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Title Page:

The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) – Methods and Response Rates.

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Abstract

The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) addresses the urgent need for data on diabetes prevalence, risk factors and associated conditions in Australia. Here we describe the methods used and the response rates obtained. AusDiab is a population-based cross-sectional survey of national diabetes mellitus prevalence and associated risk factors in people aged ≥25 years, conducted between May 1999 and December 2000 in the 6 states and the Northern Territory of Australia. The study involved an initial household interview, followed by a biomedical examination that included an oral glucose tolerance test (OGTT), standard anthropometric tests, blood pressure measurements and the administration of questionnaires. Of the 20,347 eligible people (aged ≥ 25 years and resident at the address for ≥6 months) who completed a household interview, 11,247 (55.3%) attended for the biomedical examination. Of those who completed the biomedical examination 55.1% were female. Comparisons with the 1998 Australian population estimates showed that younger age responders were under-represented at the biomedical examination, while the middle-aged and older age groups were over-represented. Weighting of the AusDiab data for age and gender have corrected for this bias. AusDiab, which is the largest national diabetes prevalence study undertaken in a developed nation to have used an OGTT, provides a valuable national resource for the study of the prevalence and possible causes of diabetes, as well as identifying possible risk factors that may lead to diabetes. Furthermore, it generates the baseline data for a prospective 5-year cohort study. The data will be important for national and regional public health and lifestyle education and health promotion programs.

Key Words: AusDiab; response rates; diabetes survey; Australia; diabetes prevalence.
1. Introduction

Globally, the prevalence of diabetes, particularly Type 2 diabetes is rapidly increasing [1]. Indeed, it has been predicted that the global figure of people with diabetes will rise from current levels of about 150 million in 2000 to 300 million by 2025 [2]. However, with the exception of the USA [3], nationally representative, population based diabetes prevalence data among developed nations is scarce. In particular, few studies have involved an oral glucose tolerance test (OGTT).

In Australia, estimates of diabetes prevalence and other categories of glucose intolerance are confined to studies conducted 10 to 20 years ago on a small sample of residents from a rural town in Western Australia [4]. Most recent estimates of diabetes prevalence in Australia have relied on self-reported data, but since Type 2 diabetes can be asymptomatic for many years before it is diagnosed in a clinical situation, reliance on self-reported information invariably contributes to an underestimation of the true prevalence. Furthermore, such studies fail to provide information on the extent of other states of glucose intolerance, which are known to substantially increase risk of future diabetes.

To address the urgent need for more definitive data on the true current prevalence of diabetes and its associated risk factors in Australia, the Australian Diabetes, Obesity and Lifestyle Study (AusDiab) was a cross-sectional study involving a standard OGTT conducted during 1999-2000 in all Australian States and the Northern Territory. The present paper provides a detailed description of the survey methods including the design, sampling techniques and survey protocols. Data on weighting of the sample, response rates and statistical techniques are also presented. The survey methods conform to those recommended by the World Health Organisation (WHO) [5], and the study was approved by the International Diabetes Institute ethics committee.
The AusDiab study aimed to determine the national prevalence of diabetes and other selected non-communicable diseases and their risk factors in a representative sample of adults aged 25 years and over from each of the states and the Northern Territory of Australia.

More specifically, the objectives of the study were:

1. to estimate the national and regional prevalence of diabetes and other forms of abnormal glucose tolerance
2. to estimate the prevalence of the cardiovascular risk factors within the Metabolic Syndrome, including obesity, hypertension, and lipid profile abnormalities
3. to assess the distribution and relationships of the cardiovascular risk factors indicated above
4. to assess temporal trends in risk factor prevalences with reference to previous Australian surveys
5. to describe health knowledge and attitudes and utilization of health services, and
6. to provide baseline data for longitudinal cohort studies

2. Methods

2.1 Target population/Eligibility requirements

Non-institutionalised adults aged 25 years and over residing in private dwellings in each of the 6 states and the Northern Territory of Australia were included in the survey if they had resided permanently at the address for a minimum of six months prior to the survey. Persons with physical or intellectual disabilities that precluded participation in the study were not included.

2.2 Sampling frame

A stratified cluster sampling method was used, involving seven strata (six states and the Northern Territory) and clusters based on Census Collector Districts (CDs – the smallest
geographic unit defined by the Australian Bureau of Statistics at each census, with an average of 225 dwellings each). Within each state, six CDs were randomly selected with a selection probability proportional to the population size (population aged over 25 years).

Due to the logistic and economic constraints of the survey, and to avoid the bias of including an unrepresentative number of high prevalence groups, the following exclusion criteria were adopted:

1. CDs containing fewer than 100 persons aged 25 years and over
2. CDs that formed part of a Statistical Local Area (SLA) that was classified as 100% rural according to 1996 census data [6]
3. CDs that contained more than 10% indigenous population

Of the total pool of CDs available (34,410), 4141 CDs (12%) were excluded from selection on these grounds. From the excluded CD’s, 762 (18.4%) had >10% indigenous population, 1464 (35.4 %) were rural, 1100 (26.6%) had <100 persons aged ≥25 years, while 815 (19.7%) had more than one factor of the exclusion criteria. The three exclusion categories meant that the total eligible population (adults aged ≥25 years) was reduced by 6.44% from 11,341,070 to 10,610,855. This comprised 241,931 (33.1%) adults from CDs that had >10% indigenous population, 349,716 (47.9%) adults from CDs that were rural, 74,723 (10.2%) adults from CDs that had <100 people aged ≥25 years and 63,845 (8.7%) adults from CDs that had more than one factor of the exclusion criteria.

2.3 Sample size determination

The sample size was selected based on precision of estimates to identify a national diabetes prevalence of 7.0% (an estimation based on results of previous surveys, and the expectation that the diabetes rate had increased over time). As a secondary objective of the study was to deliver useful state-specific prevalence estimates, the sampling frame was stratified at the
state level. With very little loss of efficiency, an accurate national estimate can be obtained from weighted samples of equal size from the six states and the Northern Territory. Accounting for the clustering of the survey design, a sample size of 10,500 (1500 per state) was predicted to provide 95% confidence intervals of 6.2 – 7.8, around a diabetes estimate of 7.0%. This level of precision was regarded as acceptable, and the sample size was considered achievable and within the funding constraints of the survey. It should be noted however, that the sample size was calculated for total diabetes prevalence only and would be expected to have limited power to describe the prevalence of type 1 diabetes in this sample.

2.4 Sample selection

It was calculated that six CDs were required to provide the required sample size (1500 per state) within each state. Following an initial field visit, if the CD was considered inappropriate for sampling in that location, the selected CD was replaced with another randomly selected CD from the same state. Replacements occurred in seven instances during the course of the survey, for the following reasons:

1. The low population density of the CD made it economically and logistically impossible to conduct the survey activities within the allocated timeframe (3 CDs)
2. The area selected was predominantly an industrial/business zone (2CDs)
3. No eligible ‘neighbouring’ CD was available (see below) (1CD)
4. The area had been recently involved in a large-scale health survey, including diabetes testing (1CD)

After the first three sites had been surveyed, it became clear that a single CD would not provide the required sample size at each location surveyed. Clusters were subsequently formed by combining the randomly selected index CD and its largest adjoining neighbours
to achieve a minimum cluster size of 250 participants. The final sample comprised 3 single CDs, 22 pairs of CDs, 16 triplets and 1 quad.

2.5 Survey protocol and procedures

The AusDiab survey activities occurred over a 21-month period between May 1999 and December 2001. Approximately 2 months were allocated to the collection of data in each state and the Northern Territory. The AusDiab survey activities were divided into two phases – the household interview and the biomedical examination.

2.5.1 Household census and interview

Following a local media advertising campaign involving news items in local community newspapers and local radio and/or television, all private dwellings within the sampled cluster received a hand-delivered (non-addressed) letter informing residents about the survey and advising that an AusDiab interviewer would visit to conduct the household interview. A brochure describing the study objectives, the interview and examination process, and study confidentiality was supplied in the initial contact letter. This brochure was provided only in English.

The first visit by the interviewer occurred approximately 3 days after the letter had been delivered. If the interviewer could not make contact with household members, a letter was left requesting the household to telephone a toll-free number to arrange a suitable interview time. The interviewers made a minimum of 2 visits and up to 5 visits before a household was classified as a non-contact.

Where possible, at each participating household a personal interview was conducted with every adult member aged 25 years and over who met the eligibility requirements. The
interview ascertained marital status, level of education, date and country of birth, language spoken at home and history of diabetes or high blood sugar levels. In some instances, adult household members were unable to answer for themselves because of old age, illness, intellectual disability or difficulty with the English language. In these cases, a responsible ‘proxy’ was interviewed on their behalf. There were no provisions for interviews to be conducted in languages other than English. In order to obtain a personal interview with all eligible household members, interviewers made appointments to visit as often as was necessary to the household. In a small number of cases interviews were conducted over the telephone with the Household Survey Coordinator.

At the completion of the interview, all household members aged 25 years or older were invited to attend a local testing site for the biomedical examination. Participants were provided with a brochure explaining the biomedical examination procedures, together with the self-administered SF-36 General Health and Well-Being questionnaire, which they were asked to complete and bring to their biomedical examination appointment.

2.5.2 Biomedical examination

The biomedical examination was conducted at a local test site on weekdays (except Friday) and weekend days over an 8-day period in each sampled area. Local survey sites included community centres, scout headquarters, sporting venues, church halls and schools. Survey activities at the testing site commenced at 7:00 a.m. and typically finished at 2:00 p.m. On average, approximately 40 participants attended daily.

All responders gave written informed consent to participate in the survey upon arrival at the testing site. The AusDiab biomedical examination protocol followed closely the WHO recommended model for diabetes and other non-communicable disease field surveys [5, 7].
The components of the biomedical examination are shown in Table 1. Following the initial collection of the fasting blood sample, an oral glucose tolerance test (OGTT) was performed on all participants, except those on insulin or oral hypoglycaemic drugs or those who were pregnant. The OGTT was performed according to World Health Organization (WHO) specifications. Participants moved through the biomedical examination procedures in a circuit-like manner that took approximately 2.5 to 3 hours to complete. The SF-36 and dietary questionnaires were self-administered, while all other questionnaires were interviewer administered. All data from the participant record forms were entered both electronically and manually.

3. Results

3.1 Survey Response

Response rates to the household interview and the biomedical examination are shown in Figure 1. In total, the AusDiab interviewers approached 25,984 households in the 42 selected clusters. Of these, 6,769 (26%) were classified as non-contacts. Reasons for non-contact (and hence non-participation) in the household interview included language difficulties (318 households), no access gained to the residence (e.g. because of dangerous dogs, security fences) (941), the householders not being contactable despite several attempts (5358), and other reasons such as drunkenness or disability of the householders (152).

Of the 19,215 residential properties where contact was achieved, 1095 were excluded because none of the occupants met the residency criteria of the survey, and a further 991 were excluded because all of the residents in the household were less than 25 years of age. Of the remaining 17,129 eligible households, 5,178 refused to be interviewed and 472 were away for the duration of the study period, giving rise to a total of 11,479 households (70.2%) where an interview was achieved. Reasons for refusal included health concerns (486, 9.4%),
being unable to attend because of work commitments (1,159, 22.4%), feeling they were too old to participate (368, 7.1%), medical problems (1,317, 25.4%), and “other” reasons (1,848, 35.7%).

Assuming that the proportion of ineligible households was similar between the contacted (2,086/19,215 = 10.9% ineligible) and the non-contacted households, 49.6% (11,479/23,163) of eligible households participated in the household interview. The denominator here (23,163) is calculated as all private dwellings (25,984) minus all ineligible households (2,821, which is comprised of 2,086 contacted ineligible households, plus 735, which is an equivalent percentage of non-contacted ineligible households). This response rate is a conservative estimate, as more of the non-contacted households are likely to be unoccupied or have fewer occupants than contacted households.

In the 17,129 households that were confirmed as containing at least one eligible participant, 20,347 eligible adults were interviewed. Of those who participated in the household interview, 11,247 (55.3%) took part in the biomedical examination. This response rate for the biomedical examination ranged from 49.5% in Queensland and 49.6% in South Australia to 61.8% in Western Australia (Table 2). Assuming that the numbers of eligible adults residing in the 5,178 households that refused the household interview was the same as in those which participated, and combining the household response rate (11,479/17,129 – 67%) with the biomedical examination response rate (11,247/20,347 – 55.3%) the overall response rate can be estimated to be 37%.

3.2 Profile of responders & weighting of the survey sample
To account for the clustering and stratification of the survey design, and to adjust for non-response, the data have been weighted to match the age and gender distribution of the 1998
estimated residential population of Australia aged over 25 years [8]. The weighting factor is based on the probability of selection in each cluster. The number of males and females in each cluster aged 25 years and over identified in the 1996 Census was used to calculate the probability of selection in each cluster. The weight was then calculated based on the probability of selection, adjusted to reflect the age and sex structure of the 1998 estimated residential population over the age of 25. Groups based on age deciles and gender defined the weighting variable. As there are two distinct populations in our sample – one who participated in the household interview and a subset of this population who attended the biomedical examination, two weighting factors have been applied, one to all responders to the biomedical examination and another to all responders to the household interview.

Among the responders to the biomedical examination (n=11,247), 44.9% were male, with the mean age being 51.5 years (Table 3). This compares to 49.0% male in the 1998 Australian population, and a mean age in the 1996 census [6] over 25 years of 48.1 years. Among the non-responders (n=9,049), 51.2% were male and the mean age was 47.7 years. Weighting of the sample to the estimated 1998 residential Australian population corrected the gender and age bias, with 49.0% (95% CI, 47.9 - 50.1) of the weighted responders to the biomedical examination being male, and the mean age being 48.2 years (95% CI, 46.6-49.9).

Table 3 provides a comparison between responders and non-responders to the biomedical examination for both unweighted and gender and age-adjusted estimates, with respect to various demographic characteristics. For the crude, unadjusted estimates, significant differences were observed for percent married, the percentage of English speaking participants, the percent born in the United Kingdom (UK), and the percentage who suspected they had diabetes, but no differences were noted for the percentage born in Australia, the percentage born outside the UK or Australia, the percentage who had
completed the highest year of school, and the percentage who had ever been told they had diabetes. Adjustment for age and gender rectified the difference between responders and non-responders for the percentage married, but differences were still observed in the percentage who suspected that they had diabetes, the percent born in the UK and the percentage of English speakers. Additionally, after adjustment for age and gender, the percentage who had completed the final year of high school, technical education or University was higher for responders.

4. Discussion

The Australian Diabetes, Obesity and Lifestyle Study is the largest cross-sectional study of the prevalence of diabetes and its precursors ever performed in a developed nation. Through its capacity to provide the first definitive data on the true magnitude of the diabetes epidemic in Australia, AusDiab will not only be a valuable resource for health care planners in Australia, but will also serve as an important research tool for the study of diabetes and associated diseases on a longitudinal basis.

The AusDiab experience provides a valuable insight into the execution of population-based, cross-sectional surveys involving the use of an OGTT. Since AusDiab required careful consideration of the logistics required to achieve a national sample within the funding and timeframe constraints imposed, particular emphasis was given to the establishment of a study design that reflected the ‘best available’ model. This extensive 12-month planning process was crucial to the successful implementation of the study.

Several aspects of the methods used in sample selection and the study design of AusDiab warrant further discussion. First, the inclusion criteria contained only those CDs that contained less than 10% indigenous population. Existing data provide clear evidence of a
very high prevalence of diabetes among the indigenous population in Australia [9]. To overcome the chance selection of one or more CDs with a large proportion of indigenous people, and thus minimize the potential bias introduced to the national and state diabetes estimates, we considered it more practical to restrict the inclusion criteria to those CDs likely to contain smaller proportions of indigenous people rather than account for any potential bias at the analysis stage. Furthermore, this approach was considered important for the operations of the study, since aspects such as questionnaire design would have required extensive modifications to reflect the cultural differences. It is unlikely that this restriction would have impacted greatly on the generation of national estimates since the indigenous population is numerically a very small minority group in Australia (approximately 2% of the total Australian population), and indeed, represented only 0.8% of the total AusDiab sample. Preparations are presently underway to address these issues through a survey that will employ similar survey methods used within AusDiab in urban indigenous Australians living in Darwin, Northern Territory.

The decision to sample equal numbers from each stratum reflects a compromise between the primary and secondary objectives of the survey. It is probable that a study design that sampled from the states proportional to their size would have been more efficient in terms of providing a more accurate national diabetes prevalence estimate, however accurate estimates for all states (in particular the smaller states) would have been compromised. Since weighting of the data prior to the analysis stage enables us to allow for over-representation of the smaller states and under-representation of the larger states, it is unlikely that our primary objective was compromised unduly by this decision.

It is also noted that, due to the exclusion criteria of the study, the results may not be generalisable to either the indigenous population or the rural population of Australia. The
primary aim of the study, however, was to provide estimates which were accurate for the
Australian population over 25 years as a whole and these exclusion criteria should not
significantly affect that aim.

The response rates to AusDiab can be interpreted in several ways. In many studies where a
defined population is used as the sample pool, an absolute response rate can be accurately
calculated. For example, when using an electoral role in the sample selection, the number of
residents in each household is accurately known, allowing the demographic profile of both
the non-responders and the responders to be calculated. In AusDiab, the sample pool was
comprised of households in CDs based on the 1996 Australian census, conducted two years
prior to commencement of the AusDiab survey. An accurate estimate of the number of
residents in households where contact was not achieved, as well as the age and gender
profile of these households cannot be accurately obtained. This is due to the possibility that
in those households where contact could not be achieved, many may have been unoccupied,
or the resident population in each household may be lower (assuming that the more people
residing in a household, the more likely it is that someone will be home when an interviewer
calls).

Our estimates suggest, however, that reasonably good response rates were obtained from
those households where contact could be achieved. Furthermore, considering the duration
and nature of the testing procedures involved in the biomedical examination for each
individual, the response to the biomedical examination is acceptable. Nevertheless,
additional in-depth analyses will be necessary to explore whether specific non-response
biases exist at both the national and state level.
Regarding the analysis of non-response bias presented, there are several points worth noting. Firstly, the difference in the percentage of English speakers between responders and non-responders shown in table 3, while being significant, was fairly small (96.1% vs. 93.6%) and is unlikely to have had a significant impact on diabetes or other prevalence estimates. Similarly, the percentage of responders born in the UK was only slightly greater than the percentage of non-responders born in the UK (10.3% vs. 8.8%), although again, this difference was significant. Most of the difference in country of birth between responders and non-responders was removed by age and gender-standardisation. It is unlikely that the percentage of people born in the UK would have an important effect on diabetes prevalence estimates, since many cultural similarities exist for those born in the UK and those born in Australia.

The greatest differences between responders and non-responders were observed in suspicion of diabetes and level of education. Firstly, the percentage of those who suspected they had diabetes (but have never been told they do) was significantly higher in the responders (1.5%) compared to the non-responders (0.5%). Only one in 12 of those who suspected they had diabetes were actually found to have the disease, compared to one in 25 of those who did not suspect they had diabetes. Taking into account the very low prevalence of those who suspected they had diabetes, and the low prevalence of those found to actually have diabetes when they suspected they had diabetes, the difference between responders and non-responders with respect to suspicion of diabetes would have increased the total number of newly diagnosed cases of diabetes by 6 or 7 persons at most. This would be expected to have only a negligible effect on the total prevalence estimates for diabetes.

Participants who attended the biomedical examination were more likely to have completed the final year of high school, University or other higher education (58.2% vs. 51.3%) than
non-responders. This would indicate that the higher socio-economic groups were overrepresented in AusDiab. This difference could potentially bias estimates of diabetes, as well as other studied variables. However, for glucose intolerance, as well as other cardiovascular disease risk factors such as dyslipidaemia, physical activity, alcohol consumption and smoking, there is a negative association with socio-economic status [10]. Therefore, our estimates of these disease states, if a socio-economic bias does indeed exist, are likely to underestimate the true prevalence. Of course, education level is only one indicator of socio-economic status, and other variables such as income level, occupation and type of residence will need to be considered in further analyses of response bias. Detailed comparisons between responders and the Australian population aged over 25 (using both census data and other previous surveys), particularly in the areas of socio-economic status, language spoken and suspicion of diabetes, will be valuable in assessing more precisely the impact of any response bias in the AusDiab survey.

AusDiab is a major achievement in the study of diabetes in Australia. The study not only provides much needed data on the current magnitude of the diabetes epidemic that exists in Australia but also fills a 10 year void in knowledge on current levels of many of the associated cardiovascular disease risk factors that can only be determined through blood collection. Furthermore, an important extension to this initiative will be the follow-up of the AusDiab cohort, that will provide the first opportunity ever in Australia to examine the natural history of diabetes and its complications, as well as the incidence of cardiovascular disease among this representative sample of Australians with diabetes or impaired glucose metabolism.
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References


Table 1 - Variables assessed within AusDiab

<table>
<thead>
<tr>
<th>Category</th>
<th>Variable</th>
<th>Measurement Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic characteristics</td>
<td>• Age, sex, ethnicity</td>
<td>Household interview &amp; Interviewer-administered questionnaires at survey site</td>
</tr>
<tr>
<td></td>
<td>• Socio-economic status (education, occupation, income)</td>
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</tr>
<tr>
<td></td>
<td>• Diabetes status</td>
<td></td>
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<tr>
<td>Medical and family history</td>
<td>• Family history (diabetes)</td>
<td>Interviewer-administered questionnaires at survey site</td>
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<td></td>
<td>• Chronic health conditions (cardiovascular disease, gout)</td>
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<td></td>
<td>• Women's health</td>
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<tr>
<td>Life-style related factors</td>
<td>• General health &amp; well-being</td>
<td>SF-36 Questionnaire</td>
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<td>• Alcohol/tobacco</td>
<td>Interviewer-administered questionnaires at survey site</td>
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<td>• Physical activity</td>
<td>Anti-Cancer Council of Victoria Dietary Questionnaire (self-administered)</td>
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<td>• Health knowledge, attitudes and practice data</td>
<td>Interviewer-administered questionnaires at survey site</td>
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<td>• Health service utilisation patterns</td>
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<td>Physical measurements</td>
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<td>Beam balance scales</td>
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<td>• Waist &amp; hip circumference</td>
<td>Tape measure</td>
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<td>• Body fat determination</td>
<td>Bioimpedance</td>
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<td>• Blood pressure</td>
<td>Dinamap / mercury</td>
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<td>Blood measurements (fasting)</td>
<td>• 12-lead ECG</td>
<td>Glucose Oxidase Enzymatically - Olympus AU600 analyser</td>
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<td>• Blood Glucose</td>
<td>Boronate affinity high performance liquid chromatography (HPLC)</td>
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<td>• Blood Lipids</td>
<td>Immunoturbidimetric method - Olympus AU600 analyser</td>
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<td>• HbA1c</td>
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<td>Urine measurements (spot morning sample)</td>
<td>• Albumin</td>
<td>Olympus AU600 analyser</td>
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<td>• Creatinine</td>
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### Table 2 - Response rates of eligible residents to the biomedical examination by State/Territory

<table>
<thead>
<tr>
<th>State / Territory*</th>
<th>Eligible residents (n)</th>
<th>Respondents to household interview (n)</th>
<th>Respondents to biomedical examination (n)</th>
<th>Biomedical examination response rate (%)#</th>
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</thead>
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<tr>
<td>VIC</td>
<td>2,396</td>
<td>2,391</td>
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<td><strong>Total</strong></td>
<td><strong>20,347</strong></td>
<td><strong>20,293</strong></td>
<td><strong>11,247</strong></td>
<td><strong>55.3</strong></td>
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</tbody>
</table>

* VIC=Victoria, WA=Western Australia, NSW=New South Wales, TAS=Tasmania, SA=South Australia, NT=Northern Territory, QLD=Queensland

# Calculated as biomedical examination responders as a percentage of eligible residents
Table 3 - Response rates of eligible residents to the biomedical examination by age and gender.

<table>
<thead>
<tr>
<th>Age/Gender group</th>
<th>Eligible residents (n)*</th>
<th>Respondents to household interview (n)*</th>
<th>Respondents to biomedical examination (n)*</th>
<th>Biomedical examination response rate (%)#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male 25-34</td>
<td>1757</td>
<td>1747</td>
<td>590</td>
<td>33.6</td>
</tr>
<tr>
<td>Male 35-44</td>
<td>2342</td>
<td>2331</td>
<td>1093</td>
<td>46.7</td>
</tr>
<tr>
<td>Male 45-54</td>
<td>2290</td>
<td>2281</td>
<td>1345</td>
<td>58.7</td>
</tr>
<tr>
<td>Male 55-64</td>
<td>1516</td>
<td>1515</td>
<td>928</td>
<td>61.2</td>
</tr>
<tr>
<td>Male 65-74</td>
<td>1125</td>
<td>1122</td>
<td>731</td>
<td>65.0</td>
</tr>
<tr>
<td>Male 75+</td>
<td>677</td>
<td>677</td>
<td>362</td>
<td>53.5</td>
</tr>
<tr>
<td>Female 25-34</td>
<td>1894</td>
<td>1890</td>
<td>803</td>
<td>42.4</td>
</tr>
<tr>
<td>Female 35-44</td>
<td>2510</td>
<td>2503</td>
<td>1465</td>
<td>58.4</td>
</tr>
<tr>
<td>Female 45-54</td>
<td>2355</td>
<td>2352</td>
<td>1546</td>
<td>65.6</td>
</tr>
<tr>
<td>Female 55-64</td>
<td>1649</td>
<td>1647</td>
<td>1096</td>
<td>66.5</td>
</tr>
<tr>
<td>Female 65-74</td>
<td>1286</td>
<td>1285</td>
<td>837</td>
<td>65.1</td>
</tr>
<tr>
<td>Female 75+</td>
<td>927</td>
<td>927</td>
<td>451</td>
<td>48.7</td>
</tr>
</tbody>
</table>

* NOTE – 19 eligible people refused to give their age and are thus missing from this table, of whom 16 were respondents to the household interview, and none were respondents to the biomedical examination.
# Calculated as biomedical examination responders as a percentage of eligible residents
Table 4 - Comparison between biomedical examination responders and non-responders, both unweighted, and age and gender-adjusted to the 1998 estimated residential population aged over 25 years. Estimates are percentages (95% CI).

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Responders to biomedical exam. (unweighted)</th>
<th>Non-responders to biomedical exam. (unweighted)</th>
<th>Responders (age &amp; gender adjusted to 1998 population&lt;sup&gt;a&lt;/sup&gt;)</th>
<th>Non-responders (age &amp; gender adjusted to 1998 population&lt;sup&gt;a&lt;/sup&gt;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>71.5 (68.8 - 74.2)</td>
<td>67.0 (64.4 - 69.5)</td>
<td>68.5 (65.5 - 71.5)</td>
<td>67.6 (65.0 - 70.2)</td>
</tr>
<tr>
<td>Country of Birth: Australia</td>
<td>76.0 (72.9 - 79.1)</td>
<td>77.1 (73.8 - 80.5)</td>
<td>77.6 (74.6 - 80.6)</td>
<td>76.7 (73.3 - 80.1)</td>
</tr>
<tr>
<td>Country of Birth: U.K.</td>
<td>11.3 (9.7 - 12.8)</td>
<td>8.7 (7.2 - 10.2)</td>
<td>10.3 (8.9 - 11.7)</td>
<td>8.8 (7.3 - 10.4)</td>
</tr>
<tr>
<td>Country of Birth: Other</td>
<td>12.7 (10.2 - 15.2)</td>
<td>14.1 (10.9 - 17.3)</td>
<td>12.1 (9.7 - 14.5)</td>
<td>14.4 (11.1 - 17.7)</td>
</tr>
<tr>
<td>Language Spoken: English</td>
<td>96.0 (94.6 - 97.4)</td>
<td>93.7 (91.2 - 96.3)</td>
<td>96.1 (94.9 - 97.4)</td>
<td>93.6 (91.0 - 96.2)</td>
</tr>
<tr>
<td>Education: completed high school/University/technical education</td>
<td>55.8 (51.4 - 60.1)</td>
<td>51.7 (46.4 - 57.1)</td>
<td>58.2 (54.0 - 62.4)</td>
<td>51.3 (46.0 - 56.6)</td>
</tr>
<tr>
<td>Ever Told have DM?</td>
<td>6.4 (5.7 - 7.1)</td>
<td>6.2 (5.2 - 7.1)</td>
<td>5.9 (5.3 - 6.5)</td>
<td>6.4 (5.4 - 7.3)</td>
</tr>
<tr>
<td>Suspect have DM?</td>
<td>1.5 (1.3 - 1.7)</td>
<td>0.5 (0.4 - 0.7)</td>
<td>1.5 (1.3 - 1.7)</td>
<td>0.5 (0.4 - 0.7)</td>
</tr>
</tbody>
</table>

<sup>a</sup> June 30, 1998 Australian Population [8]
Figure 1 - Flowchart of Households and persons selected to participate in AusDiab.

HOUSEHOLDS

All Selected Dwellings = 28,033

Private Dwelling = 25,984

Contact = 19,215

Eligible Household = 17,129

Participate in HH Interview = 11,479

Eligible People = 20,347

Participate in HH Interview = 20,293

Agreed to attend for Biomedical Exam. = 15,178

Attended Biomedical Examination = 11,247*

Refuse HH Interview = 5,178

Refuse Biomedical Exam. = 5,115

Failed to attend Biomedical Examination = 3,934

Non-residential + non-occupied = 2,049

Non-contact = 6,769

Ineligible Household = 2,086

Away Duration = 472

Eligible Household = 17,129

Ineligible Household = 2,086

Participate in HH Interview = 11,479

Refuse HH Interview = 5,178

Agreed to attend for Biomedical Exam. = 15,178

Attended Biomedical Examination = 11,247*

Refuse Biomedical Exam. = 5,115

Failed to attend Biomedical Examination = 3,934

*3 people undertook biomedical examination without having completed a household interview.