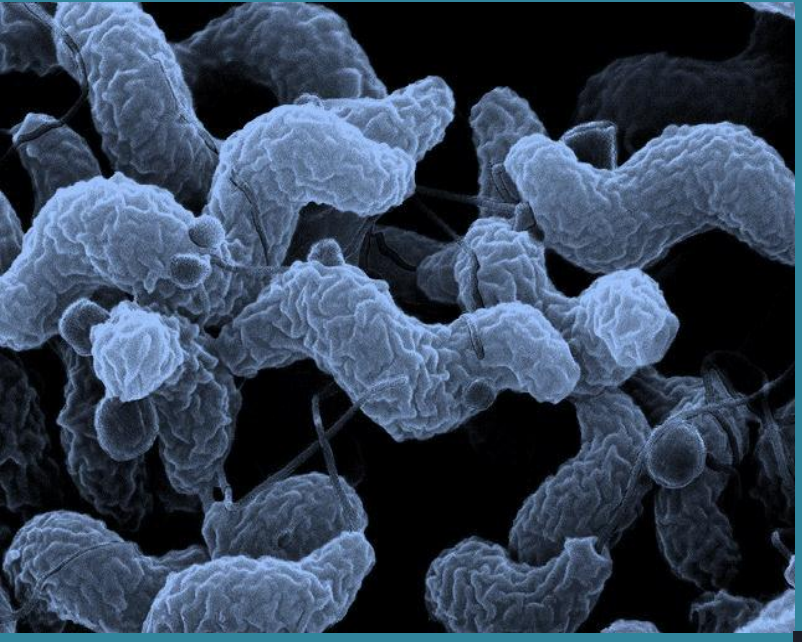
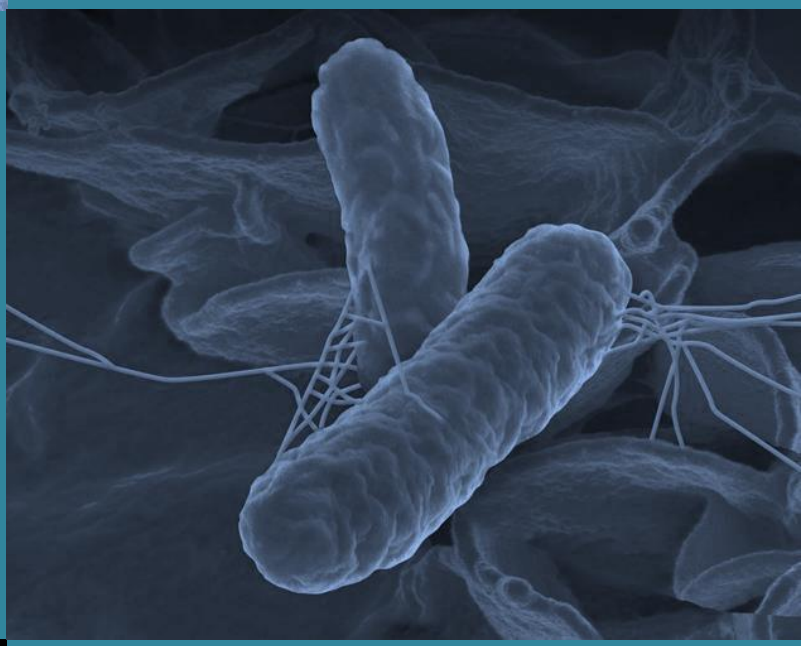
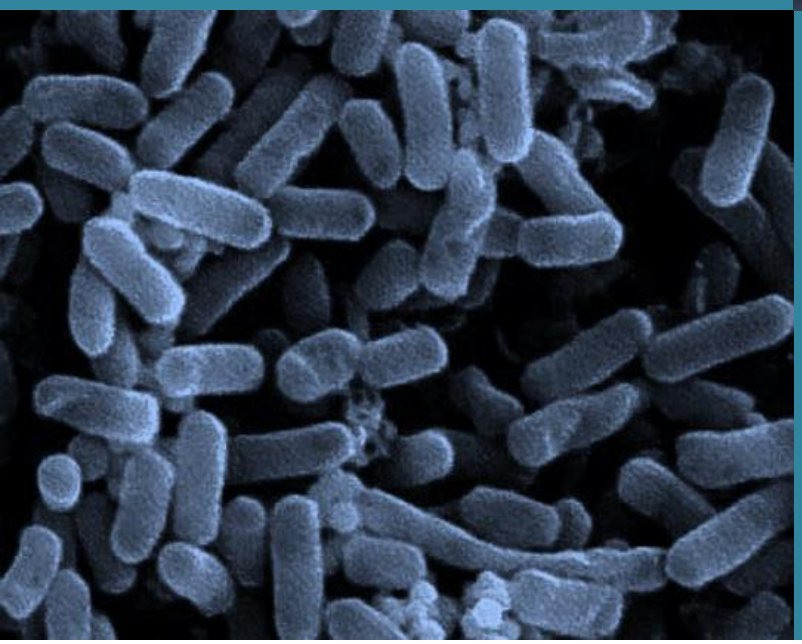


Gastrointestinal Infections in Northern Ireland





Annual Surveillance Report 2016

HSC Public Health Agency

Gastrointestinal Infections in Northern Ireland Annual Surveillance Report 2016

Contents

Key Points

- A number of infections displayed an increase in reports including *Crypstosporidium, E. coli O157, Giardia and Salmonella.*
- *Campylobacter* infections decreased slightly in 2016 (5% reduction) representing the second yearly decrease after a long period of increasing rates. This decrease occurred in the context of new testing methods that might have been expected to lead to higher rates of detection due to increased sensitivity.
- There has been a large increase in *Cryptosporidium* infections in 2016 (38% increase). Taking into account a similar increase in 2015, the numbers of laboratory reports have almost doubled since 2014. These increases may be due, at least in part, to changes in testing policy and test type for *Cryptosporidium* in several laboratories.
- There were 81 laboratory confirmed cases of *E. coli* O157 reported in 2016. Excluding 2012 when a major outbreak took place, this represents the largest number of reports in the past ten years.
- *Giardia Lamblia* reports also increased substantially with 121 reports in 2016 compared to 93 in 2015. This follows a large increase in 2015. Similar to Cryptosporidium this increase is likely due to changes in testing policy and test type in several laboratories.
- The number of *Salmonella* infections reported increased from 125 in 2015 to 144 in 2016, representing a 15% increase. Reports of S. enteriditis fell by 27% with the overall increase due to S. typhimurium and other serovars.
- The number of *Shigella* reports decrease compared to 2016 with a total of 21 culture confirmed cases compared to 31 in 2015. However, compared to previous years the number of reports still remains elevated.
- Travel remains a significant risk factor for some gastrointestinal infections, with 39% of *Salmonella* infections being related to travel outside the UK in 2016.
- The number of outbreaks increased substantially in 2016 particular in hospital reports of Norovirus outbreaks.
- Differences in testing policy and procedures between laboratories and their relatively recent introduction continue to make interpretation of surveillance data challenging.

Introduction

The Public Health Agency (PHA) has a lead role in protecting the population from infection and environmental hazards through a range of core functions including communicable disease surveillance and monitoring, operational support & advice, and education, training and research.

The effective management of infectious disease depends on high quality surveillance. Surveillance of communicable gastrointestinal infectious disease provides timely information so that public health action can result.

Epidemiological data is collated from a number of surveillance systems:

- Regional CoSurv for NI laboratories – all confirmed organisms/infections are reported electronically from seven laboratories to PHA.
- Reference laboratory reporting – selected organisms are sent by the local laboratories to reference laboratories in England for typing and the results are reported to PHA.
- Notifications of Infectious Diseases (NOIDS) – General Practitioners and Hospital Physicians have a statutory duty to report notifiable infectious diseases (e.g. food poisoning) to the PHA under the Public Health Act (NI) 1967.
- HP Zone – software package used in case management, contact tracing, and outbreak investigation & control. HP Zone facilitates the capture of data and collection of timely local and regional infectious disease intelligence.
- Enhanced surveillance systems for *E. coli* O157 - an active surveillance system is in place to assemble a comprehensive clinical, epidemiological and microbiological dataset on all primary indigenous *E. coli* O157 cases.

The range of surveillance outputs is broad and includes:

- Weekly surveillance – weekly internal report to the Health Protection team.
- Monthly/quarterly and annual returns – to various external bodies including the Food Standards Agency, European Centre and Disease Control, Epidemiology of Foodborne Infections Group and Department of Health, Social Services & Public Safety.
- Annual reports and data – published yearly on the PHA website.
- Analysis of outbreaks – descriptive and/or analytical epidemiological analysis.

This report presents the epidemiological data for selected gastrointestinal infections reported in Northern Ireland in the calendar year 2016.

It should be noted that most gastrointestinal illness samples which are sent for testing are not tested for every organism listed. What testing occurs may vary between laboratories and based on clinical criteria or age.

Campylobacter

Number of cases	**1,258**
Incidence rate	**67.6 per 100,000 population**

Campylobacter is the most common bacterial cause of gastrointestinal infection in the UK and Europe. Campylobacteriosis is characterised by diarrhoea, abdominal pain, malaise, fever, nausea, and vomiting. Symptoms generally last for only a few days.

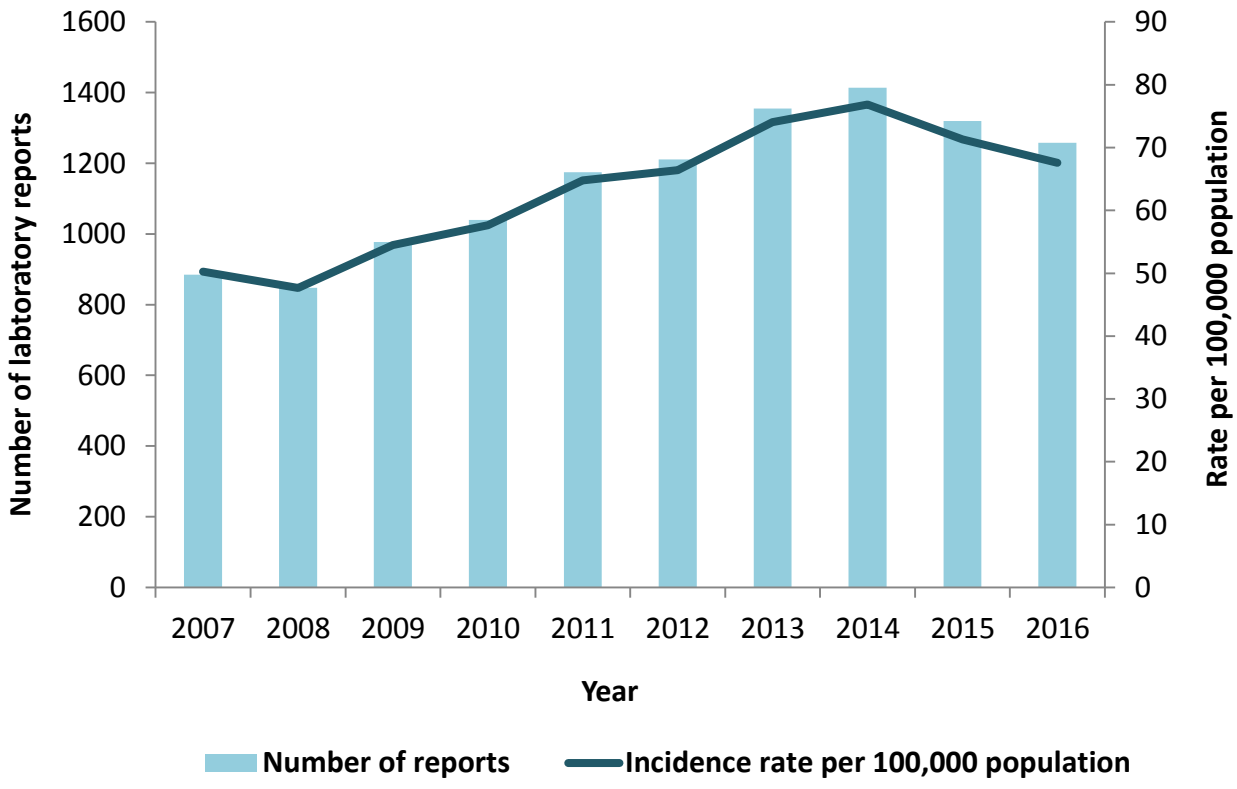
Despite two successive decreases in reports, C*ampylobacter* remains the most common bacterial gastrointestinal infection in Northern Ireland with 1,258 laboratory reported cases in 2016, a decrease of 62 cases (5%) compared to 2015 (n=1,320 cases) (Table 1, Figure 1). This decrease is despite the introduction of PCR testing in several laboratories over the previous 2 years which might have been expected to lead to increased ascertainment.

The incidence of C*ampylobacter* infections in 2016 was 67.6 per 100,000 population.

Table 1. No of laboratory reports of *Campylobacter*, 2007 - 2016

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
885	848	977	1040	1175	1211	1355	1414	1320	1258

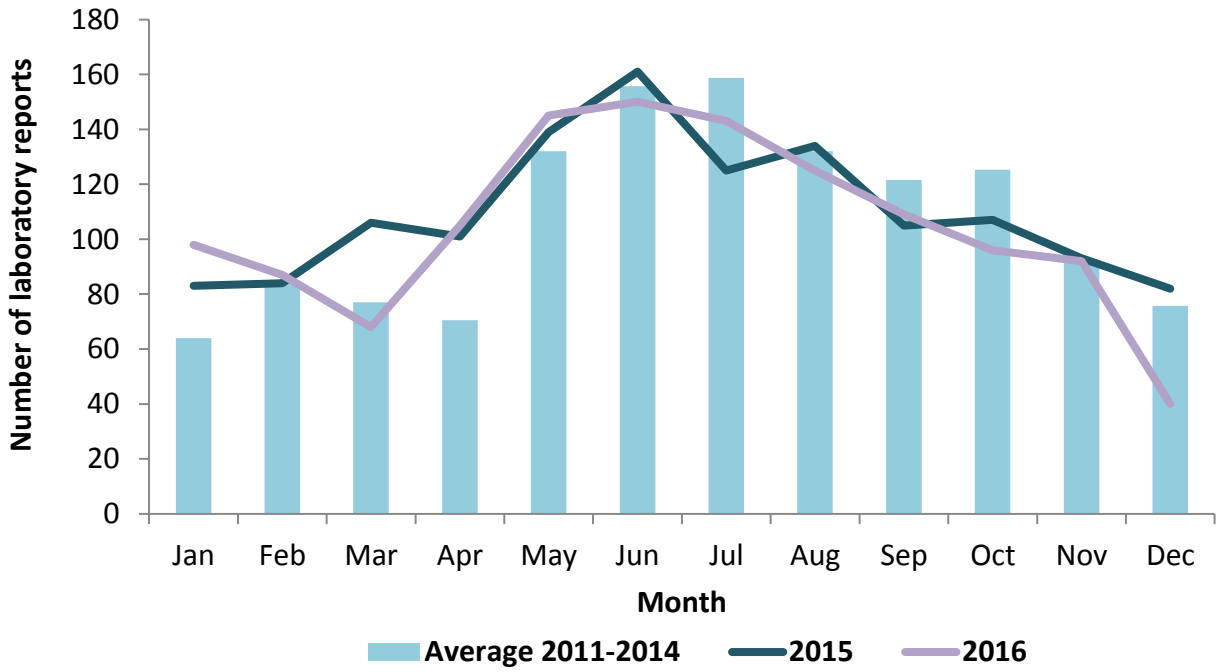
Fig 1: Laboratory reports and incidence rate of *Campylobacter*, 2007 - 2016



Cases of C*ampylobacter* follow a seasonal pattern with the number of cases generally increasing in May with a peak in June/July and declining from September onwards.

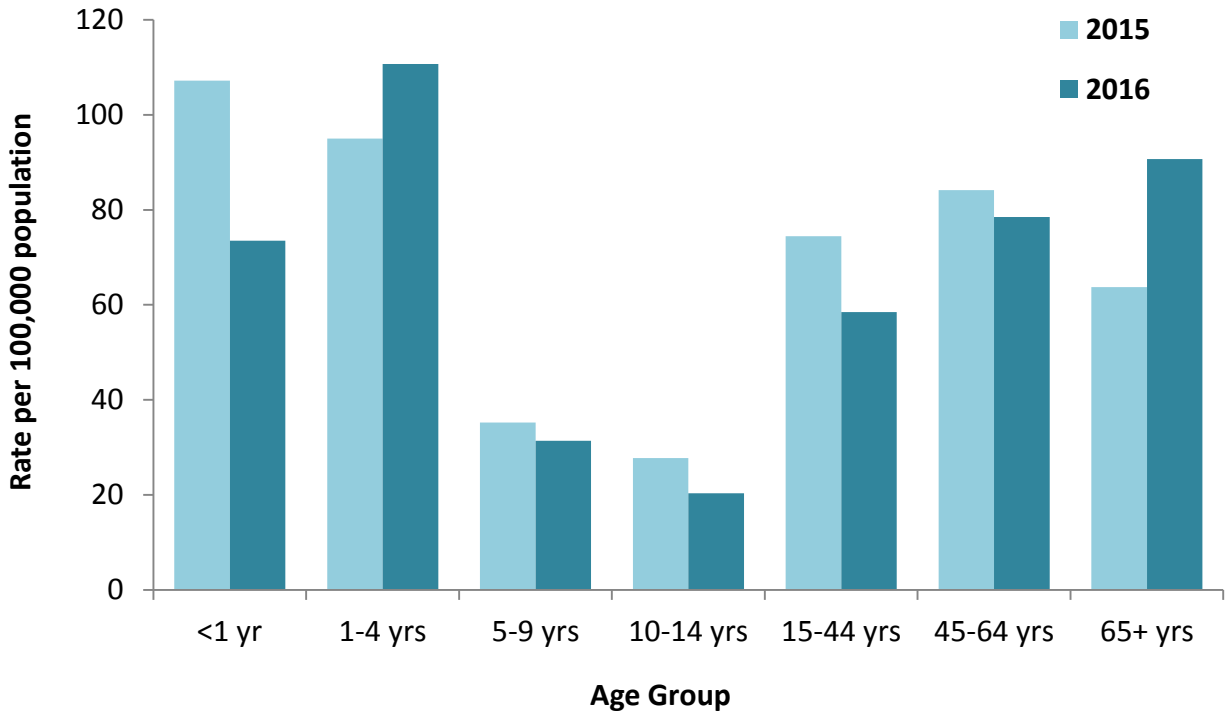
Monthly reports in 2016 generally followed those of 2015 with the exception of March and December where there was a significant decrease, (Figure 2).

Fig 2: Monthly laboratory reports of *Campylobacter*, 2015 - 2016



There was substantial variation in the age specific rates in 2016 compared to 2015. Whilst most age specific rates decreased in line with the overall rates, those in the 1-4 and over 65 year age groups increased. The highest incidence rate of laboratory reported C*ampylobacter* infections in 2016 was in the 1-4 year old age group (110.7 per 100,000 population) (Figure 3). The over 65 year age group showed a large increase in rates compared to 2015 and was the second highest age specific rate in 2016 (90.7 per 100,000 population) – this is the highest level in this age group over the past 10 years. There was a substantial drop in the rates for the under 1 year age group; however, this may be related to the relatively low numbers in this age group. The proportion of reported cases that were male was 58% (n=735), a slight increase over 2015.

Fig 3: Laboratory reports of *Campylobacter*, age-specific incidence rate, 2015 - 2016



Cryptosporidium

Number of cases	**282**
Incidence rate	**15.1 per 100,000 population**

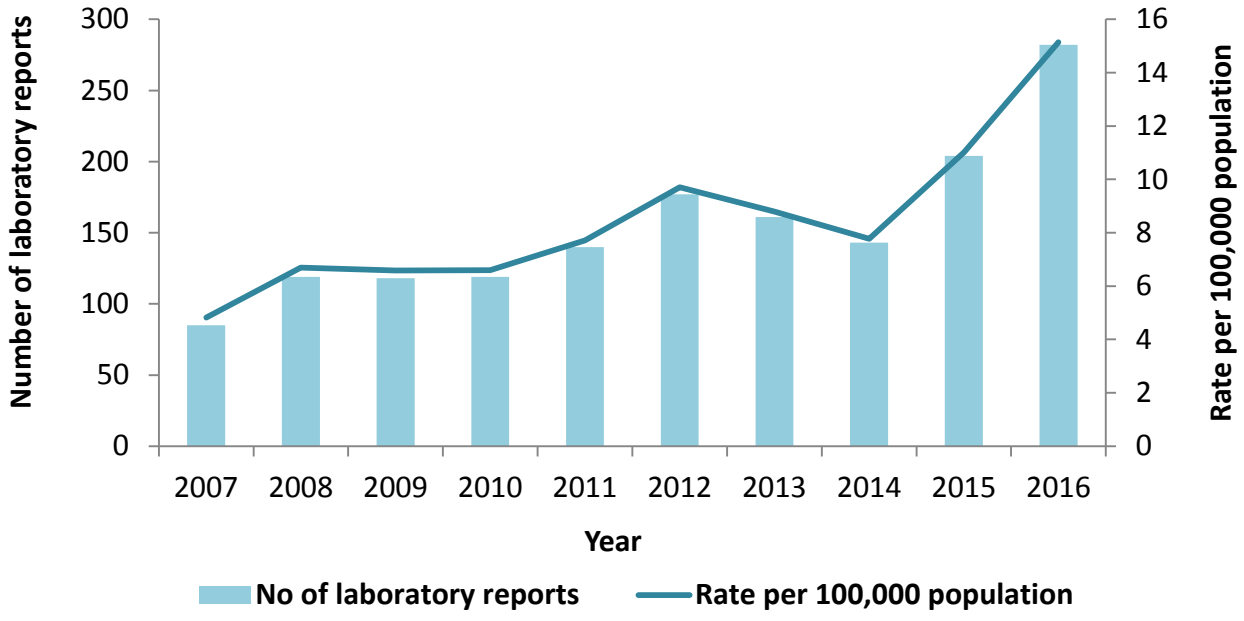
Cryptosporidium is a protozoal parasite that causes a diarrhoeal illness that can last between 2 days and 4 weeks. The infection can be a more serious illness in people who are immunosuppressed. *Cryptosporidium* is found in lakes, streams, rivers, untreated water and occasionally in swimming pools.

The number of laboratory reports of Cryptosporidium continued to increase in 2016 although this would be expected given the changes to laboratory policy and testing type in several local laboratories in 2014/15 (Table 2, Figure 4). Some of this increase likely represents increased ascertainment; however, as cryptosporidium reports increased substantially in one of the trusts where no changes in testing policy or testing type had taken place it would appear that there was also a true increase in incidence of Cryptosporidium infections. The incidence rate of C*ryptosporidium* infection was 15.1 per 100,000 population. No outbreaks of C*ryptosporidium* were identified in 2016 and 29 cases (10%) were thought to be associated with travel outside the United Kingdom, a slight increase compared to 2015.

Table 2. No of laboratory reports of *Cryptosporidium*, 2007 - 2016

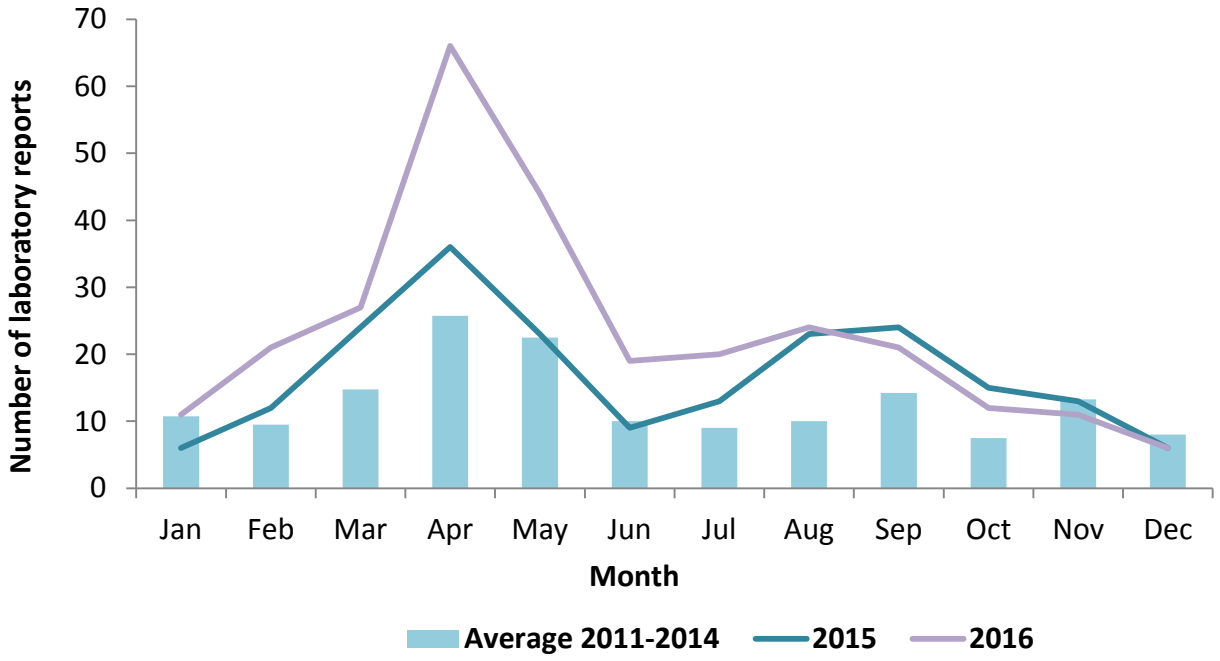
2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
85	119	118	119	140	177	161	143	204	282

Fig 4: Laboratory reports of *Cryptosporidium*, 2007 - 2016



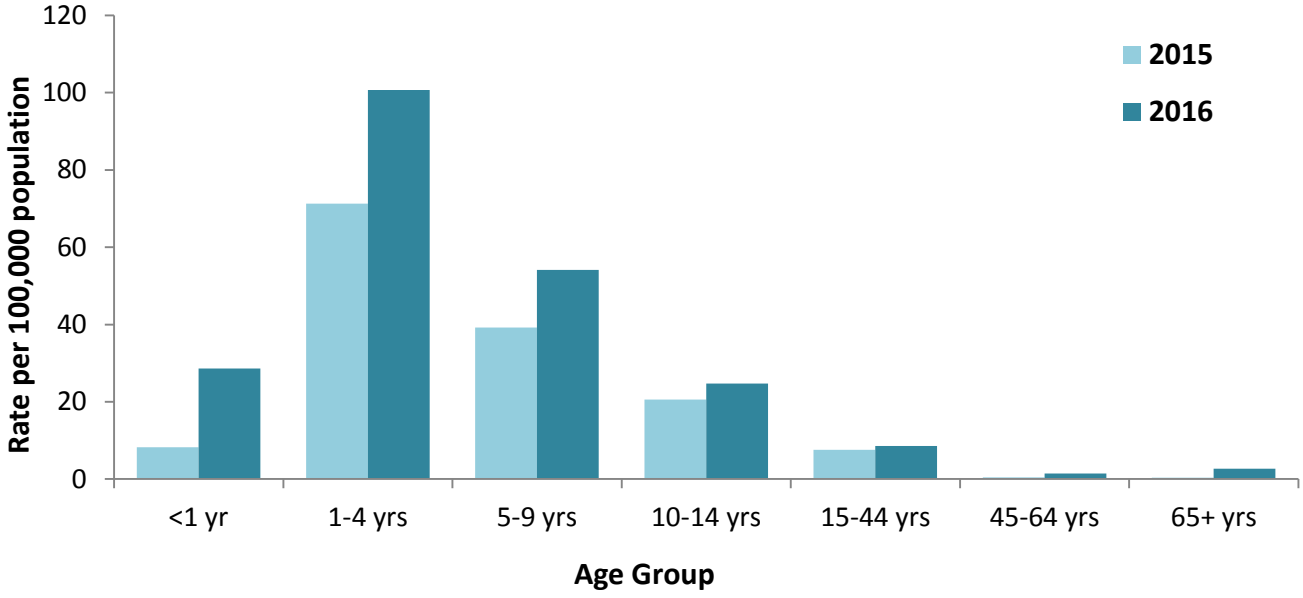
The spring peak in 2016 was much higher than in 2015 with a similar small secondary peak in August/ September (Figure 5). The number of laboratory reports outside of the spring peak was relatively similar to 2015 which also tends to support the impression that the increase was not solely down to increased ascertainment. Had the increase been solely down to laboratory changes one would have expected an increase across the entire year.

Fig 5: Monthly laboratory reports of *Cryptosporidium*, 2011 - 2016



Similar to previous years the highest incidence rate in 2016 was in the 1-4 years old age group (100.7 per 100,000 population) (Figure 6). All age groups have seen an increase in incidence rate during 2016. Overall 53% of cases were males in 2016.

Fig 6: Laboratory reports of *Cryptosporidium*, Age-Specific Rate (per 100,000 population), 2015 - 2016



E. coli O157

Number of cases	**81**
Incidence rate	**4.3 per 100,000 population**

Escherichia coli O157 is a bacterial cause of gastroenteritis. Symptoms can range from mild gastroenteritis to severe bloody diarrhoea. A small proportion of patients can develop haemolytic uraemic syndrome (HUS) which is a serious life-threatening condition resulting in kidney failure.

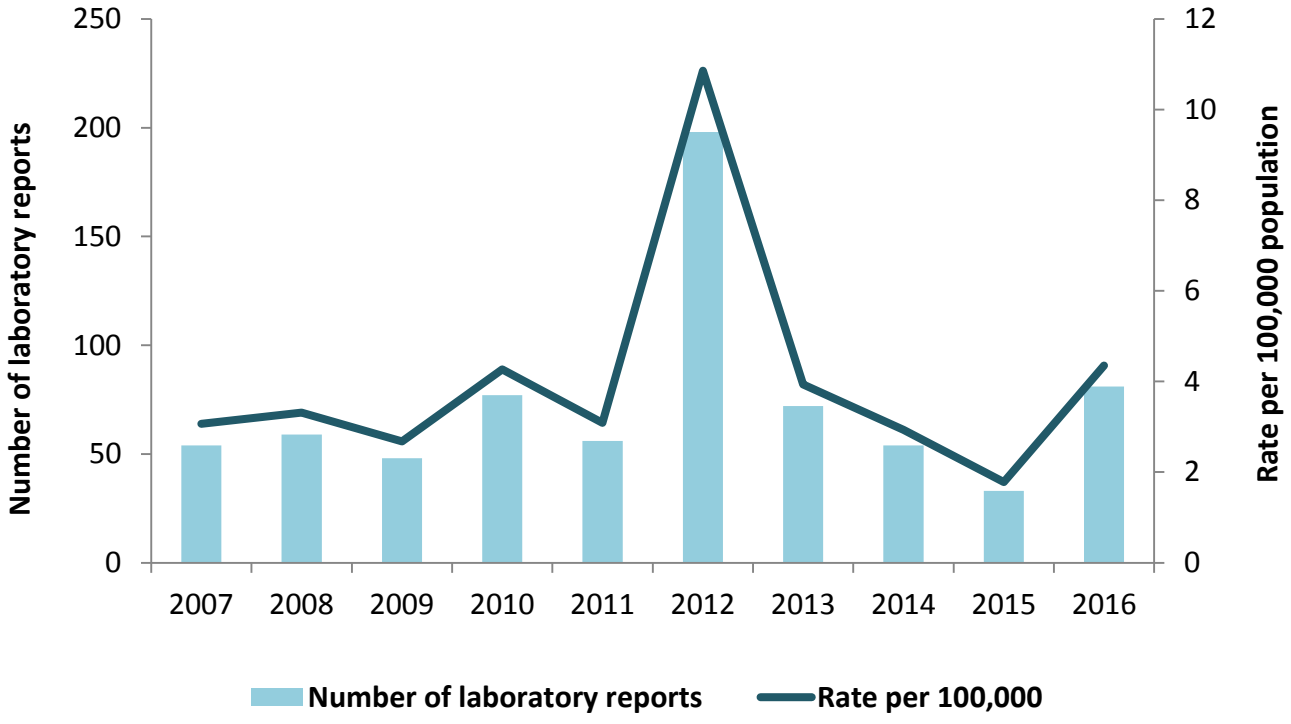
There were 81 laboratory culture confirmed cases of *E. coli* O157 reported in 2016, of which 63 (78%) tested positive as Vero cytotoxin-producing *E. coli* (VTEC). VTEC strains produce a toxin which can cause severe illness. Note that in 2016 not all O157 cultures were sent to PHE for toxin typing. There were no cases associated with outbreaks, and 11 cases (14%) were associated with travel outside the United Kingdom (Figure 7, Table 3).

Table 3. No of laboratory reports of *E. coli* O157, 2006 - 2016

2007	2008	2009	2010	2011	2012*	2013	2014	2015	2016
54	59	48	77	56	198	72	54	33	81

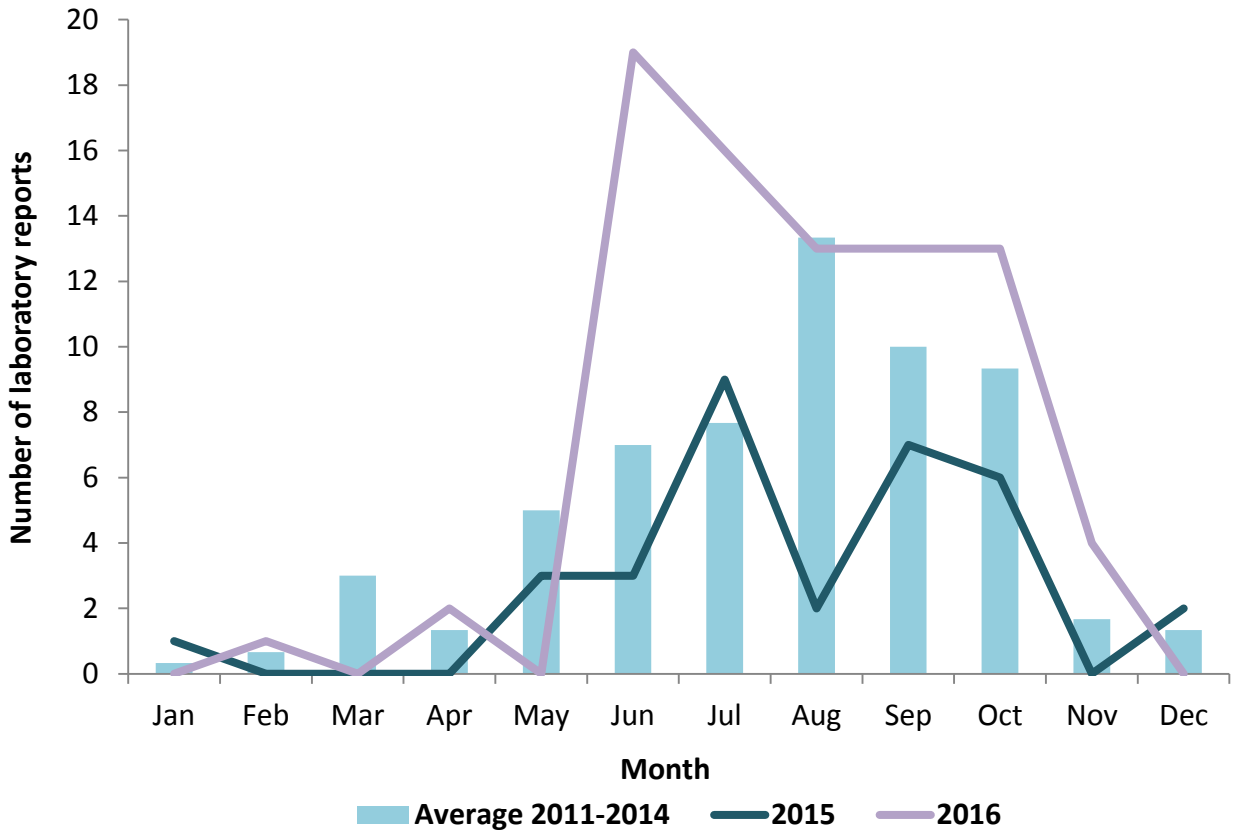
** increase due to largest recorded outbreak of E. coli in N. Ireland with 141 confirmed cases*

Fig 7: Laboratory reports of *E. coli* O157, 2007 - 2016



In 2016 the number of reports peaked in June, much earlier than usual, and remained elevated until October.

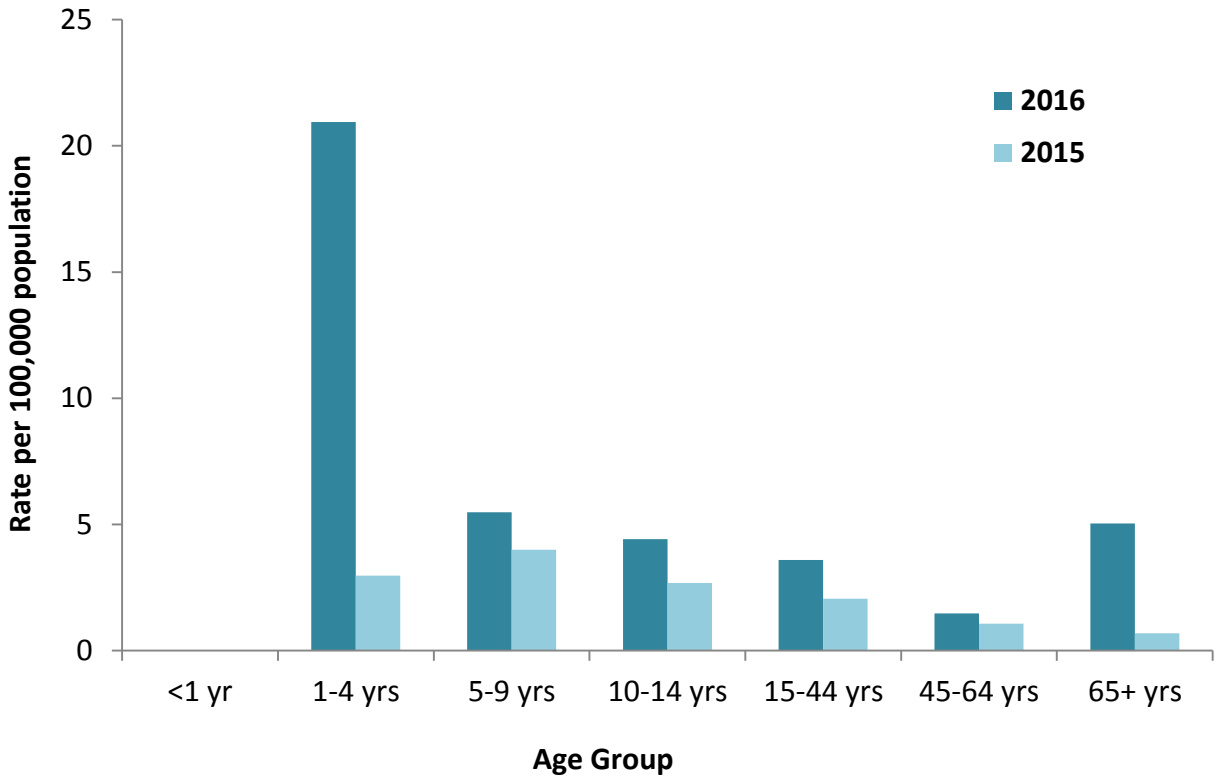
Fig 8: Monthly laboratory reports of *E. coli* O157, 2011 - 2016*



** 2012 not included due to the atypical nature of the large outbreak that occurred in this year.*

The increase in overall rates was reflected in every age-specific rate with the exception of the under 1 year age group which, similar to 2015, had no cases reported. The highest incidence rate was in the 1-4 year age group. Both the 1-4 and over 65 year age groups showed a large increase in incidence rate, although in absolute terms the number of cases remains small with 19 cases in the 1-4 year age group and 15 in the over 65 year age group (Figure 9).

Fig 9: Distribution of *E. coli* O157 cases by age group, 2015 - 2016



Phage type data were only available for 49 cases (60%) in 2016, a substantial reduction compared to previous years. This is due to a lower number of O157 cultures being sent for phage and toxin typing to the reference laboratory. Phage type 32 was the largest single phage type identified in 2016 (45% of those typed).

Verocytotoxin gene type was available for 63 of the 81 laboratory culture confirmed cases in 2016. Toxin type VT2 was the most common toxin profile with 51% of cases (where toxin typing took place) displaying this toxin type. The majority of the remaining cases were toxin type VT1 & 2 (27%) with the remaining reports not stating the toxin profile (Table 4).

Table 4: Verotoxin (VT) genes of laboratory confirmed cases of *E. coli* O157, 2006 - 2016

VT	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
VT1	0	0	0	2	0	0	0	0	0	0
VT2	45	39	25	42	24	34	50	18	16	32
VT1+2	4	11	11	22	20	153	9	13	10	17
VT+	0	6	8	1	5	2	2	12	6	14
Total	**49**	**56**	**44**	**67**	**49**	**189**	**61**	**43**	**32**	**63**

Questionnaires were received for 77 of the 81 O157 cases (95%) with 73 reporting symptoms. Those not reporting symptoms are contacts of symptomatic cases who have tested positive for E coli O157. The most common symptoms reported were diarrhoea (87%) and abdominal pain (87%) similar to previous years (Table 5). Overall 71% of cases experienced bloody diarrhoea. Cases in the over 65 year age group were the most likely to report bloody diarrhoea, with 93% of cases reporting these symptoms.

Table 5: Symptoms experienced by *E. coli* O157 cases, 2016

Symptom	Number	Percentage*
Abdominal pain	67	87%
Blood in stools	55	71%
Diarrhoea	67	87%
Fever	28	36%
Nausea	37	48%
Vomiting	29	38%

** percentage of cases where a questionnaire has been received*

Hospital admissions occurred in all but one of the age groups. There were 43% of cases admitted to hospital in 2016, an increase compared to 2015 (57%). There were substantial variations in the percentage hospitalised by age group but this may be due to the small numbers involved (Table 6).

Table 6: Hospitalisation of *E. coli* O157 cases by age group, 2016

Age group	Number of cases for whom questionnaire was received	Number of cases who visited GP	Number of cases who attended hospital	Number of cases hospitalised	% of age group hospitalised
<1	2	2	1	1	50%
1-4	17	10	5	3	18%
5-9	7	3	4	3	43%
10-14	5	3	3	2	40%
15-44	25	17	17	14	56%
45-64	7	7	2	0	0%
65+	14	9	10	10	71%
Total	**77**	**51**	**42**	**33**	**43%**

E. coli – serotypes other than O157

The introduction of PCR testing in several of the Northern Ireland health service laboratories has allowed for the detection of non-O157 serotypes of verotoxin positive *E. coli* where previously only E. *coli* O157 could be identified. However, only one laboratory in Northern Ireland is currently able to identify the particular serotype involved and this is limited to the eight most commonly found serotypes. The other laboratories do not routinely send non-O157 serotypes for further identification, resulting in an underestimate of the incidence of non-O157 serotypes and possible variation due to geographical differences.

In addition some specimens that test positive using PCR techniques cannot be subsequently cultured or identified. In most cases this would likely be due to the serotype being one the laboratory cannot identify but it can also include cases of O157 where it simply has not been possible to culture the organism. Depending on the severity of the symptoms or links to existing cases, a questionnaire may not be obtained for cases only identified through PCR testing. These changes mean that data prior to 2015 is not directly comparable to current data, as well as making interpretation of more recent data difficult. 2016 is the first year in since 2013 where there have been no major changes in testing procedures relating to E. coli within any of the local laboratories.

The number of serotype O026 increased substantially in 2016 due to two outbreaks reported in childcare settings which were deemed to be mainly person to person spread. There was also an increase in PCR only reports of toxin positive E. coli where serotype cannot be identified (Table 8).

Table 7: Culture positive VTEC samples where a serotype was established

Serotype	2014*	2015	2016
O 026	18	17	32
O 145	1	4	3
O 091	1	2	0
O 110	1	1	0
Others*	4	1	1

* Others includes serotypes where only one positive has been identified in the past 3 years

There were also 10 cases where E. coli was cultured but it was not possible to identify the serotype. Samples positive for non-O157 are not routinely sent for toxin or phage typing so this information is not available for the majority of non-O157 cases.

Table 8: PCR positive only VTEC samples		
2014	**2015**	**2016**
0	93	128

There were a total of 175 cases where E. coli was detected but the serotype was either not O157 or not typed, this includes both culture and PCR only samples. Of these 175 cases questionnaires were obtained for 97 (55%) with 85 being symptomatic (87% of questionnaires).

In general the percentage of cases suffering from each of the symptoms is lower than for E. coli O157; however, this might be expected as PCR only test results may be indicative of lower levels of infection. Similar to O157, abdominal pain and diarrhoea are the primary symptoms reported (Table 9).

Table 9: Symptoms experienced by *VTEC non-O157** cases, 2016		
Symptom	**Number**	**Percentage***
Abdominal pain	63	65%
Blood in stools	31	32%
Diarrhoea	66	68%
Fever	30	31%
Nausea	30	31%
Vomiting	23	24%

** percentage of cases where a questionnaire has been received*

The proportion admitted to hospital is also considerably lower than for E. coli O157 with only 9% admitted compared to 43% of O157 cases (Table 10).

Table 10: Hospitalisation of *VTEC non-O157* * cases by age group, 2016

Age group	Nor of cases for whom questionnaire was received	Number of cases who visited GP	Number of cases who attended hospital	Number of cases hospitalised	% of age group hospitalised
<1	1	1	1	0	0%
1-4	33	15	6	2	7%
5-9	9	4	0	0	0%
10-14	2	1	1	0	0%
15-44	33	21	6	3	9%
45-64	9	8	3	2	22%
65+	10	4	3	2	20%
Total	**97**	**54**	**20**	**9**	**9%**

* Table includes culture confirmed non-O157 VTEC cases as well as untyped and unknown serotypes identified through PCR testing.

Giardiasis

Number of cases	**121**
Incidence rate	**6.5 per 100,000 population**

Giardia lamblia is a protozoan parasite that causes giardiasis. The parasites are found in the gut of both humans and animals. Giardiasis can cause diarrhoea, abdominal cramps and flatulence; however up to a quarter of cases can be asymptomatic.

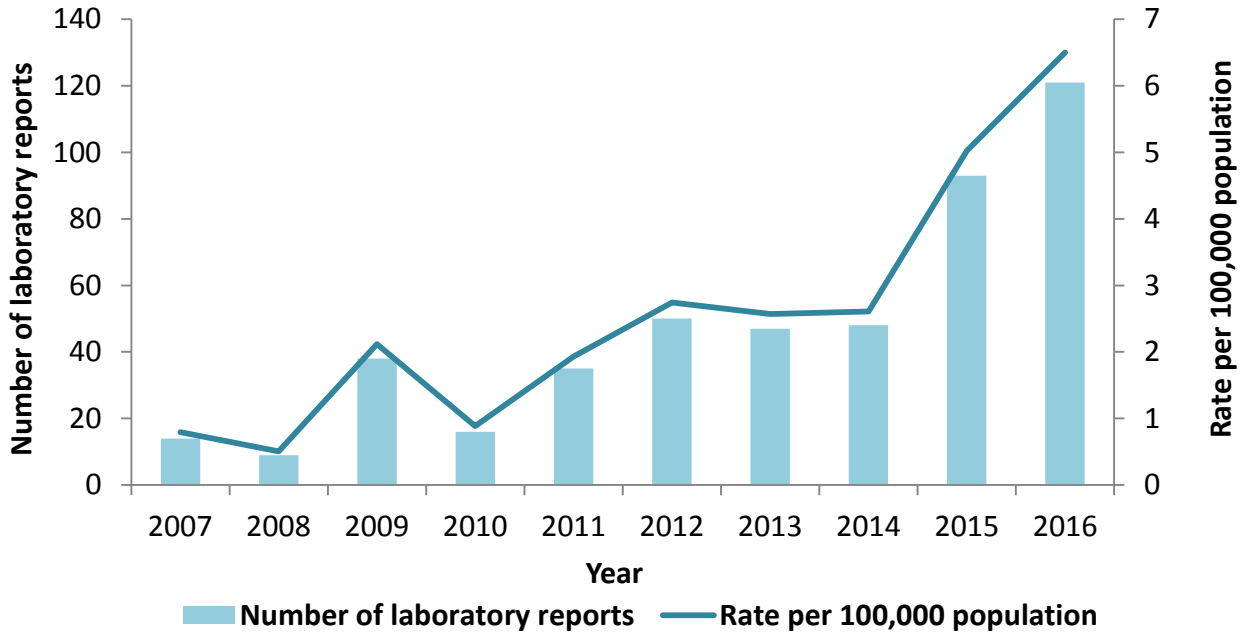
There was a large increase in the number of laboratory reports of *Giardia* in 2016. Similar to *Cryptosporidium* a number of laboratories introduced PCR testing for *Giardia* in 2014/15 and changed their testing policies. The increase in cases may be due to increased ascertainment rather than a true increase as there is no evidence of an increase in those laboratories that have not change testing procedures.

Laboratory confirmed cases of giardiasis increase from 93 in 2015 to 121 in 2016 (30% increase). The incidence rate in 2016 was 6.5 per 100,000 population. There were 28 (23%) cases that were reported as being likely to be associated with foreign travel (Table 11, Figure 10). Approximately 70% of cases were male. There were no outbreaks of giardiasis reported in 2016.

Table 11. No of laboratory reports of *Giardia lamblia*, 2007 - 2016

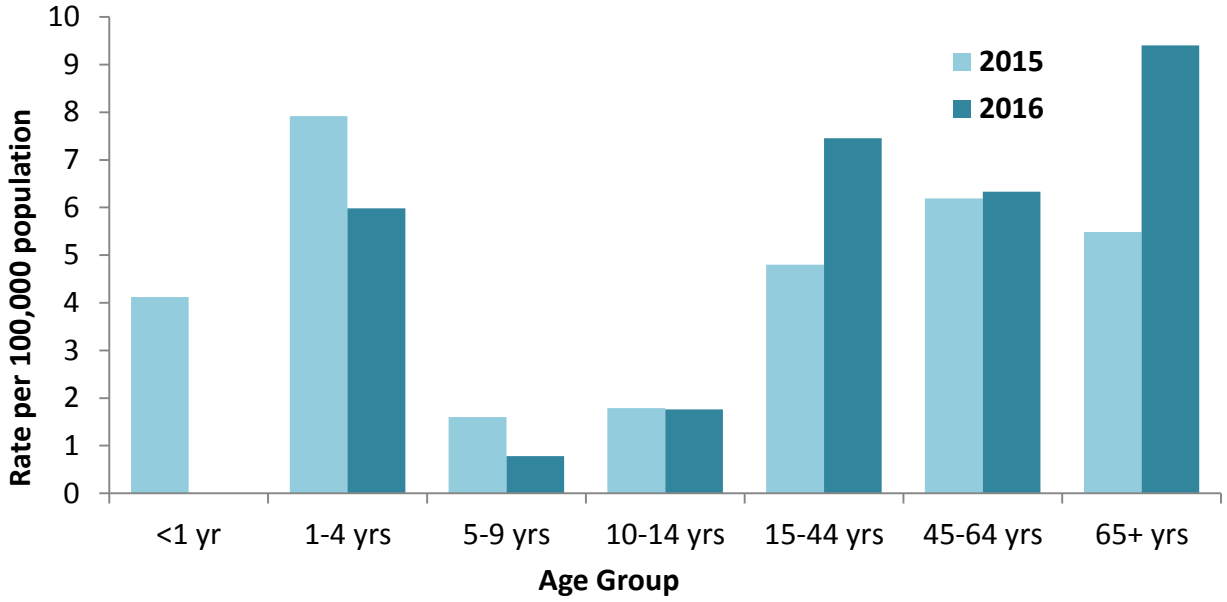
2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
14	9	38	16	35	50	47	48	93	121

Fig 10: Laboratory reports of *Giardia lamblia* (all specimen types), 2007 - 2016



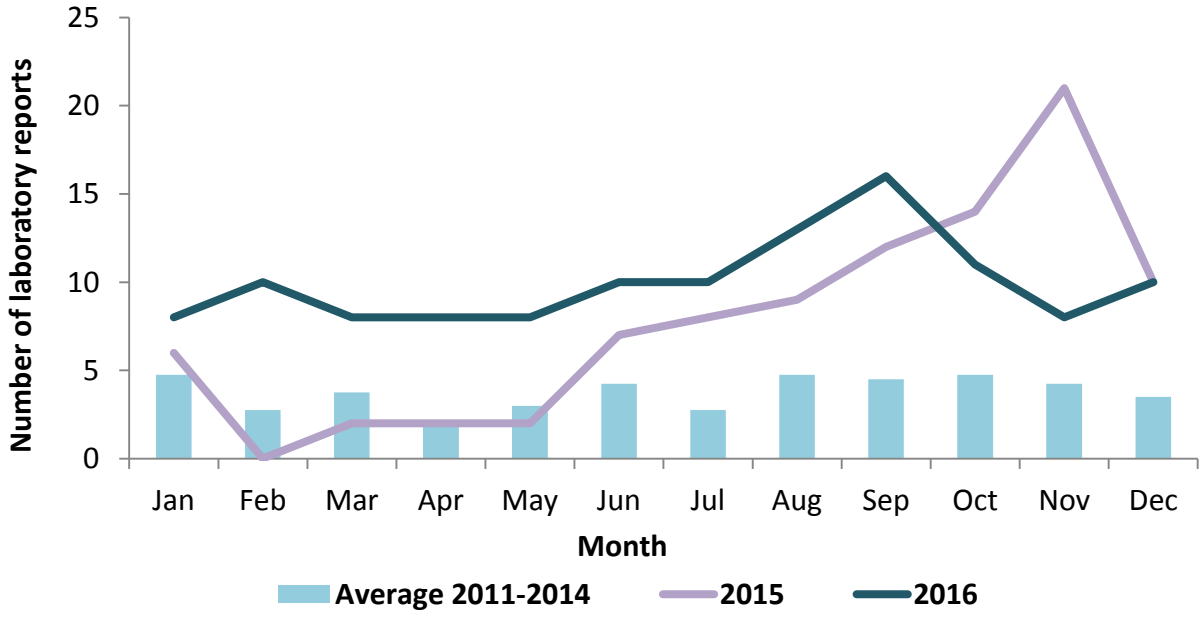
The highest incidence rate in 2016 was in the over 65 year age group (9.7 per 100,000 population) which also displayed the largest proportional increase compared to 2015. Despite the overall increase in incidence rates only two age specific rates increased – the 15-44 and over 65 year age groups, with all other age groups showing a decrease or remaining steady (Figure 11).

Fig 11: Laboratory reports of *Giardia lamblia* (all age groups), 2015 – 2016



In 2016 the number of reports peaked in September; however the numbers of reports were relatively stable throughout the year with a far less pronounced peak compared to the previous year and compared to Cryptospodium and other gastrointestinal infections (Figure 12).

Fig 12: Monthly laboratory reports of *Giardia lamblia*, 2011 - 2016



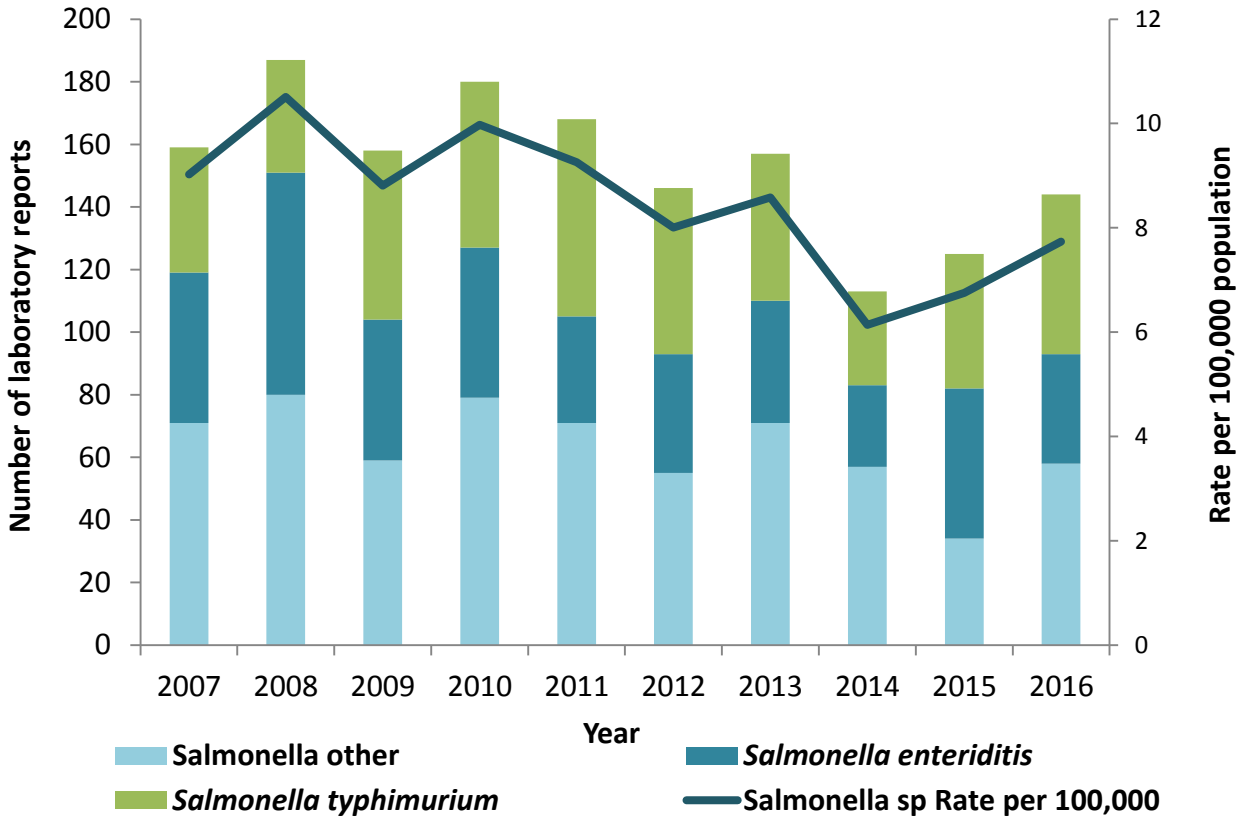
Salmonella

Number of cases	**144**
Incidence rate	**7.7 per 100,000 population**

Salmonella infections are one of the most commonly reported causes of bacterial gastrointestinal infections across Europe. *Salmonella* infection is characterised by abdominal pain, diarrhoea, fever, nausea, headache and occasionally vomiting. Dehydration amongst vulnerable populations such as infants, the immunocompromised and the elderly can be severe.

Laboratory reports increased for the second year in a row following a period of an overall downward trend, although cases of *S.* enteriditis decreased substantially. A total of 144 reports were received, representing a 15% increase compared to 2015. The incidence of *salmonella* infections was 7.7 per 100,000 population. The number of reported cases that were likely to be associated with foreign travel made up a substantial proportion of the reports at 39% (n=56). Consistent with previous years there were significant differences in the proportion due to travel between serotypes, with 57% of *S.* enteriditis due to travel but only 25% in the case of *S*. typhimurium. There were two cases of both *S.* typhi and S. paratyphi and all were associated with travel.

Fig 13: Laboratory Reports of *Salmonella*, 2007 - 2016



In 2016 *S.* enteritidis and *S*. typhimurium remained the two most frequently reported serotypes in Northern Ireland, accounting for 24% and 35% of cases respectively (Table 12). After a significant drop in 2015 the levels of reports of *Salmonella* classified as 'other' have increased but are still lower than levels seen prior to 2014.

Table 12. No of laboratory reports of *Salmonella*, 2007 - 2016

Serovar	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Enteriditis	48	71	45	48	34	38	39	26	48	35
Typhimurium	40	37	54	53	63	53	47	30	43	51
Paratyphi	2	1	0	2	1	1	1	1	0	2
Typhi	2	1	0	0	1	0	1	1	1	2
Other	67	77	59	77	69	54	69	55	33	54
Total	**159**	**187**	**158**	**180**	**168**	**146**	**157**	**113**	**125**	**144**

Similar to many gastrointestinal illnesses, S*almonella* cases also followed a seasonal pattern. Reports of salmonella peaked in September although an earlier peak was observed in June (Figure 14). As expected the cases of the most common serotypes *S.* enteriditis and *S.* typhimurium peaked in different months, with *S. e*nteriditis peaking in August and *S.* typhimurium peaking in October (Figure 15). The difference in peak months may be partially due to the differing proportions due to travel for each of these serovars.

Fig 14: Monthly laboratory reports of *Salmonella*, 2011 - 2016

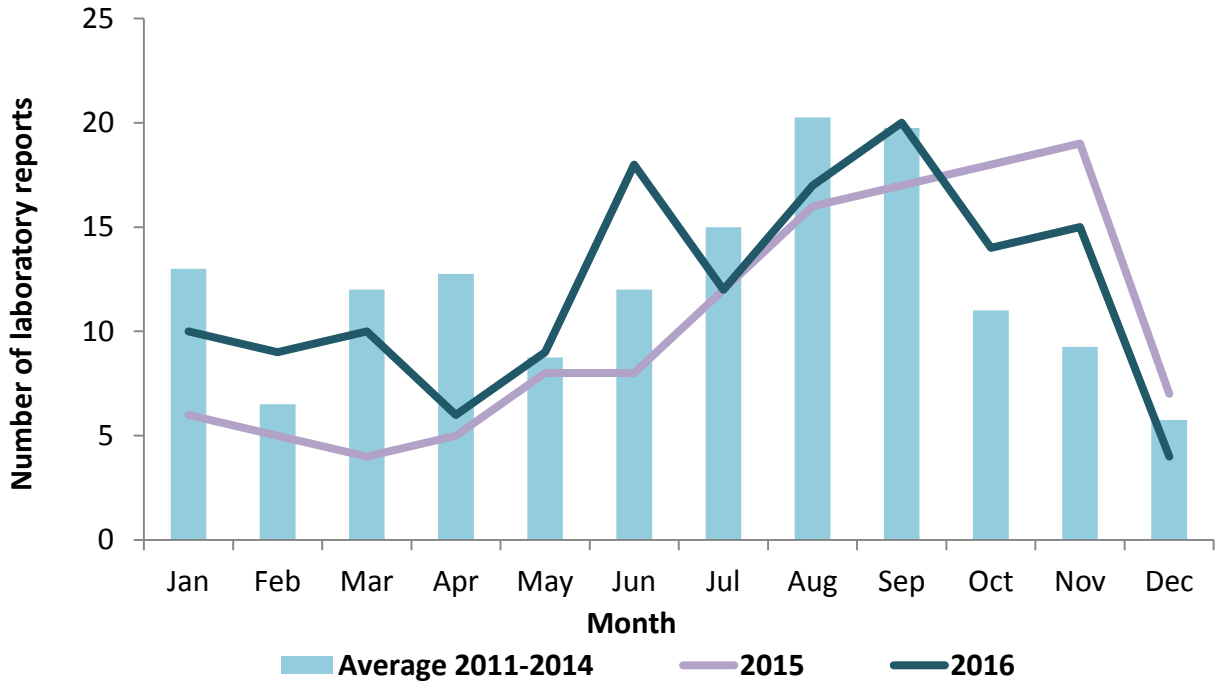
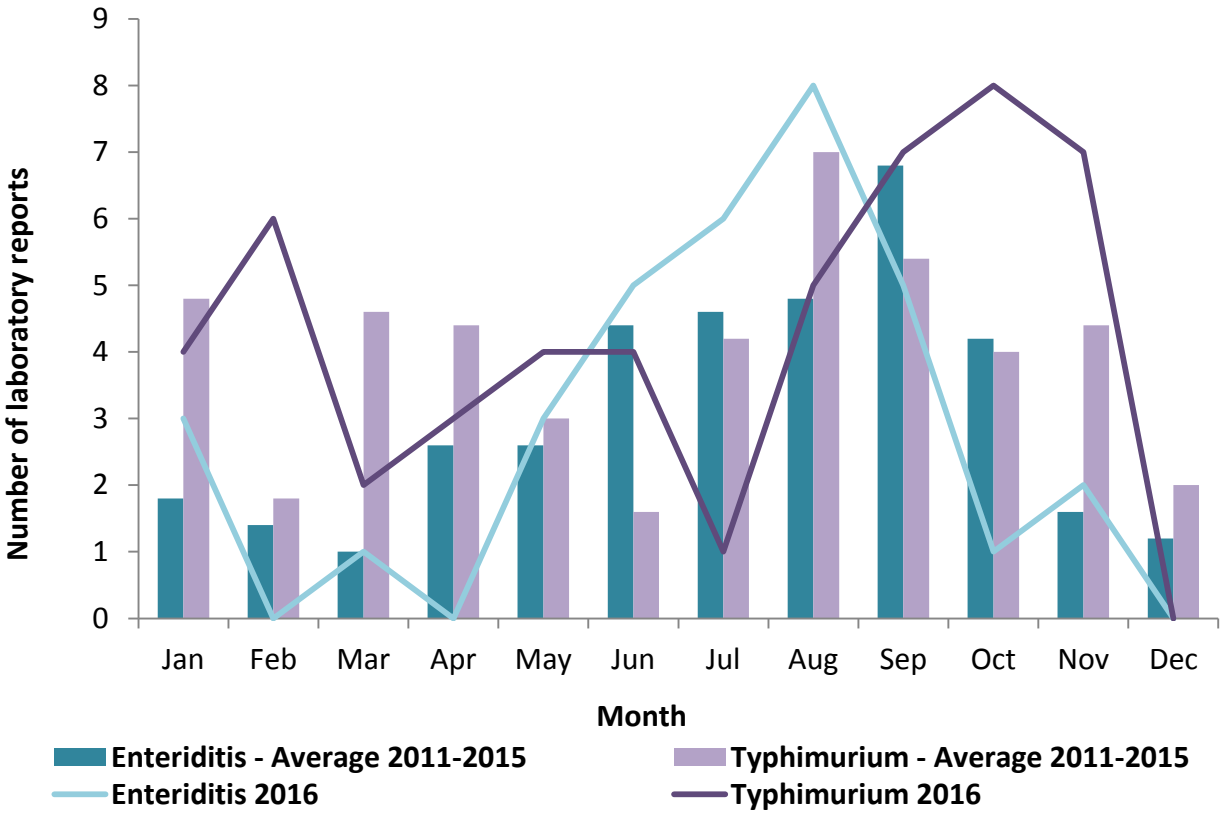
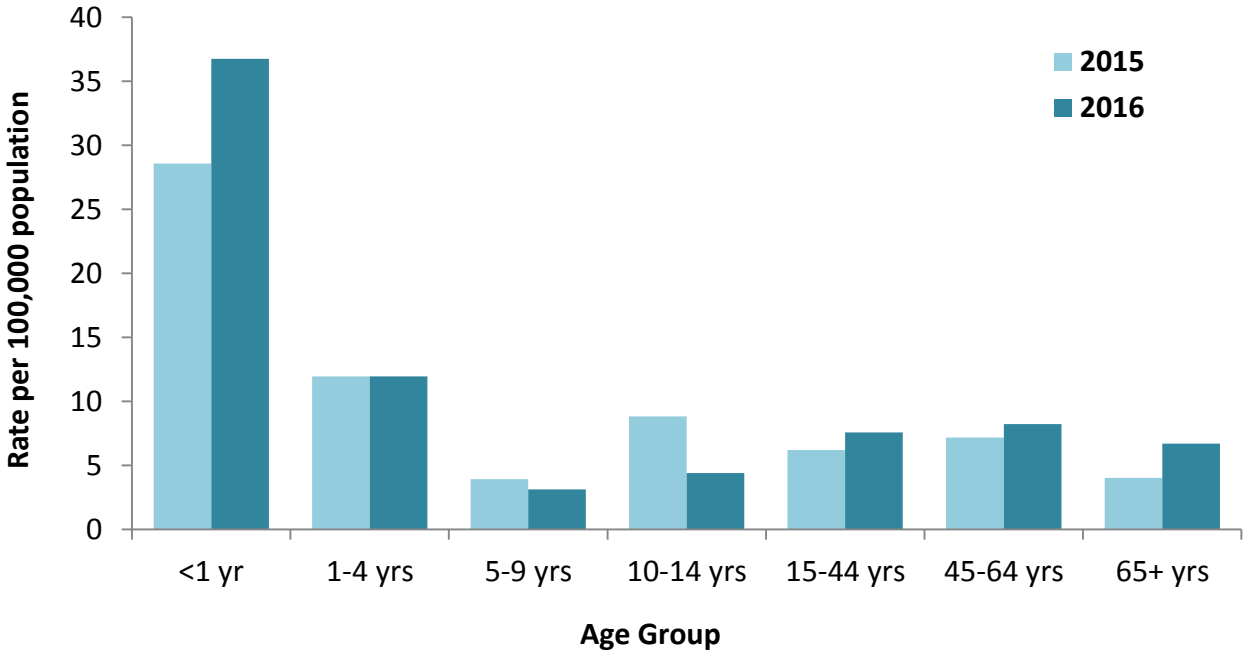


Fig 15: Monthly laboratory reports of *S*. Enteriditis and *S*. Typhimurium, 2016



In 2016 53% of the cases were male, a reduction from 2015. The highest incidence rate in 2016 was in the under 1 year old age group (36.8) per 100,000 population although this represents only 9 cases (Figure 16).

Fig 16: Laboratory reports of *Salmonella*, age specific rates (per 100,000 population), 2015 - 2016



Other serotypes for which more than one report was received in 2016 are presented in Table 10 along with data from the previous 3 years; however, other than S. enteriditis and S. typhimurium the numbers of individual serovars remain very low. There were an additional 21 serovars reported in 2016 where only one case was reported.

Table 13. *Salmonella* serovars 2013 - 2016

2013		2014		2015		2016	
Serovar	**No**	**Serovar**	**No**	**Serovar**	**No**	**Serovar**	**No**
Infantis	7	*Java*	4	*Infantis*	3	*Infantis*	7
Senftenberg	4	*Agona*	3	*Stanley*	3	*Oranienburg*	3
Bareilly	3	*Heidelberg*	3	*Agona*	2	*Agona*	3
Java	3	*Infantis*	3	*Heidelberg*	2	*Bredeney*	2
Kentucky	3	*Newport*	3	*Saint-Paul*	2	*Stanley*	2
Stanley	3	*Saint-Paul*	3	Nachshonim	2	*Newport*	2
Abony	2	*Stanley*	3	Muenchen	2	*Hadar*	2
Agama	2	*Virchow*	3			*Typhi*	2
Agona	2	*Braenderup*	2			*Paratyphi*	2
Dublin	2	*Corvallis*	2				
Saint-Paul	2						
Haifa	2						
Mikawasima	2						
Hadar	2						
Panama	2						
Kottbus	2						

During 2015 full genome sequencing was introduced by Public Health England for *Salmonella* testing. As part of this change in testing routine phage typing of Salmonella isolates was stopped.

Shigella

Number of cases	**21**
Incidence rate	**1.1 per 100,000 population**

Shigellosis, also called bacillary dysentery, is caused by four species; *Shigella dysenteriae*, *Shigella flexneri*, *Shigella boydii* and *Shigella sonnei*. The two most commonly seen in Northern Ireland are *Shigella sonnei* and *Shigella flexneri* with the latter generally being more severe. The illness is characterised by diarrhoea, sometimes with blood and mucus and is common amongst young children, although infection can occur in all ages after travel to areas where hygiene is poor. Invasive disease is rare but extra-intestinal complications such as Haemolytic Uraemic Syndrome (HUS) can occur.

The number of culture confirmed laboratory reports of Shigella species decreased in 2016 with a reduction in both *S. flexneri* and *S. sonnei* (Tables 14 & 15). Similar to other gastrointestinal organisms there have been changes in testing procedures over recent years including the introduction of PCR testing. However, it is only possible to identify the species from the cultured organism. These changes in testing may have led to increased ascertainment of the infection.

Table 14. No of culture confirmed laboratory reports of Shigellosis, 2007 - 2016

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
16	16	13	5	8	9	4	21	31	21

Table 15. No of culture confirmed reports of Shigellosis by serogroup, 2012 - 2016

Serogroup	2012	2013	2014	2015	2016
S. boydii	0	0	1	1	0
S. dysenteriae	1	0	0	0	0
S. flexneri	5	1	13	14	8
S. sonnei	3	2	7	16	12
Untyped	0	1	0	0	1
Total	**9**	**4**	**21**	**31**	**21**

Table 16. No of PCR only reports of Shigellosis, 2013 - 2016

	2014	2015	2016
Number of reports	4	16	9

Fig 17: Culture confirmed laboratory reports of *Shigella*, 2007 - 2016

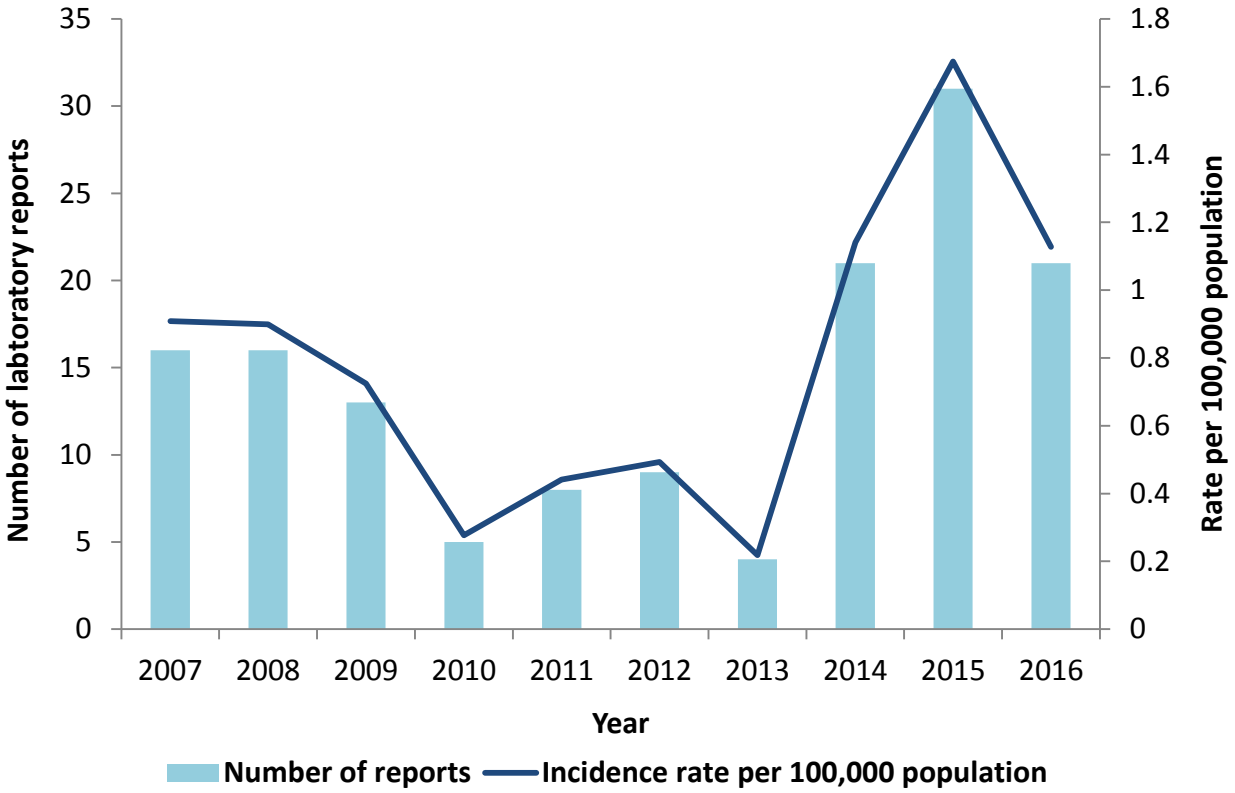
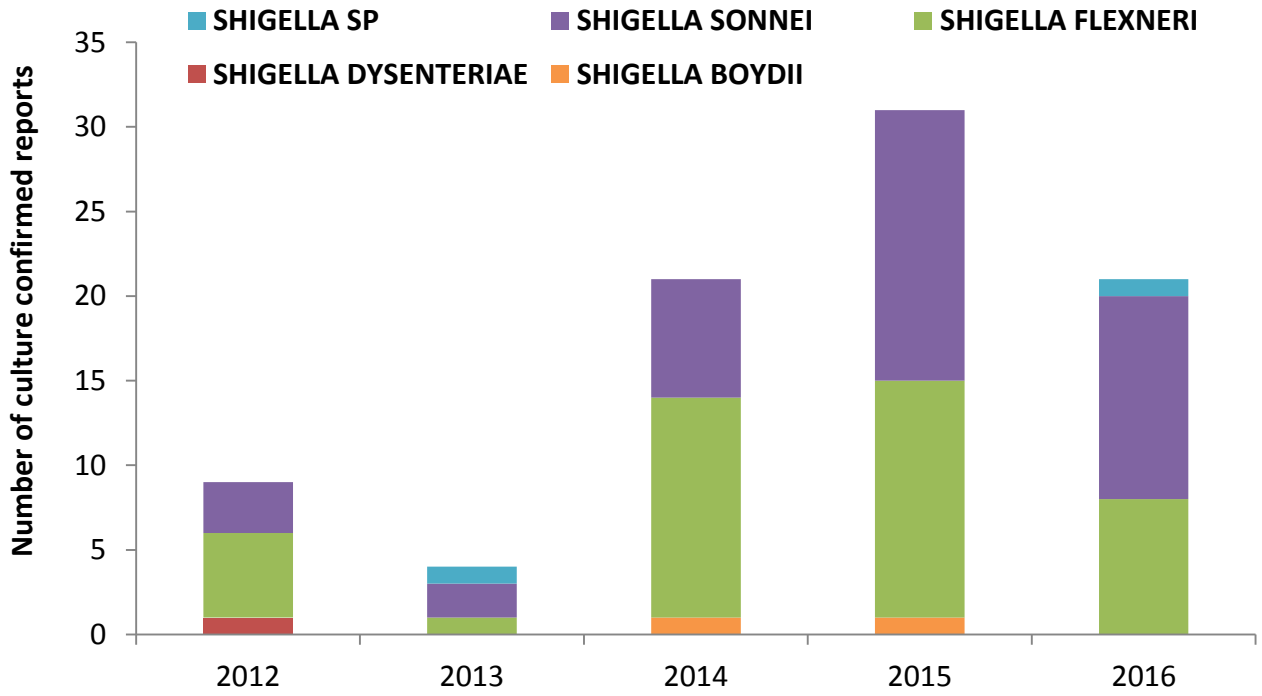


Fig 18: Culture confirmed laboratory reports of *Shigella sp* 2012 - 2016



Whilst a number of gastrointestinal infections show a larger proportion of male cases *Shigella sp* has a much larger proportion of males than any other, particularly in those infections considered to be community acquired (i.e. not travel related). Two charts indicating age and sex breakdown for all cases of Shigella during the period 2014-2016 are shown below to highlight the differences.

Fig 19. Age/Sex breakdown of laboratory reports of Shigella sp, 2014-2016 All cases

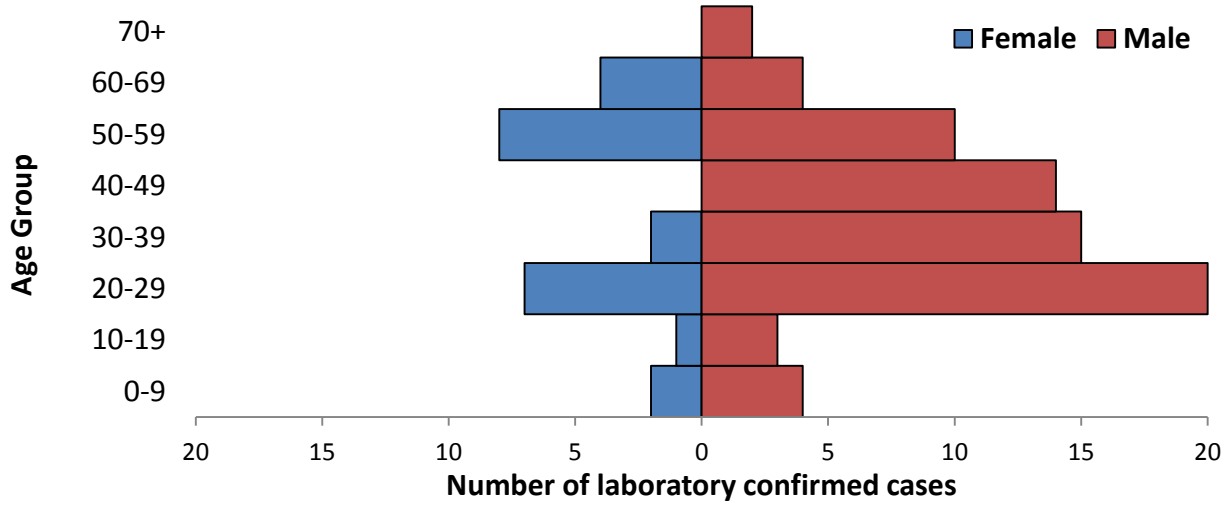
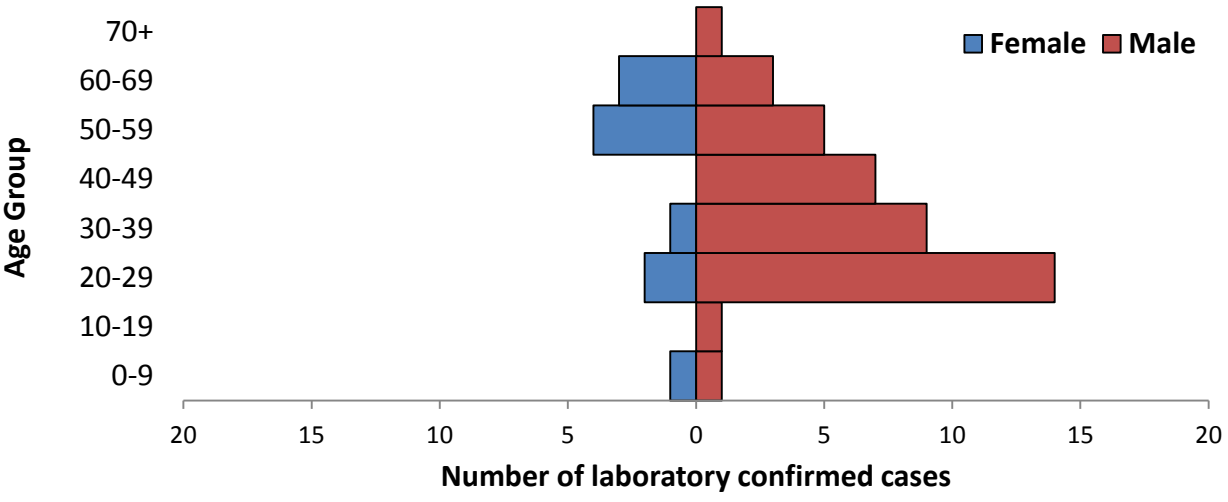


Fig 20. Age/Sex breakdown of laboratory reports of Shigella sp, 2014-2016 Community cases



Shigella sp has been involved in a number of ongoing outbreaks within the MSM (males who have sex with males) community in England. Enhanced surveillance of cases in Northern Ireland have also indicated that at least some are likely related to sexual transmission within the MSM community. This may also partially explain the high proportion of males with the infection.

Other Gastrointestinal Infections

Adenovirus (gastroenteritis)

Adenovirus causes a variety of disease but certain serotypes can cause gastroenteritis, particularly in young children. It is estimated that it is the second most common virus causing gastroenteritis in young children. Symptoms generally include diarrhoea and vomiting but tend to be relatively mild and short-lived although dehydration can sometimes be an issue.

Table 17. No of laboratory reports of Adenovirus (faecal), 2007 - 2016

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
138	270	222	127	209	207	102	125	115	104

Clostridium perfringens

Clostridium perfringens is widely distributed in the environment and foods, and forms part of the normal gut flora in humans and animals. Food poisoning most often occurs when food (usually meat) is prepared in advance and kept warm for several hours before serving. Illness generally lasts no more than 24 hours although elderly people may be more seriously affected. This organism is not routinely tested for in cases of gastroenteritis. In 2016 there were 24 cases of clostridium perfringens reported in NI (Table 18).

Table 18. No of laboratory reports of Clostridium perfringens, 2007 - 2016

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
20	36	18	36	16	28	24	23	34	24

Listeria

Listeria is a rare but potentially life-threatening disease. Healthy adults are likely to experience only mild infection, causing flu-like symptoms or gastroenteritis. However, listeria infection can occasionally lead to severe blood poisoning or meningitis. Pregnant women, the elderly and people with weakened immune systems are more susceptible to listeria. It is particularly dangerous in pregnancy as although the illness is unlikely to be serious for the mother, it can cause miscarriage, premature delivery or severe illness in a newborn child. This organism is not routinely tested for in cases of gastroenteritis. In 2016 there were four cases of listeria reported in NI (Table 19).

Table 19. No of laboratory reports of *Listeria*, 2007 - 2016

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
5	11	4	2	3	7	2	4	6	4

Norovirus

Norovirus is the most common known cause of gastrointestinal infections in the UK. Within closed settings such as hospitals, the virus can cause widespread disruption because it is able to survive for long periods in the environment, it has a low infectious dose and any immunity to infection is short-lived. Norovirus infection rates peak in winter months; however, it is present in the community all year round.

Numbers of laboratory reports of norovirus do not necessarily reflect the level of norovirus present in the community as many reports are associated with outbreaks. However, in outbreak situations only a small number of patients are usually tested and once norovirus is identified there is usually no further testing done for patients associated with that outbreak; this means that relatively few cases are identified for testing.

In 2016 there were 618 laboratory reports of Norovirus reported in NI (Table 20).

Table 20. No of laboratory reports of norovirus, 2007 - 2016

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
439	439	424	643	445	592	386	272	335	618

Rotavirus

Rotavirus is a common cause of gastroenteritis in infants and very young children, with many children suffering an infection by the age of five. Rotavirus can cause severe vomiting, severe diarrhoea, and stomach cramps. These symptoms usually last from 3-8 days. Adults may become infected; however, repeat infections are generally less severe than infections during childhood. The majority of infections tend to occur during the spring (Table 21).

A vaccine for rotavirus for children was introduced in Northern Ireland in July 2013, and a high uptake rate has been reported so far (estimated at 94% of eligible children receiving two doses of the vaccine in the first year of the programme). For further information on the rotavirus immunisation programme please see http://www.publichealth.hscni.net/news/pha-launches-rotavirus-vaccine-protect-babies-under-4-months.

Rotavirus reports decreased substantially in 2016 with the lowest number of reports since the introduction of the vaccine.

Table 21. No of laboratory reports of rotavirus, 2007 - 2016

2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
363	724	594	599	630	543	599	210	404	101

Gastrointestinal Outbreaks

A total of 236 gastrointestinal outbreaks were reported in 2016 with the suspected mode of transmission for these outbreaks being either person-to-person spread or unknown in all cases. This is a large increase over 2015 where only 161 outbreaks were reported, with most of the increase being due to reports of outbreaks in hospitals. This is reflected in the large increase in laboratory reports of norovirus.

Similar to previous years the most commonly identified causative agent of the gastrointestinal outbreaks was norovirus, which accounted for 120 (51%) of outbreaks, again representing a large increase since 2015. Three other outbreaks had an organism identified, one as rotavirus and two as E coli O 026. The E coli outbreaks were both in childcare settings and were primarily person to person spread.

The causative organism was not determined in 113 of the gastrointestinal outbreaks, although it is likely these were viral in origin.

During 2016 there were a total of 93 hospital outbreaks affecting at least 447 people; 140 residential institution outbreaks affecting at least 1771 people; and a further 3 outbreaks linked to other sites (e.g. nursery, conference facilities) (Table 22).

Table 22: Total distribution and location of gastrointestinal outbreaks 2016 (based on date of report to PHA)

Location	Identified Organism(s)	No of outbreaks	Number of symptomatic individuals*
Hospital	Norovirus	54	270
	Not identified	38	177
	Rotavirus	1	Unknown
Residential institution	Norovirus	66	1334
	Not identified	74	437
Other	*E coli* O26	2	25
	Not identified	1	12

* In gastrointestinal outbreaks it is not normal practice for all symptomatic individuals to be tested once the causative organism has been identified. Therefore the number of symptomatic individuals is often in excess of the number of laboratory confirmed cases.

Summary

There were large increases in some organisms in 2016, including *Cryptosporidium*, *E. coli* O157, *Giardia* and Norovirus.

Campylobacter decreased for the second year in a row (5% reduction) following a long period of increases. This decrease occurred despite the inclusion of both culture positive and PCR only results due to changes in testing which might have been expected to raise overall numbers.

Similar to 2015 *Cryptosporidium* reports increased significantly (38%). Whilst this increase may be due in part to testing changes, increases were also seen in areas where no changes in testing had taken place indicating a true increase in incidence. Reports of *giardiasis* also showed a large increase rising from 48 cases in 2014 to 92 in 2016 (29% increase). In contrast to *Cryptosporidium* no increase was seen in Giardia in areas unaffected by testing changes which may indicate that the continuing increase is mainly down to changes in testing protocols and test type.

E. coli O157 cases more than doubled in 2016 compared to 2015 (145% increase). However, whilst elevated this figure is similar to those seen in earlier years. We are continuing to see relatively large numbers of other serotypes and PCR positive only specimens, although these data are difficult to interpret due to the lack of comparable data.

Salmonella increased again in 2016 rising by 11% Similar to previous years a large proportion (39%) of reported cases were thought to be travel related and similar variations were found between different serotypes in terms of the proportion due to travel.

Shigella reports decreased in 2016 with both *S. sonnei* and *S. flexneri* decreasing. Reports remain relatively high compared to the years prior to 2014.

Outbreak activity increased substantially for the second year in a row with 236 gastrointestinal outbreaks being reported. Similar to previous years the majority of outbreaks are related to either Norovirus or suspected viral gastroenteritis, with two outbreaks related to E. coli O 026 and one to rotavirus. The majority of the viral outbreaks took place in residential facilities, particularly those for the elderly population although outbreak activity in hospitals increased at a much higher rate than in residential homes in 2016.

The number of reports of rotavirus data decreased by 75% compared to 2015 and represents the lowest number of reports in the past 10 years by far. This is likely due to the effect of the ongoing vaccination programme.

Relatively recent changes in both tests used and which organisms are routinely tested for continue to make interpretation of gastrointestinal data more difficult. Until testing has been standardised and/or we have sufficient data this difficulty is likely to continue.

Summary table of laboratory reports

Table 23. No of laboratory reports of selected gastrointestinal infections, 2007 - 2016										
Organism	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
Adenovirus (faecal)	138	270	222	127	209	207	102	125	115	104
Campylobacter sp	885	848	977	1040	1175	1211	1355	1414	1320	1258
Clostridium perfringens	20	36	18	36	16	28	24	23	34	24
Cryptosporidium sp	85	119	118	119	140	177	161	143	204	280
E coli O157	54	59	48	77	56	198	72	54	33	81
Giardia sp	14	9	38	16	35	50	47	48	93	120
Listeria sp	5	11	4	2	3	7	2	4	6	4
Norovirus	439	439	424	643	445	592	386	272	335	618
Rotavirus	363	724	594	599	630	543	599	210	404	101
Salmonella sp	159	187	158	180	168	146	157	113	125	144
Shigella sp	16	16	13	5	8	9	4	21	31	21

See individual sections for more information.

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