

The selection of population groups by age  
for a National Population Health Survey  
using objective measures

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**AHMS Working Paper Series No. 5**

Public Health Information Development Unit

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## National Library of Australia Cataloguing in Publication entry

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Hetzel, Diana.

The selection of population groups by age for a National Population Health Survey using objective methods.

ISBN 0 7308 9291 3.

1. Health surveys - South Australia. 2. Medical care surveys - South Australia. 3. Age groups. I. Public Health Information Development Unit (Australia). II. Australia. Dept. of Health and Ageing. III. Title. (Series : AHMS working paper series ; no. 5).

362.1099423

## Public Health Information Development Unit, The University of Adelaide

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This research was produced by the Public Health Information Development Unit (PHIDU), The University of Adelaide, South Australia in December 2000. The research was funded under a grant by the Australian Government Department of Health and Ageing. The views expressed in this paper are solely those of the authors and should not be attributed to the Department of Health and Ageing or the Minister for Health and Ageing.

Suggested citation:

Hetzel D. (2003) *The selection of population groups by age for a national population health survey using objective measures*. AHMS Working Paper Series No. 5. Public Health Information Development Unit, Adelaide.

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ISSN 1448-577X AHMS Working Paper Series

Published online by Public Health Information Development Unit, The University of Adelaide

## **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.

# The selection of population groups by age for a National Population Health Survey using objective measures

## **1. Introduction**

The notion of 'population health' has gained currency in recent years in the published health literature, and in the development of health and related policy in Australia. A focus on specific groups of special interest within the population as a whole has emerged.

The basis for selection of certain groups for a survey or study relates specifically to the area of interest, which may be made on any of the following grounds:

- Age
- Sex
- Race/ethnicity
- Geographical location
- Predisposition or vulnerability for a particular trait or condition (disease, risk, protective factor etc.)
- Socioeconomic status
- Perceived health or other social status
- Anticipated or previous focus for a health or other intervention
- Policy directions, and so on.

In the developmental process for the proposed program of national population health surveys using objective measures, the significance of each of these factors will depend on the priorities identified by the Inter-Governmental Steering Committee's review of significant policy areas that should be covered by the Survey.

## **2. Population groups identified from consultations to date**

There has been some discussion about the selection of population groups for the proposed survey. This short paper discusses population groups for inclusion on the basis of age, but other criteria have been discussed by the Steering Committee:

- Indigenous health – to be surveyed separately and not included as an oversampled group in the Survey;
- Rural and remote health – recommended inclusion by the Steering Committee and the Reference Group;
- Time trend information to link to previous national (blood) surveys – recommended inclusion by the Steering Committee.

Consultations with the various jurisdictions have highlighted the following population groups (with age as the criterion) for inclusion and particular foci of interest have been identified:

### *Children and young people under 18 years*

- to allow a 'life course' perspective (DHAC)
- to determine when various risk factors for chronic diseases such as cardiovascular disease are established (National Heart Foundation)
- to explore excessive expenditure in under 4 year olds (estimate of costs of hospitalisations and MBS/PBS payments - DHAC, Insights into the utilisation of health services, Occasional Paper: New series No.9, in press)
- suggested measurements:
  - blood lead (children only - DHAC)
  - physical inactivity (both children and young people - DHAC)
  - nutrition (children only - DHAC)
  - obesity (children only - DHAC), (both - QLD)
  - anthropometric measures for growth charts (children only - DHAC)
  - iron status (both - QLD), (adolescents - Reference Group)
  - diabetes (both - Health Outcomes Plan, QLD Health, 2000).

### *Young adults (18-29 years)*

- to identify an important group in terms of follow up (NSW)
- suggested measurements:
  - diabetes (Health Outcomes Plan, QLD Health, 2000).

### *Middle-aged (40-64 years)*

- to predict disease burden as this population group enters older age (ACT)
- to add to data for all groups across the life course (DHAC)
- in order to conform to the three age ranges for monitoring incidence 35-44, 45-54, 55-64, this survey would need to include 25+ to pick up outcomes with a 10 year linkage period ((Health Outcomes Plan, QLD Health, 2000)
- suggested measurements:
  - diabetes (Health Outcomes Plan, QLD Health, 2000).

### *Older people*

- to gauge extent of physical inactivity (DHAC)
- to explore excessive expenditure in those over 50 years (estimate of costs of hospitalisations and MBS/PBS payments) (DHAC, Insights into the utilisation of health services, Occasional Paper: New series No.9, in press)
- suggested measurements:
  - hormone replacement therapy (QLD)
  - musculoskeletal (Reference Group)
  - higher prevalence of many diseases (NSW)
  - diabetes (Health Outcomes Plan, QLD Health, 2000).

Decisions now need to be made at the Inter-Governmental Steering Committee level about the population groups of interest.

### **3. Scope of previous national population health surveys using objective measures in Australia**

There have been relatively few national surveys using objective measures conducted in Australia, although the AusDiab Survey is currently in the field. As a result, there are few recent national data of objective measures of health status for the Australian population. This has led to a significant gap in our knowledge of the health of Australians, and little current data to support health policy and program development.

A summary of the main national surveys using objective measures is contained in Table 1.

During the 1980s, there were three surveys conducted by the National Heart Foundation (NHF), in association with the Commonwealth Department of Health, to monitor the prevalence of cardiovascular risk factors in adults (*National Heart Foundation Risk Factor Prevalence Surveys 1980, 1983 and 1989*). Each survey included a questionnaire and a number of objective measures. A total of 20,000 adults living in capital cities participated in these surveys, with measures being collected from participants at designated Risk Assessment Centres.

In 1985, a national survey of 8,500 school students was undertaken to determine their health and fitness. The survey included a questionnaire and a number of objective measures, including blood sampling, and samples were collected at schools.

In 1990, the Commonwealth government commissioned a survey of the fitness levels of Australian adults. The sample size of the Pilot Survey was 2289 adults who responded to a questionnaire and underwent physical tests to determine their fitness and a range of measures of heart disease risk and physical well being, including blood sampling.

In 1995, pilot testing for the 1995 National Nutrition Survey included the taking of a blood sample, but a lack of funding precluded blood sampling from the final Survey. In the same year, a national survey of lead in children was undertaken.

In 1999/2000, the International Diabetes Institute has been conducting the Australian Diabetes Obesity & Lifestyle Study (AUSDIAB). The overall sample size is 10,000 adults 25 years and over, and there is a high degree of clustering of the sample. A number of objective measures are being taken (refer to Table 1).

### **4. International survey experience**

Other countries have made a commitment to the gathering of national data regarding their population's health on a more regular basis. Canada is yet to develop its measurement survey although planning is underway. A summary and a list of measures are contained in Table 2.

#### 4.1 USA

The NHANES survey series has been run in the USA since 1960. The current survey program, beginning in 1999, is a continuous, annual survey that can be linked to related Federal Government surveys of the general U.S. population. From January 2001, there will be an integrated survey -- the National Food and Nutrition Survey (NFNS) that will provide comprehensive information on health and nutrition characteristics of the U.S. population.

Since April 1999, NHANES has collected data from a representative sample of the U.S. population, newborns and older, every year. The new design also allows increased flexibility in survey content. The number of people examined in a 12-month period will be about the same as in previous NHANES, about 5,000.

Health measurements by participant age and sex appear in Table 2.

#### 4.2 United Kingdom

The Health Survey for England is a series of annual surveys about the health of people in England, designed to improve information about morbidity. This information is used to underpin and improve targeting of nationwide health policies. The Health Survey is designed to be nationally representative of people of different age, sex, geographic area and socio-demographic circumstances.

The 1991 and 1992 surveys had a limited population sample of about 3,000 and 4,000 adults respectively. For 1993 to 1996 the adult sample was boosted to about 16,000 to enable analysis by socio-economic characteristics and health regions. In 1995 for the first time, a sample of about 4,000 children was also introduced. In the 1997 Health Survey, the sample was about 7,000 children and 9,000 adults. In 1998, the sample was again about 16,000 adults and 4,000 children.

All eight surveys have covered the adult population aged 16 and over living in private households in England. The four most recent surveys, 1995-1998, have also covered children aged 2 to 15 years living in households selected for the survey. One of the survey's aims has been to measure the height of children at different ages, replacing the National Study of Health and Growth (from 1995). The Health Survey for England contains a 'core' content that is repeated each year and each survey year has one or more modules on subjects of special interest.

The 'core' includes:

- questions on general health and psycho-social indicators, smoking, alcohol, demographic and socio-economic indicators, questions about use of health services and prescribed medicines and blood pressure; and
- measurements of height, weight and blood pressure.

The modules may be about a single topic, several topics or about population groups. The modules to date have been:

1993 cardiovascular disease

1994 cardiovascular disease  
1995 asthma, accidents, disability  
1996 asthma, accidents, special measures of general health (Euroquol, SF36)  
1997 children and young people  
1998 cardiovascular disease  
1999 ethnic groups  
2000 older people, social exclusion  
2001 disability, asthma, accidents.

Children aged 13 to 15 are interviewed in person, with the permission of a parent or guardian. Where the child is aged 2 to 12, one of the child's parents or guardians answer the questions on the child's behalf, with the child present during the interview. Because of children's need for privacy in respect to some of their responses, self-completion questionnaires are provided to children aged 8 to 15 for topics such as drinking and smoking. (This is also the case for young adults aged 16 and 17.)

#### 4.3 New Zealand

The only experience in New Zealand with biomedical risk factor surveying is reflected in the 1996/97 NZ Health Survey that was linked to the 1997 National Nutrition Survey. The cost of the National Nutrition Survey (NNS) was \$NZ 3.5 million over three years in contracts, excluding costs to the Ministry of Health for staff time, and the cost of the National Health Survey was \$NZ 750,000. The NNS was run by the University of Otago under contract. The linkage with the NZ Health Survey was due to political pressures preventing separate funding of the NNS. It was the best way to ensure that both surveys occurred. Those who were involved with the surveys do not recommend a linkage in the future. It reduced the response rate in the second survey due to the multiple dropout opportunities (NNS was 50.1%).

Blood sampling was crucial to the NNS. It provided good data for blood cholesterol and iron deficiency. It provided a reality check for the nutrient information where available. For example, dietary inadequacy of iron was very high from the 24-HDR data, yet blood samples showed iron deficiency anaemia was a non-issue for nearly all of the female population. The results of the NNS have shown three key nutrition issues in NZ - obesity and overweight, food security and calcium inadequacy. These are all now priorities within the Ministry for policy work, but given a number of constraints, and the size of the issue, obesity is progressing first.

#### 4.4 Finland

In Finland, several national research institutes (Social Insurance Institution (SII), National Research and Development Centre for Health and Welfare (Stakes), Statistics Finland and Institute of Occupational Health) have carried out questionnaire and interview surveys with a health component in nationally representative population samples. The National Public Health Institute (KTL) has monitored health behaviour and risk factors by population surveys. However, most of the comprehensive health examination data on the population's health



comes from the SII's Mini-Finland Health Survey carried out twenty years ago in 1978 - 1980. One of its findings was that simultaneous use of health interview and health examination methods is a prerequisite of valid information on many common public health problems.

A new comprehensive population health survey has been designed in order to assess the population's health and functional capacity, their determinants and their time trend in Finland. Health 2000 is a health interview and examination survey, which is being carried out in Finland from 2000-2001. The National Public Health Institute has the main responsibility for the survey. Other Finnish social and health care organisations are participating.

The main aim of Health 2000 is to provide an up-to-date comprehensive picture of health and functional ability in the working-aged and aged population by studying the prevalence and determinants of most important health problems and associated need for care, rehabilitation and help.

A nationally representative sample of 10,000 persons has been drawn of the population aged 18 and over. Targets of the study are general health, major chronic conditions, determinants of health, diseases, functional ability and limitations, health needs and service needs and their satisfaction. The target population comprises all persons aged 18 and over and living in Finland. Persons aged 30 or over will be interviewed and invited to the health examination and younger adults aged 18-29 will be interviewed only. In addition, one thousand persons who participated in the Mini-Finland Health Survey will be reexamined. Those who are invited in the survey are first interviewed at home. After one to six weeks they will be invited to attend a health examination. Home-based visits for examination are also offered.

## **5. Suggested inclusion of population groups**

An examination of the international surveys using objective measures indicate that other countries are investing in the surveying of a number of differently aged groups, including those under the age of 18 years.

There is experience within Australia for the surveying and measurement of people across age groups, including children. There is support from all jurisdictions for the inclusion of a range of age groups, as well as from non-government agencies such as the National Heart Foundation. As it is proposed to conduct a program of surveys over a number of years, there will also be opportunities to focus on groups of special interest.

The current interest in chronic diseases and their burden for the Australian population supports the inclusion of a range of ages. There is particular interest in children and young people, as there is mounting evidence at these ages for the onset of behaviours and some risk factors that may pre-dispose individuals to chronic diseases later in life. Furthermore, the ability to sample households and

survey families may afford an excellent opportunity to identify concurrent risk factors of family members. Such information will be able to be used to underpin health policy and preventive strategies.

It is therefore recommended that the Steering Committee consider the inclusion of a range of age groups from childhood onwards in the survey program.

**Table 1: Objective measures in previous ‘national ‘Australian surveys**

<b>1980 NHF Survey of adults</b>	<b>1983 NHF Survey of adults</b>	<b>1989 NHF Survey of adults</b>	<b>1985 Survey of Fitness of School Children</b>	<b>1990 Pilot Survey of Adult Fitness</b>	<b>1995 National Survey of Lead in Children</b>	<b>1995 National Nutrition Survey</b>	<b>1999/00 AusDiab Aust. Diabetes Obesity &amp; Lifestyle Study</b>
Questionnaire	Questionnaire	Questionnaire	Questionnaire	Questionnaire	Questionnaire	Questionnaire (incl. food frequency)	Questionnaire
	24hr dietary recall		24hr dietary recall			24hr dietary recall	Food frequency questionnaire
Physical measurements	Physical measurements	Physical measurements	Physical measurements	Physical measurements		Physical measurements	Physical measurements
BP	BP	BP	BP	BP		BP>16y (included in the pilot only)	BP, ECG >40y (incl. autonomic neuropathy)
<u>Fasting blood sample -10mL</u> Total cholesterol HDL cholesterol Triglycerides	<u>Fasting blood sample -12.5mL</u> Total cholesterol HDL cholesterol Triglycerides Glucose	<u>Fasting blood sample -12mL</u> Total cholesterol HDL cholesterol Triglycerides  Iron Ferritin Transferrin	<u>Fasting blood sample -15mL</u> Total cholesterol HDL cholesterol Triglycerides  Iron Ferritin Transferrin	<u>Fasting blood sample -10mL</u> Total cholesterol HDL cholesterol Triglycerides	<u>Blood lead sample</u>	<u>Blood sample</u> (included in the pilot only)	<u>Blood samples - 8.5mL</u> Total cholesterol HDL cholesterol Triglycerides Glucose (whole blood & serum) Hb A1c <u>Oral GTT</u> <u>Urine - 8mL</u> Creatinine Albumin
			Fitness tests	Fitness tests			
				Lung function			
							Foot screening/ sensory tests
							Eye examination (retinal photography)

**Table 2: A summary of some international surveys**

UK					
<i>Health Survey for England</i>		LINKAGE	INTERVIEW AREAS	MEASURES	AGE GROUPS
1991 - 3000 adults			<b>Core:</b> general health and psycho-social factors smoking, alcohol, demographic and socio-economic health services use blood pressure; prescribed medicines	Core: height, weight and blood pressure	
1992 - 4000 adults					
1993 - 16000 adults			<b>Special focus:</b> cardiovascular dis.	Total cholesterol Fibrinogen	Adults
1994 - 16000 adults			cardiovascular dis.	Haemoglobin Ferritin	
1995 - 16000 adults 4000 children			asthma, accidents, disability	Glycated Haemoglobin, Gamma gt Serum Cotinine Sample stored	
1996 - 16000 adults 4000 children, 2-15y			asthma, accidents, Euroquol, SF36		
1997 - 9000 adults 7000 children <i>(Health Survey of Young People)</i>			children and young people: GHQ12		13+ yrs
			asthma non-fatal accidents lung function physical exercise diet child behaviour contraceptive pill use cycle helmet use	saliva blood lung function  special questionnaire	4-17 yrs 18-24 yrs  13-15 yrs. 4-15 yrs young adults 8-12 yrs.
			adults: GHQ12 respiratory problems, lung function, physical activity diet contraceptive pill use	IgE Lung function	adults
1998 - 16000 adults 4000 children			cardiovascular dis.	Total cholesterol HDL cholesterol Fibrinogen	
1999 - 16000 adults 4000 children			ethnic groups	Haemoglobin Ferritin	
2000			older people, social exclusion	C-reactive protein	

**USA**  
*NHANES*

	<b>LINKAGE</b>	<b>INTERVIEW AREAS</b>	<b>MEASURES</b>	<b>AGE GROUPS</b>
Rolling annual survey of 5000 people from 1999	yes, to National	Extensive: (see below)		
face-to-face interview, questionnaire and centre or home-based measures	Health Interview Survey and others planned	<u>Health Interviews:</u> Health status Mental health Questions about drug and alcohol use Nutrition Physical activity Reproductive health Sexual experience Tobacco use	Physician's exam Blood pressure and older Body fat Bone density Oral health Saliva test Vision test Hearing test Fitness test Height, weight etc. TB skin test Hair sample for mercury Cognitive testing Balance Leg circulation and sensation Volatile organic compounds	all ages (parent for 0-11) 8-39 years (parent for 8-15)
				12+ years all ages (parent for 0-5) 12-15 years Females 12+ years 14-59 years 12+ years
				all ages 8+ years 8+ years 8+ years 2+ Years 40+ years 12+ years 20 - 69 years 12+ years all ages 1+ years 1-5 years, females 16+ 60+ years 40-69 years 40+ years some 20-59 years
			<u>Urine tests:</u>	
			Bone status tests Kidney function Chlamydia and gonorrhoea Exposure to pesticides Pregnancy test	8+ years 6+ years 14-39 years some 6-59 years females 12-59, girls 8-11 who have menstruated
			<u>Blood tests:</u>	
			Anaemia Cholesterol Glucose markers Immunisation status Infectious diseases Kidney function Lead Cadmium Mercury Liver function Nutrition status Hormone tests Herpes type 2 HIV Volatile organic compounds Exposure to environ. chemicals Sample stored	all ages 3+ years 12+ years 6-49 years 3+ years 12+ years all ages all ages 1-5, and females 16-49 12+ years all ages 12+ years 14-49 years 18-49 years some 20-59 years some 12-19 years

**NZ**

	<b>LINKAGE</b>	<b>INTERVIEW AREAS</b>	<b>MEASURES</b>	<b>AGE GROUPS</b>
<b>National Health Survey (NHS) 1992/3</b>				
12 month survey of 7065 people by telephone	no	Health status: disability asthma diabetes high blood pressure	Nil	Adults
		Health risk behaviour: smoking physical activity alcohol intake		
		Use of health services Demography and socioeconomic circumstances		
<b>National Health Survey (NHS) 1996/7</b>				
12 month survey of 7862 people 15+ &	yes, to NNS	As above, plus injuries and poisoning		Adults 15+ Children under
1019 children under 15 years		self report physical and mental health		15 years
Face-to-face interview and questionnaire Home-based measurement				
<b>National Nutrition Survey 1997</b>				
12 month survey of 4636 people 15+ yrs.	yes, to NHS	Diet recall Food frequency Food preparation Alcohol intake Environmental chemicals	Blood pressure Blood lipids Anthropometric measures Blood iron indices (transferring receptors)	People 15 years and over " " Females 15-34 years