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The Epidemiology of Human Salmonellosis, Campylobacteriosis, Cryptosporidiosis, Shigellosis and VTEC infection in the Health Service Executive Mid-Western Area, 2001 to 2004

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Introduction:

Each year there are thousands of cases of food-poisoning and gastroenteritis reported in Ireland.[1] These categories include cases that are caused by a variety of viral, bacterial and protozoal pathogens. Most reported cases are likely to be of viral aetiology. Very young children are especially prone to rotavirus infection. In the last two years hundreds if not thousands of cases of viral gastroenteritis were caused by norovirus infection (also known as winter vomiting bug, Norwalk-like virus and SRSV). Outbreaks were reported in healthcare institutions – both nationally and in the Health Service Executive (HSE) Mid-Western Area. The main bacterial causes of food-poisoning are campylobacter and salmonella. Verotoxigenic *E. coli* (VTEC) infections are less common but have the potential to cause more serious and life-threatening illness. Cryptosporidium is the most commonly detected protozoal cause of gastroenteritis although occasional detections of Giardia lamblia have been reported recently. All pathogens have the potential to cause substantial outbreaks of disease. Salmonella has been associated with many outbreaks of food-poisoning in Ireland and the HSE Mid-Western Area. Cryptosporidium was identified as the causative organism in a large waterborne outbreak in the Midland Health Board region in recent times.[2]

In 2003, a multi-agency investigation, "Acute Gastroenteritis in Ireland, North and South" published detailed results on a survey of gastroenteritis on the island of Ireland.[4] Subsequently *safe*Food published a report on Acute Gastroenteritis in Ireland, North and South: A Study of General Practitioners.[5] Both reports provide insight into the burden of illness of gastroenteritis and processes in notifying illness. This report details the descriptive epidemiology of laboratory confirmed cases of campylobacteriosis, cryptosporidiosis, salmonellosis, shigellosis and VTEC in the HSE Mid-Western Area (formerly Mid-Western Health Board) from 2001 to 2004.

Sampling Protocols: All faeces samples submitted for investigation are routinely checked for salmonella, VTEC and campylobacter. Samples submitted for investigation on children below 15 years or samples for "ova, cysts and parasites" are routinely checked for cryptosporidiosis. A change to the sample investigation protocol for cryptosporidium in early 2002 means the data between both periods are not comparable but some 2001 data are presented.

Rates in this report, where calculated, are per 100,000 population and are based on the data published by Central Statistics Office for Census 2002.

Census	**2002**
Ireland	3,917,203
HSE-MWA	339,591
Clare	103,277
Limerick	175,304
Tipperary	61,010

Acknowledgements:

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Results:

In the HSE- Mid-Western Area (HSE-MWA) from January 2001 to December 2004, there were 347 reports of campylobacter, 144 reports of cryptosporidiosis and 106 reports of salmonellosis (Table 1).
The HSE-MWA had one of the lowest incidence rates of campylobacter in Ireland in 2004 (Table 2). The Health Protection Surveillance Centre[3] reported a national crude incidence rate (per 100,000 population) of 34.0 in 2002 and 39.9 in 2003 for campylobacter. Annual crude incidence varies dramatically between Areas, the highest rates being detected in the neighbouring Midland, South Eastern and Western Areas (see Map 1). Very little national data is available on cryptosporidium. The crude incidence of salmonellosis appears to be slightly lower in the Mid-Western Area in each year compared to the crude rate reported nationally of 11.5, in 2002 and 12.4 in 2003.

Table 1: Number of reports of campylobacter, cryptosporidium and salmonella in HSE-MWA 2001-2004.

	Organism			Total
Year	**Campylobacter**	**Cryptosporidiosis**	**Salmonellosis**	
2001	62	4	28	94
2002	71	49	33	153
2003	103	48	22	173
2004	111	43	23	177
Total	**347**	**144**	**106**	**597**

In 2003, in Northern Ireland, the annual crude incidence rate (CIR) of 43.8 was reported for campylobacter. CIRs for 'England & Wales' and Scotland for **2004** were 81.0 and 86.3 respectively.
In 2003, in Northern Ireland, a CIR of 8.3 was reported for cryptosporidium. CIRs for 'England & Wales' and Scotland for **2004** were 6.5 and 9.2 respectively. Detection rates in the UK in 2003 rose to the higher levels seen in Ireland. In 2004 there was a large fall in the rate in England & Wales and Scotland.
The CIR of salmonellosis in this Area is much lower than the CIR seen in UK regions. In 2003, in Northern Ireland, a rate of 12.6 was reported for salmonellosis. Rates for 'England & Wales' and Scotland for **2004** were 24.5 and 22.6 respectively.

Table 2: Annual crude incidence rate per 100,000 (CIR) of each pathogen in HSE-MWA, 2001-2004.

	Organism		
Year	**Campylobacter**	**Cryptosporidiosis**	**Salmonellosis**
2001	18.3	1.2	8.2
2002	20.9	14.4	9.7
2003	30.3	14.1	7.1
2004	32.6	12.7	6.8

Includes non-HSE-MWA residents.

The population estimates for CCA are not as reliable as county estimates so rates are based on county population.
Ten cases of campylobacteriosis were diagnosed in non-HSE-MWA residents. In most years, the rate of campylobacteriosis in Tipperary North was particularly high compared to other areas (Table 3a). Over the last three years there has been a constant rise in incidence of campylobacteriosis in the Mid-Western Area. The incidence rate in Ireland was falling between 1999 and 2002 but increased in 2003. The crude incidence rate in the Mid-Western Area was still significantly lower than

the national rate in 2003 (p=0.006). In very rare instances there can be sequelae to campylobacter infection, most notably an association with Guillain-Barré syndrome.

Table 3a: Annual incidence rate for campylobacteriosis by county, 2001 – 2004.

	County							
	Clare		**Limerick**		**Tipperary N**		**HSE-MWA**	
	Cases	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
2001	14	13.6	23	13.1	20	32.8	57	16.8
2002	18	17.4	41	23.4	11	18	70	20.6
2003	25	24.2	51	29.1	21	34.4	97	28.5
2004	32	30.9	49	28.0	26	42.6	107	31.5
Total	**89**		**164**		**78**		**331**	

Rate expressed per 100,000 population. Excludes cases from outside HSE-MWA.

In 2003, one case of cryptosporidiosis was in a non-HSE-MWA resident. In 2004, one case of cryptosporidiosis was recorded in a non-HSE MWA resident. In comparison to Clare and Limerick, the rate of cryptosporidiosis in Tipperary North appeared to be very low in 2001-2 but this annual incidence rose in 2003-4 (Table 3b).

Table 3b: Annual incidence rate for cryptosporidiosis by county, 2001 – 2004.

	County							
	Clare		**Limerick**		**Tipperary N**		**HSE-MWA**	
	Cases	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
2001	2	2.0	1	1.1	0	-	3	0.9
2002	15	14.5	31	17.7	3	4.9	49	14.4
2003	15	14.5	25	14.3	7	11.5	47	13.8
2004	15	14.5	9	5.1	18	29.5	42	12.4
Total	**47**		**66**		**28**		**141**	

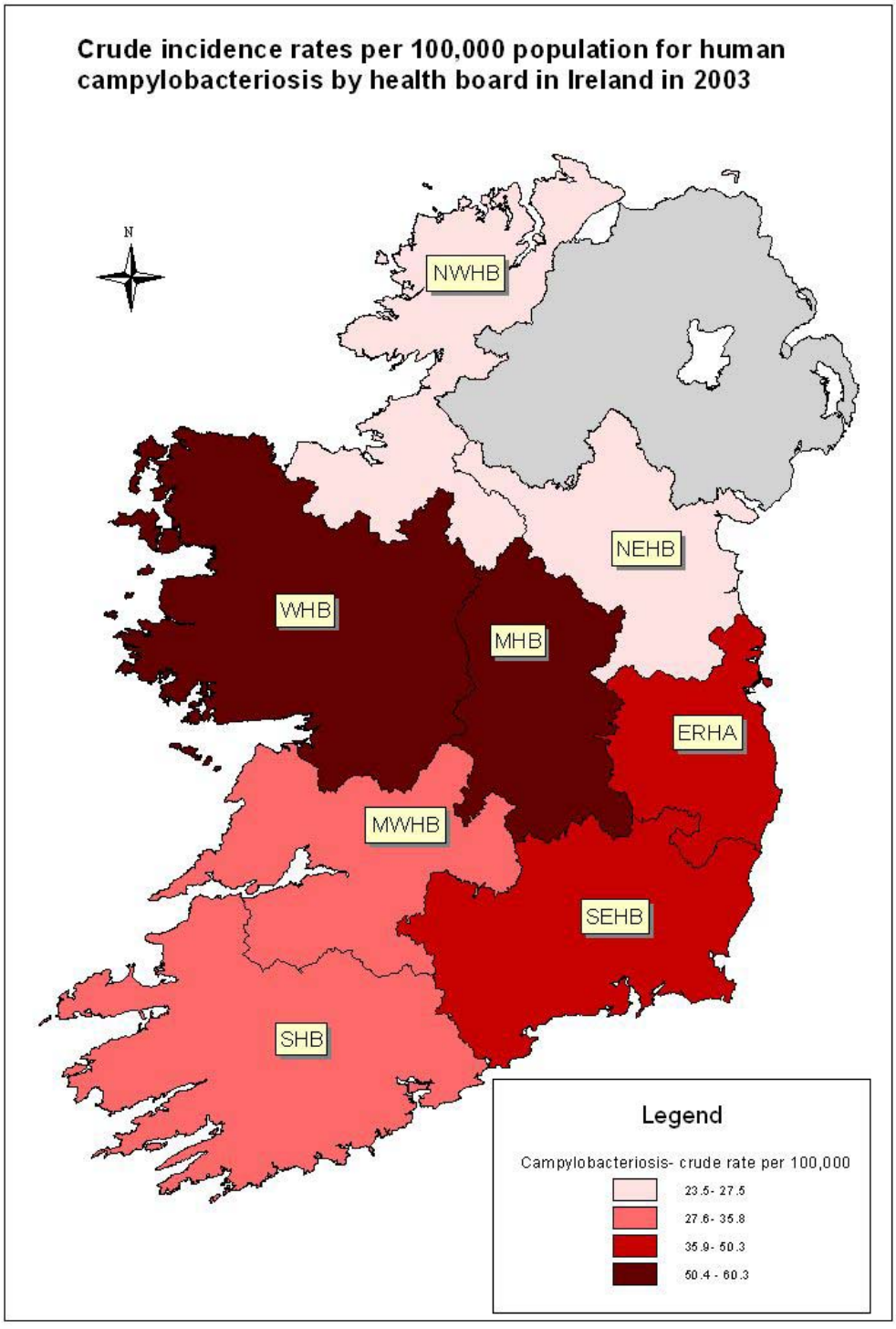
Rate expressed per 100,000 population. Excludes cases from outside HSE-MWA.

In 2002, the rate of salmonellosis in Tipperary North was particularly high compared to the low rate in Clare (Table 3c). In 2003, two cases of salmonellosis were isolated in non-HSE-MWA residents. In 2004, six cases of salmonellosis were recorded in non-HSE-MWA residents. Two cases of *S.* Typhi were recorded and are only included in table 11.

Table 3c: Annual incidence rate for salmonellosis by county, 2001 – 2004.

	County							
	Clare		**Limerick**		**Tipperary N**		**HSE-MWA**	
	Cases	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**	**Cases**	**Rate**
2001	7	7.4	17	10.3	3	5.2	27	8.5
2002*	4	4.3	19	11.5	9	15.5	32	10.1
2003	3	2.9	12	6.9	7	11.5	22	6.5
2004	5	4.8	10	5.7	2	3.3	17	5.0
Total	**19**		**58**		**21**		**98**	

*Rate expressed per 100,000 population. *Excludes one case, no address assigned. Excludes cases from outside HSE-MWA.*



Map 1: Crude incidence rates for campylobacter in 2003 by 'Health Board' (Source: NDSC Annual Report 2003).

Seasonality (based on date of isolation when known, or reporting):
Data from INFOSCAN shows campylobacter to have increased at all times of the year since 1998.[6] Prior to 1998, a peak was seen in May-June but the "peak" is less pronounced in recent years (Figure 1).

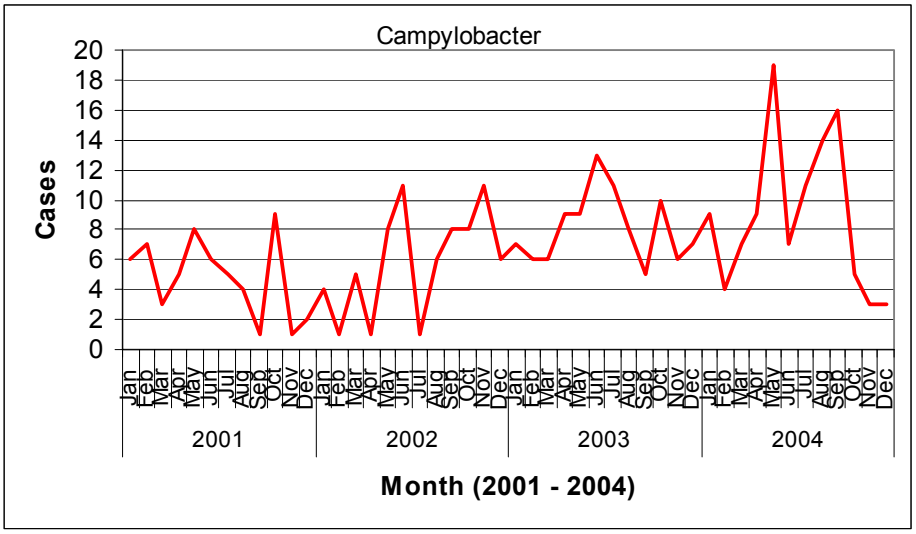


Figure 1: Cases of campylobacter reported in the HSE-MWA, 2001-2004 (n=331).

Reports of cryptosporidiosis show a characteristic seasonal peak in spring but in 2002, a peak was also recorded in autumn (Figure 2). This was not repeated in 2003. In 2003 there were a number of cryptosporidium infections associated with travel abroad – at least two of these cases appear to be associated with the use of recreational swimming pools.

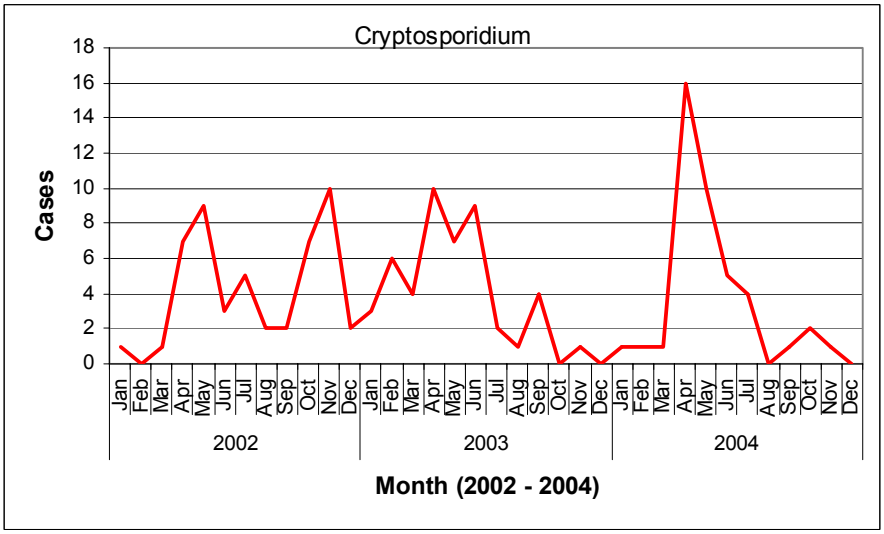


Figure 2: Cases of cryptosporidiosis reported in the HSE-MWA, 2002-2004 (n=138).

Reports of salmonellosis tend to peak in the summer period but the incidence has fallen in recent years and now even small increases can cause a peak at any time over the year (Figure 3).

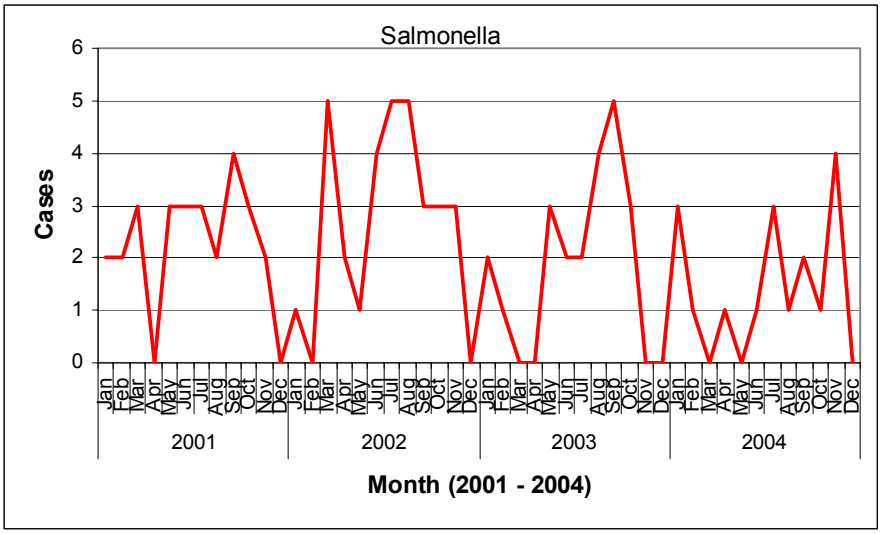


Figure 3: Cases of salmonellosis reported in the HSE-MWA, 2001-2004 (n=98).

Sex Distribution:
From 2001 to 2004, 181 cases of campylobacter were detected in males and 150 in females (Table 4). The male to female ratio was 1:0.8. Apart from some occasional deviations, there appears to be more males than females affected in most years in the regions. Typically more males than females are affected by campylobacteriosis but this trend was reversed in 2001 in the HSE-MWA.

Table 4: Sex distribution of campylobacter by county in HSE-MWA, 2001-2004.

County	**Clare** (n=89)		**Limerick** (n=164)		**Tipperary N** (n=78)		**HSE-MWA**	
Sex	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Year								
2001	5	9	7	16	13	7	25	32
2002	13	5	20	21	7	4	40	30
2003	13	12	26	25	14	7	53	44
2004	19	13	28	21	16	10	63	44
Total	**50**	**39**	**81**	**83**	**50**	**28**	**181**	**150**

From 2002 to 2004, 74 cases of cryptosporidium were detected in males and 64 in females (Table 5). The male to female ratio was 1.2:1. A preponderance of disease in males is seen but rates can vary in each region over the years.

Table 5: Sex distribution of cryptosporidiosis by county in HSE-MWA, 2002-2004.

County	**Clare** (n=45)		**Limerick** (n=65)		**Tipperary N** (n=28)		**HSE-MWA**	
Sex	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Year								
2002	10	5	18	13	1	2	29	20
2003	12	3	13	12	5	2	30	17
2004	3	12	3	6	9	9	15	27
Total	**25**	**20**	**34**	**31**	**15**	**13**	**74**	**64**

From 2001 to 2004, 61 cases of salmonellosis were detected in males and 37 in females (Table 6). The male to female ratio was 1.6:1. This distribution was unusual and particularly apparent in the Tipperary North region and Clare. A large proportion of cases appear to be associated with recent travel. An association between recent travel and cases of *S.* Enteritidis non-PT4 was apparent particularly in 2002 and 2003.

Table 6: Sex distribution of salmonellosis by county in HSE-MWA, 2001-2004.

County	**Clare** (n=19)		**Limerick** (n=58)		**Tipperary N** (n=21)		**HSE-MWA**	
Sex	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Year								
2001	6	1	9	8	1	2	16	11
2002*	2	2	10	9	9	0	21	11
2003	3	0	6	6	5	2	14	8
2004	5	0	5	5	0	2	10	7
Total	**16**	**3**	**30**	**28**	**15**	**6**	**61**	**37**

*Excludes one case not assigned to a county.

Age Distribution:
The age distribution of campylobacter cases was very similar for all three years examined (Table 7). Age specific incidence rates are shown for each year (Figure 4). With campylobacter, the trend mirrors the pattern reported in national statistics, most cases occurred in the very young and a second peak is present in the 25-34 year old age groups and in the oldest age groups.

Table 7: Age distribution of all cases of campylobacteriosis 2001-2004.

	Age Group (Years)										
Year	**0-4**	**5–9**	**10–14**	**15-19**	**20-24**	**25-34**	**35-44**	**45–54**	**55–64**	**65+**	**Total**
2001	22	3	2	3	4	9	4	1	1	8	57
2002	23	2	0	5	6	13	7	3	6	5	70
2003	27	4	5	4	7	15	12	3	6	13	96
2004	38	10	4	2	9	12	7	5	9	11	107
Total	**110**	**19**	**11**	**14**	**26**	**49**	**30**	**12**	**22**	**37**	**330**

The age distribution of cryptosporidiosis cases must be interpreted with consideration to the age threshold in laboratory investigation practice stated in introduction (Table 8 and Figure 5).

Table 8: Age distribution of all cases of cryptosporidiosis, 2002-2004.

	Age Group (Years)										
Year	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-34**	**35-44**	**45-54**	**55-64**	**65+**	**Total**
2002	25	15	2	2	0	4	0	0	0	1	49
2003	31	13	1	0	0	1	0	0	0	1	47
2004	28	10	2	0	0	1	1	0	0	0	42
Total	**84**	**38**	**5**	**2**	**0**	**6**	**1**	**0**	**0**	**2**	**138**

Salmonellae affect a wider age range compared to campylobacter and cryptosporidium but a large proportion of cases still occur in the younger age groups (Table 9 and Figure 6). In 2003, the magnitude of effect in the very young by this pathogen was reduced.

Table 9: Age distribution of all cases of salmonellosis, 2001-2004.

	Age Group (Years)										
Year	**0-4**	**5-9**	**10-14**	**15-19**	**20-24**	**25-34**	**35-44**	**45-54**	**55-64**	**65+**	**Total**
2001	7	5	1	2	4	2	2	1	1	2	27
2002	8	1	1	4	4	3	4	5	1	1	32
2003	3	1	2	0	2	3	2	4	3	2	22
2004	4	2	0	0	1	4	1	1	1	3	17
Total	**22**	**9**	**4**	**6**	**11**	**12**	**9**	**11**	**6**	**8**	**98**

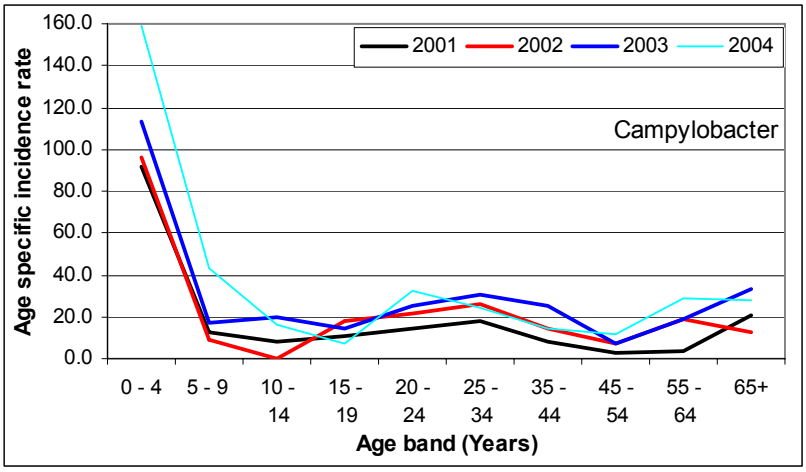


Figure 4: Age-specific incidence rates of campylobacteriosis, 2001- 2004.

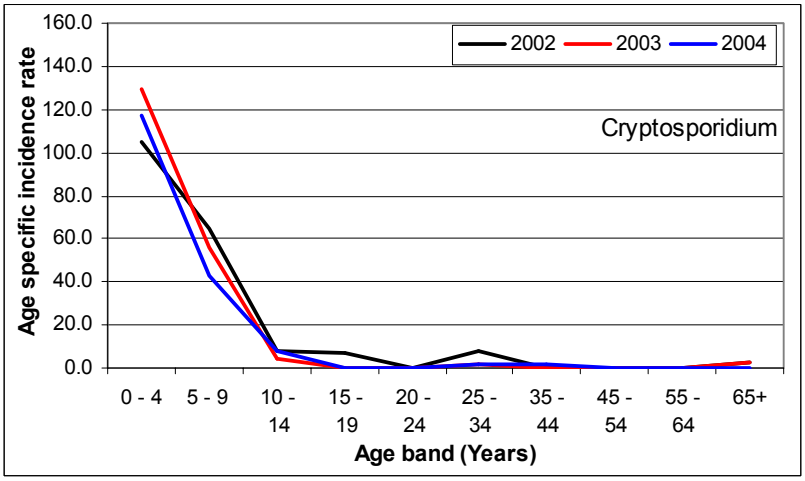


Figure 5: Age-specific incidence rates of cryptosporidiosis, 2002-2004.

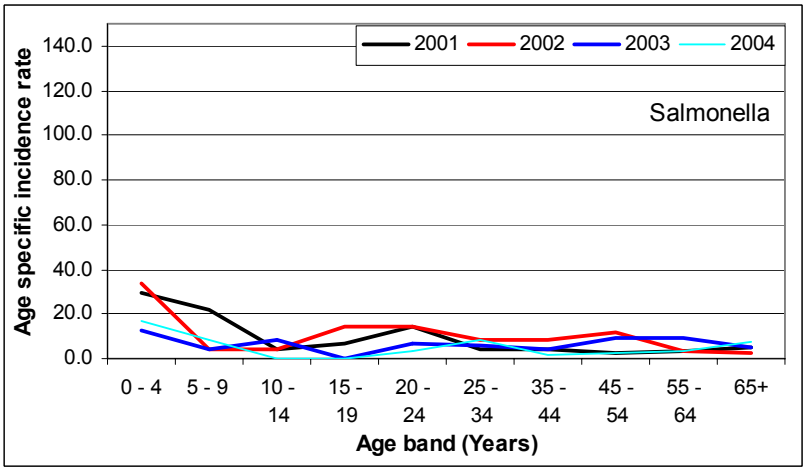


Figure 6: Age-specific incidence rates of salmonellosis, 2001-2004.

Species Listing:
Campylobacter: Several species of campylobacter cause campylobacteriosis. The most common species is *C. jejuni* followed by *C. coli* (Table 10). In recent years the increase in laboratory confirmed cases is seen for *C. jejuni* only.
In 2001, nalidixic acid resistance was reported in 19% of campylobacter isolates (n=62).

Table 10: Isolates of campylobacter species in HSE-MWA, 2001-2004.

Year	*C. jejuni*	*C. coli*	*C. species*	*C. upsaliensis*
2001	48	5	3	1
2002	59	6	5	0
2003	84	6	7	0
2004	99	6	2	0

Salmonella: Several different serovars of *S. enterica* were isolated (Table 11). *S*. Enteritidis represented 41%, 42% and 30% of isolates in 2001, 2002 and 2003, respectively. *S*. Typhimurium represented 44%, 30% and 21% respectively in 2001, 2002 and 2003.
Data from the investigation of isolates at the National Salmonella Reference Laboratory, Galway are also available. In 2001, *S.* Enteritidis PT4 (4) was the most common phage type followed by PT21 (3). In more recent years 2002-4, a change in the epidemiology of phage types of *S*. Enteritidis is evident with a greater proportion of non-PT4 isolates being identified. *S*. Typhimurium DT104 (6) was the most common phage type detected, followed by DT193 (3) and U302 (2). None of the *S*. Typhimurium DT193 isolates were kanamycin resistant. There is growing concern about the level of antibiotic resistant *S*. Typhimurium DT104 reported.

Table 11: Serovars of S. enterica in HSE-MWA, 2001-2004.

Year	*2001*	*2002*	*2003*	*2004*
S. Typhimurium	12	10	5	5
S. Enteritidis	11	14	8	7
S. Dublin	0	3	2	1
S. Hadar	0	1	3	0
S. Infantis	0	1	0	0
S. Mbandaka	0	1	0	0
S. Singapore	0	1	0	0
S. Stanley	0	1	0	1
S. Typhi	0	1	2	0
S. Agona	1	0	0	0
S. Brandenberg	1	0	0	0
S. Bredeney	1	0	1	0
S. Java	1	0	0	0
S. Manhattan	0	0	1	0
S. Kentucky	0	0	1	0
S. Virchow	0	0	1	1
S. Newport	0	0	0	1
S. Rubislaw	0	0	0	1
Total	**27**	**33**	**24**	**17**

One isolate of salmonella was isolated from urine. Seven serovars were reported from blood cultures, two *S*. Dublin, one *S*. Typhimurium, one *S*. Stanley and three *S*. Typhi. In 2002, the *S*. Typhi was a resident of another region in Ireland. In 2003, both *S*. Typhi isolates were recorded in visitors to Ireland from the Indian subcontinent.

One unusual serovar, *S*. Havana was isolated in the region but was from a non-HSE-MWA resident. One isolate was recovered from a wound swab.
Between 2002 and 2004, 29 isolates of S. Enteritidis were confirmed, 27 were phage typed (PT), 18 were non-PT4 (62%) and 9 were PT4 (31%). Recent travel history was ascertained in 14 non-PT4 cases and all gave a history of recent foreign travel, Spain in the majority of cases (12/14).

Outbreaks:
Most cases of campylobacteriosis are sporadic. No outbreaks of campylobacteriosis were reported. Consumption of undercooked poultry is regarded as an important risk factor for campylobacteriosis. Six cases reported travel abroad as a possible risk factor in their illness associated with campylobacter. Contact with pets is an important risk factor for campylobacteriosis.
No large outbreaks of cryptosporidiosis were reported in 2002. Some cases were linked through a family outbreak. Contact with farm animals and pets are believed to be important risk factors for this disease.
No large outbreaks of salmonellosis were reported. Eight cases (four pairs) were linked through four different family outbreaks. Of all cases of salmonellosis, 27 reported recent travel history but these data are not ascertained in all cases so bias can be present. Eight cases in 2004 reported travel abroad as a possible risk factor for their illness associated with salmonella. *S*. Virchow and *S*. Manhattan were possibly associated with travel to Spain. Alerts from Enter-Net about salmonellosis in Europe were received throughout the period. The largest relating to *S*. Enteritidis PT14b in 2002, but no linkage to any cases in this region was confirmed.
Since January 1st 2004 there is a requirement on clinicians and laboratory clinical directors to notify outbreaks and any changing patterns/ unusual clusters of disease to the Director of Public Health who must in turn notify the Health Protection Surveillance Centre.

Outcome:
No deaths due to campylobacteriosis, cryptosporidiosis or salmonellosis were reported. There was one isolate of *Campylobacter jejuni* from blood culture in 2003.

Shigellosis
There were five reports of shigellosis in 2003. Two were *Shigella sonnei* and these were linked cases with travel abroad (Tunisia) reported as a probable cause. There were three reports of *Shigella flexneri* in 2003 – all appeared to be sporadic.
There were two reports of human shigellosis in 2004, one case was *S. sonnei,* the case reported recent travel to Sri Lanka and the other was *S. boydii* – the latter was believed to be travel related (South Africa).

VTEC Infections
VTEC infection can be caused by a number of different serotypes of *E. coli*. The most notable serotype is *E. coli* O157 although other types can be verotoxin producers. In a small proportion of cases this infection can lead to very serious illness such as haemorrhagic colitis and haemolytic uraemic syndrome. A classic symptom of the illness is "bloody diarrhoea", however this can be a symptom of shigellosis and there are cases of VTEC infection without bloody diarrhoea. Some cases are asymptomatic.
Enhanced surveillance of VTEC has been in place since 1998 (Table 12).

Table 12: Number of reports of suspected VTEC infections in HSE-MWA 1999-2004.

Year	HSE-MWA
1999	12
2000	3
2001	3
2002	5
2003	10
2004	8
Total	**41**

Includes non-HSE-MWA residents.

In each year there are a number of cases which are not laboratory-confirmed and some cases can be detected in non-HSE-MWA residents. Up to 2003, the HSE-MWA had one of the lowest incidences of VTEC infection in Ireland (Table 13). VTEC rates for 2003 in Scotland and England & Wales were 2.9 and 1.2 respectively. Scotland has traditionally had a high level of VTEC infection and large outbreaks in the past. The lower rate of 2.9 seen in 2003 was followed in 2004 with a rate of 4.1 (209 cases). In England & Wales the rate of VTEC O157 in 2004 was 1.35.

Table 13: Number of reports of confirmed VTEC infections in HSE-MWA and Ireland and crude incidence rate (CIR) 2000-2004.

Year	HSE-MWA	CIR	Ireland	CIR
2000	2	0.6	37	0.9
2001	2	0.6	50	1.3
2002	0	0	68	1.7
2003	7*	2.1	82	2.1
2004	6‡	1.8	-	-
Total	**17**		**237**	

*Excludes non-residents. *Three confirmed cases detected but excluded (non-HSE-MWA residents).* ‡ *Two confirmed cases detected but excluded (non-HSE-MWA residents).*

Males (9) and females (8) were equally affected and most cases occur in the young (Table 14). Two were detected from residents in Clare and ten in Limerick. The five cases in Tipperary North were all detected in 2004 and three cases (O157) were epidemiologically linked.
In 2004, 4/6 VTEC cases were serotype O157 phage type 32 and 2/6 cases were serotype O26. One case of VTEC O157 is likely to have been acquired abroad.

National data published by the Health Protection Surveillance Centre point to a late summer/early autumn peak. In the HSE-MWA, cases occurred sporadically during the year.
In 2003, three cases of VTEC infection were detected in non-HSE-MWA residents – these cases were linked to outbreaks of VTEC infection in the eastern region. One family outbreak (3 cases) of VTEC infection in 2003 reported travel abroad as a risk factor. Another risk factor reported in one case in 2003 was contact with farm animals.

Table 14: Age distribution of all cases of confirmed VTEC in HSE-MWA 2000-2004 (n=17).

	Age Group (Years)									
	0-4	**5–9**	**10–14**	**15-19**	**20-24**	**25-34**	**35-44**	**45–54**	**55–64**	**65+**	**Total**
Cases	9	0	0	1	0	0	4	0	1	2	17

Phage typing and verotoxin detection is carried out through the Public Health Laboratory in Cherry Orchard Hospital, Dublin. All isolates detected in the HSE-MWA region are referred to this laboratory. Phage type 32 was the most common phage type reported (9), one PT2 and one PT21/28 was reported. Verotoxin was confirmed in 16 cases (VT1 or VT2).
In 2003, one case of verotoxin *E. coli* O26 was detected in this region; in 2004 three were detected (one non-HSE MWA resident). From data made available by Public Health Laboratory, Cherry Orchard Hospital – other cases of verotoxin positive *E. coli* O26 have been reported in the Western and North Western Area.
No cases of haemolytic uraemic syndrome occurred in any cases detected in the HSE-MWA.

Other causes of Gastroenteric Illness:
Giardia: Four cases of Giardiasis were reported by the laboratory in 2004 – two adults, one male and one female, in Co. Limerick and two adults, one male and one female, in Co Clare.
Two cases of Blastocystis and seven Entamoeba coli were detected in 2004.

Norovirus: Norovirus (winter vomiting illness) was reported as laboratory confirmed in over 230 cases in 2004 alone in the Mid-Western Area. Testing is mainly confined to hospital outbreaks or outbreak investigations. Anecdotal reports suggest the virus is prevalent in the community though few people either seek medical advice or get tested. In this Area there were outbreaks of norovirus in all the acute hospitals in 2004. In many circumstances visiting to hospitals can be restricted and in severe circumstances more extreme measures need to be adopted to resolve the outbreak.

Hepatitis A: There were three cases of laboratory confirmed hepatitis A reported in 2004.

Acute Infectious Gastroenteritis: There were 109 laboratory reports of acute infectious gastroenteritis (rotavirus, adenovirus, enteropathogenic E. coli etc…) in 2004. The majority were rotavirus infections.

Weekly Infectious Disease Notifications:
Most but not all cases of campylobacteriosis (58%), cryptosporidiosis (41%) and salmonellosis (73%) were reported through the weekly infectious disease notification system to the Health Protection Surveillance Centre. Under legislation in force in 2003, only cases of cryptosporidiosis under 2 years of age were notifiable. These reports and campylobacteriosis reports may not be distinguishable from other gastroenteritis and bacterial food-poisoning reports. Thus direct comparisons are not useful and it is difficult to determine the true burden of disease in the population without laboratory data.
It is estimated that the true burden of illness may be ten times the number of cases reported nationally. It is very important that clinicians notify **all** suspect and confirmed cases to the Department of Public Health.
New legislation was enacted with effect from January 2004 that makes clinician and laboratory notification of all cases of campylobacteriosis, cryptosporidiosis, listeriosis, trichinosis, shigellosis, norovirus, VTEC, giardiasis, hepatitis A and salmonellosis a requirement under law. A category of "acute infectious gastroenteritis" remains and covers illness due to rotavirus, enteropathogenic *E. coli* and other pathogens.
There is also a requirement to report outbreaks and any changing patterns/ unusual clusters of disease.
The lack of attendant resources to cope with the burden of reporting and follow-up under the new legislation has severely constrained the timeliness and completeness of response in the Department of Public Health. Currently the process leads to significant duplication of notifications. Where in previous years about 200 cases of infectious disease were notified, over 2000 reports on 1600 notifications are received.
All cases of VTEC have been under enhanced surveillance since 1998. Five of the seven cases confirmed in 2003 were reported under the weekly notification system

Prevention and Treatment:
Handwashing – before preparing food, after handling meat and after contact with pets – can help minimise risk of infection. Proper cooking of all meats (especially poultry) and maintenance of fridges at temperatures less than 4^{o}C will help minimise risk.
Campylobacteriosis, cryptosporidiosis and salmonellosis are usually self-limiting gastrointestinal infections. A decision to treat infection with antibiotics should be made in consultation with, and advice from the local consultant microbiologist.

Conclusions:

- The crude annual incidence rates of campylobacteriosis, VTEC infection and salmonellosis in the HSE-MWA appear to be lower than national rates.
- The crude annual incidence rate of cryptosporidiosis is comparable to similar rates in the UK but there is a lack of national data in Ireland.
- Several isolates of salmonella and campylobacter were isolated from blood, demonstrating the ability of these pathogens to cause more serious systemic infections.
- *S*. Typhimurium and *S*. Enteritidis share top position as dominant serovars in this region. With new entrants to the Irish population, clinicians must be vigilant for more unusual clinical presentations and microbiological pathogens such as *S*. Typhi.
- Young children appear to be the most vulnerable to infection with campylobacter, VTEC and cryptosporidium.
- Thorough investigation of reports of salmonellosis has revealed important risk factors such as recent foreign travel.

- Outbreaks of salmonellosis continue to occur across Ireland and Europe and timely and vigilant surveillance is required to enable an appropriate response to disease.
- Important legislative changes were introduced in 2004 which impact on the reporting of pathogens responsible for food borne disease and gastrointestinal illness.

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