

Air Quality & Respiratory Health Study

Phase 1 Report: Summary results from 2006

Air Quality & Respiratory Health Study – summary baseline results

The Air Quality & Respiratory Health Study (AQRHS) is being conducted to determine whether the effects of changes in air quality arising from traffic-related air pollution are associated with changes in respiratory health in people living around the Lane Cove Tunnel.

The baseline testing (first round) of the survey was conducted during June-Dec 2006. Information on respiratory health was collected by questionnaire from 3002 participants living in four zones around the Lane Cove Tunnel:

- Zone 1- “Predicted decrease” - zone predicted to experience a decrease in exposure to pollution arising from changes in traffic
- Zone 2- “Predicted increase” – zone predicted to experience an increase in exposure to air pollution arising from changes in traffic
- Zone 3 - “Stack” – an area encompassing all households within 650m of the eastern ventilation stack of the LCT tunnel
- Zone 4 - “Control” – a control area in the same general vicinity but where no change in traffic or pollutant exposure is expected

From these participants a sub-group of 341 people were recruited into and actively participated in a symptom diary study. The diary study involved participants recording symptoms and peak expiratory flow readings on a twice daily basis for a nine week period.

Passive sampling for nitrogen dioxide (NO₂) was also conducted at about thirty eight sites in the Lane Cove area, including within the zones. Nitrogen dioxide is being used as a marker of traffic related air pollution in this study. The NO₂ readings, together with geographical information, will be used to predict individual NO₂ levels for each household during the period that the study was conducted.

Summary of the information collected in the baseline survey

1. Questionnaire Survey

The study has recruited 1835 households out of a total of 5612 households located in the study zones (33%) (Table 1). From the respondent households, 3002 eligible participants were interviewed for the Questionnaire Survey.

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Table 1: Response rates: Baseline testing conducted in 2006

	Zone 1 Predicted decrease	Zone 2 Predicted increase	Zone 3 Stack	Zone 4 Control	Overall
Total number of households in each zone	1598	1275	1465	1274	5612
Q'aire survey respondent households (%)*	37%	31%*	25%*	38%	33%
Number of Q'aire survey participants	1035	596	603	768	3002

*49 households resided in both Zone 2 & Zone 3; these households have been included in the calculation of response rates for both of these 2 zones.

Table 2: Comparison of study population with general population (Census, 2001)

Zone	% Children 0-19 years		% Adults 20-75 yrs		Gender Male (%)	
	Study pop'n	General pop'n	Study pop'n	General pop'n	Study pop'n	General pop'n
1 Predicted Decrease	29	23	70	77	44	46
2 Predicted Increase	27	22	73	78	46	47
3 Stack	26	20	74	80	47	49
4 Control	30	26	70	74	47	49

The subjects who participated in this survey were similar in age and sex to the general population in the area sampled (using Census 2001 data). Because of this similarity we

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are confident that the study population is representative of the overall population in the locations studied.

Table 3: Summary statistics by zone

Zone	Participants % of total	Households % of total	Household type		Age of participants (mean)* years	Sex of participants*	
			House (%)	Unit (%)		Male (%)	Female (%)
1 Predicted Decrease	34	32	51	49	35	44	56
2 Predicted Increase	20	21	33	67	35	46	54
3 Stack	20	20 [^]	42	58	37	47	53
4 Control	26	27	92	8	37	47	53
OVERALL			56	45	36	46	54

* There were no statistically significant differences between zones

[^] Data for the 49 households that contributed data to both Zone 2 & Zone 3 have been incorporated in Zone 2 data only.

The average age of participants was 36 years and did not differ between the zones (Table 3). The proportions of male and female participants were also very similar between the interviewed zones. Overall the proportion of males in the study in 2006 was 46%, and for females was 54%.

Overall prevalence of symptoms in questionnaire survey

- Diagnosed asthma

Seventeen percent (17.1%) of participants reported ever having been diagnosed with asthma by a doctor or at a hospital. This compares with National Health Survey (NHS)¹ data for 2004-05 where 20.3% of Australians had reported ever having had a diagnosis of asthma by a doctor or nurse.

¹ Australian Centre for Asthma Monitoring 2007. Asthma in Australia: findings from the 2004-05 National Health Survey. Cat. No. ACM 10. Canberra: Australian Institute of Health & Welfare.

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- **Current asthma**

Ten percent (10.2%) of participants were found to have current asthma (defined as having had a diagnosis of asthma and having had an episode of wheeze in the last 3 months or used medication for asthma in the last 3 months). This compares to a figure of 10.3% for the Australian population surveyed in the NHS 2004-05 reported as having current asthma (defined as ever having been diagnosed with asthma and answering yes to the question: “do you still get asthma?”).

- **Wheeze**

In this study, twenty four percent (24%) of participants reported ever having wheezed and thirteen percent (13%) of participants had wheezed in the last three months.

2. *Diary study*

There were 341 active participants in the diary study, of whom 49% were children.

Table 4: Summary statistics for the Diary study

Zone	No. of participants %	Mean age (yrs)	Age group*		Sex*	
			Children <18 yrs (%)	Adults (%)	Male (%)	Female (%)
1 Predicted Decrease	26	29	53	47	44	57
2 Predicted Increase	25	29	49	51	47	54
3 Stack	25	29	57	43	47	53
4 Control	24	34	43	57	48	52
TOTAL	341	30	51	49	46	54

* Differences between zones are not statistically significant.

3. *NO₂ passive sampling*

Sampling for nitrogen dioxide (NO₂) levels was conducted in approximately 38 locations in the local area including within the four zones. This sampling used passive NO₂ samplers, which were placed at the various locations for three separate two week periods during September to December, 2006. Some of these samples were placed by roadways and in parks, and some were placed outside participant households. The purpose of this part of

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the study was to determine how ambient NO₂ varies within the Lane Cove/Ryde area. NO₂ was measured as a marker of traffic-related air pollution. These NO₂ readings will be used to predict exposure to NO₂ for each individual household in the study. The study will also be using all of the air quality data obtained from the fixed site monitors erected by the tunnel builder/operator and used for reporting to the community and government.

Table 5 lists separately the range in readings obtained from the two week samplers that were placed in general locations (roadways, parks, etc – “general ambient”) and those placed outside participants’ homes (“household ambient”). The highest readings were found along Epping Road in all three rounds of testing and reflect the heavy traffic experienced along the road in 2006.

Table 5: Summary statistics for the NO₂ passive sampling

	Ambient sampling, NO₂ (ppbv)*	
Round	Type of sample	Range
1 18 Sept-2 Oct	General ambient	8.2-26.5
	Household ambient	9.0-21.5
2 23 Oct-6 Nov	General ambient	7.8-22.5
	Household ambient	7.6-15.4
3 27 Nov-11 Dec	General ambient	6.9-22.0
	Household ambient	6.7-16.3

*ppbv = parts per billion by volume

Next steps

Now that the tunnel has opened we are conducting a follow-up (second round) of testing. This commenced in June 2007. First round participants will be contacted to collect information about respiratory health in 2007. Each participant will be interviewed and tested as close as possible to 12 months after their original interview date. McNair Ingenuity Research, a market research company, has again been contracted to conduct the questionnaire survey. This involves a face-to-face interview with most participants. The diary study will involve home visits by members of the AQRHS team to explain completion of the symptom diary, demonstrate peak flow measurement, and to conduct breathing tests and allergy skin prick tests, and to collect DNA samples (by swabbing inside the mouth) at the homes of participants.

Three rounds of passive NO₂ sampling will again be conducted during September to December this year.