Acute Gastrointestinal Illness (AGI) Study:
Community Survey

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by
Dr. Bruce Adlam
Dr. Shanika Perera
Dr. Rob Lake
Dr Jonathan Williman
Dr. Lou Gallagher, Epidemiologist, ESR
Alokananda Bhattacharya, Biostatistician, ESR

in association with

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Acute Gastrointestinal Illness (AGI) Study:
Community Survey

Dr Fiona Thomson-Carter
Population and Environmental Health
General Manager

Dr Rob Lake   Dr Kerry Sexton
Project Leader   Peer Reviewer

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SUMMARY

Aim

The Acute Gastrointestinal Illness (AGI) Study comprises three separate studies, which aim to quantify the burden of AGI in New Zealand. These studies include a community study, the results of which are detailed in this report, as well as a general practice study and a community and hospital laboratory survey.

The specific objective of the AGI Community Study was to conduct a telephone survey of a randomly selected, suitably weighted, sample of the New Zealand population over a twelve month period, to determine the period prevalence and burden of AGI in New Zealand.

The AGI Community Study was conducted with the assistance of the International Collaboration on Enteric Disease "Burden of Illness" Studies in order to ensure that results were comparable with studies already conducted overseas.

Methods

The study design of the Acute Gastrointestinal Illness (AGI) Community Study was based on studies conducted in Australia, Canada, Ireland and the USA as part of the International Collaboration on Enteric Disease "Burden of Illness" Studies. The study was a representative, retrospective, cross-sectional telephone survey of the New Zealand Community, conducted over a 12-month period. The selection, recruitment and interviewing of study participants was performed by a subcontracted research company[i].

A required sample size of 3,457 was calculated for this study and 270 participants were recruited per calendar month, stratified by telephone directory region to obtain a geographically representative sample. Additional sampling was conducted in telephone directory regions with a high Maori population in order to obtain a Maori booster sample to ensure at least 15% of the total sample was Maori.

Private households were randomly selected using random digit dialling, while the individual with the last birthday in each household was selected as a study participant to ensure random selection. Interviews were conducted using computer assisted telephone interviewing (CATI)

The survey questionnaire included items based on the following categories:

- Demographic and personal information
- Household information
- Symptoms, perceived cause, and illness progression
- Medical consultation, investigation and treatment
- Social and economic impact of illness

The following case definition was used to define an AGI case: any study participant with at least one episode of diarrhoea and/or vomiting experienced in the previous four weeks, excluding non-infectious causes.

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[i] UMR Research

Results

There were 3220 respondents in the general sample, and this was supplemented by the Maori Booster sample of 435 to give combined total of 3655 respondents. The overall cooperation rate was 21.4%. There was a higher proportion of female respondents (62% vs. 38%) and respondents aged 45 or older were over-represented compared with the NZ Census 2006.

With the Maori booster sample, the number of Maori respondents (19.6%) compared favourably with the NZ Maori Census population (13.4%).

The principal findings for the community study included:

Prevalence and incidence of AGI

- The overall crude four week period prevalence of AGI in New Zealand was 8.1%.
- The four week period prevalence of AGI adjusted for age, sex, and ethnicity standardised was 8.6% (95% CI 7.6, 9.6) using the New Zealand 2006 census population as the reference standard (Statistics New Zealand, 2006).
- The four week period prevalence of AGI adjusted for age, sex and ethnicity was 9.3% (95% CI 8.1, 10.4) using the world standard as given by WHO (Ahmad *et al*.,2005).
- The incidence of AGI per person year was 1.11 representing 4.66 million cases in New Zealand in one year.
- Quarterly variation was observed during periods closely approximating the four seasons, with AGI period prevalence lower in winter (5.8%), higher in spring (8.4%), and peaking in late summer (10.8%).
- The highest prevalence of AGI was observed in Wairarapa, Hutt Valley, Otago, MidCentral Hawke's Bay, Northland and Canterbury District Health Board regions. After weighting, however, none were statistically significantly different from the national rate.
- The weighted prevalence of AGI for males was higher than for females (9.3% vs. 7.9% respectively) though this difference was not statistically significant.
- The period prevalence of AGI varied across age groups with children aged less than 1 year and children aged 1 to 4 years were markedly over-represented ($p = <0.05$).
- Males were over-represented in children aged 0 to 14 years; however there was a cross over to increased prevalence in females in the 25 to 44 years age group.
- Prevalence of AGI was higher in Maori compared to non-Maori (10.9% vs. 8.2 %) but this difference was not statistically significant. However, when Pacific Island, Asian, and MELAA ethnicities were excluded from the non-Maori category, the prevalence of AGI among Maori participants weighted by age and sex was significantly higher than for European/Other.
- No association was found between prevalence of AGI and household income or household size, or deprivation score.
- Rural addresses (compared with urban and district addresses) had a higher prevalence of AGI peaking in Aug/Sep/Oct quarter (~spring) but this was not statistically significant; nor was there a difference in prevalence of AGI in rural areas (with population less than 1000) vs. non rural areas.

Duration and Severity of AGI

- The majority of AGI cases had vomiting and/or diarrhoea for 2 days with about 50% recovering by day 2, and 80% by day 4.
- AGI symptoms persisted in 13% for 5 days or more. The reason for the small increase in the percentage of AGI cases with a symptom duration of 7 days is not known but there was a similar finding in the Australian National Gastroenteritis Study. One possible explanation is that this was a rounding effect by participants to 7 days (1 week).
- Of all AGI cases, 28% of AGI cases were classified as "severe" using the Australian National Gastroenteritis Study 2001-2002 case definition where 29% of cases met the same criteria for severe gastroenteritis (Hall *et al.*, 2004).
- Correlation between perceived severity and individual symptoms was low in the total study population. There was a higher-correlation between perceived severity and number of vomits and days of diarrhoea for Maori respondents but no significant correlation was detected for the non-Maori respondents between perceived severity and individual symptoms.
- For the age groups 0 - 4 years and 5 - 14 years, the number of vomits or diarrhoea episodes correlated fairly well with the parent's perception of severity. There was no correlation between perception of severity and actual severity demonstrated in the other age groups, though in the older age groups 45 to 65 years and over 65 years, the perception of severity showed a stronger correlation with number of days with diarrhoea. This may be due to concerns by older cases that longer duration might be suggestive of underlying causes other than AGI.

Healthcare

- A third of cases (35. 4%) sought at least some kind of healthcare advice with 21.9% of cases seeking professional advice from a general practitioner (GP). An additional 4.4% attended primary care A&E or after-hours clinics.
- The estimated burden of disease on Healthcare Providers is extrapolated to 1.52 million cases of AGI in one year, the greatest burden of which falls on General Practice and A&E or After-hours clinics (0.92 million and 0.23 million consultations respectively).
- A number of symptoms (vomiting, blood in stools, headache, fever, muscle/body ache, and sore throat) but not diarrhoea were associated with a higher likelihood of a GP visit, as was a duration of illness greater than 2 days. The presence of headache as a symptom for which AGI cases sought health care advice may be due to heightened public awareness of meningitis in New Zealand. No such trend was revealed in the Australian National Gastroenteritis Study.
- In the total study sample, 32% of AGI cases who were Maori sought health professional advice from their GP.
- Stool samples were requested for 40% (20/49) of the AGI cases with diarrhoeal illness who attended a GP with a compliance rate of 90% (18/20).
- Two thirds (12/18) of AGI cases with diarrhoeal illness who submitted a stool specimen were aware of their results.

Missed work and other activities

- Activities or work was missed in 90% of AGI cases, with the period of time lost having a weighted mean of 2.9 days (median 2.0).

- Approximately half (52%) reported missing recreational activities, while 36% of AGI cases either missed work or required a carer to miss work.
- Over the 12 month study period, the total days of paid work missed by AGI cases or their carers totalled 4.5 million.
- Questions on occupation were considered but not asked of respondents in this survey. It was felt there would be too few cases in each occupational category for any meaningful analysis.

Co-occurrence of illness in household

- Similar illness of other household members was reported by 30% (88/297) of AGI respondents, and affected up to four others in the same household. This raises the possibility of person to person spread and may explain higher rates observed in 25 to 44 year old females.

Discussion

Using the case definition for the Australian National Gastroenteritis Survey 2001 the weighted incidence of AGI in New Zealand was 0.82 per person per year compared with 0.9 cases per person per in Australia.

Other points of comparison**:**

- In contrast to all overseas studies, New Zealand males reported a higher prevalence of AGI than females (although this was not statistically significant).
- As with all overseas studies the highest prevalence and incidence of AGI was amongst children aged less than 5 years ($p = <.05$), with a generally decreasing prevalence and incidence with increasing age.
- The number of AGI cases visiting a GP in New Zealand was similar to those reported visiting a medical health professional in overseas studies (approximately 20%).
- The percentage of AGI cases in New Zealand who visited their GP and were requested to provide a stool sample (40%) was approximately twice as high as reported in overseas surveys – though small numbers were involved.
- The percentage of AGI cases taking medication in New Zealand (38.2%) is similar to Australia, but lower than reported for Canada and Ireland. The percentage of cases taking antibiotics (7.1%) was within the range for other countries (3.6 – 8.3%).

Conclusion

The AGI Community Study is the first study to be conducted in New Zealand to directly quantify the prevalence and incidence of AGI in the general community using a representative sample of the New Zealand population recruited over a 12 month period. The results of this study demonstrate that AGI poses a significant burden on the New Zealand community, which is markedly higher than previous estimates based on mathematical modelling using notifiable disease surveillance data. This study contributes to the International Collaboration on Enteric Disease "Burden of Illness" Studies, the results of which indicate that the prevalence of AGI is similar in Australasia and North America.

The results of the AGI Community Study provided an opportunity to assess the extent to which the general community was affected by AGI, including the severity of illness, health

seeking behaviour, treatment, and the social and economic impact. These results, along with the results from the AGI General Practice Study and the AGI Laboratory Survey, will serve to inform the notification pyramid associated with AGI in New Zealand.

1. INTRODUCTION

This survey of the community was one of the elements of a study of acute gastrointestinal illness (AGI) in New Zealand. The other elements included a General Practice (GP) study to investigate the incidence of AGI-related visits, stool specimen request criteria, reporting of cases to Medical Officers of Health, and a survey of community and hospital laboratories to describe and quantify the under-ascertainment of AGI at the phase when a stool sample was submitted for analysis for enteric pathogens. The study was conducted by the Institute of Environmental Science and Research (ESR) for the New Zealand Food Safety Authority (NZFSA).

The overall objectives for the AGI study were:
- To determine the magnitude and distribution of self reported AGI in the New Zealand population;
- To estimate the burden of disease associated with AGI;
- To describe and estimate the magnitude of under-ascertainment of AGI at each stage in the national communicable disease surveillance process; and,
- To identify modifiable factors affecting under-ascertainment that, if altered, could improve the sensitivity, representativeness and usefulness of the AGI component of the surveillance system.

The community study is described in the project specification as:
Population study: A telephone survey of a randomly selected, suitably weighted, sample of the New Zealand population over a twelve month period, to determine the period prevalence and burden of AGI in New Zealand. The study design would utilise the experience of, and ensure comparability with, the studies already performed in Australia, Canada, Ireland and USA and others being planned through the International Collaboration on Enteric Diseases 'Burden of Illness Studies'.

The community study questionnaire design and survey methodology, as well as the analysis and reporting, were performed by ESR. The telephone interviews were conducted by UMR Research.

1.1. Timeline
The community study was conducted from approximately mid 2005 to mid 2007. Important dates were:
- May – September 2005: protocol and questionnaire design, establishment of a Steering Committee;
- October 2005: application for Ethics Committee approval;
- January 2006: final approval by Ethics Committee;
- February 2006 – January 2007: telephone survey;
- March 2007: 12 month data set complete;
- April – May 2007: analysis and draft report writing; and,
- June – August 2007: review period and report completion.

1.2. Background on Community Studies

A literature review was conducted to provide context for this project. The material assembled has been summarised in Appendix 9.

2.   METHODOLOGY

2.1.   Study Methods

2.1.1. Study Design

The study design of the Acute Gastrointestinal Illness (AGI) Community Study was based on studies completed in Australia, Canada, Ireland and the United States that formed part of the International Collaboration on Enteric Disease "Burden of Illness" studies (Scallan *et al.,* 2005). The AGI Community Study was a nationwide, retrospective, cross-sectional telephone survey conducted over a 12-month period in New Zealand. The selection, recruitment and interviewing of study participants was performed by a subcontracted research company, UMR Research.

2.1.2. Ethics and Consent

An application for approval for this study was made to the Multi-region Ethics Committee. Provisional approval was given in November 2005, subject to two minor modifications to the protocol. These changes were made and final approval was given in January 2006.

During the initial part of the telephone interview, the age of the respondent (the last person in the household to have a birthday) was identified. If the person was aged less than 12 years, questions were answered by the parent or guardian. Respondents aged between 12 and 16 years answered for themselves, provided that permission was granted by a parent or guardian. Otherwise, the parent or guardian answered on their behalf. Adults over 16 years answered for themselves.

Potential respondents were given the opportunity to decline during the filtering and suitability screening and at any time during the interview.

2.1.3. Study Period

The duration of the study period was 12 months to account for the seasonal variation in the occurrence of AGI.

2.1.4. Sample Size

A sample size of 3457 was calculated for a study with 80% power based on a significance level of 5%, an assumed 28-day period prevalence of 10% for acute gastrointestinal illness[ii], and a required accuracy of 1%. Approximately 300 study participants were recruited per month over the 12-month study period in order to obtain an adequate sample size.

[ii] In the NSAGI (National Studies on Acute Gastrointestinal Illness) Population Study conducted in Canada from 2001-2002 the 28-day period prevalence of "acute gastrointestinal illness" was 10.04% (Majowicz *et al.,* 2005). In the National Gastroenteritis Survey conducted in Australia from 2001-2002 the 28-day period prevalence of "gastroenteritis" was 7.39% (Hall *et al.*, 2004). While both studies used case definitions that included symptoms of diarrhoea and/or vomiting and excluded non-infectious causes, the case definition used in the Australian study was more specific and therefore less inclusive.

2.1.5. Source and Eligible Population

The source population was the entire New Zealand population. The eligible population included all persons in private households with a land telephone line (both listed and unlisted). The NZ Census 2006 estimate of access to landline is 91.6% of the population.

2.1.6. Sampling Frame

Due to the use of random digit dialling, the sampling frame was based on telephone numbers that had been randomly generated from all number ranges in Telecom's White Pages[iii] of New Zealand, which allowed the capture of unlisted numbers. The following types of telephone numbers were filtered out from the randomly generated numbers: the Telecom yellow pages (business listings); fax lines; and disconnected numbers.

2.1.7. Sample Selection

The total study sample was composed of a general sample and a Maori booster sample in order to achieve adequate representation of Maori. The size of the Maori booster sample was determined to ensure at least 15% of the total sample was Maori[iv]. Separate sampling protocols were used for the general sample and the Maori booster sample.

2.2. General Sample Protocol

2.2.1. Recruitment

The general sample involved the recruitment of 270 study participants per calendar month[v]. Approximately 60 to 70 study participants were recruited each week (see Appendix 1).

2.2.2. Regional Stratification

The general sample was stratified by telephone directory region in order to obtain a geographically representative sample. Telephone directory regions in New Zealand include: Auckland (six regions); Outer Auckland; Bay of Plenty; Christchurch; Gisborne; Hawkes Bay; Manawatu; Marlborough; Nelson Bays; Northland; Otago; Southland; Taranaki; Timaru; Waikato; Wairarapa; Whanganui; Wellington; and West Coast. The quotas for each telephone directory region were based on 2001 Census population data as the 2006 Census data were not available during the study design phase. Due to the 12-month study period, monthly regional quotas were applied. Once the database was complete for the 12 months, the address information was geocoded to District Health Board (DHB) and Territorial Authority (TA) level using *Geostan NZ Version 2.1*.

2.2.3. Household Selection

Random digit dialling was conducted to select private households using randomly generated telephone numbers as previously described. If the interviewer determined that the contact

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[iii] Telecom is New Zealand's national telephone directory provider.
[iv] According to 2001 Census data, 14.7% of the census usually resident population count were Maori.
[v] During the first month of data collection, the quota for the general sample was 250. This monthly quota was subsequently increased to 270 for the remaining study period.

was a business line or the contact was not a private household, the interviewer did not proceed with the survey.

2.2.4. Participant Selection

The individual with the last birthday in each household was selected as a study participant to ensure random selection. It is acknowledged that incorrect selection is possible. The Australian National Gastroenteritis Survey 2002 revealed that some selection bias (where the phone was preferentially handed to someone in the household who had gastroenteritis recently), occurred in about 7% of households. Our survey did not request the birthdates of everyone in the household so it was not possible to cross check the eligibility of the respondent. Interview respondent criteria are described below under data collection.

2.3.   Maori Booster Sample Protocol

2.3.1. Recruitment

The Maori booster sample involved the recruitment of 35 Maori participants per calendar month[vi]. (see Appendices 2 & 3 for Maori and Total Sample response and cooperation rate and Appendix 4 for details of Maori recruitment in the General, Booster and Total sample).

2.3.2. Regions Sampled

The Maori booster sample was obtained by sampling telephone directory regions with a high density Maori population based on 2001 Census data.

2.3.3. Household Selection

Random digit dialling was conducted to select private households for the Maori booster sample as described in the general sample protocol.

2.3.4. Participant Selection

The individual with the last birthday was selected in each household and a screening question was administered to ascertain his or her ethnicity. Only those individuals subsequently identified as Maori were eligible as study participants for the booster sample.

2.4.   Survey Instrument

The survey questionnaire was predominantly based on questionnaire items used by the overseas "Burden of Illness" studies to allow the direct comparison of the New Zealand study results with international data. The questions themselves were therefore not independently validated. The survey questionnaire included items based on the following categories:

- Demographic and personal information (age, sex, ethnic group, overseas travel in the past four weeks)
- Household information (number of children/adolescents in household, number of adults in household, total household income, household address)

[vi] During the first month of data collection, the quota for the Maori booster sample was 50. This monthly quota was subsequently decreased to 35 for the remaining study period.

- Symptoms (number of episodes of diarrhoea and/or vomiting in the past four weeks, duration of most recent episode, severity of most recent episode, symptoms associated with most recent episode, duration of diarrhoea only during most recent episode, duration of vomiting only during most recent episode, maximum number of loose stools and/or vomiting in any 24-hour period during most recent episode, perceived cause of most recent episode)
- To assess the perception of severity, respondents were asked *"On a scale of 1 to 5 how would you rate the severity of this episode of diarrhoea or vomiting?"* (where 1 = very mild and 5 = very severe). Their perceptions of severity were compared with definitions of "actual severity" developed using criteria from the Australian National Gastroenteritis Study 2001-2002 (Hall *et al.,* 2004).
    - Severe: *at least 2 days of illness and at least 5 loose stool or 4 vomits in 24 hours.*
    - Moderate: *at least 2 vomits OR at least 3 loose stools in 24 hours.*
    - Mild (by exclusion): *at least 1 vomit or at least 2 episodes of diarrhoea in 24 hour*s.

- Medical consultation and treatment (consultation with medical and non-medical professionals, hospital admission, request for stool sample for laboratory testing, provision of requested stool sample, results of submitted stool sample, medications taken)
- Social and economic impact of illness (full-time or part-time employment in the past four weeks, days missed from work due to most recent episode, attendance at educational institution in past four weeks, days missed from school/study due to most recent episode, days missed from recreation/holiday/household activities due to most recent episode, days missed from work by other household members due to most recent episode, number of household members with similar illness).

2.4.1. Pilot

The draft questionnaire was tested in October 2005 with ten pilot interviews. Two people had experienced an episode of vomiting/or diarrhoea in the 4 weeks prior, whereas eight of the respondents had not had symptoms. Those without symptoms received the abbreviated interview while the two people with symptoms received the full interview. As a result of the pilot, minor changes in style and order of questions were made. Data from the pilot interviews were not included in the overall dataset used for the study analysis.

2.5.   Data Collection

2.5.1. Interview Scheduling

Interviews were routinely conducted on Sunday 9.30am to 9.00pm and Monday 5.30pm to 9.00pm in a two-day block each week. When a public holiday occurred on a Sunday or Monday, interviewing was shifted to the next two consecutive days that did not fall on a public holiday. Appointments were made to call back study participants/interview respondents if the time they were first contacted was not convenient. Appointment times could be made outside the two-day interviewing block. Up to five call-backs were made for engaged numbers, unanswered numbers, answering machines and unavailable study participants/interview respondents.

2.5.2. Interview Respondent

Study participants who were children aged less than 12 years required consent from a parent or guardian. Once consent was acquired, a parent, guardian or alternative proxy (such as a grandparent or nanny) served as the interview respondent.

If the selected study participant was aged between 12 and 16 years, consent was first obtained from a parent or guardian to directly interview the child or adolescent. Questions were initially administered to the parent or guardian to ascertain demographic and personal information of the selected child or adolescent, as well as household information.

Study participants aged 17 years and older were directly interviewed after providing consent.

2.5.3. Interview

Interviews were conducted using computer assisted telephone interviewing (CATI). A long interview was conducted when a study participant had experienced diarrhoea and/or vomiting in the past four weeks. All questions were administered in a full interview, the duration of which ranged between 10 and 15 minutes. For study participants who had not suffered from diarrhoea and/or vomiting in the past four weeks, an abbreviated interview was conducted involving demographic, personal and household questions only. The duration of the abbreviated interview ranged between 4 and 5 minutes.

2.5.4. Briefings

All interviewers were given an initial briefing presentation to provide the context for the CATI. New interviewers recruited during the year were given the same briefing during training, before they started interviewing.

2.5.5. Validations

All interviewers had a sample of their interviews validated as part of the quality assurance process. A minimum of 10 percent of each interviewers work was validated and documented. The validation process aimed to validate data collected in the original interview through direct observation of the interviewer, using a random drop-in listening mechanism and CATI observation of the documentation. Interviewers were aware they would be monitored but unaware of when. Since the validations in this study were through direct observation, congruence testing was not carried out. A representative sample of each interviewer's work was validated and recorded in a quarterly validation report. This validation process ensured a high level of quality control.

2.6. Data Analysis

2.6.1. Case Definition for Acute Gastrointestinal Illness (AGI)

Respondents reporting "any diarrhoea or vomiting" included episodes relating to all causes, including non-infectious causes such as pregnancy, medication, chronic illness and alcohol. These were respondents who answered "yes" to the question; *In the past 4 weeks, have you (has your child) had either diarrhoea or vomiting?"*

Respondents who thought their vomiting and/or diarrhoea was caused by one of the following; *"water, virus, food, food poisoning, chicken, don't know"* were included in the

case definition for AGI, while those who thought their vomiting and diarrhoea was caused by non infectious causes such as *"chronic medical condition, medications, pregnancy, dietary indiscretion, other medical condition, or other exposures e.g. diesel fumes"* were excluded.

All cases who met the case definition of AGI *"any study participant with at least one episode of diarrhoea and/or vomiting experienced in the previous four weeks, excluding non-infectious causes"* were included in the analysis so that the full spectrum of disease in New Zealand could be examined. Our case definition was fully inclusive of those with respiratory symptoms noting that the Australian National Gastroenteritis Study required a higher level of gastrointestinal symptoms in cases with respiratory symptoms to meet the primary case definition.

2.6.2. Ethnicity

Prioritised ethnicity according to Level 1 codes (Ministry of Health, 2004:32) was used to assign the following mutually exclusive categories: Maori, Pacific Island, Asian, European and Other. For purposes of calculation of rates and responses the last two categories were combined to form European/Other. Most calculations however used Maori and non-Maori categorisation in order to ensure compatibility with international studies which used "indigenous" and "non-indigenous" status in analyses.

2.6.3. Definition of Rurality

In an attempt to identify farming respondents those with rural delivery addresses and rapid ID addresses (used by the NZ Fire Service and State Highway addresses in non city regions) were identified as rural in the initial rural vs. district and urban analysis.

Geographic information from cases in the survey data was also geocoded to the Territorial Authority (TA) level. Respondents living in coded areas with town centres of less than one thousand people, or coded "rural other" were defined as rural. Further analyses of rural respondents involved two categories: rural and non rural, where non rural included both district and urban TAs.

2.6.4. Definition of Season

In New Zealand seasons are normally defined by the following calendar months:
- Spring: September, October and November
- Summer: December, January and February
- Autumn: March, April and May
- Winter: June, July and August
-

This study was conducted from February 2006 through to January 2007 therefore the quarters in this study are offset by one month and do not represent the seasons as above. Where discussed, quarterly results can be broadly associated with seasons as follows:

- ~Spring :   August, September, October
- ~Summer: November, December, January
- ~Autumn: February, March, April
- ~Winter: May, June, July

2.7. Statistical Methodology

2.7.1. Prevalence and Incidence Rates

The four week period prevalence was calculated by dividing the number of respondents meeting the case definitions of AGI described above by the respondent sample. The denominators used were the total respondent sample, the number of respondents with all cause vomiting or diarrhoea in the past four weeks, and the respondents meeting the case definition of AGI. Where additional sub group analysis is performed the denominator is stated.

Incidence rate was calculated by taking the 4 week period prevalence over 12 months dividing by 4 and multiplying by 52 to give an incidence of AGI per person per year.

Some population groups (as determined by age or ethnicity) were over or under-represented in the sample population compared to other populations. These inconsistencies were dealt with by weighting the data. Survey weights by age and ethnicity allowed the sample to produce estimates for the entire population that are comparable either between regions or to those of other countries. For the analysis in this report, weights were assigned to respondents based on their age, gender and Maori/non-Maori status. Thus, weighted results provide a more accurate estimate than crude figures based on sample data only.

Period prevalence and incidence estimates were weighted by the method described in 2.7.2 and those quoted are weighted unless specifically stated as crude figures.

The study was performed over a twelve month period and the weighted prevalence/incidence rates so calculated over the twelve month period are referred to as "Prevalence of AGI"/ "Incidence of AGI" to assist in the readability of the document.

2.7.2 Weighting by New Zealand Population

The New Zealand weight for each individual was calculated as:

New Zealand Weights = (proportion of the particular group in the NZ census population*)
$$\frac{}{\text{(proportion of the particular group in the sample)}}$$
*(Statistics New Zealand, 2006)

2.7.3 Weighting by World Population

The World weight for each individual was calculated as:

World Weights = (proportion of the particular group in the world population**)
$$\frac{}{\text{(proportion of the particular group in the sample)}}$$
** (Ahmed et al., 2005)

2.7.4   Precision and Confidence Intervals

This study involved a sample of the New Zealand population. The precision referred to how closely the results from a sample could reproduce the results that would be obtained from a complete count (i.e. census) conducted using the same techniques.

The precision of any result generated from the sample was expressed by the 95% confidence interval in the analysis. With 95% probability, one could predict that the true value for the New Zealand census population would lie in the confidence interval. The width of the confidence interval depends on the sample size of the group. The confidence interval is less reliable when the sample size is small. Non overlapping confidence intervals between two groups indicated a significant difference while no conclusion could be made if they overlap. In this report, statistically significant differences referred to a statistical hypothesis test result where the p-value was less than 0.05. When the p-value was less than 0.05 there was less than a 5% chance that the observed finding was likely to be due to chance (or greater than 95% certainty of the result).

2.7.5   Weighted percentages

Data were analysed using SAS version 9.1. Weighted percentages were calculated using SURVEYFREQ procedure. PROC SURVEYFREQ computed the variance estimates based on the sample design used to obtain the survey data with unequal weighting. This method used the Taylor expansion method to estimate sampling errors of estimators based on complex sample designs. It obtained a linear approximation for the estimator and then used the variance estimate for this approximation to estimate the variance of the estimate itself (Fuller, 1975, Woodruff, 1971). SURVEYMEANS procedure was used to produce estimates of the survey population means and totals from sample survey data. The procedure also produced variance estimates, confidence limits, and other descriptive statistics.

2.7.6   Comparison between proportions and two means

In this study, comparison between two proportions was statistically tested using the chi-square test, while comparison between two means was tested using the Student's t-test.

2.7.7   Logistic regression

Logistic regression (PROC LOGISTIC) was used to determine significant predictors of gastroenteritis by calculating relative risk with 95% confidence intervals. Initially, all models were fitted with one predictor or dependent variable (e.g. age group, sex etc.) which gave some indication of the effect of each predictor. In the multivariate model, all predictors were fitted at once in a single model. The result for each predictor in the multivariate model was thus adjusted for other factors in the model.

2.7.8   Correlation Coefficients

The Spearman correlation coefficient (range 0 to 1) summarises the strength and direction (positive or negative) of a relationship between two variables. The closer the correlation coefficient to 1, the higher the correlation. This was used to explore the correlation between perceived severity by the respondents and the actual severity (based on number of vomits, loose stools and duration of illness).

Correlation coefficients for AGI prevalence by deprivation index were calculated using Microsoft Office Excel 2003.

2.7.8   Survival Analysis

At the time of the interview some respondents were still having gastrointestinal symptoms. In such cases, PROC LIFETEST using survival analysis was used to calculate median symptom duration.

3. RESULTS

3.1. Survey Results

3.1.1. Quality Control

Interviewing commenced in February 2006 and continued through to January 2007. Twenty two interviewers were initially briefed and trained for the CATI survey. Of these 22, eight resigned during the first half of the study and one was withdrawn. In August, six new interviewers were briefed and trained and the second half of the study was conducted without incident over the last six months with a stable interviewing team. The contractors reported completed interview validations for 20% of the total completed interviews

3.1.2. Cooperation Rate

The overall cooperation rate was 21.4%. This was calculated as the number of completed interviews divided by the sum of the completed interviews, refusals before and after establishing contact with a suitable respondent including hang ups, and those with language problems. The impact on the cooperation rate by respondents who were physically unable to partake or who had hearing problems were analysed separately as of June 2006. This had very little impact on the cooperation rate (i.e. 0.1% difference), and these observations were excluded in the final cooperation rate as they were not measured from the onset of the study. The cooperation rate was 25.3% in the general sample and 10.1% in the Maori booster sample.

This method of estimating cooperation rate differed from that described in overseas AGI studies which used "non-interviews"[vii] in the denominator rather than all refusals. Rates obtained in this survey were "typical of those for a non-incentivised telephone survey by market research companies in NZ[viii]". The cooperation rates between countries are therefore not directly comparable.

The refusal rate was defined as the number of refusals and hang ups, divided by the total number of eligible households. The overall refusal rate was 43.1%, while the refusal rate was 44% in the general sample and 40.7% in the Maori booster sample.

Tables showing details of the telephone interactions for the general sample, Maori booster sample, and combined total sample, are shown in Appendices 1, 2 and 3 respectively.

3.1.3. Reliability

Concordance testing of the observed interviews and their documentation was performed during the validation and quality control checks on 20% of completed interviews.

3.1.4. Non response Bias

The authors acknowledge some degree of possible non response bias - the CATI method cannot provide information on non-responders (refusals or hang ups). There was no major

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[vii] A "non interview" is defined as one that involves the identification of, and contact with an eligible respondent. A refusal occurs when there is a decline following this identification and contact.
[viii] Personal communication with UMR Market Research

difference observed between overall refusal rates between the general sample and the Maori booster sample (40.4% versus 44% respectively), though there was a marked difference between the cooperation rates (25.3% versus 10.1% respectively).

3.2.   Sample Characteristics and Distribution

The individual with the last birthday in each household was selected as a study participant to ensure random selection as per the methodology described above. A summary of the demographic characteristics of respondents and their households is shown in Table 1.

Table 1:   Characteristics of Survey Households c.f. with Census 2006 (1) Households

Respondent characteristic (3)	General Sample(2) n=3,220		Total sample n= 3,655		New Zealand population estimates 2006 n= 4,184,600	
	N	%	N	%	N	%
Sex						
Male***	1233	38.3	1,396	38.2	2,048,300	48.9
Female***	1987	61.7	2,259	61.8	2,136,200	51.1
Age Group						
<1 year ***	17	0.5	26	0.7	59,060	1.4
01-4 year	143	4.4	175	4.8	226,940	5.4
05-14 year***	295	9.2	344	9.4	602,310	14.4
15-24 year***	235	7.3	290	7.9	604,750	14.5
25-44 year	875	27.2	1,025	28	1,181,430	28.2
45-64 year***	1060	32.9	1,168	32	998,460	23.9
65+***	570	17.7	602	16.5	511,620	12.2
Indigenous status						
Maori***	283	8.8	718	19.6	565,329	14.9
Non-Maori***	2930	91.0	2890	80.2	3,560,300	85.1
Unknown	7	0.2	7	0.2		
Ethnicity (4)						
Maori***	283	8.8	718	19.6	624,300	14.9
Pacific***	79	2.5	79	2.2	301,600	7.2
Asian***	166	5.2	166	4.5	404,400	9.7
MELAA (5)	31	1.0	31	0.8	38,600	0.9
European***	2682	83.5	2682	73.4	3,213,300	76.8
Refused/not stated	10	0.2	10	0.3	-	-
DHB (6)						
Northland*	112	3.5	161	4.4	152,550	3.6
Waitemata	381	11.8	419	11.5	504,600	12.1
Auckland*	301	9.3	329	9	428,300	10.2
Counties Manukau***	274	8.5	314	8.6	454,900	10.9
Auck. Region NFD (7)	23	0.7	27	0.7	.	.
Waikato	259	8.0	318	8.7	350,210	8.4
Lakes*	59	1.8	68	1.9	101,500	2.4
Bay of Plenty*	173	5.4	206	5.6	200,850	4.8
Tairawhiti	30	0.9	46	1.3	45,900	1.1
Taranaki	92	2.9	110	3	107,420	2.6
Hawke's Bay	124	3.9	154	4.2	152,620	3.6

Whanganui*	53	1.6	72	2	63,979	1.5
MidCentral	123	3.8	151	4.1	163,913	3.9
Hutt Valley**	82	2.5	90	2.5	141,000	3.4
Capital and Coast	246	7.6	260	7.1	278,036	6.6
Wairarapa	32	1.0	33	0.9	39,580	0.9
Nelson Marlborough	120	3.7	127	3.5	133,700	3.2
West Coast	25	0.8	30	0.8	32,110	0.8
Canterbury	398	12.4	416	11.4	483,380	11.6
South Canterbury	60	1.9	61	1.7	55,080	1.3
Otago	157	4.9	164	4.5	184,865	4.4
Southland	96	3.0	99	2.7	109,684	2.6
Household size						
One person***	670	20.8	752	20.6	328,311	22.6
Two people*	1069	33.2	1,179	32.3	494,043	34
Three people**	490	15.2	546	14.9	240,291	16.5
Four people ***	571	17.7	658	18	221,667	15.2
Five people ***	278	8.6	322	8.8	102,714	7.1
Six or more people *	142	4.4	198	5.4	67,146	4.6
Household income(1)						
<$25,000***	534	17.8	597	16.3	328,407	22.6
$25,000 - <$50,000	789	24.5	917	25.1	338,721	23.3
$50,000 - <$100,000***	994	30.1	1,142	31.2	302,259	20.8
>=$100,000***	482	14.9	531	14.5	126,243	8.7
Unknown/Refused	421	13.1	468	12.8	248,607	17.1
Total Households Size (Census 2006)			3655		1454,172	
Total Households Income (Census 2001)			3655		1344,237	

(1) New census 2006 population estimates were used. Household income totals were taken from 2001 census figures as specific categories were not readily available for 2006 census figures.
(2) The General sample does not include the Maori booster sample. Total sample includes both General and Maori booster sample
(3) Level of statistical difference between sample size and NZ Census 2006   *** p<0.00011, ** p<0.01,*p<0.05
(4) Respondent sample and Census 2006 were total response ethnicity
(5) MELAA ethnicity = Middle Eastern, Latin American, Asian - included in new 2006 population estimates by statistics New Zealand
(6) District Health Boards (DHBs) sorted North to South.
(7) Auckland NFD = Auckland not further defined, all 'unknown' are know to be within the Auckland calling area although precise address details were not obtained.

The difference between the survey respondents and that of the New Zealand population as determined by the NZ Census 2006[ix] is shown in Figure 1. Small differences were observed between Maori in the General sample and Maori in the Top up sample (see Appendix 5).

[ix] The estimated resident population of New Zealand is an estimate of all people who were usually living in New Zealand at June 2006. Visitors from overseas are excluded. It is based on the census usually resident population count with adjustments for residents missed or counted more than once by the census (net census undercount), and for residents temporarily overseas on census night. http://www.stats.govt.nz/tables/nat-pop-est-tables.htm

Figure 1:   Difference between the Survey Respondents and NZ Census Data
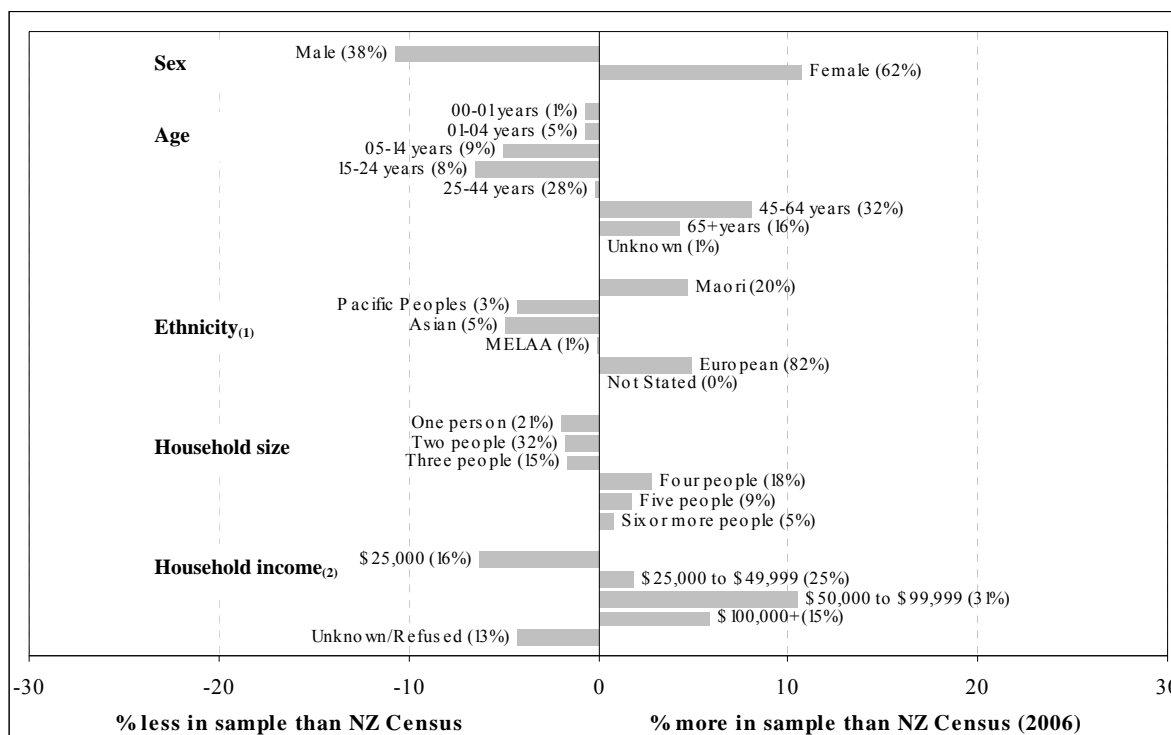
(1) Respondent sample and Census 2006 was total response ethnicity. These characteristics follow addition of the Maori booster which increased Maori from 8.8% in the general sample to 19.6% in the total sample.
(2) For household income NZ Census 2001 was used as figures from the NZ 2006 Census were not available.

3.2.1. Age and Sex

There was a higher percentage of females compared to males participating in the study (62% versus 38% of respondents respectively), even though females represent 51% of the New Zealand population. In addition, respondents aged 45 years or older were a greater proportion of the study population than in the New Zealand population.

These discrepancies were expected because of the sampling method where the household was randomly selected prior to the selection of the respondent. Single person households only contained adults, which ultimately had the effect of under-representing children and over-representing older respondents.

3.2.2. Ethnicity

Ethnicity was recorded as "total response" ethnicity. This meant that respondents could respond to the question *"Which ethnic group do you belong to?"* with more than one ethnicity. Maori representation was higher in the total survey sample (the general sample with the Maori booster sample added) compared to the Census proportion (19.6% versus 14.9% respectively). The proportion of Maori in the general sample prior to boosting was 8.8%. Asian and Pacific Island ethnicities were under-represented in the study population (see Figure 1 and Table 1).

3.2.3. Household Size

Household size of respondents was compared with the 2006 Census data (see Figure 1). Larger households (4 or more people) were over-represented by 20% compared to the Census data.

On average, New Zealand households contacted in this study reported just under three occupants per house (see Appendix 7). This varied by DHB, with the highest occupant density in Counties Manukau and Tairawhiti DHBs (3.4 and 3.2 occupants per house respectively), with lower-than average occupancy rates from Lakes, Wairarapa and West Coast DHBs (2.3 occupants per house for each DHB). The observed pattern showed no correlation between ethnicity and higher household numbers across the DHBs. This analysis was based on comparison with Statistics NZ Census Data, 2001 as ethnicity rates by DHB were not yet available from Statistics NZ Census 2006.

3.2.4. Household Income

Household income data was obtained for 87% of the total survey sample. Household income was less than $50,000 per annum for 41.4% of participants. It should be noted that the missing data on household income was lower in the study population (12.8%) compared to the NZ Census 2001 (17.1%).

3.2.5. District Health Board

The distribution of the survey respondents according to DHB closely matched the national population distribution according to Census 2006 data (see Figure 2), indicating that the total survey sample was regionally representative.

Figure 2:   DHB of Respondent Sample vs. NZ Census 2006
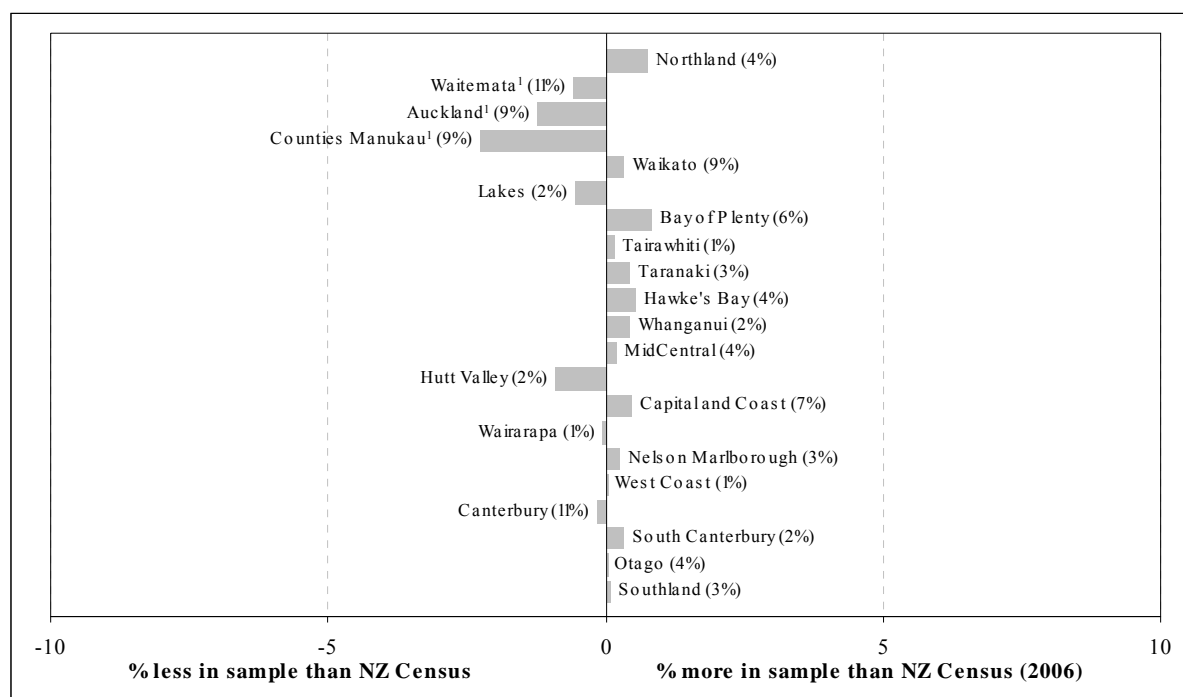
(1) Additional cases from the Auckland region were interviewed (0.7%) however specific DHB could not be assigned as precise address details were not obtained.

3.2.6. Distribution of Survey Sample Over Time

Participants were contacted between February 2006 and January 2007. Monthly responses broken down by DHB area demonstrated minimal fluctuation in the percentage of participants within each DHB over the 12 month study period, and closely reflected the population distribution for each DHB[x] according to 2006 Census data (see Appendix 6). It was noted that non response was highest in March and lowest in July and August.

3.3.   Acute Gastrointestinal illness (AGI)

Of the 3,655 CATI interviews, 416 (11.4%) respondents reported any diarrhoea or vomiting in the previous four weeks.

A total of 119 study participants with diarrhoea or vomiting were excluded because of other conditions (see Table 2). The most common reason for exclusion was chronic or long lasting illness, followed by taking medication or undergoing medical treatment.

Table 2:   Non-AGI Cases with Diarrhoea or Vomiting

Reason for exclusion	No
A chronic or long lasting illness	47
Medication or medical treatment	40
Pregnancy	5
Dietary indiscretion	15
Other medical condition	10
Other exposures	2
Total	**119**

Thus 297 respondents met the criteria for the primary definition of AGI as described in the methodology, giving a crude period prevalence of 8.1% (95% CI 7.2, 9.0) in the New Zealand population. This corresponded to a weighted age, sex and Maori/non-Maori status period prevalence of 8.6% (95% CI 7.6, 9.6) using the New Zealand 2006 census population as the reference standard. Using the world standard population as given by WHO (Ahmed *et al.*, 2005), the calculated period prevalence was 9.3% (95% CI 8.1, 10.4).

3.3.1. Overseas Travel

To clarify whether AGI was acquired in New Zealand or overseas, respondents were asked if they had travelled overseas in the preceding 4 weeks. In the AGI sample (crude data n=297) 3.7% had travelled overseas compared with 5.8% in the total sample (n=3,655). Overseas travel was not a significant risk or protective factor for AGI (p=0.08).

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[x] Using monthly geographical quotas minimised area fluctuation over time.

3.4.   Incidence

With an estimated New Zealand population in 2006 of 4,184,600 people (NZ Census 2006), the weighted incidence rate of "any diarrhoea or vomiting" was 1.52 per person in one year (see Table 3). Excluding non-infectious causes for AGI, the incidence rate was 1.11 cases per person per year, when weighted for age, sex, Maori/non-Maori status and quarter (~ season). Extrapolation of these estimates to the New Zealand population resulted in approximately 6.3 million cases of any vomiting/diarrhoea and 4.7 million cases of AGI in one year (see Table 3).

Of the 297 respondents who met the case definition for AGI, 82 (28%) reported they had experienced more than one episode of diarrhoea or vomiting separated by 7 days or more in the 4 weeks prior to interview. In all there were an additional 214 episodes of vomiting/diarrhoea. It was not possible to apply any exclusion to these other episodes as questions regarding possible cause, symptoms and duration related to the last episode only. "AGI - single episode per case" therefore represents a conservative estimate (4.66 million) while "AGI - all episodes included" represents an upper estimate (6.62 million)

Table 3:   Number and Incidence of Cases of Vomiting/Diarrhoea and AGI in New Zealand in One Year, 2006-2007

Definition	Number of cases – weighted (1)	
	Estimate(5)	(95% CI)
Diarrhoea and/or vomiting - any cause (2)		
Number in one year	6.34 million	(5.8 million, 6.9 million)
Incidence per person per year	1.52	(1.38, 1.65)
AGI - single episode per case(3)		
Number in one year	4.66 million	(4.2 million, 5.2 million)
Incidence per person per year	1.11	(1.00, 1.23)
AGI- all episodes included(4)		
Number in one year	6.62 million	(6.0 million, 7.2 million)
Incidence per person per year	1.58	(1.44, 1.72)

(1) Number of cases is extrapolated from AGI Survey rates figures weighted by age, sex, and Maori / non-Maori status
(2) Case definition "Diarrhoea or vomiting – any cause": any vomiting and/or diarrhoea in the 4 weeks prior to interview
(3) Case definition "AGI"–single episode per case": vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(4) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes not able to be excluded
(5) Estimate is based on estimated NZ population in 2006 = 4,184,600 (NZ Census 2006)

3.4.1. Season

Over the 12 month duration of the study, the period prevalence of AGI appeared to be highest in the warmer months (November to April) and lowest in the colder months (May to September) (see Figure 3).

Figure 3:   Prevalence of AGI by Month, 2006-2007
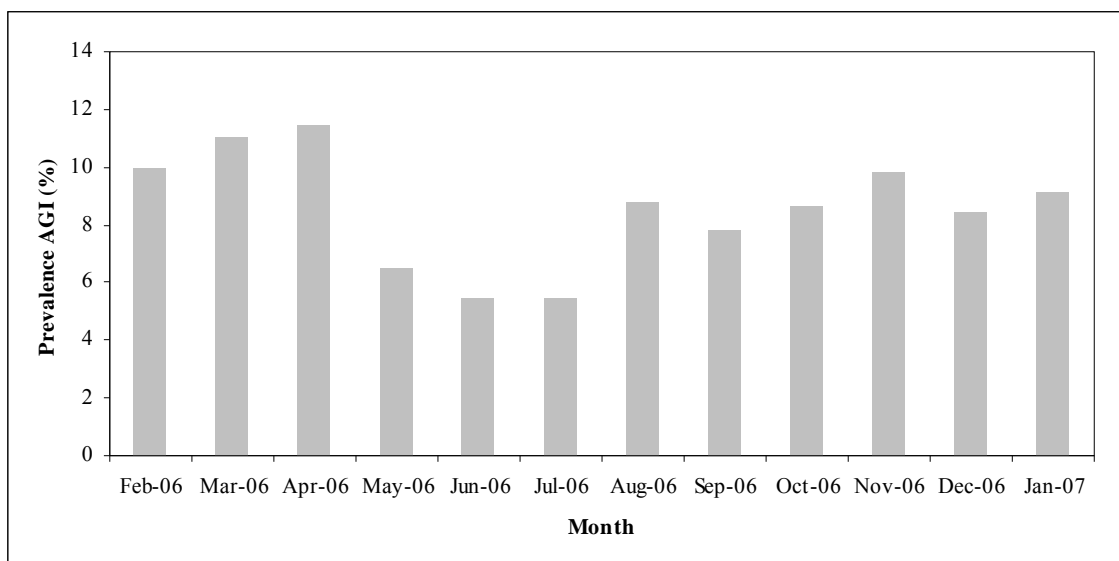
(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(2) Prevalence weighted by age , sex , Maori/ non-Maori status

Figure 4 shows the prevalence by quarter. The number of respondents was the same in each quarter and the data supported the seasonality pattern of higher prevalence in warmer months (10.8%) compared to colder (5.8%), with an increasing prevalence occurring again in Aug/Sep/Oct quarter (8.4%) (~Spring).   However, there was considerable overlap of the confidence intervals. Weighted quarterly rates varied from the national rate with statistical significance for all quarters except August/September/October (~Spring), with only May/June/July (~Winter) being lower than the national average.

Figure 4:   Mean Prevalence of AGI by Quarter, 2006-2007
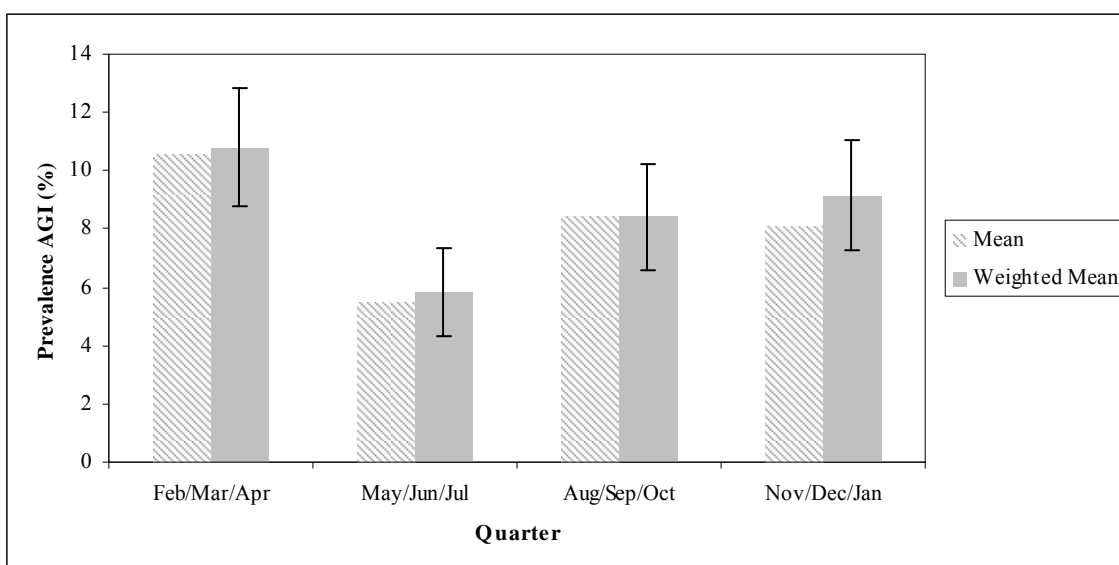
(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(2) Prevalence weighted by age , sex , Maori/ non-Maori status and quarter

3.4.2. Prevalence of AGI by Demographic Factors

Prevalence of AGI varies by sex, age, Maori/non Maori status, region and socioeconomic factors as shown by the univariate weighted prevalence in Table 4, and multivariate regression in Table 6. It should be noted that the data are based on the most recent episode of AGI occurring over the past four weeks.

Table 4: Prevalence of AGI by Demographic Factors

Characteristic	Number with AGI[1] n = 297	AGI prevalence		95% CI
		Crude %	Weighted [2] %	
Sex				
Male	125	9.0	9.3	7.8, 10.8
Female	172	7.6	7.9	6.8, 9.0
Age group				
<1 year	3	11.5	15.8	10.8, 20.9
1-4 years	30	17.1		
5-14 years	35	10.2	9.9	6.7, 13.1
15-24 years	24	8.3	8.5	5.3, 11.7
25-44 years	103	10.0	9.6	7.8, 11.4
45-64 years	78	6.7	7	5.5, 8.4
65+ years	22	3.7	3.7	2.2, 5.2
Maori/non- Maori status(Prioritised)				
Maori	75	10.4	10.9	8.6, 13.2
Non-Maori	222	7.6	8.2	7.2, 9.1
Geographical Distribution by District Health Board (DHB)				
Northland	16	9.9	11.3	6.4, 16.2
Waitemata	38	9.1	8.4	5.8, 11.1
Auckland	19	5.8	5.2	2.8, 7.6
Counties Manukau	21	6.7	6.8	4.0, 9.5
Auck. Region NFD	4	14.8	14.9	-
Waikato	21	6.6	7.1	4.3, 9.9
Lakes	6	8.8	9	2.2, 15.8
Bay of Plenty	17	8.3	9.4	5.4, 13.4
Tairawhiti	4	8.7	9.3	-
Taranaki	8	7.3	5.7	1.4, 10.0
Hawke's Bay	17	11.0	11.6	6.5, 16.6
Whanganui	3	4.2	6.3	0.7, 11.9
MidCentral	17	11.3	11.7	6.6, 16.8
Hutt Valley	11	12.2	13.2	6.2, 20.2
Capital and Coast	21	8.1	9.2	5.7, 12.7
Wairarapa	4	12.1	15.9	-
Nelson Marlborough	6	4.7	4.8	1.1, 8.6
West Coast	2	6.7	8.3	-
Canterbury	39	9.4	10.1	7.2, 13.0
South Canterbury	0	0.0	0	-
Otago	15	9.1	12.3	7.3, 17.4
Southland	8	8.1	7.2	2.1, 12.3
Household income/annum				
<25,000	42	7.0	8.1	5.9, 10.3
25 to <50,000	80	8.7	9.2	7.4, 11.1
50 to <100,000	99	8.7	8.8	7.2, 10.5
>=100,000	45	8.5	8.7	6.3, 11.1
Unknown/Refused	31	6.6	6.9	
Household size				
1	50	6.6	6.9	5.1, 8.7
2	85	7.2	8	6.5, 9.5
3	56	10.3	10.6	8.0, 13.2
4	58	8.8	9.1	6.9, 11.3
5	33	10.2	9.8	6.6, 13.0
6+	15	7.6	6.6	3.1, 10.0

(1) Case definition "AGI "– vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(2) Prevalence weighted by age, sex and Maori/ non-Maori status
(3) "-"denotes the number of cases in the study sample were small so normality assumption for calculating CI could not be assumed

3.4.3. Sex

Males reported a higher prevalence of AGI than females (9.3% vs. 7.9% respectively), however, this difference was not statistically significant (p=0.10). The gender distribution was influenced by age as reported below in section 3.5.2.

3.4.4. Age

Prevalence of AGI was highest amongst the 0 to 4 years age group (15.8%) (see Figure 5), with a general decrease as age increased (p = <0.05 for AGI prevalence in 0-4 years against all age groups). The lowest prevalence was for those aged 65 or older (less than 4%).

Figure 5:   Prevalence of AGI by Age
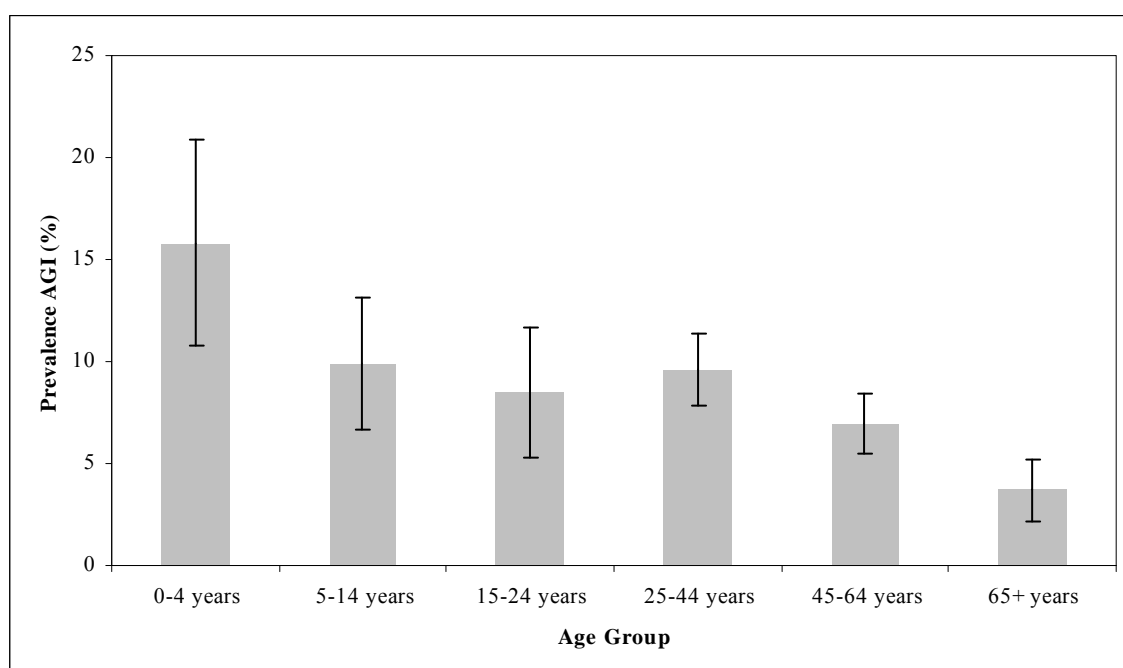
(1) Case definition "AGI "– vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded
(2) Prevalence is weighted by age, sex and Maori/ non-Maori status
(3) Age groups < 1 and 1 to 4 have been combined for standardisation

There was a higher prevalence in the 25 to 44 year old age group which appeared to be due to an increased incidence in females belonging to this age group. This is better demonstrated by the crude incidence rate for each age group by sex (see Figure 6).

Figure 6:   Crude Incidence of AGI by Age and Sex
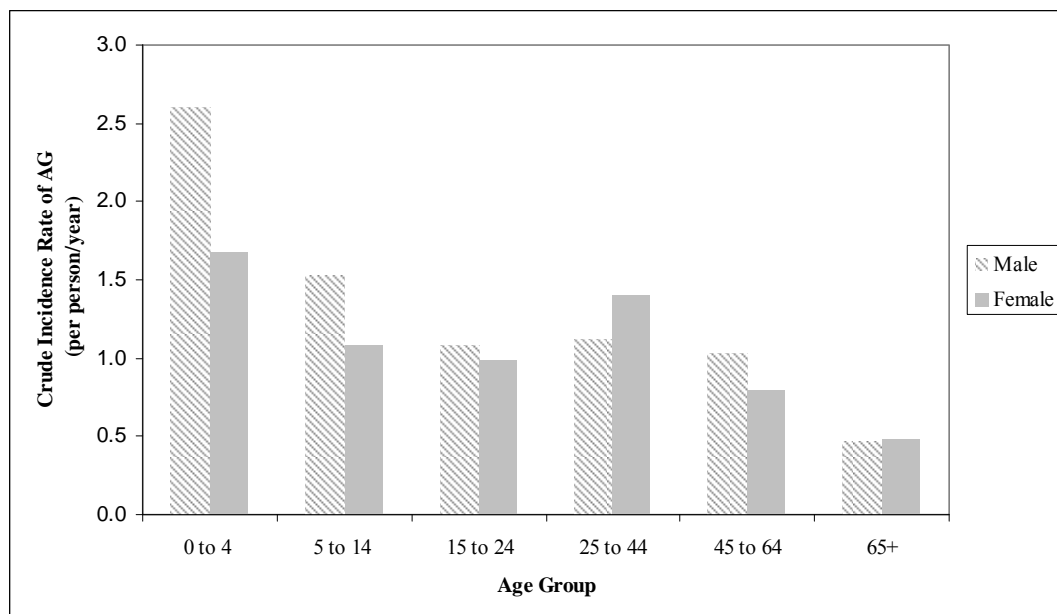
(1) Case definition "AGI "– vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded
(2) Age groups < 1 and 1 to 4 have been combined

3.4.5. Region

Annual prevalence varied significantly by District Health Board (DHB) area (see Table 4, Figure 7 and Figure 8).

Figure 7:   Prevalence of AGI by District Health Board (DHB) Region, NZ
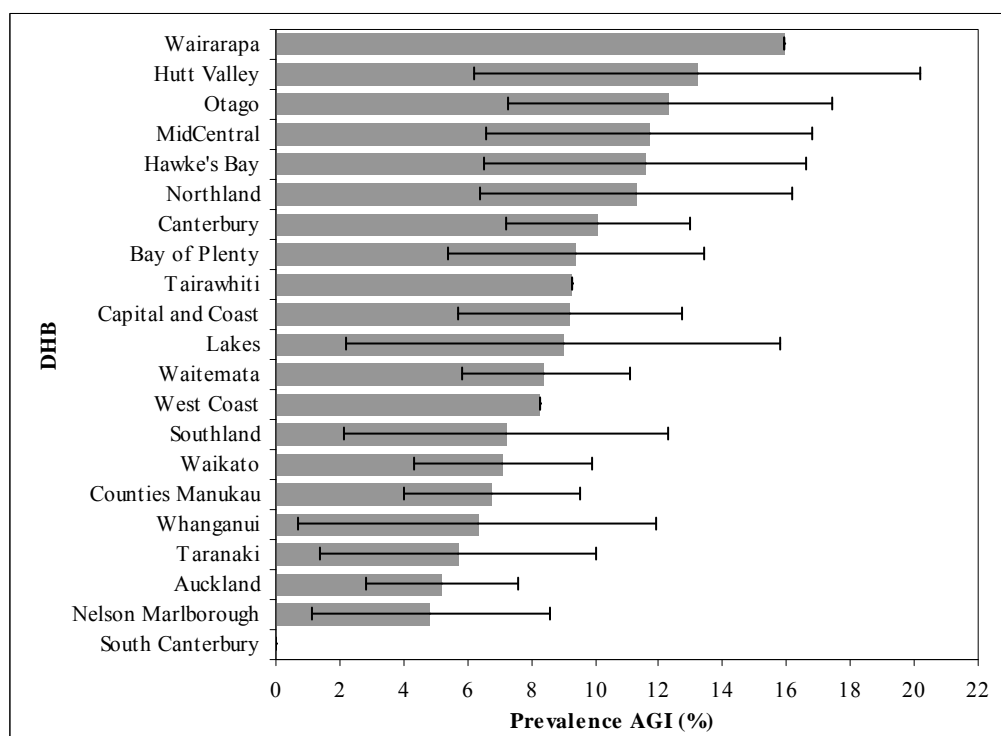
(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded.
(2) Prevalence is weighted by age, sex and Maori/ non-Maori status. Ethnicity by DHB not yet available for NZ Census 2006
(3) The number in the study sample for Tairawhiti (46), Wairarapa (33) and West Coast (30) is small so normality assumption for CI could not be assumed on weighted data

The highest prevalence figures were observed in Wairarapa, Hutt Valley, Otago, MidCentral, Hawke's Bay, Northland and Canterbury (all above 10%). Prevalence values for Wairarapa and Tairawhiti should be interpreted with caution due to small numbers. While one DHB reported no gastroenteritis (South Canterbury), others had case numbers too low to be weighted (Tairawhiti, Wairarapa and West Coast). Crude data on AGI prevalence by DHB can be found in Appendix 8.

Figure 8:   Prevalence Map of AGI by District Health Board Region, NZ

Prevalence of AGI (%)
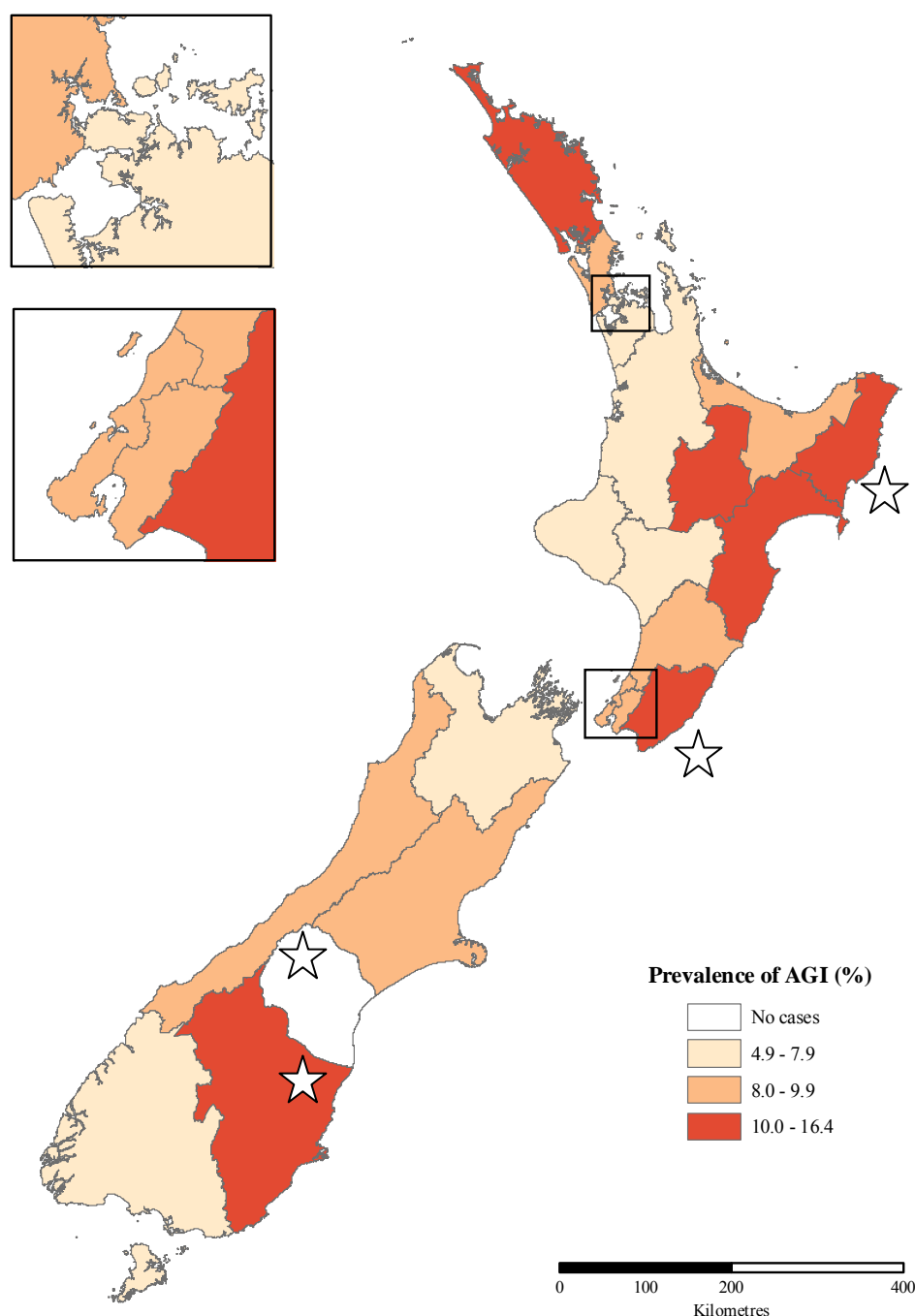
☆ denotes areas where the study sample was small and the results should be interpreted with caution.
(1) Prevalence is weighted by age, sex and Maori/ non-Maori status.
(2) Case definition " AGI " – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded

3.4.6. Ethnicity

Ethnicity responses were analysed according to the prioritisation process as defined by Statistics New Zealand. Although the higher prevalence of AGI amongst Maori compared to non-Maori was not statistically significant (Table 4), when Pacific Island, Asian, and MELAA ethnicities were excluded from the non-Maori category, the prevalence of AGI among Maori participants weighted by age and sex was higher than for European/Other and this difference was statistically significant ($p < 0.05$) (Table 5).

Pacific Island ethnicity was associated with the highest observed prevalence of AGI followed closely by Maori (see Table 5). However, the higher relative risks for Asian and Pacific Island ethnicities were not statistically significant in their difference from European/Other ethnicity.

Table 5:   Prevalence of AGI by Ethnic Group (Prioritised)

Ethnicity	Sample	AGI cases (1)	Prevalence(2) % (95% CI)	Relative Risk (95% CI)	P value
Maori	718	75	10.8 (8.5, 13.0)	1.29 (1.02, 1.64)	p= 0.04
Pacific Island	79	9	11.1 (4.5, 18.0)	1.50 (0.73, 2.41)	p= 0.35
Asian	166	9	4.4 (1.3, 7.5)	0.71 (0.27, 1.02)	p= 0.05
MELAA	31	2	5.7	0.68	
European/Other	2654	202	8.3 (7.3, 9.4)	Reference	
Total	**3648**	**297**			

(1) Case definition "AGI "– vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded
(2) Prevalence is weighted by age, sex

3.4.7. Household Size

Prevalence of AGI was lowest in single person households (6.9%) and households with more than six people (6.6%). Prevalence of AGI was highest in households with three occupants (10.6%) but there was no linear relationship observed between AGI and increasing household size and all confidence intervals overlapped (see Table 4).

3.4.8. Household Income

Prevalence of AGI was marginally lower in households with an income less than $25,000 (8.1%) compared with households higher incomes, however this difference was not statistically significant. No linear relationship between AGI and household income was observed (see Table 4).

3.4.9. Urban, District and Rural Areas

In an attempt to explore prevalence for those respondents living on farms compared with their city or provincial counterparts we examined prevalence of AGI in urban, district (as defined by NZ Census Territorial Authority classification) and rural postal delivery areas by quarter. (See Figure 9) Despite the wide confidence intervals in the rural sample, the results suggested that AGI prevalence in rural communities from August to January were disproportionately higher than in the cities.

Figure 9: **Prevalence of AGI Comparison Between Urban, District and Rural Areas(2) by Quarter**
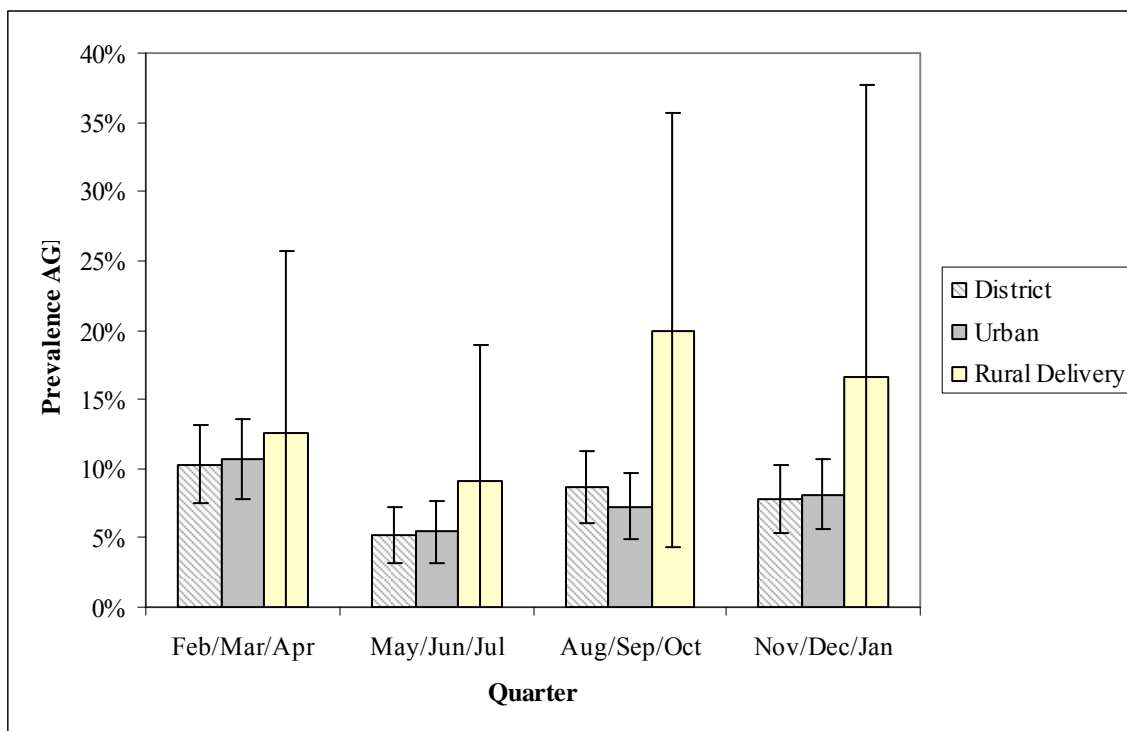
(1) Data presented here are crude data (no adjustment for other variables)
(2) Definition of rural used in this analysis was having a "Rural Delivery" Postal Address, State Highway address or a Rapid ID address for Fires Service, as defined in section 2.6.3.

Using the Territorial Authority definition to compare rural and non-rural samples (where "rural" is defined as a Territorial Authority with a population less 1000), prevalence of AGI was nearly identical (8.3% rural versus 8.4% non-rural). This difference between rural and non-rural prevalence of AGI was not significant after weighting by age, gender and Maori/non Maori ethnicity ($p > 0.05$).

Deprivation score was not a significant predictor of AGI prevalence among rural or non-rural populations (see Figure 10). The R^2 refers to the percentage of variation observed in the data that can be explained by the trend line.

Figure 10   Rural and Non-rural Prevalence of AGI by Deprivation Score
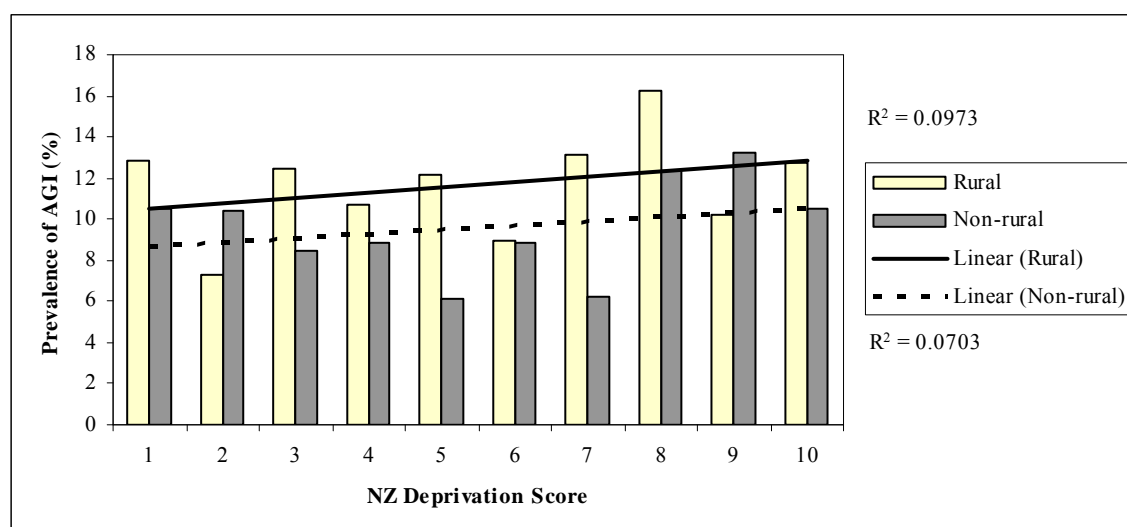
(1) Prevalence is weighted by age, sex and Maori/ non-Maori status.
(2) "Rural" is defined as a Territorial Authority (TA) with a population less than 1000
(3) NZ Deprivation Score: 1 is low levels of deprivation and 10 is high .

3.4.10. Demographic Predictors of AGI in New Zealand

Multivariate regression was used to calculate relative risk in order to identify the variables with the strongest influence on AGI prevalence (see Table 6). Overall, sex was not a significant demographic predictor, while age group was, with each age group showing a statistically significant increase compared to those aged 65 and older (risk of AGI decreasing with age). Quarter (~season) was associated with AGI prevalence with summer and autumn having a relative risk of 1.6 (95% CI 1.1 to 2.3) and 1.8 (95% CI 1.2 to 2.5) respectively when compared with winter. Maori ethnicity, North vs. South Island geographic distribution, household size and income were not significantly associated with AGI in this study population by multivariate regression.

Table 6:   Relative Risks of Demographic Predictors of AGI

Characteristic	Relative Risk (95% CI)		P value
Sex			
Male	1.1	(0.9, 1.4)	0.3
Female	1.0		*reference*
Age group			
0-4 year	4.3	(2.5, 7.5)	<0.001
05-14 year	2.8	(1.6, 4.9)	<0.001
15-24 year	2.3	(1.3, 4.2)	<0.01
25-44 year	2.7	(1.7, 4.4)	<0.001
45-64 year	1.9	(1.2, 3.1)	<0.01
65+	1.0		*reference*
Maori/ non-Maori status			
Identified as Maori	1.2	(0.9, 1.4)	0.2
Non-Maori	1.0		*Reference*
Geographical Distribution			
North Island	0.9	(0.7, 1.2)	0.7
South Island	1.0		*reference*
Quarter (~Season)			

Characteristic	Relative Risk		P value
		(95% CI)	
Aug/Sep/Oct (~ Spring)	1.4	(1.0, 2.0)	0.1
Nov/Dec/Jan (~ Summer)	1.6	(1.1, 2.3)	<0.05
Feb/Mar/Apr (~ Autumn)	1.8	(1.2, 2.5)	<0.01
May/Jun/Jul (~ Winter)	1.0		*reference*
Household size			
Large (over 6 members)	0.5	(0.2, 1.3)	0.1
Moderate (5-6 members)	0.9	(0.5, 1.4)	0.6
Small (2-4 members)	1.0	(0.7, 1.5)	0.9
Single-person	1.0		*Reference*
Household income			
<25,000	1.0		*reference*
25,000 to <50,000	1.0	(0.7, 1.5)	1.0
50,000 to <100,000	0.9	(0.6, 1.3)	0.6
>=100,000	0.9	(0.5, 1.5)	0.7

3.5. Symptoms and Symptom Duration of AGI

AGI was assessed by the symptoms, duration of symptoms, attendance at health professionals, and loss of work time or participation in other activities.

3.5.1. Symptoms

The most common symptoms amongst cases of AGI were diarrhoea (83%), stomach cramps (76%), nausea (57%) and vomiting (49%) (see Table 7). Fever or headache or muscle/body aches occurred in just under half of AGI cases. Upper respiratory symptoms of sore throat, cough or runny nose occurred in 32%. Blood in stools occurred in 4% of cases.

Table 7: Proportion of Cases with AGI with Various Symptoms

Symptom	Crude data		Weighted(2)	
	AGI(1) cases with symptom n = 297	Percentage with symptom	Percentage with symptom	(95% CI)
Vomiting	137	46.1	49.0	(43.3, 54.7)
Diarrhoea	248	83.5	82 5	(78.2, 86.8)
Blood in stools	11	3.8	4.0	(1.7, 6.2)
Stomach cramp	219	75.8	75.7	(70.7, 80.6)
Fever	126	43.0	43.9	(38.2, 49.6)
Headache	122	44.2	43.5	(37.6, 49.3)
Nausea	161	57.1	56.9	(51.1, 62.7)
Muscle/body ache	124	44.1	44.5	(38.7, 50.3)
Sore throat	106	35.9	31.5	(31.5, 42.5)

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(2) Weighted by age, sex and Maori/ non-Maori status

3.5.2. Duration of Vomiting and Diarrhoea

Of the 297 cases, sixteen (5.4%) indicated they still had symptoms at the time of the interview and four were not sure. These respondents were excluded from the analysis of duration of

symptoms shown in Table 8. This indicated that the majority of cases had vomiting or diarrhoea for 2 days. Those with vomiting-only had a median duration of symptoms lasting 1 day, though the mean duration was longer (2.1 days), indicating that a few cases had longer duration.

Table 8:   Duration of Vomiting and/or Diarrhoea in AGI

Symptom	Crude data			Weighted(2)
	AGI Cases(1)	Median (days)	Mean (days)	Mean (days) (95% CI)
Vomiting and/or diarrhoea resolved	276	2.0	2.5	2.49 (2.19, 2.78)
Vomiting Any vomiting	130	1.0	1.9	1.79 (1.42, 2.17)
Vomiting only (no diarrhoea)	49	1.0	2.1	1.71 (0.89, 2.54)
Diarrhoea Any diarrhoea	227	2.0	2.4	2.38 (2.12, 2.64)
Diarrhoea only (no vomiting)	146	2.0	2.2	2.19 (1.88, 2.49)

(1) Includes cases with symptoms of vomiting and diarrhoea (who had finished vomiting/diarrhoea at the time of interview)
(2) Mean wweighted by age, sex and Maori/ non-Maori status

Duration of illness included all cases of AGI (i.e. cases with vomiting and diarrhoea, as well as cases with vomiting only or diarrhoea only). Figure 11 shows the duration in days, using crude data, of all cases of AGI whether their symptoms were resolved or not. The duration of illness persisted for 5 days or more in 13% of cases (39/297).

Figure 11:   Duration of Vomiting/diarrhoea
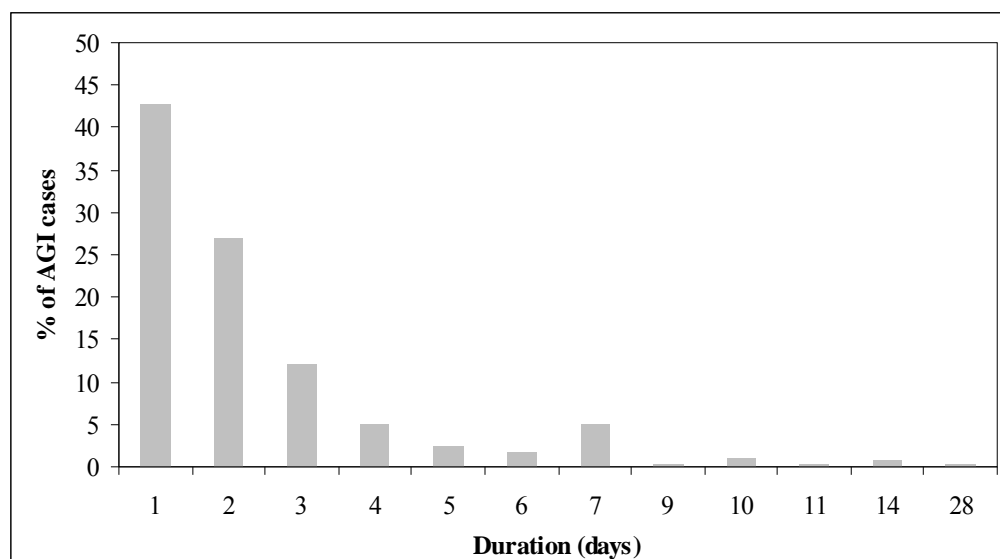
(1) Case definitions "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded
(2) Data presented here are crude data (no adjustment for other variables)

Survival analysis was conducted including the 16 cases that still had symptoms at the time of the interview to show the resolution of vomiting/diarrhoea symptoms (see Figure 12). This

curve showed a rapid fall away of symptoms by about 50% of AGI cases after the first 2 days, then a slowing of recovery to nearly 80% by 4 days and 90% by the seventh day.

Figure 12: Survival Analysis for Duration of Vomiting/Diarrhoea
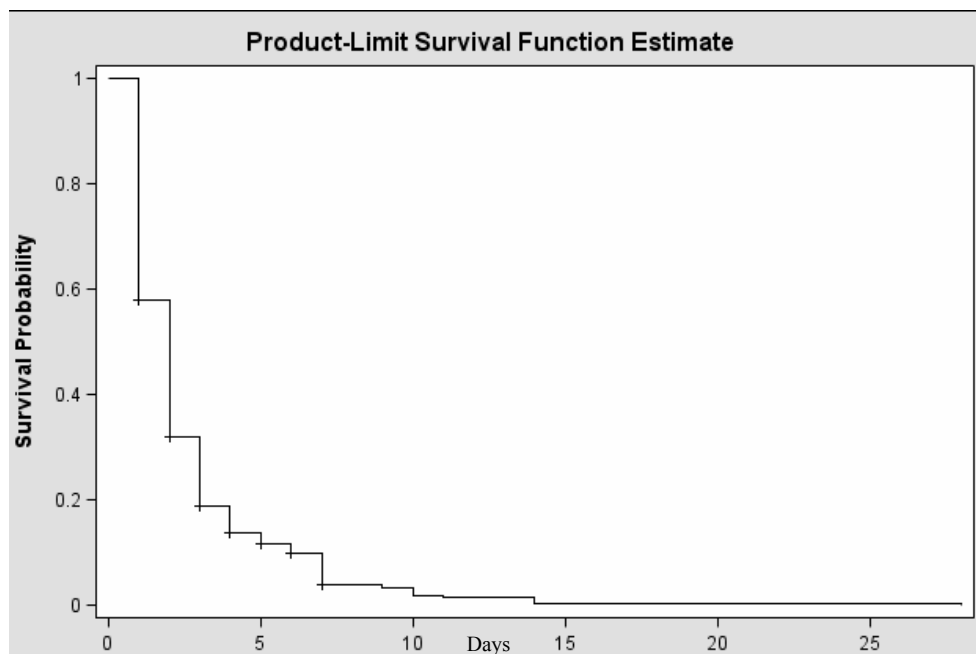
3.5.3. Duration of Symptoms by Age

The mean duration of vomiting/diarrhoea was observed to be shortest for 5 to 14 years age group (1.9 days) and longest for the 15 to 24 year old age group (3.5 days) For the 15 to 24 years age group, 25% were still symptomatic after 4.5 days compared with 2 days for 25% of 5 to 14 years age group. In all other age groups, 25% of cases were still symptomatic after 3 days. (See Table 9)

Table 9: Duration of Vomiting/diarrhoea for AGI cases by Age Group

Age group	No of AGI cases(1)	AGI still with symptoms(2)	Mean days Duration (se)*	Percentile		
				25th	50th Median	75th
0-4 years	33	0	2.7 (0.35)	1.0	2.0	3.0
5-14 years	35	3	1.9 (0.27)	1.0	1.0	2.0
15-24 years	24	1	3.5 (0.68)	1.0	2.0	4.5
25-44 years	103	5	2.7 (0.33)	1.0	2.0	3.0
45-64 years	78	4	2.2 (0.20)	1.0	2.0	3.0
65+ years	22	3	2.3 (0.32)	1.0	2.0	3.0
Unknown	2	0				
Total	**297**	**16**	**2.5 (0.15)**	**1.0**	**2.0**	**3.0**

(1) Case definition " AGI " – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(2) Crude data including those still having symptoms at the time of interview
* (se) = standard error

3.5.4. Severity of Symptoms

The average and median for the maximum number of vomits or loose stools in a 24 hour period is shown in Table 10. Among those vomiting, the median number of vomits was three in 24 hours while the median number of loose stools was four.

Table 10: Maximum Number of Loose Stools or Vomits in 24 hours Among all Cases of AGI

| AGI (1) symptom (n=296)	Mean (2)	Median (2)	Weighted Mean (3) (95%CI)
Vomiting	3.12	3.0	3.13 (2.9 - 3.4)
Loose stools	3.64	4.0	3.56 (3.4 - 3.8)

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded
(2) Crude data
(3) Mean weighted by age, sex and Maori/ non-Maori status

Severe AGI was defined according to the definition of severe gastroenteritis used by the Australian National Gastroenteritis Study 2001-2002 (at least 2 days of illness and at least 5 loose stool or 4 vomits in 24 hours) (Hall *et al.*, 2004). Of all 297 AGI cases, 28% of cases were classified as severe.

3.5.5. Perception of Severity

Respondents were asked *"On a scale of 1 to 5 how would you rate the severity of this episode of diarrhoea or vomiting?"* (where 1 = very mild and 5 = very severe). Their perceptions of severity were compared with definitions of "actual severity" developed using criteria from the Australian National Gastroenteritis Study 2001-2002 (Hall *et al.*,2004). See Table 11.

Table 11: Respondent Perceived Severity of AGI Compared to Actual Severity

Actual Severity	Perceived severity score (1-5) (1)			Total
	Score 1&2 Crude No (row %)	Score 3 Crude No (row %)	Score 4&5 Crude No (row %)	Crude No (col %)
Mild n=33	20 (61)	8 (24)	5 (15)	33 (14)
Moderate n=122	52 (43)	33 (27)	37 (30)	122 (51)
Severe n=83	10 (12)	24 (29)	49 (59)	83 (35)
Total n=238	**82 (35)**	**65 (27)**	**91 (38)**	**238 (100)**

Mild = at least 1 vomit OR at least 2 diarrhoea in 24 hours
Moderate = at least 2 vomits OR at least 3 loose stools in 24 hours
Severe = at least 2 days duration AND at least 4 vomits in 24 hours OR at least 5 loose stools in 24 hours
(1) Crude data including only those who provided an answer to all questions (n=238)

Overall, the correlation between perceived severity by the respondents and the actual severity (based on number of vomits, loose stools and duration of illness) was 0.39, which means only 39% of cases perceived their AGI severity to be the same as the actual severity according to symptoms reported.

Correlations were also calculated for individual symptoms such as the duration of vomiting and/or diarrhoea, and the number of vomits and/or diarrhoea in 24 hours. Correlation between perceived severity and individual symptoms was low in the total study population. There was a higher-correlation between perceived severity and number of vomits and days of diarrhoea for Maori respondents (correlation coefficient 0.46 and 0.40 respectively).

For the younger age groups, age 0 - 4 years and 5 - 14 years, the number of vomits or diarrhoea episode correlated fairly well with the parent's perception of severity (correlation coefficients 0.54 for vomiting and 0.50 for diarrhoea in for 0 - 4 years, and 0.52 for vomiting and 0.77 for diarrhoea in 5-14 years). There was no correlation between perception of severity and actual severity demonstrated in the other age groups, though in the older age groups 45 - 65 years and over 65 years, the perception of severity showed a stronger correlation with number of days with diarrhoea (0.48 in 45 - 65 years and 0.51 in over 65 years).

3.6. Seeking the Assistance of Health Care

A third (35.4%) of all AGI cases sought at least some kind of health professional advice or treatment. Based on the crude data, general practitioners (GPs) were the health professionals seen most frequently (21.9%), followed by pharmacists (13.8%) and then nurses (7.7%) (see Table 12). Approximately 5% of cases sought help from Accident and Emergency (A&E) or after-hours clinics, likewise for telephone helpline (Healthline) or alternative healthcare. Only 2% of AGI cases sought help at hospital emergency departments. Only three respondents were hospitalised with a hospital duration of 1, 2 and 4 days (mean number of days = 2.33). Amongst Maori AGI cases, 41% sought advice or treatment from a health professional, compared to 33% of non-Maori cases.

The burden of disease on health professionals equated to a weighted estimate of 1.5 million encounters in a year, of which nearly 0.92 million were to the GP and an additional 230,000 to primary care A&E or after hours clinics.

Table 12: Number of AGI Cases Seeking Health Care

Health care provider (1)	Crude data (n=297)			Extrapolated(3) (*Pop =4,184,600*)
	Non-Maori n=222 (%)	Maori n=75 (%)	All AGI(2) n=297 (%)	Number (95% CI)
GP	41 (18.5)	24 (32.0)	65 (21.9)	0.92 million (0.73, 1.12 million)
A&E or after hours(4)	8 (3.6)	5 (6.7)	13 (4.4)	0.23 million (0.12, 0.34 million)
GP & A&E or after hours	49 (22.1)	29 (38.7)	78 (26.3)	1.15 million (0.94, 1.37 million)
Hospital emergency	4 (1.8)	2 (2.7)	6 (2.0)	
Nurse	17 (7.7)	6 (8.0)	23 (7.7)	
Pharmacist	28 (12.6)	13 (17.3)	41 (13.8)	
Healthline	5 (2.3)	7 (9.3)	12 (4.0)	
Alternative healthcare	13 (5.9)	4 (5.3)	17 (5.7)	
Seeking help from at least one facility	74 (33.3)	31 (41.3)	105 (35.4)	1.52 million (1.29 – 1.75 million)

(1) Respondents were able to choose from more than one healthcare provider
(2) Case definition " AGI " – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded
(3) Extrapolation weighted by age sex and Maori/ non-Maori status and based on estimated NZ population in 2006 = 4,184,600 million (NZ Census 2006)
(4) A&E clinics or after hours refers to non-hospital accident and emergency centres or after hour clinics in the community

Analysis of symptoms associated with a visit to a GP demonstrated that diarrhoea was not a predictor of AGI cases visiting a GP (RR = 0.6), while vomiting, blood in stools, headache, fever, muscle/body ache, and sore throat were associated with visiting the GP, and these observations were statistically significant (see Table 13). Duration of symptoms greater than 1-2 days were also associated with a higher likelihood of a visit to the GP (RR = 2.3 for 3-4 days and RR = 5.1 for 5 or more days).

Table 13:   Predictors of Cases of AGI Visiting a GP

Symptoms and Duration of AGI(1)	Cases with symptom n = 297	Percentage visiting GP	Relative Risk (95% CI)	
Symptom				
Vomiting	137	29.2	2.0	(1.3, 3.1)
Diarrhoea	248	19.8	0.6	(0.4, 1.0)
Blood in stools	11	45.5	2.3	(1.2, 4.3)
Stomach cramp	219	21.1	1.3	(0.7, 2.2)
Fever	126	28.6	1.7	(1.1, 2.6)
Headache	122	29.5	2.1	(1.3, 3.3)
Nausea	161	25.0	1.3	(0.8, 2.0)
Muscle/body ache	124	26.8	1.6	(1.0, 2.5)
Sore throat	106	29.5	1.7	(1.1, 2.5)
No Symptom			*Reference(2)*	
Duration of AGI				
1-2 days	207	13.1	*Reference*	
3-4 days	51	29.4	2.3	(1.3, 3.9)
5+ days	35	62.9	5.1	(3.3, 7.8)

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(2).Reference for symptom group univariate analysis was 'not experiencing specific symptom'.
(3) Four cases with AGI were unable to recall the duration of symptoms

3.6.1. Laboratory Testing

Of the 297 cases of gastroenteritis in the total survey sample, 248 had diarrhoea and of these, 49 attended their GP. Stool samples for laboratory testing were requested in 40% of these cases (20/49). One additional case bypassed their GP and approached the laboratory directly.

The key predictor for AGI cases having a stool laboratory request when attending their GP was the presence of blood in the stool (4/5) and the duration of diarrhoea (see Table 14). Compared to cases with duration of diarrhoea of 1-2 days (reference group), patients with diarrhoea of 3-4 days had a relative risk for stool sample request of 1.4, while those with diarrhoea lasting 5 days or more, the relative risk was 2.1. Because of low numbers these relative risks do not reach statistical significance.

Overall, of the 248 cases with diarrhoea, there was a marked difference in the proportion stool requests in cases attending their GP with duration of illness 3 to 4 days (38%) and 5 days or over (58%) compared with 1 to 2 days having stool requests (RR=1.4 and 2.1 respectively).

Table 14:   Duration of AGI in Cases Having Stool Specimen Requests

(20 of 49 attending GP)

Duration of AGI(1)	No of AGI (1) cases in community	AGI cases with diarrhoea attending GP	No. of AGI cases with stool request (2) (%)		RR of having stool request(3) (95% CI)	
Duration						
1-2 days	169	18	5	(28)	*reference*	
3-4 days	47	13	5	(38)	1.4	(0.5,3.8)
5 + days	30	17	10	(58)	2.1	(0.91,4.9)
Unknown	2	1				
Total	**248**	**49**	**20**			

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded. **Must have diarrhoea**
(2) One case with illness duration of 2 days referred themselves directly to laboratory with stool sample.
(3) Unadjusted due to small numbers

The probability of having a stool test ordered from AGI cases is shown by duration in Table 15. For those with an illness of short duration, only 1 in 34 had a stool test ordered. For those with a medium duration of illness this was 1 in 9 cases, and for longer duration of illness (5+ days) one in three cases was asked for a stool sample to be sent for laboratory investigation.

Table 15:   Probability of Identification of Pathogen by Laboratory by Severity of AGI with Diarrhoea

Duration of AGI	No of AGI (1) cases in community	% AGI cases visited GP(2)	% cases visited GP + stool test ordered	Probability stool test in community cases	Stool test factor
Duration					
1-2 days	169	11	28	0.030	1 in 34
3-4 days	47	28	38	0.106	1 in 9
5+ days	30	57	58	0.33	1 in 3
Unknown	2				
Total	**248**				

(1) Case definition "AGI " – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded. **Must have diarrhoea**
(2) Unweighted due to small numbers.

Of the 20 respondents who were asked to provide a stool sample, 18 provided the sample and two did not. Of the 18 who complied with the stool sample request, 12 (66.7%) were aware of the result (see Table 16). Half (6/12) reported that their result was due to Campylobacter and a third reported their result as "food poisoning". Of the two who did not provide a sample, one quoted inconvenience (time, lack of facilities) as the reason for non-compliance, while the other was physically unable to provide the specimen.

Table 16:   AGI Respondent Awareness of Stool Laboratory Tests Results

Result as reported by AGI respondent (1)	Case(2) (%)
Unsure	1 (8.3)
Nothing was found	1 (8.3)
Campylobacter	6 (50.0)
'Food poisoning'	4 (33.3)
Total	**12 (100)**

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded. **Must have diarrhoea**
(2) Unweighted due to small numbers.

3.6.2. Medications

Of the respondents who had AGI, 38% took at least one medication to treat or relieve symptoms. Fever was the symptom treated most frequently (56%) however all the other symptoms listed were also treated with medications about half of the time (see Table 17). This extrapolates to 1.7 million people taking any medication for AGI in one year in New Zealand (see Table 18).

Table 17:   Symptoms of AGI treated with Medications

| AGI symptom[1]	Number with Symptom[2]	Number taking Medication	% cases taking medication
Vomiting	137	71	52.2
Diarrhoea	248	87	35.1
Blood in stools	11	6	54.5
Stomach cramp	219	90	41.1
Fever	126	70	56.0
Headache	122	61	50.4
Nausea	161	76	47.5
Muscle/body ache	124	59	47.6
Sore throat	106	51	48.1

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(2) Crude data is used in this analysis

Of those taking any medication, 7.1% took antibiotics. Based on the assumption that antibiotics were prescribed by a clinician (and not taken from a private supply directly accessible by the case), one in five AGI cases attending a doctor or nurse was prescribed an antibiotic to treat AGI. When extrapolated, this equates to 300,000 courses of antibiotics in a year (see Table 18). Predictors of prescribing antibiotics were blood in stools (50%), duration of diarrhoea (43%), and fever (24%) (Analysis not shown).

Table 18:   Use of Medications in AGI

Type of medication taken	Crude n=297		Weighted	
	Number taking medication	(%)	Estimated number[1] taking medication (95% CI)	
Any medication	113	(38.2)	1.68 million	(1.38 million, 1.99 million)
Antibiotic	21	(7.2)	312,985	(179445, 446526)

(1) Estimate is extrapolated from figures weighted by age, sex, and Maori / non-Maori status and based on estimated NZ population in 2006 = 4,184,600

3.7.   Missed Work or Activities

AGI in the study population appeared to impact on work, school and recreational activities. Of the 297 AGI cases, 266 (90%) reported loss of time at work, school or recreation. Recreational activities were affected in 50% of cases for a mean duration of 2.8 days (see Table 19). Work was missed by 23% of cases (mean 2.9 days) and school/preschool/other educational activity was missed by 15% of cases (mean 3.3 days).

Table 19:   Missed Work or Activities due to AGI

Type of activities missed	Crude n=297		Weighted (2)
	AGI Cases(1) missing activities	(%)	Mean no. of days missed(2) [median]
Work	68	(22.9)	2.9 [2.0]
School/preschool or other study	43	(14.5)	3.3 [2.0]
Recreational/holiday activities	156	(52.5)	2.8 [2.0]
Total	**267**	**(89.6)**	**2.9 [2.0]**

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded
2)   Weighted by age, sex and Maori/ non-Maori status

3.7.1. Time off work

The survey results indicated that AGI caused a considerable amount of missed work in the study population. A third of all cases (36.4%) reported missed work time for either themselves (22.9%) or another person (13.5%) (see Table 20). Of the 297 AGI cases, 163 were in paid employment. In this employed group AGI 42% missed paid work themselves for a mean duration of 2.9 days. An additional 14% of AGI resulted in carers missing work for a mean of 2.3 days. When extrapolated to the NZ population; over 4.5 million days paid work were missed in 1 year either directly or indirectly due to AGI.

Table 20:   Missed Paid Work Because of AGI

Details of person missing work	Crude (n=297)			Weighted(3)	
	No of AGI cases(1) missing work (%)		% of all paid worker cases(2) (n=163)	Days paid work missed	(95% CI millions)
Cases missed paid work themselves	68	(22.9)	41.7	2.85 million	(1.84, 3.87)
Other person missed paid work to care for case.	40	(13.5)		1.67 million	(1.04 , 2.29)
Total cases causing missed paid work	**108**	**(36.4)**		**4.52 million**	**(3.15, 5.90)**

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious causes excluded
(2) Number with AGI, employed for last 4 weeks and >15 years = 163
(3) Weighted by age, sex and Maori/ non-Maori status

3.9   Illness Within the Household

Respondents were asked if others in their household were also affected by a similar illness during the same time period. A large percentage of AGI cases (29.6%) reported others in their household being affected (see Table 21). Of the 88 cases who reported others in the household being affected, 62.5% reported only one other person was affected, 21.6% reported two others were affected, 12.5% reported three and 3.4% reported four others were affected.

Table 21:   Others in household affected by similar AGI

Others in the household with a similar AGI illness (1)	Crude n=297	Weighted(2)
	Crude frequency (%)	Weighted frequency %
Yes	88 (29.6)	31.0
No	208 (70.0)	68.3
Don't know/Not sure	1 (0.3)	0.7
Total	**297 (100)**	**100.0**

(1) Case definition "AGI" – vomiting and/or diarrhoea in the 4 weeks prior to interview, non infectious excluded
(2) Weighted by age, sex and Maori/ non-Maori status

4. DISCUSSION

This discussion concerns only the community survey and comparison with similar overseas surveys. A final report will collectively analyse, interpret and discuss data from all the AGI studies in order to estimate the burden of AGI.

4.1. Principal Findings

For the purposes of this report all 297 cases who met the broad case definition of AGI ("any study participant with at least one episode of diarrhoea and/or vomiting experienced in the previous four weeks, excluding non-infectious causes") were included in the analysis so that the full spectrum of disease in New Zealand could be examined. Different case definitions have been used in various international comparisons. Some of these case definitions excluded vomiting and include diarrhoea only, e.g. in Scallan *et al.*, (2005) the case definition for the international comparison was; *of those who had reported diarrhoea in the 4 weeks prior to interview, only those who reported at least 3 episodes of diarrhoea in any 24 hour period.* Other case definitions in the literature included vomiting as well as diarrhoea and have criteria set on the number of vomits or diarrhoea. For example, those who reported diarrhoea or vomiting in the 4 weeks prior to interview were only included if they had at least 2 vomits or at least 3 diarrhoea in any 24 hour period, in the Australian National Gastroenteritis Survey 2001.

Prevalence and incidence of AGI

- The overall crude four week period prevalence of AGI in New Zealand was 8.1%.
- The four week period prevalence of AGI adjusted for age, sex, and ethnicity standardised was 8.6% (95% CI 7.6, 9.6) using the New Zealand 2006 census population as the reference standard (Statistics New Zealand, 2006).
- The four week period prevalence of AGI adjusted for age, sex and ethnicity was 9.3% (95% CI 8.1, 10.4) using the world standard as given by WHO (Ahmad *et al.*,2005).
- The incidence of AGI per person year was 1.11 representing 4.66 million cases in New Zealand in one year.
- Quarterly variation was observed during periods closely approximating the four seasons, with AGI period prevalence lower in winter (5.8%), higher in spring (8.4%), and peaking in late summer (10.8%).
- The highest prevalence of AGI was observed in Wairarapa, Hutt Valley, Otago, MidCentral Hawke's Bay, Northland and Canterbury District Health Board regions. After weighting, however, none were statistically significantly different from the national rate.
- The weighted prevalence of AGI for males was higher than for females (9.3% vs. 7.9% respectively) though this difference was not statistically significant.
- The period prevalence of AGI varied across age groups with children aged less than 1 year and children aged 1 to 4 years were markedly over-represented (p = <0.05).
- Males were over-represented in children aged 0 to 14 years; however there was a cross over to increased prevalence in females in the 25 to 44 years age group.
- Prevalence of AGI was higher in Maori compared to non-Maori (10.9% vs. 8.2 %) but this difference was not statistically significant. However, when Pacific Island, Asian, and MELAA ethnicities were excluded from the non-Maori category, the prevalence of AGI among Maori participants weighted by age and sex was significantly higher than for European/Other.

- No association was found between prevalence of AGI and household income or household size, or deprivation score.
- Rural addresses (compared with urban and district addresses) had a higher prevalence of AGI peaking in Aug/Sep/Oct quarter (~spring) but this was not statistically significant; nor was there a difference in prevalence of AGI in rural areas (with population less than 1000) vs. non rural areas.

Duration and Severity of AGI

- The majority of AGI cases had vomiting and/or diarrhoea for 2 days with about 50% recovering by day 2, and 80% by day 4.
- AGI symptoms persisted in 13% for 5 days or more. The reason for the small increase in the percentage of AGI cases with a symptom duration of 7 days is not known but there was a similar finding in the Australian National Gastroenteritis Study. One possible explanation is that this was a rounding effect by participants to 7 days (1 week).
- Of all AGI cases, 28% of AGI cases were classified as "severe" using the Australian National Gastroenteritis Study 2001-2002 case definition where 29% of cases met the same criteria for severe gastroenteritis (Hall *et al.*, 2004).
- Correlation between perceived severity and individual symptoms was low in the total study population. There was a higher-correlation between perceived severity and number of vomits and days of diarrhoea for Maori respondents but no significant correlation was detected for the non-Maori respondents between perceived severity and individual symptoms.
- For the age groups 0 - 4 years and 5 - 14 years, the number of vomits or diarrhoea episodes correlated fairly well with the parent's perception of severity. There was no correlation between perception of severity and actual severity demonstrated in the other age groups, though in the older age groups 45 to 65 years and over 65 years, the perception of severity showed a stronger correlation with number of days with diarrhoea. This may be due to concerns by older cases that longer duration might be suggestive of underlying causes other than AGI.

Healthcare

- A third of cases (35. 4%) sought at least some kind of healthcare advice with 21.9% of cases seeking professional advice from a general practitioner (GP). An additional 4.4% attended primary care A&E or after-hours clinics.
- The estimated burden of disease on Healthcare Providers is extrapolated to 1.52 million cases of AGI in one year, the greatest burden of which falls on General Practice and A&E or After-hours clinics (0.92 million and 0.23 million consultations respectively).
- A number of symptoms (vomiting, blood in stools, headache, fever, muscle/body ache, and sore throat) but not diarrhoea were associated with a higher likelihood of a GP visit, as was a duration of illness greater than 2 days. The presence of headache as a symptom for which AGI cases sought health care advice may be due to heightened public awareness of meningitis in New Zealand. No such trend was revealed in the Australian National Gastroenteritis Study.
- In the total study sample, 32% of AGI cases who were Maori sought health professional advice from their GP.
- Stool samples were requested for 40% (20/49) of the AGI cases with diarrhoeal illness who attended a GP with a compliance rate of 90% (18/20).

- Two thirds (12/18) of AGI cases with diarrhoeal illness who submitted a stool specimen were aware of their results.

Missed work and other activities

- Activities or work was missed in 90% of AGI cases, with the period of time lost having a weighted mean of 2.9 days (median 2.0).
- Approximately half (52%) reported missing recreational activities, while 36% of AGI cases either missed work or required a carer to miss work.
- Over the 12 month study period, the total days of paid work missed by AGI cases or their carers totalled 4.5 million.
- Questions on occupation were considered but not asked of respondents in this survey. It was felt there would be too few cases in each occupational category for any meaningful analysis.

Co-occurrence of illness in household

- Similar illness of other household members was reported by 30% (88/297) of AGI respondents, and affected up to four others in the same household. This raises the possibility of person to person spread and may explain higher rates observed in 25 to 44 year old females.

4.2. Representativeness and Generalisability

- There was higher participation in this study among females.
- The study population is fairly representative of New Zealand in terms of geographical distribution, household size and income.
- Representation by Maori and European/other ethnicities was higher than the general population, whereas Asian and Pacific ethnicities were under represented. This is a result of the "Maori booster" sample used to target Maori participants specifically.
- The extra effort made to obtain the Maori booster sample could lend itself to sampling error. In addition there appears to have been a change in sampling Maori halfway through the year as less total calls were required to fill the quota (see Appendices 2 and 3). Minor differences were observed between Maori in the general sample and Maori in the booster sample (see Appendix 5).
- The largest differences in the sample population were in gender and age representation: females and older people were over-represented. Females and older persons may have been less likely to hang up and be more willing to engage. There may also be a bias due to this being a landline telephone survey and females and older persons may have been more likely to be at home.
- Overall the percentage differences between the study population and the national population were considered to be reasonably minor. Weights were applied to correct respondent data for some of the differences in the population sample.

4.3. International Comparison

In order to compare with the overseas studies summarised in Appendix 9, it is necessary to recalculate the prevalence according to the appropriate case definition (Scallan *et al*., 2005): at least one episode of diarrhoea (at least 3 loose stools in any 24 hour period) in the last 4

weeks with non infectious causes excluded. These results are shown in Table 20, and show that the New Zealand results were consistent with those from overseas, apart from the lower rate in Ireland.

Table 22: **International Comparison of the Prevalence of Reporting AGI$_{(1)}$ in 4 Weeks Prior to Interview**

Country	Sample size	Rate$_{(2)}$	95% CI
Canada (British Columbia)	4612	8.8%	8.0, 9.6
New Zealand	3655	7.8%	6.8, 8.6
Canada (Hamilton, Ontario)	3496	7.6%	6.7, 8.5
United States	14647	7.6%	6.9, 8.3
Australia	6087	6.4%	5.4, 6.9
Ireland	9903	3.4%	3.1, 3.8

(1) Case definition: At least one episode of diarrhoea (at least 3 loose stools in any 24 hour period) in the last 4 weeks with non infectious causes excluded.
 (2) All countries standardized for age and sex

The case definition for the Australian National Gastroenteritis Survey 2001 was at least 2 vomits or at least 3 stools in any 24 hour period. Using this case definition the weighted incidence of AGI in New Zealand was 0.82 per person per year compared with 0.9 cases per person per in Australia.

Other points of comparison**:**

- Sex: in contrast to all overseas studies, New Zealand males reported a higher rate of AGI than females although this was not statistically significant.
- Age group: as with all overseas studies the highest prevalence and incidence of AGI was amongst children aged less than 5 years (p =<.05), with a generally decreasing prevalence and incidence with increasing age, so that the lowest rates were observed amongst people over 65 years old.
- Visiting a medical health professional: the number of AGI cases visiting a GP in New Zealand was similar to those reported visiting a medical health professional in overseas studies (approximately 20%) (Hall *et al.*, 2004). Maori were well represented following adding of the booster sample (discussed in Section 4.2).
- Visiting a health professional and request for a stool sample: The percentage of AGI cases in New Zealand who visited their GP and were requested to provide a stool sample (40%) was approximately twice as high as reported in overseas surveys, though small numbers of cases were involved,
- Medication and antibiotics: The percentage of AGI cases taking medication in New Zealand (38.2%) is similar to Australia, but lower than reported for Canada and Ireland. The percentage of cases taking antibiotics (7.1%) was within the range for other countries (3.6 – 8.3%) (Roy *et al.*, 2006).

5. CONCLUSIONS

The AGI Community Study is the first study to be conducted in New Zealand to directly quantify the prevalence and incidence of AGI in the general community using a representative sample of the population recruited over a 12 month period. The results of this study demonstrate that AGI poses a significant burden on the New Zealand community, which is markedly higher than previous estimates based on mathematical modelling using notifiable disease surveillance data (Lake *et al.*, 2000). This study contributes to the International Collaboration on Enteric Disease "Burden of Illness" Studies, the results of which indicate that the prevalence of AGI is similar in Australasia and North America.

The results of the AGI Community Study provided an opportunity to assess the extent to which the general community was affected by AGI, including the severity of illness, health seeking behaviour, treatment, and the social and economic impact. These results, along with the results from the AGI General Practice Study and the AGI Laboratory Survey, will serve to inform the notification pyramid associated with AGI in New Zealand.

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7. APPENDICES

Appendix 1: General Sample, Response and Cooperation Rate by Month

Description	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Total
Total numbers called	2677	2988	2691	2663	2844	2635	2890	3011	3373	3216	3232	2685	34905
Business numbers/fax	309	341	300	319	309	317	316	345	363	348	361	281	3909
Disconnected	762	873	805	800	867	741	794	867	1148	892	895	722	10166
Total eligible households	1606	1774	1586	1544	1668	1557	1780	1799	1862	1976	1976	1682	20810
No answer/ answering machine	350	394	317	357	425	388	453	547	619	597	754	610	5811
Busy	22	27	26	22	18	14	24	23	28	17	33	14	268
Language problems	25	37	29	26	25	31	32	30	35	36	20	15	341
Hung up				34	22	15	29	23	19	27	26	42	237
Refusals	720	820	773	687	755	728	812	757	729	837	724	605	8947
Not suitable	185	182	154	135	128	113	136	130	149	177	134	111	1734
Terminated/abandoned	17	15	4	9	6	6	7	4	3	3	2	2	78
Appointments not kept	30	4	3	4	2	1	8	4	7	2	2	8	75
Stopped interviews	7	6	0	0	0	0	1	0	0	0	0	0	14
Physically/mentally unable					3	1	1	3	0	1	2	0	11
Hearing problems					14	10	7	8	3	9	9	5	65
Completed interviews	**250**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**3220**
Cooperation rate	**25.1%**	**24.0%**	**25.2%**	**26.5%**	**25.2%**	**25.9%**	**23.6%**	**25.0%**	**25.6%**	**23.1%**	**26.0%**	**29.0%**	**25.3%**
Refusal Rate	**45%**	**46%**	**49%**	**47%**	**47%**	**48%**	**47%**	**43%**	**40%**	**44%**	**38%**	**38%**	**44%**

Appendix 2: Maori Booster Sample, Response and Cooperation rate by Month

Description	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Total
Total numbers called	2727	1616	821	1901	1171	689	334	500	979	1649	1402	1107	14896
Business numbers/fax	363	188	85	226	125	68	23	53	94	173	146	92	1636
Disconnected	761	428	236	534	312	179	58	121	257	437	345	287	3955
Total eligible households	1603	1000	500	1141	734	442	253	326	628	1039	911	728	9305
No answer/ answering machine	305	126	104	206	210	152	71	109	395	486	564	354	3082
Busy	19	6	6	12	18	1	3	8	3	3	10	2	91
Language problems	29	12	4	6	4	6	0	4	2	16	2	5	90
Hung up	19	4	3	11	19	6	4	5	10	25	9	8	123
Refusals	645	487	185	488	262	181	120	130	151	375	336	300	3660
Not suitable	512	322	162	379	179	120	38	60	109	233	140	168	2422
Terminated/abandoned	11	5	1	4	1	2	1	0	4	6	0	1	36
Appointments not kept	9	0	0	0	0	0	2	0	0	0	0	0	11
Stopped interviews	4	3	0	0	0	0	0	0	0	0	0	0	7
Pysically unable/mentally unable					2	1	0	0	0	0	2	0	5
Hearing problems					4	0	1	0	2	1	0	1	9
Completed interviews	**50**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**35**	**435**
Cooperation rate (1)	**6.7%**	**6.5%**	**15.4%**	**6.5%**	**10.9%**	**15.4%**	**22.0%**	**20.1%**	**17.7%**	**7.8%**	**9.2%**	**10.1%**	**10.1%**
Refusal rate	**41.4%**	**49.1%**	**37.6%**	**43.7%**	**38.3%**	**42.3%**	**49.0%**	**41.4%**	**25.6%**	**38.5%**	**37.9%**	**42.3%**	**40.7%**

Appendix 3: Total Sample, Response and Cooperation Rate by Month

Description	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Total
Total numbers called	5404	4604	3512	4564	4015	3324	3224	3511	4352	4865	4634	3792	49801
Business numbers/fax	672	529	385	545	434	385	339	398	457	521	507	373	5545
Disconnected	1523	1301	1041	1334	1179	920	852	988	1405	1329	1240	1009	14121
Total eligible households	3209	2774	2086	2685	2402	1999	2033	2125	2490	3015	2887	2410	30115
No answer/ answering machine	655	520	421	563	635	540	524	656	1014	1083	1318	964	8893
Busy	41	33	32	34	36	15	27	31	31	20	43	16	359
Language problems	54	49	33	32	29	37	32	34	37	52	22	20	431
Hung up	19	4	3	45	41	21	33	28	29	52	35	50	360
Refusals	1365	1307	958	1175	1017	909	932	887	880	1212	1060	905	12607
Not suitable	697	504	316	514	307	233	174	190	258	410	274	279	4156
Terminated/abandoned	28	20	5	13	7	8	8	4	7	9	2	3	114
Appointments not kept	39	4	3	4	2	1	10	4	7	2	2	8	86
Stopped interviews	11	9	0	0	0	0	1	0	0	0	0	0	21
Pysically unable/mentally unable	0	0	0	0	5	2	1	3	0	1	4	0	16
Hearing problems	0	0	0	0	18	10	8	8	5	10	9	6	74
Completed interviews	**300**	**305**	**305**	**305**	**305**	**305**	**305**	**305**	**305**	**305**	**305**	**305**	**3655**
Cooperation rate	**17.3%**	**18.3%**	**23.5%**	**19.6%**	**21.9%**	**24.0%**	**23.4%**	**24.3%**	**24.4%**	**18.8%**	**21.4%**	**23.8%**	**21.4%**
Refusal rate	**43.1%**	**47.3%**	**46.1%**	**45.4%**	**44.0%**	**46.5%**	**47.5%**	**43.1%**	**36.5%**	**41.9%**	**37.9%**	**39.6%**	**43.1%**

Appendix 4: Details of Maori in General and Booster Sample

	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Total
Total sample	300	305	305	305	305	305	305	305	305	305	305	305	**3655**
No. Maori General Sample	18	31	30	14	23	24	21	21	23	23	30	12	**270**
No. Maori Booster Sample	50	35	35	35	35	35	35	35	35	35	35	35	**435**
No. Maori Total Sample	68	66	65	49	58	59	56	56	58	58	65	47	**705**
% Maori Total Sample	**22.7%**	**21.6%**	**21.3%**	**16.1%**	**19.0%**	**19.3%**	**18.4%**	**18.4%**	**19.0%**	**19.0%**	**21.3%**	**15.4%**	**19.3%**

Note: Final Number of Maori in General Sample after analysis was 283 and Total Maori

Appendix 5   Sample characteristics of Maori in General vs. Maori Top Up sample

Respondent characteristic	Maori in General List (n=283)	Maori in Top Up sample (n= 435)	Total Maori Sample (n=718)	Maori Census (2006)
Sex				
Male	38.9%	37.5%	38.0%	49.4%
Female	61.1%	62.5%	62.0%	50.6%
Age				
< 1 year	0.4%	2.1%	1.4%	2.6%
1 to 4 years	10.6%	7.4%	8.6%	9.6%
5 to 14 years	17.3%	11.3%	13.6%	22.7%
15 to 24 years	9.2%	12.6%	11.3%	18.2%
25 to 45 years	35.0%	34.5%	34.7%	27.6%
45 to 64 years	23.7%	24.8%	24.4%	15.2%
65 + years	3.9%	7.4%	6.0%	4.0%
Household Size				
1	10.2%	18.9%	15.5%	2006 data not available
2	25.1%	25.3%	25.2%	2006 data not available
3	17.0%	12.9%	14.5%	2006 data not available
4	21.6%	20.0%	20.6%	2006 data not available
5	14.1%	10.1%	11.7%	2006 data not available
6+	12.0%	12.9%	12.5%	2006 data not available
Household Income				
Less than $25,000	16.3%	14.5%	15.2%	2006 data not available
25,000 to 50,000	29.0%	29.4%	29.2%	2006 data not available
50,000 to 100,000	33.9%	34.0%	34.0%	2006 data not available
100,000+	11.0%	11.3%	11.1%	2006 data not available
Don't know/ refused	9.9%	10.8%	10.4%	2006 data not available

Appendix 6: Percentage of Respondents by Month and DHB c.f. Census Population

DHB	Census 2006	February 2006	March 2006	April 2006	May 2006	June 2006	July 2006	August 2006	September 2006	October 2006	November 2006	December 2006	January 2007
Non response	-	0.7%	2.3%	0.3%	1.0%	1.0%	0.0%	0.0%	1.0%	1.0%	0.7%	1.0%	0.0%
Auckland	10.0%	8.0%	8.5%	7.5%	6.9%	6.2%	10.5%	9.2%	9.8%	10.5%	10.8%	10.2%	9.8%
Bay of Plenty	4.8%	5.7%	4.6%	5.2%	5.2%	5.9%	6.2%	4.6%	5.6%	5.2%	6.6%	4.9%	7.9%
Canterbury	11.6%	10.3%	11.8%	11.1%	11.1%	10.8%	10.8%	12.5%	12.1%	11.8%	11.1%	11.5%	11.5%
Capital and Coast	6.6%	7.0%	5.9%	8.2%	7.9%	7.9%	6.6%	6.9%	6.9%	5.9%	6.2%	6.9%	9.2%
Counties Manukau	10.8%	8.3%	7.2%	8.5%	8.9%	11.1%	8.9%	9.5%	7.5%	7.9%	8.2%	8.2%	8.9%
Hawke's Bay	3.7%	3.3%	4.3%	3.9%	4.3%	3.9%	4.3%	4.3%	4.6%	3.6%	4.9%	4.6%	4.6%
Hutt	3.4%	2.7%	3.3%	2.3%	2.3%	1.3%	3.0%	2.3%	2.3%	3.6%	3.6%	2.6%	0.3%
Lakes	2.4%	3.0%	2.3%	1.6%	2.3%	1.6%	1.6%	2.0%	2.3%	2.6%	0.7%	2.0%	0.3%
MidCentral	3.9%	4.3%	3.9%	5.2%	4.9%	4.9%	3.0%	4.9%	3.3%	3.9%	3.0%	3.9%	4.3%
Nelson-Marlborough	3.2%	3.0%	3.3%	3.9%	3.3%	3.3%	3.6%	3.9%	3.9%	3.6%	3.3%	3.3%	3.3%
Northland	3.7%	4.7%	3.9%	4.3%	4.6%	5.6%	4.6%	3.6%	3.0%	4.6%	4.6%	4.6%	4.9%
Otago	4.5%	4.7%	4.6%	3.9%	4.6%	4.6%	4.6%	4.3%	3.9%	4.6%	3.9%	4.6%	5.6%
South Canterbury	1.3%	1.0%	1.6%	2.0%	1.0%	2.3%	2.0%	2.0%	2.0%	1.6%	1.3%	1.6%	1.6%
Southland	2.6%	2.7%	2.3%	2.3%	3.3%	2.0%	3.6%	2.6%	3.0%	3.0%	3.3%	2.6%	2.0%
Tairawhiti	1.1%	2.0%	1.0%	1.3%	1.0%	0.7%	2.0%	1.3%	1.0%	1.3%	1.0%	1.3%	1.3%
Taranaki	2.6%	3.7%	3.6%	3.0%	2.6%	2.6%	2.3%	3.0%	3.0%	2.6%	3.0%	3.0%	3.9%
Waikato	8.4%	8.0%	10.2%	8.5%	9.2%	7.9%	8.2%	8.9%	9.5%	7.5%	8.2%	10.5%	7.9%
Wairarapa	1.0%	1.0%	0.7%	1.0%	0.7%	1.0%	1.3%	0.7%	1.3%	1.0%	1.0%	0.7%	0.7%
Waitemata	12.0%	12.7%	12.5%	12.8%	12.8%	12.5%	10.2%	11.1%	11.5%	10.8%	10.8%	9.8%	10.2%
West Coast	0.8%	0.7%	0.7%	1.3%	0.7%	0.7%	0.7%	0.7%	0.7%	1.0%	1.3%	1.0%	0.7%
Whanganui	1.5%	2.7%	1.6%	1.6%	1.6%	2.3%	2.3%	2.0%	2.0%	2.3%	2.6%	1.3%	1.3%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Appendix 7:   Average Household Size of Survey Sample, by DHB

DHB	N	Mean
Auckland	329	2.8
Bay of Plenty	206	2.9
Canterbury	416	2.7
Capital and Coast	260	2.7
Counties Manukau	314	3.4
Hawke's Bay	154	3
Hutt	90	3
Lakes	68	2.3
MidCentral	151	2.9
Nelson-Marlborough	127	2.7
Northland	161	2.9
Otago	164	2.6
South Canterbury	61	2.8
Southland	99	2.5
Tairawhiti	46	3.2
Taranaki	110	2.5
Waikato	318	2.8
Wairarapa	33	2.3
Waitemata	419	2.8
West Coast	30	2.3
Whanganui	72	3
Total	**3655**	**2.8**

Note: Crude data

Appendix 8:   Annual Prevalence of AGI by DHB
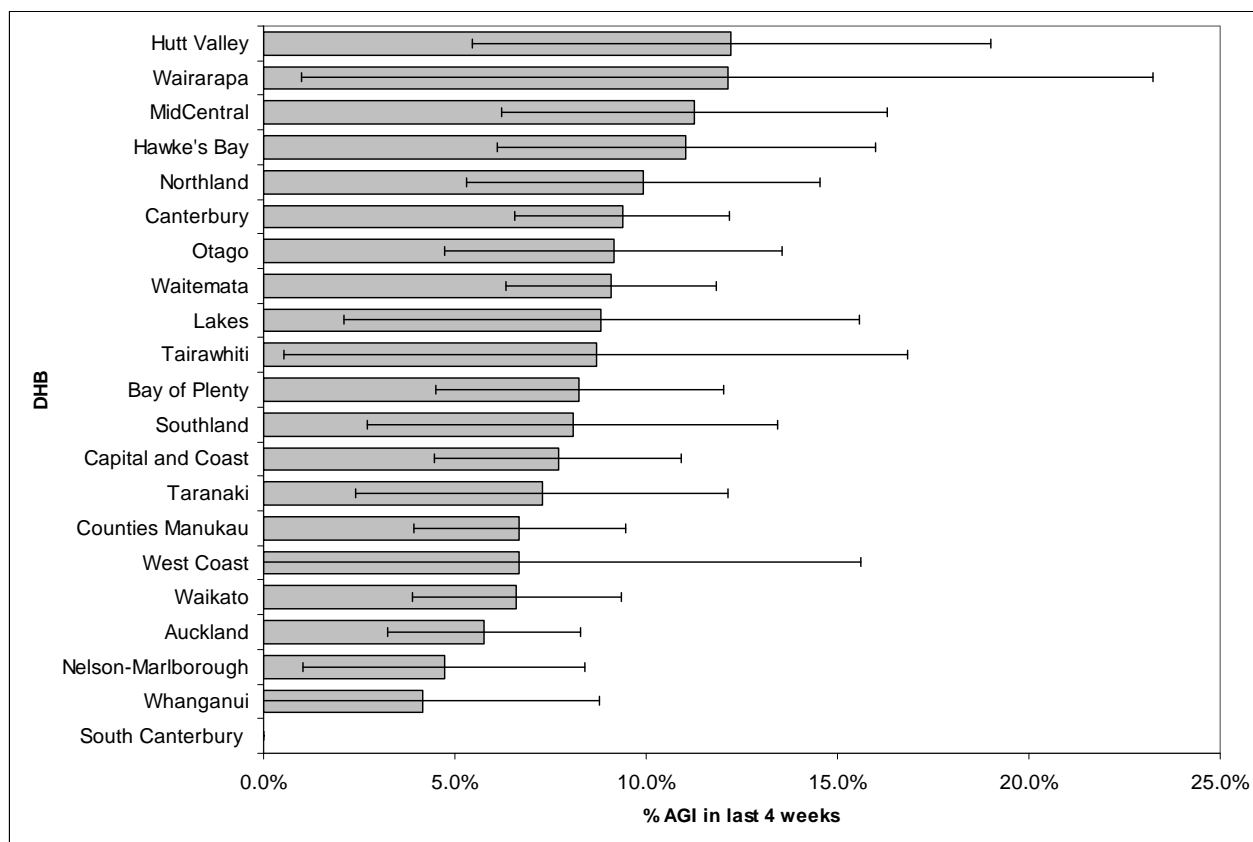
Note: Crude data

Appendix 9:   AGI Community Study Literature Review

Method

The primary source of literature on national surveys for the prevalence of gastrointestinal illness was material assembled by the International Collaboration on Burden of Illness Studies Group, in particular a key paper comparing surveys in Australia, Canada (Hamilton, Ontario), Ireland, and the United States (Scallan *et al.*, 2005). The studies described in this paper are those to which the New Zealand study was intended to be compared.

Further searches were conducted in PubMed using search terms:

- community survey gastrointestinal
- community survey diarrhoea
- prevalence diarrhoea survey
- prevalence gastrointestinal survey

This literature review includes an update of the material in the review paper (Scallan *et al.*, 2005). Two new studies that have used a similar methodology were identified:

- Malta (Gauci *et al.*, 2007)
- Canada (British Columbia) (Thomas *et al.*, 2006)

The summary tables below presented in the paper by Scallan *et al.*, (2005) have been updated to include these two studies, where possible. The study in Malta used a slightly broader case definition (see footnote to the table) but the study in British Columbia reported results for the same case definition.

This is followed by selected information related to community prevalence of AGI extracted from other studies that used different methodologies.

A review of 33 studies since 1953 on the rate of acute gastrointestinal illness in seven developed countries has recently been published (Roy *et al.*, 2006). The incidence and prevalence estimates for AGI range from 0.1 to 3.5 episodes per person year. However, differences in study design, methodology, and case definition make comparison of these studies problematic.

	Australia	**Canada (Hamilton, Ontario)**	**Ireland**	**United States**	**Malta**	**Canada (British Columbia)**
Study period	September 2001-August 2002	February 2001-January 2002	December 2000-November 2001	February 2000-January 2001	April 2004 – December 2005	June 2002 – June 2003
Study area	Entire population	Population of one municipality	Entire population	Population of selected counties in nine states	Entire population	Population of three local public health authority regions
Population in study area (million)	19.0	0.5	5.3	32.9	0.4	0.8
Sampling method Household	Random digit dialling	Randomly selected telephone numbers	Random digit dialling	Random digit dialling	Randomly selected from general population database	Randomly selected telephone numbers
Sampling method Individual	Chosen by last birthday	Chosen by next birthday	Chosen by next birthday	Chosen by Kish grid	Age stratified random sample	Chosen by next birthday
Languages	Arabic, Cantonese, English, Greek, Italian, Vietnamese, Mandarin	English	English	English	Maltese/English (?)	English/French/Cantonese
Timing of interviews	Daytime/evenings/weekends	Daytime/evenings/weekends	Evenings/weekends	Daytime/evenings/weekends	?	Daytime/evenings/weekend
Contact attempts	Up to 10	Up to 5	Up to 4	Up to 20	?	Up to 5
Sample size	6087	3496	9903	14647	3513	4612
Co-operation rate	68.2	34.7	84.1	37.1	99.7	44.3
Statistical weighting	By area (i.e. states/territories), age, sex, household size, number of telephone lines in each household to the population of Australia	By age and sex to the population of study area	By age, sex, and jurisdiction to the population of Northern Ireland and the Republic of Ireland	By age, sex, site, and the number of residential telephone lines in each household to the population of the united States	By age and sex to the population of the study	Weighted for population size (age and sex as for other Canadian study?)
Prevalence in the four weeks prior to interview	6.4 (5.4-6.9)	7.6 (6.7-8.5)	3.4 (3.1 -3.8)	7.6 (6.9 – 8.3)	3.18 (0.7 -5.74)*	8.8 (8.0–9.6)
Standardised to the world population	6.5	7.9	3.6	7.8		
Sex – male	5.5 (4.2-6.3)	6.2 (5.1-7.4)	2.7 (2.3-3.2)	7.2 (6.1-8.3)	3.78 (1.00-6.73)	
Sex – female	7.2 (5.9-7.9)	9.0 (7.6-10.3)	4.2 (3.7-4.8)	8.0 (7.2-8.8)	2.59 (0.53-4.75)	
<5	8.2 (3.5-10.7)	11.7 (7.3-16.2)	7.6 (5.9-9.8)	11.2 (7.1-15.3)		
5-14	4.8 (2.4-6.1)	5.2 (3.2-7.2)	4.7 (3.8-5.8)	8.3 (5.5-11.1)		
15-24	6.9 (4.4-8.3)	9.6 (6.9-12.3)	2.7 (2.0-3.6)	6.6 (4.7-8.5)		
25-44	7.8 (5.8-8.9)	8.2 (6.6-9.9)	3.8 (3.2-4.6)	8.6 (7.5-9.7)		
45-64	6.1 (4.5-7.0)	8.4 (6.5-10.3)	2.1 (1.6-2.8)	7.2 (6.0-8.4)		
>65	3.6 (1.8-4.5)	3.9 (2.2-5.6)	1.7 (1.1-2.6)	3.9 (2.8-5.0)		

Actual number of respondents reporting diarrhoea	414	261	311	1064	99	
With a duration ≥1 day	6.4	7.6	3.4	7.6	3.18*	8.8
With vomiting	2.0	2.0	2.0	2.6		
With fever	2.2	2.9	1.1	2.5		
With abdominal pain/cramps	4.0	6.0	2.1	5.0		
With a duration ≥3 days	1.9	3.8	1.6	2.0		
With vomiting	0.6	1.2	0.9	0.8		
With fever	0.7	1.7	0.6	0.8		
With abdominal pain/cramps	1.1	3.1	1.0	1.3		
Who visited a medical person	195. (13.7-22.7)	20.4 (15.6-25.3)	19.5 (15.7-24.1)	19.0 (15.8-22.3)		11.5 (52/451)
Male	16.4 (7.4-21.2)	18.2 (10.9-25.6)	18.2 (12.5-25.6)	18.2 (13.0-23.4)		
Female	21.9 (14.3-26.0)	21.9 (15.5-28.3)	20.4 (15.5-26.3)	19.7 (15.7-23.7)		
Age group						
<5	17.0 (2.8-24.7)	33.3 (14.4-52.3)	26.4 (16.5-39.7)	19.2 (7.4-31.0)		
5-14	49.1 (24.2-62.6)	44.6 (4.9-64.3)	15.8 (9.3-25.6)	16.9 (10.2-29.6)		
15-24	16.0 (2.6-23.2)	17.3 (6.3-28.4)	39.1 (26.4-53.6)	20.8 (9.7-31.9)		
25-44	6.6 (2.2-9.1)	11.3 (4.6-18.0)	8.6 (4.6-15.5)	16.2 (11.6-20.8)		
45-64	24.0 (11.5-30.8)	17.4 (8.4-26.3)	14.3 (6.8-27.9)	21.0 (14.5-27.5)		
>65	37.2 (14.0-49.7)	32.4 (11.7-53.1)	33.3 (17.2-54.9)	28.7 (15.1-42.3)		
Who visited a medical person and were asked to submit a stool sample	18.4 (6.2-24.9)	14.4 (5.1-23.7)	14.9 (8.3-25.4)	21.1 (14.1-28.1)		2.7 (12/451)
Who reported taking antibiotics	3.6 (1.0-5.0)	3.8 (1.5-6.1)	5.6 (3.6-8.6)	8.3 (6.1-10.5)	7 (prior to illness)	
Who reported taking anti-diarrhoeals	12.8 (7.8-15.4)	19.5 (14.7-24.2)	18.7 (14.9-23.1)	-		13.3 (60/451)
Who reported taking any medication	37.9 (30.6-41.9)	73.1 (67.8-78.4)	45.8 (40.8-51.1)	-	11 (prior to illness)	63.9 (50.8 if herbal remedies excluded)

* Case definition included people with vomiting at least 3 times in 24h or diarrhoea or vomiting with two or more additional symptom in 24h, as well as 3 loose stools within 24h

England

The study of infectious intestinal disease in England conducted from August 1993 to January 1996 (Wheeler *et al.*, 1999) identified a community rate of 19.4/100 person years (95% confidence interval 18.1 – 20.8). This estimate derived from a prospective study over a six month period conducted by post or telephone, and the case definition was loose stools or vomiting lasting less than two weeks, in the absence of a known non-infectious cause and preceded by a symptom-free period of three weeks. Vomiting was considered significant if it occurred more than once in a 24 hour period and if it incapacitated the case or was accompanied by other symptoms such as cramps or fever.

A retrospective estimate of reported diarrhoea in the month before recruitment was 6.5% (95% confidence interval 6.0-7.0%). This was extrapolated to a rate of 55/100 person years, nearly three times the prospective estimate.

Netherlands

A postal survey conducted in 1991 (Hoogenboom-Verdegaal *et al.*, 1994) defined two grades of episodes of gastroenteritis: Grade 1, diarrhoea or vomiting and at least 2 additional symptoms of either nausea, abdominal pain, cramps, blood or mucus in stools within the period of 1 week; Grade 2, diarrhoea or vomiting and at least 2 additional symptoms as in Grade 1 but both on the same day and lasting at least 2 days within the period of 1 week. Grade 2 is more severe, and a subset of Grade 1. An incidence of 190 and 50 cases per 1000 persons per 4 months was calculated for definitions 1 and 2. This converted to an incidence of 570 and 150 episodes of gastrointestinal illness per 1000 person years respectively.

A more recent Dutch community prospective diary-based study was conducted in 1998-1999 (de Wit *et al.*, 2001a; 2001b). The overall standardised incidence of gastroenteritis was 283 per 1000 person years. The case definition was at least 3 loose stools in 24 hours, or loose stools with two additional symptoms or vomiting with two additional symptoms (additional symptoms included diarrhoea, vomiting, nausea, fever, abdominal pain, abdominal cramps, blood in the stool, mucous in the stool). In the community study (but not the associated GP study), an additional case definition was included: vomiting at least three times in 24 hours. If the cases fitting this definition were excluded, the incidence was 276 per 1000 person years.

USA

A population based estimate of the burden of diarrhoeal disease in the United States (Jones *et al.*, 2007) was based on a number of telephone surveys, principally conducted by FoodNet and including the survey summarised in the paper by Scallan *et al.*, (2005). A diarrhoeal episode was defined as ≥3 loose stools in a 24h period, and acute diarrhoeal illness (ADI) as ≥3 loose stools in 24h with either impairment of daily activities or duration of diarrhoea >1 day. The overall weighted prevalence of ADI in the previous month was 5.1% (95% CI ±0.3%), corresponding to 0.6 episodes of ADI per person per year. Rates of ADI were highest in those aged <5 years. Of those reporting ADI, 19.5% visited a medical provider.

Acute Gastrointestinal System in NZ Project – Maori Top-up

_____

Int ID   _____   Market   _____

Phone no.   _____   Sex   Male 1
                                                                       Female... 2

Date   _____

Start time   _____   Finish time   _____

Call   1   2   3   4

_____

INTRO   Hello, my name is %INAME%. I'm calling on behalf of the New Zealand
         Food Safety Authority. We are conducting a national survey about
         the health issue of stomach and intestinal illness. Your input is
         important as it will help determine the impact of this health issue
         on the community. The interview is confidential and takes about
         5-10 minutes.

         We need to randomly select one person in your household to be
         interviewed, from everyone who lives in your household could you
         please say who was the last person to have their birthday?
         [INTERVIEWER: TRY TO ESTABLISH FIRST NAME AND MUST GET "CORRECT" AGE
         RANGE]
         Would that person be aged...
         17 years or older...............................[]   GO TO ADULTQ
         12 to 16 years................................ ..[]   GO TO PERMISSQ
         under 12 years..................................[]   GO TO GUARDQ
         Don't proceed..................................[]   TERMINATE

_____

ADULTQ   CONTINUE
       IF INTRO='17 years or older' ASK ADETH & ALL ADULTS QUESTIONS

_____

ADETH   Which ethnic group do you (does your child) belong to?
         [INTERVIEWER: TRY TO GET ONLY "ONE" OR "MAIN" ETHNIC GROUP - IF
         RESPONDENT SELECTS SEVERAL ETHNIC GROUPS, THEN TICK OR SPECIFY
         ALL ETHNIC GROUPS STATED]
         [READ LIST]
         New Zealand European.............................1
         Maori..2
         Samoan...3
         Cook Island Maori..................................4
         Tongan...5
         Niuean...6
         Chinese..7
         Indian..8
         Other (specify)   …… 9

         Specified Other

```
_____
ADULT    Is that you?  [DO NOT READ]
         Yes.............................1
         No..............................2
_____
         IF ADULT='Yes' ASK ADULTYES

_____
ADULTYES   Would you be happy to take part in this survey?
         Yes.............................1   GO TO Q1BEGIN
         No..............................2
         Unsure......................3
_____
         IF ADULTYES='No' OR ADULTYES='Unsure' SAY EXIT LINE

_____
Thank you for your time. Good bye
_____
         IF ADULT='No' ASK ADULTNO

_____
ADULTNO    Is the person who was the last to have their birthday available?
         [INTERVIEWER: IF RESPONDENT REPLY "YES" - REPEAT INTRODUCTION AND
         REQUEST CONSENT]
         [IF RESPONDENT REPLY "NO", REQUEST TO ARRANGE CALL BACK AT SPECIFIC
         TIME TO INTERVIEW PERSON WHO HAS LAST TO HAVE THEIR BIRTHDAY]
         [IF RESPONDENT SAY "NO" FOR DON'T WANT CALL BACK THEN SELECT
         RESPONSE ""NO""]
         [DO NOT READ]
         Yes.............................1   GO TO INTRO
         No..............................2
_____
         IF ADULTNO='No' SAY EXIT LINE

_____
Thank you for your time.  Good bye
_____
         END OF ADULT QUESTIONS - GO TO Q1 BEGIN - ASK ALL

_____

PERMISSQ  CONTINUE
         IF INTRO='12 to 16 years' ASK PMETH & ALL PERMISS QUESTIONS
_____
PMETH     Which ethnic group do you (does your child) belong to?
         [INTERVIEWER: TRY TO GET ONLY "ONE" OR "MAIN" ETHNIC GROUP - IF
         RESPONDENT SELECTS SEVERAL ETHNIC GROUPS, THEN TICK OR SPECIFY
         ALL ETHNIC GROUPS STATED]
         [READ LIST]
         New Zealand European............................1
         Maori....................................................2
         Samoan.................................................3
         Cook Island Maori.................................4
         Tongan..................................................5
         Niuean...................................................6
         Chinese.................................................7
         Indian....................................................8
         Other (specify)                    ……9

         Specified Other
_____
PERMISS    Since (CHILD'S FIRST NAME ONLY) is between 12 and 16 years old, I
         need to ask the child's guardian for permission to interview
         him/her.  Are you the child's parent or guardian?
         [DO NOT READ]
```

Yes...1
No..2
Unsure...3

_____
        IF PERMISS='Yes' ASK PERMISS1

_____
PERMISS1   May I have your permission to speak with (CHILD'S FIRST NAME)?
        [DO NOT READ]
        Yes...1   GO TO Q1BEGIN
        No..2
        Unsure...3

_____
        IF PERMISS1='No' OR PERMISS1='Unsure' SAY EXIT LINE

_____
Thank you for your time. Good bye

_____
        IF PERMISS='No' OR PERMISS='Unsure' ASK PERMISS2

_____
PERMISS2   May I speak with the child's parent or guardian?
        [INTERVIEWER: ASK TO SPEAK WITH PARENT/GUARDIAN][IF PARENT/GUARDIAN
        IS NOT AVAILABLE, ARRANGE TO CALL BACK AT A SPECIFIC TIME]
        [DO NOT READ]
        Yes...1
        No..2
        Unsure...3

_____
        IF PERMISS2='No' OR PERMISS2='Unsure' SAY EXIT LINE

_____
Thank you for your time. Good bye

_____
        IF PERMISS2='Yes' ASK PERMISS3

_____
PERMISS3   Hello, my name is %INAME%. I'm calling on behalf of the New Zealand
        Food Safety Authority. We are conducting a national survey about
        the health issue of stomach and intestinal illness. Your input is
        important as it will help determine the impact of this health issue
        on the community. The interview is confidential and takes about
        5-10 minutes.

        We need to randomly select one person in your household to be
        interviewed, from everyone who lives in your household and I believe
        that your child is the last person to have their birthday?
        May I have permission to speak with (CHILD'S FIRST NAME)?
        Yes...1   GO TO Q1BEGIN
        No..2
        Unsure...3

_____
        IF PERMISS3='No' OR PERMISS3='Unsure' SAY EXIT LINE

_____
Thank you for your time. Good bye

_____
        END OF PERMISS QUESTIONS - GO TO Q1BEGIN - ASK ALL

_____
GUARDQ   CONTINUE
        IF INTRO='under 12 years' ASK GUETH & ALL GUARD QUESTIONS

_____
GUETH   Which ethnic group do you (does your child) belong to?
        [INTERVIEWER: TRY TO GET ONLY "ONE" OR "MAIN" ETHNIC GROUP - IF
        RESPONDENT SELECTS SEVERAL ETHNIC GROUPS, THEN TICK OR SPECIFY
        ALL ETHNIC GROUPS STATED]

[READ LIST]
New Zealand European.............................1
Maori...2
Samoan...3
Cook Island Maori.................................4
Tongan...5
Niuean..6
Chinese..7
Indian...8
Other (specify)   .…… 9

Specified Other

_____
GUARD   Since (CHILD'S FIRST NAME) is less than 12 years old, I will need to
speak to the child's parent or guardian and ask them the questions
instead. Are you their parent or guardian?
[DO NOT READ
Yes..1
No...2
Unsure......................................3
_____

     IF GUARD='Yes' ASK GUARD1

_____
GUARD1   Would you be happy to do the interview on your child's behalf?
[DO NOT READ]
Yes..1   GO TO Q1BEGIN
No...2
Unsure......................................3
_____
     IF GUARD1='No' OR GUARD1='Unsure' SAY EXIT LINE
_____
Thank you for your time. Good bye
_____
     IF GUARD='No' OR GUARD='Unsure' ASK GUARD2

_____
GUARD2   [INTERVIEWER: ASK TO SPEAK WITH PARENT/GUARDIAN]
May I please speak to the child's parent or guardian?
[IF PARENT/GUARDIAN IS NOT AVAILABLE, BEFORE ENTERING RESPONSE,
ARRANGE TO CALL BACK AT A SPECIFIC TIME, TYPE IN "STOP" AND ENTER
APPOINTMENT TIME. IF RESPONDENT DO NOT WANT TO ARRANGE CALL BACK
SELECT "NO" or "UNSURE"]
Yes..1
No...2
Unsure......................................3
_____
     IF GUARD2='No' OR GUARD2='Unsure' SAY EXIT LINE
_____
Thank you for your time. Good bye
_____
     IF GUARD2='Yes' ASK GUARD3

_____
GUARD3   Would you be happy to do the interview on your child's behalf?
Yes..1   GO TO Q1BEGIN
No...2
Unsure......................................3
_____
     IF GUARD3='No' OR GUARD3='Unsure' SAY EXIT LINE
_____
Thank you for your time. Good bye

_____
END OF GUARD QUESTIONS - GO TO Q1BEGIN - ASK ALL
_____

Q1BEGIN   CONTINUE
_____
IF INTRO='17 years or older'
SET Q1RECORD='A participant aged 17 years and older'

IF INTRO='12 to 16 years'
SET Q1RECORD='A child aged 12 - 16 years'

IF INTRO='under 12 years'
SET Q1RECORD='A child under 12 years'

IF Q1RECORD='A child under 12 years' OR Q1RECORD='A participant aged 17 years and older' ASK Q1 - Q33C2I

_____

The following questions are about you (your child) and your household and are for statistical purposes only

_____

IF Q1RECORD='A child under 12 years' ASK Q1A

_____

Q1A   What is the gender of your child that had the last birthday?
         [INTERVIEWER: RECORD SEX]
         Male..1
         Female.......................................2

_____

IF Q1RECORD='A participant aged 17 years and older' ASK Q1B

_____

Q1B   INTERVIEWER: Enter gender of respondent
         Male..1
         Female.......................................2

_____

ASK ALL

_____

Q2   What age are you (is your child)?
         [INTERVIEWER: FOR A CHILD WHOSE AGE IS STATED IN MONTHS, RECORD THE
         AGE IN YEARS AT THE CHILD'S LAST BIRTHDAY. i.e. 1 TO 11 MONTHS IS
         "0" YEARS OF AGE, 12 TO 23 MONTHS IS "1" YEARS, 24 TO 35 MONTHS IS 2
         YEARS OF AGE]
         [PLEASE CHECK SHOWCARD]
         0 TO 11/17+   _____
         Don't know......................................Y
         Refused...{

_____

Q3   How many people in your household are aged under 18 years?
         [ENTER NUMBER OF PEOPLE UNDER 18 YEARS]
         0+   _____
         Don't know......................................Y
         Refused...{

_____

Q4   How many people in your household are aged 18 years and over?
         [ENTER NUMBER OF PEOPLE OVER 18 YEARS]
         1+   _____
         Don't know......................................Y
         Refused...{

_____

Q6   Have you (Has your child) travelled overseas in the past four weeks? [DO NOT READ]
         Yes..1
         No...2
         Refused to say...........................3
         Don't know / Not sure...............4

_____

******* NEW QUESTION ******

_____

I am now going to ask you questions about stomach and intestinal symptoms, in particular diarrhoea and vomiting.

_____

Q7   In the past 4 weeks have you (has your child) had either diarrhoea
         or vomiting? [DO NOT READ]
         Yes..1
         No...2
         Don't know / Not sure...............3

_____

Refused to say...........................4

_____

ROUTE Q7='No' OR Q7='Don't know / Not sure' OR Q7='Refused to
say' GO SECT6Q32

_____

Q8   How many separate episodes of diarrhoea or vomiting did you (your
        child) have in the past 4 weeks? By episode, I mean an illness
        during which you (your child) experienced diarrhoea or vomiting that
        is separated from another such illness by 7 days or more?
        [INTERVIEWER: ENTER NUMBER OF EPISODES IN PAST 4 WEEKS]
        [INTERVIEWER: NUMBER ENTERED CAN ONLY BE BETWEEN 1 AND 4]
        1 TO 4   _____
        Don't know.......................................Y
        Refused..{

_____

This next set of questions refers to the most recent episode of diarrhoea or
vomiting that you have (your child has) had.

_____

Q9   Did this diarrhoea or vomiting occur in the past 7 days? [DO NOT READ]
        Yes...1
        No..2
        Don't know / Not sure................3
        Refused to say...........................4

_____

IF Q9='Yes' ASK Q10

_____

Q10   Are you (Is your child) still having diarrhoea or vomiting now?   [DO NOT READ]
        Yes...1
        No..2
        Don't know / Not sure................3
        Refused to say...........................4

_____

ASK ALL

_____

Q11   During this episode, for how many days in TOTAL did you (your child)
        have diarrhoea and/or vomiting?
        [INTERVIEWER: ENTER NUMBER OF DAYS]
        [INTERVIEWER: MAXIMUM NUMBER OF DAYS IS 28]
        [29 = DON'T KNOW / NOT SURE]
        [30 = REFUSED TO SAY]

        1 TO 30   _____

_____

Q12   On a scale of 1 to 5, how would you rate the severity of this
        episode of diarrhoea or vomiting, if 1 was a very mild episode that
        was scarcely noticeable and 5 was a very severe episode that
        prevented you (your child) from doing all your usual daily
        activities (like going to work or school)? [DO NOT READ]
        1 - Very mild.............................1
        2..2
        3..3
        4..4
        5 - Very severe........................5
        Unsure.....................................6

_____

Q13   During this episode, which of the following symptoms did you (your
        child) have?   [RANDOMIZE]
    -1-   Vomiting
    -2-   Diarrhoea
    -3-   Blood in your stools

_____

-4-   Stomach cramps or abdominal pain
-5-   Fever / chills
-6-   Headache
-7-   Nausea
 8-   Muscle / body aches
-9-   Sore throat or cough or runny nose

```
                -1-   -2-   -3-   -4-   -5-   -6-   -7-   -8-   -9-

Yes..............   1    1    1    1    1    1    1    1    1
No...............   2    2    2    2    2    2    2    2         2
Don't know...   3    3    3    3    3    3    3    3    3
Refused to say. 4    4    4    4    4    4    4    4    4
```
_____
        IF Q13(1)='Yes' ASK Q14A, Q14B
_____
Q14A   During this episode, how many days did you (your child) have
        vomiting?
        [INTERVIEWER: ENTER NUMBER OF DAYS]
        [INTERVIEWER: MAXIMUM NUMBER OF DAYS IS 28]
        1 TO 28   _____
        Don't know.......................................Y
        Refused...{
_____
Q14B   During this episode, what was the most number of times vomiting
        occurred in any 24 hour period?
        [0 = NONE]
        [1 - 4 MEANS THEIR RESPECTIVE NUMBER]
        [5 = 5 OR MORE]
        [6 = DON'T KNOW / NOT SURE]
        [7 = REFUSED TO SAY]
        [DO NOT READ: UNLESS RESPONDENT REPLIES "DON'T KNOW / NOT SURE]

        0 TO 7   _____
_____
        IF Q13(2)='Yes' ASK Q15A, Q15B
_____
Q15A   During this episode, how many days did you (your child) have
        diarrhoea?
        [INTERVIEWER: MOST RESPONDENTS WILL UNDERSTAND THIS TERM. "LOOSE
        BOWEL MOTIONS" IS ONE ALTERNATIVE TERM BUT THE MORE COLLOQUIAL TERM
        OF "SOFT OR RUNNY POO" MAY BE ALSO REQUIRED]
        [INTERVIEWER: ENTER NUMBER OF DAYS]
        [INTERVIEWER: MAXIMUM NUMBER OF DAYS IS 28]
        1 TO 28   _____
        Don't know.......................................Y
        Refused...{
_____
Q15B   During this episode, what was the maximum number of stools or bowel
        movements you (your child) had in any 24 hour period?
        [0 = NONE]
        [1 - 4 MEANS THEIR RESPECTIVE NUMBER]
        [5 = 5 OR MORE]
        [6 = DON'T KNOW / NOT SURE]
        [7 = REFUSED TO SAY]
        [DO NOT READ: UNLESS RESPONDENT REPLIES "DON'T KNOW / NOT SURE]

        0 TO 7   _____
_____
        IF Q1RECORD='A child under 12 years' OR Q1B='Male' ASK Q16A

Q16A   Do you think your (your child) symptoms were caused by ONE of the
       following?
       [INTERVIEWER: DO NOT READ "OTHER", UNLESS RESPONDENT MENTION
       SOMETHING ELSE THEN SELECT "OTHER" AND ENTER THEIR RESPONSE]
       [READ LIST]
       A chronic or long lasting illness.................1
       Medication or medical treatment................2
       [DO NOT READ] Don't know / Not sure..3
       [DO NOT READ] Refused to say..............4
       Other (specify)   ……..5

       Specified Other

_____
       IF Q1B='Female' ASK Q16B

_____
Q16B   Do you think your symptoms were caused by ONE of the following?
       [INTERVIEWER: DO NOT READ "OTHER", IF RESPONDENT MENTION SOMETHING
       ELSE THEN SELECT "OTHER" AND ENTER THEIR RESPONSE]
       [READ LIST]
       A chronic or long lasting illness....................1
       Medication or medical treatment...................2
       Pregnancy / morning sickness.......................3
       [DO NOT READ] Don't know / Not sure….4
       [DO NOT READ] Refused to say................5
       Other (specify)   ……...6

       Specified Other

_____
       ASK ALL

_____
Q17   Did you (your child) consult any of the following for advice or
       treatment for these symptoms?   [RANDOMIZE]
   -1-   GP
   -2-   Private A & E clinic or after hours doctor
   -3-   Hospital Emergency Department
   -4-   Nursing services
   -5-   Pharmacist
   -6-   Healthline (24 hour telephone health advice service)
   -7-   Alternative healthcare
             -1-   -2-   -3-   -4-   -5-   -6-   -7-

Yes............... 1   1   1   1   1   1   1
No................ 2   2   2   2   2   2   2
Don't Know   3   3   3   3   3   3   3
Refused to say .4   4   4   4   4   4   4

_____
       IF Q17(7)='Yes' ASK Q17G

_____
Q17G   Please specify the name of the Alternative healthcare
       [NOTE: ALTERNATIVE HEALTHCARE INCLUDES NATUROPATHY, HOMEOPATHY,
       CHIROPRACTICS, HERBALIST etc.]
       [CODED]

_____
       IF Q17(1)='Yes' OR Q17(2)='Yes' OR Q17(3)='Yes' OR Q17(4)='Yes' ASK Q18

_____
Q18   Were you (was your child) admitted to hospital overnight for this
       illness? [DO NOT READ]
       Yes...1
       No..2

Don't know / Not sure...............3
        Refused to say...........................4

_____
        IF Q18='Yes' ASK Q18A
_____

Q18A   How many days did you (your child) spend in hospital?
        [INTERVIEWER: ENTER NUMBER OF DAYS]
        1+   _____
        Don't know.......................................Y
        Refused..{

_____
        IF Q13(2)='Yes' ASK Q19
_____

Q19   As a result of this illness, were you (was your child) asked to
        provide a stool sample for testing?
        [INTERVIEWER: THE TERM "STOOL SAMPLE" MAY REQUIRE ALTERNATIVE TERMS
        SUCH AS "FAECAL SAMPLE / SPECIMEN" OR EVEN "SAMPLE OF POO"]
        [DO NOT READ]
        Yes...1
        No..2
        Don't know / Not sure...............3
        Refused to say...........................4

_____
        IF Q19='Yes' ASK Q20
_____

Q20   Did you (your child) actually provide a stool sample that was tested
        by a laboratory? [DO NOT READ]
        Yes...1
        No..2
        Don't know / Not sure...............3
        Refused to say...........................4

_____
        IF Q20='Yes' ASK Q21
_____

Q21   Do you know the result of the stool sample?
        [DO NOT READ]

        Yes...1
        No..2
        Don't know / Not sure...............3
        Refused to say...........................4

_____
        IF Q21='Yes' ASK Q21A
_____

Q21A   What was the result?
        [CODED]

_____
        IF Q20='No' ASK Q22
_____

Q22   Why did you (your child) not provide a stool sample?   [DO NOT READ]
        Recovered / felt better..........................1
        Inconvenience (time, lack of facilities)2
        Disgusting / unpleasant........................3
        Physically unable................................4
        Forgot..5
        Don't know / Not sure..........................6
        Other (specify)   7
        Specified Other

_____
        ASK ALL

Q23   Did you (your child) take any medication for your (their) symptoms? [DO NOT READ]
     Yes..1
     No..2
     Don't know / Not sure................3
     Refused to say............................4

     IF Q23='Yes' ASK Q24

Q24   Did you (your child) take any of the following medications? [RANDOMIZE]
  -1-   Medicine to stop diarrhoea (e.g. Immodium, Lomotil)
  -2-   Medicine to stop nausea (e.g. Maxalon, Stemetil)
  -3-   Antibiotics (e.g. Amoxil, Synermox, Erythromycin, Bactrim)

	-1-	-2-	-3-
Yes...............	1	1	1
No...............	2	2	2
Don't know..	3	3	3
Refused to say...	4	4	4

     ASK ALL

I am now going to ask you some questions about how your (your child's) illness
affected work, schooling and other activities.

     IF Q1RECORD='A child under 12 years' SKIP Q25

Q25   During the last four weeks were you (your child) employed either
     full-time or part-time?   [DO NOT READ]
     Yes..1
     No..2
     Don't know / Not sure................3
     Refused to say............................4

     IF Q25='Yes' ASK Q26

Q26   As a result of this illness, did you (your child) miss work? [DO NOT READ]
     Yes..1
     No..2
     Don't know / Not sure................3
     Refused to say............................4

     IF Q26='Yes' ASK Q26A

Q26A   How many days did you (your child) miss?
     [INTERVIEWER: ENTER NUMBER OF DAYS MISSED FROM WORK DUE TO ILLNESS]
     1+   _____
     Don't know.......................................Y
     Refused...{

     ASK ALL

Q27   [INTERVIEWER: THE WORD "PRESCHOOL" IN THIS QUESTION IS ONLY
     APPLICABLE FOR A CHILD UNDER 5 YEARS OF AGE]
     During the last four weeks did you (your child) attend (preschool),
     school or any other educational institution?   [DO NOT READ]
     Yes..1
     No..2
     Don't know / Not sure................3
     Refused to say............................4

Q28   [INTERVIEWER: THE WORD "PRESCHOOL" IN THIS QUESTION IS ONLY
APPLICABLE FOR A CHILD UNDER 5 YEARS OF AGE]
As a result of this illness, did you (your child) miss (preschool),
school or other study? [DO NOT READ]
Yes..1
No...2
Don't know / Not sure................3
Refused to say...........................4

Q28A   How many days did you (your child) miss?
[INTERVIEWER: ENTER NUMBER OF DAYS MISSED FROM SCHOOL/STUDY DUE TO
ILLNESS]
1+   _____
Don't know.......................................Y
Refused...{

Q29   As a result of this illness, did you (your child) miss recreation
activities or holiday activities or work around the house? [DO NOT READ]
Yes..1
No...2
Don't know / Not sure................3
Refused to say...........................4

Q29A   How many days did you (your child) miss?
[INTERVIEWER: ENTER NUMBER OF DAYS MISSED FROM
RECREATION/VACATION/HOUSEHOLD WORK]
1+   _____
Don't know.......................................Y
Refused...{

Q30   As a result of your (your childs) illness, did anyone else in your
household have to miss work? [DO NOT READ]
Yes..1
No...2
Don't know / Not sure................3
Refused to say...........................4

Q30A   How many days did they miss work?
[INTERVIEWER: ENTER NUMBER OF DAYS MISSED FROM WORK]
1+   _____
Don't know.......................................Y
Refused...{

Q31   Did anyone else in your household have a similar illness? [DO NOT READ]
Yes..1

No..2
Don't know / Not sure................3
Refused to say............................4

_____

IF Q31='Yes' ASK Q31A

_____

Q31A   How many others (not including yourself (your child)) in your
        household had a similar illness?
        [INTERVIEWER: ENTER NUMBER OF OTHERS IN HOUSEHOLD WITH SIMILAR
        ILLNESS]
        1+   _____
        Don't know.......................................Y
        Refused...{

_____

ASK ALL

_____

SECT6Q32 CONTINUE

_____

Q32   I would now like to ask you about your total HOUSEHOLD income. I am
        going to read you a list of income categories. Please stop me when
        a category best describes your total household income including all
        household members, before tax, in the last financial year? Was it...?
        [READ LIST]
        Less than $25,000.......................................1
        $25,000 to $50,000.....................................2
        over $50,000 to $100,000..........................3
        more than $100,000...................................4
        [DO NOT READ] Don't know / Not sure..5
        [DO NOT READ] Refused to say..............6

_____

Q33   It is important to identify which geographic areas are most affected
        by stomach and intestinal illness. Are you willing to give your
        street name and suburb or town? [DO NOT READ]
        Yes...1
        No..2
        Unsure.......................................3

_____

IF Q33='Yes' ASK Q33A, Q33B

_____

Q33A   What is the name of your street?
          [INTERVIEWER: ENTER STREET NAME ONLY][CODED]
          [CHECK SPELLING]

_____

Q33B   What suburb or town do you live in?
          [INTERVIEWER: ENTER SUBURB OR TOWN][CODED]

_____

          IF Q33='Yes' ASK Q33C

_____

Q33C   It would be helpful if we could locate your household according to
          specific Census boundaries. Are you willing to give us the street
          number of your house or a nearby house on the same side of your
          street?
          [DO NOT READ]

          Yes...1
          No..2
          Why do you need an address?....3
          Don't know / Not sure................4
          Refused to say...........................5

_____

          IF Q33C='Yes' ASK Q33C1

_____

Q33C1   What is your street number?
          [INTERVIEWER: ENTER THE STREET NUMBER]

_____

          IF Q33C='Why do you need an address?' READ MESSAGE - ASK Q33C2

_____

Some diseases occur more often in different parts of the country. It is
important to identify which areas are most affected by stomach and intestinal
disease. In order to do this we need to map your household according to
specific Census boundaries

_____

Q33C2   Are you willing to give us the street number of your house or a
          nearby house on the same side of the street?
          [DO NOT READ]

          Yes...1
          No..2
          Unsure.......................................3

_____

          IF Q33C2='Yes' ASK Q33C2I

_____

Q33C2I   ... street number
          [INTERVIEWER: ENTER THE STREET NUMBER]

_____

_____

Before I speak to (child's first name) we need to ask you a few questions about
your child and household, which will be used for statistical purposes only

_____

PQ1   What is the gender of your child that had the last birthday?
       [INTERVIEWER: RECORD GENER]

(71) SP

Male...1
Female...2

_____

PQ2   What age is your child?
       [INTERVIEWER: FOR A PERSON WHOSE AGE IS STATED IN YEARS AND MONTHS,
       RECORD THE AGE IN YEARS AT THAT PERSON'S LAST BIRTHDAY. i.e. 12
       YEARS AND 1 TO 11 MONTHS IS "12" YEARS OF AGE]

12 TO 16   _____ (72-73)
Don't know......................................Y
Refused...{

_____

PQ3   How many people in your household are aged under 18 years?
       [INTERVIEWER: ENTER NUMBER OF PEOPLE AGE UNDER 18 YEARS - ENTER
       NUMBER]

Card: 05 (6-7)
1+   _____ (8-16)
Don't know......................................Y
Refused...{

_____

PQ4   How many people in your household are aged 18 years and over?
       [INTERVIEWER: ENTER NUMBER OF PEOPLE AGE 18 YEARS AND OVER - ENTER
       NUMBER]

1+   _____ (17-25)
Don't know......................................Y
Refused...{

_____

PQ6   Has your child travelled overseas in the past four weeks?
       [DO NOT READ]

(26) SP

Yes...1
No..2
Don't know / Not sure................3
Refused to say...........................4

_____

PQ7   I would now like to ask you about your total HOUSEHOLD income. I am
       going to read you a list of income categories. Please stop me when
       a category best describes your total household income including all
       household members, before tax, in the last financial year? Was it...?
       [READ LIST]

(27) SP

Less than $25,000.................................1
$25,000 to $50,000..............................2
Over $50,000 to $100,000...................3
More than $100,000.............................4
[DO NOT READ] Don't know.............5
[DO NOT READ] Refused to say........6

_____

PQ8   It is important to identify which geographic areas are most affected
        by stomach and intestinal illness. Are you willing to give your
        street name and suburb or town?
        [DO NOT READ]

                                    (28) SP
        Yes..1
        No...2
        Unsure...3

_____
        IF PQ8='Yes' ASK QP8A, PQ8B
_____

QP8A   What is the name of street name?
        [CODED]

                            (29-38)

_____
PQ8B   What suburb or town do you live in?
        [CODED]

                            (39-48)

_____
        IF PQ8='Yes' ASK PQ8A1
_____

PQ8A1   It would be helpful if we could locate your household according to
        specific Census boundaries. Are you willing to give us the street
        number of your house or a nearby house on the same side of the
        street?
        [DO NOT READ]

                                    (49) SP
        Yes..1
        No...2
        Why do you need an address?....3
        Don't know / Not sure................4
        Refused to say...........................5

_____
        IF PQ8A1='Yes' ASK PQ8A1I
_____

PQ8A1I   What is your street number?
        [INTERVIEWER: ENTER THE STREET NUMBER]

                            (50-59)

_____
        IF PQ8A1='Why do you need an address?' READ MESSAGE - ASK PQiA1II
_____

Some diseases occur more often in different parts of the country. It is
important to identify which areas are most affected by stomach and intestinal
disease. In order to do this we need to map your household according to
specific Census boundaries

_____
PQ8A1II   Are you willing to give us the street number of your house or a
        nearby house on the same side of the street?
        [DO NOT READ]

                                    (60) SP
        Yes..1
        No...2
        Unsure...3

_____

PQ8A1III   What is your street number?
     [INTERVIEWER: ENTER THE STREET NUMBER]

                          (61-70)

_____

    ASK ALL

_____

Thank you for your time. May I now speak to (child's first name)?

_____

Hello my name is %INAME%. I'm calling on behalf of New Zealand Food Safety
Authority. We are conducting a national survey about the health issues of
stomach and intestinal illness. The interview is confidential and takes about
5 - 10 minutes. You can refuse to answer any question at any time during this
survey.
I am going to ask you questions about stomach and intestinal symptoms, in
particular diarrhoea and vomiting.

_____

PQ9   In the past 4 weeks have you had either diarrhoea or vomiting?
    [DO NOT READ]

                         (71) SP
    Yes..............................1
    No..............................2
    Don't know / Not sure...........................3
    Refused to say..................................4

_____

    ROUTE PQ9='No' OR PQ9='Don't know / Not sure' OR PQ9='Refused to
say' GO NAMESTAT

_____

PQ10   How many episodes of diarrhoea or vomiting did you have in the past
    4 weeks? By episode, I mean an illness during which you experienced
    diarrhoea or vomiting that is separated from another such illness by
    7 days or more
    [INTERVIEWER: ENTER NUMBER OF EPISODES IN PAST 4 WEEKS]
    [INTERVIEWER: NUMBER ENTERED CAN ONLY BE BETWEEN 1 AND 4]

    1 TO 4   _____   (72)
    Don't know......................................Y
    Refused...{

_____

This next set of questions refers to the most recent episode of diarrhoea or
vomiting that you have had.

_____

PQ11   Did this diarrhoea or vomiting occur in the past 7 days?
    [DO NOT READ]

                         (73) SP
    Yes..............................1
    No..............................2
    Don't know / Not sure...........................3
    Refused to say..................................4

_____

_____

PQ12   Are you still having diarrhoea or vomiting now?
     [DO NOT READ]

(74) SP

Yes..1
No..2
Don't know / Not sure...........................3
Refused to say..................................4

_____

ASK ALL

_____

PQ13   During this episode, for how many days in TOTAL did you have
     diarrhoea and/or vomiting?
     [INTERVIEWER: ENTER NUMBER OF DAYS]
     [INTERVIEWER: MAXIMUM NUMBER OF DAYS IS 28]
     [29 = DON'T KNOW / NOT SURE]
     [30 = REFUSED TO SAY]

1 TO 30   _____ (75-76)

_____

PQ14   On a scale of 1 through to 5, how would you rate the severity of
     this episode of diarrhoea or vomiting, if 1 was a very mild episode
     that was scarcely noticeable and 5 was a very severe episode that
     prevented you from doing all your usual daily activities (like going
     to work or school)?
     [DO NOT READ]

(77) SP

1 - Very mild episode...........................1
2..2
3..3
4..4
5 - Very severe episode.........................5
Unsure...6

_____

PQ15   During this episode, which of the following symptoms did you have?

[RANDOMIZE]

-1-   Vomiting
-2-   Diarrhoea
-3-   Blood in your stools
-4-   Stomach cramps or abdominal pain
-5-   Fever / Chills
-6-   Headache
-7-   Nausea

	-1- (78)	-2- (79)	-3- (80)	-4- 6/8	-5- (9)	-6- (10)	-7- (11)	SP
Yes...............	1	1	1	1	1	1	1	
No................	2	2	2	2	2	2	2	
Don't know / Not sure.............	3	3	3	3	3	3	3	
Refused to say....	4	4	4	4	4	4	4	

-8-   Muscle / body aches
-9-   Sore throat or cough or runny nose

	-8- (12)	-9- (13)	SP
Yes...............	1	1	
No................	2	2	
Don't know / Not sure.............	3	3	
Refused to say....	4	4	

_____
        IF PQ15(1)='Yes' ASK PQ16A, PQ16B
_____

PQ16A   During this episode, how many days did you have vomiting?
        [INTERVIEWER: ENTER NUMBER OF DAYS]
        [INTERVIEWER: MAXIMUM NUMBER OF DAYS IS 28]

        1 TO 28   _____ (14-15)
        Don't know.......................................Y
        Refused...{

_____
PQ16B   During this episode, what was the most number of times vomiting
        occurred in any 24-hour period?
        [0 = NONE]
        [1 - 4 MEANS THEIR RESPECTIVE NUMBER]
        [5 = 5 OR MORE]
        [6 = DON'T KNOW / NOT SURE]
        [7 = REFUSED TO SAY]
        [DO NOT READ: UNLESS RESPONDENT REPLIES "DON'T KNOW / NOT SURE]

        0 TO 7   _____ (16)

_____
        IF PQ15(2)='Yes' ASK PQ17A, PQ17B
_____

PQ17A   During this episode, how many days did you have diarrhoea?
        [INTERVIEWER: MOST RESPONDENTS WILL UNDERSTAND THIS TERM. "LOOSE
        BOWEL MOTIONS" IS ONE ALTERNATIVE TERM BUT THE MORE COLLOQUIAL TERM
        OF "SOFT OR RUNNY POO" MAY BE ALSO REQUIRED]
        [INTERVIEWER: ENTER NUMBER OF DAYS]
        [INTERVIEWER: MAXIMUM NUMBER OF DAYS IS 28]

        1 TO 28   _____ (17-18)
        Don't know.......................................Y

_____

Refused..{

_____

PQ17B   During this episode, what was the maximum number of stools or bowel
       movements you had in any 24-hour period?
       [0 = NONE]
       [1 - 4 MEANS THEIR RESPECTIVE NUMBER]
       [5 = 5 OR MORE]
       [6 = DON'T KNOW / NOT SURE]
       [7 = REFUSED TO SAY]
       [DO NOT READ: UNLESS RESPONDENT REPLIES "DON'T KNOW / NOT SURE]

       0 TO 7   _____   (19)

_____
     IF PQ1='Male' ASK PQ18A

_____
PQ18A   Do you think your symptoms were caused by ONE of the following?
       [INTERVIEWER: DO NOT READ "OTHER", IF RESPONDENT MENTION SOMETHING
       ELSE THEN SELECT "OTHER" AND ENTER THEIR RESPONSE]
       [READ LIST]

                           (20) SP
       A chronic or long lasting illness................1
       Medication or medical treatment..................2
       [DO NOT READ] Don't know / Not sure..............3
       [DO NOT READ] Refused to say.....................4
       Other (specify)   5
                        (21-30)
       Specified Other

_____
     IF PQ1='Female' ASK PQ18B

_____
PQ18B   Do you think your symptoms were caused by ONE of the following?
       [INTERVIEWER: DO NOT READ "OTHER", IF RESPONDENT MENTION SOMETHING
       ELSE THEN SELECT "OTHER" AND ENTER THEIR RESPONSE]
       [READ LIST]

                           (31) SP
       A chronic or long lasting illness................1
       Medication or medical treatment..................2
       Pregnancy / morning sickness.....................3
       [DO NOT READ] Don't know / Not sure..............4
       [DO NOT READ] Refused to say.....................5
       Other (specify)   6
                        (32-41)
       Specified Other

_____
     ASK ALL

_____
***** New Questions *****

_____

PQ19   Did you consult any of the following for advice or treatment for
        these symptoms?

        [RANDOMIZE]

  -1-   GP
  -2-   Private A & E clinic or after hours doctor
  -3-   Hospital Emergency Department
  -4-   Nursing services
  -5-   Pharmacist
  -6-   Healthline (24 hour telephone health advice service)
  -7-   Alternative healthcare

	-1-	-2-	-3-	-4-	-5-	-6-	-7-	
	(42)	(43)	(44)	(45)	(46)	(47)	(48)	SP
Yes..............	1	1	1	1	1	1	1	
No................	2	2	2	2	2	2	2	
Don't know / Not								
sure..............	3	3	3	3	3	3	3	
Refused to say....	4	4	4	4	4	4	4	

_____
        IF PQ19(7)='Yes' ASK PQ19G
_____

PQ19G   Please specify the name of the Alternative healthcare
        [NOTE: ALTERNATIVE HEALTHCARE INCLUDES NATUROPATHY, HOMEOPATHY,
        CHIROPRACTICS, HERBATLIST etc.]
        [CODED]

                        (49-58)

_____
        IF PQ19(1)='Yes' OR PQ19(2)='Yes' OR PQ19(3)='Yes' OR PQ19(4)='Yes' ASK PQ20
_____

PQ20   Were you admitted to hospital overnight for this illness?
        [DO NOT READ]

                        (59) SP
        Yes..............................1
        No...............................2
        Don't know / Not sure............3
        Refused to say...................4

_____
        IF PQ20='Yes' ASK PQ20A
_____

PQ20A   How many days did you spend in hospital?
        [INTERVIEWER: ENTER NUMBER OF DAYS]

        1+   _____ (60-68)
        Don't know.......................Y
        Refused..........................{

_____

IF PQ15(2)='Yes' ASK PQ21

_____

PQ21   As a result of this illness, were you asked to provide a stool
sample for testing?
[INTERVIEWER: THE TERM "STOOL SAMPLE" MAY REQUIRE ALTERNATIVE TERMS
SUCH AS "FAECAL SAMPLE / SPECIMEN" OR EVEN "SAMPLE OF POO"]
[DO NOT READ]

(69) SP
Yes..1
No...2
Don't know / Not sure............................3
Refused to say..................................4

_____

    IF PQ21='Yes' ASK PQ22

_____

PQ22   Did you actually provide a stool sample that was tested by a
laboratory?
[DO NOT READ]

(70) SP
Yes..1
No...2
Don't know / Not sure............................3
Refused to say..................................4

_____

    IF PQ22='Yes' ASK PQ23

_____

PQ23   Do you know the result of the stool sample?
[DO NOT READ]

(71) SP
Yes..1
No...2
Don't know / Not sure............................3
Refused to say..................................4

_____

    IF PQ23='Yes' ASK PQ23A

_____

PQ23A   What was the result?
[CODED]

Card: 07 (6-7)
(8-27)

_____

IF PQ22='No' ASK PQ24

_____
PQ24   Why did you NOT provide a stool sample?
       [DO NOT READ]

(28) SP
Recovered / felt better..........................1
Inconvenience (time, lack of facilities).........2
Disgusting / Unpleasant..........................3
Physically unable...............................4
Forgot..5
Don't know / Not sure...........................6
Other (specify)   7
(29-38)
Specified Other

_____
    ASK ALL

_____
PQ25   Did you take any medication for your symptoms?
       [DO NOT READ]

(39) SP
Yes...1
No..2
Don't know / Not sure...........................3
Refused to say..................................4

_____
    IF PQ25='Yes' ASK PQ26

_____
PQ26   Did you take any of the following medications?

    [RANDOMIZE]

  -1-   Medicine to stop diarrhoea (e.g. Immodium, Lomotil)
  -2-   Medicine to stop nausea (e.g. Maxalon, Stemetil)
  -3-   Antibiotics (e.g. Amoxil, Synermox, Erythromycin, Bactrim)

	-1- (40)	-2- (41)	-3- (42)	SP
Yes...............	1	1	1	
No...............	2	2	2	
Don't know / Not sure.............	3	3	3	
Refused to say....	4	4	4	

_____
    ASK ALL

_____
 I am now going to ask you some questions about how your illness affected work,
schooling and other activities

_____
PQ27   During the last four weeks were you employed either full-time or
      part-time?
      [DO NOT READ]

(43) SP
Yes...1
No..2
Don't know / Not sure...........................3
Refused to say..................................4

_____

_____

PQ28   As a result of this illness, did you miss work?
     [DO NOT READ]

                         (44) SP
     Yes..1
     No...2
     Don't know / Not sure...........................3
     Refused to say..................................4

_____

_____

PQ28A   How many days did you miss?
     [INTERVIEWER: ENTER NUMBER OF DAYS MISSED FROM WORK DUE TO ILLNESS]

     1+   _____ (45-53)
     Don't know......................................Y
     Refused...{

_____

_____

PQ29   During the last four weeks did you attend, school or any other
     educational institution?
     [DO NOT READ]

                         (54) SP
     Yes..1
     No...2
     Don't know / Not sure...........................3
     Refused to say..................................4

_____

_____

PQ30   As a result of this illness, did you miss, school or other study?
     [DO NOT READ]

                         (55) SP
     Yes..1
     No...2
     Don't know / Not sure...........................3
     Refused to say..................................4

_____

_____

PQ30A   How many days did you miss?
     [INTERVIEWER: ENTER NUMBER OF DAYS MISSED FROM SCHOOL/STUDY DUE TO
     ILLNESS]

     1+   _____ (56-64)
     Don't know......................................Y
     Refused...{

_____

_____

PQ31   As a result of this illness, did you miss recreation activities or
holiday activities or work around the house?
[DO NOT READ]

                              (65) SP
Yes..1
No..2
Don't know / Not sure...........................3
Refused to say..................................4

_____

     IF PQ31='Yes' ASK PQ31A

_____

PQ31A   How many days did you miss?
[INTERVIEWER: ENTER NUMBER OF DAYS MISSED FROM
RECREATION/VACATION/HOUSEHOLD WORK]

1+   _____ (66-74)
Don't know.....................................Y
Refused..{

_____

     ASK ALL

_____

PQ32   As a result of your illness, did anyone else in your household have
to miss work?
[DO NOT READ]

                              (75) SP
Yes..1
No..2
Don't know / Not sure...........................3
Refused to say..................................4

_____

     IF PQ32='Yes' ASK PQ32A

_____

PQ32A   How many days did they miss work?
[INTERVIEWER: ENTER NUMBER OF DAYS MISSED FROM WORK]

                       Card: 08 (6-7)
1+   _____ (8-16)
Don't know.....................................Y
Refused..{

_____

     ASK ALL

_____

PQ33   Did anyone else in your household have a similar illness?
[DO NOT READ]

                              (17) SP
Yes..1
No..2
Don't know / Not sure...........................3
Refused to say..................................4

_____

IF PQ33='Yes' ASK PQ33A

_____

PQ33A   How many others (not including yourself) in your household had a
         similar illness?
         [INTERVIEWER: ENTER NUMBER OF OTHERS IN HOUSEHOLD WITH SIMILAR
         ILLNESS]

         1+   _____ (18-26)
         Don't know......................................Y
         Refused..{

_____

         ASK ALL

_____

NAMESTAT CONTINUE

_____

NAME   Occasionally our supervisors call to ensure I have done the
         interview.
         May I have your first name only

_____

PHCHK   ....and can I confirm that your phone number is %KEY%
                              (62) SP
           Yes...1
           No...2

_____

         IF PHCHK='No' ASK STD, PHONE

_____

STD   Could you please tell me the std code for your area
         [YOU CAN ONLY ENTER THE STD CODE 04 OR 4]

         1 TO 9   _____   (63)

_____

PHONE   ....and if you could tell me your phone number
           [ENTER ONLY THE RESPONDENTS 7 DIGIT PHONE NUMBER]

           1000000 TO 9999999   _____ (64-70)

_____

         ASK ALL

_____

That's the end of the interview. The answers of everyone in this study will be
combined to give us information about stomach illness in New Zealand. The
result of this survey will be published on the New Zealand Food Safety
Authority website after all interviews are completed by the end of January
2007. If you have any queries about the content of the survey you can contact
Rob Lake (03) 351 6019 and if you have any queries on how the survey was
administered you can ring my supervisor Pania Brown on (09) 373 8711
Thank you very much for your time.

_____