Australian Health Measurement Survey: An example with a focus on Metabolic Syndrome and mental health

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Acknowledgment

The papers in the AHMS Working Paper Series were prepared by staff of the Public Health Information Development Unit, University of Adelaide, as background material to the development of a national biomedical risk factor survey for Australia.

This process resulted in the preparation of a Business Case for the Australian Health Measurement Survey program (AHMS), which was undertaken by an Inter-Governmental Steering Committee (drawn from Commonwealth, State and Territory health and information agencies), assisted by a scientific Reference Group. Their expertise and contribution to the developmental process is hereby acknowledged.

Australian Health Measurement Survey: An example with a focus on Metabolic Syndrome and mental health

This paper outlines the objectives of the Australian Health Measurement Survey (see Sections 1 and 2) and presents an example of content and design that could be used for the first survey in the program (from Section 3 onwards).

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1. Survey background and objectives

1.1 Background

The Australian Health Measurement Survey (AHMS) has been proposed as a program of cross sectional population health surveys, with a component of objective measurement, that will examine a range of disease outcomes and risk factors/determinants in the Australian population over time. It has been proposed that the survey be initially repeated at a time interval of six years (with a view to more frequent repeats once the initial survey has been analysed) and that it contain a longitudinal component of 10 years' linkage, for example, to the national cancer and death registers. The survey program will provide objective measures of health status to compare with selected self reported measures of health. The possibility of running the Australian Health Measurement Survey in conjunction with the National Health Survey is currently under discussion with the Australian Bureau of Statistics.

1.2 Objectives and outcomes

The broad objectives of the program of surveys are to:

- Determine the prevalence of selected disease outcomes and risk factors/determinants in the Australian population and selected population groups, as a basis for policy and strategy developments.
- Monitor trends in the prevalence of these selected disease outcomes and risk factors/determinants in the Australian population and selected population groups.
- Examine the relationships among selected diseases and risk factors/determinants.
- Validate self report of selected risk factors/determinants using biological measures in order to assess the validity of time trends in health indices obtained using self report.

It is envisaged that the survey program will have the following outcomes. There is potential for it to:

- generate reliable objective evidence over time, for population health planning and the evaluation of major disease prevention and control activities, including some of the National Health Priority Area (NHPA) strategies and related interventions;
- examine the relationships among selected diseases and risk factors/determinants to assist in focusing research efforts and policy and intervention development;
- provide the infrastructure for "opportunistic" testing of issues of concern (i.e. lead or other pollutants) that may arise in the future and to provide a bank of stored samples for further research; and
- validate the self report measures that are collected in face-to-face population health surveys and potentially provide weights for adjustment of those surveys.

2. Selection criteria for content

The Steering Committee recommends that content areas covered by the survey:

1. be issues of national public health importance and reflect government health objectives.
2. address problems that could be changed through public policy and strategy initiatives.
3. have reliable, replicable and valid measures that are easy to administer and that link with other areas for which objective measures are required.

3. Content Framework

A consultation was held with State and Territory jurisdictions to establish their policy priorities in order to frame potential content in a policy context. This information was incorporated into a framework based on the Commonwealth's proposed *Chronic Disease Framework* (Sindall, 2000), which has now been developed into the *Preventing Chronic Disease – a strategic framework* by the National Public Health Partnership. The AHMS framework includes a range of health conditions currently considered government priorities and outlines their public health importance, government strategies/initiatives and risk factors and determinants.

It is evident from the framework that many risk factors/determinants are common to a range of conditions and these have formed the core content of the survey program (see Section 4 – *Core content*). Specific disease or population focuses can then be chosen for each of the different surveys in the program (see Section 4 – *Special interest modules*).

The framework is not exhaustive and emerging health priorities can be added over time. The framework should also be updated as information about the risk factors and determinants of health conditions are better understood.

4. Content: core and special interest modules

It has been proposed that the surveys have two content components: core content and special interest modules.

4.1 Core content

Core content would be measured at every survey in order to provide a consistent picture of common risk factors and socioeconomic determinants of health over time. This approach is used in the National Health Survey of the UK, which includes in its core content the objective measures of height, weight and blood pressure and subjective measures of general health, risk factors and socioeconomic status.

The core content presented in this illustrative example for the AHMS is outlined in detail in Section 6 but includes:

- **objective measures** of blood pressure, height, weight, abdominal circumference.
- **subjective measures** of tobacco exposure, physical activity, food and supplement intake, alcohol intake, psychosocial factors, health management, mental health, socioeconomic status and demographics.

Some of the subjective measures in the core could be validated in the first survey using objective measures. These include:

- salivary cotinine for tobacco exposure,
- salivary cortisol for psychosocial stress,
- pedometer measurements for physical activity, and,
- blood markers for food and supplement intake.

Core content will allow for the monitoring of:

- body measurements (in particular to focus on meeting the WHO reporting requirements of growth in children and to describe the prevalence of childhood obesity and adolescent eating disorders).
- the major risk factors and socioeconomic determinants of health
- the relationship between risk factors and determinants (for example, the relationship between socioeconomic status and smoking)
- the progression of risk over the life course
- the relative contribution of risk factors versus socioeconomic determinants to the overall disease burden.

4.2 Special interest modules

Special interest modules would examine particular health related questions on a one off or occasional (rotating) basis in order to examine a particular health issue in greater depth. The special interest modules used by the National Health Survey of England have included cardiovascular disease (1994), asthma/accidents/disability (1995), children and young people (1997), ethnic groups (1999), older people and social exclusion (2000). As can be seen, special interest content could focus on a disease outcome, age group or population group.

Special interest content may also include small opportunistic topics of concern that are not large enough to be the major focus of a survey. These may include lead levels in children or validation of the vaccination sero-surveys.

The special interest content presented in this illustrative example for the first AHMS focuses on:

- **the Metabolic Syndrome (cardiovascular disease, diabetes, renal disease)**
- **mental health**

These modules have been chosen for a number of reasons:

1. They fit the selection criteria outlined in section 3, the details of which can be found in Appendix A.

2. Focusing the first survey on the metabolic syndrome and mental health adds only a few additional measures to the proposed core content. The physical measures component is therefore simple, requiring minimal equipment, and will be portable and relatively quick to administer (see Section 8.3 *Stage 2: The nurse visit*). This will make it possible to trial the success of such a program without the difficulties posed by cumbersome equipment that were reported by AusDiab. Subsequent surveys could deal with more complex physical measures.

3. These content modules will provide an opportunity to test the utility of the life course determinants that are increasingly being seen as crucial in the development of chronic disease (see Section 4).

The second survey – focus on nutrition

The second survey could focus on nutrition to enhance the body measurements' data collected in the first. It would be advantageous to leave nutrition to the second survey in order to thoroughly examine the best methodology for measuring nutrition through a health survey. There is currently a debate over the effectiveness of 24 hour recall and food frequency questionnaires, and other methods recently put into the field such as the bar-coding of food in people's houses used by the New Zealand program. Time would allow for a more thorough investigation of the utility and practicality of these data collection tools.

5. A life course perspective

It is increasingly being acknowledged that chronic diseases are the result of the accumulation of deprivation and risk factors across the life course. Parental health, inter uterine development, childhood health, childhood circumstances, adult socioeconomic status and adult behaviours have all been found to be important contributors to disease outcomes (Davey Smith *et al*., 2001). Specific life course factors for most disease outcomes, however, have been poorly described to date, and this would be an important research area that could be addressed by this survey.

Cardiovascular disease has the best-described life course factors and these have been summarised in a recent review by Davey Smith *et al*. (2001). These factors are shown in the following table. All factors except those related to life in utero can be measured in this example of the AHMS.

Table 5.1 Life course risk factors for cardiovascular disease.

Ticks indicate that the factor could be measured in the Australian Health Measurement Survey. Note that all factors except some early childhood factors could be included.

Parental health and interuterine development	→	**Childhood**	→	**Late adolescence**	→	**Adulthood**	
Maternal health, development, and diet before and during pregnancy	✗						
Certain acquired infections	✗						
Short leg length	✗						
Parental history of CHD	✓						
		Low birth weight	✓				
		Poor growth					
		Obesity	✓	Obesity	✓	Obesity	✓
		Diet	✓	Diet	✓	Diet	✓
		Socioeconomic deprivation	✓	Socioeconomic deprivation	✓	Socioeconomic deprivation	✓
				Blood pressure	✓	Blood pressure	✓
				Serum cholesterol	✓	Serum cholesterol	✓
				Smoking	✓	Smoking	✓
				Little physical activity	✓	Little physical activity	✓
						Job insecurity	✓
						Short stature	✓
						Binge alcohol drinking	✓
						Diabetes and components of the metabolic syndrome in adulthood	✓

6. An example of an AHMS content

The following tables detail the measures that would be included in the illustrative example of the metabolic syndrome, body measurement and mental health. The first two tables outline the core content while the second outlines the special interest modules. The tables also outline the ages of respondents for each measure.

It should be noted that both short and more in depth mental health measures are available. Mental health can therefore be included as a risk factor in all surveys, but can also be a special interest module using a more in depth measure.

Table 6.1 Core content measures

Physical measurements	**Children**		**Adults**			**Older**
	0 - 11	**12-14**	**15-19**	**20 - 29**	**30 - 64**	**65+**
Measures						
Blood pressure	● (5+)	●	●	●	●	●
Height	● (2+)	●	●	●	●	●
Weight	●	●	●	●	●	●
Abdominal circumference	● (2+)	●	●	●	●	●

Questionnaire	**Children**		**Adults**			**Older**
	0 - 11	**12-14**	**15-19**	**20 - 29**	**30 - 64**	**65+**
Initiators and promoters						
Tobacco exposure						
Self smoking	● (8+)	●	●	●	●	●
Parental smoking	●	●	●	●	●	●
Exposure history (proportion of exposure from work, social, home)	●	●	●	●	●	●
Physical activity						
Self report	●	●	●	●	●	●
Food and supplement intake						
Methodology to be established	●	●	●	●	●	●
Alcohol intake						
Self report		●	●	●	●	●
Psychosocial factors						
Social support		●	●	●	●	●
Health care (dependant on special interest module chosen)						
Self management				●	●	●
Management by health professionals				●	●	●

Questionnaire	Children		Adults			Older
	0 - 11	12-14	15-19	20 - 29	30 - 64	65+
Knowledge of risk factors			●	●	●	●
Use of/access to services	●	●	●	●	●	●
Use of/access to screening				●	●	●
Mental health (short measures)						
Mental health problems:						
GHQ12 or K10				●	●	●
Strengths and Difficulties Questionnaire (SDQ)	● (3 +)	●	●			
Quality of life:						
SF12/36				●	●	●
Child Health Questionnaire (CHQ)	● (3 +)	●	●			
Socioeconomic status and demographics						
Occupation						
Current occupation			●	●	●	●
Employment status			●	●	●	●
Work conditions			●	●	●	●
Work control			●	●	●	●
Exposure to certain substances at work			●	●	●	●
Employment history			●	●	●	●
Socioeconomic status						
Reported birth weight	●	●				
Parents occupation at time of birth (lifecourse ses)	●	●	●	●	●	●
(UK Breadline also asks Looking back over your adult life, how often have there been times in your life when you think you have lived in poverty by the standards of that time?)						
Income			●	●	●	●
Home ownership			●	●	●	●
Educational attainment			●	●	●	●
Economic capacity (ability to raise $2000 in a week in an emergency, and, financial difficulties in the last year, could you pay a $100 bill, Do you think you could genuinely say you are poor now, all the time, sometimes, or never)			●	●	●	●
Food security	●	●	●	●	●	●

Questionnaire	Children		Adults			Older
	0 - 11	12-14	15-19	20 - 29	30 - 64	65+
Demographics						
Age	●	●	●	●	●	●
Sex	●	●	●	●	●	●
Indigenous status	●	●	●	●	●	●
Locality	●	●	●	●	●	●
Ethnicity	●	●	●	●	●	●

Table 6.2 Measures to validate core subjective measures

Physical measures	Children		Adults			Older
	0 - 11	12-14	15-19	20 - 29	30 - 64	65+
Saliva						
Cotinine (tobacco exposure)	●	●	●	●	●	●
Cortisol (psychosocial stress)	●	●	●	●	●	●
Blood						
Markers of fruit and veg intake (see Blood in special interest modules below)		●	●	●	●	●
Other						
Pedometer (physical activity) (see Other in special interest modules below)		●	●	●	●	●

Table 6.3 Measures for special interest modules

Physical measures	Children		Adults			Older
	0 - 11	12-14	15-19	20 - 29	30 - 64	65+
Blood						
Serum lipid levels - cholesterol - LDL - triglycerides (fasting) - HDL (fasting)		●	●	●	●	●
C-reactive protein (marker of inflammation)		●	●	●	●	●
Homocysteine (marker of folate status)		●	●	●	●	●
Fasting glucose after 6 hours (everyone)			●	●	●	●
Oral Glucose Tolerance Test (sub sample)			●	●	●	●
Glycosylated haemoglobin HbA1c		●	●	●	●	●
Insulin (marker of insulin resistance)		●	●	●	●	●
Serum creatinine		●	●	●	●	●
Markers of fruit and vegetable intake - red cell folate - carotenoids (lutein, cryptoxanthin, lycopene, beta carotene) - also homocysteine above		●	●	●	●	●
Urine						
Dipstick test urine		●	●	●	●	●
Urine microscopy and culture (if urinalysis + or greater for leucocytes, nitrites or blood)		●	●	●	●	●
Spot urine for albumin/creatinine ratio		●	●	●	●	●
	0 - 11	12-14	15-19	20 - 29	30 - 64	65+
Other						
Pedometer (physical activity)		●	●	●	●	●

Questionnaire	Children		Adults			Older
	0 - 11	12-14	15-19	20 - 29	30 - 64	65+
Hereditary conditions	●	●	●	●	●	●
Mental health						
Expanded questionnaires (see core measures)		●	●	●	●	●

7. Survey methodology

7.1 Overview

The following design of the Australian Health Measurement Survey (AHMS) will provide data at the national level about the population living in private dwellings in Australia. It will also provide some data at regional levels, although not necessarily at a State/Territory level. The sample will be determined by the Australian Bureau of Statistics (ABS) from their sampling frame to cover the whole of Australia other than the 'sparsely settled' areas. Inclusion of the sparsely settled areas will be considered later in the AHMS program, depending on advice from the ABS following their experience in undertaking sample surveys in these areas, and on consultation with Indigenous groups and agencies. The potential for individual surveys in the AMHS program to over-sample in Indigenous populations is currently being addressed with Indigenous groups and agencies and it is envisaged that the first survey will not over-sample.

It has been proposed that an interviewer/nurse team conduct the interviews (Stage 1) and measurements (Stage 2) in the home for the initial survey, but in subsequent surveys, Stage 2 could be conducted in a specified venue where a wider range of measurements could be undertaken. The nurse visit in the home is considered the best way to maximise response in the first survey because the suggested content requires simple, portable equipment (see *Section 4.2 Special interest modules*). Use of computer-assisted personal interviewing (CAPI) by the interviewers is proposed (subject to availability), with information obtained directly from those aged 12 or over, and from a parent with the child present for children aged less than 12. Interviews in Stage 1 will be followed by a visit by a nurse (Stage 2), who will obtain permission for, and subsequently take, a range of objective measurements.

The possibility of running the AHMS in conjunction with the ABS National Health Survey (NHS) is currently under discussion. This document includes designs both for a survey linked to the NHS and a 'stand alone' survey. The stand alone survey option incorporates the use of ABS interviewers (as offered by the Statistician) because ABS expertise and techniques (such as persistent follow up of households) are seen as critical to the success of the AHMS if it is not run in conjunction with the NHS.

7.2 Sample design

A multi-stage stratified probability sampling design selected by the ABS is proposed. The population surveyed would therefore be the population living in private dwellings. Those living in institutions (e.g. hospitals, prisons, reformatories), the homeless and those living in the sparsely settled areas would not be covered. The first two of these groups is likely to be, on average, in poorer health than those in private dwellings, and this should be borne in mind when considering the results from the AHMS.

If the AHMS is undertaken as a part of the NHS, one adult, one child/adolescent aged 7 to 17 years and all infants/children aged below 7 years would be selected in each household. The application of specific weights would be required to compensate for this selection scheme when preparing prevalence and cross-classified output.

It is proposed that if the AHMS is undertaken as a stand alone survey all members of each selected household be included. This approach provides the opportunity to collect information from families in the same household. It would also reduce the number of households to be surveyed by 40% from that in the previous example.

7.3 Sample size

The sample size for the NHS is 20,000 dwellings with a possible 31,485 people being interviewed, comprising 5,735 at ages 0 to 6 years, 5,285 from 7 to 17 years and 20,465 aged 18 years and over (based on the 2001 NHS sample design). The AHMS would draw on all or a part of this sample to seek their involvement in the Stage 2.

If the AHMS is undertaken as a stand alone survey, a sample size of 9,500 dwellings would deliver a possible 25,500 interviews, comprising 2,600 children at ages 0 to 6 years, 4,100 from 7 to 17 years and 18,800 aged 18 years and over. The sample size is approximately double the recent AusDiab survey and approximately 80% of that planned for the 2001 NHS (see Attachment B for comparison with previous Australian surveys).

Table 7.1 Sample size estimates at different stages of a stand alone AHMS survey

Section	Per cent retained	Completed interviews/measurements [persons]			
		Children		Other	Total:
		<7 yrs	7 – 17 yrs	18+ yrs	all ages
Sample selections	..	3,290	5,110	23,540	31,940
Successful interviews	80%	2,630	4,090	18,840	25,560
Successful nurse home visit	80%	2,100	3,270	15,070	20,440

A critical factor in establishing the size of the sample is an understanding of the uses to which the data will be put. In the AHMS it will be important to be able to identify groups in the population with particular conditions or measurements. The expected prevalence of these conditions or measurements will determine the size of the sample. Examples are provided in Table 7.2 of the size of the estimates likely to be produced for varying prevalence rates in different age groups, and the sample size required to produce these estimates. The examples also show the confidence intervals associated with these estimates to achieve results of sufficient precision (the level of precision is to be determined by the Steering Committee).

Example 1:
To produce an estimate for a measurement with a prevalence of 10% for 10 year age groups for adults to 75+ years, with a 95% confidence interval ranging from 7% to 13%, would require a sample size of 23,006 interviews. This would provide an estimated 15,823 blood samples.

Example 2:
To produce an estimate for a measurement with a prevalence of 50% for 10 year age groups for adults to 65+ years, by sex, with a 95% confidence interval ranging from 46% to 54%, then a sample of 21,277 interviews would be required.

Example 3:
To produce an estimate for a measurement with a prevalence of 25% for children in the 5 to 9 and 10 to 14 year age groups by sex, with a 95% confidence interval ranging from 20% to 30%, would require a sample size of 15,146 interviews.

These examples are summarised below in Table 7.2.

Table 7.2 Sample size estimates for selected prevalence rates

Examples	Blood Samples	Examinations	Interviews
Prevalence: 10% ± 3% Adults: 10 year age groups to 75+	15,823	20,013	23,006
Prevalence: 50% ± 4% Adults: (10 year age groups to 65+) by sex	14,634	18,510	21,277
Prevalence: 25% ± 5% Adults: (10 year age groups to 65+) by sex Children: (5-9, 10-14 year age groups) by sex	10,417	13,176	15,146

Alternatively, the 95% confidence intervals for a range of prevalence estimates can be identified against particular sample sizes (based on the number interviewed in Stage 1 of the survey). For example, if the survey aims to interview 25,000 respondents then (using the assumed response rates presented in the next section) the estimates produced and their associated confidence intervals would be as follows:

Males, aged 55-64 years with high blood pressure: 34.3% with CI (31.0, 37.6)
Males, aged 35-44 years with high blood cholesterol: 52.7% with CI (49.7, 55.7)
Children, aged 5-9 years with a particular condition: 10.0% with CI (8.5, 11.5)
Children, aged 5-9 years with a particular condition: 20.0% with CI (17.9, 22.1)

7.4 Estimated survey response

The estimates presented below are based on information from the 1995 NHS, the 1995 National Nutrition Survey (NNS) and experience gained from other Australian surveys. Response rates in the 1998 Health Survey for England were also examined, in particular to assist in estimating response for measurements/samples.

As informants will be asked to co-operate in a sequence of operations, beginning with a face-to-face interview, progressing to a nurse visit and ending with a request for physical measurement, individual non-response will accumulate through the survey sections. The estimated proportion of individual response for adults and children for both the collection as a part of the NHS and as a stand alone survey are shown below (Tables 7.3 and 7.4).

For the 'AHMS linked to NHS' example in Table 7.3, the estimate for the population 'Measured' in Stage 2 is based on retaining 70% of those interviewed in Stage 1. Note that while the NHS interview achieved an overall response rate of 91.5%, a lower 62% of those completed the NNS interview, an overall response of 57%. Thus the proportion of 70% retained used in Table 7.3 may be seen as generous. This is especially so with the requirement for interviewees who agree to participate in Stage 2 to mail in their consent, and in the absence of a straightforward mechanism to follow-up those who fail to send in their consent. However, with the initial relatively high response rate in Stage 1 a substantial amount of information will be available to compare the characteristics of Stage 2 respondents with those of non-respondents.

For the stand alone option, the estimated proportion of successful interviews shown in is 80% (Table 7.3). Recent household interviews have provided response rates lower than this, but it is believed that these can be improved on with careful management and training, appropriate publicity and drawing on the experience and professionalism of interviewers from the ABS pool. The AHMS also has something to offer participants, by way of a free health check: this is regardless of any direct incentives that may be decided upon. As regards response rates to other surveys, the Child and Adolescent Component of the National Survey of Mental Health and Well-being achieved a response rate of 70%. The level would have been higher had interviewers met contractual obligations on number of call backs before selecting a replacement household. In the light of this experience, and the methodology to be applied in this survey, 80% appears achievable.

It is estimated that 80% of those interviewed in Stage 1 will be measured in Stage 2. Achieving this proportion will again be dependent on the quality of the procedures in place, and will be enhanced by the use of home visits by the nurse.

Table 7.3 Estimated Proportion of Response - Adults

Section	AHMS linked to NHS % retained	Section	AHMS stand alone, with ABS interviewers % retained
Stage 1 Interviewed	92	Stage 1 Interviewed	80
Stage 2 Measured [70%]	64	Stage 2 Measured [80%]	64
Saliva*	62	Saliva*	62
Blood*	53	Blood*	53

*Based on drop off rates from the Health Survey of England (see Attachment C)

Similar data for the estimated responses for children are shown in Table 7.4. It is believed that the response rates for the collection of saliva and blood from children are at the lower end of what could be expected from a well run survey.

Table 7.4 Estimated Proportion of Response - Children

Section	AHMS linked to NHS % retained	Section	AHMS stand alone, with ABS interviewers % retained
Stage 1 Interviewed	92	Stage 1 Interviewed	80
Stage 2 Measured [75%]	69	Stage 2 Measured [85%]	69
Saliva*	67	Saliva*	67
Blood*	51	Blood*	51

*Based on drop off rates from the Health Survey of England (see Attachment C)

8. Operational issues

8.1 Documentation

All survey data collection documents, measurement protocols and sample collection protocols will be determined as part of the further development of the survey program. An outline of the processes proposed for the Stage 1 interview and the Stage 2 nurse visit is summarised below.

8.2 Stage 1: the interview

It is proposed that data be collected at two levels – the household and the individual. Subject to availability, interviewers could use computer-assisted personal interviewing focusing on content areas contained in Section 6. Respondents will also be given a self-completion questionnaire about their tobacco use and alcohol consumption.

8.3 Stage 2: the nurse visit

It is proposed that nurses take measurements of height, weight, blood pressure and abdominal circumference, biological samples (see *8.4 Collecting samples*) and collect information about the use of prescribed medicines and vitamin or mineral supplements. Some measures will be limited to a particular age range, as described in Section 6.

8.4 Collecting samples

Consents would be obtained for all samples collected. For the example outlined in Section 6:

- blood samples would be collected from those over 18,
- samples of urine and a small sample of blood (by venepuncture) would be taken from those aged 12 and over, and,
- a saliva sample for cotinine assay would be taken from those aged 4 years and over.

Respondents will be offered the option of an anaesthetic cream prior to venepuncture and this protocol will be piloted.

Collection of physical measurements in the National Health Survey of England takes a nurse a mean of 3 –10 minutes in respondents under 4 up to 40 minutes in respondents over 65. These times include the taking of blood, saliva, blood pressure, lung function and waist, hip and demi span measures (note: not all measures are taken in all age groups).

Samples will be analysed for measures derived from the content in Section 6 and nurses could also seek consent to the storage of a small sample of blood for possible future analysis.

8.5 Provision for non-English speaking respondents

Consideration will need to be given to the needs of Non-English speaking respondents with respect to interviewing, survey materials and self-administered questionnaires. For the gaining of consents for the taking and storage of samples, the use of trained interpreters is likely to be required in order for consent to be informed and valid. Similar issues will accompany the feedback of results to respondents. The ethical implications of the use of other people in a household

as interpreters at either Stage 1 or Stage 2, for respondents who cannot speak English sufficiently well to be interviewed in English, will need further consideration. The optimal procedure would be to allocate an interviewer who could speak the appropriate language to a non-English speaking respondent so that the interview can be conducted in the respondent's own language. The same interviewer could also accompany the nurse for the Stage 2 visit.

9. Ethical clearance

Ethical approval for the survey will be required from an appropriate Institutional Research Ethics Committee, to be determined once the successful tenderer for the running of the Survey has been decided. AHMS will be run in accordance with current national and international ethical guidelines for human research.

Appendix A

The Steering Committee selection criteria as applied to the metabolic syndrome and body measurements.

(Research criteria to be added when determined)

1. They must be issues of national public health importance and must reflect government health objectives. .

The metabolic syndrome

Cardiovascular disease, diabetes have been designated National Priority Health Areas in Australia. All conditions of the metabolic syndrome and body measurement have been included as core conditions in the Commonwealth Department of Health and Aged Care's draft *Chronic Diseases Framework* (Sindall, 2000).

Cardiovascular disease

Cardiovascular disease kills more Australians than any other disease, accounting for around forty percent of all deaths each year (AIHW, 2000). It is responsible for nearly eighteen percent of the total disease burden (12.4% ischaemic heart disease and 5.4% stroke) making it the number one cause of the burden of disease and injury (Mathers *et al*., 1999). The National Health Survey estimated that 2.8 million Australians (sixteen percent of the population) had a cardiovascular condition in 1995, the most common condition being high blood pressure (AIHW, 2000). Cardiovascular disease ranks higher than any other disease in terms of health care costs in Australia (DHFS, 1998). It accounts for twelve percent of total health care costs and a quarter of direct health system costs (DHFS, 1998).

Diabetes mellitus

Diabetes is the seventh leading cause of death (AIHW, 2000) and burden of disease and injury in Australia, accounting for three percent of Australia's total disease burden (Mathers *et al*., 1999). Provisional results from the AusDiab study suggest that 7.2% of the population have diabetes while 16.1% have impaired glucose metabolism (personal communication). The 1995 National Health Survey reported a smaller percentage of diabetics estimating that 2.5% of the population had had a diagnosis at some time with it likely that a further 1.5% had undiagnosed diabetes (AIHW, 2000). Forty two percent of detected by the National Health Survey had Type 2 diabetes, 18% had Type 1, 6% had gestational diabetes (a type of diabetes that occurs in pregnancy) and for 33% had an unknown type that was likely to have been Type 2 (AIHW, 2000). There are significant costs, both indirect and direct, related to the treatment of the complications of diabetes. The most recent estimates of costs to the health care system estimate that $681 million is spent per annum (NHPA Report on Diabetes, 1999). This is a particularly high level of health system expenditure given the relatively low prevalence of the condition (NHPA Report on Diabetes, 1999).

Renal disease

In 1998, renal disease was the 12th leading cause of death, responsible for 1.3% of overall deaths (ABS, 1999). Renal disease becomes the 7th leading cause of death (3.2% of deaths) when examining the contributing causes of death (ABS, 1999). There may be significant under-recording of renal disease as a cause of death as has been demonstrated in the US (40% not coded on death certificates) (Perneger *et al*., 1993). In 1998, there were 10403 people in Australia treated with dialysis or transplantation (Disney *et al*., 1999). In 1997, the age and sex adjusted incidence rate for end stage renal disease among Indigenous Australians was 8.8 times that for non-Indigenous Australians (Cass *et al*., 1999). Dialysis procedures are the most common reason for admission to public hospitals (378,466 separations in 1997-98) (AIHW, 2000). The estimated cost for diseases of the kidney and urinary tract in public hospital admissions for 1997-98 was $468 million (AIHW, 2000). While Australian figures do not exist, it has been estimated that as many as 1,250,000 Australians are likely to have early renal impairment if compared to prevalence in similar countries.

Obesity

In 1995, 7.4 million adults in Australia were overweight (56% of those aged 18 years and over) and 2.4 million (19%) were obese (AIHW, 2000). Twenty-two percent of children and adolescents aged 2-17 years were overweight or obese. There has been a significant increase in the proportion of overweight people in the last fifteen years (AIHW, 2000). Over four percent of the attributable burden of disease in Australia in 1996 was related to obesity, making it the sixth most important risk factor for disease (Mathers *et al*., 1999).

Mental Health

Mental health is a National Health Priority Area (*National Health Priority Areas Report: Mental Health 1998* (DHAC & AIHW, 1999)) and depression is the fourth leading cause of burden of disease and injury in Australia, accounting for 3.7% of the total burden (8th in men, 3rd in women) (Mathers *et al*., 1999). The 1995 National Health Survey estimated that more than one million Australians suffered a mental health problem or disorder, half of which had the problem long term (AIHW, 2000). In 1997 the Survey of Mental Health and Wellbeing found that 18% of adults suffered a mental disorder and that the prevalence and type of mental disorders varies across the population (AIHW, 2000). Co-morbidity (with both other mental disorders and physical conditions such as the metabolic syndrome, disability and cancer) is common (AIHW, 2000). The burden of disease from mental health is thought to be increasing (AIHW, 2000). Mental health has subsequently been included as a linked condition in the Commonwealth Department of Health and Aged Care's draft *Chronic Diseases Framework* (Sindall, 2000).

2. They address problems that could be changed through public policy and strategy initiatives.

The prevention activities for the metabolic syndrome (all) and mental health (*) are:

Prevention activity	Policy strategy
Reduce physiological risk factors	
Decrease high blood pressure and high blood cholesterol	Eat well Australia (10 year strategy) NHMRC dietary Guidelines
Decrease diabetes	National Diabetes Strategy
Reduce risk factors	
Reduce tobacco use *	National Tobacco Strategy 1999-2002
Increase regular physical activity	Active Australia Initiative National Physical Activity Guidelines 1999 Acting on Australia's Weight National Public Health Nutrition Strategy National Healthy Ageing Strategy
Increase the proportion of people whose eating behaviours are consistent with dietary guidelines	Eat Well Australia (10 year strategy) NHMRC Dietary Guidelines National Child Nutrition Program Acting on Australia's Weight
Decrease obesity	Acting on Australia's Weight
Decrease high alcohol intake *	National Alcohol Plan 2000-2003
Decrease depression and anxiety *	National Mental Health Strategy National Youth Suicide Prevention strategy Occupational Health and Safety legislation and codes of practice
Improve social living conditions *	Stronger families, stronger communities
Improve access to treatment and screening	
Reduce socioeconomic and environmental health determinants	
Improve health in early life *	The Health of Young Australians: a national health policy for children and young people.
Reduce socioeconomic inequalities in health through *: - macro-economic change - improved access to - essential facilities and services - improved work conditions - strengthened communities - removal of barriers to healthier lives	Although the relationship between socio-economic factors and these diseases is strong, the underlying factors have not yet been well described. The strategies will encompass a wide range of economic, welfare, housing, taxation, education, occupational, industrial, transport and health policies. This survey could help to elucidate these pathways and subsequent strategies.

3. They have reliable, replicable and valid measures that are easy to administer and that link with other areas for which physical/biological measures are required.

Measures outlined in section 6.

Attachment B: Summary of Australian National Health Surveys: Sample Size

Survey	Collection Period	Households	Persons	Response Rate	Objective Measures	Comment
1977/78 Australian Health Survey	July 1977 to June 1978	15,500 priv dwgs				Excluding rural NT
1980 Risk Factor Prevalence Survey	May 1980 to Nov 1980		5,617 (25-64 yrs)	75% (interview)	blood pressure blood sample height & weight	National Heart Foundation Electoral roll sample Capital cities
1983 Risk Factor Prevalence Survey	May 1980 to Nov 1980		7,640 (25-64 yrs)	75% (interview)	blood pressure blood sample height & weight	National Heart Foundation incorporated 1983 National Dietary Survey of Adults Electoral roll sample Capital cities (excluding Darwin, Canberra)
1983 Australian Health Survey	Feb 1983 to Jan 1984	18,000 dwgs				
1989 Risk Factor Prevalence Survey	June 1989 to Dec 1989		9,328 (20-69 yrs)	75% (interview) 57% (blood)	blood pressure blood sample height & weight	National Heart Foundation Electoral roll sample Capital cities (excluding Darwin, Canberra)
1989/90 National Health Survey	Oct 1989 to Sep 1990	22,200	57,000			
1995 National Health Survey	Jan 1995 to Jan 1996	21,418 priv dwgs 369 sp dwgs	53,751	92%		
1995 National Nutrition Survey	Feb 1995 to Mar 1996		13,858 (2+ yrs)	92% (NHS interview) 56% (NNS measures)	blood pressure height & weight waist & hip	
1999/2000 AusDiab	Apr 1999 to		10,000 (25- yrs)	70% (interview) 48% (centre)	blood pressure blood & urine height & weight waist & hip ECG & body fat foot & eye exam	6 CDs per State Excluding ACT
2001 National Health Survey	Feb 2001 to Dec 2001	20,480	5,735 (0-6 yrs) 5,285 (7-17 yrs) 20,465 (18+ yrs) 31,485 (Total)			

Attachment C: Health Survey of England, 1997: Proportion of respondents in co-operating households, Adults and Children

ADULTS

	Men %	Women %	All adults %
Interviewed	88	96	92
Height measured	85	92	89
Weight measured	84	88	86
Saw a nurse	76	81	79
Waist and hip measured	75	79	77
Blood pressure measured	75	79	77
Saliva sample obtained	75	78	77
Agreed to give blood	64	67	65
Blood sample obtained	62	63	62

CHILDREN

	Boys %	Girls %	All children %
Interviewed	96	97	96
Height measured	93	91	92
Weight measured	92	91	91
Saw a nurse	83	83	83
Mid-upper arm measured	82	82	82
Blood pressure measured (aged 5 and over)	81	81	81
Gave a saliva sample (aged 4 and over)	81	81	81
Agreed to a blood sample (aged 11-15)	56	42	49
Blood sample obtained (aged 11-15)	51	34	43

Note: There were a number of identified causes for the very low response rate for blood samples among girls.