness of outcomes data was described as follows by the Department of Health and Ageing:

> Foodborne diseases are useful to highlight particular problems with sectors of the food safety system, but not good enough to use to benchmark the functioning of the system. The main reason for this is that foodborne illness is a rare event that occurs due to many different causes, making it difficult to link back to specific systemic breaches in the food supply system. We do observe increases in outbreaks associated with certain foods that we know are related to food safety breaches in industry sectors, but these are useful only as evidence of a problem, not for monitoring trends. (sub. 20, p. 1)

Outcomes data do not usually help to judge the effectiveness of a particular regulation, let alone particular aspects of a regulation. However, when used in conjunction with current indicators (such as the number of inspectors, number of food inspections conducted and percentage of sub-standard conditions identified) and intermediate indicators (relating to changes in food control practices), such information provides a broad context for benchmarking different approaches to food safety regulation.