BACKGROUND DOCUMENT BASED ON SUMMARY REPORTS RECEIVED FROM COUNTRIES AND OTHER MATERIAL for reference and use at the TECHNICAL DISCUSSIONS ON "MASS HEALTH EXAMINATIONS AS A PUBLIC HEALTH TOOL"

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Prepared by Dr J. M. G. Wilson, Consultant.
Preface

The subject of "Mass Health Examinations as a Public Health Tool" was chosen by the Executive Board at its forty-fourth session for the Technical Discussions at the Twenty-fourth World Health Assembly because of its practical importance in promoting community health; and in addition because of growing interest in the possibilities of screening for the early detection of disease, particularly with the assistance of recently developed automated techniques.

It is worth noting that the Technical Discussions at the Twenty-first World Health Assembly were devoted to "National and Global Surveillance of Communicable Diseases" which constitutes one important application of mass health examinations (MHEs).

In October 1970 the Director-General sent a document entitled "Suggested Outline for use by Countries in Discussing Mass Health Examinations as a Public Health Tool" to Member States, Associate Members, intergovernmental organizations and non-governmental organizations in official relations with the World Health Organization. This document presented the subject and requested comments as follows:

In view of the importance of validity in the performance of MHEs and the harm and waste of resources that can result from using invalid techniques, it would be helpful if Member States could report on MHE tests or examinations which they use or plan to use, and which they consider are in need of better validation.

Would Member States comment on MHEs in progress or planned in which new designs in recording, analysis and/or evaluation are incorporated? If MHEs are in progress where, for particular reasons, evaluation has proved difficult or impossible, comments would be appreciated.

In planning MHEs the cost in relation to other health care operations is of the first importance. The need for basic health services with which mass health examinations can be integrated on a continuing basis is paramount. If feasible, a number of mass health examinations might be combined for economy in the use of resources. An account of experience of costing MHEs and their integration and combination on the lines discussed is requested.

Member States are asked to comment on particular experiences they may have had with the training of personnel connected with MHEs. Experience with different patterns of deployment of staff aimed at meeting particular MHE problems would be especially valuable. Difficulties encountered with special training, e.g. of laboratory workers, radiologists and radiographers needed for MHEs would be of interest, as would information on the use made of WHO training courses.

Comment is invited on the experiences of Member States in the planning, evaluation, and implementation of health education aspects of mass health examination programmes. In addition, information would be useful on the integration of health education in education and training activities for health workers and on steps taken by health ministries to strengthen technical health education services at various administrative levels.

The whole question of priorities in health care is one in which interest has developed greatly in recent years. Comments on experience in determining priorities for mass health examinations are requested, including notes of particular methods employed. In addition a list of mass health examinations in progress or contemplated, in order of priority, would be helpful.
The experience of Member States over ethical and confidentiality questions related to mass health examinations is requested. Comment on existing or contemplated legislation in connexion with mass health examinations would be welcome, including arguments both in favour and against legislation which may affect the usefulness of mass health examinations as a public health tool.

Comments are asked for on the three types of programme discussed: epidemiological surveys; communicable disease surveillance; prescriptive screening or case-finding. The experience of Member States in organizing these surveys and the value derived from them would be particularly helpful. Much still needs to be learned about the value of prescriptive screening for many chronic diseases; reports on activities in this field would be welcomed.

Member States are asked to comment on work in progress, or planned, aimed at elucidating the problems of evaluating automation in the service of MHEs. Of particular interest is work on: the better deployment of automated laboratory and other services; the value of "admission profiles" in diagnosis; the evaluation of automated multiphasic health testing; the use of MHEs as a tool for arriving at a logic for medical diagnosis which could be used for automated medical diagnosis.

Up to the date of completion of this document comments have been received from 57 Member States and Associate Members, three inter-governmental organizations and 21 non-governmental organizations in official relations with WHO. These very valuable comments, in addition to some of the broad principles presented in the outline document, form the basis of this background document.

Selected references to the literature were included in the outline document in order to illustrate the topics discussed. However, the literature is so vast that it was considered impractical to attach a bibliography to this document other than of WHO publications.

2. Introduction

The field of mass health examinations is expanding rapidly and already embraces a very wide range of health activities, from the extremely simple, such as looking for the scars of smallpox vaccination, to the highly complex, such as the application of a battery of automated biochemical, haematological and other screening tests. Some of the most important terms used in this field are understood to have the following meanings in this document.

The word "mass" in the present context is taken to mean "large numbers of people" regardless of whether people are present for examination "en masse" or are examined serially over a period of time which might be divided into a series of sessions, as at an antenatal clinic, for example.

The term "health examination" covers investigations aimed at primary prevention (e.g. the determination of needs for immunization), at early, pre-symptomatic, detection (e.g. of cancer of the cervix of the uterus), and at late detection (e.g. of illness unrecognized as such by individuals), as well as epidemiological surveys to determine the health status of a population (e.g. for malaria, yaws, tuberculin sensitivity or various antibody levels). Surveys may be carried out with the aim of intervention in the disease chain (e.g. poliomyelitis immunization), for the promotion of health, such as the study of anthropometric variables in a population of young children, aimed at determining the need for improvement in the diet, or for the purpose of research for which there is no immediate application (e.g. the identification of blood group distribution in a population).

In addition to the primary aims of health examinations, the form they may take also needs considering. Often the term is restricted to the examination of man only. However, in the public health context the examination of animals for en- or epizootic conditions may be equally
important (for example, of cattle for the control of brucellosis, of dogs and wild animals for rabies, or of birds for psittacosis). In relation to health man may be considered as an animal sharing his environment with other animals.

The term "public health tool" expresses different possible uses of MHEs, such as in planning public health services and in providing the information required in order to make decisions concerning intervention in the disease chain with preventive or early treatment measures.

The meaning of two further terms should be considered since it is central to much of this background paper. The first is the term "surveillance", which is used to mean the exercise of continuous observation of and watchfulness over the distribution or spread of disease and factors related thereto, of sufficient accuracy and completeness to be pertinent to disease control. The emphasis in the present context falls on the word "continuous". Whereas "health examination" implies possibly an examination at a point in time, "surveillance" indicates repeated examination and the vigilant watch for change (malaria or smallpox, for example, may have been reduced to negligible proportions in a given population. However, continuing surveillance is needed to give early warning of a recrudescence).

The second term is "screening" by which is meant medical investigation which does not arise from a patient's request for advice for specific complaints. This allows a wide interpretation of the types of examination and makes no reference to their speed or accuracy.

Prescriptive screening, or case-finding, seeks to find cases of latent or unreported disease in a population, with a view to bringing individual patients to treatment, and, if the disease is communicable, to protecting the rest of the population from infection. Tuberculosis is a good example of a chronic communicable disease for which the prevention of spread and the early treatment and cure of the individual patient have been the twin aims of screening. There is an important distinction to be made between the use of tests as diagnostic aids in clinical medicine and their use in prescriptive screening, even though the same test may be used in each instance. In the first instance, the patient is already in medical hands and has presented with some complaint. In the second instance a member of the public has been invited to undergo a particular examination by screening for a condition which he very probably does not have and about which he has made no complaint. This makes it necessary to take into account legal and ethical considerations.

3. Validity

Member States have made repeated reference to pulmonary tuberculosis. One Member State reports that about one-half of the population have been infected with tubercle bacilli, and that for every person with active disease, about four have radiological abnormalities suggesting tuberculosis. An active BCG programme is operating for primary prevention. Under these circumstances the more specific sputum examination in high-risk patients, such as tuberculosis contacts and people with persistent cough may be more useful than chest radiography. This course of action has been discussed by more than one Member State, at least one having abandoned mass miniature radiography for sputum examination.

This policy was also strongly advocated by one non-governmental organization.

Mass radiography is however, still being widely used in screening for pulmonary tuberculosis, and while its technical validity has not generally been held in doubt (except that its specificity is of a low order), there now appears to be good evidence that, where there has been a decline in the prevalence of pulmonary tuberculosis, this is not attributable to any great extent to the use of mass radiography. Mass radiography may have been overestimated as a factor leading to reduction in morbidity and mortality from pulmonary tuberculosis, because it was acting within the context of a steadily falling baseline of disease. Also, the advent of specific drug and antibiotic therapy has led to treatment becoming so successful that the prognosis may be as good in patients diagnosed by sputum microscopy and culture at a later stage of their
illness, as in those identified at an early stage by mass radiography. Nevertheless, mass radiography is still being advocated because it also screens for other chest conditions like cancer of the lung, cardiovascular disease and non-specific lung disease. A major objection raised against this policy was that cardiovascular and non-specific lung disease are better detected in other ways, and that lung cancer detected in this way still carries a very poor prognosis and later symptomatic detection of this condition gives practically no worse a prognosis.

Some Member States have mentioned the following as being in need of better validation: the leishmanin skin test for leishmaniasis; the mass examination of blood sera for leptospirosis icterohaemorrhagica; screening tests for mental illness; the significance as disease indicators of routine biochemical laboratory values, such as serum cholesterol, lipoproteins, uric acid, diagnostic enzyme values (e.g. alkaline phosphatase and serum glutamic oxalo-acetic transaminase) vitamin levels (e.g. vitamin A, C, folate) and plasma-bound iodine. The need was expressed for further work in establishing the range of these and other variables in disease, and in developing a system of external quality control of laboratory results. The need was also expressed for a test to distinguish between syphilis and other treponematoses and for a valid serological screening test for gonorrhoea.

In cervical cytology for the prevention or early detection of cancer of the uterine cervix, the published work on the error rate is inadequate. The error in reading slide preparations of cervical cells is probably in the region of 10 per cent.; while the total error rate attributable to missed cases including errors related to the exact site from which the smear was taken and biological errors related to the phase of the menstrual cycle may be as high as 30 per cent. If the error rate is as high as this the most effective policy might be to carry out two cervical cytology screenings at an interval of a few months only, after which it would probably be safe to defer the next screening for a much longer period. Further study of this question is indicated.

Recent validation of the standard screening test for congenital dislocation of the hip has also given a disappointing result. In one study, out of a total of 1350 infants ranging in age from within a week of birth to 20 months, and followed up for a minimum of two years, the results were:

<table>
<thead>
<tr>
<th>Number screened</th>
<th>1350</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dislocation</td>
<td>No dislocation</td>
</tr>
<tr>
<td>Suspicion on screening</td>
<td>34</td>
</tr>
<tr>
<td>Suspicion later proved to be:</td>
<td>False 27</td>
</tr>
<tr>
<td>Ultimate diagnosis</td>
<td>12 cases of dislocation</td>
</tr>
</tbody>
</table>

Thus, sensitivity was only 58 per cent, since out of 12 infants later proved to have congenital dislocation, only seven were suggested at screening whereas five were missed, although the medical experience of the screeners was certainly not poor. The specificity of the test was 98 per cent, since out of 1338 infants later proved not to have congenital dislocation, 1311 were cleared at screening. However, although 12 cases were eventually diagnosed
out of 1350 births and in spite of this high specificity, 27 infants were wrongly suspected at screening of having the condition. Clearly, very high standards of screening are required for the efficient application of this screening test.

One Member State drew attention to the difficulty in validating tests before embarking on surveys. It pointed out that adequate expertise is generally not available, and that assistance in the design of surveys would be welcome.

Finally, in some Member States in which sufficient medical manpower is available, MHEs are carried out to a great extent by doctors in the form of a physical examination and further investigation as required. With this flexible approach the question of validity of screening examinations may not be as important as it is when screening tests are applied by less highly trained people. In the latter situation the success of the whole screening operation may depend almost entirely on the validity of the test.

4. Records, statistics and evaluation

The outline document stressed the importance of establishing a suitable record system so that a proper evaluation of the effect of the disease control effort can be carried out, and health plans modified when and as indicated.

From comments received, it is generally considered that the first need for developing and using records in MHEs is a well-established hospitals' records system. Analysis of a random sample of a developed hospitals' records system can provide much information on the expressed medical needs of a population. Unmet needs, identified through MHEs, can then be determined ad hoc and the two pictures compared. In many countries in which tuberculosis control is now relying on sputum examination of high risk groups it is often a simpler task to provide this service at hospitals and health centres (where these exist), and to record and evaluate the results of treatment there, rather than to create a separate system, including recording and evaluation, outside the hospitals and health centres.

Some Member States have drawn attention to difficulties in evaluating MHEs, resulting from problems of validating the source data. It is pointed out that in planning MHEs careful attention needs to be given to the title and definition of the data it is intended to collect. Without formal definitions a medical diagnosis may vary according to the particular doctor making it. Another point in planning MHEs in which a sample population is to be examined is the need for a truly random sample, in order to eliminate bias. Sampling is, of course, much more easily carried out where a good sampling frame exists. One Member State considers the ideal to be a medical and social register of all inhabitants, based on an identification number allocated at birth. This will be referred to again in relation to legal and ethical aspects. Some Member States draw attention to the difficulties of recording and evaluation when both a public and a private sector in medicine are involved. In all events, the gap between expectation and fulfilment in accumulation of reliable data remains alarming; in one country in which registration of cancers is obligatory there remain, it has been discovered, some 30 per cent. of cancers not registered.

An important point mentioned is the need to design from a start a system of records appropriate for built-in evaluation of MHEs. Early research opportunity for validation of a cervical cytology screening technique was missed, because the particular record system needed for evaluation was not designed for this purpose. One Member State reports plans for a retrospective survey of cytology records with the specific aim of demonstrating the validity of screening in preventing cancer of the cervix.

5. Costs

The cost of an MHE needs to be examined carefully in relation to investments required in the form of manpower and other resources, as compared with the benefits accrued, either as measured directly or as assessed indirectly in the form of penalties incurred by not carrying
it out. The effectiveness of the particular form of MHE has to be assessed in comparison with other methods of health care aimed at the control of the same disease conditions. The comparison of the effectiveness of different ways of controlling pulmonary tuberculosis has already been discussed to some extent in this background paper in the section on validity. Because of the increasing cost per case of pulmonary tuberculosis discovered through mass radiography a number of countries are diminishing their mobile X-ray services in favour of static screening units in hospital X-ray departments, and are encouraging a more selective use of this form of screening.

Identification of open cases of tuberculosis through sputum microscopic examination has been given preference over mass radiography by a number of Member States on the grounds of cost also. In one country, for example, the cost of detecting one case was US$ 60.00 by mass miniature radiography as compared with US$ 2.00-3.00 by routine attendance and sputum microscopy. Very wide variation is reported in the cost of detecting one active case of tuberculosis, presumably depending largely on the prevalence of the condition. Figures as high as US$ 3000 and even US$ 10,000 per active case discovered are quoted.

One Member State, in which there is an apparent increase in the prevalence of diabetes, has raised an interesting point concerning the cost/effectiveness analysis of screening for the early detection of diabetes. It found that diabetes detection by screening costs about 100 times as much, for each case detected, as conventional diagnosis in the patient who reports symptoms to his doctor. Nevertheless, this was considered a worthwhile investment. However, it has also been pointed out that even if diabetics do benefit from early treatment, evidence that this is instrumental in preventing the onset of cardiovascular and neurological complications has still to be firmly established.

The cost of instituting a country-wide policy of mass population screening must inevitably be heavy and opinions have been expressed that more could be achieved by screening selectively those at particular risk, thus increasing the yield and reducing the cost per case diagnosed.

Examples of reducing the cost of MHEs by combining a number of examinations have also been the subject of comment by a number of Member States. These include MHE for yaws combined with BCG vaccination; tuberculosis, malaria and leprosy; post-epidemic stools for cholera vibrio and other enteric organisms in food handlers; blood serum taken for identification of poliomyelitis virus, also examined for enterovirus antibodies; combination of BCG vaccination and trachoma and schistosomiasis control in schoolchildren; combined dental and dietary survey; combined physical examination, including smallpox scar survey, with examination of blood for malaria, trypanosomiasis, filariasis and for measles antibodies, together with BCG vaccination.

6. Training and manpower

Member States are clearly experiencing difficulties over manpower for MHEs but many of them appear to be meeting their training problems fairly successfully.

One problem in some countries is the shortage of specialists to carry out the training of auxiliary staff. Most of the training of auxiliary staff, who are those most constantly referred to in the context of MHEs, is of the in-service type carried out at more than one level. Usually practical training at field stations is complementing a more formal training at a central establishment. The conflict between meeting service needs and providing the necessary time for training staff has been given prominence, especially where there is a shortage of professional staff.

In one country where tuberculosis control has become largely integrated with the hospital services, it has been found necessary to employ managerial teams to supervise the effective integration at local level of the various activities of staff into the overall health services.
The problems of the auxiliary trained specifically for some particular task, and his place in specialized laboratories and other sophisticated health facilities, have been raised by a number of Member States. Many auxiliary workers appear still to be trained ad hoc in such skills as laboratory work in malaria eradication programmes, yaws control, radiography, X-ray film reading, audio-vision testing, BCG vaccination and smallpox survey work, and in maternal and child health care. In some countries they take cervical smears, code and read electrocardiographs and measure the blood pressure. In one instance, quarantine inspectors have been trained to run a mass radiography station, taking and reading miniature X-ray films. Following a 10 week full-time course, their speed in screening these films reached about one per minute. A comparison of their findings with those reached by professionals reading films in parallel showed that proficiency is not related to the degree of previous training or educational status of the reader.

From the information received there appears to be a tendency in some countries to entrust auxiliary health workers with multiple tasks, thus economizing on more highly trained professional staff. In connexion with this tendency, the question has been raised of the provision of satisfactory career prospects for the auxiliary worker, who possibly needs access to a general training course so that he can gain higher qualifications and take his place in the basic health services. The question of professional responsibility for tasks performed by auxiliary health personnel has also been raised. There are essential and unavoidable differences between normal clinical practice and the conditions under which some MHEs have to be carried out which make it necessary for the auxiliary worker to perform tasks which would normally be carried out by a qualified nurse, if not a doctor. The degree to which it is considered proper for the medical profession to delegate responsibility, as well as local arrangements, have influenced countries' attitudes to this question.

7. Priorities

The principal criteria that have emerged as priority determinants for any particular form of MHE are: the relative importance of the prevailing disease problems; the availability of health services, with the necessary trained staff, to deal with the findings of MHEs, be these clinical or epidemiological; the possibility of subsequent action; and the cost of providing the MHE, in addition to the resource and manpower implications for the existing health services.

Naturally the priorities for MHEs vary greatly from country to country according to the prevailing health and economic situation. Indeed, in some countries priorities are determined more by economic and social than by medical factors. For example, where roads are few or do not exist, and where people do not live in towns or villages but in thinly populated areas, the problems of MHEs are primarily those of logistics. At the other end of the scale are highly urbanized countries where the communicable diseases have been largely controlled. Their main interest in MHEs lies in the early detection and treatment of conditions like cardiovascular disease, diabetes and various forms of cancer. An intermediate position is occupied by a number of countries in which MHEs are used mainly for the detection of communicable diseases, but which have basic health services adequately developed to provide suitable care for the control of disease detected in this way.

Several Member States have emphasized the need for basic health services to deal with the findings of MHEs and have advocated determining priorities in accordance with the ability of these services to treat patients discovered through MHEs. In this context at least one Member State has indicated that its priority in the management of tuberculosis must be the immunization of susceptibles with BCG, since facilities to treat cases of tuberculosis that might be found by MHEs are not available.

The following table, although merely a census of MHEs mentioned in answers which did not attempt to furnish exhaustive lists of MHEs performed, and although based on the information received from 57 Member States may help to indicate the conditions for which MHEs are being most frequently used.
NUMBERS OF MEMBER STATES HAVING REPORTED MHEs - BY CONDITION

**Communicable diseases**

A. **Viral**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Reported States</th>
</tr>
</thead>
<tbody>
<tr>
<td>smallpox</td>
<td>11</td>
</tr>
<tr>
<td>trachoma</td>
<td>8</td>
</tr>
<tr>
<td>poliomyelitis</td>
<td>5</td>
</tr>
<tr>
<td>yellow fever</td>
<td>4</td>
</tr>
<tr>
<td>measles</td>
<td>3</td>
</tr>
<tr>
<td>arboviruses</td>
<td>3</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td>2</td>
</tr>
<tr>
<td>rubella</td>
<td>1</td>
</tr>
<tr>
<td>influenza</td>
<td>1</td>
</tr>
<tr>
<td>rabies</td>
<td>1</td>
</tr>
<tr>
<td>dengue fever</td>
<td>1</td>
</tr>
<tr>
<td>haemorrhagic fever</td>
<td>1</td>
</tr>
<tr>
<td>unspecified</td>
<td>1</td>
</tr>
<tr>
<td>yellow fever</td>
<td>4</td>
</tr>
<tr>
<td>dengue fever</td>
<td>1</td>
</tr>
<tr>
<td>measles</td>
<td>3</td>
</tr>
<tr>
<td>arboviruses</td>
<td>3</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
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</table>

B. **Rickettsial**

<table>
<thead>
<tr>
<th>Condition</th>
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</tr>
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<tbody>
<tr>
<td>typhus</td>
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C. **Bacterial**

<table>
<thead>
<tr>
<th>Condition</th>
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<tbody>
<tr>
<td>tuberculosis</td>
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<tr>
<td>gonorrhea</td>
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<tr>
<td>syphilis</td>
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<tr>
<td>VD unspecified</td>
<td>5</td>
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<tr>
<td>leprosy</td>
<td>10</td>
</tr>
<tr>
<td>yaws</td>
<td>8</td>
</tr>
<tr>
<td>cholera</td>
<td>4</td>
</tr>
<tr>
<td>diphtheria</td>
<td>4</td>
</tr>
<tr>
<td>bacterial conjunctivitis</td>
<td>3</td>
</tr>
<tr>
<td>plague</td>
<td>2</td>
</tr>
<tr>
<td>brucellosis</td>
<td>2</td>
</tr>
<tr>
<td>leptospirosis</td>
<td>1</td>
</tr>
<tr>
<td>pertussis</td>
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</tr>
<tr>
<td>tetanus</td>
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</table>

D. **Parasitic**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Reported States</th>
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</thead>
<tbody>
<tr>
<td>malaria</td>
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<tr>
<td>schistosomiasis</td>
<td>11</td>
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<tr>
<td>helminthias</td>
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<tr>
<td>filariasis</td>
<td>5</td>
</tr>
<tr>
<td>trypanosomiasis</td>
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<tr>
<td>Chagas' disease</td>
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</tr>
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<td>onchocerciasis</td>
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<tr>
<td>amoebiasis</td>
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<tr>
<td>leishmaniasis</td>
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<td>parasitic diseases - unspecified</td>
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</table>

E. **Communicable diseases**

<table>
<thead>
<tr>
<th>Condition</th>
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</tr>
</thead>
<tbody>
<tr>
<td>unspecified</td>
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</tbody>
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Non-communicable diseases and conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Member States Reporting</th>
</tr>
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<tbody>
<tr>
<td>cancers</td>
<td>18</td>
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<tr>
<td>malnutrition</td>
<td>15</td>
</tr>
<tr>
<td>occupational diseases</td>
<td>12</td>
</tr>
<tr>
<td>diabetes</td>
<td>9</td>
</tr>
<tr>
<td>phenylketonuria</td>
<td>8</td>
</tr>
<tr>
<td>other metabolic diseases</td>
<td>2</td>
</tr>
<tr>
<td>hearing and vision</td>
<td>7</td>
</tr>
<tr>
<td>unspecified diseases of the heart and circulation</td>
<td>6</td>
</tr>
<tr>
<td>dental health</td>
<td>6</td>
</tr>
<tr>
<td>arterial hypertension</td>
<td>4</td>
</tr>
<tr>
<td>anaemias</td>
<td>4</td>
</tr>
<tr>
<td>ischaemic heart disease</td>
<td>3</td>
</tr>
<tr>
<td>thyroid diseases</td>
<td>3</td>
</tr>
<tr>
<td>congenital abnormalities</td>
<td>3</td>
</tr>
<tr>
<td>glaucoma</td>
<td>3</td>
</tr>
<tr>
<td>non-specific respiratory diseases</td>
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</tr>
<tr>
<td>nephropathies</td>
<td>2</td>
</tr>
<tr>
<td>rheumatic diseases</td>
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</tr>
<tr>
<td>mental impairments</td>
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<tr>
<td>chronic diseases - unspecified</td>
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</tr>
</tbody>
</table>

NUMBERS OF MEMBER STATES HAVING REPORTED MHEs - BY PARTICULAR CATEGORIES OF PEOPLE

<table>
<thead>
<tr>
<th>Category</th>
<th>Member States Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>school health</td>
<td>12</td>
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<tr>
<td>pre-natal and fertility</td>
<td>9</td>
</tr>
<tr>
<td>infant health</td>
<td>7</td>
</tr>
<tr>
<td>fitness for work</td>
<td>6</td>
</tr>
<tr>
<td>student health</td>
<td>4</td>
</tr>
<tr>
<td>army entrants</td>
<td>3</td>
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8. **Legal and ethical considerations**

The successful application of MHEs can be affected by legal and ethical considerations. The legal aspect concerns the effect that the laws of a country may have in facilitating or impeding MHEs. The ethical aspect is concerned mainly with the preservation of the confidentiality of medical information relating to individual people, and with the resulting degree of confidence the public may have in MHEs, knowing to what extent their privacy is being preserved. The two aspects are, however, closely related, for it may be legally incumbent on a doctor to breach professional secrecy in the interests of the public as a whole.

There are some apparent differences between countries in the legal requirements for people to undergo MHEs of various kinds, for example, certain immunization procedures, but no clear indication emerges from the comments of Member States about the practical outcome of a permissive or a mandatory policy. One Member State comments that making MHEs compulsory may in fact have the reverse effect to that desired; while another view is that better health education should be a substitute for compulsory examination. However, the view is strongly held that certain individuals, such as food handlers or school teachers, who, by their situation can constitute a risk to society, should be subject to compulsory examination. There appears to be no argument concerning the mandatory nature of periodic health examinations for people wishing to enter an occupation in which their health is necessary for the safety of others (e.g. train and bus drivers, airline pilots). It was pointed out that it is necessary for the individual in certain situations to sacrifice some personal liberty for the good of the population as a whole, but it was also mentioned that in such a situation there should always be an opportunity for the individual to withdraw from the situation. Malaria eradication is given as one example in which there may need to be a legally enforceable right of entry to dwellings in order to carry out residual spraying. It appears, however, to be very rare for legal action to become necessary.

Confidentiality is generally strongly guarded, either formally through the enactment of laws or informally through the Hippocratic code of ethics of the medical profession. One Member State where medical confidentiality is preserved by law commented that people had been unaware of their right not to disclose personal medical information, and that better education may lead to less rather than more co-operation! It would seem that medical confidentiality is not always as well preserved as it might be during the course of MHEs, and one Member State considers that appropriate training of paramedical and auxiliary personnel is needed if members of the public are to have trust in the confidentiality of the personal medical information they are asked to provide.

MHEs as part of occupational health schemes seem to present a particular problem, namely the propriety of passing clinical information to employers and insurance companies. The general view appears to be that, providing the state of his health does not endanger others, the individual has the right to the preservation of the confidentiality of his own medical information. On the other hand, employment medical officers claim that by the judicious use of confidential medical information they can place people in the occupations most suited to their state of health. There does, however, seem to be some divergence of views about the degree of current knowledge concerning the usefulness to health of major changes of occupation, for example for the supposed benefit to people with hypertension.

Over-protection of confidential data may sometimes occur, and one Member State considers that amendment of present legislation is needed to make it permissible for agencies to advise medical practitioners of findings concerning their patients - in particular information obtained about the health of blood donors.

The increasing application of automatic data handling and processing by computers has brought the whole question of the use of confidential medical data to the forefront of debate. There appears to be no obstacle where the use of data in a statistical form, which does not divulge the identity of individuals, is under discussion. However, the holding of large
amounts of information about individuals in computer data banks is agreed to constitute a potential danger to medical confidentiality. Safeguards, such as coded computer programme keys can be devised, but there remains the possibility that such data could be used and linked with other, non-medical data, for purposes other than those for which the individual undergoing an MHE provided it whilst in a confidential medical professional relationship.

9. Health education

Numerous Member States have stressed the importance of health education for the successful conduct of MHEs.

Various methods have been reported to this end. In some countries MHE staff are trained for health education, whereas in others health education specialists are part of the MHE team. One comment made was that the surveillance organization of malaria eradication programmes, with its periodic house visiting schedule covering even the remotest areas of the malarious part of the country, is in a unique position for dissemination of information and for health education of the rural population. Several Member States advocate gaining the active support of the local authorities, civil servants, teachers, voluntary organizations and the use of mass media (press, radio, television).

The point has been made that if it is not to lose its impact, the health education programme must be followed immediately by the MHE, and also that a health education campaign must take into consideration the local conditions, attitudes and customs. A warning note has been made concerning the possible adverse psychological impact of trying to solicit the interest of apparently healthy population groups and individuals in undergoing routine health examinations. An element of induced fear of the consequences of ill-health might be unavoidable in this kind of public health activity and might, in a certain proportion of individuals, result in psychological trauma. This is illustrated in the reply of one Member State that they had refrained from utilizing mass information media in support of a survey on chronic non-specific respiratory diseases for fear that the display of the problem of influence of air pollution on cough and expectoration would lead to an excessively high percentage of false-positive responses in the interviews.

One Member State has pointed out that health education may also be the outcome of an MHE, when for example recruits found to have a positive serological reaction for syphilis are given health education lectures.

Another Member State has advocated sociological studies into attitudes of groups, particularly those of such socio-economic status, whose co-operation it is difficult to obtain. It has been pointed out that a most important ingredient in health education is the presentation to a population of the pros and cons of a particular action in a manner that they can understand, resistance to innovation when advantages and disadvantages of the new activity are not well understood being a protective action.

According to one Member State the major topic to be discussed appears to be motivation in seeking screening or early care.

10. Epidemiological surveys and disease surveillance

Some Member States are carrying out large-scale epidemiological surveys, including trials of intervention (sometimes in collaboration with WHO or other international agencies), together with immunological surveys of such conditions as measles, rubella (in women) and poliomyelitis, and studies of the effectiveness of vaccines.

One Member State has commented on the difficulty of carrying out valid epidemiological surveys because of lack of information about the population denominator, i.e. the precise population from which the information to be obtained derives. An example cited is the
information obtained at school health examinations when the exact constitution of the school population is not known. Much the same disadvantage applies to surveys of morbidity. Frequently the base population structure may not be known or, if it is, the study sample may not be representative of it. However, as long as the degree of bias is known, allowance for it can be taken into account.

One Member State, relying on experience gained in several surveys, has usefully drawn attention to essential steps in planning epidemiological surveys in order to ensure their success. These are the development of a detailed protocol, clearly stating the purpose, logistics, analytical techniques, data handling and sample collection methods; careful training of secretaries, technicians and data groups; the institution of control procedures for all parts of the programme; good communications, including meetings to keep everyone concerned with the study fully informed.

Another Member State has expressed the need for further exploration of methods of using the information provided by epidemiological surveys for health planning. At present inadequate means exist for translating epidemiological and operational data into information that can readily and easily be used for planning health services.

In a few countries surveys of oral pathology and of the prevalence of rheumatic diseases are being carried out. There appears to be rather less information available, as a result of epidemiological surveys, in these two areas than for other conditions. It was felt that recent data in a form comparable between countries would be useful.

A non-governmental organization has drawn attention to the current problems that have arisen over blood transfusion as the result of the discovery of the relationship between Australia antigen and serum hepatitis. It is suggested that serological surveillance for Australia antigen on an international scale, including developing countries, where the prevalence of the antigen is thought to be particularly high, would be useful.

The table on pages 9 and 10 indicates that in many countries MHEs are still used most frequently for communicable disease control. In one Member State the continuing reporting of morbidity statistics on communicable diseases, compiled from a wide sample of general practitioners is carried out. Although the general practitioners taking part are not representative of all general practitioners in the country, nevertheless the system does provide a useful early warning system on epidemics. In the same Member State a more complex system of recording all morbidity, by diagnoses, spells and days of sickness, together with all general practitioner contacts over a period of time, is being instituted. This should provide useful data on the health state of the community.

One Member State has drawn attention to an effective pattern of use of the MHE in the control of smallpox in Africa. A cluster sampling technique is used to identify and quantify three factors in the control of smallpox:

- incidence
- vaccination coverage
- estimated immunity

Data are collected by randomly selecting clusters of people for physical examination for both facial smallpox scars and vaccination scarring. Historical data are simultaneously collected on the occurrence of smallpox in the past year, and the last vaccination. The technique has succeeded in identifying an area of unreported smallpox; measuring the efficiency of smallpox reporting by the surveillance system; measuring the effectiveness of the vaccination programme in reaching target populations; and identifying areas of low immunity for revaccination.
The following critical points have been identified as essential to implementation of this type of survey: a clear definition of survey objectives; definite objective criteria for disease evaluation; adequate sample size (number of clusters and people per cluster); explicit instructions for cluster selection to avoid observer bias; careful selection and training of staff, including a supervised pilot trial in the field.

11. Prescriptive screening

A number of Member States have reported prescriptive screening programmes, either for isolated conditions or multiphasic in nature.

It has been pointed out that in order to make MHEs for prescriptive screening as economic as possible in terms of a high yield of newly detected cases, and to avoid as far as possible the unrewarding examination of very large numbers of people in whom disease is not present, it is important to orientate MHEs towards high risk groups in the population. This approach also applies to the examination of particular groups such as schoolchildren, university students, sportsmen and recruits, the members of which need to comply with some standard of performance, and to groups of persons such as teachers, bus drivers, aircraft pilots and food handlers, who, when ill, could jeopardize the health or safety of others.

In many countries large-scale prescriptive screening examinations are performed on various occupational groups and great efforts are made to ensure that these examinations are followed by appropriate health care.

Many countries set considerable store on physical examination throughout life, but especially in early childhood and school life. However, doubts have been raised about the value of some of these examinations, for example repeated physical examinations throughout school life. In some countries there is a move to limit these examinations to periods of particular risk. One of the reasons for this difference in approach may be the current lack of standardization in the assembly of information, which makes comparisons between examinations of doubtful validity, as pointed out by one Member State. Another reason put forward is related to medical manpower. The medical benefits of routine medical examination of apparently healthy people by doctors (even when assisted by auxiliary staff) may be relatively slight, and where there is a shortage of doctors these examinations could be carried out only rarely, if at all.

The use of radiological facilities has been commented upon. Evidence that X-rays may be used too freely in routine MHEs has been reported and one non-governmental organization has stressed the risk of increasing the population dose of X-rays on insufficient grounds. It is suggested that the rationale for using X-rays in routine MHEs always needs to be closely looked at especially in terms of the likely yield of early diagnosed newly detected cases and of the possibility of providing effective treatment. It was pointed out that the use of xenography can reduce X-irradiation exposure by 50 per cent. Further exploration of thermography, ultrasonic examination and hormonal assay as substitutes for X-ray examination in breast disease is required. The risk was pointed out that repetition of X-ray examinations of the lower spine, which sometimes form part of an industrial medical examination, could lead to an undesirably high dosage.

Another aspect mentioned is the need to review all X-ray equipment with the aim of reducing the X-ray dose to the lowest possible level.

One Member State described a method of avoiding possible X-ray risks stemming from uncontrolled use of X-rays, by the establishment of an X-ray bank. Here, serial films of persons X-rayed for tuberculosis are filed at national level with the objective of monitoring changes in the epidemiology of the disease and of assessing the effects of the newer forms of treatment. Under these circumstances, it should be feasible also to monitor X-ray dosage to the population from chest films.
Another problem raised by Member States in which systematic prescriptive screening is carried out, is the poor response rate of women invited to undergo screening for cancer of the cervix uteri and of the breast. In one country, for women over 35 years of age, it was only 25 per cent. In another the response rate for cytology screening alone varied from about 25 per cent. for older women to 75 per cent. for women under 30. Quite apart from the question of the validity of screening tests for cervical cancer, if the older women who are at greatest risk, do not undergo screening, cervical cytology cannot achieve its objectives.

A number of Member States are contemplating the institution of screening programmes for hypertension and the creation of registers for patients with elevated blood pressure. This matter is currently under discussion with the World Health Organization with a view to collaborative studies between Member States.

Screening infants' blood for phenylketonuria is practised by a number of Member States and the tendency is growing to screen at the same time for other, often rarer, metabolic defects. One Member State reports screening in a national testing centre for seven inborn errors of metabolism in addition to phenylketonuria. The results from this screening survey are being compared with those of research units in other countries. The need for research in this field is stressed, not least because doubt exists about the effectiveness of treatment in these conditions other than phenylketonuria and galactosaemia. A phenylketonuria register is operating in one Member State where it is hoped to analyse detailed records of all cases occurring in the country with the aim of arriving at a better evaluation of the results of treatment than is presently possible, and also of discovering at what age, or ages, treatment can be stopped.

MHEs for detecting early hearing and visual defects in infancy and childhood are also discussed by Member States. In one country trials of hearing tests in neonates have been instituted. It is intended to introduce this form of testing on a national scale. Schoolchildren are routinely tested by audio-vision testers with an ad hoc training. About 20 per cent. of these schoolchildren are referred for specialist investigation. Another Member State reports that tests for the early detection of hearing defects are carried out at eight to 12 months, at three to five years, and again at six to seven years of age. One of the chief aims is to develop and validate sensitive, inexpensive and simple diagnostic methods for the detection of hearing loss in childhood in view of doubts concerning the validity of tests at present available.

One Member State reports studies on the occurrence and aetiology of profound mental impairment in children aged five to 14 years; while a non-governmental organization draws attention to a minimum rate of three to five per cent. mental retardation and of 0.1 per cent. severe retardation in the general population. It also indicates that the total burden of mental illness in a population is of the order of 10 per cent: There are certainly cross-cultural difficulties in the design of screening instruments suitable for identifying mental illness through MHEs, as well as problems concerning the management of people so identified. Research is in progress in a number of Member States on the better validation of mental illness screening tests and on the forms of treatment, including the organization of health care, most suited to patients with previously unreported illness.

12. The future

The role of MHEs in the future has been discussed by Member States as was suggested in the outline document, mainly in terms of automation. However, one comment made was that it would be profitable to consider the largest issue confronting countries in this field, namely how to secure a planned development of this complex service in the light of the many problems still to be solved. Related to this is another comment that the integration of MHEs into the general health services has a broader significance than that of cost alone. One Member State stressed the importance of developing simple diagnostic tools for MHEs which could be used in developing countries.
The use of automated techniques in the future is being actively explored in some countries where extensive trials are in progress. A crucial question that has been identified in relation to the use of automated laboratory techniques as an aid to MHEs is the development of better indices of the significance in health and disease of particular tests and of the levels of relevant variables in blood and other biological fluids. Many trials are in progress aimed at testing the value of performing a large number of automated tests on either hospital populations or on people in the community. It is hoped that current trials will provide pointers to groupings of laboratory tests which are most useful for the diagnosis of certain categories of disease, or which are most relevant for particular age groups or clinical disciplines. Thus the usefulness of automated laboratory tests in the elderly, in infancy and childhood, and in acute medical or surgical hospital patients are likely to be different. So far, unexpected diabetes and anaemia are generally the commonest diagnoses which hospital admission profiles have led the clinician to make. Hyperparathyroidism and hypothyroidism are two less common conditions which are likely to be missed using conventional diagnostic methods. However, these trials have not yet permitted definite conclusions to be reached concerning the value of automated laboratory techniques in MHEs.

One comment made was that physicians have had traumatic experiences when faced with a plethora of unsolicited laboratory data. More intensive research over a long period of time seems clearly needed before the best uses of the tool of automation can be defined. One Member State has commented that in the meantime there may be a real risk of the establishment of automated laboratories on a wide commercial scale in some countries, and that the public might suffer as a result of batteries of laboratory tests being made available to them directly, without the benefit of interpretation by a medical adviser. Should this situation occur much harm might result from the incorrect interpretation of test results in the absence of the normal diagnostic procedures.

Other developments for future MHEs suggested by Member States and non-governmental organizations include the automation of serological tests, particularly in screening for venereal diseases, a reliable device for the scanning of large numbers of blood films for malarial parasites and improved methods of autoanamnesis, with or without interview screening. It has been pointed out in relation to cytology for cancer control that research in the field of automation for cell pattern recognition has proved more successful for isolated cells and for various classes of lymphocytes than for the more complex problems raised by cervical cytology. The adaptation of automated techniques for routine screening of cytological specimens does not appear to be feasible in the near future and it would therefore be unwise for countries to defer the training of cyto-technologists in the hope that automated methods will shortly be available.

Developments which might prove to be of great importance in the future are the intervention trials now in progress or in the planning stage, to a great extent under WHO auspices, of early diagnosis and treatment of certain conditions with a view to preventing their sequelae, such as the prevention of stroke by the early detection and treatment of people with elevated blood pressure. If developments of this kind become a reality they are likely to transform the whole scene of medical care, giving it a more dynamic preventive orientation.

A most important comment concerning future developments in MHEs was that all new forms of MHE should be fully validated before they are introduced as part of the routine health services. This applies equally to epidemiological surveys, disease surveillance and automated multiphasic health tests, and implies the need for further pilot studies with built-in mechanisms for evaluation, leading to recommendations concerning the most effective tests, the most useful examinations and the simplest and most efficient techniques.
13. **Suggested questions for particular consideration at the Technical Discussions**

The following questions, which will be reflected in the agenda for the Technical Discussions, are suggested for particular consideration by discussion groups.

(1) To what extent should techniques and tests be validated before being routinely used in MHEs?

(2) Should mechanisms for evaluation be built into MHEs, and, if so, what are the most appropriate methods?

(3) In determining priorities, should consideration be given to the public health importance of the conditions for which the use of MHEs is under consideration, to the possibility of subsequently providing health care, to popular demand and to cost factors?

(4) What patterns of staff deployment are suitable for MHEs and how is staff training for this purpose best organized?

(5) How can health education, legislation and ethical considerations contribute to ensuring the participation of the target population in MHEs?

(6) How useful are MHEs for epidemiological surveys and for disease surveillance to what degree should they be integrated into the general health services?

(7) What is the value of prescriptive screening in general, and of automated multiphasic health testing in particular, in the provision of modern health care?

(8) What trends can be recognized and what predictions can be made concerning developments in MHEs and their influence on the pattern of health care in the future?

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