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Enhancing Foodborne Disease Surveillance Across Australia

A Survey of Community Diarrhoeal Illness Among Adults and Young Children in Queensland

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CONTENTS

SUMMARY

- A total of 3081 persons aged 18 years or older were surveyed about diarrhoeal illness in the month preceding the interview.
- A nested survey of 386 persons who were parents or caregivers to children aged 7 months to 4 years was conducted to obtain corresponding data on diarrhoeal illness in children in this age range.
- 13.6% of adults and 18.9% of children were reported as having had acute diarrhoea in the preceding month.
- 18.4% of adults with acute diarrhoea and 46.6% of parents or carers of children with acute diarrhoea, sought medical care for their illness, while 2.6% of adult cases and 8.2% of child cases submitted stool specimens for pathology testing.
- Adults who consulted a medical practitioner were as likely to have a stool specimen requested (22.1%) as were parents or carers of children (26.5%) who sought medical care.
- Persons aged 18 to 39 years were almost twice as likely as those aged 40 years and older to report acute diarrhoea in the preceding month.
- There was no significant difference between the proportion of male (14.0%) and female (13.1%) respondents with acute diarrhoea.
- There was no significant difference for incidence of acute diarrhoea between persons living in a capital city or other major urban areas and persons living in rural and remote areas.
- There was no significant difference in the incidence of acute diarrhoea between lower and higher socioeconomic groups as measured by SEIFA.
- Fever and vomiting were reported more frequently among young children with acute diarrhoea than in adults.
- Persons aged 60 years and older were more likely to seek medical consultation for acute diarrhoea than persons aged 18 to 59 years.
- The estimated annual incidence of acute diarrhoeal illness in the Queensland population is 5.3 to 6.4 million episodes or 1.49 to 1.79 episodes / person / year.
- The estimated number of foodborne illness cases in Queensland is between 1.6 million and 1.9 million cases per year. This represents an annual incidence of foodborne illness in Queensland of 0.45 to 0.54 episodes / person / year.
- It is estimated that between 0.1% and 1.0% of acute gastroenteritis cases in Queensland have a confirmed diagnosis with a notifiable pathogen.

INTRODUCTION

This report documents the results of a telephone survey of community diarrhoeal illness among Queensland residents aged 18 years and older, and children aged between 7 months and 4 years. The survey was conducted by the Epidemiology Services Unit, Health Information Centre, of Queensland Health between 12 March and 3 May 2001 on behalf of OzFoodNet Queensland.

The survey of community diarrhoeal illness was conducted as part of the Queensland Health 2001 Omnibus Survey which also comprised questions on a number of other health topics including nutrition, physical activity, falls, child play equipment injury, child poisoning and child immunisation. Standard demographic questions were also asked of all respondents.

The questions on diarrhoeal illness were included upon the request of the Queensland OzFoodnet Site in order to obtain information which could be used to estimate the incidence of acute diarrhoeal illness in Queensland and determine the health seeking behaviours of persons with acute diarrhoea and the investigation patterns of medical practitioners.

The principle aims of the gastroenteritis component of the survey were:

- to obtain estimates of the incidence of acute diarrhoea in adults and young children in Queensland
- to determine what proportion of adults and young children with acute diarrhoea seek medical attention
- to determine what proportion of medical practitioners request a stool sample for laboratory testing for persons presenting with acute diarrhoea
- to determine what proportion of cases who consult a medical practitioner for acute diarrhoea actually provide a stool specimen for laboratory testing
- to examine the influence of certain demographic factors on the incidence of acute diarrhoea and the likelihood that medical attention will be sought
- to identify the burden of acute diarrhoeal illness in terms of time taken off from normal duties
- to obtain information which could be used in conjunction with data from other sources, in order to calculate a crude estimate of the incidence of foodborne illness in Queensland

Interviews were restricted to persons 18 years and above who were contactable by private telephone. The information relating to child diarrhoeal illness was restricted to children aged seven months to four years and was obtained from the much smaller subgroup of adult interviewees who identified as parents or caregivers for a child in that age range. There is no information relating to children in the 5-17 year age range.

The interview sought information relating to diarrhoeal illness in the preceding month only, therefore, the data collected from this survey is restricted to the months of February to April.

METHODS

Interviews

Interviews were conducted using the Health Information Centre's Computer Aided Telephone Interview (CATI) system. Trained telephone interviewers and a supervisor were employed to conduct the interviews.

Survey design

The survey design was a two stage random sample with private households as the primary sampling unit. The target population was households with at least one individual aged 18 years or more. A simple random sample of Queensland households was selected from numbers listed in at least one of the White Pages directories for Queensland published over the previous five years. From each selected private household, one resident individual aged 18 years or more was asked to participate in the survey. If there was more than one eligible individual in a household contacted, the person who had most recently had a birthday was asked to participate. Owing to differences between male and female response rates, the survey was stratified by sex to ensure an equal male-female ratio.

New telephone numbers not yet listed in a directory and silent numbers held by a single household for more than five years were excluded from the sampling frame. The sample selected represented a simple random sample drawn from over 95% of private households in Queensland with a fixed phone.

The following individuals were excluded from selection:

- those under 18 years of age;
- those unable to speak English sufficiently well for an interview to be conducted;
- those with a mental or physical disability which prevented them from being able to take part in a telephone interview;
- usual residents of the selected household who were absent from the household during the interview period;
- visitors to the selected household who did not usually live in that household
- Unable to make contact with a household member after at least 6 telephone attempts

A combination of daytime and evening interviewing sessions was utilised in order to give people, particularly shift workers, every opportunity to participate. Sessions were Monday to Friday (3:30pm – 8:30pm), Tuesday (9:30am – 1:30pm), Thursday (12:30 - 3:30pm) and Saturday (9:30am – 4:30pm). If a respondent was contacted at an inconvenient time, an appointment was made for a more suitable time if possible.

Child diarrhoeal survey

A nested survey of diarrhoeal illness was conducted to obtain information about children aged 7 months to 4 years old by interviewing survey respondents who were parents or caregivers to a child in this age range. If there was more than one child aged between 7 months and 4 years in the household, the child who most recently had a birthday was selected for the survey.

Questionnaire

A total of 17 diarrhoeal-related questions were administered to adult respondents and 13 diarrhoeal-related questions to carers of children aged 7 months to 4 years. These included questions on chronic illness, other gastrointestinal symptoms, medical consultation, investigation patterns of medical practitioners and time off from routine work and other duties because of illness.

The case definition for an episode of diarrhoea was three or more loose stools in a 24 hour period during the month preceding the interview. Persons with a known chronic condition in which diarrhoea is a predominant symptom, were excluded from the definition of acute diarrhoea unless their symptoms were different to the usual pattern seen with their chronic illness. A standard set of demographic questions was also included. The diarrhoeal-related and demographic questions from the Omnibus 2001 Survey are presented in Appendix 2.

Demographic information

The following demographic information was collected from survey respondents:

- age group and sex of respondent
- geographic location of respondent
- education level of respondent
- total household income
- first language spoken of respondent
- socioeconomic status of respondent (SEIFA quintiles)

The Australian Bureau of Statistics (ABS) has developed Socioeconomic Indices for Areas (SEIFA), which entails summary measures derived from previous population censuses to measure various aspects of socioeconomic conditions by geographic area[1]. For this survey, the Queensland Index of the ABS Index of Relative Socioeconomic Disadvantage, at the level of statistical local area (SLA) was used as a method of classifying respondents by socio-economic status.

The Australian Bureau of Statistics Rural, Remote and Metropolitan Areas Classification was used as a method of classifying respondents according to geographic location[2]. This classification is based on population size and density and categorises SLA's into metropolitan areas (capital city and other major urban), rural zones and remote zones.

Data analysis and statistical testing

Data were analysed using Epi Info (V 6.04)[3]. This program was used to compute medians and frequencies with 95% confidence intervals[4]. Statistical significance testing of the associations between population subgroups and various outcomes were conducted using the chi-squared test for proportions and the Kruskal-Wallis test for continuous data.

Estimates of acute diarrhoeal illness in Queensland

Estimates of the incidence of acute diarrhoeal illness were calculated based on the assumptions that an episode of diarrhoeal illness was short in duration in comparison to the reporting period (one month) and that each case contributed only one episode of acute diarrhoea in the preceding month.

Age-adjusted rates were calculated for the 18 years and older survey respondents to reflect the age distribution of the state population when calculating the incidence of acute diarrhoea in Queensland. The direct standardisation method was applied using the 2000 Estimated Resident Population of Queensland which was based on the 1996 Census conducted by the Australian Bureau of Statistics[5,6].

RESULTS

Demographic characteristics of respondents

A total of 3081 adults aged 18 years or older throughout Queensland were interviewed between March and May 2001. The median age of respondents was 47 years (range 18 – 96 years) and the male:female ratio was 1.01:1 (50.2% male). The age distribution of 3081 survey respondents is shown in Table 1 along with the age distribution of adults (18 yrs +) for the 2000 Estimated Resident Population of Queensland. When compared to the age distribution of adults in the Queensland population, the proportion of 18 to 39 year old persons in this survey is under-represented, whereas, persons aged 40 years and older are slightly over-represented.

Table 1. Age distribution for 3081 survey respondents and adults aged 18 years and older from the 2000 Estimated Resident Population of Queensland

Agegroup (yrs)	Frequency of respondents in survey	% distribution of survey respondents	% distribution of Qld adults
18 – 29	439	14.2	23.9
30 – 39	609	19.8	20.2
40 – 49	734	23.8	19.5
50 – 59	540	17.5	15.6
60 – 69	406	13.2	9.8
70 +	353	11.5	10.9

The geographic distribution of survey respondents was: 66.6% Capital City and Major Urban Centres; 31.4% rural areas and 2.1% remote areas. The distribution of persons aged 18 years and older in Queensland during 2000 was estimated to be 60.7% Capital City and Major Urban Centres; 34.1% rural areas and 5.2% remote areas[6]. Thirty-eight (1.2%) respondents identified as Aboriginal or Torres Strait islander origin.

Adult Diarrhoeal Cases (18 years and older)

Case numbers

The case definition for diarrhoea was three or more loose stools in a 24-hour period. A total of 479 (15.5%, 95%CI 14.3% – 16.9%) respondents reported having had diarrhoea in the preceding month.

Number of cases with acute diarrhoea

Of the 479 respondents with diarrhoea, 73 reported that they suffered from a chronic condition in which diarrhoea was a predominant symptom. Fifty-eight respondents identified their diarrhoea as probably due to their chronic condition and three were unsure. Twelve of the 73 respondents did not attribute their diarrhoea to their chronic condition and were included as acute cases. Therefore, a total of 418 (13.6%, 95%CI 12.4% – 14.8%) respondents were defined as having had acute diarrhoea in the preceding month.

Age and sex distribution of acute diarrhoea cases

The frequency of acute diarrhoea among the total number of respondents in each age group is shown in Table 2. There was a significant decreasing trend in the proportion of respondents with acute diarrhoea as the age of the survey respondents increased ($p < 0.001$).

Table 2. Age distribution of acute diarrhoea cases among respondents

Agegroup	Frequency	No. of respondents	Percent
18 - 29	93	439	21.2
30 – 39	110	609	18.1
40 – 49	97	734	13.2
50 – 59	65	540	12.0
60 – 69	31	406	7.6
70 +	22	353	6.2

Persons aged 18 to 39 years were almost twice as likely to report acute diarrhoea than persons aged 40+ years (Risk Ratio {RR} 1.8, 95%CI 1.5 – 2.2, p <0.001).

There was no significant difference between the proportion of male (14.0%) and female (13.1%) respondents with acute diarrhoea (p =0.45). This finding was similar for those respondents aged between 18 and 39 years only, with 21.1% of males and 17.8% of females reporting acute diarrhoea (p =0.17).

Diarrhoeal symptoms and response to illness

Other symptoms reported by respondents with acute diarrhoea (n=418) included 238 cases with abdominal cramps (56.9%, 95%CI 52.0% - 61.7%), 64 with fever (15.3%, 95%CI 12.1% - 19.2%) and 60 had vomiting (14.4%, 95%CI 11.2% - 18.2%). Nineteen (4.5%, 95%CI 2.8% - 7.1%) of the 418 respondents with acute diarrhoea reported blood in their stool.

Seventy-seven (18.4%, 95%CI 14.9% – 22.5%) of the 418 cases sought medical care with either a doctor or nurse. Seventeen (22.1%) of the 77 consulting cases were asked to provide a stool specimen for pathological examination and 11 (14.3%) provided a stool specimen (2.6%, 95%CI 1.4% – 4.8% of all acute diarrhoea cases).

The most common reasons for respondents with acute diarrhoea not seeking medical care were that the diarrhoea did not last long enough (34.1%) or the illness was too mild (22.4%). Only one respondent reported the cost of a medical consultation as the reason for not seeking medical care for their diarrhoea.

Burden of acute diarrhoea

One hundred and ten (3.6%, 95%CI 3.0% - 4.3%) of the 3081 respondents surveyed had time off during the previous month from routine daily work, recreational, or household duties as a result of diarrhoea or to care for someone else with diarrhoea.

Sixty-seven (16.0%, 95%CI 12.7% - 20.0%) of the 418 respondents with acute diarrhoea had time off from routine daily work, recreational, or household duties as a result of the diarrhoea. Sixty-two (14.8%) missed at least half a day (range 1 – 30 days) from their routine work, recreational or household duties.

Persons with acute diarrhoea who reported having abdominal cramps, fever or vomiting were more likely to have at least a half day or more time off due to their illness compared to those who did not report these symptoms ($p < 0.001$).

Similarly, persons with acute diarrhoea who consulted a medical practitioner or nurse were more likely to have at least a half day or more time off compared to those who did not seek medical care ($p < 0.001$).

Other demographic factors and the incidence of acute diarrhoea

Remoteness of place of residence

There was no significant difference in the incidence of acute diarrhoea between persons living in a capital city and persons living elsewhere in Queensland ($p = 0.25$) or persons living in a capital city and those living in remote areas of Queensland ($p = 0.30$). There was also no significant difference between persons living in a capital city or other major urban locations and persons living in rural and remote areas ($p = 0.10$).

Relative social disadvantage (as measured by SEIFA)

There was no significant difference between SEIFA quintiles 1 (least disadvantaged) and 5 (most disadvantaged) for persons reporting acute diarrhoea in the previous month ($p = 0.64$).

Educational status

Persons with a higher level of education (completed senior high school, trade, technical certificate, diploma, university or college degree) were more likely to report acute diarrhoea than persons with a lower level of education (no schooling, completed primary or junior high school) ($p = 0.001$). Similarly, those whose highest level of education was senior high school or a university or college degree were more likely to report acute diarrhoea than persons with a trade, technical certificate, diploma or lower level of completed schooling ($p = 0.006$). However, there was no significant difference between persons with a tertiary education (university or college degree) and those with a lower level of education ($p = 0.70$).

Income

Respondents from a household with an annual income >$50,000 were more likely to report acute diarrhoea than persons from households with an annual income ≤$50,000 ($p = 0.03$).

Demographic factors and medical consultation

The 77 respondents who sought medical care were compared with the other 341 respondents with acute diarrhoea to see whether there were any demographic factors associated with seeking consultation or not. Persons aged 60 years and older were more likely to seek medical consultation for acute diarrhoea than those aged 18 to 59 years (p =0.02). No other associations were identified (Table 3).

Table 3. Association of demographic factors and seeking medical consultation

Demographic Factor	P value
Sex (male vs female)	0.60
Age (18-39 yrs vs 40+ yrs)	0.71
Age (18-59 yrs vs 60+ yrs)	0.02
Location (capital city/major urban vs other)	0.98
Location (capital city vs rural and remote)	0.89
First language (English or not)	0.79
Household income (≤$50,000 vs >$50,000)	0.51

Child Diarrhoeal Cases

Case numbers

A total of 386 respondents were care givers to one or more children aged between 7 months and 4 years. Seventy-five (19.4%, 95%CI 15.7% – 23.8%) of the 386 respondents reported having cared for a child aged 7 months to 4 years with diarrhoea in the preceding month.

Number of children with acute diarrhoea

Four of the 75 children with diarrhoea were also reported as having a chronic condition in which diarrhoea was a prominent symptom. However, two of the four children were included as acute cases as their diarrhoea was not thought to be due to their chronic condition. Therefore, a total of 73 (18.9%, 95%CI 15.2% – 23.3%) children were defined as having had acute diarrhoea in the preceding month.

There was no significant difference between the proportion of male (16.8%) and female (20.9%) children with acute diarrhoea (p =0.31).

Diarrhoeal symptoms and response to illness

Almost half of the children had symptoms of fever (49.3%, 95%CI 37.5% - 61.2%) and abdominal cramps (45.2%, 95%CI 33.7% - 57.2%), with vomiting in 31.5% (95%CI 21.4% - 43.6%) and blood in the stool in 2.7% (95%CI 0.5% - 10.4%).

Thirty-four (46.6%, 95%CI 35.0% – 58.6%) of the 73 children with acute diarrhoea visited a doctor or nurse. Nine (26.5%) of the 34 consulting cases were requested to provide a stool specimen for pathological examination and six (17.6%) provided a stool specimen (8.2%, 95%CI 3.4% – 17.6% of all acute cases).

Comparison of Adult and Child Surveys

Frequency of diarrhoea, medical consultation and investigation

There were differences in the frequencies of reported acute diarrhoea between adults and children aged 7 months to 4 years as well as differences in the proportions who consulted doctors and had their illnesses investigated further. These are summarised in Table 4.

Table 4. Comparison of adult and child acute diarrhoeal illnesses

Adult cases of diarrhoea		
	Numbers	**% (95%CI)**
Acute diarrhoea	418 / 3081	13.6% (12.4% – 14.8%)
Cases consulted doctor	77 / 418	18.4% (14.9% – 22.5%)
Stool collected	11 / 418	2.6% (1.4% – 4.8%)
Child cases of diarrhoea		
	Numbers	**% (95%CI)**
Acute diarrhoea	73 / 386	18.9% (15.2% – 23.3%)
Cases consulted doctor	34 / 73	46.6% (35.0% – 58.6%)
Stool collected	6 / 73	8.2% (3.4% – 17.6%)

During this survey, young children (aged 7mths to 4 years) were 40% more likely to have had acute diarrhoea reported in the preceding month than adults (RR =1.4, 95%CI 1.1 – 1.8, p =0.005) and they were more than twice as likely as adults to have had a medical consultation for their diarrhoea (RR =2.5, 95%CI 1.8 – 3.5, p <0.001). Subsequently, a significantly higher proportion of young children (8.2%) with acute diarrhoea had a stool collected for pathological examination compared to adults (2.6%) with acute diarrhoea (p =0.03). There was no significant difference in the proportion of children (26.5%) and adults (22.1%) who, upon seeing a medical practitioner, were requested to provide a stool specimen by their medical practitioner (p =0.62).

Fever (49.3%, 95%CI 37.5% - 61.2%) and vomiting (31.5%, 95%CI 21.4% - 43.6%) were reported more frequently among children with acute diarrhoea than in adults (fever 15.3%, 95%CI 12.1% - 19.2%; vomiting 14.4%, 95%CI 11.2% - 18.2%). There was no significant difference in the reporting frequency of abdominal cramps or blood in the stool between adults and children with acute diarrhoea.

Estimated incidence of acute diarrhoeal illness in Queensland

(i) Adults (18 + years)

The monthly incidence of acute diarrhoeal illness among survey respondents aged 18 years and older was 13.6%. Assuming there was only one episode of acute diarrhoea among cases during the preceding month, an estimate of the Queensland incidence of acute diarrhoeal illness was calculated by age-adjusting the data to minimise any bias resulting from an over or under representation of a particular age group among adults.

The age-adjusted estimate for the monthly incidence of acute diarrhoeal illness in Queensland for adults aged 18 years and older was 14.6% (146 episodes per 1000 persons). The estimated number of episodes of acute diarrhoeal illness in Queensland for any one month period was calculated by multiplying the age-adjusted incidence (14.6%) by the adult population of Queensland (estimated resident population of persons aged 18 years and older = 2,655,120). The number of episodes of acute diarrhoea among adults for any one month = 387,647.

This number was multplied by a factor of 12 to obtain the estimated number of episodes of acute diarrhoeal illness which occur in Queensland over a 12 month period. Therefore, the estimated annual incidence of acute diarrhoeal illness among adults in Queensland = 4,651,764 episodes or 1.75 episodes / person / year.

A second annual estimate was calculated, to adjust for seasonality, by multiplying the number of episodes of acute diarrhoea for any one month by a factor of 10 (rather than 12). [1] The estimated annual incidence of acute diarrhoeal illness among adults in Queensland, adjusted for seasonality, was 3,876,470 episodes or 1.46 episodes / person / year.

Therefore, the annual incidence of acute diarrhoeal illness among adults in Queensland is estimated to be 1.46 to 1.75 episodes / person / year.

[1] The multiplication factor of 10 was based on Queensland notification data from 1998 to 2000, which showed consistent yearly seasonal variation in the number of notifications received for Salmonella and Campylobacter (common foodborne pathogens which cause gastroenteritis). During this three year period, there was a total of 17,965 notifications of Salmonella and Campylobacter, a monthly average of 499 (8.3%/year). During the months of February to April, the monthly average for the three years was 594 notifications which is 10% of the average yearly total. Consequently, because the survey asked diarrhoeal questions relating to this period, it is likely that the prevalence of acute diarrhoea during this period will be slightly higher than the monthly average calculated over a whole year.

(ii) Children aged 7 months to 4 years

Assuming there was only one episode of acute diarrhoea among children during the preceding month, the monthly incidence of acute diarrhoeal illness among children aged 7 months to 4 years was 18.9% (189 episodes per 1000 persons). The estimated resident population of 0-4 year olds in Queensland (2000) was 240,905.

The number of episodes of acute diarrhoea among children aged 7 mths to 4 years for any one month = 240,905 x 18.9% = 45,531.

Therefore, the estimated annual incidence of acute diarrhoeal illness among children aged 7 mths to 4 years in Queensland = 546,372 episodes or 2.27 episodes / person / year. Adjusting for seasonality, by multiplying the monthly number of episodes by a factor of 10, the estimated annual incidence of acute diarrhoeal illness among children aged 7 mths to 4 years in Queensland was 455,310 episodes or 1.89 episodes / person / year.

Therefore, the annual incidence of acute diarrhoeal illness among children aged 7 mths to 4 years in Queensland is estimated to be 1.89 to 2.27 episodes / person / year.

(iii) All persons in Queensland

Assuming the incidence of acute diarrhoeal illness among children aged 5 to 17 years is between that of adults (14.6%) and young children aged 7 mths to 4 years (18.9%), the minimum incidence of 14.6% was used as the estimate for children in this age range.

The two estimates for the age-adjusted annual incidence of acute diarrhoeal illness among persons aged 5 years and older in Queensland were 4,855,160 and 5,826,192 episodes. The two estimates for the annual incidence of acute diarrhoeal illness among children aged 7 mths to 4 years in Queensland were 455,310 and 546,372 episodes.

Therefore, the estimated annual incidence of acute diarrhoeal illness in the Queensland population = 4,855,160 + 455,310 = 5,310,470 episodes and 5,826,192 + 546,372 episodes = 6,372,564 episodes.

Therefore, the annual incidence of acute diarrhoeal illness in Queensland is estimated to be 1.49 to 1.79 episodes / person / year.

(iv) Crude estimate of foodborne illness incidence in Queensland

Incidence of acute diarrhoeal illness = 1.49 to 1.79 episodes / person / year
= 5,310,470 to 6,372,564 episodes

Data from the United States indicate that approximately 35% of acute gastroenteritis cases are foodborne in origin (Mead et al.)[7]. A range of 30% to 60% were reported in a recent document produced by the Australia and New Zealand Food Authority (ANZFA) [8].
Assuming that at least 30% of the Queensland cases of acute diarrhoea are foodborne, then the minimum estimated number of foodborne illness cases would be between 1,593,141 and 1,911,769 per year in Queensland (446 - 536 cases / 1000 popn). This represents an annual incidence of foodborne illness in Queensland of 0.45 to 0.54 episodes / person / year.

(v) Notifiable fraction for gastroenteritis

The notifiable fraction is simply the proportion of cases of gastroenteritis in the community that are reported to the notifiable diseases surveillance system.

There are four components which comprise the notifiable fraction for gastroenteritis. These are:

- The proportion of community cases of gastroenteritis which present to a GP (Pg)
- The proportion of cases which present to a GP and have a stool collected (Ps)
- The proportion of stools which are positive for a notifiable pathogen (Pp)
- The proportion of positives which can be found on a notifiable diseases register (Pn)

Notifiable fraction (Nf) = Pg x Ps x Pp x Pn

Pg: Survey results indicated 18.4% of adults (18+ yrs) and 46.6% of children aged 7 mths to 4 years consulted a medical practitioner or nurse for their illness.

Ps: Similarly, 14.3% of adults and 17.6% of children who presented to a medical practitioner provided stool specimens for pathology examination.

Pp: Stool cultures were not performed on survey respondents to enable calculation of pathogen-specific proportions. Therefore, this figure was estimated for all notifiable pathogens using data provided by two large private pathology laboratories.

Campylobacter and Salmonella notifications contribute more than 97% of the total enteric illness notifications each year in Queensland[9]. Data from Queensland Medical Laboratories and Sullivan and Nicolaides Pathologists, the two largest private pathology laboratories in Queensland, showed that Campylobacter and Salmonella were isolated from approximately 6% of all stools cultured during 2001. Data was not available by age group.

Pn: In Queensland, all notifiable pathogens isolated from pathology laboratories are reported to the Notifiable Conditions Register. It would be reasonable to assume that almost all reports would reach the surveillance system. Therefore, Pn = 100%.

Using the above data, the following notifiable fractions for acute gastroenteritis were calculated for Queensland:

Adults (18 years and older): Nf = Pg x Ps x Pp x Pn
Nf = .184 x .143 x .06 x 1.0
Nf = 0.0016
i.e. 1 out of every 500 (0.2%) adult cases of acute gastroenteritis in the community are diagnosed and reported to the notifiable diseases register.

Children (7 mths to 4 years): Nf = Pg x Ps x Pp x Pn
Nf = .466 x .176 x .06 x 1.0
Nf = 0.0049
i.e. 1 out of every 200 (0.5%) child cases of acute gastroenteritis in the community are diagnosed and reported to the notifiable diseases register.

DISCUSSION AND CONCLUSION

The higher incidence of acute diarrhoea among young children (aged 7 months to 4 years) compared to adults is probably a result of several factors including under-developed immune systems in this age group, a smaller infective dose requirement for pathogens to produce illness, and behavioural factors such as lack of hygiene and close contact when mixing with other children.

Similarly, the higher incidence of symptoms such as vomiting and fever among young children in comparison to adults may be due to the types of enteric pathogens which commonly cause infection in this age group and changing physiological characteristics and immune response with increasing age.

The decreased incidence of acute diarrhoea among older persons in this survey suggests that the risk of foodborne illness among older persons is considerably less than younger adults, despite the greater proportion of immuno-compromised individuals among older persons in comparison to the general population. This is supported by notification data which shows the lowest rates for *Salmonella* and *Campylobacter* infection occur among persons aged 60 years and older[9]. Factors which may partly explain this effect include social and economic barriers which affect the elderly's risk behaviour and therefore make them less likely to be exposed to foodborne pathogens from sources outside the home.

This survey found that 1 in every 5-6 adults and 1 in 2 children aged between 0 and 4 years consulted a medical practitioner for their illness, which suggests that acute diarrhoea is probably a more serious illness in younger children, or is perceived to be more serious by their parents, than adults with similar symptoms. Adults may be more likely to deal with such symptoms themselves without consulting their doctor. Most parents are also aware of the greater risk of dehydration among young children with diarrhoea. The higher proportion of young children with vomiting and fever might also contribute to the higher consultation rate. This higher consultation rate would contribute to the higher notification rates of foodborne pathogens seen among young children.

Despite the likelihood of acute diarrhoea being a more severe illness among young children, this survey indicated that medical practitioners were no more likely to request a stool sample from young children than from adults.

It was not apparent why persons with an educational status of junior or lower should be at lower risk of acute diarrhoea than persons of higher educational status. There was a strong expected association between higher educational status and less social disadvantage as indicated by SEIFA ranking for the respondents but then social disadvantage was not a risk factor for diarrhoea. Age was considered the most likely explanation as older persons, in general, were more likely to have a lower educational status and were less likely to report acute diarrhoea. This was confirmed when the data was stratified by age.

Confounding by age was also identified as the reason for the decrease in acute diarrhoea seen among households with incomes less than $50,000. Older persons had a smaller household income on average, compared to younger families and were less likely to report acute diarrhoea.

Extrapolating the results of this survey to the general Queensland population should be done with caution. The primary reason is that the age distribution of the 3081 adult repondents was not representative of that of the adult Queensland population, but was biased toward older persons. Although confidence limits are presented, these are for the purpose of sampling errors and do not address the issue of age bias in the sample. However, the data was age adjusted for the calculation of estimates of the annual incidence of acute diarrhoeal illness and foodborne illness in Queensland.

The case definition used in this study was the same as that used by the Centers for Disease Control (CDC) FoodNet 1996/1997 population survey, a retrospective survey of more than 9000 households in six states[7]. This definition can be compared with results obtained from the OzFoodNet 2001/2002 National Gastroenteritis Survey which is currently being conducted. The Melbourne Water Quality Study, a randomised, blinded, controlled trial conducted in Melbourne between September 1997 and February 1999, calculated estimates of 'highly credible gastroenteritis' based on the following case definition: two or more loose stools, or two or more episodes of vomiting, or one loose stool together with abdominal pain or nausea or vomiting, or one episode of vomiting with abdominal pain or nausea in a 24-hour period[10].

The estimates of incidence for acute diarrhoeal illness in Queensland assume that each case of acute diarrhoea was limited to one episode during the preceding month. Other major assumptions used in these calculations were the multiplication factor of 10 to adjust for seasonality which was based on historical notification data, and the monthly estimate of 14.6% for children aged between 5 and 17 years for which no data was collected. The final estimate of 5.3 to 6.4 million episodes of acute diarrhoea per year in Queensland (1.49 to 1.79 episodes / person / year), is somewhat higher than the estimated annual incidence obtained from the Melbourne study (0.80 episodes / person / year). However, the Queensland estimate may not be unreasonable given the warmer climate and the greater likelihood of foodborne illness. The incidence of diarrhoeal illness in the CDC FoodNet population survey was 1.4 episodes / person / year.

Another limitation to consider when interpreting these results is that the incidence of acute diarrhoeal illness can vary with season, as certain enteric pathogens vary in prevalence during the year and this survey was limited to a three-month period. Any estimates of the annual incidence using this data may be subject to this bias. An attempt was made to address seasonality by calculating a range rather than a point estimate for the annual incidence estimates. Surveys conducted over a 12-month period would address this issue, however, the costs of such surveys may be a limiting factor.

Other limitations to consider when interpreting and / or comparing these results to other surveys are:

- the absence of data for children in the 5 to 17 year age range
- the exclusion of some persons with mental or physical disabilities or insufficient understanding of English
- the assumptions used when calculating annual incidence estimates
- the possibility of reporting bias by repondents due to the recall period of one month

The estimate of foodborne illness incidence in Queensland is a very crude estimate based on the assumptions described above as well as the assumption that at least 30% of acute diarrhoea cases are foodborne. Based on the age distribution of notifications of foodborne pathogens in Queensland, it is likely that the proportion of acute diarrhoeal illness that is foodborne in origin will vary considerably between age groups. Therefore, the estimate of between 1.6 million and 1.9 million cases per year in Queensland should also be interpreted with caution.

A limiting factor in the calculation of the notifiable fraction estimates is the lack of data for the proportion of stools which are positive for a notifiable pathogen (Pp) for different age groups. However, it would be reasonable to assume from the estimates calculated in this study, that between 0.1% and 1.0% of acute gastroenteritis cases in Queensland have a confirmed diagnosis with a notifiable pathogen.

The notifiable fraction estimates reported in this survey indicate that much of the acute diarrhoeal illness occurring in the community is not being detected by the notifiable disease surveillance system, particularly among adults. Although these low estimates would be due in part to a considerable proportion of acute gastroenteritis cases having an unknown or non-notifiable etiology (e.g. viruses), this data suggests that the sensitivity of the surveillance system to detect potential outbreaks might be limited for some pathogens. It is likely that the notifiable fraction will vary for different enteric pathogens as a result of variation in the severity of illness. Ideally, it would be informative to know what fraction of cases of gastroenteritis in the community are represented by notifiable, non-notifiable and unknown enteric pathogens. This information could only be obtained through a separate study which would require all survey participants to have stool specimens tested for a full range of potential pathogens.

A twelve month national survey of community gastroenteritis is currently being conducted by the National Centre for Epidemiology and Population Health and OzFoodNet in order to estimate the incidence and severity of gastroenteritis in the Australian community and provide information to allow the calculation of a national estimate of the incidence of foodborne illness. Queensland specific estimates will be calculated from the National survey to enable a comparison with the estimates obtained from this survey.

In conclusion, this survey shows the large scale of acute diarrhoeal illness in the Queensland community and indicates the significance of foodborne illness as a public health burden. Follow-up population surveys of acute diarrhoeal illness in Queensland are warranted to confirm the accuracy of these estimates and to monitor trends in the incidence of acute gastroenteritis and foodborne illness. These figures will contribute toward determining the effectiveness of foodborne disease prevention efforts. Ongoing studies and improved diagnostic testing will lead to more information and allow more refined estimates to be calculated. It would be preferable in future to survey all ages of the Queensland population and to collect data on individual episodes of diarrhoea to enable more accurate estimates of incidence to be calculated.

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APPENDIX 1

QUESTIONNAIRE (Foodborne illness component)

INTRODUCTION

Correct
Hello. My name is . . . .. I'm calling from the Qld Health Department.
Can I check whether I have rung (read out phone no.)?

If number is non residential skip to Non-residential log screen
If number residential skip to Intro1

Intro1
Thank you. As I said, my name is ……. The Health Department is speaking with people throughout the state in relation to some of our health programs. Our aim is to better direct and plan the provision of health services to Queenslanders.

In order to representative of the population, it is important that we speak with equal numbers of men and women. So for this particular interview I need to speak with a . . . . (insert either man or woman), living in the household, who is aged 18 years or more.

Can I ask are there any people in the house who fit this description?

1. Yes
2. No
3. Refusal

if yes skip to Number
if no skip to household ineligible log screen
if they refuse skip to refusal log screen

Number
Is there just one, or more than one person living in the household who fits the description?

1 Just one
2 More than one
3 No one fits description
4 Refusal - didn't establish if req'd person in household

if 1 skip to One
if more than 1 skip to More
if no one fits description skip to household ineligible log screen
if they refuse skip to refusal log screen

One
Would you be that person?

1 Yes
2 No
3 Refusal

More
Given that there is more than one man/woman who fits our criteria, I'd like to speak with the one who has most recently had a birthday. (Would you be that person?)

1 Yes
2 No
3 Refusal

Once have R on the line:

Intro2
The interview is totally confidential. Could you spare some time to answer some questions for me please?

(Interviewer: If necessary say: Your telephone number was randomly selected by computer and as we currently have no record of your name or address, you may participate in the survey anonymously. It is an important interview and the questions cover a variety of easy to answer topics. Would you be willing to take part?)

1 Agreed to interview
2 Agreed to interview but suggested a call back
3 No, refused interview

if agreed to interview now skip to Good
if callback skip to appointment screen
if they refused skip to refusal screen

Good
Good, thank-you. Before we begin, I should stress the importance of answering the questions as accurately as possible. So please feel free to take as much time as you need before answering. If there are any questions you would rather not answer, just say so. Some calls are monitored by my supervisor for training and quality purposes.

(INTERVIEWER: If R is concerned about someone 'listening in' on their conversation, tell them that - "My supervisor sometimes listens to check that I am conducting the interview properly, and reading the questions correctly.")

SKIP TO QUESTIONNAIRE PROPER

Dem1 The next few questions asked are only relevant to particular age groups. Could you please tell me your date of birth?
(Interviewer: If R is hesitant about answering this sort of question say: " Date of birth is asked as most people find it easier to remember their date of birth than their age.").

1 Gave date of birth or age or age group
2 Refused to answer

Dem2 And, could you tell me how many children fifteen or under live in the household?
(Interviewer: if R is hesitant say, this question is asked because there is a relationship between the amount of physical activity done and how many children a person has)
(Interviewer: if R refuses to answer, type 0 and attach an F2 note)

Dem2b Are you a parent or a care giver to these children/this child?
(Interviewer: If R is hesitant say, "this question is asked because it is believed that caring for children has an impact on how physically active people are..)

1 Yes
2 No
3 Refused to answer

Dem3 Which of the following best describes your current employment status?
(Interviewer: Read out categories 1 to 8)
(Interviewer: This is whatever they spend more hrs/week doing)

1 Employed full time
2 Employed part-time or casual
3 Home duties
4 Unemployed
5 Full-time student
6 Part-time student
7 Retired
8 Permanently ill / unable to work
9 No response

FOOD BORNE ILLNESS

FBI1 The next set of questions is designed to help us determine the usual level of diarrhoea in the population.
In the past month, that is since (….), did you have diarrhoea? By diarrhoea I mean 3 or more loose stools in a 24 hr period?

1 Yes
2 No - skip to FBI17
3 Don't know - skip to FBI17
4 Refused to answer - skip to FBI17

FBI2 In the past month, did you take any of the following:
(Interviewer: Read out highlighted categories 1 - 5)

1 Prednisone or other oral steroids
2 Immunosuppression therapy
3 Chemotherapy
4 Radiation therapy
5 Antibiotics
6 None of the above
7 Don't know
8 Refused to answer

FBI3 Do you have any chronic illness in which diarrhoea is a prominent symptom, such as Crohn's disease, ulcerative colitis, or irritable bowel syndrome?
(Interviewer: diarrhoea – loose bowel motions or loose stools)

1 Yes (specify)
2 No - skip to FBI6
3 Don't know - skip to FBI6
4 Refused to answer - skip to FBI6

FBI4 In the past month, did you have diarrhoea, that is 3 or more loose stools in 24 hours, that you attributed to your chronic illness?

1 Yes
2 No
3 Don't know
4 Refused to answer

FBI5 In the past month, did you have either MORE diarrhoea than is usual for you, or diarrhoea that you did NOT attribute to your chronic illness?

1 Yes
2 No (skip to FBI17)
3 Don't know (skip to FBI17)
4 Refused to answer (skip to FBI17)

FBI6 In relation to the most recent time you had diarrhoea (that you don't think was due to your chronic illness), did you have any of the following symptoms with it?
Did you have fever?

1 Yes
2 No
3 Don't know
4 Refused to answer

FBI7 Did you have vomiting?

1 Yes
2 No
3 Don't know
4 Refused to answer

FBI8 Did you have abdominal cramps?

1 Yes
2 No
3 Don't know
4 Refused to answer

FBI9 Did you have blood in your stool?

1 Yes
2 No
3 Don't know
4 Refused to answer

FBI10 Did you consult a doctor or nurse for this diarrhoea?

1 Yes
2 No - skip to FBI14
3 Don't know - skip to FBI15
4 Refused to answer - skip to FBI15

FBI12 Did the doctor or nurse you saw for this diarrhoea request a stool specimen?

1 Yes
2 No - skip to FBI15
3 Don't know - skip to FBI15
4 Refused to answer - skip to FBI15

FBI13 Did you provide a stool specimen for testing?

1 Yes - skip to FBI15
2 No - skip to FBI15
3 Don't know - skip to FBI15
4 Refused to answer - skip to FBI15

FBI14 Why did you decide not to seek medical care for this illness?
(Interviewers: Multiple responses allowed - prompt with "anything else")

1 Illness did not last long enough
2 Illness was too mild
3 Did not have fever
4 Did not have bloody diarrhoea
5 Did not have abdominal pain
6 Didn't believe that it would make a difference in outcome of this illness
7 Cost of seeking medical care
8 Too busy
9 Other reason (specify)
10 Don't know
11 Refused

FBI15 In the last month, did you have time off from your routine daily work, recreational, or household duties because of this diarrhoea?

1 Yes
2 No - skip to FBI17
3 Don't know - skip to FBI17
4 Refused to answer - skip to FBI17

FBI16 In the last month, on how many days did you miss more than half a day from your routine daily work, recreational or household duties, because of this diarrhoea?

_____

FBI17 In the last month did you have time off from your routine daily work, recreational, or household duties to care for someone else with diarrhoea?

1 Yes
2 No - if R is a care giver skip to child otherwise skip to dem4
3 Don't know - if R is a care giver skip to child otherwise skip to dem4
4 Refused to answer - if R is a care giver skip to child otherwise skip to dem4

FBI18 In the last month, on how many days did you miss more than half a day from your routine daily work, recreational or household duties to care for someone with diarrhoea?

_____

if R is a care giver skip to child otherwise skip to dem4

Child Earlier you said you had (1 child or x children)
Could you please tell me their age/ages so that I am able to ask you questions in relation to their correct age group/groups?
(Interviewer: if R is not sure ask for an approximation of the children's ages)

_____

QUESTIONS FBICH1-FBICH15 ASKED OF PARENTS WITH CHILDREN AGED 7 MONTHS - 4 YEARS

FBICH1 **The next set of questions is to help us determine the usual level of diarrhoea in children aged 7 months and 4 years. Could you please think of your child in this age group who most recently had their birthday.**

In the past month, that is since (…), did your child have diarrhoea? By diarrhoea I mean 3 or more loose stools in a 24 hr period.

1 Yes
2 No - skip to IMM1
3 Don't know - skip to Imm1
4 Refused to answer - skip to Imm1

FBICH2 **In the past month, did your child take any of the following:**
(Interviewer: Read out highlighted categories 1 - 5)

1 Prednisone or other oral steroids
2 Immunosuppression therapy
3 Chemotherapy
4 Radiation therapy
5 Antibiotics
6 None of the above
7 Don't know
8 Refused to answer

FBICH3 **Does this child have any chronic illness in which diarrhoea is a prominent symptom, such as Crohn's disease, ulcerative colitis, or irritable bowel syndrome?**
(Interviewer: diarrhoea – loose bowel motions or loose stools)

1 Yes (specify)
2 No - skip to FBICH6
3 Don't know - skip to FBICH6
4 Refused to answer - skip to FBICH6

FBICH4 **In the past month, did your child have diarrhoea, that is 3 or more loose stools in 24 hrs, that you attributed to their chronic illness?**

1 Yes
2 No
3 Don't know
4 Refused to answer

FBICH5 **In the past month, did they have either MORE diarrhoea than is usual for them, or diarrhoea that you did NOT attribute to their chronic illness?**

1 Yes
2 No - skip to Imm1
3 Don't know - skip to Imm1
4 Refused to answer - skip to Imm1

FBICH6 **In relation to the most recent time this child had diarrhoea (that you don't think was due to their chronic illness), did they have any of the following symptoms with it?**

Did they have fever?

1 Yes
2 No
3 Don't know
4 Refused to answer

FBICH7 **Did they have vomiting?**

1 Yes
2 No
3 Don't know
4 Refused to answer

FBICH8 **Did they have abdominal cramps?**

1 Yes
2 No
3 Don't know
4 Refused to answer

FBICH9 Did they have blood in their stool?

1 Yes
2 No
3 Don't know
4 Refused to answer

FBICH10 Did you consult a doctor or nurse for their diarrhoea?

1 Yes
2 No - skip toFBI14
3 Don't know - skip to Imm1
4 Refused to answer - skip to Imm1

FBICH11 Did the doctor or nurse this child saw for their diarrhoea request a stool specimen?

1 Yes
2 No - skip to Imm1
3 Don't know - skip to Imm1
4 Refused to answer - skip to Imm1

FBICH12 Did this child provide a stool specimen for testing?

1 Yes - skip to Imm1
2 No - skip to Imm1
3 Don't know - skip to Imm1
4 Refused to answer - skip to Imm1

FBICH13 Why did you decide not to seek medical care for this child's illness?
(Interviewers: Prompt with "is there anything else")

1 Illness did not last long enough
2 Illness was too mild
3 Did not have fever
4 Did not have bloody diarrhoea
5 Did not have abdominal pain
6 Didn't believe that it would make a difference in outcome of this illness
7 Cost of seeking medical care
8 Too busy
9 Other reason (specify)
10 Don't know
11 Refused

DEMOGRAPHICS – ASKED OF EVERY RESPONDENT

Dem4 I would now like to ask you some background questions about yourself.
(Interviewer: If R is hesitant about answering this sort of question say: "These questions are important as they enable us to look at different groups within the community, for example younger people, those who are married, employed or retired and see whether those groups have different experiences.")

Firstly, what is your current marital status? Are you..
(Interviewer: Read out options 1 to 6)

1 Married
2 De facto
3 Separated
4 Divorced
5 Widowed or
6 Single / Never married
7 Refused to answer

Dem5 Which of the following list best describes the HIGHEST level of education you have completed?
(Interviewer: Read out categories 1 to 6)

1 No schooling / didn't complete primary school
2 Completed primary school *(Grade 7 / age 12/13 in QLD)*
3 Completed junior high school *(Grade 10 / age 15/16 in QLD)*
4 Completed senior high school *(Grade 12 / age 17/18 in QLD)*
5 Trade, Technical certificate or diploma, or
6 University or college degree
7 Other (specify)
8 Refused to answer

if (dem3=7) & if (age>65) skip to dem7
if (dem3=7) & if (dem1c>64) skip to dem7
if (dem3=7) & if (dem1d>4) skip to dem7
if (dem3=3) & if (age>65) skip to dem7
if (dem3=3) & if (dem1c>64) skip to dem7
if (dem3=3) & if (dem1d>4) skip to dem7

wkstat1 The next question is about your current work status. Please answer for ALL the options which apply to you.

Would you describe yourself as employed, either self-employed, or employed for salary or wages?
(Interviewer: if R asks why we are asking this question again say, "we are testing a new format for the question and need to know how the answers differ from the old question, so please bear with me.")

1 Yes (specify) - skip to wkstat5
2 No
3 Refused to answer

wkstat2 Are you permanently unable to work because of illness or disability?

1 Yes (skip to wkstat5)
2 No
3 Refused to answer

wkstat3 Are you unemployed?

1 Yes
2 No – skip to wkstat4
3 Refused to answer – skip to wkstat4

wkstat3a How long have you been unemployed?

_____

wkstat3b And are you currently seeking work?

1 Yes
2 No
3 Refused to answer

skip to wkstat5

wkstat4 Are you retired?

1 Yes
2 No
3 Refused to answer

wkstat5 Are you a student?

1 Yes
2 No - skip to wkstat5z
3 Refused to answer - skip to wkstat5z

wkstat5a Are you a full-time student or part-time student?

1 Full-time
2 Part-time

wkstat5z Would you describe your main occupation as household duties?

1 Yes
2 No
3 Other (specify)
4 Refused to answer

Dem7 What was your first language as a child?

1 English
2 Non-English
3 No response / can't remember

Dem8 Are you of Aboriginal or Torres Strait Islander origin?

1 Yes - Aboriginal only
2 Yes - Torres Strait Islander only
3 Yes - both
4 No
5 Refused to answer

Dem9 How many adults, that is those aged 18 and over, live in your household
INCLUDING YOURSELF?

_____

Dem10 Which of the following categories does your total gross annual household income from all sources fall into? That is the total income from all members of your household before tax is deducted. Would it be:
(Interviewer: Read out categories 1 to 4)

1 Less than $25 000
2 $25 001 - $50 000
3 $50 001 - $100 000
4 Over $100 000
5 Don't know
6 Refused to answer

Dem12 Increasing numbers of people are seeking to have their phone numbers not listed in the White Pages. Can you tell me whether your number is listed or not?

1 Yes
2 No
3 Refused to answer

Dem13 How many mobile phones are used for personal calls by people in your household aged 18 years and over?
(Interviewer: if R gives a number say, "Can I just check that is __ mobile phones, not __ people?)

_____

Dem14 *(Interviewer: What is the sex of the respondent?)*
(Do not ask this question aloud)

1 Male
2 Female
3 Don't know

WHERE DOES R LIVE

L1 So that we can establish the boundaries of our interviewing area, can I ask whether you live in a town or city or out in the country?

1 Town or City (skip to L2)
2 Out in the country
3 No response (skip to L5)

L1b Does this place have a name?
(Interviewer: this does not refer to property names)

1 Yes
2 No (skip to L4)
3 Refused to answer (skip to L4)

L2 Which town do you live in? / What is it's name?

1 Brisbane
2 Cairns
3 Gold Coast
4 Ipswich
5 Logan City
6 Mackay
7 Rockhampton
8 Sunshine Coast
9 Toowoomba
10 Townsville
11 Other (specify) – skip to L5
12 Refused to answer – skip to L5

L3 Which suburb of Brisbane/Cairns/Gold Coast etc. so you live in?
(Interviewer: If at all unsure of the spelling ask: "Could you spell that for me please".)
skip to L5

L4 Where do you live in relation to the nearest town? Does that place have a name?

(Interviewer: We want the NAME of the nearest town, and the distance and direction R lives from it, eg 30km S of Warwick)

_____

L5 What is the postcode of your residence?

(Interviewer: Code 4999 if postcode is not known)

_____

QUALITY ASSURANCE

Qaname Well that's the end of the questionnaire. I just have one last thing to ask. Occasionally my supervisor will call some people back to check I have conducted the interview properly.

1 Yes (Int: Type in R's name, phone no and your interviewer no)
2 No

thanks THANK-YOU VERY MUCH FOR ALL YOUR HELP.

Once again, my name is _____ from the Queensland Health Department.

GOOD-BYE!