

# Guideline for assessing engineered stone workers exposed to silica

This guideline documents the recommended process for assessing and managing workers exposed to respirable crystalline silica from fabricating and installing engineered stone.

It is designed to help medical practitioners identify silica-related respiratory disease in workers in the engineered stone industry and includes:

- the process for respiratory testing and chest radiology
- follow-up investigations and referrals to appropriate medical specialists where initial screenings indicate abnormal results
- follow-up health assessment, including recommendations for further review for workers exposed to respirable crystalline silica who do not currently have a diagnosis for silica-related disease.

This guideline supports robust and consistent diagnoses for potential cases of silicosis, and particularly for potential cases of accelerated silicosis, and ensures the diagnostic process is undertaken in a reasonable timeframe. It is based on current best practice for diagnosing and assessing occupational lung diseases as endorsed by Queensland's medical profession.

## Background

Crystalline silica (quartz) is a common mineral found in most rocks, sands and clays and products such as concrete, mortar, bricks and natural and composite stone benchtops.

Workers involved in cutting, grinding, shaping and polishing engineered stone may be exposed to very fine respirable silica dust (respirable crystalline silica). Inhaling respirable crystalline silica can cause diseases such as chronic bronchitis, emphysema, lung cancer, scleroderma and silicosis. Unlike natural stone such as granite, which typically contains only up to 30 per cent silica, engineered stone can have silica concentrations of more than 90 per cent. Therefore it is critical that appropriate controls are in place to eliminate or minimise a worker's chance of inhaling respirable crystalline silica.

Since issuing a safety alert on 18 September 2018, the Office of Industrial Relations has conducted compliance audits of all known Queensland businesses that fabricate engineered stone. These audits identified unsafe practices such as uncontrolled dry cutting, poor dust control measures, lack of respiratory protective equipment and a lack of appropriate health monitoring of workers. As a result of sub-standard work practices, many workers in the industry were exposed to unsafe levels of respirable crystalline silica. Workers who have fabricated or installed engineered stone prior to 2018 are considered to be at a high risk of occupational exposure to respirable crystalline silica.

This guideline was developed by the Office of Industrial Relations in collaboration with members of the Practitioner Guidance for Silicosis Reference Group (the Reference Group).

The Reference Group was an outcome of the Silica Exposure Medical Roundtable held on 9 November 2018, which identified

the need for guidance for medical practitioners to ensure robust diagnosis and consistent management of workers exposed to respirable crystalline silica from engineered stone.

The Reference Group included key health specialists from the Thoracic Society of Australia and New Zealand, the Australasian Faculty of Occupational and Environmental Medicine, the Australian and New Zealand Society of Occupational Medicine, the Royal Australian and New Zealand College of Radiologists, and the Australian College of Rural and Remote Medicine. The Reference Group was also supported by the Australian Institute of Occupational Hygienists, Queensland Health, WorkCover Queensland and the Department of Natural Resources, Mines and Energy.

## Implementation

The Guideline sets out the process for assessing the respiratory health of a worker with exposure to respirable crystalline silica from engineered stone for silica-related diseases, including referrals for additional testing or investigations which may be required depending on the individual worker's circumstances.

Medical practitioners should use their clinical judgement to determine the most appropriate testing for the worker. This includes, for example, if a potentially high-risk worker should be referred directly for a high-resolution CT scan (HRCT) and respiratory function testing in the first instance or referred directly to a respiratory physician for evaluation. The pathway chosen by the clinician should consider the worker's history, presentation, accessibility to testing, and their unique circumstances.

If a worker has sustained, or is suspected to have sustained, a work-related injury from working with engineered stone, they may be entitled to workers' compensation. Please refer to [worksafe.qld.gov.au](http://worksafe.qld.gov.au) or call WorkCover Queensland on 07 3006 8365.

Specialist medical practitioners who have diagnosed a worker with an occupational

dust lung disease are also obligated to notify the [Notifiable Dust Lung Disease Register](http://www.health.qld.gov.au/public-health/industry-environment/dust-lung-disease-register) administered by Queensland Health.:

<http://www.health.qld.gov.au/public-health/industry-environment/dust-lung-disease-register>.

This guideline does not replace existing obligations to provide health monitoring to workers exposed to respirable crystalline silica from engineered stone under Queensland's work health and safety laws. The *Work Health and Safety Act 2011* place a duty on a person conducting a business or undertaking (usually the employer) to ensure, so far as is reasonably practicable, that the health of workers is monitored to prevent illness or injury.

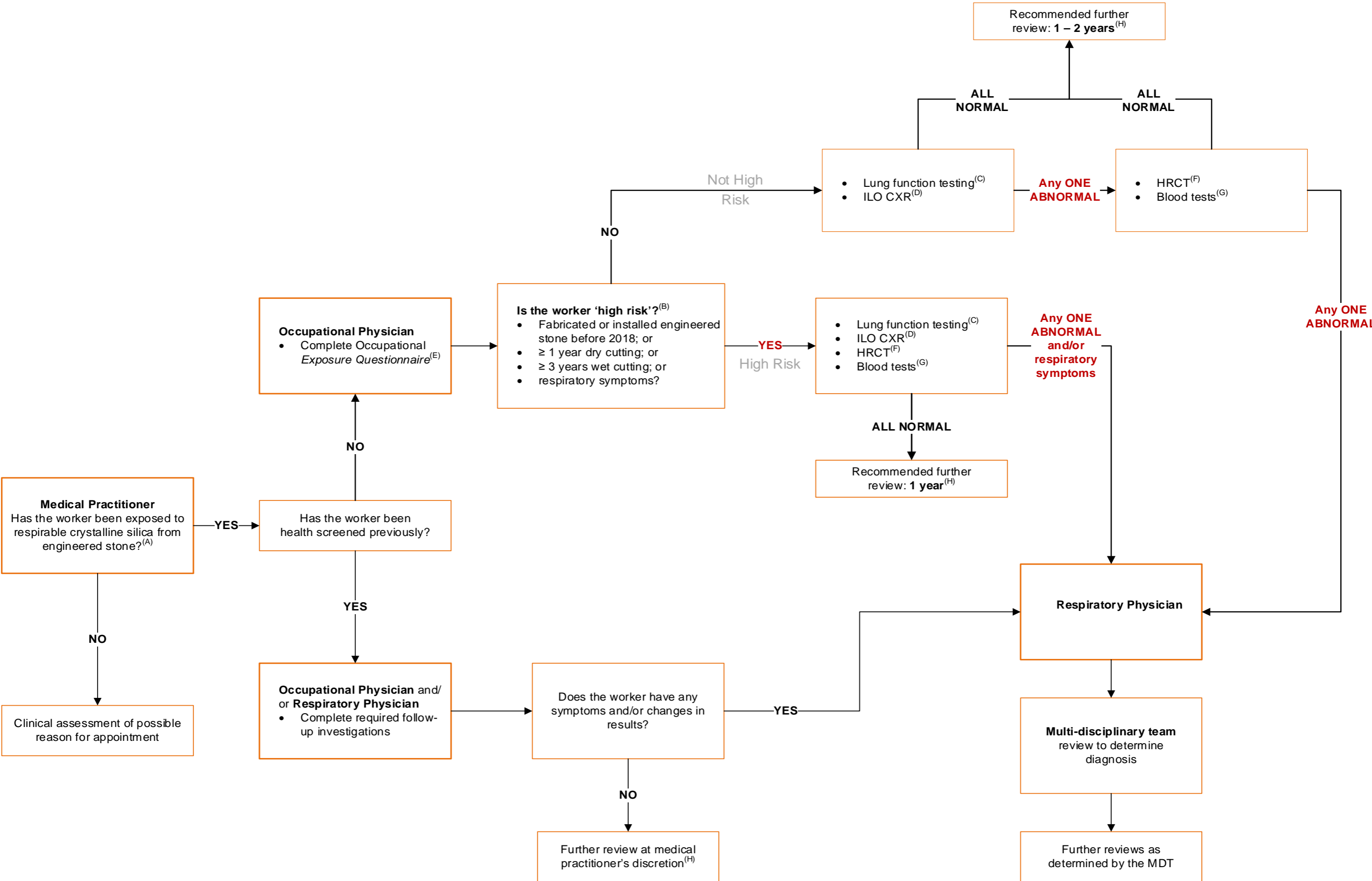
The *Work Health and Safety Regulation 2011* (the WHS Regulation) places specific duties on a person conducting a business or undertaking (e.g. the employer) to provide health monitoring to workers who use hazardous chemicals. Silica is a hazardous chemical that requires health monitoring. All requirements in relation to health monitoring of workers exposed to respirable crystalline silica can be accessed at [worksafe.qld.gov.au](http://worksafe.qld.gov.au).

This guideline does not cover the treatment of workers diagnosed with silica-related diseases. Treating doctors should make clinical decisions about treatment based on the individual worker's circumstances.

## Review period

This guideline is current as at 1 November 2019 and should be reviewed no less than every two years.

Guidelines for clinical assessment of workers fabricating and installing engineered stone



## Supporting notes

**A:** Medical practitioners first reviewing a person potentially exposed to respirable crystalline silica are to consider whether the person:

- is a worker
- has fabricated or installed engineered stone
- has previously been health screened.

Given the unique nature of engineered stone, it is recommended that workers be referred to an occupational physician for assessment of exposure, symptomology and lung functioning, noting that silica related disease may extend beyond the respiratory system (see note G), which is beyond the scope of this guideline.

An occupational physician referred a worker, who is a current or former worker in the engineered stone industry, should refer to the additional guidance set out in (E) below.

**B:** Workers may be considered 'high risk' if the worker has any of the following risk factors:

- fabricated or installed engineered stone prior to 2018
- engaged in dry cutting engineered stone for one year or more
- engaged in wet cutting for three years or more
- respiratory symptoms.

Consideration should also be given to the use and type of respiratory protective equipment (including whether fit testing and fit checking was undertaken), whether engineering controls and exhaust ventilation were in place, and the standard of work practices and housekeeping.

An exposure history questionnaire will help to determine whether there are other environmental and occupational factors that are relevant (such as exposure to respirable crystalline silica in other industries for an extended period of time).

In each instance a clinician should use a low threshold for determining whether or not the worker should be considered high risk.

**C:** Lung function testing should include a standardised respiratory function test, including FEV<sub>1</sub>, FVC, FEV<sub>1</sub>/FVC. A test of diffusing capacity should be considered for high risk workers.

### *Spirometry*

The thresholds for FEV<sub>1</sub> and impairment are defined by the comparison of absolute measurements to reference values or longitudinal studies that show excessive declines in FEV<sub>1</sub>.

The thresholds below require further review by a respiratory physician where:

- absolute FEV<sub>1</sub> is *less than* the Lower Limit of Normal (LLN), or
- absolute FEV<sub>1</sub> is *less than* 70 per cent predicted from Global Lung Function Initiative (GLI) reference values—whichever is lower—assuming that age, height and race are entered correctly, or
- longitudinal decline of FEV<sub>1</sub> is *greater than* 15 per cent change of predicted GLI over any period of time.

Abnormal screening of lung function requires an individualised approach.

### *Diffusing lung capacity (DLCO)*

DLCO results less than the LLN require further review by a respiratory physician.

DLCO has been known to show disease in some workers even where spirometry results have been above the acceptable thresholds. Therefore, all high-risk workers should be considered for DLCO, including where there is an absence of respiratory symptoms.

Workers with a change in DLCO of more than 15 per cent between screenings should be referred for HRCT (see note F).

*How respiratory testing should be performed*

Respiratory function testing is to be performed in laboratories accredited by the Thoracic Society of Australia and New Zealand (TSANZ) and in accordance with international guidelines, except where unavailable due to geographic location of the worker. In such cases, the referring doctor is to ensure high-quality spirometry and diffusing capacity testing.

Refer to <https://www.thoracic.org.au/respiratorylaboratoryaccreditation/list-of-accredited-labs>

- D:** A full size PA digital chest x-ray to be read in accordance with *Guidelines for the use of the ILO International Classification of Radiographs of Pneumoconiosis (revised edition 2011)* by a specialist radiologist with NIOSH B reader accreditation. All patients with a 0/0, 0/- or 0/1 CXR are classified as negative on initial radiological screening. Results are to be recorded in the patient's file.

It must be noted that the chest radiograph is less sensitive than HRCT chest scanning in the diagnosis of silicosis and other occupational lung diseases (such as emphysema, asthma, fibrosis, lung cancer) and, as such, serves only as a primary screening tool to be used in conjunction with spirometry results, symptomology and exposure risk factors. It is possible for true positive cases of silicosis to be occult on chest radiographs which have an ILO classification of 0/0, 0/- or 0/1.

Further radiology in the form of HRCT chest must be considered where respiratory function testing, symptomology or exposure history is suggestive of need for further investigations, even if the ILO classification is less than 1/0 (see note F).

The ILO classification itself should not be used to diagnose silicosis. Further investigation with HRCT, correlation with exposure history and specialist review are required for this diagnosis.

In addition, it must be noted that pleural disease and parenchymal disease such as emphysema and bronchitis are not subject to the ILO -/- classification system, and careful review of the additional findings reported on the ILO chest radiograph report (particularly in regard to emphysema, hyperinflation, bronchial wall thickening and other features of occupational lung disease) must be interpreted in conjunction with spirometry results and symptomology.

- E:** To assist with determining risk factors and referral pathways for workers, occupational physicians should complete an occupational exposure history questionnaire. Questionnaires developed by Monash University and Curtin University may be suitable for this purpose. Occupational physicians should exercise their clinical judgement to determine which questionnaire is appropriate for their patient.
- F:** HRCT should be a non-contrast low dose HRCT scan including supine inspiratory and supine expiratory acquisitions. Thin slice images must be available for interpretation, and it is recommended to reconstruct MIP images and coronal images.

The HRCT study should be performed using as low a radiation dose as is practicable to produce diagnostic quality imaging and should be reported by a specialist radiologist with a B reader qualification and/or recognition and credentialing through Royal Australian and New Zealand College of Radiologists.

It is recommended that any diagnostic uncertainty on HRCT interpretation, or other aspects of disease diagnosis, be discussed by a multidisciplinary team approach on a case-by-case basis.

**G:** In the course of screening for silicosis, other diseases will be identified.

Blood tests may assist in reaching a diagnosis for these workers. The Thoracic Society of Australia and New Zealand specifies that blood tests (including but not limited to serum ACE, rheumatoid factor and an autoimmune screen) have a role in diagnosing silicosis after exposure to engineered stone processing and also form part of the assessment to exclude other diagnoses.

This cohort of workers is at higher than average population risk of developing emphysema, asthma, lung cancer, other pneumoconiosis, asbestos-related pleural and parenchymal lung disease and occupational bronchitis. Referral in to appropriate treatment pathways will depend on the spirometry results, imaging findings and symptomology.

Additionally, other diseases may present on chest imaging that are unrelated to the occupational dust exposure, and include, but are not limited to, cardiac pathology, lung infection and inflammatory processes, skeletal disorders and identification of foreign bodies.

Identification of these other diseases should prompt appropriate further investigation, history taking and treatment outside this guideline.

**H:** The timeframes for further review are a recommendation only. Timeframes should be adjusted based on the medical practitioner's clinical judgement and consideration of a worker's individual circumstances including their past and/or continued exposure to respirable crystalline silica. Given the latency period of silicosis, it is recommended that workers are reviewed for no less than ten years post the cessation of exposure.

## Respiratory function examination

### Standardised respiratory symptoms questionnaire

The below questionnaire must be administered in accordance with the [instructions](#) approved by the British Medical Research Council's Committee on Environment and Occupational Health.

The actual wording of each question must be used.

Tick the YES or NO column, or enter other codes as indicated in boxes.

When in doubt record as NO.

#### Preamble

I am going to ask you some questions, mainly about your chest. I'd like you to answer YES or NO whenever possible.

QUESTIONS	YES	NO
<b>Cough</b>		
1 Do you usually cough first thing in the morning in the winter?		
2 Do you usually cough during the day – or at night – in the winter?		
<b>If 'Yes' to 1 or 2 ask the follow-up question</b>		
3 Do you cough like this on most days for as much as three months each year?		
<b>Phlegm</b>		
4 Do you usually bring up any phlegm from your chest first thing in the morning in winter?		
5 Do you usually bring up any phlegm from your chest during the day – or night – in winter?		
<b>If 'Yes' to 4 or 5 ask the follow-up question</b>		
6 Do you bring up phlegm like this on most days for as much as three months each year?		
<b>Periods of cough and phlegm</b>		
7 In the past three years have you had a period of (increased) cough and phlegm lasting for three weeks or more?		
<b>If 'Yes' ask the follow-up question</b>		
8 Have you had more than one such period?		
<b>Breathlessness</b>		
<i>If the worker is disabled from walking by any condition other than heart or lung disease, omit question 9 and enter YES here.</i>		

<b>QUESTIONS</b>	<b>YES</b>	<b>NO</b>
9 Are you troubled by shortness of breath when hurrying on level ground or walking up a slight hill?		
<b><i>If 'Yes' ask the follow-up question</i></b>		
10 Do you get short of breath walking with other people of your own age on level ground?		
<b><i>If 'Yes' ask the follow-up question</i></b>		
11 Do you have to stop for breathe when walking at your own pace on level ground?		
<b><i>Wheezing</i></b>		
12 Have you had attacks of wheezing or whistling in your chest at any time in the last 12 months?		
13 Have you ever had attacks of shortness of breath with wheezing?		
<b><i>If 'Yes' ask the follow-up question</i></b>		
14 Is/was your breathing absolutely normal between attacks?		
15 Have you at any time in the last 12 months been woken at night by an attack of shortness of breath?		
<b><i>Chest illnesses</i></b>		
16 During the past three years have you had any chest illness that has kept you from your usual activities for as much as a week?		
<b><i>If 'Yes' ask the follow-up question</i></b>		
17 Did you bring up more phlegm than usual in any of these illnesses?		
<b><i>If 'Yes' ask the follow-up question</i></b>		
18 Have you had more than one illness like this in the past three years?		



<b>QUESTIONS</b>	<b>YES</b>	<b>NO</b>
<b>Past illnesses</b>		
19 Have you ever had, or been told that you have had:		
a) An injury affecting your chest?		
b) Heart trouble?		
c) Bronchitis?		
d) Pneumonia?		
e) Pleurisy?		
f) Pulmonary tuberculosis?		
g) Bronchial asthma?		
h) Other chest trouble?		
i) Hay fever?		
<b>Tobacco smoking</b>		
20 Do you smoke?		
<b>If 'No' ask the follow-up question</b>		
21 Have you ever smoked as much as one cigarette a day (or one cigar a week or 28 grams of tobacco a month) for as long as a year?		
<b>If 'No' to questions 20 and 21, omit remaining questions on smoking.</b>		
22 Do (did) you inhale the smoke?		
<b>If 'Yes' ask the follow-up question</b>		
23 Would you say you inhaled the smoke slightly (= 1), moderately (= 2), or deeply (= 3)?		
24 How old were you when you started smoking regularly?		
25 Do (did) you smoke manufactured cigarettes?		
<b>If 'Yes' ask the follow-up question</b>		
26 How many do (did) you usually smoke per day on weekdays?		
27 How many per day at weekends?		
28 Do (did) you usually smoke plain (= 1) or filter tip (= 2) cigarettes?		
29 What brands do (did) you usually smoke?		
30 Do (did) you smoke hand-rolled cigarettes?		

QUESTIONS	YES	NO
<b><i>If 'Yes' ask the follow-up question</i></b>		
31 How much tobacco do (did) you usually smoke per week in this way (in grams)?		
32 Do (did) you put filters in these cigarettes?		
33 Do (did) you smoke a pipe?		
<b><i>If 'Yes' ask the follow-up question</i></b>		
34 How much pipe tobacco do (did) you usually smoke per day (in grams)?		
35 Do (did) you smoke small cigars?		
<b><i>If 'Yes' ask the follow-up question</i></b>		
36 How many of these do (did) you usually smoke per day?		
37 Do (did) you smoke cigars?		
<b><i>If 'Yes' ask the follow-up question</i></b>		
38 How many of these do (did) you usually smoke per week?		
<b><i>For present smokers</i></b>		
39 Have you been cutting down your smoking over the past year?		
<b><i>For ex-smokers</i></b>		
40 When did you give up smoking altogether? ( <i>what year</i> )		
<b><i>Comments /notes</i></b>		