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PHERO is published by the:
Public Health Division
Ministry of Health and Long-Term Care
8th Floor, 5700 Yonge Street,
Toronto, Ontario, M2M 4K5

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Descriptive Epidemiology of Enteric Outbreaks Reported in Ontario, 2003

Introduction

In Ontario, enteric outbreaks are investigated by local health units as a requirement of the *Mandatory Health Programs and Services Guidelines* for the control of infectious diseases.¹ Enteric outbreak data are reported in the outbreak module of the Reportable Disease Information System (RDIS) by health units for the purpose of monitoring communicable diseases.

The findings from the analysis of enteric outbreak data in Ontario from 1994 to 2002 were influenced markedly by viral agents transmitted from person-to-person in health care institutional settings during the winter months. Approximately 65% of reported outbreaks and 80% of people affected for the period 1994 to 2002 were in health care institutions.²⁻⁴ In order to assess epidemiological findings applicable to risk settings other than health care institutions, health care institutions were removed from the analysis. The objective of this article is to provide epidemiological findings on enteric outbreaks reported in Ontario in 2003 for risk settings identified within the community.

Methods

The RDIS database was accessed on June 14, 2004 to obtain records of enteric outbreaks reported to the Ontario Ministry of Health and Long Term Care (MOHLTC) for the year 2003. An enteric outbreak is defined as two or more cases of enteric illness associated by time, exposure and/or place.

The selections within the variable "Risk Setting" were regrouped to include

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'food service sector' (restaurant, fast food outlet, hotel/motel, and resort), 'health care institutions' (health care facilities, hospitals, and long term care facilities), 'school/day care facilities' (school, college, and day care), 'other' (camp, catered event, church, religious centre, and social gathering), and 'retirement/group homes' (rest and retirement home and group home).

Enteric outbreaks that identified 'health care institutions' as a "Risk Setting" were removed from the dataset. 'Retirement/group homes' were included in the analysis as they are privately owned rental accommodations for seniors who do not require 24-hour supervision and nursing care, unlike health care facilities, hospitals, and long term care facilities, which were removed from the analysis.

The remaining records were considered for analysis if the "Episode Date" was in the year 2003 and if the variables "Epidemic Curve-Total III", or the sum of "Staff-Actual III" and "Clients-Actual III", had more than one case reported. The number of cases for each outbreak was given by the RDIS variable "Epidemic Curve-Total III" or was calculated by adding together the number of cases for the variables "Staff-Actual III" and "Clients-Actual III". The greater of the two numbers was used as the number of cases for each outbreak where there was a difference between the two numbers. Data were analyzed using SPSS (version 12.0).

The selections within the variable "Mode of Transmission" were regrouped to include 'person-to-person' (direct contamination and person-to-person), and 'other' (indirect contamination and other).

A new variable "Type of Agent" was created to include 'bacterial' (*Campylobacter sp.*, *Clostridium sp.*, verotoxin-producing *E. coli* (VTEC), *Salmonella sp.*, *Shigella sp.*, and *Yersinia sp.*), 'viral' (enterovirus, hepatitis A, influenza, *Norovirus* - formerly Norwalk-like viruses, rotavirus), 'parasitic' (*Cryptosporidium* and *Giardia*) and 'other' (other).

A new variable "Lab Confirmed" was created by adding together the number of cases for the variables "Staff-Lab Confirmed" and "Clients-Lab Confirmed".

Data Quality Evaluation

The percentage of missing and unspecified values was calculated for the variables considered in the analysis and is shown in Table 1. Findings presented in the Results section of the report do not include missing data. Data completeness and internal consistency were assessed. Duplicate cases were checked by comparing the "Episode Date", "Agent", "Risk Setting", "Mode Of Transmission", "Postal Code", and

Table 1. Enteric outbreak variables, by percentage of missing and unspecified values, Ontario, 2003 (n=300^c).

CATEGORY	NO.		% MISSING AND UNSPECIFIED
	NO. MISSING ^a	UNSPECIFIED ^b	
Episode Date	0	0	0.0
Primary Health Unit	0	0	0.0
Enteric outbreak	0	0	0.0
Disease agent	0	82	27.3
Type of agent	167	3	56.7
Risk Setting	18	2	6.7
Mode of transmission	18	40	19.3
Epidemic Curve-Total III	29	0	9.7
Clients-Actual III	3	0	1.0
Staff-Actual III	55	0	18.3
Clients-Lab Confirmed	69	0	23.0
Staff-Lab Confirmed	116	0	38.7
Lab confirmed	69	0	23.0
Clients-Hospitalized	47	0	15.7
Staff-Hospitalized	90	0	30.0
Clients-Deceased	54	0	18.0
Staff-Deceased	97	0	32.3

^amissing means no entry made
^bUnspecified means "unspecified" or "unknown" or "untypeable" or "undetermined"
^csee Results – Data Quality Evaluation

"Primary Health Unit".

Results

Data Quality Evaluation

A total of 699 enteric outbreaks were identified in RDIS for the year 2003. Of these, 50 did not meet the definition of an outbreak and were removed from the dataset. Of the remaining 649 enteric outbreaks, 349 (53.8%) reported a 'health care institution' as a risk setting and were removed from further analysis. The analysis was performed on the remaining 300 enteric outbreaks.

Descriptive Analysis

A total of 6,820 individuals were affected in the 300 enteric outbreaks reported (Table 2).

Table 2. Enteric outbreak summary statistics, Ontario, 2003

Statistics	2003
Number of Outbreaks	300
Number of Cases	6,820
Mean (cases per outbreak)	23
Median (cases per outbreak)	15
Mode (cases per outbreak)	2
Range (cases per outbreak)	2-392

Enteric outbreaks were reported in 29 of the 37 Health Units in Ontario (Figure 1).

(58.0%) percent of the reported outbreaks occurred in the three months from January to March (Figure 2).

Of the 130 enteric outbreaks for which the "Type of Agent" was identified, 59.2% were viral, 26.9% were other, 10.8% were bacterial, and 3.1% were parasitic (Table 3). Fifty-eight

In 2003, 39 outbreaks resulted in the hospitalization of 126 cases. The overall case-hospitalization rate was 1.8%. Five deaths occurred in four outbreaks in 2003. Of the 3

Figure 1. Enteric outbreaks, by health unit, Ontario, 2003 (n=300).

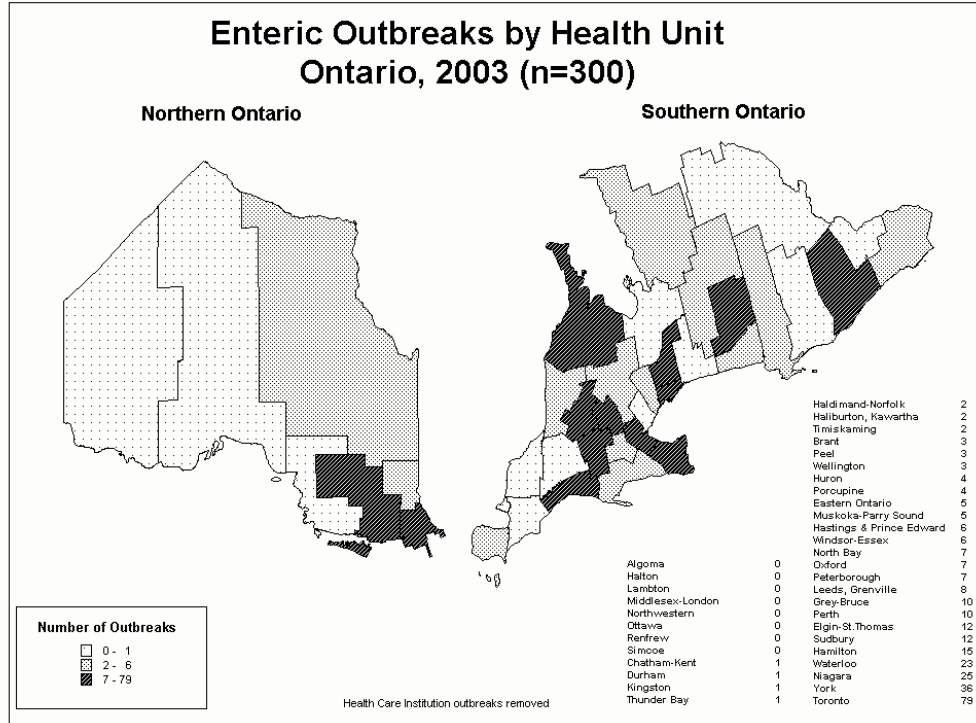
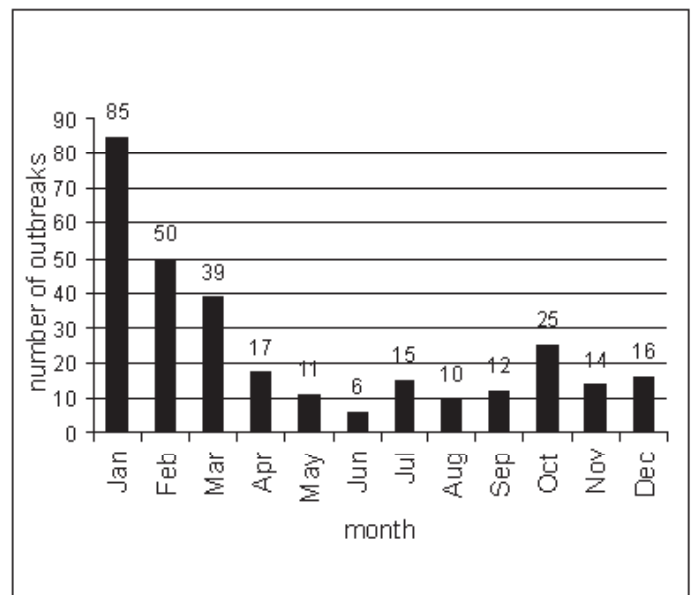


Table 3. Enteric outbreaks, by agent/organism, Ontario, 2003 (n=130).

Agent		2003 # of outbreaks	2003 # of cases
Viral	<i>Norovirus</i>	60	1728
	<i>Rotavirus</i>	11	156
	<i>Hepatitis A</i>	4	53
	<i>Enterovirus</i>	1	36
	<i>Influenza virus</i>	1	7
	Total	77	1980
% Total		59.20%	64.10%
Other	<i>Other</i>	35	903
	Total	35	903
	% Total		26.90%
Bacterial	<i>Campylobacter</i>	6	75
	<i>VTEC</i>	3	34
	<i>Shigella</i>	2	19
	<i>Salmonella</i>	1	24
	<i>Yersinia</i>	1	16
	<i>Clostridium</i>	1	5
	Total	14	173
% Total		10.80%	5.60%
Parasitic	<i>Giardia</i>	3	21
	<i>Cryptosporidia</i>	1	12
	Total	4	33
% Total		3.10%	1.10%
Total		130	3089
% TOTAL		100.00%	100.00%

Figure 2. Enteric outbreaks, by month, Ontario, 2003. (n=300)



deaths for which an agent was reported, two were associated with a *Norovirus* outbreak, and one was associated with an outbreak of 'other' type. The overall case-fatality rate was 0.1%.

20 cases per outbreak. Sixty outbreaks (21.3%) occurred in 'retirement/group home' settings involving 2,022 cases (32.0%) at an average of 34 cases per outbreak (Figure 3).

Two hundred and eighty two outbreaks identified a "Risk Setting". Of these, 149 (52.8%) were 'school/day care' outbreaks involving 3,021 cases (47.7%) at an average of

For the 124 outbreaks that the "Type of Agent" was reported, viral agents in 'school/daycare' and 'retirement/group home' accounted for 49.2% of the outbreaks (Figure 4).

Figure 3. Enteric outbreaks and cases, by risk setting, Ontario, 2003.

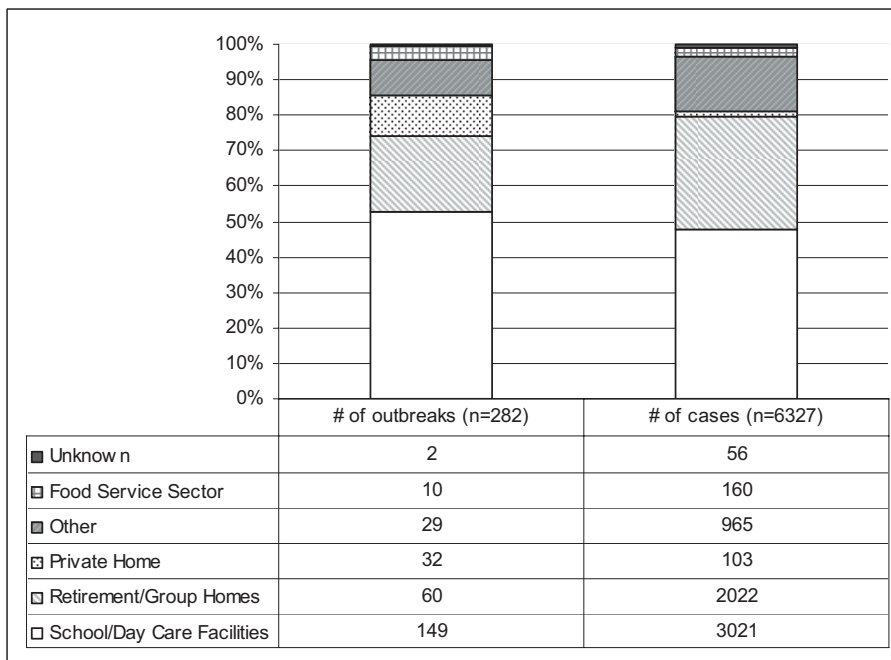
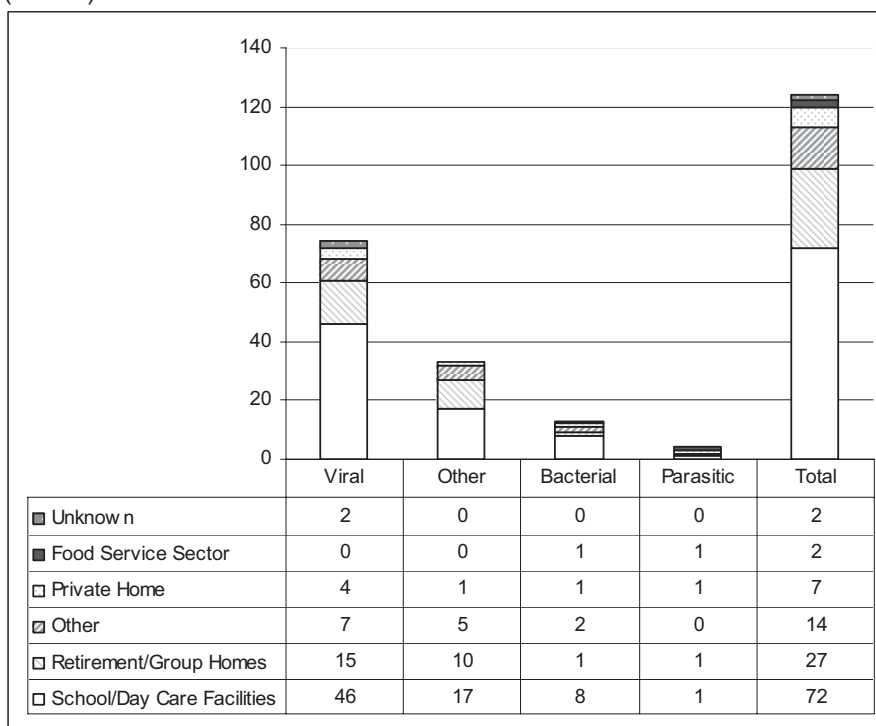


Figure 4. Enteric outbreaks, by risk setting and type of agent, Ontario, 2003 (n=124).



Two hundred eighty two outbreaks identified a “Mode of Transmission”. Of these, 187 (66.3%) were ‘person-to-person’ transmission outbreaks involving 4,274 cases (67.0%) at an average of 23 cases per outbreak (Figure 5). For the 123 outbreaks for which the “Type of Agent” was reported, ‘person-to-person’ transmission of viral agents accounted for 43.9% of the outbreaks (Figure 6).

Discussion

Of the 699 enteric outbreaks, 349 (53.8%) reported ‘health care institution’ as a risk setting and were removed from further analysis. The 53.8% health care institutional outbreaks identified in 2003 were less than the 62% identified in the period 2000 to 2002.² Fifty outbreaks did not meet the case definition of an outbreak because the reported number of persons affected was less than two or not specified.

From 1998 to 2002, the annual number of outbreaks increased gradually from 276 in 1998 to 794 in 2002 and the annual number of cases affected in outbreaks increased from 8,048 in 1998 to 30,907 in 2002.^{2,3,5} The gradual increase in the number of reported outbreaks after 1997 may have been the result of revisions of the minimum requirements of the Mandatory Health Programs and Services Guidelines (MPSGs) in 1997. The amendment to the MPSGs required that the board of health inform institutions and day cares about required reporting of designated communicable diseases and outbreaks of diseases to the Medical Officer of

Health as required under the provisions of the Health Protection and Promotion Act.¹ In 2003, the 649 enteric outbreaks reported was less than the 794 outbreaks reported in 2002.² Similarly, the 23,337 persons affected in 2003 was less than the 30,907 persons reported in 2002.²

The 300 enteric outbreaks reported in Ontario in 2003 most likely under-report the true number of enteric outbreak episodes in Ontario as only 29 of the 37 health units reported outbreaks for the year. Health units that did not report any outbreaks for the year may have experienced some enteric outbreaks. In addition, the potential for bias should be considered when interpreting the results presented in this report because a number of variables in the database had a large percentage of missing or unspecified data. Causative agents were not laboratory confirmed in 143 outbreaks (61.9%). This is a limitation that is frequently observed in outbreak investigations.⁶

For the outbreaks with an identified “Type of Agent”, enteric viruses (59.2%) were the most frequent cause of reported outbreaks. This was similar to the 54.5% reported for the previous year, with health care institutions included. In 2003 and 2002, 78% and 82.4% of the viruses identified were *Norovirus*, respectively. Of all the identified disease agents in 2003 and 2002, *Norovirus* consisted of 46.2% and 45.0%, respectively, with health care institutions included in 2002. Most viral gastroenteritis infections in industrialized countries are caused by *Norovirus*.^{7,8}

Figure 5. Enteric outbreaks and cases, by mode of transmission, Ontario, 2003

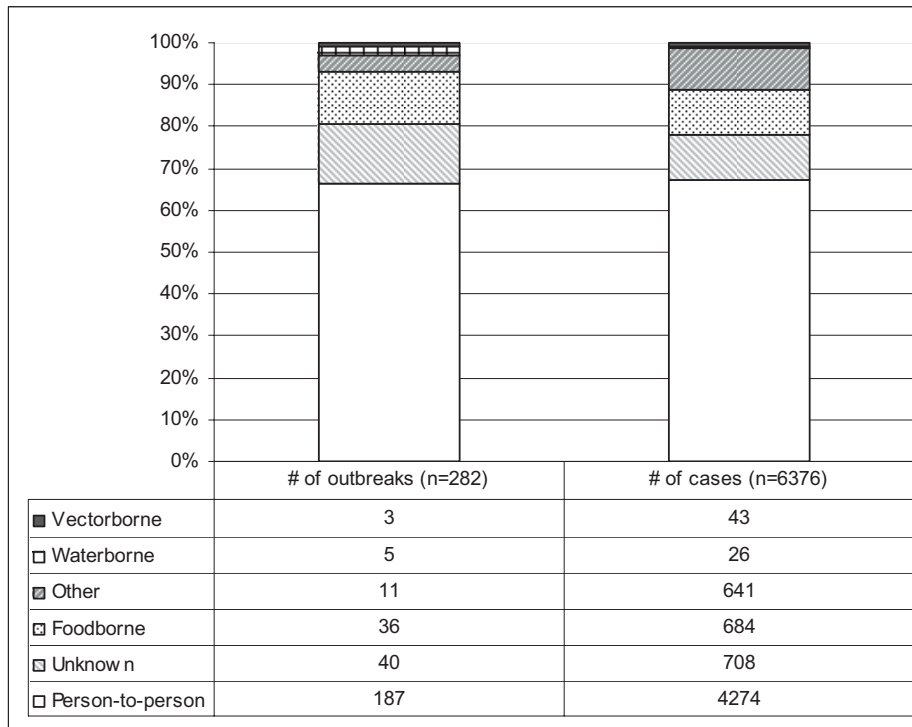
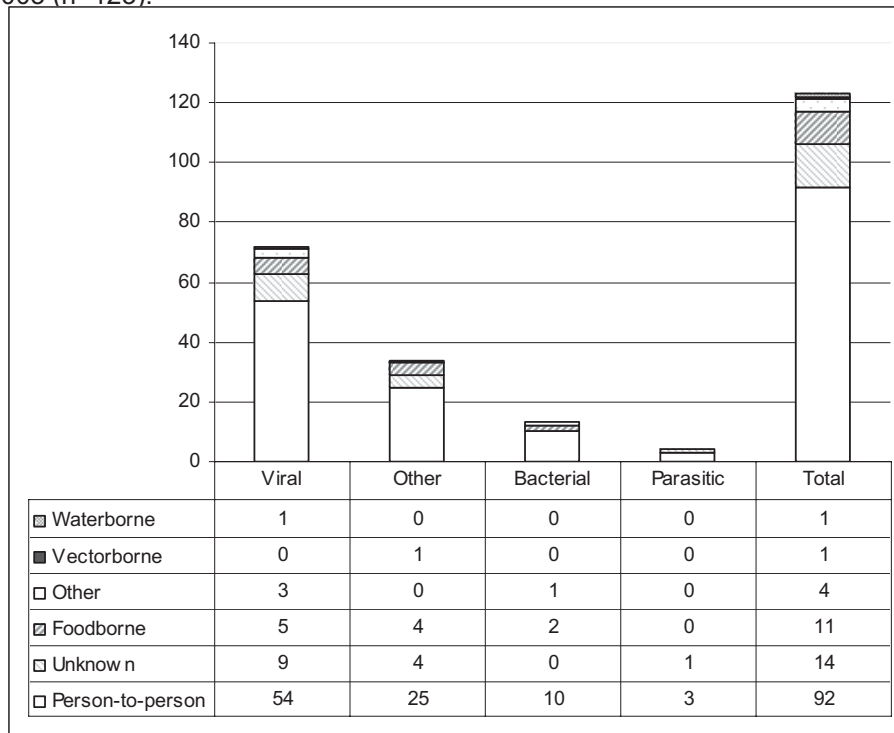


Figure 6. Enteric outbreaks, by mode of transmission and type of agent, Ontario, 2003 (n=123).



The three months from January to March accounted for 58.0% of all outbreaks reported. Further analysis indicated that 70.1% of viral outbreaks for the year occurred during the three months from January to March. This is consistent with other studies where a marked seasonality is exhibited by viruses with a peak during the winter months of the year.^{9, 10}

In 2003, outbreaks caused by *Norovirus* were responsible for 82.4% of outbreak related hospitalizations. For the 122 hospitalized cases for which “Risk Setting” was reported, ‘schools/day cares’ and ‘retirement/group homes’ accounted for 64.7% of the cases hospitalized. This is not surprising as most hospitalizations associated with enteric illness occur in the very young, the elderly, and persons with compromised immune systems who are more susceptible to dehydration as a result of enteric illness, and whose health may be put at risk from a moderate amount of dehydration caused by diarrhea and vomiting.¹¹

The most frequently reported “Risk Setting” in 2003 was ‘school/day care’ at 52.8% (149). This was similar to the 55.8% (182) reported for Ontario for the previous year, with health care institutions removed.

In 2003, the predominant mode of transmission involved in enteric outbreaks was person-to-person transmission (66.3%). This was similar to the 64.7% reported for Ontario for the previous year, with health care institutions included. Of those that reported “Risk Setting”, ‘school/day care’ (114)

accounted for 64.8% of the person-to-person outbreaks reported, and ‘day care’ (108) accounted for 61.4% of the person-to-person outbreaks reported. The susceptible population in day cares makes it important to have enteric disease control measures incorporated into infection control policies so that outbreaks can be managed promptly.

In total, 36 outbreaks involving 684 cases were attributed to foodborne transmission. Of these, analysis revealed that a Hazard Analysis Critical Control Point (HACCP) risk assessment was only conducted for 30.0% of outbreaks in food premises assigned a high or medium risk. It is important to conduct a HACCP- based investigation on implicated food items during an outbreak as it can effectively identify and correct potential hazards or points of contamination and time/temperature abuse. Identifying these critical points and implementing recommendations to initiate corrective actions may avert future occurrences of foodborne illness and also improve the usefulness of outbreak reporting.

Conclusion

The 649 enteric outbreaks reported in 2003 and the 23,337 persons affected was less than in 2002, however, the number of outbreaks reported and persons affected in 2003 was approximately twice the number for the years 1998 to 2001. The gradual increase in the number of reported outbreaks after 1997 may have partially been the result of revisions of the minimum requirements of the Mandatory Health Programs and Services Guidelines in 1997.

Health care institutions were removed in this report in order to assess epidemiological findings applicable to risk settings other than health care institutions, as they have accounted for over 62% of reported outbreaks in Ontario in the past decade. Even with the removal of health care institutions as a risk setting the predominant disease agent, mode of transmission and seasonality did not change when compared to previous years. The predominant epidemiological findings in this report are characterized by viral agent transmission of *Norovirus* from person-to-person in a school/day care setting during the winter months.

Acknowledgements

The authors would like to thank the staff at public health units as well as the staff at laboratories in Ontario for their work in investigating and reporting enteric outbreaks.

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Descriptive Epidemiology of *Campylobacter* Enteritis Reported in Ontario, 2003

Introduction

Campylobacter Enteritis is the most frequently reported enteric 'Reportable Disease' in Ontario. The illness is caused by bacteria of the genus *Campylobacter*.¹ *Campylobacter jejuni*, *C. fetus*, and *C. coli* are the species that usually cause the illness in people.² Symptoms are variable and may include diarrhea, abdominal pain, malaise, fever, nausea, and vomiting.

The objective of this article is to provide descriptive epidemiological findings on the occurrence of *Campylobacter* Enteritis for the calendar year 2003 in Ontario. To better describe the epidemiological findings pertaining to *Campylobacter* illnesses acquired in Ontario, travel-associated cases were removed from the analysis so that only illnesses acquired in Ontario were considered.

Methods

The Reportable Diseases Information System (RDIS) database was accessed on July 21, 2004 to obtain records of campylobacteriosis reported to the Ontario Ministry of Health and Long Term Care (MOHLTC) for the year 2003.

The case definition in RDIS defines a case of *Campylobacter* Enteritis as an individual with clinically compatible signs and symptoms with either (a) isolation of *Campylobacter* from the

stool or from body fluids, or (b) an epidemiologic link to two or more laboratory confirmed cases.

A case was defined as travel-associated if the individual traveled to a destination outside of Ontario and had onset of illness for *Campylobacter* that was not more than 10 days after travel. Travel-associated cases were removed for the purposes of analysis.

The remaining records were considered for analysis if the "Episode Date" was in the year 2003. Data were analyzed using SPSS (version 12.0). Crude and age-specific incidence rates were calculated using the 2001 Ontario census population as the denominator. Age- and sex-adjusted rates for health units were calculated by direct standardization using the 2001 Ontario census population.

Data Quality Evaluation

The percentage of missing and unspecified values was calculated for each variable and is shown in Table 1. Findings presented in the Results section of the report do not include missing data. Data completeness and internal consistency were assessed. Duplicate cases were checked by comparing the "Episode Date", "Episode Date Type", "Organism/Agent", "Date of Birth", "Gender", "Lab Date", "Source", and "Risk Setting".

Table 1. *Campylobacter* Enteritis variables, by percentage of missing and unspecified values, Ontario, 2003 (n=3,468^d).

Category	No. missing ^a	No. unspecified ^b	% missing and unspecified
Episode Date	0	0	0.0
Health Unit	0	0	0.0
Disease	0	0	0.0
Organism/agent	35	0	1.0
Risk Setting	117	1916	58.6
Mode of transmission	126	2087	63.8
Source	2793	23	81.2
Age	1	0	0.0
Gender	1	0	0.0
Symptoms ^c	2931	126	44.1
Hospitalization	1958	30	57.3
Death	1743	8	50.5
Outbreaks	116	89	5.9

^a "missing" means no entry made

^b "unspecified" means "unknown", "untypeable" or "other"

^c Up to two symptoms allowed per case

^d see Results – Data Quality Evaluation

Results

Data Quality Evaluation

A total of 4,050 cases of campylobacteriosis were identified in RDIS for the year 2003. No duplicate cases were detected. Of the 4,050 cases of campylobacteriosis, 582 (14%) were identified as travel-associated and were removed from further analysis. The analysis was performed on the remaining 3,468 cases.

Descriptive Analysis

Campylobacter jejuni was the most frequently reported species (Table 2). In 2003, the rate of *Campylobacter* Enteritis was 30 per 100,000 persons. Incidence rates varied by age

group, with children between 0 and 4 years of age having the highest overall incidence rate (Figure 1). Males accounted for 56% of the cases overall.

Thirty-eight (38%) percent of the reported cases occurred in the three months from July to September (Figure 2).

The most frequently reported symptoms were watery diarrhea (23%), loose stools (19%), and abdominal pain (17%) (Table 3).

Two deaths were reported in 2003. The resulting overall case-fatality rate was 0.06%. *Campylobacter* was an incidental finding in one of the deaths. No information was

Table 2. *Campylobacter* Enteritis, by number of serotypes, Ontario, 2003 (n=3,433).

Serotype	Number	Percent
<i>C. jejuni</i>	3,216	93.7
Other	151	4.4
<i>C. coli</i>	60	1.7
<i>C. laridis</i>	4	0.1
<i>C. fetus</i>	2	0.1
Total	3,433	100

Figure 1. *Campylobacter* Enteritis incidence rates, Ontario, 2003 (n=3,466).

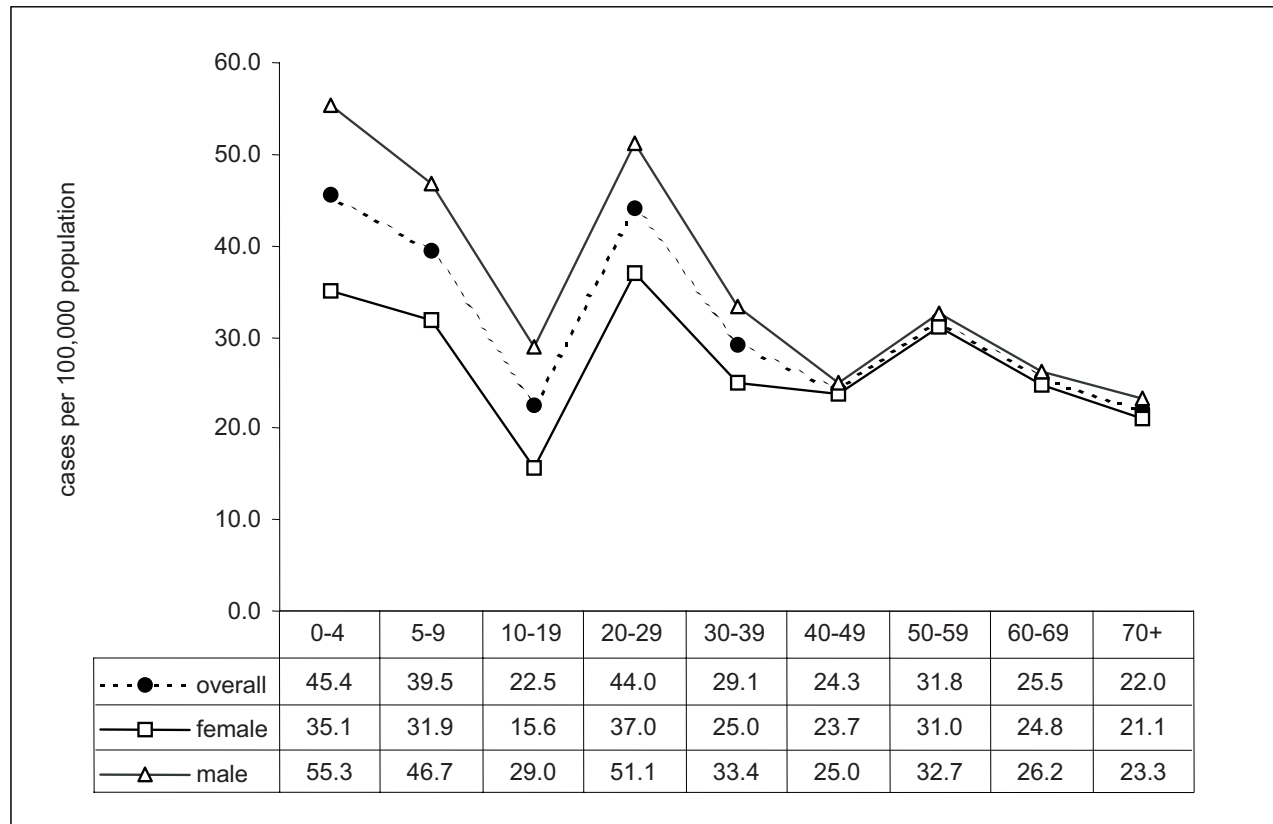


Figure 2. *Campylobacter* Enteritis, by month, Ontario, 2003 (n=3,468).

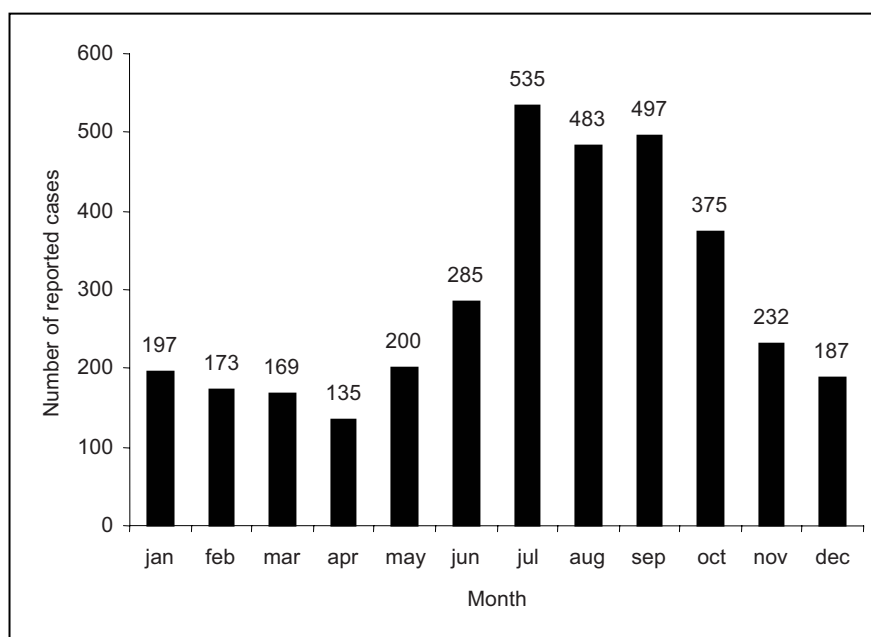


Table 3. *Campylobacter* Enteritis by frequency distribution of reported symptoms, Ontario, 2003 (n=3,879; up to two symptoms were allowed per case).

Symptoms	Number of cases	Percent
Watery Diarrhea	876	22.6
Loose Stools	747	19.3
Abdominal Pain	676	17.4
Fever	446	11.5
Cramps	245	6.3
Symptomatic	215	5.5
Bloody Diarrhea	199	5.1
Nausea and/or Vomiting	177	4.6
Headache	84	2.2
Other	68	1.8
Chills	59	1.5
Malaise	23	0.6
Fatigue	16	0.4
Weight Loss	15	0.4
Dizziness	6	0.2
Anorexia	5	0.1
Dehydration	5	0.1
Myalgia	4	0.1
Weakness	4	0.1
Other	9	0.2
Total	3,879	100

available regarding the cause of the other death. There were 102 in-patient and 72 out-patient hospitalizations. The overall in-patient case-hospitalization rate was 3% (n=3,468).

Cases of *Campylobacter* Enteritis were reported in all of the 37 Health Units in Ontario (Figure 3).

Overall, the most frequently reported mode of transmission was 'foodborne' (72%) (Table 4).

Association with an outbreak was reported for 37 (1%) cases of which the predominant species was *C. jejuni* (86%). Of these, 35 cases specified a mode of transmission, spe-

cifically; food (28), person-to-person (4), and other (3). Of those reporting food, 11 (39%) cases reported a suspect food, specifically; chicken (7), turkey (2), lamb (1), and pork (1).

Overall, the most frequently reported risk setting was home (61%), followed by restaurant/food vendor (17%), and workplace (9%) (Table 5).

Discussion

The 4,050 cases of *Campylobacter* Enteritis reported in Ontario in 2003 likely under-report the true incidence of

Figure 3. Age- and Sex adjusted incidence rates per 100,000 population for reported cases of *Campylobacter* Enteritis in Ontario by Health Unit, 2003 (n=3,466).

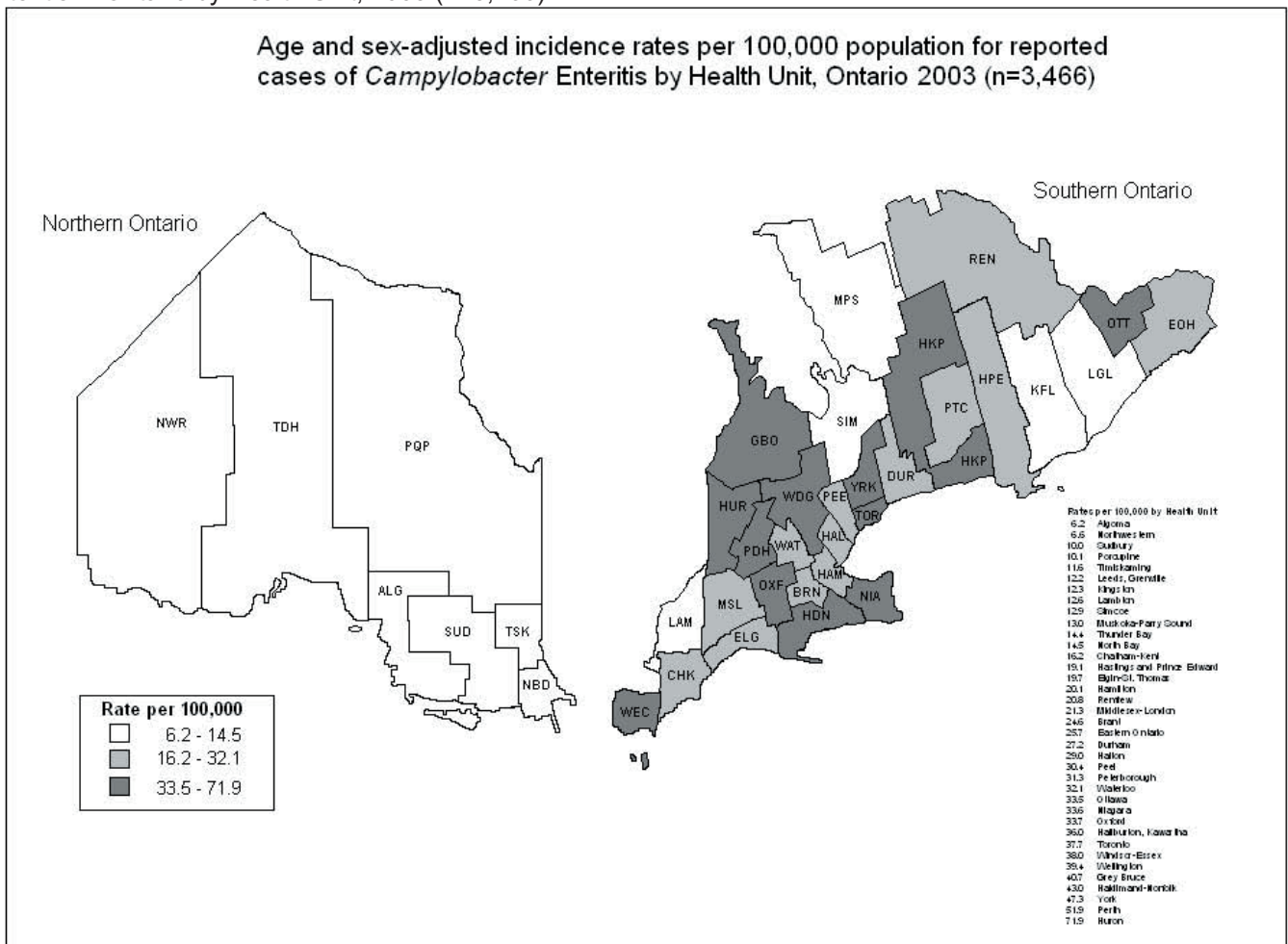


Table 4. *Campylobacter* Enteritis, by mode of transmission, Ontario, 2003 (n=1,255).

Mode of transmission	Number of Cases	Percent
Foodborne	910	72.5
Other	250	20.0
Person-to-person	48	3.8
Waterborne	47	3.7
Total	1255	100

enteric disease episodes in Ontario. The true incidence of *Campylobacter* Enteritis in Ontario is difficult to determine because valid estimates of under-reporting are not available.³ The potential for bias should be considered when interpreting the results presented in this report because a number of variables in the database had more than 50% of the data missing or unspecified.

The bimodal pattern of age-specific incidence rates of *Campylobacter* is unique among enteric bacteria.⁶ The highest incidence rate occurred in children less than 4 years of age, reaching 45 cases per 100,000 persons, but a large second peak in incidence occurred in young adults between 20 and 29 years of age reaching 44 cases per 100,000 persons. The reasons for this pattern are unknown.

Table 5. *Campylobacter* Enteritis, by risk setting, Ontario, 2003 (n=1,435).

Risk Setting	Number of Cases	Percent
Home	874	60.9
Restaurant/Food Vendor	249	17.4
Workplace	125	8.7
Other	70	4.9
Local Camping	27	1.9
Local Vacation Property	20	1.4
School	19	1.2
Lake/River/Stream/Pond	13	0.9
Hospital	10	0.7
Day care	9	0.6
Residential Facility	9	0.6
Rendezvous Outside Usual Domicile	6	0.4
Encounter following major event	1	0.1
Facility for the Developmentally Disabled	1	0.1
Medical Office	1	0.1
Pool/Spa	1	0.1
Total	1435	100

The 4,050 cases of *Campylobacter* Enteritis reported in 2003 was slightly lower than the number of cases reported in the previous six years. From 1997 to 2002, the annual number of cases ranged from 5,352 in 1998 to 4,079 in 1999.^{4, 5, 7}

Of the 4,050 cases of *Campylobacter* Enteritis, 582 (14%) were identified as travel-associated cases. For the purposes of this report, these were removed from further analysis. The analysis was performed on the remaining 3,468 cases. The remaining part of this discussion will only consider these cases.

The predominant species of *Campylobacter* in Ontario were *C. jejuni* (94%) and *C. coli* (2%) which are similar to distributions reported in previous years in Ontario and in other areas of the world.^{2, 5, 6, 7} The distinction in species is mainly of epidemiological interest since the disease each species produces is similar.⁶

The incidence among Ontario's 37 health units varied. Health units in southern Ontario experienced higher rates of illness, in general, than health units in northern Ontario.

The incidence of *Campylobacter* infection in Ontario was higher in males than females in all age groups. Other studies have also shown that males are at increased risk for *Campylobacter* infection, however, the reason remains unclear.^{8, 10, 12, 13}

The three months from July to September accounted for 38% of all *Campylobacter* cases, where 25% is expected. This is consistent with other studies in which there was an increase in the number of enteric bacterial (i.e. *Campylobacter*, *Salmonella*, and *Escherichia coli*) infections, overall, in the summer months in temperate zones.^{5, 6, 11} The reasons for the seasonal pattern could not be deduced from the analysis of the data.

In 2003, there were 37 (1%) cases of *Campylobacter* Enteritis reported for which there was an association with an outbreak. The majority of *Campylobacter* Enteritis infections (99%) appeared to be sporadic rather than outbreak associated. This finding was consistent with findings reported in other studies.^{6, 9} The findings were also consistent with one author's experience in investigating *Campylobacter*

outbreaks in that in the five years prior to 2003, no *Campylobacter* outbreaks had been investigated on the provincial level. One of the constraints in identifying outbreaks results from the reported findings that the variable "Source" had 81% missing and unspecified values. It is likely that there are many outbreaks that are not identified.

The predominant mode of transmission for Ontario-acquired illnesses was 'foodborne' (72%) in 2003. This was consistent with the 73% foodborne transmission reported for Ontario in 2002.⁵ This finding is consistent with the commonly held belief that *Campylobacter* is a foodborne illness. It should be noted, however, that the mode of transmission for 28% of the illnesses consisted of other (20%), person-to-person transmission (4%), and water (4%).

The most frequently reported risk setting in 2003 was home (61%). This was consistent with the 62% reported for Ontario in 2002, with travel-associated cases removed.⁵ Other identified risk settings included restaurant/food vendor (17%) and workplaces (9%).

Conclusion

The 4,050 cases of *Campylobacter* Enteritis reported in 2003 was consistent with the number of cases reported in the previous six years for which findings were available.^{4, 5, 7} *Campylobacter* Enteritis continues to be the most commonly reported enteric 'Reportable Disease' in Ontario. Travel-associated cases were removed in this report in order to describe the epidemiology of *Campylobacter* Enteritis illnesses acquired in Ontario.

Campylobacter Enteritis illnesses acquired in Ontario are characterized by predominantly foodborne transmission (72%) occurring in the private home setting (61%), more frequently during the summer months. Relative to other enteric pathogens, very few outbreaks of *Campylobacter* Enteritis are identified.

Acknowledgments

The authors would like to thank the staff of the health units in Ontario as well as the staff at laboratories in Ontario for their work in investigating and reporting *Campylobacter* illnesses.

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Statistics

The remainder of this issue contains the Summary of Reportable Diseases for the Ontario region of the First Nations and Inuit Health Branch and summaries for Ontario for the third quarter and the months of September and October, 2004 (pg 173-178).

Reportable Disease Summary for First Nations and Inuit Health Branch Ontario Region, July 1 - September 30, 2004

DISEASE	0 - 4		5 - 9		10 - 14		15 - 19		20 - 24		25 - 29		30 - 39		40 - 49		50 - 59		Over 60		UNK	Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F				
Campylobacter Enteritis				1															1			2
Chickenpox (Varicella)	7	13	5	4																		29
Chlamydia Infections						1	7	44	17	41	4	17	9	10	3	3		1				157
Gonorrhoea							1	6	4	3			2		1							17
Hepatitis C														1								1
Salmonellosis	1		2								1							1				5
Tuberculosis													1					1		1		3

On-Reserve Population for First Nations and Inuit Health Branch - Ontario Region = 69,016

Summary of Reportable Diseases in Ontario - 3rd Quarter 2004

Health Units by Region	Population Projections 2003	AIDS	Campylo.	Chicken-pox	Chlamydia	Enceph./Meningitis	GAS	Gonorrhoea	Hepatitis A	Hepatitis B	Hepatitis C	Hib
Northern Region	864,731	2	39	109	426	6	6	14	3	5	101	1
Algoma	119,929		9	23	56	1				4	15	
Muskoka-Parry Sound	86,383	1	4	5	31				1		11	
North Bay	94,875		2	50	38			1			12	
Northwestern	81,874	1	2	1	53		1	2			1	
Porcupine	89,876		1		50		2				4	
Sudbury	196,787		10	15	94	2	2	6	1		34	1
Thunder Bay	159,592		9	15	98	3	1	5	1	1	21	
Timiskaming	35,415		2		6						3	
Eastern Region	1,637,692		130	106	523	18	3	41	2	2	181	
Eastern Ontario	197,370		19		40	1		1			13	
Hastings & Prince Ed.	160,658		13	37	38	2		1			5	
Kingston, Fron. & Len.	188,219		7	8	76	3	1	5	1		71	
Leeds, Gren. & Lan.	167,762		10		15	1					19	
Ottawa	823,608		71	60	335	11	2	34	1	2	71	
Renfrew	100,075		10	1	19						2	
Central East Region	2,114,060	1	312	122	600	35	4	45	1	4	203	
Durham	547,759	1	63	49	204	7	1	26		1	38	
Haliburton-Kawartha	170,627		19		38	2		3			30	
Peterborough	132,615		16	14	38	9		3		1	15	
Simcoe	411,024		40	27	100	4	1				52	
York	852,035		174	32	220	13	2	13	1	2	68	
Toronto Region*	2,611,661	19	366	344	1,510	20	8	457	15	10	344	1
North		3	83	64	321	6	3	82	4	2	67	
South		13	121	56	532	7	2	216	5	5	158	1
East		2	101	178	400	5	3	84	5	2	70	
West		1	61	46	257	2		75	1	1	49	
Central West Region	2,260,237	2	326	275	852	30	8	123	12	2	162	
Halton	413,454		55	10	62	3	2	10			20	
Peel	1,122,959	1	169	252	514	20	4	75	12		94	
Waterloo	470,022		71	0	202	4	1	36		2	38	
Wellington-Duff.	253,802	1	31	13	74	3	1	2			10	
Central South Region	1,188,202	4	140	115	478	12	11	102	5	1	153	
Brant	131,721	1	8	38	66	5	1	18	1		13	
Haldimand-Norfolk	109,756		17	11	31	2		4			13	
Hamilton	516,776	3	40	30	221	4	6	57	4	1	72	
Niagara	429,949		75	36	160	1	4	23			55	
Southwest Region	1,561,717		179	20	555	58	5	117	3	5	108	0
Grey Bruce	160,624		24	7	37	1	1	1		1	12	
Elgin-St. Thomas	86,096		10		25	1		7			5	
Huron	61,896		17		18	1		1			0	
Chatham-Kent	110,124		6	2	40	1		7	1		8	
Lambton	132,664		8		44			2		2	9	
Middlesex-London	428,628		11		205	37	2	69	1	1	34	
Oxford	103,880		20		24	5		5			5	
Perth	77,265		18	11	27	1					5	
Windsor-Essex	400,540		65		135	11	2	25	1	1	30	
Third Quarter 2004	12,238,300	28	1,492	1,091	4,944	179	45	899	41	29	1,252	2
*** Total YTD 2004	-	89	3,072	14,513	15,243	380	214	2,647	148	102	3,922	4
*** Total YTD 2003	-	97	3,153	11,368	13,959	332	323	2,438	117	114	3,875	8

* The Toronto City regions above are now defined as: North - former North York; South - former City of Toronto; West - former Etobicoke and City of York; East - former Scarborough and East York

** Infectious Syphilis cases include 'Primary, Secondary and Early Latent' staging effective January 1, 2003

*** Adjusted for deletions and late reports.

Summary of Reportable Diseases in Ontario - 3rd Quarter 2004

Health Units by Region	Population Projections 2003	Influenza	IPD	Measles	Meningo-coccal	Mumps	Pertussis	Rubella	Salmon.	Shigellosis	Syphilis Infectious*	TB	VTEC
Northern Region	864,731		10		2		5		43	1	2	7	12
Algoma	119,929		4		1		1		13			1	
Muskoka-Parry Sound	86,383						3		2		1		1
North Bay	94,875		1		1				7				
Northwestern	81,874		1						1			5	3
Porcupine	89,876								3				
Sudbury	196,787		2				1		6		1		8
Thunder Bay	159,592		2						11	1		1	
Timiskaming	35,415												
Eastern Region	1,637,692	12	17		1		33	1	73	5	4	8	15
Eastern Ontario	197,370						4		7				2
Hastings & Prince Ed.	160,658	1	2				1		8				1
Kingston, Fron. & Len.	188,219	2	3				4		5		1	1	3
Leeds, Gren. & Lan.	167,762								4				3
Ottawa	823,608	9	9		1		24	1	43	5	3	6	5
Renfrew	100,075								6			1	1
Central East Region	2,114,060		10		1		53		136	9	3	17	36
Durham	547,759		3		1		12		34	1	1	2	5
Haliburton-Kawartha	170,627		1				3		10				3
Peterborough	132,615		3				18		1			1	3
Simcoe	411,024		2				5		32				5
York	852,035		1				15		59	8	2	14	20
Toronto Region*	2,611,661	5	33				32		158	33	81	74	22
North		2	5				6		36	8	4	20	4
South			8				11		38	14	73	19	6
East		1	13				6		47	2	3	19	6
West		2	7				9		37	9	1	16	6
Central West Region	2,260,237	1	25		2		69		163	18	13	31	23
Halton	413,454		3		1		6		24	4	1	1	7
Peel	1,122,959	1	13		1		7		101	8	10	29	10
Waterloo	470,022		7				39		28	4	2	1	3
Wellington-Duff.	253,802		2				17		10	2			3
Central South Region	1,188,202	1	21		2		30		66	3	4	4	20
Brant	131,721		3				11		7		1		
Haldimand-Norfolk	109,756		1				0		8		2		2
Hamilton	516,776	1	12		1		15		23	2	1	2	9
Niagara	429,949		5		1		4		28	1		2	9
Southwest Region	1,561,717	0	9	0	1	0	14	0	67	5	1	6	23
Grey Bruce	160,624		1				3		12	1			4
Elgin-St. Thomas	86,096		2						2				1
Huron	61,896		1				5		8				1
Chatham-Kent	110,124		2						3	1			4
Lambton	132,664								1	0		1	3
Middlesex-London	428,628		2		1		2		3	2			1
Oxford	103,880		1				1		5				1
Perth	77,265						3		5				3
Windsor-Essex	400,540								28	1	1	5	5
Third Quarter 2004	12,238,300	19	125	0	9	0	236	1	706	74	108	147	151
*** Total YTD 2004	-	888	714	6	35	18	476	5	1,685	226	359	483	228
*** Total YTD 2003	-	471	636	10	37	11	243	8	1,605	212	291	515	403

Summary of Reportable Diseases in Ontario - September 2004

Health Units by Region	Population Projections 2003	AIDS	Campylo.	Chicken-pox	Chlamydia	Enceph./Meningitis	GAS	Gonorrhoea	Hepatitis A	Hepatitis B	Hepatitis C	Hib
Northern Region	864,731		4	16	119	1	1	4	2		23	
Algoma	119,929			8	16						7	
Muskoka-Parry Sound	86,383				3				1			
North Bay	94,875		1	7	12						6	
Northwestern	81,874				15			1			1	
Porcupine	89,876				18		1					
Sudbury	196,787			1	26	1		1			4	
Thunder Bay	159,592		3		29			2	1		5	
Timiskaming	35,415											
Eastern Region	1,637,692		37	42	168	2	2	16	1		50	
Eastern Ontario	197,370		5		10						2	
Hastings & Prince Ed.	160,658		2		18							
Kingston, Fron. & Len.	188,219				20	1	1	2	1		23	
Leeds, Gren. & Lan.	167,762		3									
Ottawa	823,608		23	42	116	1	1	14			25	
Renfrew	100,075		4		4							
Central East Region	2,114,060		85	64	132	14	2	18		1	57	
Durham	547,759		13	34	77	4		15		1	9	
Haliburton-Kawartha	170,627		4		9	2		1			10	
Peterborough	132,615		5	7	15	2		2			2	
Simcoe	411,024		14	9	16	1					27	
York	852,035		49	14	15	5	2				9	
Toronto Region*	2,611,661	5	115	55	535	3	1	157	6	5	117	1
North		2	29	7	113	1	1	30	3	2	23	
South		2	37	11	180	1		68	1	2	57	1
East			34	28	147	1		27	2	1	22	
West		1	15	9	95			32			15	
Central West Region	2,260,237		61	15	248	10	1	34	4		49	
Halton	413,454		13		6	1	1	1			8	
Peel	1,122,959		23	11	141	8		22	4		19	
Waterloo	470,022		19		75			11			19	
Wellington-Duff.	253,802		6	4	26	1					3	
Central South Region	1,188,202		24	24	168	2	2	37	2		53	
Brant	131,721		1	9	22	1	1	3				
Haldimand-Norfolk	109,756		4	1	15			2			4	
Hamilton	516,776		9	13	87	1		25	2		26	
Niagara	429,949		10	1	44		1	7			23	
Southwest Region	1,561,717		43	2	140	15		31	2		30	
Grey Bruce	160,624		6	1	2			1			1	
Elgin-St. Thomas	86,096		1		13	1		1			2	
Huron	61,896		5		6							
Chatham-Kent	110,124		1		15			1	1		4	
Lambton	132,664		2		10			1			4	
Middlesex-London	428,628		1		42	7		16			12	
Oxford	103,880		5		6	3		1				
Perth	77,265		5	1	3						1	
Windsor-Essex	400,540		17		43	4		10	1		6	
September 2004	12,238,300	5	369	218	1,510	47	9	297	17	6	379	1
*** Total YTD 2004	-	75	3,007	12,945	14,767	366	215	2,594	147	91	3,762	5
*** Total YTD 2003	-	92	3,152	11,368	13,959	316	322	2,438	117	114	3,869	8

* The Toronto City regions above are now defined as: North - former North York; South - former City of Toronto; West - former Etobicoke and City of York; East - former Scarborough and East York

** Infectious Syphilis cases include 'Primary, Secondary and Early Latent' staging effective January 1, 2003

*** Adjusted for deletions and late reports.

Summary of Reportable Diseases in Ontario - September 2004

Health Units by Region	Population Projections 2003	Influenza	IPD	Measles	Meningo-coccal	Mumps	Pertussis	Rubella	Salmon.	Shigellosis	Syphilis Infectious*	TB	VTEC
Northern Region	864,731		3		1				6			1	3
Algoma	119,929								3				
Muskoka-Parry Sound	86,383								1				
North Bay	94,875				1				1				
Northwestern	81,874											1	3
Porcupine	89,876								1				
Sudbury	196,787		2										
Thunder Bay	159,592		1										
Timiskaming	35,415												
Eastern Region	1,637,692	8	4				6		24	1	1	2	5
Eastern Ontario	197,370								1				
Hastings & Prince Ed.	160,658	1	1						4				
Kingston, Fron. & Len.	188,219	1	1				1		2				2
Leeds, Gren. & Lan.	167,762												1
Ottawa	823,608	6	2				5		14	1	1	1	1
Renfrew	100,075								3			1	1
Central East Region	2,114,060		4				13		28	5	1	1	10
Durham	547,759		1				7		5	1			1
Haliburton-Kawartha	170,627						2		3				3
Peterborough	132,615		2										2
Simcoe	411,024		1				2		6				1
York	852,035						2		14	4	1	1	3
Toronto Region*	2,611,661	2	15	0	0	0	11	0	44	8	18	16	6
North		2	2				1		13		1	6	2
South			4				7		12	2	14	6	3
East			7						10	1	2	2	1
West			2				3		9	5	1	2	
Central West Region	2,260,237	1	7		1		13		44	5	1	9	6
Halton	413,454		1		1		1		2				4
Peel	1,122,959	1	2				3		35	3		9	
Waterloo	470,022		3				7		3	2	1		1
Wellington-Duff.	253,802		1				2		4				1
Central South Region	1,188,202		7		1		7		20		1	1	7
Brant	131,721						4						
Haldimand-Norfolk	109,756		1						3		1		
Hamilton	516,776		4				3		9			1	4
Niagara	429,949		2		1				8				3
Southwest Region	1,561,717		4				10		20	3			3
Grey Bruce	160,624		1				2		6	1			1
Elgin-St. Thomas	86,096		1						1				
Huron	61,896						5		3				
Chatham-Kent	110,124								1	1			
Lambton	132,664								1				2
Middlesex-London	428,628		1										
Oxford	103,880		1										
Perth	77,265						3						
Windsor-Essex	400,540								8	1			
September 2004	12,238,300	11	44		3		60		186	22	22	30	40
*** Total YTD 2004	-	889	711	6	35	18	473	5	1,662	224	313	429	219
*** Total YTD 2003	-	469	637	10	37	11	240	8	1,611	212	233	513	401

Summary of Reportable Diseases in Ontario - October 2004

Health Units by Region	Population Projections 2003	AIDS	Campylo.	Chicken-pox	Chlamydia	Enceph./Meningitis	GAS	Gonorrhoea	Hepatitis A	Hepatitis B	Hepatitis C	Hib
Northern Region	864,731		16	74	153	3	1	6	1	2	30	
Algoma	119,929		1		17	1				1		7
Muskoka-Parry Sound	86,383		2	18	10				1			1
North Bay	94,875		2	3	12			1				3
Northwestern	81,874		6	30	16			1		1		
Porcupine	89,876		0	0	21							
Sudbury	196,787		2	15	31	1		1				10
Thunder Bay	159,592		3	8	43		1	3				9
Timiskaming	35,415				3	1						
Eastern Region	1,637,692	1	43	86	175	2	6	15		1		53
Eastern Ontario	197,370		6	20	14	1	1	2				3
Hastings & Prince Ed.	160,658		3	1	14		2					0
Kingston, Fron. & Len.	188,219	1	4		26			1				18
Leeds, Gren. & Lan.	167,762		2		8							6
Ottawa	823,608		26	65	108	1	3	12		1		25
Renfrew	100,075		2		5							1
Central East Region	2,114,060	1	67	137	227	8	3	21	1	1	79	1
Durham	547,759		13	16	80	1		8	1	1		19
Haliburton-Kawartha	170,627		5		25	2						12
Peterborough	132,615		1	13	25	3		1				4
Simcoe	411,024		7	44	35		2	3				25
York	852,035	1	41	64	62	2	1	9				19
Toronto Region*	2,611,661	4	105	331	545	3	5	152	5			101
North		1	23	38	114		2	22				22
South		3	40	108	186	2	1	76	2			42
East			22	121	154		2	26	2			20
West			20	64	91	1		28	1			17
Central West Region	2,260,237		70	103	271	4	1	46	2	2	44	
Halton	413,454		10		27	2	1	3	1			3
Peel	1,122,959		40	98	145	2		27	1			26
Waterloo	470,022		10		72			16		2		13
Wellington-Duff.	253,802		10	5	27							2
Central South Region	1,188,202		31	68	184	2	2	37	2			59
Brant	131,721		6	7	22			8				7
Haldimand-Norfolk	109,756		4	27	7	1	1	1				1
Hamilton	516,776		12	4	96		1	22	2			25
Niagara	429,949		9	30	59	1		6				26
Southwest Region	1,561,717		35	26	199	6	2	24	1	3	39	
Grey Bruce	160,624		3		12							2
Elgin-St. Thomas	86,096		4		5	1	1	1				2
Huron	61,896		5		4							
Chatham-Kent	110,124			5	15			1	1			2
Lambton	132,664		5		8			2		2		3
Middlesex-London	428,628				86	5	1	13		1		12
Oxford	103,880		3		5							2
Perth	77,265		3	21	3							3
Windsor-Essex	400,540		12		61			7				13
October 2004	12,238,300	6	367	825	1,754	28	20	301	12	9	405	1
*** Total YTD 2004	-	95	3,439	15,338	16,997	408	234	2,948	160	111	4,327	5
*** Total YTD 2003	-	111	3,568	11,955	15,826	386	344	2,773	132	136	4,333	8

* The Toronto City regions above are now defined as: North - former North York; South - former City of Toronto; West - former Etobicoke and City of York; East - former Scarborough and East York

** Infectious Syphilis cases include 'Primary, Secondary and Early Latent' staging effective January 1, 2003

*** Adjusted for deletions and late reports.

Summary of Reportable Diseases in Ontario - October 2004

Health Units by Region	Population Projections 2003	Influenza	IPD	Measles	Meningo-coccal	Mumps	Pertussis	Rubella	Salmon.	Shigellosis	Syphilis Infectious*	TB	VTEC
Northern Region	864,731		1				5		6	1		2	
Algoma	119,929						2		1				
Muskoka-Parry Sound	86,383												
North Bay	94,875								2				
Northwestern	81,874								1			1	
Porcupine	89,876												
Sudbury	196,787						1						
Thunder Bay	159,592		1				2		1	1		1	
Timiskaming	35,415								1				
Eastern Region	1,637,692		16		1		10		9		3	1	5
Eastern Ontario	197,370		1		1				1		1		1
Hastings & Prince Ed.	160,658		3				1		1				2
Kingston, Fron. & Len.	188,219		2				3		2				1
Leeds, Gren. & Lan.	167,762								1				
Ottawa	823,608		10				6		4		1	1	1
Renfrew	100,075										1		
Central East Region	2,114,060	24	25			1	15		26		1	3	6
Durham	547,759		11				2		7			1	2
Haliburton-Kawartha	170,627		2						4				2
Peterborough	132,615		4				4		1				
Simcoe	411,024		4				1		6				
York	852,035	24	4			1	8		8		1	2	2
Toronto Region*	2,611,661	2	15	1			9		39	7	22	25	7
North		1	1				2		7	1	1	3	2
South		1	4	1			2		14	5	20	12	2
East			5				3		14			5	3
West			5				2		4	1	1	5	
Central West Region	2,260,237		13		1	1	13		37	4	1	12	8
Halton	413,454		1				1		2	1			1
Peel	1,122,959		5			1	4		25	3	1	11	5
Waterloo	470,022		6		1		6		7			1	2
Wellington-Duff.	253,802		1				2		3				
Central South Region	1,188,202		18		1		2		14			2	12
Brant	131,721		2				1		3			1	1
Haldimand-Norfolk	109,756		2						2				2
Hamilton	516,776		11				1		4			1	5
Niagara	429,949		3		1				5				4
Southwest Region	1,561,717		11				9		10				3
Grey Bruce	160,624						3		1				
Elgin-St. Thomas	86,096						1		1				
Huron	61,896		1				1						1
Chatham-Kent	110,124		3						2				
Lambton	132,664												
Middlesex-London	428,628		3				3						
Oxford	103,880						1						
Perth	77,265		2						2				
Windsor-Essex	400,540		2						4				2
October 2004	12,238,300	26	99	1	3	2	63	0	141	12	27	45	41
*** Total YTD 2004	-	914	813	7	38	20	539	5	1,826	238	386	528	269
*** Total YTD 2003	-	482	726	11	41	13	282	9	1,756	235	334	569	424