Nationwide monitoring and surveillance question development: Asthma

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Working Paper Series No. 2

Public Health Information Development Unit

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National Library of Australia Cataloguing in Publication entry

Tennant, Sarah.
Nationwide monitoring and surveillance question development: asthma.

Bibliography.
ISBN 0 7308 9223 9.

1. Asthma - Statistics. 2. Asthma - Research. I. Szuster, Fearnley Stefan Pym, 1951- . II. Public Health Information Development Unit (Australia). III. Australia. Dept. of Health and Ageing. IV. Title. (Series : Working paper series (Public Health Information Development Unit (Australia)) ; no. 2).

614.5923800723

Public Health Information Development Unit, The University of Adelaide

This research was produced by the Public Health Information Development Unit (PHIDU), The University of Adelaide, South Australia in November 2000. The research was funded under a grant from 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:

Tennant S and Szuster F. (2003) *Nationwide monitoring and surveillance question development: Asthma*. Working Paper Series No. 2. Public Health Information Development Unit, Adelaide.

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This and other publications are available from the PHIDU website (www.publichealth.gov.au).

ISSN 1447-879X Working Paper Series

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

Introduction

Asthma is a chronic inflammatory disorder of the airways that results in variable airflow obstruction in response to certain triggers (3). Depending on severity, the airflow limitation is accompanied by symptoms of breathlessness, wheezing, chest tightness, and cough (17). According to the 1995 ABS National Health Survey, it was estimated that approximately 11 per cent of Australians reported asthma as a recent or long-term condition (15). Asthma is a major cause of disability rather than premature mortality, costing the health system an estimated $478 million in 1993-94 (40 per cent of the total expenditure on chronic respiratory diseases). On the 4th of August 1999 the Australian Health Ministers announced asthma as the sixth National Health Priority Area, in response to the significant burden that asthma places on the Australian community (2).

This discussion paper examines a number of issues related to asthma and the instruments that have been used to measure asthma in the population. In particular, the paper looks at health surveillance data collection.

What Should Be Measured?

The measurement of asthma and the detail included in any data collection clearly relate to the purpose of the collection. A number of issues are related to this, including:

- Should coverage of the population be restricted to adults only (over 18 years) or expanded to cover young people, adolescents and children?
- Can point-in-time measurement be enhanced to give incidence, providing some data towards pictures of peoples' lifetime management of asthma?
- Is asthma worth measuring without conjoint information on allergens, exercise, viral infections, exposure to tobacco smoke, food chemicals, and environmental conditions?
- What kind of comparability is required of the measuring instruments (intra-population, international, cross-cultural, over time)?
- Should environmental factors that may affect peoples' asthmatic condition be collected and monitored?

Purpose of Measuring Asthma

A number of questions related to asthma measurement need to be answered.

- What is the purpose of measuring asthma in a population survey?

- What is it we want to measure?
- With what do we want to compare the answers?

The answers to these questions include the following:

- To assess population risk factor prevalence over time.
- To provide evidence for outcomes-based research into asthma.
- Using internationally agreed questionnaires and other instruments and measures to provide international comparability.
- To document the effect of health promotion activities (and other items such as changes in the built environment) directed at changing population behaviours.
- To improve population benchmarking.
- For longitudinal tracking as the population moves through different age cohorts.
- To keep the issues in the public eye.
- To allow targeting of sub-populations.
- To assist in tailoring intervention materials or programs aimed at behavioural change.
- To monitor specific population-wide goals.
- To provide information to professionals (eg, General Practitioners) on health promotions and/or interventions that work.
- For monitoring the relationship with other key risk factors (such as physical activity, smoking).
- To identify areas to invest in.
- To better predict populations at high risk.
- To examine environmental factors that may trigger an asthma attack.

Population Surveillance Concepts

Population surveillance of asthma is necessary to identify high-risk populations and to design and evaluate interventions aimed at preventing the development or exacerbation of the disease (28).

Asthma surveillance data should not only be used to identify individuals with asthma, but should also identify the associated risk factors that may trigger an asthma attack. As asthma is a largely preventable disease, identifying risk factors will provide an opportunity to improve education on the associated risks (11). The symptoms of asthma can be triggered by a wide variety of agents in the environment, acting either alone or in conjunction with other irritants (3). The irritants that cause episodes of airway narrowing and other asthma symptoms are specific to each individual, and include allergens, exercise, viral infections, exposure to tobacco smoke, food

chemicals, cold air and weather changes. **Attachment A** outlines the predisposing, causal and contributing factors that lead to the development of asthma (19).

Genetic factors such as atrophy are critical, but there is increasing evidence that environmental factors contribute significantly to the onset of asthma (16). Environmental exposure to domestic mites and passive smoking, are of particular importance for children. The increasing prevalence of asthma has been associated with increasing urbanization and the adoption of Western style home furnishings as well as exposure to vehicle exhaust and occupational sensitisers. These findings suggest that environmental factors can be adjusted in order to prevent asthma. Thus the collection of environmental data is a valuable addition so that appropriate environmental control measures can be recommended.

Scope

In a number of studies, an association between airway hyperactivity and asthma symptoms has been commented on. For epidemiological purposes the definition of "current asthma" is symptoms of asthma within the last year associated with airway hyper-responsiveness (17). Results from the British Medical Research Council (MRC) Respiratory Symptom Questionnaire have also shown an association between airway hyper-responsiveness and increased prevalence of respiratory symptoms (particularly wheeze and cough or cough and sputum production). From a study using a questionnaire developed by Mortagy et al., noted the associations between wheeze, shortness of breath at night and tightness in the chest in the early morning.

Questionnaire definitions of asthma include:

- “wheeze ever” – this definition is least useful because responses are influenced by the ability to recall events; and
- “diagnosed asthma” – more valuable because of medical certification.

Defining asthma in terms of symptoms alone has formed the basis of many epidemiological studies, but this is fraught with difficulty in the absence of objective measurement of airflow limitation and its variability (17). The symptoms of asthma that often prompt a clinical diagnosis include episodic breathlessness, wheezing, chest tightness, and cough, worse particularly at night and in the early hours of the morning. It must be noted, however, that these symptoms in themselves are not diagnostic. The following is a list of questions for considering a diagnosis of asthma (20).

- Has the person had an attack or recurrent attacks of wheezing?
- Does the person have a troublesome cough at night?
- Does the person have a cough or wheeze after exercise?
- Does the person have a cough, wheeze, or chest tightness after exposure to airborne allergens or pollutants?
- Do the person's colds "go to the chest" or take more than 10 days to clear up?

Speight et al. (27) suggest that of the questionnaire items, wheeze is a more specific marker of asthma than the recurrent cough and that an asthma diagnosis is a local variable entity, which therefore can result in under-diagnosis. However, a study undertaken by Pattermore et al. (21) concluded that among children who report respiratory symptoms, survey-reported wheeze on its own is a weaker marker of significant respiratory disease than is a doctor's diagnosis of asthma.

What is important is a history of recurrent exacerbations (or attacks) often provoked by factors such as allergens, irritants, exercise, and virus infections (20). The relief of symptoms spontaneously and more specifically by bronchodilator and anti-inflammatories, are also useful clinical markers of asthma. Although the prominent clinical manifestations of asthma include wheezing and shortness of breath (28), there is concern that wheeze may not be a symptom specific to asthma (8).

The lack of a precise definition of asthma makes comparisons between surveys difficult. Thus the primary importance of a questionnaire on asthma is not to make a definitive clinical diagnosis of asthma but to measure the prevalence of asthma symptoms in a standard way so that comparisons can be made with other populations (10). The International Study of Asthma and Allergies in Childhood (ISAAC) and the European Economic Community sponsored study of adult asthma, are useful tools that will allow for comparisons to be made in the future (18).

Population Coverage

Over two million Australians (11 per cent) have asthma, including:

- one in four primary school children;
- one in seven teenagers; and
- one in ten adults (2).

Asthma is the leading cause of disability in children, with most cases diagnosed before the age of 15 (15). In the 1995 National Health Survey (NHS), asthma was more commonly reported as a recent or long-term condition by those aged less than 25 years (149 per 1,000 persons) and was reported most often in those aged 5-14 years (192 persons per 1,000). Among those aged less than 15 years, asthma was reported more often by males, but in older age groups the condition was more common in females (3).

Throughout Australia, asthma has been measured in the SERCIS surveys (SA), NSW Health Survey, VIC Health Survey, WA Health Survey and the Tasmanian Asthma Foundation Questionnaire. The 1995 Australian National Health Survey, interviewed persons aged 18 years or over personally, those aged 15-17 years with the consent of a parent or guardian, and obtained information for persons aged less than 15 years from a person responsible for the child (4).

Relationship to Other Factors

Some common diseases and conditions, including bronchitis, obesity, hypertension, and heart disease, are associated with symptoms that are similar to those experienced by asthmatics (5), thus it is possible that questionnaire items used to identify asthmatics may identify people with alternative conditions.

Bai et al. (5) examined the symptom questions of the International Union Against Tuberculosis and Lung Disease questionnaire to determine which questions are best for predicting asthma. The results of the study showed that the questions of “wheeze in the last 12 months”, “asthma attack”, “chest tightness”, “recent nebuliser use” “wheeze following exercise” and “shortness of breath at rest” all contributed to asthma. From this it was recommended that the first three of these questions be used for future epidemiological studies as they had the strongest correlations. The questions of “wheeze following exercise”, “chest tightness on walking” and “shortness of breath at rest” were moderately correlated with breathlessness. It was also noted the questions of “chest tightness on walking” and “shortness of breath at rest” were almost as strongly correlated with breathlessness than with asthma. As the symptoms of breathlessness are common in people that are obese or have other conditions such as heart disease, these questions could therefore wrongly identify asthmatic subjects. The study also showed the questions about cough (“morning cough”, “cough for 3 months per year”, “usual cough”, and “cough with phlegm”) identified a different group of subjects that did not have asthma.

Population Survey Instruments

The variety of survey instruments designed to assess asthma symptoms is overwhelming. Most have been designed at least initially, for interviewer- or self-administration, although some have since been adapted for telephone interviewing. Many have had their reliability and validity tested over time, others not (see *International Consensus and Comparability*, page 8).

There are numerous surveys used for determining the prevalence of asthma in a given community. These ranged from local area surveys such as the Tasmania Asthma Survey (TAS), to Australia-wide studies such as the National Health Survey 1995.

A large number of International surveys are available that have been designed specifically to measure respiratory system diseases (see *International Surveys*, below). Asthma-related questions are also numerous in large nation-wide surveys, some of which are outlined in **Attachment B**.

International Surveys

1. The International Union Against Tuberculosis and Lung Disease (IUATLD) Questionnaire

The IUATLD (see **Attachment C**) questionnaire was developed in the mid-1980's to find the most valid combination of symptom-based items for identification of asthma. From this a shorter version was developed – the IUATLD (1986) Bronchial Symptoms Questionnaire.

2. The British Medical Research Council (MRC) Respiratory Questionnaire

The MRC respiratory questionnaire (see **Attachment D**) was designed for the diagnosis of chronic bronchitis in epidemiological studies, and therefore contains few questions relating to the diagnosis of asthma (24). Due to the limited questions concerning asthma, studies using this questionnaire supplement the questions with ones on severity, frequency and recentness of episodes, treatment and age at onset. However, as the MRC core items are used often, appropriate comparisons can be made between studies.

3. American Thoracic Society (ATS) ATS-DLD-78

The ATS and the Division of Lung Disease of the National Heart, Lung and Blood Institute developed a respiratory questionnaire (see **Attachment E**). The ATS-DLD-78 is based on the MRC questionnaire, however more extensive questions on asthma and wheeze are included (24).

4. The European Community for Coal and Steel (ECSC) Questionnaire

The ECSC Questionnaire was a translation of the MRC questionnaire, with additional questions regarding asthma and occupational history included.

5. The Arizona Tucson Epidemiologic Study of Obstructive Lung Diseases

The Arizona Tucson Epidemiologic Study of Obstructive Lung Diseases was developed in 1970, initially using the National Heart and Lung Institute (NHLI) questionnaire, focusing on the subject's own report of asthma.

6. The European Community Respiratory Health Survey (ECRHS)

The ECRHS was developed to answer questions on the distribution of asthma and health care given for asthma in the European community. The survey was designed to estimate variations in the prevalence of asthma, asthma-like symptoms and airway responsiveness; to estimate variations in exposure to known or suspected risk factors for asthma, and to assess to what extent these variations explain the variations in the prevalence of the disease; and to estimate differences in the use of medication for asthma (7).

7. International Study of Asthma and Allergy in Childhood (ISAAC)

The ISAAC (see **Attachment F**) is a collaborative project, which has developed a standardised methodology to describe the prevalence and severity of asthma, rhinitis and eczema in children throughout the world (25).

International Consensus and Comparability

A study undertaken by Burney et al. (8), examined whether or not the responses to the IUATLD questionnaire relate in the same way to bronchial hyper-responsiveness in different languages in different countries as they did in the original English sample. The questionnaire was compared in English, Finish, French and German and tested in Nottingham, Berlin, Helsinki and Paris. Good repeatability was shown in the answers to the questionnaire conducted in Finland and Germany, particularly those questions on asthma and wheeze. For predicting hyper-responsiveness, the questions concerning wheeze were consistently the most sensitive in each country, while the most specific symptoms were those on walking at night with shortness of breath (Paris and Nottingham) and morning tightness (Helsinki and Berlin).

A number of studies have examined the validity of asthma related questionnaires. However, in the absence of a gold standard for asthma, three methods of validation can be used:

1. to test the questionnaire in relation to a clinical physiologic investigation, usually a nonspecific bronchial challenge test;
2. to compare the answers from the questionnaire with a clinical diagnosis of asthma;
3. to compare a new questionnaire with an old one, usually the MRC questionnaire.

When the validity of the questionnaires (including the ATS-DLD-78, IUATLD and MRC) were tested in relation to a bronchial challenge test (generally using either a methacholine challenge test (MCT) or bronchial hyperactivity (BHR)), the questions concerning self-reported asthma had a mean sensitivity of 36 per cent (ranging from 7 to 80 per cent) and a mean specificity of 94 per cent (ranging from 74 to 100 per cent), however the questions concerning "physician diagnosed asthma" had a higher specificity of 99 per cent. **Table 1** shows the sensitivity and specificity of questions about "self-reported asthma", "physician diagnosed asthma" and "wheeze" in these questionnaires in a number of different studies (29).

The disadvantage of using BHR as a gold standard for asthma is that many people with BHR report no respiratory complaints, thus this is a measure of high sensitivity but low specificity for asthma (29). However, the use of the MCT as a standard for asthma underestimates the sensitivity of the questionnaire (as shown in **Table 1**).

When the validity of asthma related questionnaires were tested in relation to a clinical diagnosis of asthma, the questions concerning self-reported asthma had a mean sensitivity of 68 per cent (ranging from 48 to 100 per cent) and a mean specificity of 94 per cent (ranging from 78 to 100 per cent). **Table 2** shows the sensitivity and specificity to the question "Have you ever had asthma?" (29).

In epidemiological studies the specificity of the diagnostic test is of great importance (29), as a low specificity (below 95 per cent) will give many false-positive cases. It is therefore recommended that questions with high specificity be used, these include questions about "self-reported asthma" and "physician-diagnosed asthma".

Table 1 – Sensitivity and Specificity of Questions About "Self-Reported Asthma", "Physician Diagnosed Asthma" and "Wheeze" in Identifying Subjects with a Positive Non-specific Bronchial Challenge Test*

		Sensitivity, %			Specificity, %		
Study	**Questionnaire**	**Self-Reported Asthma**	**Physician Diagnosed Asthma**	**Wheeze**	**Self-Reported Asthma**	**Physician Diagnosed Asthma**	**Wheeze**
Hendrick et al., 1983	ATS-DLD-78	—	—	45	—	—	81
Welty et al., 1984	ATS-DLD-78	—	38	55	—	99	66
Mortagy et al., 1986	MRC based	—	—	50	—	—	71
Rijcken et al., 1986†	MRC based	13	—	16	97	—	96
Dales et al., 1987	ATS-DLD-78	7	—	26	97	—	87
Enarson et al., 1987‡	ATS-DLD-78	12	10	29	97	99	85
Burney et al., 1989§	IUATLD						
PD20<8 µmol histamine		22	—	47	99	—	92
PD20<1 µmol histamine		43	—	57	97	—	88
Burney et al., 1989	IUATLD						
Finland		74	—	95	91	—	74
West Germany		33	—	59	93	—	80
France		80	—	73	74	—	65
United Kingdom		53	—	89	100	—	62
Abramsson et al., 1991	IUATLD	26	—	49	97	—	86
Kongerud and Soyseth, 1991‖	Self-administered[#]	—	—	53	—	—	82

Source: Toren et al., 1993

* The criteria for a positive test vary among the different studies.

† Persistent wheeze.

‡ Recalculated by Smith et al., 1989

§ Wheezing and reported asthma in the last 12 months

‖ PC20≤8mg/ml.

Kongerud and Soyseth formulated the following question about wheeze: "Have you at any time during the past year felt wheezing in your chest?"

Table 2 – Sensitivity and Specificity to the Question "Have you Ever Had Asthma" in Order to Separate Asthmatics from Nonasthmatics*

Study	Sensitivity, %	Specificity, %
Edfors-Lubs, 1971	88	97
Kiviloog et al., 1974	100	97
Burney et al., 1989		
Overall	62	91
Finland	68	95
West Germany	56	100
France	75	77
United Kingdom	48	100

Source: Toren et al., 1993
* The diagnosis is based on the clinical judgment of a physician

A number of international studies have examined the comparability between surveys. The agreement between the following questionnaires was defined as the fraction of subjects who had the same answer in both questionnaires:

- The Arizona Tucson Epidemiologic Study was validated by comparing it to the MRC and NHLI. Agreement in the responses concerning wheezing, shortness of breath and exertion breathlessness was about 0.9 and 0.8 for those concerning physician diagnosed chest diseases (13).

- Samet et al. validated a modified interview-based MRC questionnaire by comparing it to a self-administered version on the NHLI questionnaire. Agreement in the responses concerning dyspnea, cough, phlegm and wheezing was approximately 0.8 (26).

- Comstock et al. validated the ATS-DLD-78 questionnaire by comparing it to the MRC questionnaire. Agreement in the responses concerning asthma was 0.99 (9).

- Abramson et al. validated the IUALD questionnaire by comparing it to the MRC questionnaire. Agreement in responses concerning wheezing was 0.92 (1).

Helsing et al. compared the NHLI questionnaire, ATS-DLD-78 questionnaire and the MRC questionnaire. The results showed there to be no significant differences in the questions concerning wheezing, breathlessness was reported less often by respondents of the NHLI questionnaire and the prevalence of asthma was 5.6 per cent in the MRC questionnaire and 4.8 per cent in the AST-DLD-78 questionnaire (29).

Reliability of a questionnaire is most often assessed by comparing the agreement of responses between two questionnaires (as shown above), however the reliability can also be estimated by the kappa index. The kappa indices from a number of studies are shown in **Table 3**.

Table 3 – Kappa index

Study	Questionnaire/Question	Kappa Index			
		Asthma	Wheezing	Wheezing with Dyspnea	Dyspnea
Bridges-Webb	"Do you suffer from asthma?"	0.99	—	—	—
Van der Lende et al	ECSC	0.96	0.72	—	—
Samet et al.	MRC	—	0.73	—	—
Dales et al.	ATS-DLD-78 (modified)	0.96	0.76	0.86	—
Kongerud et al.	MRC (modified)	0.66	0.66	—	0.63
Burney et al.	IUALD				
British		—	0.76	—	—
International		0.70-1.00	0.73-0.95	—	—

Source: Complied from Torens et al., 1993

Jenkins et al. (12) tested the validity of both the ISAAC questionnaire and the Tasmania Asthma Survey (TAS) by comparing the responses from each of the questionnaires with a physician assessment of asthma status in the past 12 months. As shown in **Table 4,** both questionnaires showed high agreement with the physician diagnosis. The results of the study concluded that the ISAAC questionnaire and the TAS are valid instruments for the determination of asthma symptoms in the past 12 months.

Table 4 – Parameter estimates (and 95% confidence intervals) of sensitivity, specificity, positive predicted value (PPV), negative predicted value (NPV), and Youldens index between response to questionnaires, bronchial hyper-responsiveness (BHR) to hypertonic saline and physician diagnosis of current asthma

	Sensitivity	Specificity	PPV	NPV	Youldens Index
Adults:					
Questionnaire vs. diagnosis	0.80 (0.58,0.93)	0.97 (0.90,0.90)	0.89 (0.68,0.98)	0.94 (0.86, 0.98)	0.76 (0.54,0.90)
BHR vs. diagnosis	0.39 (0.21,0.61)	0.90 (0.80,0.96)	0.55 (0.31,0.79)	0.82 (0.71,0.90)	0.29 (0.09,0.51)
Questionnaire + BHR vs. diagnosis	0.37 (0.20,0.59)	0.99 (0.95,1.00)	0.94 (0.65,1.00)	0.83 (0.73,0.91)	0.36 (0.18,0.58)
Children:					
Questionnaire vs. diagnosis	0.85 (0.73,0.93)	0.81 (0.76,0.86)	0.61 (0.50,0.71)	0.94 (0.88,0.98)	0.66 (0.53,0.76)
BHR vs. diagnosis	0.54 (0.40,0.67)	0.89 (0.83,0.94)	0.64 (0.49,0.77)	0.85 (0.79,0.90)	0.43 (0.29,0.57)
Questionnaire + BHR vs. diagnosis	0.47 (0.35,0.60)	0.94 (0.90,0.97)	0.74 (0.58,0.86)	0.84 (0.78,0.89)	0.41 (0.28,0.55)

Source: Jenkins et al. (1996)

Current Data Limitations

- Questions concerning wheeze are often not specific enough, as many other diseases apart from asthma give rise to wheezing (6)
- Patients may have not been told they have asthma by a physician who view the diagnosis as pejorative (30)
- Asthma symptoms are exceedingly intermittent and variable (10)
- Symptom questionnaires have potential problems arising from subjective symptom recognition and recall (23)
- Wheezing and other symptoms of obstruction are clinical expressions not easily captured by objective measurements (14)
- The prevalence of asthma is difficult to follow over time owing to changes in diagnostic practice (14)
- Questions on wheeze are subject to differences in interpretation of the term (22)

Conclusion

Public health surveillance on asthma allows health professionals to plan, carry out, and evaluate activities for protecting public health. Tracking and studying asthma cases and severe episodes can help us understand how many people have asthma, who is at high risk, who has more severe asthma, and if any of these measures change over time. Surveillance is essential for understanding the extent of the problem, knowing how to address the problem, and assessing the success of intervention efforts.

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Attachment A

RISK FACTORS THAT LEAD TO THE DEVELOPMENT OF ASTHMA:

Predisposing Factors

Atopy
Gender

Causal Factors

Indoor allergens

- Domestic mites
- Animal allergens
- Cockroach allergen
- fungi

Outdoor allergens

- Pollens
- Fungi

Aspirin
Occupational sensitisers

Contributing Factors

Respiratory infections
Small size at birth
Diet
Air pollution

- Outdoor pollutants
- Indoor pollutants

Smoking

- Passive smoking
- Active smoking

FACTORS THAT EXACERBATE ASTHMA: TRIGGERS:

Allergens
Respiratory infections
Exercise and hyperventilation
Weather
Sulfur dioxide
Foods, additives, drugs

Attachment B

International Nation-Wide Surveys with Asthma-Related Questions

United States					
Survey	**Year**	**Sample size (weighted pop. Estimates)**	**Geographical/population coverage**	**Age (years)**	**Definition of diabetes**
National Health Interview Survey	1998	107,000	noninstitutionalized United States residents	All	Have you EVER been told by a doctor or health professional that you had Asthma?
Behavioral Risk Factor Surveillance System	Ongoing	200/month	noninstitutionalized United States residents	18+	Did a doctor tell you that you had asthma?
National Health and Nutrition Examination Survey	Ongoing	5,000 annually	15 U.S. locations a year		In the past 12 months {have you/has SP} had wheezing or whistling in {your/his/her}chest?
Wisconsin Family Health Survey	1998	2,463 households annually/ 6,560 persons	stratified random sample of households in Wisconsin	All	……please tell me whether you or anyone in your household has ever been told by a doctor that they have……Asthma?
Canada					
General Social Survey	1985	11,200 (19,669,000)	10 provinces	15+	Do you have asthma?
General Social Survey	1991	11,924 (20,980,862)	10 provinces	15+	Do you have asthma?
National Longitudinal Survey of Children and Youth	1994/95	22,831 (4,673,390)	Provinces and territories; diabetes question asked of only women with children under 2 years of age	NA (mothers)	Do/Does … you/ … have any of the following long-term conditions …….. Asthma Has … ever had asthma that was diagnosed by a health professional?
Hawaii					
Hawaii Health Survey	Telephone survey since 1996	12,923	Statewide households (4,382), the respondent was the person who was most knowledgeable about their household	18+	Has anyone in the household been told by a physician or medical professional that they have asthma?

England					
The Health Survey for England	1993 onwards	19,654 (1998)	representative sample living in private households in England.	2+	^CHave Has^youname had wheezing or whistling in the chest in the last 12 months?
National Survey of Physical Activity and Health	1991	4200	112 parliamentary constituencies	adults	Have you ever had any of the following….Asthma?
Wales					
The Welsh Health Survey	1995	50,000	Electoral role	adults	Do you have any of these CHEST or BREATHING difficulties now ….. Asthma?/

Attachment C

The International Union Against Tuberculosis and Lung Disease (IUTALD) (1986) Bronchial Symptoms Questionnaire

1. Have you had wheezing or whistling in your chest, at any time in the last 12 months?
2. Have you been woken up with a feeling of tightness in your chest first thing in the morning at any time in the last 12 months?
3. Have you at any time in the last 12 months had an attack of shortness of breath that came on during the day when you were not doing anything strenuous?
4. Have you had an attack of shortness of breath that came on after you stopped exercise at any time in the last 12 months?
5. Have you at any time in the last 12 months been woken at night by an attack of shortness of breath?
6. Have you at any time in the last 12 months been woken at night by an attack of coughing?
7. Do you usually cough first thing in the morning?
8. Do you usually bring up phlegm from your chest first thing in the morning?
9. Have you brought up phlegm from your chest like this most mornings for at least 3 months each year?
10. Which of the following statements best describes your breathing?
    a. I never or only rarely get trouble with my breathing
    b. I get regular trouble with my breathing, but it always gets completely better
    c. My breathing is never quite right
11. When you are in a dusty part of the house or with animals (for instance dogs, cats, or horses) or near feathers (including pillows, quilts and eiderdown) do you ever:
    a. Get a feeling of tightness in your chest?
    b. Start to feel short of breath?
12. Have you ever had asthma?
13. Have you had an attack of asthma at any time in the last 12 months?
14. Are you currently taking any medicines, (including inhalers, aerosols or tablets) for asthma?

Attachment D

The British Medical Research Council Respiratory Questionnaire

CONFIDENTIAL QUESTIONNAIRE ON Respiratory Symptoms (1986), Interview questions only (does not include physical examination components), 1986 version

Approved by Medical Research Council's Committee on Environmental and Occupational Health

Before this questionnaire is used the instruction sheet must be read

Surname

First name(s)

Address

Serial Number
Sex (M=1 F=2)

Date of Birth Day Month Year

Name at birth if different from above

Own doctor Name

Address

Other identifying data

Civil state

Occupation

Industry

Ethnic group

Interviewer

Day Month Year
Date of Interview

Use the actual wording of each question. Put 1= Yes, 2= No, or other codes as indicated in boxes. When in doubt record as no.

Preamble

I am going to ask some questions, mainly about your chest. I should like you to answer **Yes** or **No** whenever possible.

Cough

1 Do you usually cough first thing in the morning in winter?
2 Do you usually cough during the day or at night-in the winter?

If Yes to 1 or 2

3 Do, you cough like this on most days for as much as three months each year?

Phlegm

4 Do you usually bring up phlegm from your chest first thing in the morning in the winter?
5 Do you usually bring up any phlegm from your chest during the day-or at night in winter?

If Yes to 4 or 5

6 Do you bring up phlegm like this on most days for as much as three months each year?

Periods of cough and phlegm

7a In the past three years have you had a period of (increased) cough and phlegm lasting for three weeks or more?

If Yes

7b Have you had more than one such period?

Breathlessness

If subject is disabled from walking by any condition other than heart or lung disease, omit question 8 and enter 1 here ☐

8a Are you troubled by shortness of breath when hurrying on level ground or walking up a slight hill?

If Yes

8b Do you get short of breath walking with other people of your own age on level ground?

If Yes

8c Do you have to stop for breath when walking at your own pace on level ground?

Wheezing

9 Have you had attacks of wheezing or whistling in your chest at any time in the last 12 months?

10a Have you ever had attacks of shortness of breath with wheezing?

If Yes

10b Is/was your breathing absolutely normal between attacks?

11 Have you at any time in the last 12 months been woken at night by an attack of shortness of breath?

Chest Illnesses

12a During the past three years have you had any chest illness which has kept you from your usual activities for as much as a week?

If Yes

12b Did you bring up more phlegm than usual in any of these illnesses?

If Yes

12c Have you had more than one illness like this in the past three years?

Past illnesses

Have you ever had, or been told that you have had:

13a An injury or operation affecting your chest

13b Heart trouble

13c Bronchitis

13d Pneumonia

13e Pleurisy

13f Pulmonary tuberculosis

13g Bronchial asthma

13h Other chest trouble

13i Hay fever

Tobacco smoking 1 = Yes, 2 = No

14 Do you smoke?

If No

14a Have you ever smoked as much as one cigarette a day (or one cigar a week or an ounce of tobacco a month) for as long as a year?

If No to both parts of question 14, omit remaining questions on smoking

15a Do (did) you inhale smoke?

If Yes

15b Would you say you inhaled the smoke slightly = 1, moderately = 2, or deeply = 3?

16 How old were you when you started smoking regularly?

17a Do (did) you smoke manufactured cigarettes?

If Yes

17b How many do (did) you usually smoke per day on weekdays?

17cHow many per day at weekends?

17d Do (did) you usually smoke plain (=1) or filter tip (=2) cigarettes?

17e What brands do (did) you usually smoke?

18a Do (did) you smoke hand-rolled cigarettes?

If Yes

18bHow much tobacco do (did) you usually smoke per week in this way?

18c Do (did) you put filters in these cigarettes?

19a Do(did) you smoke a pipe?

If Yes

19b How much pipe tobacco do (did) you usually smoke per week?

20a Do (did) you smoke small cigars?

If Yes

20b How many of these do (did) you usually smoke per day?

21a Do (did) you smoke other cigars?

If Yes

21bHow many of these do (did) you usually smoke per week?

For present smokers

22aHave you been cutting down smoking over the past year?

For ex-smokers Month Year

22b When did you give up smoking altogether?

Attachment E

American Thoracic Society and National Heart & Lung Institute - Division of Lung Disease Respiratory Questionnaire

ATS-DLD-78-A
ADULT QUESTIONNAIRE - SELF COMPLETION
(for those 13 years of age and older)

Thank you for your willingness to participate. You were selected by a scientific sampling procedure, and your cooperation is very important to the success of this study. This is a questionnaire you are asked to fill out. Please answer the questions as frankly and accurately as possible. ALL INFORMATION OBTAINED IN THE STUDY WILL BE KEPT CONFIDENTIAL AND USED FOR MEDICAL RESEARCH ONLY. Your personal physician will be informed about the test results if you desire.

IDENTIFICATION

IDENTIFICATION NUMBER: #####

NAME:_____ _____ ___
(Last) (First) (MI)

STREET _____

CITY _____ STATE ____ ZIP _____

PHONE NUMBER: ( ) _____-_____

INTERVIEWER: ###

DATE: _____
MO DAY YR ==========

1. BIRTHDATE: _____ ____ _____
Month Day Year

2. Place of Birth: _____

3. Sex:
1. Male ____
2. Female ____

4. What is your marital status?
1. Single ____
2. Married ____
3. Widowed ____
4. Separated/Divorced ____

5. Race:
1. White ____
2. Black ____
3. Oriental ____
4. Other ____

6. What is the highest grade completed in school? _____
(For example: 12 years is completion of high school)

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SYMPTOMS

These questions pertain mainly to your chest. Please answer yes or no if possible. If a question does not appear to be applicable to you, check the does not apply space. If you are in doubt about whether your answer is yes or no, record no.

COUGH

7A. Do you usually have a cough? 1. Yes ___ 2. No ___
(Count a cough with first smoke or on first going out-of-doors. Exclude clearing of throat.)[If no, skip to question 7C.]

B. Do you usually cough as much as 4 to 6 times a day, 4 or more days out of the week? 1. Yes ___ 2. No ___

C. Do you usually cough at all on getting up, or first thing in the morning? 1. Yes ___ 2. No ___

D. Do you usually cough at all during the rest of the day or at night? 1. Yes ___ 2. No ___

IF YES TO ANY OF THE ABOVE (7A,7B,7C, OR 7D), ANSWER THE FOLLOWING:
IF NO TO ALL, CHECK DOES NOT APPLY AND SKIP TO 8A.

E. Do you usually cough like this on most days for 5 consecutive months or more during the year? 1. Yes ___ 2. No ___
8. Does not apply __

F. For how many years have you had this cough? _____
Number of years
88. Does not apply __

==========

PHLEGM

8A. Do you usually bring up phlegm from your chest? 1. Yes ___ 2. No ___
(Count phlegm with the first smoke or on first going out-of-doors. Exclude phlegm from the nose. Count swallowed phlegm)
[If no, skip to 8C.]

B. Do you usually bring up phlegm like this as much as twice a day, 4 or more days out of the week? 1. Yes ___ 2. No ___

C. Do you usually bring up phlegm at all on getting up or first thing in the morning? 1. Yes ___ 2. No ___

D. Do you usually bring up phlegm at all during the rest of the day or at night? — 1. Yes ___ 2. No ___

IF YES TO ANY OF THE ABOVE (8A, B, C, OR D), ANSWER THE FOLLOWING:
IF NO TO ALL, CHECK DOES NOT APPLY AND SKIP TO 9A.

E. Do you bring up phlegm like this on most days for 3 consecutive months or more during the year? — 1. Yes ___ 2. No ___ 8. Does not apply __

F. For how many years have you had trouble with phlegm? — _____ Number of years 88. Does not apply __

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EPISODES OF COUGH AND PHLEGM

9A. Have you had periods or episodes of (increased*) cough and phelgm lasting for 3 weeks or more each year? *(For individuals who usually have cough and/or phlegm) — 1. Yes ___ 2. No ___

IF YES TO 9A:

B. For how long have you had at least 1 such episode per year? — _____ Number of years 88. Does not apply __

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WHEEZING

10A. Does your chest ever sound wheezy or whistling:

1. When you have a cold? — 1. Yes ___ 2. No ___
2. Occaisonally apart from colds? — 1. Yes ___ 2. No ___
3. Most days or nights? — 1. Yes ___ 2. No ___

IF YES TO 1, 2, OR 3 IN 10A:

B. For how many years has this been present? — _____ Number of years 88. Does not apply __

11A. Have you ever had an ATTACK of wheezing that has made you feel short of breath? — 1. Yes ___ 2. No ___

IF YES TO 11A:

B. How old were you when you had your first such attack? — _____ Age in years 88. Does not apply __

C. Have you had 2 or more such episodes? — 1. Yes ___ 2. No ___ 8. Does not apply __

D. Have you ever required medicine or treatment for the(se) attack(s)? 1. Yes ___ 2. No ___ 8. Does not apply __

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BREATHLESSNESS

12. If disabled from walking by any condition other than heart or lung disease, please describe and proceed to Question 14A.

Nature of condition(s):_____

13A. Are you troubled by shortness of breath when hurrying on the level or walking up a slight hill? 1. Yes ___ 2. No ___

IF YES TO 13A:

B. Do you have to walk slower than people of your age on level because of breathlessness? 1. Yes ___ 2. No ___ 8. Does not apply __

C. Do you ever have to stop for breath when walking at your own pace on the level? 1. Yes ___ 2. No ___ 8. Does not apply __

D. Do you ever have to stop for breath after walking about 100 yards(or after a few minutes) on the level? 1. Yes ___ 2. No ___ 8. Does not apply __

E. Are you too breathless to leave the house or breathless on dressing or undressing? 1. Yes ___ 2. No ___ 8. Does not apply __

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CHEST COLDS AND CHEST ILLNESSES

14A. If you get a cold, does it usually go to your chest? (Usually means more than 1/2 the time) 1. Yes ___ 2. No ___ 8. Don't get colds__

15A. During the past 3 years, have you had any chest illnesses that have kept you off work, indoors at home, or in bed? 1. Yes ___ 2. No ___

IF YES TO 15A:

B. Did you produce phlegm with any of these chest illnesses? 1. Yes ___ 2. No ___ 8. Does not apply __

C. In the last 3 years, how many such illnesses, with (increased) phlegm, did you have which lasted a week or more? _____Number of illnesses _____No such illnesses _____Does not apply

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PAST ILLNESSES

16. Did you have any lung trouble before the age of 16? 1. Yes ___ 2. No ___

17. Have you ever had any of the following:

1A. Attacks of Bronchitis? 1. Yes ___ 2. No ___

IF YES TO 1A:

B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___

C. At what age was your first attack? _____ Age in years
88. Does not apply __

2A. Pneumonia (include bronchopneumonia)? 1. Yes ___ 2. No ___

IF YES TO 2A:

B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___

C. At what age did you first have it? _____ Age in years
88. Does not apply __

3A. Hayfever? 1. Yes ___ 2. No ___

IF YES TO 3A:

B. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___

C. At what age did it start? _____ Age in years
88. Does not apply __

18A. Have you ever had chronic bronchitis? 1. Yes ___ 2. No ___

IF YES TO 18A:

B. Do you still have it? 1. Yes ___ 2. No ___
8. Does not apply ___

C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___

D. At what age did it start? _____ Age in years
88. Does not apply __

19A. Have you ever had emphysema? 1. Yes ___ 2. No ___

IF YES TO 19A:

B. Do you still have it? 1. Yes ___ 2. No ___
8. Does not apply ___

C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___

D. At what age did it start? _____ Age in years
88. Does not apply __

20A. Have you ever had asthma? 1. Yes ___ 2. No ___

IF YES TO 20A:

B. Do you still have it? 1. Yes ___ 2. No ___
8. Does not apply ___

C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
8. Does not apply ___

D. At what age did it start? _____ Age in years
88. Does not apply __

E. If you no longer have it, at what age did it stop? _____ Age stopped
88. Does not apply __

21. Have you ever had:

A. Any other chest illnesses? 1. Yes ___ 2. No ___
If yes, please specify _____

B. Any chest operations? 1. Yes ___ 2. No ___
If yes, please specify _____

C. Any chest injuries? 1. Yes ___ 2. No ___
If yes, please specify _____

22A. Has doctor ever told you that you had heart trouble? 1. Yes ___ 2. No ___

IF YES to 22A:

B. Have you ever had treatment for heart trouble in the past 10 years? 1. Yes ___ 2. No ___
8. Does not apply ___

23A. Has a doctor ever told you that you have high blood pressure? 1. Yes ___ 2. No ___

IF YES to 23A:

B. Have you had any treatment for high blood pressure (hypertension) in the past 10 years? 1. Yes ___ 2. No ___
8. Does not apply __

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OCCUPATIONAL HISTORY

24A. Have you ever worked full time (30 hours per week or more) for 6 months or more? 1. Yes ___ 2. No ___

IF YES to 24A:

B. Have you ever worked for a year or more in any dusty job? 1. Yes ___ 2. No ___ 8. Does not apply ___

Specify job/industry: _____ Total years worked __
Was dust exposure 1. Mild ___ 2. Moderate ___ 3. Severe ___ ?

C. Have you ever been exposed to gas or chemical fumes in your work? 1. Yes ___ 2. No ___ 8. Does not apply ___

Specify job/industry: _____ Total years worked __
Was dust exposure 1. Mild ___ 2. Moderate ___ 3. Severe ___ ?

D. What has been your usual occupation or job -- the one you have worked at the longest?

1. Job-occupation: _____
2. Number of years employed in this occupation:_____
3. Position-job title: _____
4. Business, field, or industry: _____

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TOBACCO SMOKING

25A. Have you ever smoked cigarettes? (NO means less than 20 packs of cigarettes or 12 oz. of tobacco in a lifetime or less than 1 cigarette a day for 1 year. 1. Yes ___ 2. No ___

IF YES to 25A:

B. Do you now smoke cigarettes (as of 1 month ago)? 1. Yes ___ 2. No ___ 8. Does not apply ___

C. How old were you when you first started reg-cigarette smoking? ____ Age in Years 88.Does not apply __

D. If you have stopped smoking cigarettes com-pletely, how old were you when you stopped? ____ Age stopped Check if still smoking ___ 88.Does not apply __

E. How many cigarettes do you smoke per day now? ___ Cigarettes/day 88.Does not apply __

F. On the average of the entire time you smoked, how many cigarettes did you smoke per day?

___ Cigarettes/day
88.Does not apply __

G. Do or did you inhale the cigarette smoke?

1. Does not apply ___
2. Not at all _____
3. Slightly _____
4. Moderately _____
5. Deeply _____

26A. Have you ever smoked a pipe regularly? (YES means more than 12 oz tobacco in a lifetime.)

1. Yes ___ 2. No ___

IF YES to 26A:

B1. How old were you when you started to smoke a pipe regularly?

____ Age

2. If you have stopped smoking a pipe completely, how old were you when you stopped?

____ Age stopped
Check if still smoking pipe ___
88.Does not apply __

C. On the average over the entire time you smoked a pipe, how much pipe tobacco did you smoke per week ?

____ oz per week (a standard pouch of tobacco contains 1 1/2 oz)
88.Does not apply __

D. How much pipe tobacco are you smoking now?

___ oz per week
88. Not currently smoking a pipe ___

E. Do or did you inhale the pipe smoke?

1. Never smoked ____
2. Not at all _____
3. Slightly _____
4. Moderately _____
5. Deeply _____

27A. Have you ever smoked cigars regularly? (Yes means more than 1 cigar a week for a year).

1. Yes ___ 2. No ___

IF YES to 27A:

B1. How old were you when you started smoking cigars regularly?

____ Age

2. If you have stopped smoking cigars completely, how old were you when you stopped?

____ Age stopped
Check if still smoking cigars___
88.Does not apply __

C. On the average over the entire time you

___ Cigars per week

smoked cigars, how many cigars did you smoke per week ? 88.Does not apply __

D. How many cigars are you smoking per week now? ___ Cigars per week
88. Check if not smoking cigars currently __

E. Do or did you inhale the cigar smoke?
1. Never smoked ____
2. Not at all _____
3. Slightly _____
4. Moderately _____
5. Deeply _____

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FAMILY HISTORY

28. Were either of your natural parents ever told by a doctor that they had a chronic lung condition such as:

	FATHER			MOTHER		
	1. YES	2. NO	3. DON'T KNOW	1. YES	2. NO	3. DON'T KNOW
A. Chronic brochitis?	_____	____	_____	_____	____	_____
B. Emphysema?	_____	____	_____	_____	____	_____
C. Asthma?	_____	____	_____	_____	____	_____
D. Lung cancer?	_____	____	_____	_____	____	_____
E. Other chest conditions?	_____	____	_____	_____	____	_____

29A. Is parent currently alive?

	_____	____	_____	_____	____	_____

B. Please Specify:

_____ Age if living	_____ Age if living
_____ Age at death	_____ Age at death
8. Don't know _____	8. Don't know _____

C. Please specify cause of death.

_____ _____

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Attachment F

Respiratory questions in International Study of Asthma and Allergy in Childhood Questionnaire (ISAAC) questionnaire

1. Have you ever had wheezing or whistling in the chest at any time in the past? Yes/No

   If you have answered "No" please skip to question 11

2. Have you had wheezing or whistling in the chest in the last 12 months? Yes/No

   If you have answered "No" please skip to question 11

3. How many attacks of wheezing have you had in the last 12 months?

   None

   1-3 months

   4-12 months

   More than 12 months

4. In the last 12 months, how often, on average, has your sleep been disturbed due to wheezing?

   Never woken with wheezing

   Less than one night per week

   One or more nights per week

5. In the last 12 months, has wheezing ever been severe enough to limit your speech to only one or two words at a time between breaths? Yes/No

6. In the last 12 months, how much did this wheezing interfere with your daily activities?

   Not at all

   A little

   A moderate amount

   A lot