Epidemiology of chronic non-specific respiratory diseases*

The current state of research into the epidemiology of chronic non-specific respiratory diseases (CNSRD) is reviewed. Recommendations are made on the definitions of CNSRD for use in epidemiological studies, and various aspects of the etiology and natural history of CNSRD are identified as requiring further investigation. The need for standardization of investigative methods is emphasized. Since smoking is such an important factor in the etiology of CNSRD, it is recommended that efforts be made to discourage children from taking up the habit.

The public health problem of diseases of the respiratory tract has for centuries been dominated by mortality from pneumonia and pulmonary tuberculosis. The introduction of effective chemotherapy, first for pneumonia and then for tuberculosis, has reduced the importance of these conditions. Most of the industrialized countries, having to a large extent controlled morbidity as well as mortality from tuberculosis, have become aware of the problem of death from respiratory failure and of the existence in many persons of chronic disease of the airways and of the lung parenchyma. Chronic cor pulmonale, i.e., congestive heart failure secondary to lung disease, has emerged as an important type of heart disease and cause of death. Pneumonia as a fatal disease of the adult unresponsive to chemotherapy may be secondary to various chronic diseases, including those of the respiratory tract already mentioned.

Consequently clinicians, physiologists, pathologists, and epidemiologists have conducted studies in hospitals, clinics, and increasingly also in the community, in an effort to measure the size of the problem of chronic pulmonary diseases of a non-tuberculous character. Many of these conditions remained etiologically obscure until methods of study were formulated that revealed important geographical and social differences strongly indicative of the etiological role of the environment. Thus the possibility has arisen of steps towards action against certain personal and environmental factors such as cigarette smoking and air pollution, even though their relative importance as etiological factors remains uncertain.

It is expected that the development of national research programmes, such as those of the National Heart and Lung Institute in the USA and of cooperative regional studies in Europe, will ultimately add greatly to existing knowledge and will either support or disprove the tentative conclusions concerning causative factors of the various forms of chronic non-specific respiratory diseases. Careful planning, expert guidance, and trained assistance are needed if such studies are to be made in the developing countries. Indeed, the chest diseases of these countries differ greatly from those of the USA and Europe, particularly where pulmonary tuberculosis continues to occur. Nevertheless, preliminary studies in India, South-East Asia, and elsewhere indicate that chronic, non-specific, non-tuberculous respiratory diseases exist and may grow in importance in the future.

One problem facing investigators is that of the terminology and definitions of the conditions grouped as chronic non-specific respiratory diseases (CNSRD). In some countries these have been given the title “chronic non-specific lung diseases” (CNSLD). Useful definitions must be applicable to epidemiological studies despite the limitations imposed by their community nature. The choice of methods of study that can be recommended for epidemiological investigations may differ according to the particular country or age-group of the persons who are surveyed.

The results of field studies already published have suggested certain etiological factors in the case of

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* This Memorandum was drafted by the signatories listed on page 259. Requests for reprints should be addressed to: Division of Non-Communicable Diseases, World Health Organization, 1211 Geneva 27, Switzerland.
chronic bronchitis, generalized airways obstruction, and possibly emphysema. Their consideration suggests the possible formulation of preventive action that may be recommended as worthy of acceptance.

Even more fundamental, however, are the recommendations for the training of persons who may plan and execute epidemiological studies in their own countries. The role of WHO at an international level may be that of providing guidance, of facilitating training, and of co-ordinating the surveys undertaken. Only in this way will sound knowledge be gained concerning the relative importance of conditions of these kinds of symptoms, secretion, and volume. They may be present in various territories. Action of a preventive character may then be possible.

**DEFINITIONS OF CNSRD RECOMMENDED FOR EPIDEMIOLOGICAL PURPOSES**

The term "chronic non-specific respiratory diseases" is employed here to embrace a number of conditions of the lungs and airways characterized by disorders of structure, function, or both. The definitions of these conditions should be specified in terms of symptoms, physiological effects, or structural anatomy. These conditions will be discussed as follows:

1. Chronic bronchitis.
2. Generalized airways obstruction.
3. Emphysema.

They may be present alone or in combination in the same individual.

**Chronic bronchitis**

The following definition is proposed for general use: Chronic bronchitis is non-neoplastic disorder of structure or function of the bronchi usually resulting from prolonged or recurrent exposure to infectious or non-infectious irritation.

In 1965 the British Medical Research Council (MRC) Committee on the Aetiology of Chronic Bronchitis defined simple chronic bronchitis as "chronic or recurrent increase in the volume of mucoid bronchial secretion sufficient to cause expectoration". This usually appears as a productive cough. It may be pointed out that since the normal volume of bronchial secretion is not known, an increase in the volume may imply bronchial hypersecretion and/or a deficiency of the clearance rate from the tracheobronchial tree. In epidemiological studies, a history of productive cough on most days for at least 3 months has often been accepted as a criterion. In such studies the probability of correct diagnosis is strengthened if localized lung disease of any kind such as tuberculosis and pneumonia, generalized specific lung diseases such as pulmonary granulomata and pneumoconioses, or primary cardiovascular or renal disease are excluded. It must be remembered that chronic bronchitis may co-exist with any of the above conditions.

According to the character of the sputum, some persons adopt the term "mucopurulent bronchitis" when the sputum is persistently or intermittently mucopurulent and when this is not due to localized bronchial pulmonary disease.

**Generalized airways obstruction**

The term "airways obstruction", as commonly used, refers to slowing of forced expiration and may be acute or chronic. The term is useful to describe subjects found in population surveys where more detailed characterization is not possible, or to describe results of ventilatory tests. The term "chronic" is used when airways obstruction persists despite a prolonged period of maximum medical management or when it has been demonstrated in at least 2 examinations over a period of at least 3 months, tests being carried out when the subject is not in an unstable or symptomatic exacerbation.

**Chronic obstructive bronchitis** is chronic bronchitis with persistent irreversible or partially reversible slowing of forced expiration that cannot be attributed to a loss of lung recoil. This term is not intended to imply an equivalence with simple chronic bronchitis as defined above. Indeed, the anatomical alterations leading to this condition may lie in bronchioles or in tissues surrounding the airways rather than within the larger bronchi.

**Small airways obstruction** is accompanied by widespread obliteration or narrowing of airways of less than 2 mm internal diameter. It must be fairly far advanced before slowing of forced expiration occurs. It is common to a variety of lung diseases.

**Asthma**, as commonly understood, refers to a chronic condition characterized by recurrent bronchospasm resulting from a tendency to develop reversible narrowing of the airway lumina in response to stimuli of a level or intensity not inducing such narrowing in most individuals.

**Bronchospasm** is a term used to imply any transient episode of airways obstruction of sufficient
severity to result in symptoms. It is accepted that this term does not differentiate between spasm of bronchial muscle and mucosal oedema.

**Emphysema**

This is defined as an enlargement of the air spaces distal to the terminal non-respiratory bronchiole, accompanied by destructive changes of the alveolar walls. The defining characteristics are readily demonstrable only on pathological examination of the lung. Various physiological and radiological criteria have been proposed for the detection of emphysema in life, but agreement upon these as a basis for definition has not yet been reached.

**METHODOLOGY OF EPIDEMIOLOGICAL STUDIES OF CNSRD**

**Objectives of epidemiological studies**

The objectives in epidemiological studies of CNSRD may be:

1. To investigate the relationship of indices of CNSRD to the personal and environmental circumstances of individuals living in different social, economic, and geographic areas.
2. To investigate the prevalence and natural history of CNSRD.
3. To investigate the contribution of host factors to the development of CNSRD.
4. To identify the factors influencing the medical and social needs of persons with CNSRD.
5. To determine the applicability and effectiveness of techniques of detection, treatment, and prevention of CNSRD.

**Choice of methods**

It is essential in epidemiological field studies that the methods used be rigorously standardized. Unless this is done valid comparisons may not be possible among the findings in sub-groups of a study population, or among the findings from studies conducted in different populations. For these reasons considerable efforts have been made in developing strictly standardized techniques for measuring lung function, and in assessing symptoms by means of questionnaires.

The choice of the population to be studied will depend upon the objectives of the particular study. The method of population selection in a study of CNSRD must follow well recognized epidemiological principles.

Various criteria have been evolved to evaluate epidemiological measurement techniques. These can be applied in the case of studies of CNSRD, both to questions designed to elicit the presence of symptoms and also to the lung function techniques. Of these criteria, the repeatability of the measurement is of paramount importance, since reproducibility is essential for precision. Coupled with repeatability is the concept of validity, i.e., the extent to which the test measures what it is intended to measure. Other indices of validity involve the sensitivity and specificity of the method. In addition to repeatability and validity, other criteria include the practicability, acceptability, and cost of the method.

**Respiratory symptom questionnaires**

The presence of respiratory symptoms may be the only indication of the presence of CNSRD, and the variation found between observers in their assessment of the presence of symptoms led to the evolution of standardized respiratory symptom questionnaires. These consisted of a series of questions on respiratory symptoms that would be asked in a standard sequence in the course of an interview with each subject.

**MRC questionnaire**

The most widely used and comprehensively validated respiratory symptom questionnaires have been those produced by the MRC Committee on the Aetiology of Chronic Bronchitis. The first version of this questionnaire was published in 1960; it was revised in 1965 and further revised in 1974. In response to the wishes of the majority of investigators who had used earlier versions, no major changes were introduced in 1974. This has ensured that comparisons could be made between studies that used the different versions. The revised version of the questionnaire and manual on “The use of the questionnaire on respiratory symptoms” and “Instructions to interviewers” is recommended.

**Other questionnaires**

The EEC questionnaire is a translation from the 1965 MRC questionnaire and includes certain additional questions. Its comparability with the MRC questionnaire, and its validity, have been fully established.

The questionnaire recommended by the National Heart and Lung Institute of the USA is derived from the MRC questionnaire, but it differs from it in minor ways and by the optional addition of ques-
tions by investigators. The comparability of this questionnaire with the MRC questionnaire has not yet been established.

**Methods for testing questionnaires**

Various approaches have been used to test questionnaires. Some of these are as follows:

1. Test the repeatability of answers to questions given to the same subject on different occasions.
2. Test the repeatability of answers given by the same subject to the same question when asked by different observers.
3. Examine the relationship between the presence of symptoms and an objective test in different population samples, e.g., answers to questions on phlegm production and measurement of sputum production.
4. Determine the relationship of answers to the subsequent progress of the individual.

It should be emphasized that testing questionnaires is a difficult and time-consuming procedure.

The prevalence rate based upon answers to individual questions is highly susceptible to changes in their method of use. For example, trained and untrained observers may obtain quite different answers to the same questions in the same subjects. Training of observers is, therefore, an essential prerequisite to the use of interviewer-administered questionnaires.

Changes in the sequence in which the questions are asked can also change the prevalence rate. The insertion of additional questions within the body of the questionnaire carries special risks. Specific studies are required to establish the effects of such insertions upon the reporting of symptoms.

In this context it is, however, recognized that modifications are sometimes unavoidable when the existing questions may be misunderstood or inapplicable when used in a particular population. In certain populations a symptom questionnaire would be an inappropriate method where, for example, no adequate words existed in the language to describe the symptoms.

It is recommended that the MRC questionnaire be used in studies of CNSRD as the standard reference questionnaire, and that it should be used as the basis for subsequent translation.

**Questionnaires on respiratory disease in children**

The MRC questionnaire was developed for adults, and there is no corresponding questionnaire for children. However, studies in the UK have used the MRC questions on cough, phlegm, and wheeze with very little change in working as the basis of a respiratory symptoms questionnaire. Several versions of these questionnaires have been adequately tested by completion either by older children themselves, or by parents on behalf of their younger children.

It is considered, however, that the questionnaires in current use for children are not yet suitable as standard reference questionnaires.

**Tests of lung function**

Tests of lung function are principally used in epidemiological studies: (a) to provide evidence on the presence, extent, mechanisms and, in longitudinal studies, the progression of impairment of pulmonary function; and (b) to provide an objective method of physiological classification of persons in studies of CNSRD.

A number of tests of lung function have been used in epidemiological field studies. Mainly owing to their practicality, low cost, and acceptability by subjects, tests that measure lung volume and flow have been the most extensively used. These measurements include $FEV_{1.0}$, vital capacity, and peak expiratory flow rate.

Although $FEV_{1.0}$ and peak expiratory flow rate are relatively insensitive tests of lung dysfunction, a number of studies have shown that those with impairment of these pulmonary functions have a higher risk of morbidity and mortality from CNSRD. The lack of specificity of these tests for defined clinical states, and their relative insensitivity in certain forms of CNSRD, has led investigators to seek other tests of pulmonary dysfunction. A number of other lung function tests, including flow-volume curves, closing volume, and diffusing capacity are potentially useful in epidemiological studies. However, these tests are still in the process of development and evaluation.

The general opinion is that $FEV_{1.0}$, vital capacity, and peak flow rate should continue to be recommended as basic measurements of ventilatory function in future studies. These measurements should be performed regardless of whether or not other tests of lung function are also made. For epidemiological purposes, techniques that record the forced expiratory curve are usually advantageous.

Any test employed in an epidemiological study should be carefully standardized with regard to methods of performance and analysis. The appara-
tus must be regularly calibrated. Intra- and inter-
observer variability, as well as other sources of
variability, should be evaluated. The necessity for
careful training of personnel performing these tests is
emphasized.

It is considered that the use of the term "normal
values" as an aid to predicting expected values of
lung function is misleading and that, if it is necessary
to derive such values, they should be called instead
"reference values". The source, age, sex and other
characteristics of the subjects comprising the "refer-
ence" group should be clearly stated.

PREVALENCE AND ETIOLOGY OF CNSRD

Mortality statistics

Mortality rates for CNSRD show great variability
from one country to another. While some of the
variability may reflect a greater tendency for these
diseases to develop in certain areas, differences in
diagnostic habits are so great that these differences
in reported mortality rates must be interpreted with
cautions.

Studies of clinical illness

CNSRD are major causes of morbidity and dis-
ability in many countries. As with mortality data,
variations in diagnostic habits make comparisons
between different countries unreliable.

Comparisons of clinically ill subjects with chronic
airways obstruction have been carried out in several
countries and suggest that the same range of clinical
illness is encountered in different areas. These studies
do not allow, however, an accurate appraisal of the
relative importance of emphysema and intrinsic dis-
ease of the airways in the pathogenesis of CNSRD in
different regions.

Population studies

Extensive population surveys have been carried
out in many parts of the world in an attempt to
determine the prevalence of CNSRD. It is evident
that certain features of CNSRD, such as chronic
cough and expectoration, are frequent complaints in
almost all populations so far studied. In addition,
airways obstruction of a mild degree is found fre-
quently and may occur in individuals who have no
respiratory complaints.

Many of these studies have attempted to relate
ventilatory impairment and respiratory symptoms to
factors that may be of importance in their patho-
genesis. Also, studies comparing the prevalence of
abnormalities in different localities provide informa-
tion concerning the importance of certain environ-
mental factors. Unfortunately, only limited data of a
longitudinal type have been reported. Thus, while
the effects of various factors on the prevalence of
respiratory symptoms and ventilatory impairment
have been elucidated, it remains uncertain that these
factors have the same relationship to the early stages
of a disabling, potentially fatal disease. Considerable
uncertainty remains concerning the early natural
history of disabling CNSRD.

The following factors have been examined for a
possible relationship to respiratory symptoms and
ventilatory impairment:

Smoking. Virtually all studies reveal a close rela-
tionship between cigarette smoking and CNSRD.
Sputum production is closely related to cigarette
smoking and among cigarette smokers becomes
increasingly frequent with age and with number of
cigarettes smoked. In both cross-sectional and longi-
dudinal studies, ventilatory function shows a greater
decline with age among cigarette smokers. Indeed,
cigarette smoking is the most important determinant
of CNSRD in almost all studies so far reported. It is
less certain that pipe or cigar smoking are important
causes of CNSRD, possibly because pipe and cigar
smokers do not usually inhale deliberately.

Environmental air pollution. There has been con-
siderable variability in reported effects of environ-
mental air pollution. It is clear, however, that people
residing in some unpolluted rural areas have less
CNSRD than those who reside in highly-polluted
urban regions. The importance of specific air pollu-
tants is less certain and, in most studies so far
reported, cigarette smoking is quantitatively more
important than environmental pollution in inducing
respiratory abnormalities.

Socioeconomic status. In many studies, CNSRD
are more prevalent in lower socioeconomic groups,
even after accounting for smoking habits and expo-
sure to air pollutants. The mechanism of the effect
remains unclear.

Occupation. High prevalence of CNSRD has been
noted in several specific occupational groups, parti-
cularly those exposed to high concentrations of
airborne irritants or allergens. Unfortunately, it is
often difficult to distinguish occupational, smoking,
and socioeconomic effects, and the separate effect of
occupational exposure on CNSRD is therefore diffi-
cult to estimate.
Bronchial reactivity. Many studies have shown that subjects with various types of CNSRD have a greater decrease in ventilatory function in response to a variety of stimuli than do normal subjects. While it is possible that a high degree of bronchial reactivity is a factor predisposing to CNSRD, this has not yet been proved.

Acute respiratory infections. It has long been suspected that recurrence of upper and lower respiratory infections might be of importance in the pathogenesis of CNSRD, but available data indicate only that they are associated findings.

Familial factors. Circumstantial evidence exists that there is a familial tendency to CNSRD, and a familial tendency to asthma is well documented. An inherited homozygotic defect leading to severe deficiency of alpha-1-antitrypsin is associated with a tendency to develop emphysema. It is much less certain that heterozygotic abnormalities or mild deficiencies of alpha-1-antitrypsin are associated with increased risk of CNSRD.

Atopic predisposition. While clearly related to asthma, the possible relationship of atopic predisposition to other CNSRD requires further study.

Childhood respiratory disorders. It is strongly suspected that childhood respiratory illnesses or early exposure to bronchial irritants may predispose to CNSRD, but the exact importance of childhood events has not yet been established.

Weather and climate. Exacerbations of CNSRD and acute respiratory infections have been related to low environmental temperatures, but the importance of climatic conditions in the initiation of CNSRD remains uncertain.

EARLY STAGES OF CNSRD

The early manifestations of CNSRD may precede the development of findings necessary at present to establish its diagnosis. For this reason, and because therapy of CNSRD in its advanced stage is frequently disappointing, a legitimate and desirable area for epidemiological investigation is the delineation of the earlier stages of these diseases. The objectives of such studies would include:

1. A description of the early natural histories of CNSRD.
2. Detection of etiological factors contributing to the development of CNSRD.
3. Detection of populations and/or individuals at risk of developing crippling CNSRD.
4. The effects upon the natural histories of CNSRD of intervention, i.e., of deliberate alterations in personal or environmental factors.

Inasmuch as the ultimate goal of investigators interested in CNSRD is the prevention and control of these diseases, these four objectives are vital aims.

Traditional methods of epidemiological investigation of CNSRD using questionnaires and lung function tests are appropriate, except that the usual measurements obtained from a forced expiratory spirogram may not be sufficiently sensitive to detect early functional abnormalities. Indeed, the ability to predict later development of disabling CNSRD from symptoms and mild FEV abnormalities is still uncertain. Therefore, other physiological techniques must be evaluated as methods for detecting early disease and, if found appropriate, should be used. Other tests to determine genetic, immunological, microbiological, and biochemical factors of potential importance in etiology should be developed.

Functional abnormalities can be detected in the lungs of a significantly high percentage of smokers at a stage when the FEV₁,₀ is normal. These smokers may or may not have symptoms and some smokers with symptoms do not have detectable functional abnormalities. Some of these functional abnormalities are reversible upon ceasing to smoke. If they can be shown to indicate an early stage of CNSRD, this increases the possibility of control of these diseases. Thus it is of paramount importance to determine the prognostic significance of these abnormalities and this will require long-term, prospective studies.

Long-term studies will also be needed to determine the role of respiratory infections and other etiological factors in the development of CNSRD. Studies in children may be particularly suitable for answering some of these questions. Although longitudinal studies may be expensive, the potential benefit from such studies would justify the cost.

PREVENTION, RESEARCH, AND TRAINING
IN THE FIELD OF CNSRD

Prevention

The aim of preventive action should be the use of current knowledge to abolish or modify the influence of factors that affect the onset or evolution of CNSRD. The success of such action, which may depend on the initiative of either individual or community, will depend partly on the relative impor-
tance of that factor in increasing the frequency of serious disease and partly on its amenability to change. Research in prevention must take account of the many factors and permit the evaluation of their joint effect in producing CNSRD. The major known etiological agents have already been stated and their implications for preventive action are discussed below.

**Smoking**

Unfortunately, the effect of mass health education, either by the publication of authoritative reports by national bodies or of propaganda material through the national news or entertainment media, has usually been both transitory in duration and disappointing in degree. So far, penal levels of taxation have been suggested but not imposed. There has been a switch from cigarettes to either pipes or cigars which, on the basis of past surveys, have been associated with lower risks of serious respiratory disease. On the other hand, there is evidence that the more seriously addicted smoker who makes this change carries over the habit of deep inhalation and continues to expose himself to the respiratory risk incurred by that practice. Advice to the intransigent addict on the use of alternative modes of smoking must therefore be given with that caution in mind.

An ominous development in some countries has been the ever-decreasing age at which smoking is begun, for this seriously increases the total lifetime duration of exposure to tobacco smoke. Taken together with the findings in some studies of increased morbidity among school children and young adults who smoked, this underlines the importance of concentrating efforts in health education on the young. In such action, emphasis should be put on the positive advantages of not smoking, rather than on the long-term hazards to health.

Research is still needed on national trends in mortality from chronic lung disease in relation to the detailed history of tobacco consumption and the mode of that consumption. Comparisons should be made between successive generations in respect of the association between age-specific death rates and the age of starting to smoke cigarettes, and the distribution of cigarette, pipe, and cigar smoking in adult life. Because of the consistently high correlation between the use of cigarettes and the presence of CNSRD it is essential that standardized measurements of cigarette smoking in study populations be included in all investigators in which the role of other etiological factors is being evaluated.

More could be done by comparative prevalence surveys on the effect upon respiratory symptoms, function, and mortality of different smoking materials including modified cigarettes with a low tar content, filter-tipped cigarettes, and new smoking materials. In some developing countries the introduction of manufactured cigarettes may present a special hazard, particularly since the adverse role of relatively small amounts of tobacco smoked in other ways has not yet been determined. If the health effects of all such changes in smoking materials are to be assessed, base-lines must be established by epidemiological surveys of the appropriate populations before and after their introduction.

**Air pollution**

Pollution of the environment by products of combustion of fossil fuels may have both acute and chronic effects on the course of respiratory disease; much depends, however, on its physicochemical nature and concentration. The health benefits of community action to diminish or abolish pollution depend, therefore, on the mode of combustion of fuel and the prevailing level and source of air pollution.

The vigorous enforcement of public health legislation to control smoke in the UK, for example, has reduced the levels of smoke pollution dramatically and there is now evidence of benefit in respect of the exacerbations of chronic lung diseases.

Occupational exposure to dusty conditions and toxic vapours is a special case of environmental pollution. The difficulty of establishing their specific effects should not inhibit the promotion of measures for their suppression. At the same time steps should be taken, by periodic surveys of those exposed, to monitor the effects of such measures on respiratory health. The introduction of new industrial processes which may lead to the emission of toxic gases makes such monitoring of particular importance.

International comparisons, e.g., of inhabitants of towns of similar size and population density using different heating and industrial fuels, may serve to distinguish the specific effect of coal smoke or other forms of pollution. Studies of the respiratory infections and pulmonary function of infants and children are of special value in this context since smoking may not have started. The parental cooperation is high and the populations are conveniently accessible. Any long-term or residual effects of exposure to atmospheric pollution can also be demonstrated by longitudinal studies of cohorts of children born
and growing up in different environments and followed up into adult life. Experience in the UK has shown that information on this and other aspects of respiratory health can be economically derived from a general national cohort study.

Other factors

The specific contribution of particular aspects of the social and domestic environment to the causation of chronic lung disease has not yet been precisely assessed. In developing countries, crowding and low economic and social standards seem to be important factors in this respect. It seems reasonable to suppose that improvements (e.g., in housing) may, by decreasing the risk of the transfer of infection, lessen the chance of serious illness in infancy and early childhood. Any general advance in living standards may thus reduce respiratory mortality in successive generations.

The causes of the marked social-class gradient in mortality from CNSRD noted in some countries has not yet been satisfactorily explained. Here, family studies of both parents and children may indicate the specific influence on the prevalence of respiratory symptoms, functional disability, or the incidence of serious pulmonary infections of specific domestic circumstances. The sharing of bedrooms or the use and effectiveness of different forms of heating may be investigated as well as the smoking habits of the parents, the noxious effect of which has already been demonstrated by such family studies.

International comparisons of mortality and morbidity

If national mortality and morbidity statistics are to be effective tools for international comparisons, the efforts by WHO to improve their quality, comparability, and speed of availability need to be reinforced. There is much to be learnt from the study of such statistics in the detection of the increasing mortality from chronic lung disease in certain countries and the comparison of age-sex patterns. At best, mortality statistics can give only a broad indication of the frequency of CNSRD in different countries. Occupational morbidity is a further source of useful data that has been undervalued and little used. Effective, even if limited, exploitation would enhance the chance of future developments.

Both these sources require to be supplemented by epidemiological surveys of respiratory symptoms and lung function in representative national samples. The utility of such surveys for international comparison will depend on the uniform application of agreed standard procedures, as already outlined in the section on methodology.

Genetic and racial variation

Husband–wife or sibling comparisons can help to distinguish genetic from environmental factors in respiratory disease. The extreme case is exemplified by studies on twins where comparison of identical and non-identical pairs has already shown a genetically-determined predisposition to some diseases. Collaboration between twin registries in the collection of data on sufficient twin pairs to answer specific questions in respiratory and other diseases should be encouraged. Variation in lung function of different ethnic groups not explicable on grounds of physique has also been suggested; here also the examination of adequate samples of different groups to provide reference values specially appropriate to them should be encouraged.

Migrant studies

A special form of international collaboration is the study of the disease experience of migrants within a country or between countries. They can serve to show, for example, the residual effect of exposure to pollution in those moving from high to low levels or of its effect on those moving from rural to urban areas.

Natural history studies

The discussion of the problems of detecting early stages of CNSRD has emphasized the need for the development and testing of techniques designed to achieve this. The application of these techniques in special populations such as children or non-smoking adults is likely to give useful information on factors affecting the evolution of CNSRD. It is important to recognize that these factors are likely to vary in their relative importance between the very different environment of urban and rural communities in developed and developing countries, and results cannot necessarily be transferred from one context to another. Such studies should be encouraged in a wide range of national conditions.

Controlled trials in intervention

The ultimate hope is that early detection of disease, or of individuals with a high risk of developing it, will permit effective intervention to prevent serious disability and death. Although some work along these lines is in progress, no results of a rigorously controlled trial of alternative methods of intervention have yet been published.
Training of research workers

The putting into effect of research outlined above will need a cadre of trained workers. Clinicians with an inclination for such methods of investigation might usefully follow courses in epidemiological and statistical concepts and methods such as those already supported in several centres by WHO. For those already trained in this discipline, intensive courses in standardized clinical and physiological methods for field use would be appropriate. A manual of such methods would also be helpful. Workshops on specific topics with specialist participation are also likely to be useful. Similar initiatives, including conferences between specialists in this field, have already proved fruitful in respect of cardiovascular disease. Their extension to the context of respiratory disease is overdue.

RECOMMENDATIONS

There is need for epidemiological field studies to:

1. Investigate the role of personal and environmental factors in the etiology of CNSRD in different countries.
2. Investigate the natural history of CNSRD with particular reference to the early stages of the disease.
3. Supplement existing vital statistics in the investigation of international differences in CNSRD.
4. Monitor the effects changes in tobacco smoking and environmental exposures may have on CNSRD.

It is recommended that standardized methods for such studies be adopted, i.e., in the respiratory symptom questionnaires and lung function measurements. This would greatly enhance the value of studies since it will permit comparison of the findings between studies, both nationally and internationally.

Since smoking is such an important factor in the etiology of CNSRD, efforts should be made to encourage young children not to take up the habit. This will require controlled trials of alternative techniques.

The training of investigators in the epidemiological methods used in the field surveys and controlled trials should be facilitated.

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RÉSUMÉ

ÉPIDÉMIOLOGIE DES MALADIES RESPIRATOIRES CHRONIQUES NON SPÉCIFIQUES

Ce mémorandum fait le point des études épidémiologiques sur les maladies respiratoires chroniques non spécifiques. Si ces études ont été faites surtout dans les pays de développement avancé, rien ne permet de penser que ces maladies ne soient pas également fréquentes dans les pays en voie de développement. Le premier problème auquel on se heurte est celui des définitions des états morbides groupés sous la désignation de maladies chroniques respiratoires non spécifiques et de la terminologie qui s’y rapporte; le mémorandum définit les infections suivantes: bronchite chronique, bronchite chronique simple, emphysème, obstruction généralisée des voies
respiratoires (y compris la bronchite chronique oblitérante), obstruction des bronchioles et asthme.

Avant d'examiner la méthodologie des études épidémiologiques, le mémorandum suggère différents objets pour ces études, notamment: prévalence et histoire naturelle des maladies respiratoires chroniques non spécifiques; rapport entre les facteurs individuels et facteurs de milieu et la fréquence des maladies respiratoires chroniques non spécifiques; les facteurs qui déterminent les besoins médicaux et sociaux des personnes atteintes de ces maladies; applicabilité et efficacité des techniques de dépistage, de traitement et de prévention.

Le mémorandum examine les méthodes d'étude des maladies respiratoires chroniques non spécifiques, et notamment les questionnaires sur les symptômes et les épreuves de la fonction pulmonaire. Il souligne la nécessité de recourir à des méthodes normalisées. Il passe en revue les différents questionnaires sur les symptômes respiratoires qui sont actuellement en usage et recommande l'emploi du questionnaire du Medical Research Council du Royaume-Uni dans sa version 1974 comme questionnaire standard de référence pour l'étude des maladies respiratoires chroniques non spécifiques. Des nombreuses épreuves existantes de la fonction pulmonaire, seules sont recommandées celles du VEMS (volume expiratoire maximal par seconde), de la capacité vitale et de la ventilation maximale comme mesures de base de la fonction ventilatoire pour les études futures.

Le mémorandum examine les observations tirées d'études sur a) la mortalité due aux maladies respiratoires chroniques non spécifiques, b) des cas cliniques de ces maladies et c) des études de population. Sur la base de ces études on a identifié divers facteurs qui peuvent être associés aux maladies respiratoires chroniques non spécifiques. Ce sont notamment l'usage du tabac, la pollution atmosphérique, le statut socio-économique, la profession, la réactivité bronchique, les infections respiratoires aiguës, les facteurs familiaux, la pré-disposition atopique, les maladies respiratoires dans l'enfance et le climat.

Le mémorandum souligne l'utilité d'étudier les premiers stades des maladies respiratoires chroniques non spécifiques puisque toute action dans le sens de la lutte contre ces maladies et de leur prévention requiert ces connaissances. Actuellement, la prévention repose essentiellement sur les efforts pour persuader les gens de ne pas fumer, bien que l'on ait constaté que l'action communautaire visant à réduire la pollution atmosphérique joue un rôle favorable. Le mémorandum recommande que l'on s'efforce de dissuader les gens, et notamment les enfants, de prendre l'habitude du tabac.

Diverses occasions de recherches épidémiologiques sont mentionnées. On pourrait notamment mettre davantage à profit les statistiques de morbidité et de mortalité pour des comparaisons des maladies respiratoires chroniques non spécifiques à l'échelon international, étudier l'environnement social et domestique ainsi que les facteurs génétiques de la sensibilité aux maladies respiratoires chroniques non spécifiques, organiser des essais cliniques contrôlés sur les différentes méthodes d'intervention pour empêcher l'apparition et la progression de ces maladies.