

# Telephone Survey of Infectious Intestinal Disease in the Republic of Ireland



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# Executive summary

Infectious intestinal disease is a disease of the digestive system caused by infectious agents. Most infectious intestinal disease (IID) is self-limiting, requiring no clinical intervention, but it causes a substantial burden to the population through healthcare usage and absenteeism. Understanding the magnitude, distribution and demographic factors associated with IID is key to its mitigation.

The cases and outbreaks of human disease detected via surveillance represent but a small proportion of the true burden of disease in the population, and special studies are needed periodically in order to be able to extrapolate true population experience from what is reported via surveillance. One way to identify the true extent of IID is to estimate illness in the community, and not just at the point where the individual has made contact with the health services.

This report describes a telephone survey commissioned by **safefood** to obtain data on the self-reported incidence of IID in the population on the Republic of Ireland (ROI) using two recall periods: 7 days and 28 days. The survey comprised 3,601 telephone interviews carried out in 2009, 3,000 among the 7-day recall group and 601 among the 28-day recall group. A random digit dialling (RDD) sampling method of residential landline telephone numbers using CATI (computer aided telephone interviewing) was used to sample households. Within households, interviewers asked to interview the household member whose birthday occurred next. Respondents were assigned at random to answer questions regarding symptoms of diarrhoea and vomiting experienced either in the previous 7 days or the previous 28 days. All age groups were included in the survey. A quota-based sampling strategy, to reflect the age and sex distribution of the population, was employed.

The data obtained was analysed using four different case definitions to estimate the incidence of IID in the Republic of Ireland using two recall periods: 7 days and 28 days. Case Definition 1 is the United Kingdom IID2 Study case definition “cases are persons with loose stools or clinically significant vomiting lasting less than two weeks, in the absence of a known non-infectious cause, preceded by a symptom-free period of three weeks. Vomiting is considered clinically significant if it occurs more than once in a 24-hour period, and if it incapacitates the case or is accompanied by other symptoms such as cramps or fever”. Case Definition 2 varies from Case Definition 1, in so far as it requires a symptom-free period of one day, as distinct from three weeks. Case Definition 3 was also investigated, this being a definition developed in an international comparison of telephone surveys of IID, i.e., “Cases are persons with three loose stools, or any vomiting, in 24 hours, excluding those: (a) with cancer of the bowel, irritable bowel syndrome, Crohn’s disease, ulcerative colitis, cystic fibrosis, coeliac disease, or another chronic illness with symptoms of diarrhoea or vomiting, or (b) who report

their symptoms were due to drugs, alcohol, or pregnancy.” For the purposes of comparison with other UK countries, a fourth case definition (Case Definition 4) was used. This case definition was equivalent to Case Definition 1, but without the requirement for a three-week, symptom-free period prior to illness. This is because this information was not collected in the UK IID2 Study telephone survey, so use of this definition improves comparability between studies.

The data was also analysed to compare the incidence of IID in the Republic of Ireland with the incidence in Northern Ireland, using data from the recent UK IID2 Study, and to estimate the incidence of IID for the Island of Ireland as a whole; and to compare the incidence of IID in the Republic of Ireland with the incidence in the UK, as estimated in the UK IID2 Study.

The overall rates of IID by recall period, based on Case Definition 1, were found to be 1.1 cases per person-year, after standardising for age and sex in respect of the 7-day recall group. Among the 28-day recall group, the standardised incidence rate was 0.6 cases per person-year. Rates were highest among young children (<5s) and lowest in those aged 65 years and above, and rates estimated from the 7-day recall group were consistently higher than those estimated from the 28-day recall group. Notably, IID rates among males were similar in both 7-day and 28-day recall groups, but among females, the rate was four times higher among the 7-day recall group compared with the 28-day recall group.

Among the 7-day recall group, the rate was similar for all case definitions (1.1, 1.3, 1.2 and 1.3 cases per person year in respect of Case Definitions 1, 2, 3 and 4, respectively), and standardising for age and sex had relatively little effect on the estimates. Among the 28-day recall group, standardisation had a larger effect, and resulted in higher rate estimates (0.6, 0.6, 0.8 and 0.6 cases per person in respect of Case Definitions 1, 2, 3 and 4, respectively).

In respect of comparison between countries, standardised rates of IID using the most directly comparable estimates, based on Case Definition 4, were found to be very similar for NI and ROI for the 7-day recall group. Among the 28-day recall group, the rate was somewhat higher in Northern Ireland than in the Republic of Ireland, although there was insufficient evidence to rule out sampling variation in this result (NI 28-day recall rate = 0.8, ROI = 0.6).

In comparing the rates in the ROI with those for other countries, as estimated from the UK IID2 Study telephone survey, rates of IID were higher in Scotland, in both the 7-day and 28-day recall groups. However, confidence intervals were wide and compatible, with these differences being due to sampling variation. Similarly, the rate of IID in Wales was 1.6 times that in the Republic of Ireland among the 7-day recall group, although this difference was not seen among the 28-day recall group. For England and Northern Ireland, estimated rates were more similar in both recall groups. Despite the higher rates seen in Scotland and Wales, these have little influence on the overall UK rate, because of the relatively small contribution of these two countries to the UK population. The overall estimated rates in the UK were 1.5 cases per person-year for the 7-day recall group, and 0.5 cases per person-year

for the 28-day recall group. While the 7-day recall estimate was somewhat higher than that in the Republic of Ireland, there was insufficient evidence to rule out sampling variation as an explanation.

For those recalling cases of IID, a range of symptoms were reported, and there was some evidence that severity of illness differed between 7-day and 28-day recall groups, with a pattern of greater severity being experienced by those in the 28-day recall group. This is particularly the case in relation to absence from normal daily activities where, among cases in the 28-day recall group, 78 per cent reported being absent from normal daily activities as a result of their illness, compared with 32 per cent among cases in the 7-day recall group. This reinforces the fact that the economic burden of IID in ROI is substantial, which in turn underscores the need for continued efforts to prevent or reduce the rate of IID in the community through public health initiatives. A concomitant reduction in the amount of healthcare usage would also follow from a reduction in the rate of IID in the community.

The overlapping time periods between the present survey and the UK IID2 Study, and the use of comparable case definitions enabled comparison of IID rates between countries over a similar time period. The results showed that rates of IID in the ROI are generally similar to those in the UK as a whole. The estimated rate was shown to depend on the period over which participants were asked to recall symptoms.

The overall rate of IID estimated in this study for the 28-day recall group was similar to that reported in a previous retrospective **safefood** funded study in the Island of Ireland (IOI) using the same period of recall. The rate reported in the IOI study was comparable to that found here (0.6 per person-year using a 28-day recall period), as were the proportions of cases reporting bloody diarrhoea and seeking medical attention (3).

Based on the findings of the survey, three recommendations are proposed:

1. Continued efforts are required to reduce the rate of IID in the community especially amongst the under 5 age group.
2. There should be continued commitment to the provision of guidance to consumers on what to do if they have infectious intestinal disease symptoms.
3. There should be continued efforts to provide a universally accepted case definition for infectious intestinal disease.

# Foreword

I am very pleased to present this report on the telephone survey of infectious intestinal disease (IID) in the Republic of Ireland (ROI). This survey was commissioned to best estimate the incidence of IID in the ROI as a follow up to the survey published by **safefood** in 2003. This survey was also commissioned to complement the parallel survey work in the United Kingdom, namely the Second Study of IID in the UK (UK IID2 Study), in order to estimate the incidence of IID on the island of Ireland (IOI) and to compare the incidence in ROI with the incidence in the UK.

Infectious intestinal disease is a common illness in the community affecting several thousand patients every day, with significant morbidity and economic loss (3). Given the difficulties of measuring the true burden of the disease, it is clear that this survey is important in providing the evidence base in order to guide the work of those involved in the prevention, management and surveillance of IID. This work also highlights the significant economic losses associated with IID through absenteeism from the workplace or school.

I am pleased to note that there is little evidence that the incidence of IID in ROI is substantially different from that in Northern Ireland or in the UK as a whole, and this provides an impetus for the continued all-island working to promote the prevention and management of IID on the island of Ireland.

Dr Cliodhna Foley-Nolan,

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# 1 List of abbreviations

CI	Confidence Interval
ICGP	The Irish College of General Practitioners
IID	Infectious Intestinal Disease
IOI	Island of Ireland
NI	Northern Ireland
RDD	Random Digit Dialling
RR	Relative Risk
ROI	Republic of Ireland
UCD	University College Dublin
UK	United Kingdom

## 2 Acknowledgements

**safefood** would like to offer a sincere thank you to those involved in the data collection, Ms Aine O'Brien and Dr. Claire Collins of the Irish College of General Practitioners, and to Prof. Leslie Daly of the UCD School of Public Health, Physiotherapy and Population Science. **safefood** also acknowledges the work of those in Millward Brown who carried out the data collection. **safefood** also acknowledges the work of those who carried out the statistical analysis, namely Prof. Sarah O'Brien of the School of Translational Medicine, University of Manchester, Manchester, United Kingdom and Dr. Clarence Tam of the Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London, United Kingdom.

This work would not have been possible without the time and commitment of those members of the public who participated in the telephone survey, and **safefood** thanks those who gave of their time to participate.

## 3 Introduction

Infectious intestinal disease is a disease of the digestive system caused by infectious agents. Infectious intestinal disease symptoms include a combination of diarrhoea and vomiting, and sometimes abdominal pain, cramps, and fever (1). Most infectious intestinal disease (IID) is self-limiting, requiring no clinical intervention, but it causes a substantial burden to the population through healthcare usage (2) and absenteeism (3). Understanding the magnitude, distribution and demographic factors associated with IID is key to its mitigation (4). In Ireland, north and south, there are three main sources of information on IID: statutory notifications made by medical practitioners, laboratory reporting, and outbreak surveillance. (For a full list of sources of information on IID on the Island of Ireland, see the **safefood** report on surveillance on the Island of Ireland, Section 2.6) (5). The cases and outbreaks of human disease detected via surveillance, represent but a small proportion of the true burden of disease in the population, and special studies are needed periodically in order to be able to extrapolate true population experience from what is reported via surveillance (5). One way to identify the true extent of IID is to estimate illness in the community, and not just at the point where the individual has made contact with the health services. This report describes a telephone survey undertaken by **safefood** to obtain data on the self-reported incidence of IID in the population on the Republic of Ireland (ROI) using two recall periods: 7 days and 28 days. In addition, the incidence of IID in the Republic of Ireland is compared with the incidence in Northern Ireland, using data from the Second Study of IID in the UK (UK IID2 Study) (6), and an incidence for the Island of Ireland (IOI) is estimated. The incidence in the Republic of Ireland is also compared with the incidence in the UK, as estimated in the UK IID2 Study.

## 4 Methodology

### 4.1 Ethical approval

Ethics Committee approval to perform the survey was obtained from the Irish College of General Practitioners (ICGP).

### 4.2 Pilot survey

A pilot survey was conducted by Millward Brown IMS on behalf of the ICGP between 6 August 2008 and 22 August 2008. During the execution of the pilot telephone study, quality control visits and listening sessions were conducted by the ICGP IID research team. The objectives of the pilot study were to assess the recruitment process, participant compliance and efficiency of the data entry process.

### 4.3 Survey

The survey (Appendix 1) was conducted by Millward Brown IMS on behalf of the ICGP between 1 January 2009 and 31 December 2009. A random digit dialling (RDD) sampling method of residential landline telephone numbers using CATI (computer aided telephone interviewing) was used to sample households. Landline numbers on the service provider 'opt-out' database were not used. Each phone number was called six times (including at least once at the weekend and once during the week), before being identified as non-contactable. The telephone survey interviews were conducted between 5pm and 9pm Monday to Friday and from 10am to 6pm on Saturdays.

Within households, interviewers asked to interview the household member whose birthday occurred next. If the selected participant was aged 12 -15 years, and was present in the house at the time of call, the interview was completed by the teenager, provided parental consent was ascertained. In the event that the teenager was not in the house at the time of call, the interview could be completed by the parent or guardian on their behalf. If the selected participant was aged 0-11 years, a parent or guardian was asked to complete the interview on their behalf. Selected participants aged 16 years and older were interviewed if present in the household, after verbal informed consent was obtained. If the individual selected (whose birthday was next) was not present at the time of the call, arrangements

were made to ring again. Respondents were assigned at random to answer questions regarding symptoms of diarrhoea and vomiting experienced either in the previous 7 days or the previous 28 days. All age groups were included in the survey. A quota-based sampling strategy, to reflect the age and sex distribution of the population, was employed.

Responses obtained from the survey were entered directly by the interviewer into the tailor-made CATI database. At the end of the survey, all data stored within the CATI system was transferred to an SPSS file for analysis.

#### 4.4 Analysis of data

The University of Manchester and the London School of Hygiene and Tropical Medicine (LSHTM) were commissioned by **safefood** to analyse the data from the telephone survey of infectious intestinal disease (IID) in the Republic of Ireland (ROI). The objectives of the analysis were:

1. To estimate the incidence of IID in the Republic of Ireland using two recall periods: 7 days and 28 days
2. To compare the incidence of IID in the Republic of Ireland with the incidence in Northern Ireland, using data from the recent UK IID2 Study, and to estimate the incidence of IID for the Island of Ireland as a whole
3. To compare the incidence of IID in the Republic of Ireland with the incidence in the UK, as estimated in the UK IID2 Study.

Statistical analyses were performed in Stata 11.0 (Stata Corporation) and Microsoft Excel 2007.

##### 4.4.1 Case definitions

In the first instance, two different case definitions for infectious intestinal disease (IID) were of interest:

##### Case Definition 1 (IID Study case definition) (7, 8)

Cases are persons with loose stools or clinically significant vomiting lasting less than two weeks, in the absence of a known non-infectious cause, preceded by a symptom-free period of three weeks. Vomiting is considered clinically significant if it occurs more than once in a 24-hour period, and if it incapacitates the case or is accompanied by other symptoms such as cramps or fever.

**Case Definition 2 (ROI Study case definition):**

Cases are persons with loose stools or clinically significant vomiting lasting less than two weeks, in the absence of a known non-infectious cause, preceded by a symptom-free period of one day. Vomiting is considered clinically significant if it occurs more than once in a 24-hour period, and if it incapacitates the case or is accompanied by other symptoms such as cramps or fever.

The only difference between these two definitions is the requirement in Case Definition 1 for persons to have been free of IID-related symptoms for the preceding three weeks in order to define a new case of IID, as used in the first and second IID studies (7, 8).

In addition, the effect of a third case definition, developed in an international comparison of telephone surveys of IID (9), was investigated:

**Case Definition 3 (International case definition):**

Cases are persons with three loose stools, or any vomiting, in 24 hours, excluding those: (a) with cancer of the bowel, irritable bowel syndrome, Crohn's disease, ulcerative colitis, cystic fibrosis, coeliac disease, or another chronic illness with symptoms of diarrhoea or vomiting, or (b) who report their symptoms were due to drugs, alcohol, or pregnancy.

For the purposes of comparison with other UK countries, a fourth case definition (Case Definition 4) was used.

**Case Definition 4:**

This case definition was equivalent to Case Definition 1 above, but without the requirement for a three-week, symptom-free period prior to illness. This is because this information was not collected in the UK IID2 Study telephone survey, so use of this definition improves comparability between studies.

**4.4.2 Data cleaning and management**

The data sets were checked for consistency and coding errors. Individual variables were summarised and tabulated to identify inconsistent values. Variables were categorised, where necessary, for analysis.



#### **4.4.3 Representativeness of survey participants**

Survey participants were compared with the 2006 census population of the Republic of Ireland in terms of demographic and socio-economic characteristics. Data from the 2006 census were obtained from Central Statistics Office Ireland ([www.cso.ie](http://www.cso.ie)). Information was obtained on the distribution of the ROI population by age group, sex, ethnic group, highest level of education, socio-economic classification and geographic location. The composition of survey participants by each of these factors was compared to the census population, to identify sectors of the population that were over- or under-represented in the study.

#### **4.4.4 Incidence of self-reported IID in the Republic of Ireland**

The crude rate of self-reported IID was calculated as the number of IID cases divided by the person-time at risk. In addition, rates were calculated by age group, sex and socio-economic classification. To facilitate comparison with other studies (10), rates are expressed as cases per person-year, equivalent to the average number of episodes that an individual can be expected to experience in a year. Rates were calculated separately by recall group to investigate whether there were differences in the reporting of IID between those asked to recall symptoms over 7 days and those asked to recall symptoms over 28 days.

Cases in the 7-day and 28-day recall groups were compared with respect to the frequency of symptoms and health services usage, to assess whether the severity of illness was differentially reported in the two groups.

#### **4.4.5 Statistical adjustments**

Rates were standardised to account for differences in the age and sex composition of survey respondents relative to the 2006 ROI census (for detail see Appendix 2). Rates of IID, standardised by socio-economic classification, were calculated in a similar way to that described in Appendix 2. Rates of overall IID were calculated for each of the four case definitions.

#### **4.4.6 Gastrointestinal illness due to non-infectious causes**

All case definitions used exclude known non-infectious causes of gastrointestinal illness. Individuals reporting symptoms were asked a number of questions relating to non-infectious causes – see Appendix 1 Q227 to Q232. Individuals were excluded as cases, if they reported suffering from a chronic form of diarrhoea, such as Crohn's disease, ulcerative colitis, or coeliac disease, or if they had recently

had stomach or bowel surgery. They were also excluded as cases, if they reported that their symptoms were related to pregnancy or alcohol consumption. Excluding individuals with non-infectious causes of diarrhoea from the numerator, but not the denominator, would tend to result in a slight underestimate of incidence. To account for this, the denominator was adjusted by subtracting the expected proportion of person-time contributed by individuals with non-infectious causes of gastrointestinal illness in the population. This proportion was obtained from cohort recruitment information in the UK IID2 Study (8), under the assumption that the prevalence of non-infectious causes of diarrhoea is similar in the UK and the ROI.

#### **4.4.7 Foreign travel**

In the survey, information on travel outside the ROI in the 10 days prior to illness onset was obtained from all individuals reporting symptoms. From May 2009 onwards, this information was collected from all survey respondents, regardless of whether they reported symptoms (Appendix 1a). Because the rate of IID among those who travel abroad is often higher, and because IID acquired abroad is less amenable to domestic control policies, it is common to exclude travel-related cases from burden of disease estimates, adjusting the denominator accordingly for the frequency of foreign travel in the population<sup>1</sup>.

#### **4.4.8 Incidence of self-reported IID on the Island of Ireland**

Data from the ROI telephone survey and the Northern Ireland component of the UK IID2 Study telephone survey were used to estimate the incidence of self-reported IID on the Island of Ireland.

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<sup>1</sup> As information on foreign travel was only collected from all individuals from May 2009, exclusion of foreign travel could only be done from this period. To account for this, symptomatic and non-symptomatic individuals were first compared with respect to the frequency with which they reported having travelled abroad. If the proportion reporting foreign travel is similar in the two groups, it is unlikely that exclusion of foreign travel will have an influence on the incidence estimates, because the proportion excluded from the numerator and denominator will be similar. Secondly, incidence was estimated excluding foreign travel for the period May 2009 onwards, to see if this was markedly different from the overall incidence estimates.

Case Definition 4 was used as described above, to allow direct comparison between the two studies<sup>2</sup>. The overall rate on the Island of Ireland was obtained as the average of these two distributions, weighted by the relative size of the population in the two countries as of 2006<sup>3</sup>, with the Republic of Ireland comprising 72 per cent of the population and Northern Ireland the remaining 28 per cent. Separate estimates were produced for each recall period.

#### **4.4.9 Comparison of IID incidence in the Republic of Ireland and the UK**

The incidence of self-reported IID in the Republic of Ireland as estimated from the above was compared with that in the other UK countries and the UK as a whole, as estimated using data from the UK IID2 Study telephone survey<sup>4</sup>. Case Definition 4 was used as described above, to allow direct comparison between the two studies. Separate estimates were produced by recall period.

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<sup>2</sup> Incidence was estimated using bootstrap simulation methods. This approach was preferred because of the need to respect different weighting schemes in the two studies. In particular, survey data in the UK IID2 study were additionally weighted for month of interview, to avoid artefacts arising from seasonal effects, which was not necessary in the ROI survey because of the balanced distribution of interviews by calendar month. For each study, 9,999 bootstrap estimates of the rate were obtained. The median, and 2.5th and 97.5th percentiles of the resulting distributions were taken as the point estimates of the rate, and the 95 per cent confidence limits respectively.

<sup>3</sup> In the case of Northern Ireland, this data was obtained from the annual mid-year population estimates – see [www.nisra.gov.uk/demography/default.asp17.htm](http://www.nisra.gov.uk/demography/default.asp17.htm), and in the case of ROI this data was obtained from the 2006 census data – see [www.cso.ie/en/census/census2006reports/](http://www.cso.ie/en/census/census2006reports/).

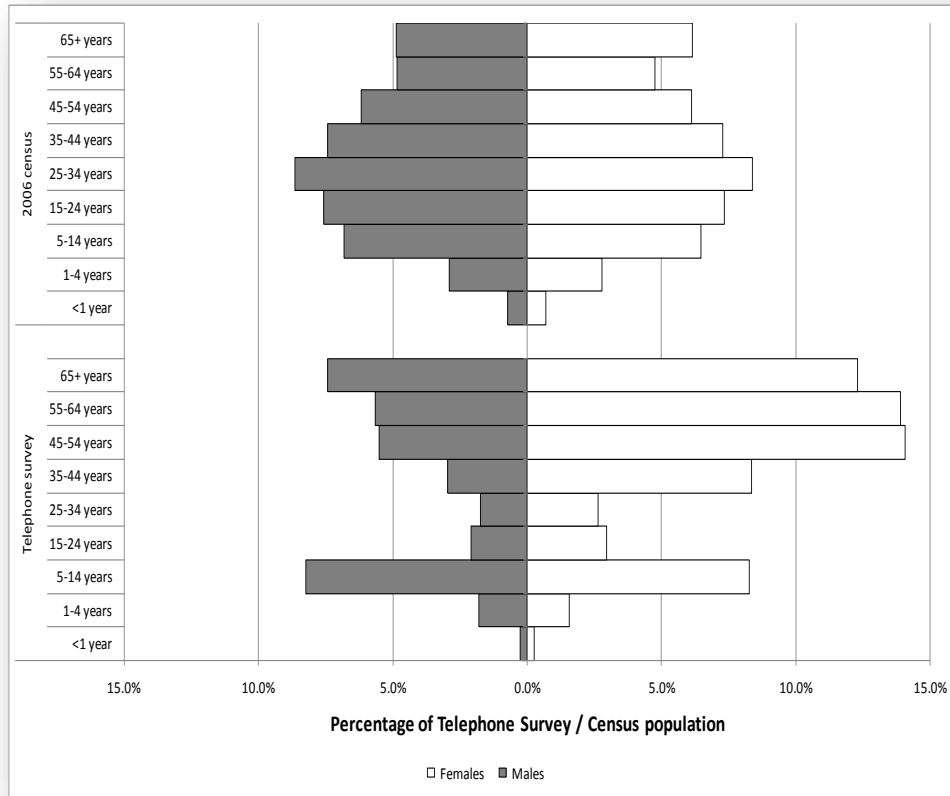
<sup>4</sup> Bootstrap estimation methods were used as described above to obtain country- and UK-specific rates and 95 per cent confidence limits. In addition, rate ratios and 95 per cent confidence limits, comparing the rate in each country with that in ROI, were estimated. Because of the different estimation methods used, rate estimates presented here for UK countries differ slightly from those presented in the UK IID2 Study report, but this makes no material difference to the results.

# 5 Results

## 5.1 Description of survey participants

For the purpose of the survey undertaken between 01 January 2009 and 31 December 2009, 3,601 interviews were completed, 3,000 among the 7-day recall group and 601 among the 28-day recall group. Data on actual numbers dialled were not available, precluding analysis of participation. It is likely that participation figures in the main study were similar to those in the pilot study, details of which are given in Appendix 3. Figure 1 compares the age and sex distribution of survey respondents with that of the 2006 ROI census population. Despite use of quota-based sampling, the figure indicates an under-representation of infants less than one year old of both sexes, females aged between 15 and 34 years and males aged between 15 and 44 years. Females aged between 45 years and above, and males aged 55 years and above, were over-represented in the survey sample.

Figure 1: Age and sex distribution of telephone survey respondents and the 2006 ROI census population



The age and sex distribution of participants was similar between the 7-day and 28-day recall groups (Table 1).

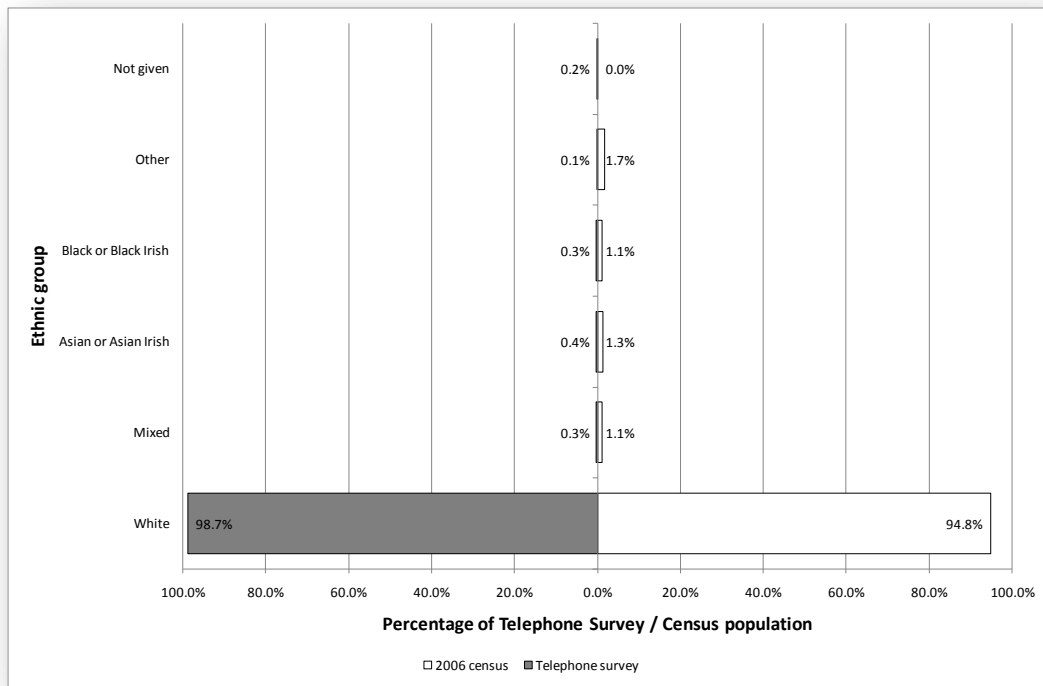
**Table 1: Age and sex distribution of participants in the Republic of Ireland telephone survey by recall group**

Age group	7-day recall group				Total	28-day recall group				Total
	Male	%	Female	%		Male	%	Female	%	
<5 years	59	2%	57	2%	116	15	2%	8	1%	23
5-14 years	245	8%	248	8%	493	52	9%	50	8%	102
15-44 years	200	7%	421	14%	621	45	7%	82	14%	127
45-64 years	331	11%	846	28%	1,177	71	12%	161	27%	232
65+ years	239	8%	354	12%	593	28	5%	89	15%	117
Total	1,074	36%	1,926	64%	3,000	211	35%	390	65%	601

Figures 2, 3, 4 and 5 compare the distribution of demographic, socio-economic and geographical factors between survey respondents and the 2006 ROI census population. Due to slight differences in the information available between the telephone survey and the census, some assumptions have been made in the categorisation of these variables. It was assumed that survey respondents who were still in full-time education could be classified as having completed third-level education.

Individuals of White and White-Irish descent were the most numerous ethnic group, and accounted for more than 98 per cent of survey respondents, while other ethnic groups were under-represented relative to the census population (Figure 2). Survey respondents were representative of the census population in terms of highest level of education completed and geographical area of residence (Figure 3). Those in managerial and manual skilled occupations were over-represented, while those in professional and non-manual occupations were under-represented (Figure 4).

Figure 2: Distribution of ethnic group among survey respondents and the 2006 ROI census population



Z

Figure 3: Distribution of highest level of education completed among survey respondents and the 2006 ROI census population

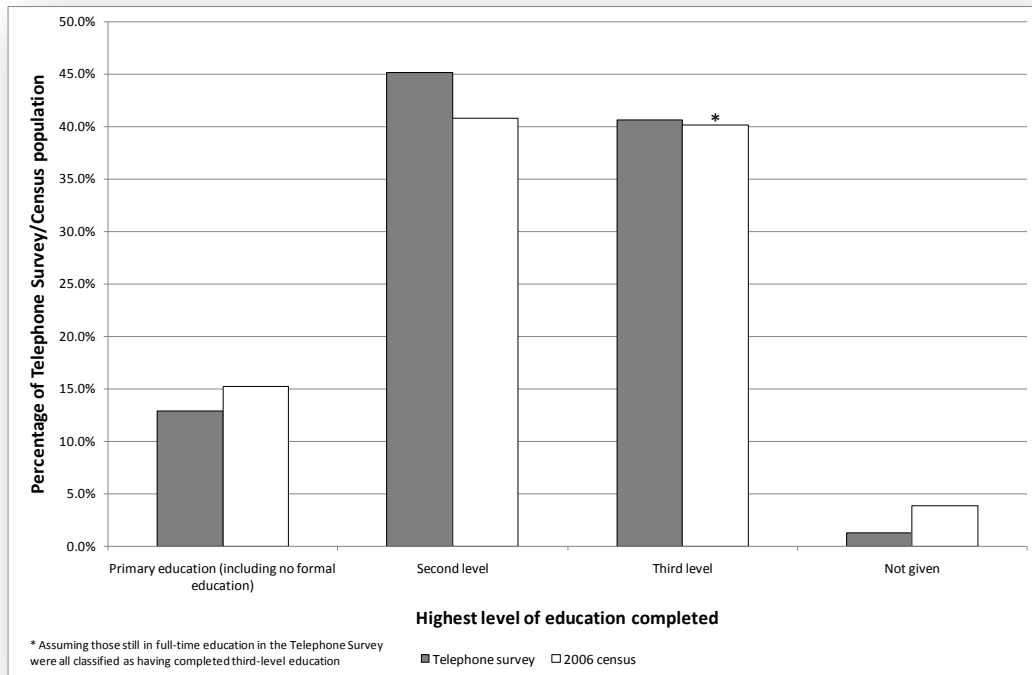




Figure 4: Distribution of socio-economic group among survey respondents and the 2006 ROI census population

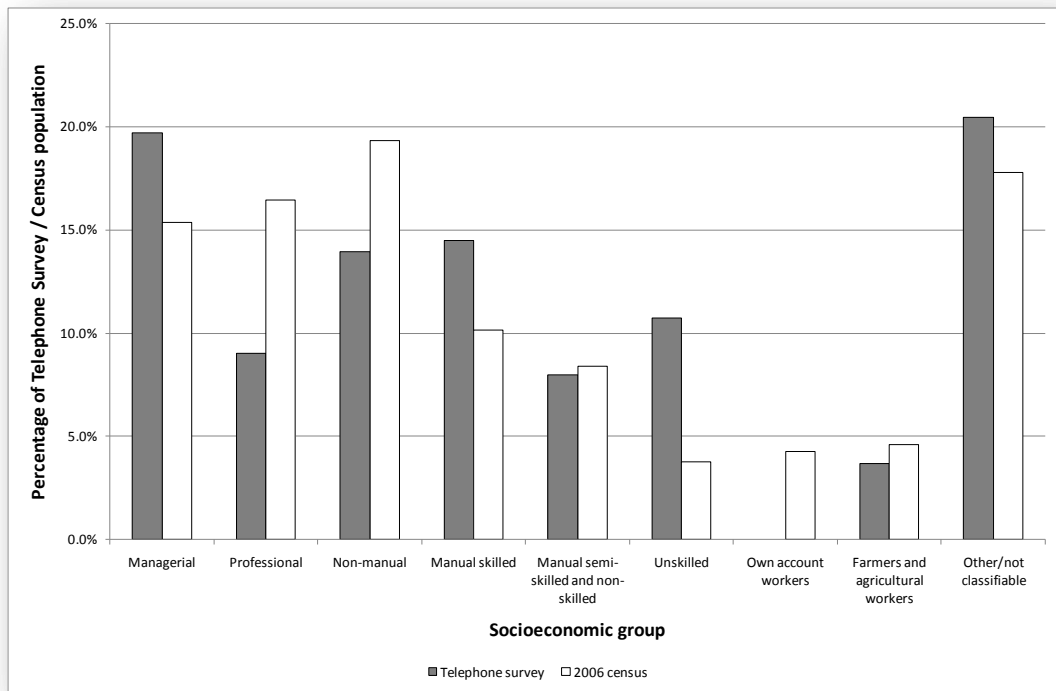
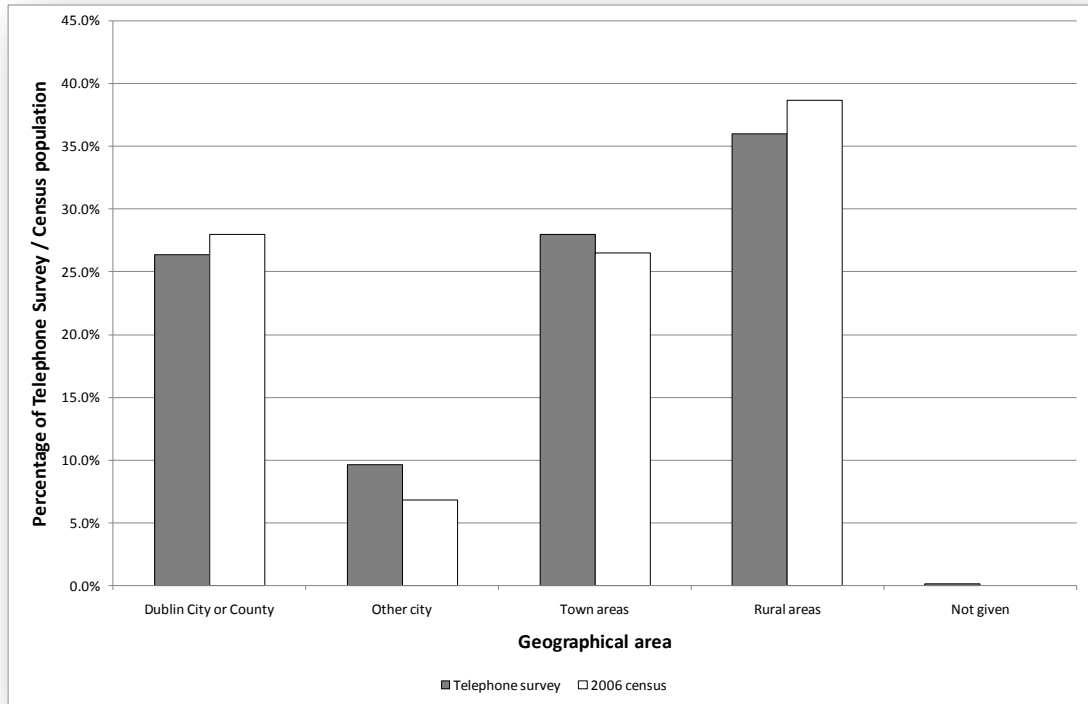


Figure 5: Distribution of geographic area among survey respondents and the 2006 ROI census population



## 5.2 Case definitions

Figures 6 to 8 show the classification of survey respondents according to Case Definitions 1 to 3. For Case Definitions 1 and 2, there were 3,446 participants who reported no symptoms or symptoms incompatible with the case definition. Of the remaining 155 individuals, 42 reported symptoms due to non-infectious causes of diarrhoea, nine reported illness lasting two weeks or longer, and six reported travel outside the ROI in the 10 days prior to symptom onset. Six individuals could not be classified as cases, due to missing information on symptoms or foreign travel. Of the remaining 92 individuals, 10 reported symptoms in the three weeks prior to the most recent episode, and one individual reported symptoms on the day prior to the latest episode, resulting in 82 cases (including travel-related cases) according to Case Definition 1, and 91 cases (including travel-related cases) according to Case Definition 2.

According to Case Definition 3, 161 individuals reported symptoms compatible with the case definition. Of these, 45 were excluded because they reported suffering conditions associated with chronic diarrhoea, and a further six because they reported that their symptoms were related to pregnancy, allergy, dietary intolerance or antibiotic use; six individuals reported travel outside the ROI in the 10 days prior to interview.

Case Definition 4 was equivalent to Case Definition 1, but included an additional 10 cases who reported symptoms in the three weeks prior to the most recent episode.

Figure 6: Classification of survey respondents according to Case Definition 1

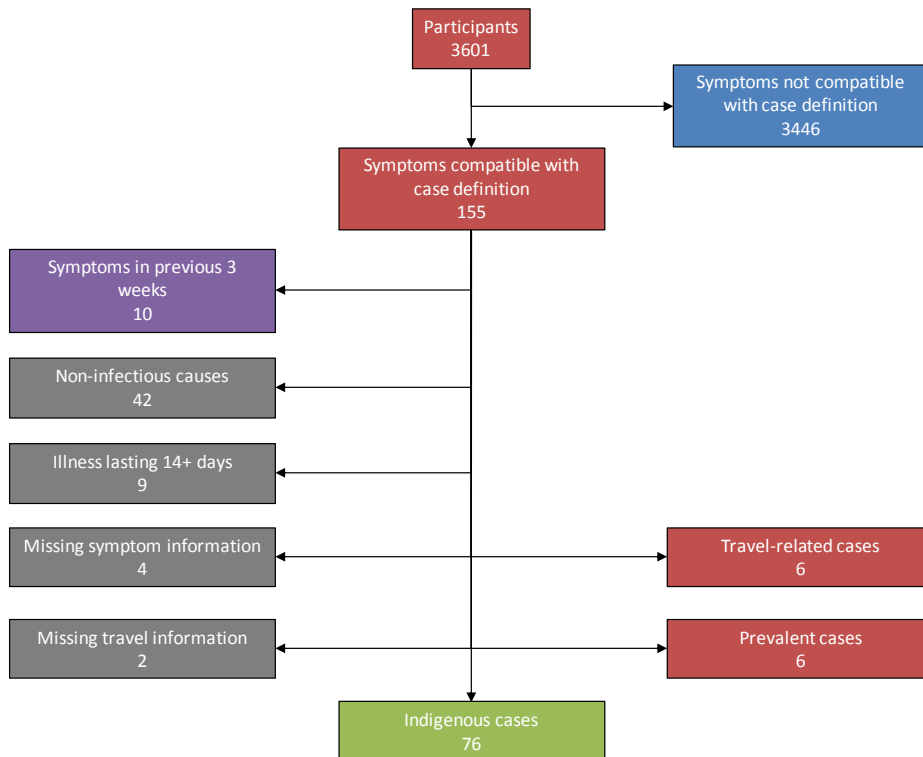


Figure 7: Classification of survey respondents according to Case Definition 2

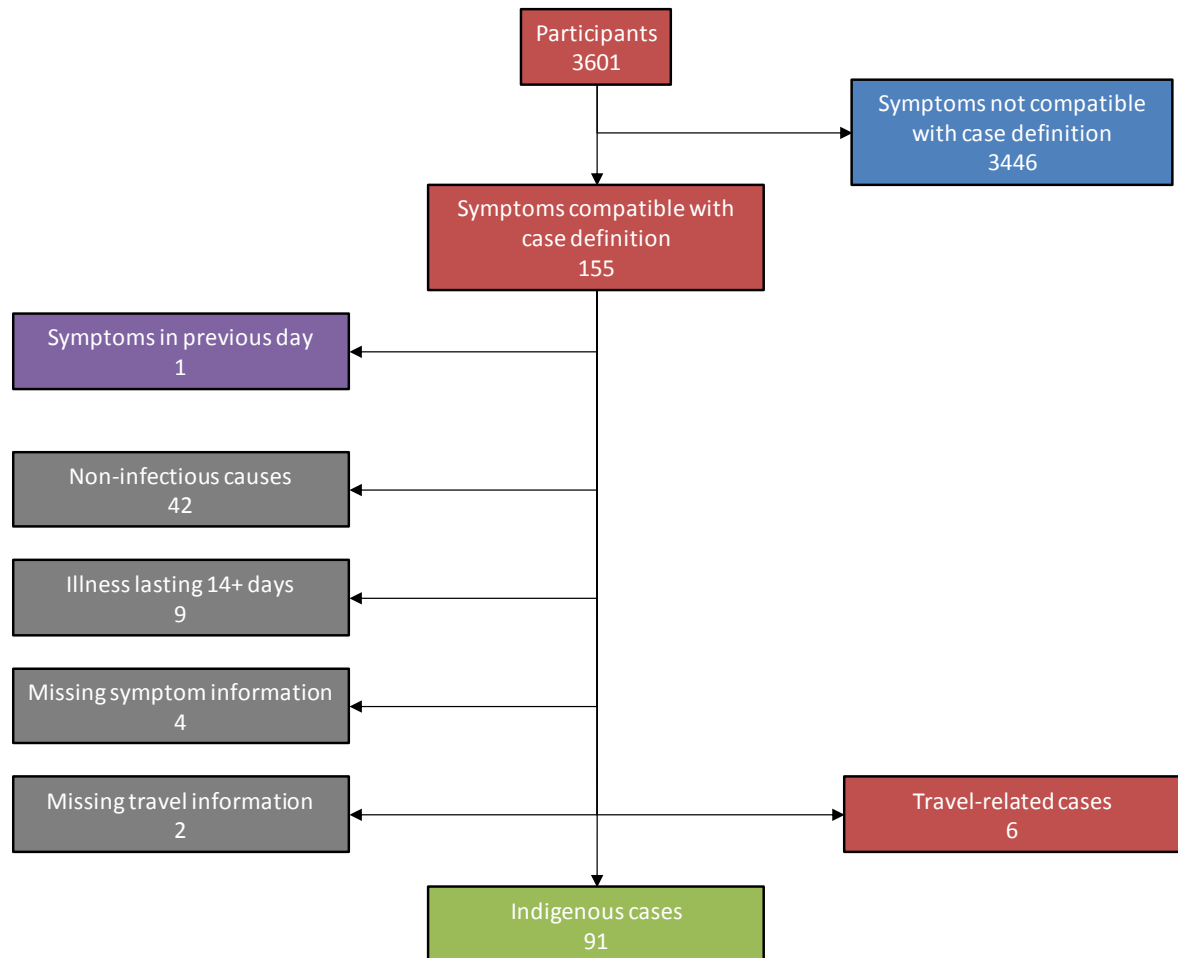
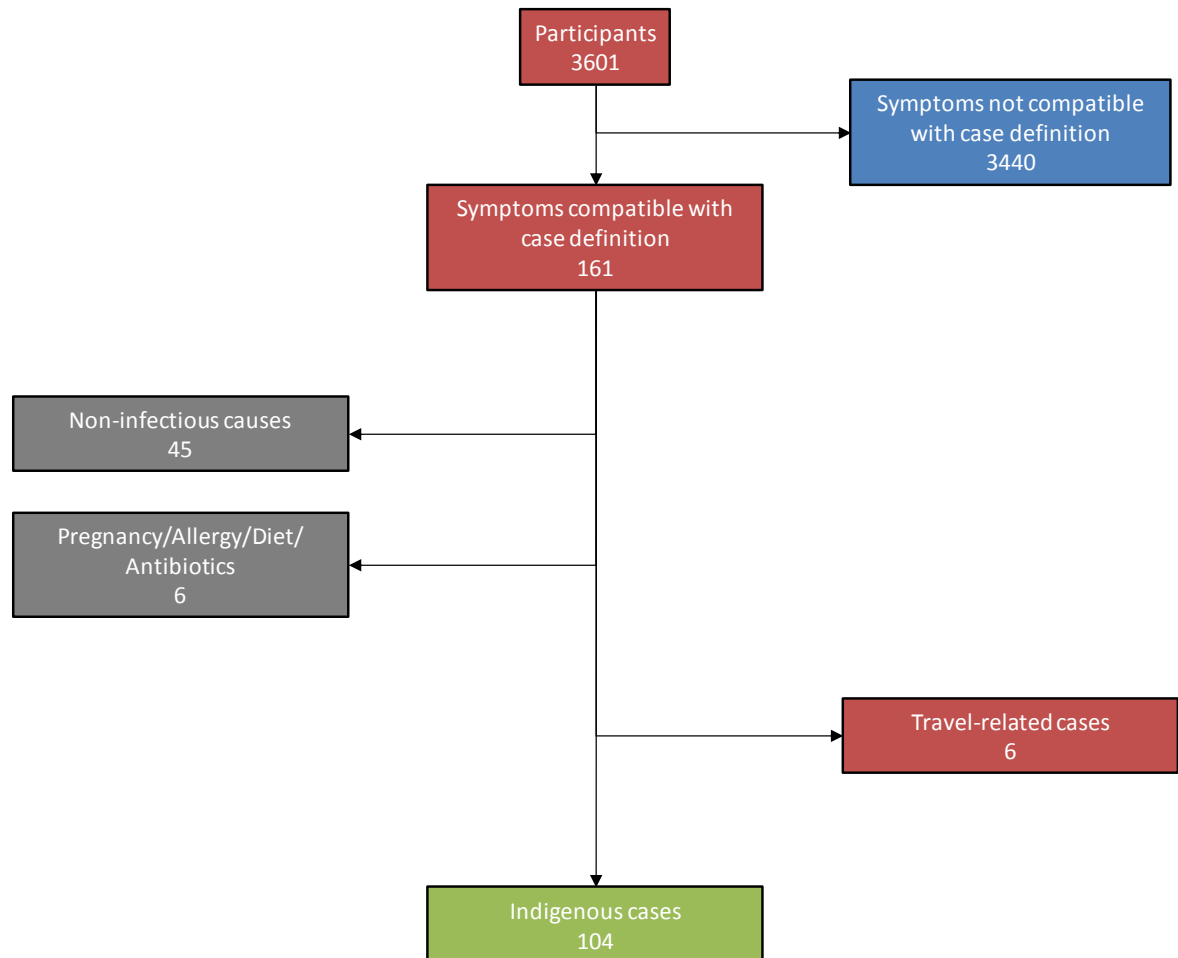


Figure 8: Classification of survey respondents according to Case Definition 3



### 5.3 Incidence of IID in the Republic of Ireland

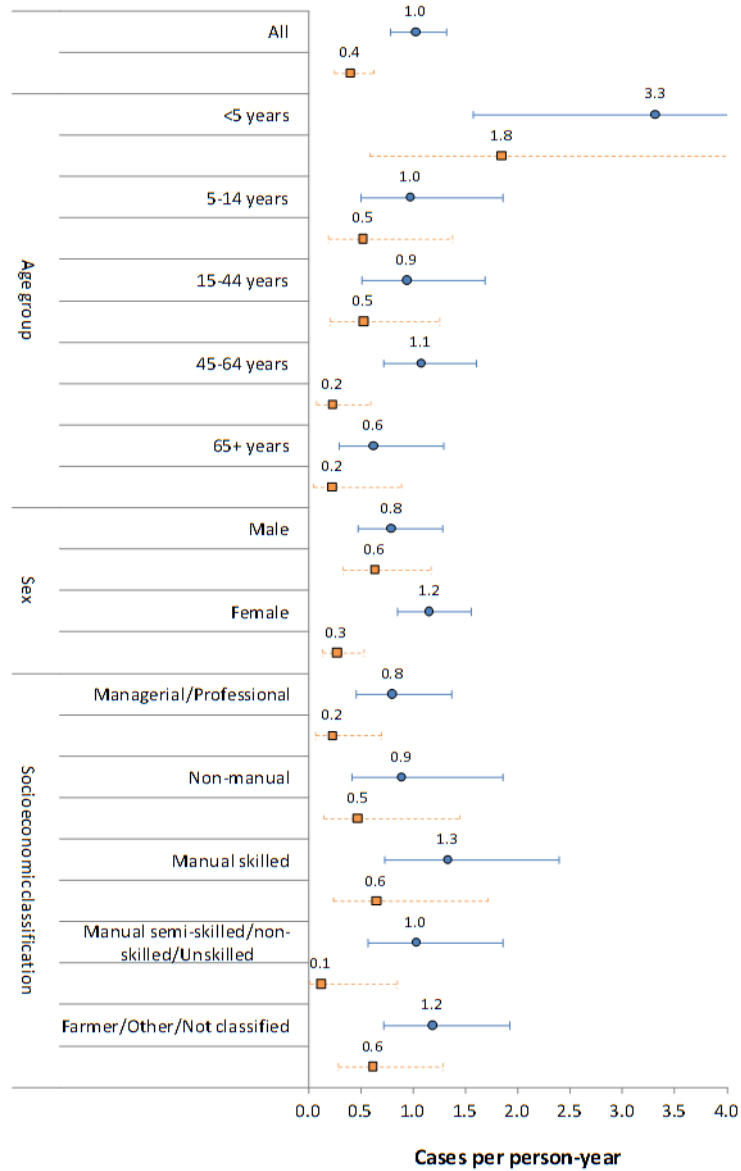
The overall rates of IID by recall period, based on Case Definition 1, are shown in Table 2. Numbers are rounded to one decimal place. Among those in the 7-day recall group, the crude rate estimate was 1.0 case per person-year (95% CI: 0.8 – 1.3) and 1.1 (95% CI: 0.7 – 1.5) after standardising for age and sex. Among the 28-day recall group, the crude rate estimate was 0.4 cases per person-year (0.2 – 0.6), and this rose to 0.6 (95% CI: 0.3 – 0.9) after standardising for age and sex. The rate estimated from 7-day recall was double that estimated from 28-day recall (RR=2.0, 95% CI: 1.04 – 4.35).

**Table 2: Crude and adjusted rates of IID by recall period in the Republic of Ireland, ROI telephone survey 2008-9**

Recall period	Adjustments	Cases	PY	Rate (95% CI)
7 days	Crude	58	56.7	1.0 (0.8 - 1.3)
	Age-sex standardised			1.1 (0.7 - 1.5)
28 days	Crude	18	45.5	0.4 (0.2 - 0.6)
	Age-sex standardised			0.6 (0.3 - 0.9)

Footnote to Table 2: Rates are presented as cases per person-year. Age-sex standardised rates are based on 9,999 bootstrap estimates. PY: person-years.

Figure 9: Rates of IID and 95 per cent CIs in the Republic of Ireland overall, by age group, sex and socio-economic classification, based on Case Definition 1



Footnote to Figure 9: Cases per person-year. Blue circles: 7-day recall group; Orange squares: 28-day recall group. 95 per cent CIs are truncated at four cases per person-year.

Figure 9 shows, for each recall period, rates of IID by age group, sex and socio-economic group, based on Case Definition 1. Rates were highest among <5s and lowest in those aged 65 years and above, and rates estimated from the 7-day recall group were consistently higher than those estimated from the 28-day recall group. Rates were similar across socio-economic groups with the exception of the manual semi-skilled and unskilled group, who reported considerably lower levels of IID in the 28-day

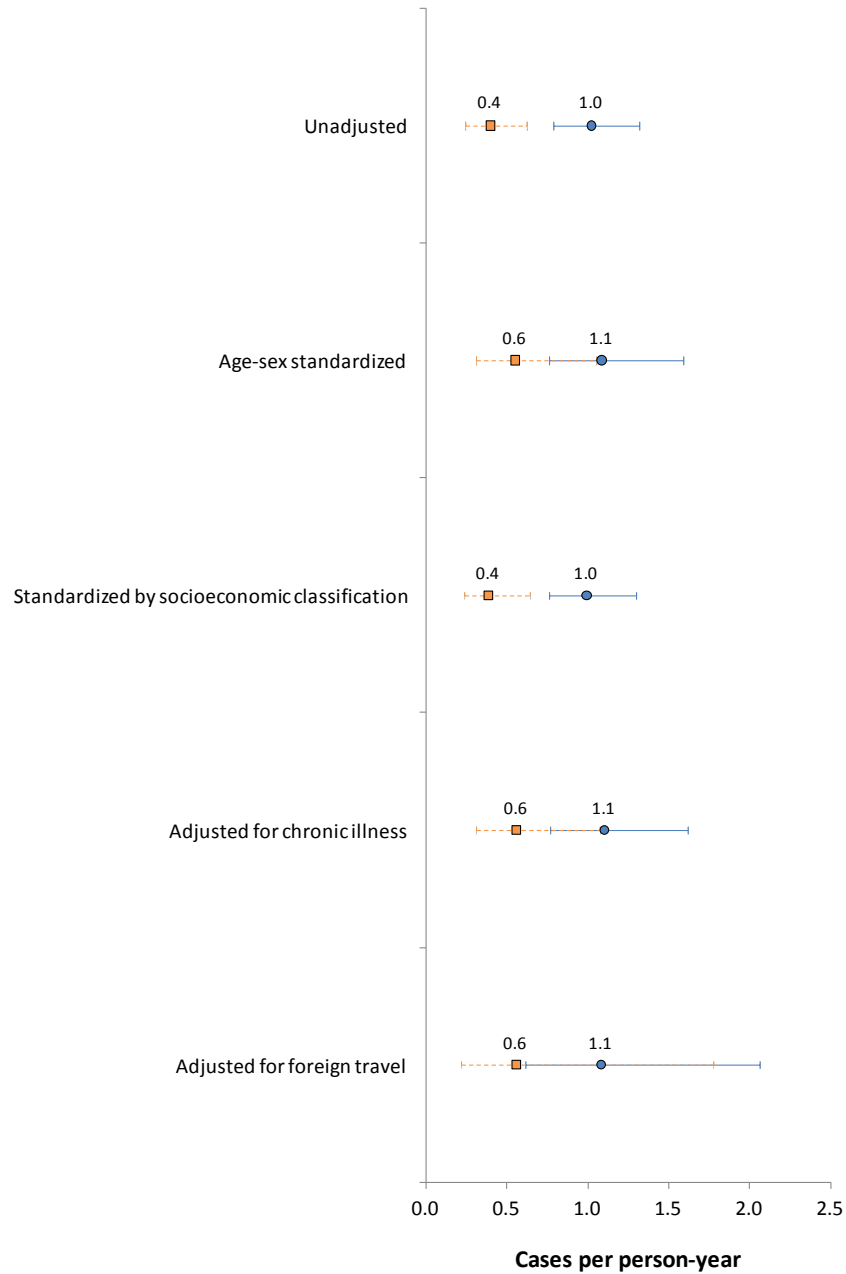
recall group. Notably, IID rates among males were similar in both 7-day and 28-day recall groups, but among females, the rate was four times higher among the 7-day recall group, compared with the 28-day recall group.

Figure 10 shows the overall rate of IID for each recall group with different levels of adjustment. Compared with the crude estimates, age- and sex-standardised estimates were slightly higher, while standardising for socio-economic group had little effect on the rate.

In Figure 11, rates of IID are presented according to the four Case Definitions. Among the 7-day recall group, the rate was similar for all case definitions and standardising for age and sex had relatively little effect on the estimates. Among the 28-day recall group, standardisation had a larger effect and resulted in higher rate estimates. This is likely to result from the smaller number of participants in this group. In addition, the rate of IID in the 28-day recall group appeared to be more sensitive to the Case Definition used: the standardised rate was 0.6 cases per person-year for Case Definitions 1 and 2, but this rose to 0.8 when Case Definition 3 was used (rate=0.82 cases per person-year, 95% CI: 0.50 – 1.35).

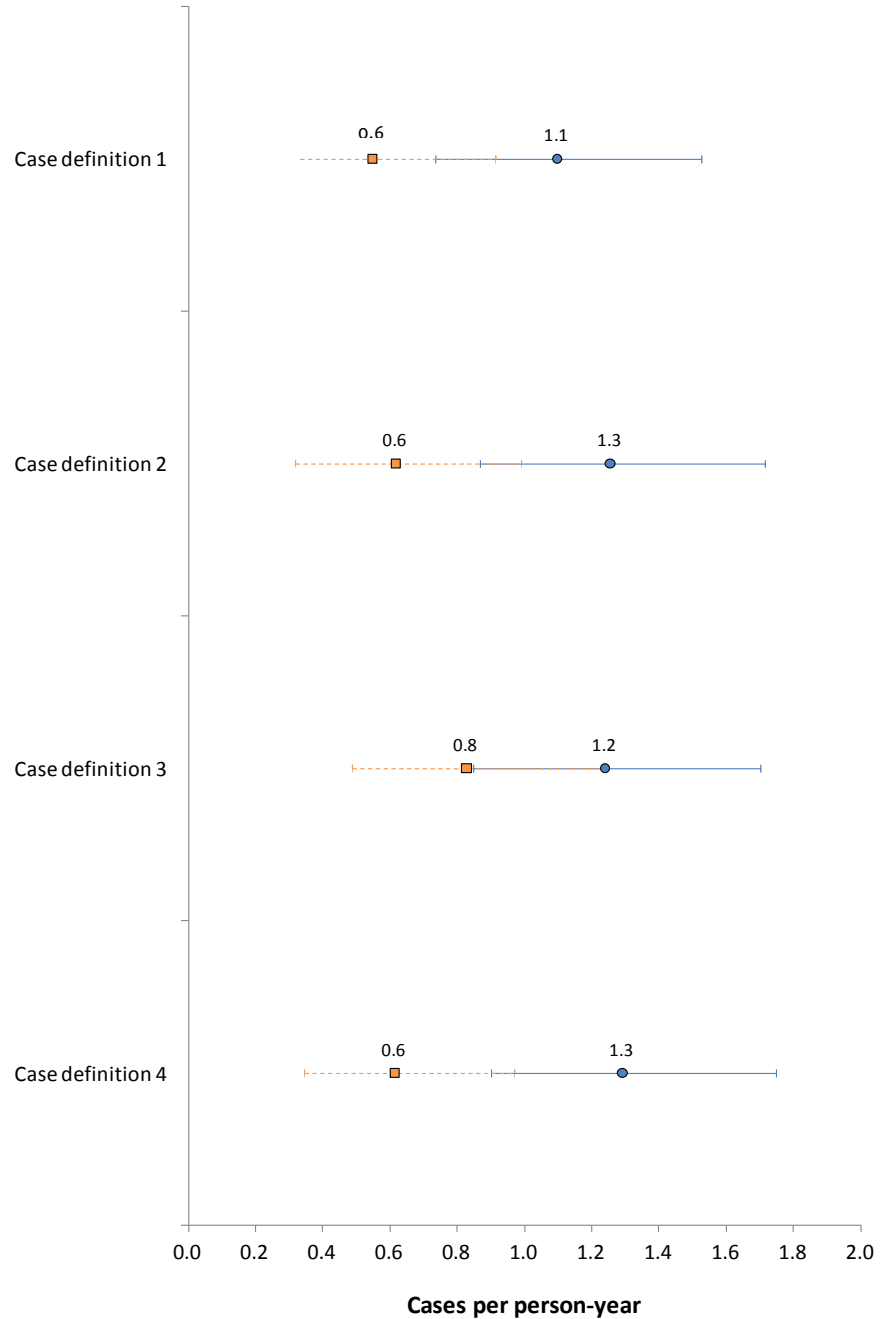


Figure 10: Overall rate of IID and 95 per cent CIs in the Republic of Ireland by recall period, with different levels of adjustment. Rates based on Case Definition 1.



Footnote to Figure 10: Blue circles: 7-day recall group; Orange squares: 28-day recall group. Rate adjusted for foreign travel includes only participants from May 2009 onwards, who had not travelled outside the ROI in the 10 days prior to interview. Rates adjusted for chronic illness and foreign travel are additionally standardised for age and sex.

Figure 11: Rates of IID and 95 per cent CIs for the Republic of Ireland, by recall period and case definition



Footnote to Figure 11: Blue circles: 7-day recall group; Orange squares: 28-day recall group. Fully adjusted rates are standardised for age and sex, and the denominator is adjusted for prevalence of non-infectious causes of IID in the population. See text for details of case definitions and adjustments.

## 5.4 Incidence of IID on the Island of Ireland

The age and sex distribution of participants in the ROI survey reported here and the UK IID2 telephone survey for NI is given in Appendix 4. A preponderance of females and older individuals was seen in both survey samples. Compared with the NI survey sample, a greater proportion of individuals in the ROI survey were in the 5 to 14-year age group (ROI: 17%; NI: 6%), but a lower proportion were aged between 15 and 34 years (ROI: 10%; NI: 16%). The socio-economic characteristics of the two survey samples could not be compared, due to the different classification schemes used in the two countries.

Standardised rates of IID by country and for the Island of Ireland are presented in Table 3. For the ROI, rates estimated using both Case Definition 1 and Case Definition 4 are given. Using the most directly comparable estimates, based on Case Definition 4, the rates of IID in the two countries were very similar for the 7-day recall group. Among the 28-day recall group, the rate was somewhat higher in Northern Ireland than in the Republic of Ireland, although there was insufficient evidence to rule out sampling variation in this result (NI 28-day recall rate = 0.8, ROI = 0.6; RR = 1.3, 95% CI: 0.6 – 2.7).

**Table 3: Standardised rates of IID by country and for the Island of Ireland by recall period. Data from ROI and UK IID2 Study telephone surveys, 2008-9. Rates are expressed as cases per person-year.**

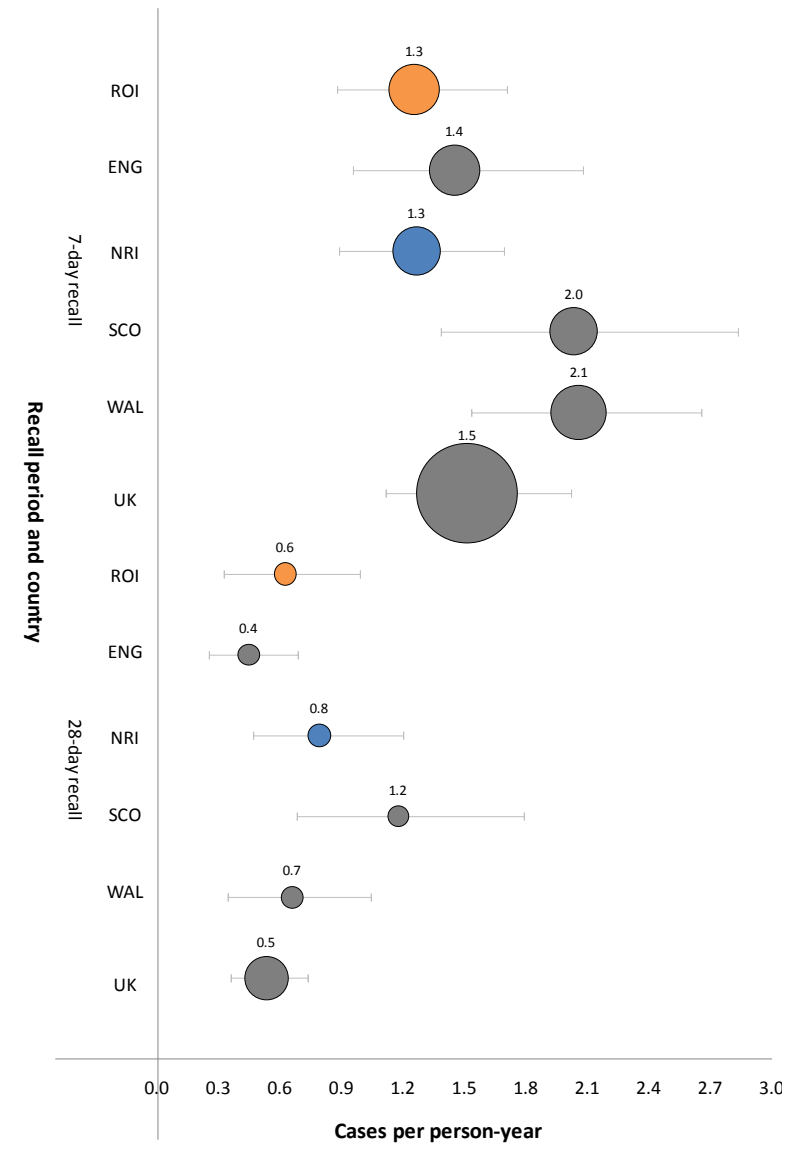
Recall period	Country	Rate (95% CI)
7-day recall	Republic of Ireland (Case Definition 1)	1.1 (0.7 - 1.5)
	Republic of Ireland (Case Definition 4)	1.3 (0.9 - 1.7)
	Northern Ireland	1.3 (0.9 - 1.7)
	Island of Ireland	1.3 (1.0 - 1.6)
28-day recall	Republic of Ireland (Case Definition 1)	0.6 (0.3 - 0.9)
	Republic of Ireland (Case Definition 4)	0.6 (0.3 - 1.0)
	Northern Ireland	0.8 (0.5 - 1.2)
	Island of Ireland	0.7 (0.4 – 1.0)

The standardised rates for the Island of Ireland were 1.3 (95% CI: 1.0 – 1.6) cases per person-year for the 7-day recall group and 0.7 (95% CI: 0.4 – 1.0) cases per person-year for the 28-day recall group (RR = 1.9, 95% CI: 1.2 – 3.1).

## 5.5 Comparison of IID incidence in the Republic of Ireland and the UK

Figure 12 compares the rates in the ROI (based on Case Definition 4) with those for other countries, as estimated from the UK IID2 Study telephone survey. Compared with the Republic of Ireland, rates of IID were higher in Scotland, in both the 7-day (RR = 1.6, 95% CI: 1.0 – 2.6) and 28-day (RR = 1.9, 95% CI: 0.9 – 4.1) recall groups. However, confidence intervals were wide and compatible, with these differences being due to sampling variation. Similarly, the rate of IID in Wales was 1.6 times that in the Republic of Ireland among the 7-day recall group (RR = 1.6, 95% CI: 1.1 – 2.6), although this difference was not seen among the 28-day recall group. For England and Northern Ireland, estimated rates were more similar in both recall groups. Despite the higher rates seen in Scotland and Wales, these have little influence on the overall UK rate, because of the relatively small contribution of these two countries to the UK population. The overall estimated rates in the UK were 1.5 (95% CI: 1.1 – 2.0) cases per person-year for the 7-day recall group, and 0.5 (0.4 – 0.7) cases per person-year for the 28-day recall group. While the 7-day recall estimate was somewhat higher than that in the Republic of Ireland, there was insufficient evidence to rule out sampling variation as an explanation (RR = 1.2, 95% CI: 0.8 – 1.9).

Figure 12: Rates of IID by recall period and country. Data from the ROI and UK IID2 telephone surveys, 2008-9, based on Case Definition 4



Footnote to Figure 12: Area of circles is proportional to sample size; UK estimates are weighted according to the relative size of the population of constituent countries. Horizontal bars represent 95 per cent confidence limits. ROI: Republic of Ireland; ENG: England; NRI: Northern Ireland; SCO: Scotland; WAL: Wales; UK: United Kingdom.

## 5.6 Frequency of symptoms and health services usage

Table 4 details the frequency of symptoms and health services usage by recall period, in addition to the frequency of absence from normal daily activities. A range of symptoms were reported and there was some evidence that severity of illness differed between 7-day and 28-day recall groups, with a pattern of greater severity being experienced by those in the 28-day recall group. This is particularly the case in relation to absence from normal daily activities<sup>5</sup> where, among cases in the 28-day recall group, 78 per cent reported being absent from normal daily activities as a result of their illness, compared with 32 per cent among cases in the 7-day recall group. There was also some suggestion that factors indicative of more severe illness, including presence of diarrhoea with blood, consulting a general practitioner, and being admitted to hospital, were reported more commonly among the 28-day recall group. These comparisons, however, were based on a small number of cases.

In relation to stool sampling, of all respondents only one case (in the 28-day recall group) reported that they/their child/their teen were asked to submit a stool sample. Scallan *et al.*, (11) have previously reported that disease severity, i.e., presence of bloody diarrhoea and diarrhoea duration  $\geq 3$  days, impacts greatly on the submission of a stool sample, and such factors may also have been at play in the context of cases reported here.

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<sup>5</sup> The question in the questionnaire stated 'Did your child's/your teen's/your illness stop you going to work/college?'

**Table 4: Frequency of symptoms and health services usage by recall period, ROI telephone survey. Cases are based on Case Definition 1; \*p-value based on Fisher's exact test.**

	Recall period				p*
	7-day (N=58)		28-day (N=18)		
	Number	%	Number	%	
<b>Symptom</b>					
Diarrhoea with blood	1	2%	1	6%	0.368
Nausea	32	55%	14	78%	0.261
Abdominal pain	34	59%	8	44%	0.305
Loss of appetite	35	60%	11	61%	0.311
Fever	19	33%	8	44%	0.160
Headache	26	45%	7	39%	0.369
Respiratory symptoms	22	38%	7	39%	1.000
<b>Health service usage</b>					
GP consultation	11	19%	4	22%	0.510
Out-of-hours consultation	1	2%	0	0%	1.000
Pharmacist	3	5%	1	6%	1.000
Nurse consultation	2	3%	0	0%	1.000
Hospital admission	0	0%	1	6%	0.237
<b>Other</b>					

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Absence activities	from normal daily	19	33%	14	78%	<0.001
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# 6 Discussion

## 6.1 Summary of main findings

### 6.1.1 Estimated rate of IID

The results of this study indicate that the estimated rate of IID in the Republic of Ireland is similar to the rate in Northern Ireland and the UK, as a whole. The estimated rate was shown to depend on the period over which participants were asked to recall symptoms. Among those asked to recall symptoms over the past seven days, the estimated rate was more than one episode per person-year in ROI, in NI and in the UK as a whole; that is, individuals in the population can expect to experience, on average, one episode of IID per year. This rate was double that estimated among persons asked to recall symptoms over the previous 28 days.

In general, the four Case Definitions used did not have a major impact on the estimated rates. The lowest estimates were obtained using the IID Studies case definition (Case Definition 1), which defines new cases as those occurring after a symptom-free period of at least three weeks. Other case definitions gave somewhat higher estimates. The major difference was seen in the 28-day recall group, in which Case Definition 3, used in other studies (9), gave a point estimate that was 33 per cent higher than that obtained from the IID Studies case definition. The reason for this difference is unclear, and this effect was not apparent in the 7-day recall group.

Respondents from both recall periods who experienced IID, reported significant levels of absence from normal daily activities, which reinforces the fact that the economic burden of IID in ROI is substantial. This, in turn, underscores the need for continued efforts to prevent or reduce the rate of IID in the community through public health initiatives. A concomitant reduction in the amount of healthcare usage would also follow from a reduction in the rate of IID in the community.

## 6.2 Scope of analysis

This report is limited to the analysis of data on completed interviews in the telephone survey. Experience from previous studies of IID using a random digit dialling sampling procedure indicates that, of potentially eligible residential households, 40 per cent to 50 per cent agree to participate. A similar level of participation was reported in the pilot study for this survey.

## 6.3 Comparison with other studies

The overall rate of IID estimated in this study for the 28-day recall group was similar to that reported in a number of previous retrospective studies in the UK, the USA and the Island of Ireland (IOI) using the same period of recall. The rate reported in a previous **safefood** funded IOI study was comparable to that found here (0.6 per person-year using a 28-day recall period), as were the proportions of cases reporting bloody diarrhoea and seeking medical attention (3). Studies in other countries, including Canada and Australia, have generally reported higher estimates, at around one episode per person per year or higher (10). These variations in reported rates are difficult to interpret, because of differences between studies in study design and sampling strategies, but could also partly be due to differences in the case definitions.

In this study, it was possible to examine the effects of different case definitions on estimated incidence. In a re-analysis of telephone survey data from five different countries (Australia, Canada, Ireland, Malta and the USA) using four different case definitions, Majowicz *et al.*, (9) found that the choice of case definition did have an impact on estimates, with rates varying by between 1.5- and 2.1-fold within countries. The choice of case definition also affected the apparent severity of illness, as measured by the proportion of cases reporting suffering bloody diarrhoea or seeking medical attention. In that analysis, using a standard case definition (Case Definition 3 in this study) and a 28-day recall period, rates varied from 0.4 per person-year in Malta to 1.0 in Australia.

## 6.4 Strengths and limitations

### 6.4.1 Survey eligibility

This survey included only landline numbers and it has been reported (12) that this can result in non-eligible bias for those members of the population that do not have a landline.

#### **6.4.2 Sample representation**

Compared with the census population, the survey sample showed an over-representation of females and those in older age groups, together with an under-representation of young adults. This was seen even in the presence of quota-based sampling. The aim of quota-based sampling is to obtain a balanced sample in terms of, in this case, age group and sex, by ensuring that a certain number of respondents are recruited in each stratum. It is, however, more time-consuming, because considerably more effort is required to recruit the target number of individuals in strata with low participation. The under-representation of young adults has been seen in other similar studies, including the UK IID2 Study telephone survey (13). Differences in the age and sex distribution between the survey sample and census population were accounted for by means of post-stratification weighting, to give more weight to age- and sex-strata that were under-represented. Bias in the estimated rates could still occur if, within strata of age group and sex, those who chose to participate in the survey differed in other ways that were related to their risk of IID. In other respects, particularly educational level and geographical distribution, the survey sample was more representative, and adjusting for differences in the distribution of socio-economic groups made little difference to the estimates.

#### **6.4.3 Recall period**

The use of two recall periods, allocated to participants at random, was an additional strength of this study. It is apparent that retrospective telephone surveys tend to result in considerably higher estimates of IID incidence, compared with prospective follow-up studies (10, 13, 14). The reasons for this are unclear, but it has been suggested that telescoping, a phenomenon whereby individuals report illness events as having occurred more recently than was actually the case, could play a role in this discrepancy. The use of different recall periods enables further examination of such recall effects. Previous studies have shown considerable differences in rate estimates when using a recall period of 7 versus 28 days (13, 15). The differences seen here are in line with those previous findings. Possible explanations for the difference in rate estimates between the 7-day and 28-day recall groups, include a greater telescoping effect among the former, which would result in an overestimate in the 7-day recall group, or less complete recall of illness events in the latter, which would result in an underestimate in the 28-day recall group. There is some indication from this and other studies that both of these phenomena may be occurring. Although this study was not sufficiently large to make statistical comparisons of symptom frequency between the two recall groups, there is an indication in the data that more severe illness is preferentially reported among the 28-day recall group: the proportions of cases reporting bloody diarrhoea, absence from normal daily activities, and seeking medical care were

all higher in the 28-day recall group. This suggests that when asked to recall symptoms over a longer time period, individuals might be more likely to recall events involving more severe symptoms. Conversely, in the UK IID2 Study telephone survey, participants in the 7-day recall group reported very high frequencies of illness and resulting use of general practice services that were incompatible with information from external sources, including rates of IID-related consultations to the Royal College of General Practitioners Weekly Returns Service (13).

#### **6.4.4 Foreign travel**

Although information on foreign travel was collected in the survey, this was initially asked only of individuals who reported symptoms, and only asked of all participants from May 2009. Restricting the data analysis to participants recruited from May 2009, and excluding all those reporting recent foreign travel, made little difference to the rate estimates, and the proportion of cases and non-cases reporting recent foreign travel was similar. This implies that, at least in this survey sample, foreign travel was not related to disease risk. Risk of illness during travel depends on the travel destination, as well as the type and duration of travel. Fewer than eight per cent of survey respondents reported recent foreign travel, and the most common destinations reported were the UK and Spain.

#### **6.4.5 Comparability with other studies**

The overlapping time periods between the present survey and the UK IID2 Study, and the use of comparable case definitions enabled comparison of IID rates between countries over a similar time period. The results showed that rates of IID in the ROI are generally similar to those in the UK as a whole.

### **6.5 Interpretation and conclusions**

Based on this analysis, the rate of IID in the Republic of Ireland is similar to that estimated in a previous telephone survey on the Island of Ireland. There is, in addition, little evidence that incidence of IID in the Republic of Ireland is substantially different from that in Northern Ireland, or in the UK as a whole. Rate estimates are, however, highly sensitive to the period of recall used, for reasons that are not entirely understood.

## 7 Recommendations

Based on the findings from this survey the following recommendations are proposed:

1. Continued efforts are required to reduce the rate of IID in the community, especially amongst the under five age group.
2. Important to continue to provide guidance to consumers on what to do if they have infectious intestinal disease symptoms<sup>6</sup>.
3. This survey highlights the need for continued efforts to provide a universally accepted case definition for infectious intestinal disease.

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<sup>6</sup> This guidance is available on (1) the **safefood** website <http://www.safefood.eu/Food-safety/Food-Poisoning.aspx> (2) the Health Protection Surveillance Centre website <http://www.hpsc.ie/hpsc/A-Z/Gastroenteric/Foodbornellness/Factsheet/> (3) and also on the Food Standards Agency website <http://www.nhs.uk/Conditions/Food-poisoning/Pages/Symptoms.aspx>.

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## 9 Appendices

### Appendix 1: Questionnaire

#### **\*QUESTION 1003**

##### **Section A: Interviewee details**

Interviewer: Who has been selected to be the subject of this interview?

- 1: Child under 12 years? With parental consent; completed by parent (regardless of whether child present in house at time of call)
- 2: Teenager aged 12-15 years; completed by parent (if subject not present in house at time of call)
- 3: Teenager (if present in house at time of call) (With parental consent)
- 4: Adult > 16 years? Completed by subject him/herself, present in house at time of call

#### **\*QUESTION 1004**

Is the questionnaire being answered by another person on behalf of the selected respondent?  
(If the respondent is < 12 yrs of age, a parent or guardian must answer on the child's behalf)

- 1: Yes
- 2: No

#### **\*QUESTION 1005**

If the respondent is aged 12-15 years, and is responding his/her self, was parental consent given to interview the teenager? Parental consent given?

- 1: Yes
- 2: No \*GO TO 3001

**\*QUESTION 1002**

Do you consent to take part?

1: Yes

2: No \*GO TO 3001

**INTERVIEWER READ OUT**

As with all medical research, some questions may appear personal, but all answers will be kept strictly confidential. Nevertheless, if at any stage you wish to stop or feel uncomfortable, please let me know.

**\*QUESTION 80010**

Record the gender of the child/teenager/adult?

1: Male

2: Female

**\*QUESTION 80020**

How old is your child/is your teenager/are you?

Years

Months

**Section B: Recent experience with diarrhoea and/or vomiting**

**\*QUESTION 20000**

Has your child/has your teenager/have you in the past 7/28 days suffered at all from vomiting or diarrhoea?

1: Yes - CONTINUE

2: No

\*IF NO "Thank you for your time, this survey deals with those who have had symptoms of diarrhoea or vomiting in the past 7/28 days. I now have some final demographic questions for you, just to ensure we are talking to a representative sample of the Irish population" GO TO SECTION F (Section C also to be asked).



**\*QUESTION 20010**

B1. Regarding your child/your teen/your most recent bout, did your child/your teen/you suffer from Vomiting only, Diarrhoea only or both vomiting and diarrhoea?

1: Diarrhoea

2: Vomiting

3: Both (Diarrhoea and Vomiting)

**\*QUESTION 20020**

B2. Are any of the diarrhoea symptoms/vomiting symptoms/symptoms still present?

1: Yes

2: No

\*\*If Yes at B2 Ask

**\*QUESTION 20022**

How many days ago did diarrhoea symptoms/vomiting symptoms/symptoms start?

\*\* (Capture number of days = L)

\*\*If No at B2 Ask

**\*QUESTION 20024**

B4. How many days ago did the diarrhoea symptoms/vomiting symptoms/symptoms stop?

\*\* (Capture number of days = G)

\*\*If No at B2 Ask

**\*QUESTION 20025**

B5. How many days did the diarrhoea symptoms/vomiting symptoms/symptoms last?

\*\* (Capture number of days = L)

**\*QUESTION 20023**

B3. How long was your child/was your teen/were you free of both diarrhoea and vomiting before this bout?

\*\* (Capture number of days = F)

**\*QUESTION 271**

B7. I'd like to talk to you about your child's/your teen's/your most recent symptoms during this time.

Did your child/your teen/you also experience any of the following symptoms?

Secondary Symptoms?

Bloody diarrhoea \*\*If answered "yes" to having diarrhoea in Question B1

Nausea (feeling sick only)

Abdominal pain (tummy pain)

Loss of appetite

High temperature (shivering and sweating)

Cough, runny/blocked nose, sore throat

Headache

1: Yes

2: No

3: Not Sure

**\*QUESTION 28**

If answered Yes to having Diarrhoea or both in B1

B8. How many times did your child/your teen/you go to the toilet on the worst day (24 hours) of his/her/your illness?

Number of times

Not Sure

**\*QUESTION 29**

If answered Yes to having Vomiting or both in B1

B9. How many times did your child/your teen/you vomit on the worst day (24 hours) of his/her/your illness?

Number of times

Not Sure

**\*QUESTION 210**

B10. Has your child/your teen/ Have you been to see your doctor/GP about this illness?

1: Yes

2: No

**\*QUESTION 211**

B11. On what date did your child/your teen/you first see the doctor/GP about these symptoms?

DAY

MONTH

YEAR

Don't Know

**\*QUESTION 212**

B12. When your child/your teen/you visited your doctor/GP, was it to seek diagnosis and treatment or because your child/your teen/you required a medical certificate for work/school/college? (tick both if applicable)

1: Diagnosis and treatment

2: Certificate for

3: Other OPEN

**\*QUESTION 213**

B13. Have you spoken to your doctor/GP over the phone for advice about your child's/your teen's/your illness?

1: Yes

2: No

**\*QUESTION 214**

If Yes to B13

B14. On what date (dd/mm/yyyy) did you first speak to the doctor/GP or nurse about these symptoms?

DAY

MONTH

YEAR

Don't Know

**\*QUESTION 215**

B15. Did you contact any other service during the course of your child's/your teen's/your illness?

- 1: Out of hours services
- 2: Advice from pharmacist
- 3: Other health-related websites
- 4: Discuss with practice nurse
- 5: Other OPEN
- 6: None

**\*QUESTION 216**

B16. Did your child's/your teen's illness prevent him/her from going to [school/play school/child minding facilities/crèche][work/school]?

- 1: Yes
- 2: No
- 3: Not sure
- 4: Not applicable

**\*QUESTION 2161**

If Yes to B16

B.16b How many days did it prevent your child/your teen/you from going to [school/play school/child minding facilities/crèche][work/school]?

\*\*If being completed by parent in respect of a child:

**\*QUESTION 217**

B17. Did your child's/your teen's/your illness stop you going to work/college?

- 1: Yes
- 2: No
- 3: Not applicable

**\*QUESTION 2171**

If Yes to B17

Q.17b. How many days did you miss from work/college or carrying out your daily activities?

**\*QUESTION 218**

B18. Did your child/your teen/you take any medications for his/her/your symptoms?

1: Yes

2: No

**\*QUESTION 219**

If Yes to B18

B19. Did you get this medication over the counter or on prescription?

**(tick both if applicable)**

1: Over the counter

2: On prescription

3: Other OPEN

**\*QUESTION 220**

B20. Can you provide us with the name(s) of the medication?

**\*QUESTION 221**

B21. How many days were these medications taken for?

**\*QUESTION 222**

B22. Did you take your child/your teenager/you go to hospital due to these symptoms?

1: Yes

2: No

**\*QUESTION 223**

B23. Was your child/your teen/were you admitted to hospital?

1: Yes

2: No

**\*QUESTION 224**

If Yes to B23

B24. How many days did your child/your teen/you spend in hospital?

**\*QUESTION 225**

B25. Was your child/your teen/were you asked to submit a stool sample for testing?

1: Yes

2: No

**\*QUESTION 226**

If Yes to B25

B26. What was the result of the test?

**\*QUESTION 227**

B27. Does your child/your teenager/do you suffer from any recurring diarrhoea or other chronic illness related to intestinal disease?

e.g. (Irritable Bowel Syndrome, Crohns disease)

1: Yes

2: No

**\*QUESTION 2271**

B27b What other illnesses does your child/your teenager/do you suffer from?

**\*QUESTION 228**

B28 Has your child/your teenager/have you ever been diagnosed with Irritable Bowel Syndrome?

1: Yes

2: No

**\*QUESTION 2281**

If Yes to B28

Q.28b How long has your child/your teenager/have you suffered from it?

YEARS

MONTHS

**\*QUESTION 229**

B29 Who told your child that they/your teenager that they/you that you had IBS?

- 1: GP
- 2: Other medical staff
- 3: Self-diagnosed
- 4: Other OPEN
- 5: Don't Know

**\*QUESTION 230**

B30 Has your child/your teenager/have you had IBS symptoms in the past month?

- 1: Yes
- 2: No

**\*QUESTION 231**

B31. Has your child/your teenager/have you had any stomach or bowel surgery which may have caused diarrhoeal illness as a consequence in the past six months?

- 1: Yes
- 2: No

**\*QUESTION 2311**

If Yes to B31

B31b What surgery has your child had/has your teenager had/ did you have?

**\*QUESTION 232**

B32. What do you think was responsible for your child's/your teen's/your illness?

\*Please tick one box only

- 1: Infection - food/water
- 2: Infection – person-to person-spread
- 3: Morning sickness
- 4: Hangover
- 5: Obstruction in throat (causing vomiting)
- 6: Chronic illness (e.g. IBS, Crohns disease)
- 7: Recent stomach/bowel surgery
- 8: Other OPEN
- 9: Don't Know

**Section C. Foreign travel in the 10 days before your illness started**

**\*QUESTION 301**

C1. Did your child/your teen/you travel outside the Republic of Ireland in the ten days before he/she/you became ill?

- 1: Yes
- 2: No

**Without Symptoms**

Did you/your child travel outside the Republic of Ireland in the last ten days?

- 1: Yes
- 2: No



**\*QUESTION 302**

If Yes to C1 ask following questions in section C

C2. What dates was your child/was your teen/were you away?

FROM DAY

FROM MONTH

FROM YEAR

RETURNED DAY

RETURNED MONTH

RETURNED YEAR

If not Sure ASK

C.2a How many days were you away on holiday

**\*QUESTION 303**

C3. If you/your child stayed abroad please state which countries?

1: Australia

2: China

3: France

4: Germany

5: Latvia

6: Lithuania

7: Poland

8: Portugal

9: Spain

10: The Netherlands

11: Thailand

12: UK

13: USA

14: Other

## Section D. Visit to farm

### \*QUESTION 401

D1. In the two weeks prior to your child/your teen/your illness did he/she/you visit a farm?

1: Yes

2: No

### \*QUESTION 4011

If Yes to D1.

D1b Was your child/your teen/were you in direct contact with farm animals?

1: Yes

2: No

3: Don't Know

## Section E: Waterborne disease

### \*QUESTION 501

E1. In the two weeks prior to illness has your child/your teen/have you been swimming?

In a swimming pool

In fresh water

In the sea

1: Yes

2: No

3: Don't Know

### \*QUESTION 502

If Yes to any in E1

E.1b Did your child/your teen/you swallow water whilst swimming or put his/her/your head under the water?

1: Yes

2: No

3: Don't know

**\*QUESTION 503**

E2. In the two weeks prior to illness have you noticed any problems with your tap water at home?

Discolouration

Cloudiness

Altered taste

Loss of pressure

Unpleasant odour

1: Yes

2: No

3: Don't know

**\*QUESTION 504**

E2. In the two weeks prior to illness have you noticed any other problems with your tap water at home?

## Section F: Demographic information

**\*QUESTION 600**

Explain that we only require this information to assess whether the people participating in this telephone survey are representative of the general population. All responses will remain anonymous).

**\*QUESTION 601**

F1. Can I ask in which county your household is located?

1: Carlow

2: Cavan

3: Clare

4: Cork

5: Donegal

6: Dublin

7: Galway

8: Kerry

9: Kildare

10: Kilkenny

11: Laois

12: Leitrim

- 13: Limerick
- 14: Longford
- 15: Louth
- 16: Mayo
- 17: Meath
- 18: Monaghan
- 19: Offaly
- 20: Roscommon
- 21: Sligo
- 22: Tipperary
- 23: Waterford
- 24: Westmeath
- 25: Wexford
- 26: Wicklow
- 99: Refused

**IF LIVE IN DUBLIN ASK**

**\*QUESTION 6011**

Fib.Can I ask in which postcode your household is located?

- 1: Dublin 1
- 2: Dublin 2
- 3: Dublin 3
- 4: Dublin 5
- 5: Dublin 6
- 6: Dublin 6w
- 7: Dublin 7
- 8: Dublin 8
- 9: Dublin 9
- 10: Dublin 10
- 11: Dublin 11
- 12: Dublin 12
- 13: Dublin 13
- 14: Dublin 14
- 15: Dublin 15
- 16: Dublin 16
- 17: Dublin 17

18: Dublin 18

19: Dublin 20

20: Dublin 22

21: Dublin 24

99: Refused

**\*QUESTION 6081**

F8d. Would you describe the place where your household is situated as being...

1: In open country

2: In a village

3: In a town (1,500+)

4: In a city (other than Dublin)

5: In Dublin city or county

6: Refused

**\*\*QUESTION 602**

\*\*F2A. Firstly, can I ask you to state your child's/your teen's/your age?

**\*QUESTION 603**

b) Can I also get your child's/your teen's/your DATE of birth (dd/mm/yyyy)

DAY

MONTH

YEAR

**\*QUESTION 604**

F4. Can you please tell me your child's/your teen's/your Ethnic origin, Is your child/your teenager/are you?

- 1: White
- 2: Mixed
- 3: Asian or Asian-Irish
- 4: Black or Black-Irish
- 5: Other OPEN
- 6: Refused

**\*QUESTION 6041**

If answered White in F4

- 1: Irish
- 2: Irish Traveller
- 3: British
- 4: Rest of Europe
- 5: Other white background
- 6: Refused

**\*QUESTION 6042**

If answered Mixed in F4

- 1: White and Black-Caribbean
- 2: White and Black-African
- 3: White and Asian
- 4: Other mixed
- 5: Refused

**\*QUESTION 6043**

If answered Asian or Asian-Irish in F4

- 1: Chinese
- 2: Indian
- 3: Pakistani
- 4: Bangladeshi
- 5: Other (SPECIFY)\*OPEN6: Refused

**\*QUESTION 6044**

If answered Black or Black-Irish in F4

- 1: Black-Caribbean
- 2: Black-African
- 3: Other (SPECIFY)\*OPEN

**\*QUESTION 605**

F5. What is/was the current employment status of the chief income earner in your home? That is the person with the largest income, whether from employment, pensions, state benefit, investments or any other source.

- 1: Employed/Self Employed
- 2: Unemployed
- 3: Retired
- 4: Student
- 5: Looking after home or family
- 6: Long-term sick or disabled
- 8: Farmer
- 7: Other (SPECIFY)\*OPEN
- 9: Refused

**\*QUESTION 66606**

F5b. Do (did) you work as an employee or are (were) you self employed in your main job?  
Your main job is the job in which you usually work(ed) the most hours.

\*Please tick one box.

- 1: Employee
- 2: Self-employed
- 3: Self-employed, without paid employees.
- 4: Assisting relative (not receiving fixed wage or salary)
- 5: None of these

**\*QUESTION 6061**

If answered Farmer in F5

F5a. Can you tell me how many acres you farm?

**\*QUESTION 606**

F6. What is/was the job title of the chief income earner in the household?

INTERVIEWER Use Precise Terms Such As:

Retail Stores Manager, Secondary Teacher, Electrical Engineer

Do not use general terms such as

Manager, Teacher, Engineer

**\*QUESTION 608**

F8a. What is the highest level of education (full-time or part-time) which the main earner has completed to date?

Please stop me when I reach the correct one

- 1: No Formal Education
- 2: Primary Education
- 3: Second Level
- 4: Third Level
- 5: Refused



**If Second Level ASK**

- 1: Lower Secondary (Junior/Intermediate/Group Certificate, O Level/GCSEs, NCVA Foundation Certificate, Basic Skills Training Certificate or Equivalent)
- 2: Upper Secondary (Leaving Certificate, Including Applied and Vocational Programmes, A Levels, NCVA Level 1 Certificate or Equivalent)
- 3: Technical or Vocational Qualification (Completed Apprenticeship, NCVA Level 2/3 Certificate, Teagasc Certificate/Diploma or Equivalent)
- 4: Both Upper Secondary and Technical or Vocational Qualifications
- 5: Refused

**If Third Level ASK**

- 1: Non Degree (National Certificate, Diploma NCEA/Institute of Technology or Equivalent, Nursing Diploma)
- 2: Primary Degree (Third Level Bachelor Degree)
- 3: Professional Qualification (of Degree Status at least)
- 4: Both a Degree and a Professional Qualification
- 5: Postgraduate Certificate or Diploma
- 6: Postgraduate Degree (Masters)
- 7: Doctorate (Ph.D)
- 8: Refused

**IF NO MORE BOUTS WITHIN SPECIFIED TIME – INTERVIEW COMPLETE**

**\*QUESTION 60010**

If respondent needs any further information they can contact Claire Collins at 01 6763705 or email her at [iids@icgp.ie](mailto:iids@icgp.ie) (Successful Interview). (THANK FOR CO-OPERATION, REASSURE CONFIDENTIALITY AND CLOSE).

**Just to remind you that all answers given are treated in the strictest confidence.**

**THANK YOU FOR YOUR CO-OPERATION, YOU'VE BEEN SPEAKING TO ..... FROM MILLWARD BROWN IMS.**

**\*QUESTION 3333**

INTERVIEWER, PLEASE INDICATE IF THE NUMBER YOU DIALLED WAS A LANDLINE OR MOBILE TELEPHONE NUMBER

- 1: Landline
- 2: Mobile

\*END

**\*\* SECOND BOUT**

\*\*If less than 7/28 days ask about second symptom (up to three additional symptoms to be asked about) (four for 28 day period)

**\*QUESTION 30010**

From your answers provided, it is apparent that your child has/your teen has/you have had another bout of illness in the past 7/28 days, the next three questions will ask only about this bout. Which symptoms were present?

1: Diarrhoea

2: Vomiting

3: Both (Diarrhoea and Vomiting)

**\*QUESTION 30011**

Second symptom.

How long did the Diarrhoea symptoms/vomiting symptoms/symptoms last?

\*\* (Capture number of days - L)

**\*QUESTION 30012**

Second symptom

Prior to this bout, how long was your child /your teen/you free of both vomiting and diarrhoea?

\*\* (Capture number of days - F)

If answered Yes to having Diarrhoea or both in Q30010

B8. How many times did your child/your teen/you go to the toilet on the worst day (24 hours) of his/her/your illness?

Number of times

Not Sure

If answered Yes to having Vomiting or both in Q30010

B9. How many times did your child/your teen/you vomit on the worst day (24 hours) of his/her/your illness?

Number of times

Not Sure

\*\*If total of first symptom and second symptom < 7/28, ask for third symptom with the same questions.

**\*\* THIRD BOUT**

\*\*If less than 7/28 days ask about third symptom (up to three additional symptoms to be asked about) (four for 28 day period).

**\*QUESTION 40010**

From your answers provided it is apparent that your child has/your teen has/you have had a third bout of illness in the past 7/28 days, the next three questions will ask only about this bout.

Which symptoms were present?

1: Diarrhoea

2: Vomiting

3: Both (Diarrhoea and Vomiting)

**\*QUESTION 40011**

Third symptom

How long did the Diarrhoea symptoms/vomiting symptoms/symptoms last?

\*\* (Capture number of days - L)

**\*QUESTION 40012**

Third symptom

Prior to this bout, how long was your child /your teen/you free of both vomiting and diarrhoea?

\*\* (Capture number of days - F)

If answered Yes to having Diarrhoea or both in Q40010

B8. How many times did your child/your teen/you go to the toilet on the worst day (24 hours) of his/her/your illness?

Number of times

Not Sure

If answered Yes to having Vomiting or both in Q40010

B9. How many times did your child/your teen/you vomit on the worst day (24 hours) of his/her/your illness?

Number of times

Not Sure

**\*\* FOURTH BOUT**

\*\*If less than 28 days, ask about fourth symptom (four for 28 day period).

**\*QUESTION 50010**

From your answers provided, it is apparent that your child has/your teen has/you have had a third bout of illness in the past 28 days, the next three questions will ask only about this bout.

Which symptoms were present?

1: Diarrhoea

2: Vomiting

3: Both (Diarrhoea and Vomiting)

**\*QUESTION 50011**

Third symptom

How long did the Diarrhoea symptoms/vomiting symptoms/symptoms last?

\*\* (Capture number of days - L)

**\*QUESTION 50012**

Third symptom

Prior to this bout, how long was your child /your teen/you free of both vomiting and diarrhoea?

\*\* (Capture number of days - F)

If answered Yes to having Diarrhoea or both in Q50010

B8. How many times did your child/your teen/you go to the toilet on the worst day (24 hours) of his/her/your illness?

Number of times

Not Sure

If answered Yes to having Vomiting or both in Q50010

B9. How many times did your child/your teen/you vomit on the worst day (24 hours) of his/her/your illness?

Number of times

Not Sure

**\*QUESTION 60010**

If respondent needs any further information they can contact Claire Collins at 01 6763705, or email her at [iids@icgp.ie](mailto:iids@icgp.ie) (Successful Interview). (THANK FOR CO-OPERATION, REASSURE CONFIDENTIALITY AND CLOSE). Just to remind you that all answers given are treated in the strictest confidence. THANK YOU FOR YOUR CO-OPERATION, YOU'VE BEEN SPEAKING TO ..... FROM MILLWARD BROWN IMS.

**\*QUESTION 3333**

INTERVIEWER, PLEASE INDICATE IF THE NUMBER YOU DIALLED WAS A LANDLINE OR MOBILE TELEPHONE NUMBER

1: Landline

2: Mobile

\*END

## Appendix 1a: Changes effective in the third and fourth quarters as outlined below.

This change is as follows: To ask the foreign travel questions of **all respondents**.

The wording for those with symptoms is:

Did you/your child travel outside the Republic of Ireland in the ten days before you became ill?

Yes

No

If “yes”, please answer the next section

What dates were you away?

From \_\_\_\_\_ DD/MM/YYYY to \_\_\_\_\_ DD/MM/YYYY

If you/your child stayed abroad please state which country/countries: \_\_\_\_\_

The wording for those without symptoms is:

Did you/your child travel outside the Republic of Ireland in the last ten days?

Yes

No

If “yes”, please answer the next section

What dates were you away?

From \_\_\_\_\_ DD/MM/YYYY to \_\_\_\_\_ DD/MM/YYYY

If you/your child stayed abroad please state which country/countries: \_\_\_\_\_

## Appendix 2: Statistical adjustments – standardisation

Rates were standardised to account for differences in the age and sex composition of survey respondents relative to the 2006 ROI census. Rates of IID standardised by socio-economic classification were calculated in a similar way.

Standardisation was achieved by means of post-stratification weights. For the purposes of post-stratification, age was grouped into nine categories: <1 year, 1-4 years, 5-14 years, 15-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, and 65+ years. For each stratum of age group and sex, individuals' weights were computed as the ratio of the size of the stratum in the census population to that in the telephone survey. The weights were then normalised so as to sum to unity. Observations were thus weighted such that more weight was given to individuals in strata that were under-represented.

The adjusted incidence was then calculated as:

$$I = \sum_j \sum_i w_j \cdot I_{ij}$$

$$w_j = \frac{N_j/n_j}{N}$$

where:

I = weighted incidence of IID

I<sub>ij</sub> = rate in individual i in age-sex stratum j

w<sub>j</sub> = weight applied to observations in age-sex stratum j

N<sub>j</sub> = size of census population in age-sex stratum j

n<sub>j</sub> = size of age-sex stratum j among survey respondents

N = size of census population

Ninety-five per cent confidence intervals (95% CI) for the rates were obtained by bootstrap methods: 9,999 bootstrap estimates of the rate were obtained by repeatedly sampling from the data random sets of observations with replacement. The size of the random sets was equal to the number of participants in the survey. From the ensuing rate distribution, the median and 2.5th and 97.5th percentiles were taken as the point estimate of the rate and 95 per cent confidence limits respectively. For consistency with subsequent analyses, bootstrap estimates of standardised rates are shown throughout the report.

Stratum-specific rates, with corresponding jackknife 95 per cent CIs, were also calculated for each age group, sex and category of socio-economic status. For the purposes of rate calculations, age was categorised into five age groups: <5 years, 5-14 years, 15 to 44 years, 45 to 64 years and 65 years and above. Socio-economic status was also classified into five categories on the basis of occupational groups: Managerial/Professional; Non-manual; Manual skilled; Manual semi-skilled, Manual non-skilled and Unskilled; and Farmer, Other or Not classified.

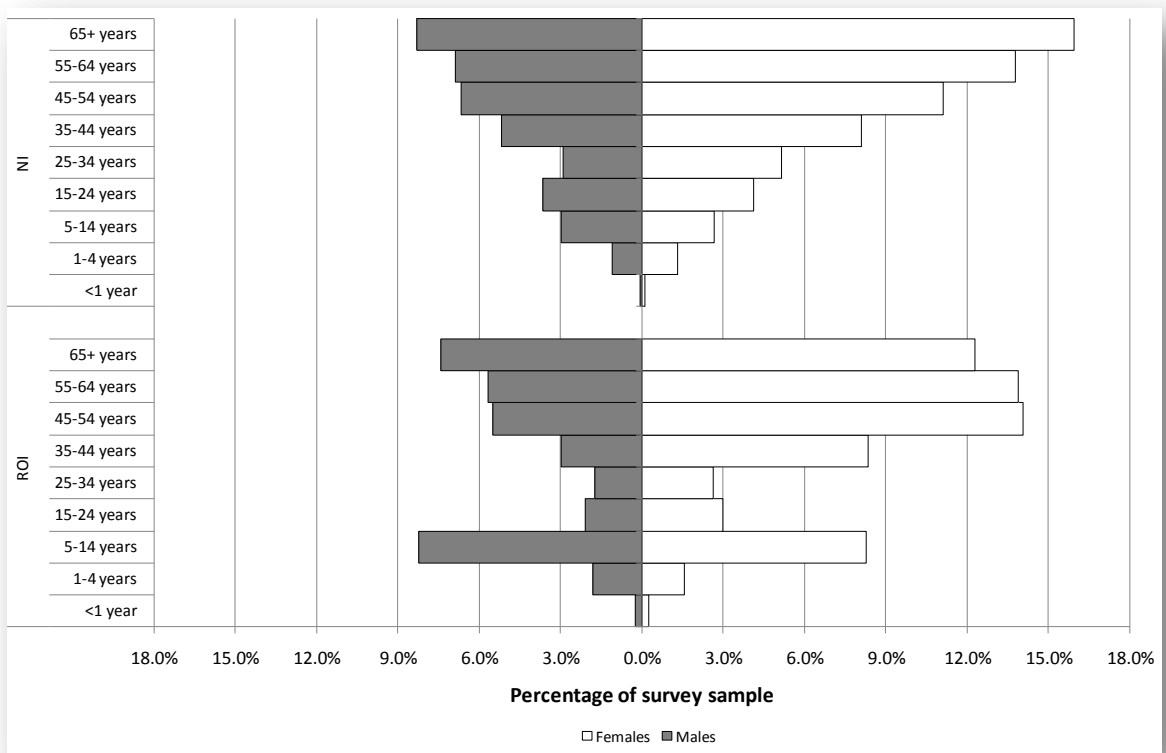


## Appendix 3: Participation results for pilot study

Outcome	Detail	n	%
Valid lines	Refusal (principle)	351	
	Refusal (busy)	168	
	Refusal (no approval)	61	
	Outside target group	215	
	Quota achieved	51	
	Language barrier/hard of hearing	20	
	Terminated-mid interview	10	
	Appointment made but no interview achieved	61	
	Completed interviews	200	
	Total Valid	1137	44.1
Invalid lines	Invalid numbers	648	
	Fax/Modem	23	
	Total invalid	671	26.0
Other non-responses	More than six contact attempts	35	
	No answer	442	
	Answering machine	110	
	Busy	185	
	Total other non-responses	772	29.9
Grand total		2580	100

Overall 9,461 telephone calls were made to 2,580 numbers

## Appendix 4: Age and sex distribution of participants in the Republic of Ireland telephone survey and the UK IID2 Study telephone survey for Northern Ireland



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