

Enteric Diseases in South Canterbury Meat Processors and Farm Workers

A review of notifications 2005–14



Canterbury

District Health Board

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FOREWORD

This report has been produced to determine the incidence over the past 10 years of the major notifiable enteric diseases in certain occupations with increased risk exposure, in order to decide if action is required to reduce their incidence.

Document availability

This document will be available internally on the Community and Public Health Intranet.

INTRODUCTION

This report supersedes the previous Community and Public Health documents of 2010 and 2013 that analysed the South Canterbury 2005–2009 and 2010–2012 notification data for the most common enteric diseases with respect to meat processors and farm workers.

For this report, EpiSurv¹ notification data from 2005–14 relating to persons in the workforce² aged 15–64 years have been analysed (in five year time series) for the most common enteric diseases (campylobacteriosis, cryptosporidiosis, giardiasis, salmonellosis and yersiniosis). Verotoxin *E. coli* (VTEC) data was not included as there was only one notification in an occupation of interest during that time.

The same occupational groupings have been used as in the previous reports (Appendix tables A1 and A2).³ Occupations of interest, because of their exposure to animals and animal products, are referred to as At-risk occupations and comprise three main groups: meat processors, dairy farm workers and other farm workers. In this report the term farm workers refers to both farmers and farm workers.

This document differs from the previous reports in two ways. Firstly, it compares the rates of diseases in the At-risk groups with the Other occupations as an indication of the increased risk due to occupation (attributable risk⁴) and secondly, an adjustment has been made for the number of persons in occupations estimated to be aged 65 years and over.⁵

RESULTS

General

- Notifications are an underestimate of the incidence of enteric diseases from a data perspective because 12 percent and 13.1 percent of notifications aged 15–64 years in 2005–09 and 2010–14 respectively had no occupation stated.
- Persons in At-risk occupations comprised approximately 14 percent of the workforce but accounted for more than 30 percent of enteric notifications (Table 1).

Specific

- i. Average annual campylobacteriosis notifications decreased 46 percent in Other occupations and 24 percent in At-risk occupations from 2005–09 to 2010–14 (Table 2, Figure 1). This decrease was in line with the decrease in incidence that occurred throughout New Zealand generally from 2005–09 (Figure 2) coinciding with the introduction of a range of voluntary and regulatory interventions to reduce *Campylobacter* spp. contamination of poultry.⁶

¹ Environmental Science and Research (ESR) national notifiable disease database

² Those for whom an occupation was stated. Persons regarded as not in the workforce and not included in the analyses consisted of the following: unemployed, mothers, students, beneficiaries, retired persons and those for whom no occupation was stated.

³ Statistics New Zealand, 2006 and 2013 census, occupation data, full and part time workers in South Canterbury

⁴ The difference in rates between the exposed and unexposed populations

⁵ There is no upper limit of age for the NZ Statistics occupation data. The populations of workers therefore were reduced by 2.9% (2005-09) and 4.2% (2010–14) to derive estimates of the workforce population aged 15–64 years, as these were the percentages of enteric notifications aged greater than 64 years with a known occupation.

⁶ Sears A, Baker MG, Wilson N, Marshall J, Muellner P, Campbell DM, et al. Marked campylobacteriosis decline after interventions aimed at poultry, New Zealand. *Emerg Infect Dis.* 2011 Jun; 17(6): 1007–1015

- ii. Campylobacteriosis comprised 72 percent of the enteric notifications in the South Canterbury workforce from 2005–2014.
- iii. Attributable risk³ for campylobacteriosis in At-risk occupations in 2005–09 was 718 per 100,000 population and in 2010–14 was 614 per 100,000 (Table 3). For meat processors and dairy farm workers the attributable risks were considerably higher (Table 4).
- iv. The differences in the rates of diseases between the At-risk and Other occupations within both time series were highly significant for campylobacteriosis and cryptosporidiosis, and for salmonellosis in 2005–2009 (Table 4).
- v. Over the 10 year timeframe 2005–2014, a person in the At-risk occupations group had significantly greater risk of developing either giardiasis ($p=0.016$) or salmonellosis ($p=0.001$) compared to a person in the Other occupations group (Table 4). However, there was no significant difference in the risk of developing yersiniosis ($p=0.259$).
- vi. The increased likelihood of developing campylobacteriosis or cryptosporidiosis in 2010–2014 was quantified for workers in the specific At-risk occupations (when compared with Other occupations). The likelihood of developing campylobacteriosis ranged from 12 times in meat processors to double in other farm workers. For the At-risk occupations as a group, the likelihood was four times for developing cryptosporidiosis (Table 5).
- vii. The reduction in the average annual rates of diseases for the various occupations from 2005–2009 to 2010–2014 was only significant for campylobacteriosis in Other and At-risk occupations (Table 6) (see i above). The reduction in campylobacteriosis in meat processors was marginally significant ($p=0.07$).

Table 1 Percentage of enteric notifications* due to At-risk occupations 2005–09 and 2010–14

	Campylobacteriosis		Enteric diseases excluding campylobacteriosis		All Enteric diseases	
	2005–09	2010–14	2005–09	2010–14	2005–09	2010–14
Percentage of enteric notifications in the workforce, that were in persons in At-risk occupations	35%	43.2%	32.7%	26.6%	34.5%	37.4%
Percentage of the workforce that were in At-risk occupations	14.1%	13.8%	14.1%	13.8%	14.1%	13.8%

* of persons in the workforce aged 15 – 64 years

Table 2 Average annual numbers of enteric notifications for specific At-risk occupations and Other occupations 2005–09 and 2010–14.

	Campy.		Crypto.		Giardiasis		Salmonellosis		Yersiniosis	
	'05-'09	'10-'14	'05-'09	'10-'14	'05-'09	'10-'14	'05-'09	'10-'14	'05-'09	'10-'14
Other occupations	70	38	8	8	3	8	7	8	4	2
Meat processor	21	15	1	1	<1	<1	1	<1	<1	<1
Dairy farm worker	7	8	2	3	<1	0	2	1	<1	<1
Other farm worker	10	6	2	2	1	1	1	1	<1	<1
At-risk occupations	38	29	5	5	2	1	3	2	1	1

Figure 1 Average annual enteric disease notification rates (per 100,000 population) by occupational grouping, 2005–09 and 2010–14

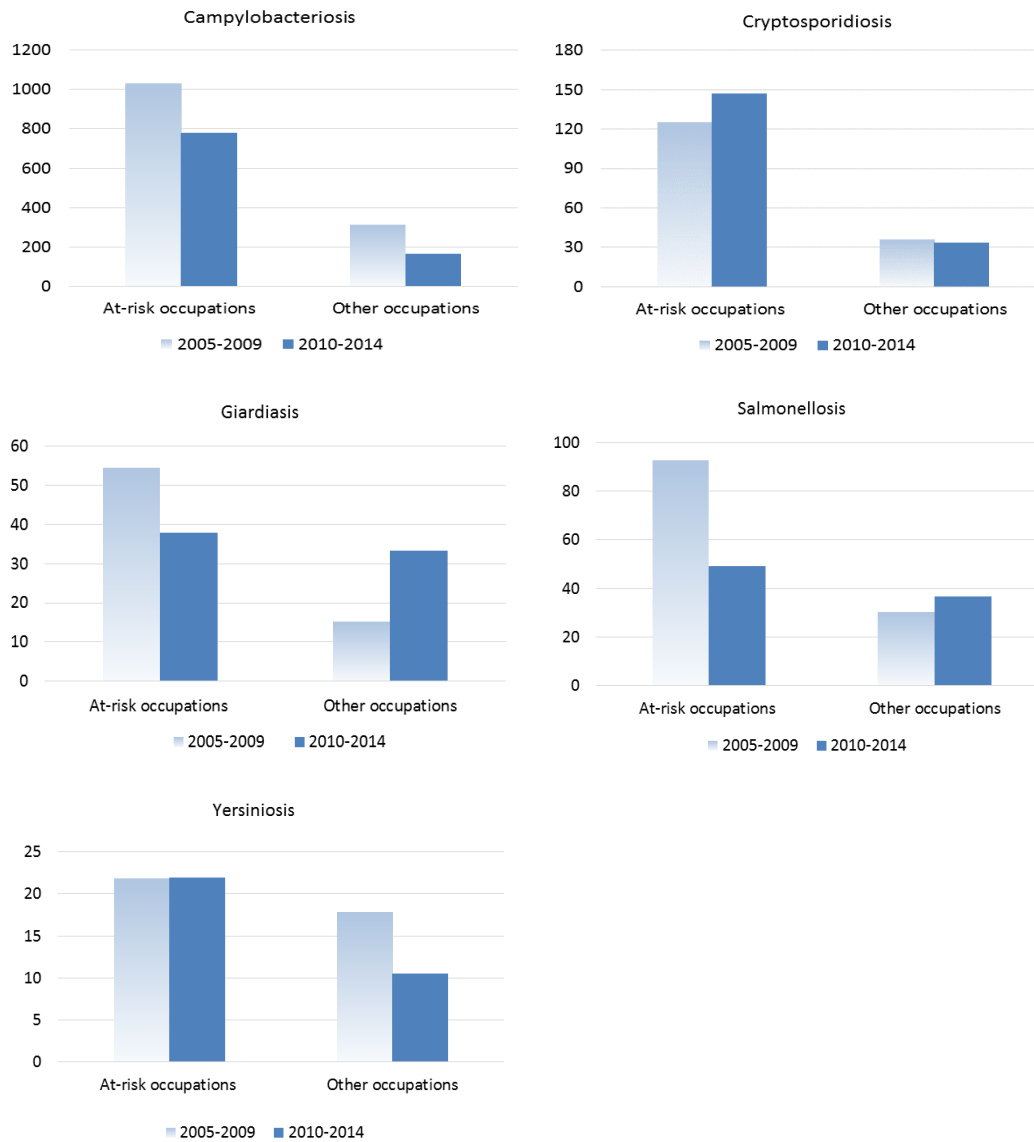


Figure 2 Campylobacteriosis rates in South Canterbury, the South Island and nationally, 2003-2014

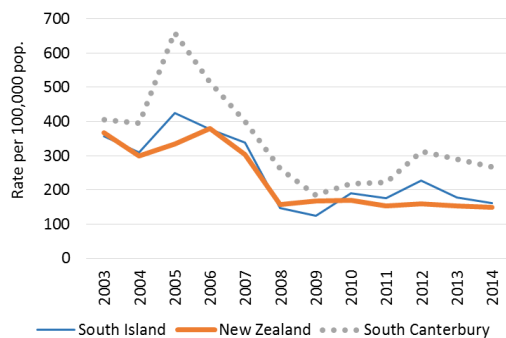


Table 3 Attributable risks (per 100,000 population) in At-risk occupations for diseases with more than 20 notifications in 5 years*

	Campylobacteriosis	Cryptosporidiosis	Salmonellosis	Enteric diseases excluding campylobacteriosis	Total enteric diseases
Attributable risk 2005-09	718	90	62	196	914
Attributable risk 2010-14	614	114		142	757

*see Small Numbers paragraph below

Table 4 Comparison of the average annual rates (per 100,000 population) of certain enteric diseases in 2005-09, 2010-14 and 2005-2014, between At-risk occupations and Other occupations (p values)

	2005-09			2010-14			2005-2014	
	Campy.	Crypto.	Salm.	Campy.	Crypto.	Salm.	Giard.	Salm.
Other occupations	313	36	30	165	33	37	24	34
Meat processors	2573 (<0.001)			1916 (<0.001)				
Dairy farm workers	1336 (<0.001)			896 (<0.001)				
Other farm workers	415 (0.07)			311 (0.004)				
At-risk occupations	1031 (<0.001)	126 (<0.001)	93 (<0.001)	779 (<0.001)	147 (<0.001)	49 (0.43)	47 (0.016)	71 (0.001)

Table 5 The increased likelihood of developing campylobacteriosis or cryptosporidiosis in At-risk occupations compared with Other occupations, 2010–14*‡

	campylobacteriosis	cryptosporidiosis
Meat processors	x12	
Dairy farm workers	x5	
Other farm workers	x2	
At-risk occupations	x5	x4

* Where the differences in rates were statistically significant (Table 4)

‡ The differences in rates were not statistically significant for any of the At-risk occupations whether individually or as a group for giardiasis, salmonellosis and yersiniosis either separately or combined.

Small Numbers

- Rates are unstable for diseases in specific occupations with less than 20 notifications in five years (Table 2) and statistical significance has not been calculated for those results.
- The problem of small numbers and unstable rates is particularly evident with respect to cryptosporidiosis, giardiasis and salmonellosis in dairy farm workers and yersiniosis in meat

processors. For these results the marked differences in rates between 2005-09 and 2010-14 (Figure 4) are not supported by any notification trends over time (Figures 5 and 6).

Figure 4 Comparison of the average annual enteric disease notification rates (per 100,000 population) in the specific At-risk and Other occupations between 2005–09 and 2010–14

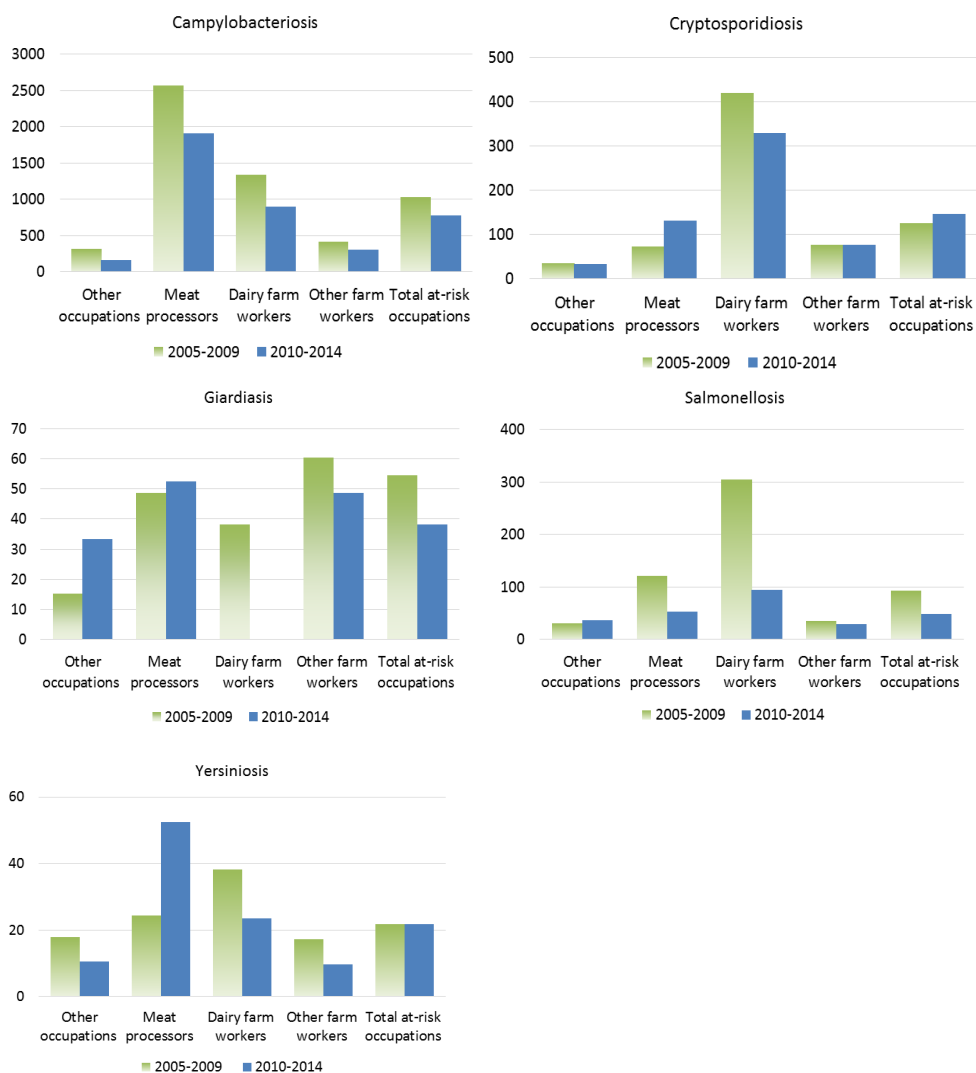


Table 6 Comparison of the average annual rates (per 100,000 population) of enteric diseases in specific At-risk and Other occupations between 2005-09 and 2010-14

	Campylobacteriosis			Enteric diseases excluding campylobacteriosis		
	2005-09	2010-14	p value	2005-09	2010-14	p value
Other occupations	313	165	<0.001	99	114	0.28
Meat processor	2573	1916	0.07	267	289	0.86
Dairy farm worker	1336	896	0.61	802	448	0.86
Other farm worker	415	311	0.11	190	165	0.51
At-risk occupations	1031	779	0.01	295	256	0.49

Figure 5 Notifications by year for cryptosporidiosis, giardiasis and salmonellosis in dairy farm workers

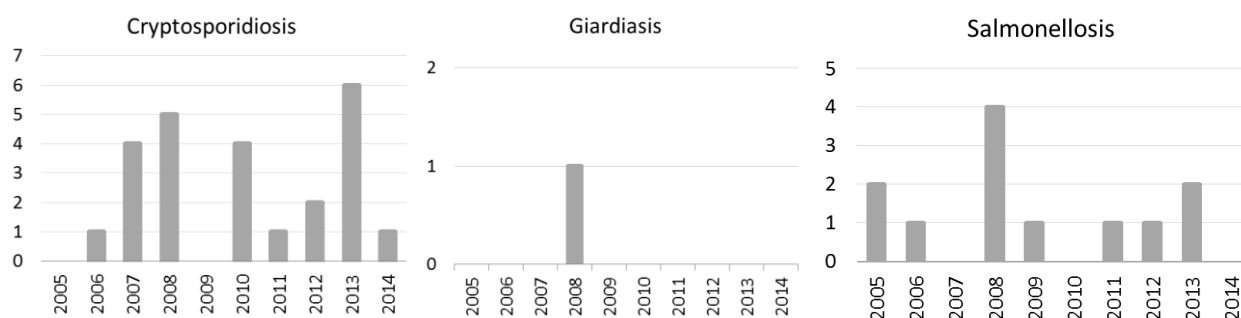
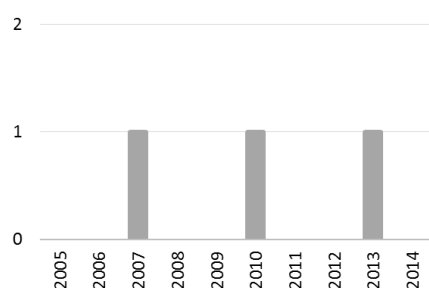


Figure 6 Notifications by year for yersiniosis in meat processors



SUMMARY

- The incidence of notifiable enteric diseases from 2005–2014 in At-risk occupations in South Canterbury was dominated by campylobacteriosis.
- The increased rates of disease in the At-risk occupations when compared with Other occupations in both 2005–09 and 2010–14 were highly significant for campylobacteriosis and cryptosporidiosis.
- In 2010–2014 meat processors were 12 times more likely to develop campylobacteriosis and dairy farm workers five times more likely when compared with workers in Other occupations. For the At-risk occupations as a group, the increased risk for cryptosporidiosis was four times.
- The only significant decreases in enteric disease rates between 2005-09 and 2010-14 were in campylobacteriosis in both the At-risk and Other occupations. This decrease was associated with an intervention in the poultry industry at the time that resulted in a nation-wide reduction in incidence.

APPENDIX**Table A1 2006 and 2013 census occupations (South Canterbury)**

	Numbers in occupations ⁷	
	2006	2013
Meat processors	849	795
Dairy farm workers	540	885
Other farm workers	2,385	2,151
Other occupations	23,085	23,856
Total	26,859	27,687

Table A2 Occupational categories included in the three occupational groups:Meat processor

- Meat Boner and Slicer
- Slaughterer
- Meat Process Worker
- Poultry Process Worker
- Butcher or Smallgoods Maker
- Meat Inspector

Other farm worker

- Crop Farmers
- Crop Farm Workers
- Mixed Crop Farmer
- Beef Cattle Farmer
- Beef Cattle Farm Worker
- Deer Farmer
- Goat Farmer
- Farm, Forestry and Garden Workers

Dairy farm worker

- Dairy Cattle Farmer
- Dairy Cattle Farm Worker

- Horse Breeder
- Livestock Farmers
- Livestock Farm Workers
- Mixed Livestock Farmer
- Mixed Livestock Farm Worker
- Pig Farmer
- Poultry Farmer
- Poultry Farm Worker

- Sheep Farmer
- Sheep Farm Worker
- Mixed Crop and Livestock Farmer
- Mixed Crop and Livestock Farm Worker
- Shearer
- Stablehand

⁷ Refer to ⁴ with regards to the populations used in calculating rates in this report.