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PUBLIC HEALTH ASPECTS OF LOW BIRTH WEIGHT

Third Report of the Expert Committee on Maternal and Child Health

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PUBLIC HEALTH ASPECTS OF LOW BIRTH WEIGHT

Third Report of the Expert Committee on Maternal and Child Health

1. Introduction

Ever since the establishment of the World Health Organization, matters related to the health of mothers and children have received great attention, among them the problem of reducing the incidence and high mortality of babies with low birth weight.

In 1950 the WHO Expert Group on Prematurity [1] made a series of recommendations concerning programme planning in relation to the premature infant. It endorsed the international definition of prematurity (a birth weight of 2500 g or less) adopted by the First World Health Assembly in 1948.

Many of the recommendations of this group were made on the basis of available observations, mainly from developed countries. These recommendations focused attention on better infant care, on the special needs of low-weight babies, on improving nutrition and the care of pregnant women.

The Expert Group realized that the definition adopted would not be applicable in some countries, and among other recommendations it suggested the setting-up in selected areas of study groups to correlate the gestation period with birth weight and other anthropometric, as well as anatomical and physiological, criteria of prematurity.

The definition has been adopted almost universally and has proved very helpful in many parts of the world, especially in assessing the size of the problem. It has also been useful as a criterion for separating off infants who may require special attention. In certain areas as well as in some individual hospitals, the use of this standard resulted in unusually high percentages of premature babies. Under the circumstances prevailing in many less developed countries, the problem of providing even the most simple kind of special care for these infants was overwhelming. As a result of clinical observation, many paediatricians also believe that a large number of these infants do fairly well without special care. For these

[1] *Wld Hlth Org. techn. Rep. Ser.*, 1950, 27

reasons lower birth weight levels have been locally adopted for practical purposes. The levels which were adopted varied considerably between countries and even between different hospitals in the same city. These variations not only create confusion, but prevent comparison.

The time for a reassessment of the situation had obviously arisen. The present Committee was given the task of looking broadly at the problem as from today, and making recommendations for the future. Its deliberations were seriously handicapped by the lack of sufficient scientific knowledge upon which to base recommendations, knowledge for example about the causes of low birth weight, and the differing viability of babies of identical weight in different circumstances. It recognized, too, the overwhelming importance of studying the relationship to the birth weight of such factors as social and economic development, rapid industrialization, poverty, ignorance, and changes in family life.

The Committee studied various documents made available to it, among them the preliminary results of the WHO Study on Birth Weight. This Study had been carried out in 37 institutions in 18 countries [1] and is the first study on this subject based on similar data collected simultaneously in many countries of the world. The preliminary analysis, based on the first 23 000 births investigated, confirmed in general many of the facts previously known on the basis of observations made in individual countries.

It is particularly interesting that it supported the suggestion that, when the proportion of low-weight babies is high and the mean birth weight is low, the difference between this situation and that occurring in areas with relatively high mean birth weight and a low proportion of low-weight babies is accounted for in two ways : a slightly higher proportion of babies born before 37 weeks of gestation, and a much higher proportion of low-weight babies born after this time.

The Committee also had available, in addition to many published scientific reports, a set of 22 working documents which had been prepared by experts in this particular field from various parts of the world.

2. Prerequisites for Successful Child-bearing

The outcome of pregnancy is determined by genetic and environmental factors. It is difficult to assess the part played by heredity. What is very striking, however, is the high degree of reproductive efficiency shown by women born, reared and reproducing in a good environment. Two useful measures of reproductive efficiency are birth weight and perinatal mortality (stillbirth and first-week death rate). Healthy young primi-

[1] The participating institutions carried out the work involved in the Study on a voluntary basis.

gravidae (aged 20 to 24) receiving a very high standard of obstetrical care for themselves and of paediatric care for their infants have been found to account for as low a perinatal death rate as 10 per thousand births. Nearly 50% of their babies weighed more than 3500 g and only about 5% weighed 2500 g or less. Of the latter, two-thirds were born before the 38th week, and there were often complications of pregnancy among these cases. Where environmental conditions are less favourable, perinatal death rates rise and birth weights are lower at all stages of gestation, and in addition premature onset of labour is more common. It seems likely that the higher incidence of babies of 2500 g or less (officially defined as premature) born to women coming from an unfavourable environment is associated more with deficient growth of the foetus at all stages of gestation than with premature birth.

The unfavourable environment will vary in degree and substance throughout the world, but will include a variety of unfavourable factors which may affect adversely the health and general efficiency of the mother, including malnutrition, infections, fatigue and overwork, bad housing, inadequate educational and health services. There is also evidence that these conditions unfortunately are of a type that do not occur singly. For example, the poorly nourished woman is often the one who gets or seeks little care during her pregnancy, lives in poor circumstances, is badly housed, ignores signs of impending obstetrical difficulties, has had many previous and closely spaced pregnancies, has many family problems, knows little of simple sanitation and hygiene, and is in general ignorant and poorly motivated to care for herself.

The association between low birth weight and poor environment is firmly established. In a given society, women from a favourable environment are on the average taller than those from one less favourable. This suggests that the latter have not grown to their full capability. Since there seems to be a correlation between height of the mother and birth weight of the baby, some of the differences in birth weight related to differing environmental background of the mother could be explained on the basis of this observation. It is reasonable to believe that qualitative as well as quantitative effects are produced by poor environment. Individual and possibly group differences must also be taken into consideration. The basic mechanisms involved are not well understood, and research is needed in this field of human reproductive physiology, which in the past has been largely neglected, particularly by obstetricians and paediatricians. There is welcome evidence that this position is being remedied now that scientific advances have made available new techniques by which these complicated processes can be studied.

The validity of these assumptions, with which the Committee agrees, concerning the relationship between a poor environment and the weight of the baby, received strong support in several of the working papers

submitted to the Committee and in particular from the preliminary results of the WHO Study on Birth Weight. These have shown that in areas—most of them underdeveloped—having a very high incidence of babies weighing 2500 g or less at birth, many of the babies are in fact the result of pregnancies lasting 37 weeks or more and behave like " mature " babies. The Study has also shown a steady increase in the mean birth weight with increasing maternal stature.

Two other factors, among the many which might affect the outcome of pregnancy, are work during the pregnancy and too frequent child-bearing. It seems likely that hard physical work, both inside and outside the home, will probably increase the risk of having a low-weight baby, especially when the mother's health is poor. This subject should be studied in varying cultural settings. Too frequent child-bearing, which occurs more often under poor environmental conditions, undoubtedly leads to maternal exhaustion and increases the incidence of small babies.

3. Prematurity and Low Birth Weight

There is in reality no sharp dividing line between mature and premature babies or between high and low birth weight. The international definition of prematurity was recommended by the WHO Expert Group for purposes of vital statistics. It has also been used successfully by many countries as a basis for planning public health programmes for low-weight babies. Other countries have experienced difficulty in employing it for this purpose on account of the very large number of newborn infants falling within the definition of prematurity, and the practical impossibility of providing even the simplest special care for all of them.

The Committee gave exhaustive consideration to the possibility of assisting these latter countries by suggesting methods for arriving at a more suitable definition. The lack of basic data and of knowledge in this field did not allow the Committee to arrive at satisfactory conclusions in this respect.

The Committee believes, however, that the vast majority of newborn infants have the potential for being born with a birth weight consistent with full viability and health, provided their mothers are born and reared and reproduce in a good environment. It assumes that any other situation is a temporary one and that it will gradually improve. For this reason, the Committee did not wish to recommend at this time a change in the upper limit of prematurity in the international definition. In view of the convincing evidence showing that many of the babies included within the limits of the definition, in certain areas, are not born prematurely, the Committee *recommends that the concept of " prematurity " in the definition should give way to that of "low birth weight "*.

4. Meeting the Problem of Low Birth Weight

4.1 Collection of data

The Committee was of the opinion that in order to assess the current situation, to plan for action, or to evaluate certain research findings, it is necessary to know the facts and to interpret them correctly.

The most important statistical information to be obtained for planning a care programme is:

(*a*) distribution of babies by birth-weight groups for all live births,

(*b*) number of deaths by birth-weight groups for all live births.

For the purpose of planning a care programme, the mortality rates up to 48 hours or up to 7 days are probably the most useful.

With this knowledge it should be possible to ascertain which babies will benefit most from the various levels of care available, ranging from the simplest to the most complicated, and also to assess the number of babies requiring each type of care.

The weight groups to which most attention must be paid are those contributing *the largest proportions* of the total deaths (deaths occurring in all weight groups). Of these groups, those with reasonably low mortality rates will benefit from simple care only, while those with the higher mortality rates will require more specialized care. A knowledge of the proportion of babies in each weight group is necessary in order to make sufficient provision for each type of care.

Ideally, all these figures should be available for the total population of the area. If they are not, an effort should be made to establish machinery to obtain them. Meanwhile it is possible to use figures collected in a hospital if one is planning a premature-baby care service for that particular institution.

It will also be necessary to improve our knowledge about the relative viability of newborn infants of equal weight in different populations. In some areas, knowledge of the distribution and characteristics of the different ethnic groups in the population will also be valuable.

The Expert Committee, therefore, *recommends that birth registration should be as complete as possible and that, as soon as is practicable, birth weight be added to the official birth certificate used in each country.*

The necessity and value of uniformity in collection of information on births and deaths was emphasized. This would allow for comparisons both within countries and internationally.

The Committee *recommends that all countries and anyone (for example, in hospitals, domiciliary services, etc.) with interest in the statistical aspects of this subject, collect and study the birth weights in 500-g weight groups*

as follows : 0-1000 ; 1001-1500 ; 1501-2000 ; 2001-2500 ; 2501-3000 ; 3001-3500 ; 3501-4000 ; 4001-4500 ; 4501-5000 ; 5001 or more.[1]

If further divisions are felt desirable, it is recommended that these be made in 250-g weight groups. Such a division is of particular value in the 2001-2500 weight group.

The Committee also *recommends the collection of mortality rates for 24-hour, 48-hour, 7-day, 28-day and one-year periods after birth.* This will allow meaningful comparisons to be made.[2]

Keeping such statistics should inevitably lead to an increased interest in the survival rates of babies of all weights and help to fill in gaps in knowledge.

4.2 Preventive aspects

It is universally accepted that the preventive aspects of a programme for low-weight babies are the most important, whatever the incidence. Special-care programmes are expensive, and the saving of very low-weight babies usually leads to an increased need for services for the physically and mentally handicapped who survive.

In the light of experience gained in the intervening years since the meeting of the Expert Group in 1950, some of the early reservations about necessary pre-requisites for starting a preventive programme [3] do not seem to be justified. It is now believed that some preventive measures can be carried out by all countries, regardless of their level of technological development and extent of health services.

4.2.1 *Preparation for child-bearing*

Preparation for child-bearing must not be confined to the period of gestation, but must be regarded as a continuing process. This matter has been well studied in the report of the Expert Committee on Maternity Care.[4]

4.2.2 *Pre-natal care*

Everything should be done to encourage the pregnant woman to seek pre-natal care as early as possible in pregnancy, so that a general examination can be made and any necessary treatment given. This is particularly important when a woman has a bad obstetric history—e.g., previous

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[1] A similar recommendation has previously been made in United Nations (1955) *Handbook of vital statistics methods (ST/STAT/Series F/7)*, New York, p. 149

[2] See also World Health Organization (1957) *Manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death*, Vol. 1, p. 391, Article 6

[3] *Wld Hlth Org. techn. Rep. Ser.*, 1950, **27**, 5

[4] *Wld Hlth Org. techn. Rep. Ser.*, 1952, **51**

abortions, stillbirths and premature births. This gives an opportunity for general advice about the hygiene of pregnancy, preparation for labour and general reassurance, all of which may help to prevent premature labour.[1]

A very high standard of out-patient care, reinforced by an adequate number of beds in hospitals specially set aside for the in-patient treatment of complications, is necessary if the best results are to be obtained. The number of beds required varies greatly with the circumstances, but the need is greatest when environmental conditions are poor and the level of health low. Provision of domestic help in the home has proved useful for mothers requiring more rest, as well as for those mothers who may be prevented by domestic difficulties from accepting admission to a hospital for pre-natal care.

Experience shows, however, that even in countries where maternity services are well developed, the groups of patients most in need of treatment and general advice are the slowest and the least likely to seek it. Health education will help to improve the situation. It is also important that pre-natal care be organized in such a way as to make it possible for the patient to co-operate. Attention must also be given to cultural factors which may prevent full participation in pre-natal care—for example, the reluctance of women in certain countries to be examined by men. The planning of care must vary very much from one situation to another, involving at times the bringing of the service to the patient. For instance, in countries where a considerable number of deliveries are attended by untrained persons, much can be achieved by giving these traditional birth attendants some simple instructions in health education and obstetrical care. To be realistic, the instructions should be given locally and, if possible, under the conditions in which attendants will work. Supervision should be provided and refresher instructions should be given at periodic intervals.[2]

4.2.2.1 *Diet in pregnancy*

The course of pregnancy is affected by both the quantity and the quality of the food eaten during this period, but it is difficult to assess their respective importance. There is a fairly close relationship between calorie intake and weight gain in pregnancy when energy expenditure is equated. Generally speaking, poor weight gain and low calorie intake are associated with low birth weight; whereas an abnormally high weight gain goes with high calorie intake and is associated with an increased incidence of pre-eclampsia, which in turn increases the incidence of low-weight babies. In countries where undernourishment is widespread, every effort should be

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[1] *Wld Hlth Org. techn. Rep. Ser.*, 1952, **51**, 10

[2] *Wld Hlth Org. techn. Rep. Ser.*, 1955, **93**, 18

made to see that the diet of the expectant mother is raised to a satisfactory level and that she is encouraged to take her due share of food. Local customs and seasonal shortages which may lead to severe restriction of the diet in pregnancy need to be taken into account when advice is given.

4.2.2.2 *Diseases existing before pregnancy*

The diseases encountered will vary widely in importance from one part of the world to another. In some areas chronic nephritis, diseases of the respiratory system, chest conditions, heart diseases and anaemia are steadily declining in frequency, but diabetic and pre-diabetic states are increasing. In other countries, tuberculosis, syphilis and anaemia may still be very common, together with tropical diseases and infestations: these conditions may be so numerous as to overshadow in importance all other diseases in pregnancy.

In the education of personnel, especially physicians, midwives and nurses, careful thought must be given to the problems in the country in which they practice if the teaching is to be realistic.

4.2.2.3 *Diseases occurring during pregnancy*

Great interest has been taken in infections occurring during pregnancy, especially in the early months, since it was observed that rubella could produce certain malformations in the foetus which can lead to premature birth. The possible effect of other infections is now under consideration.

In some areas pre-eclampsia and other hypertensive states occur frequently and constitute the most important complication of pregnancy. In such circumstances, very careful supervision is necessary, especially during a first pregnancy, to avoid the severer forms of the disease. There are indications that in some populations blood-pressure levels are generally low and pre-eclampsia seems to be less of a problem. Exact information on this point is not available at present.

Placenta praevia is another cause of premature labour. Under good pre-natal supervision the number of babies born prematurely due to this condition has decreased since after the first haemorrhage it is often possible to allow the pregnancy to continue by prolonged rest and obstetrical care.

Twinning is a common cause of low birth weight, especially since some complications of pregnancy such as pre-eclampsia are much more likely to occur with twins. The risk of premature labour can be diminished by prolonged rest over the critical period in the last three months of pregnancy. At least 15% of the low-weight babies are the result of multiple pregnancy. Twinning may occur more frequently in some countries; for example, reports indicate that in some areas in Africa the percentage is very much higher.

Blood incompatibility is also a recognized cause of premature labour.

4.2.2.4 *Interaction between health of the mother and complications of pregnancy and its effect on birth weight*

Although complications such as those listed above are present in a large proportion of all pregnancies resulting in a baby of 2500 g or less, and although pre-eclampsia is by far the most frequent of these, it cannot be assumed that one or a combination of these are always the cause of low birth weight. For example with reference to pre-eclampsia, a rise of blood pressure by itself has little effect on foetal growth, but if it is accompanied or followed by the appearance of albumen in the urine, foetal growth is very liable to be depressed. The effect has been found to be much more marked in women from a poor than from a good environment. Studies have shown that in primigravidae the incidence of severe pre-eclampsia (that is, a rise of blood pressure with albumen in the urine) is very little affected by the environment from which the mother comes, but the incidence of low-weight babies associated with the condition is about three times as great in women in the least favourable, as compared with those in the most favourable, socio-economic conditions. These differing incidences of low-weight babies associated with severe pre-eclampsia suggest that the better growth of the foetuses of mothers in the most favourable economic groups neutralizes, to some extent at least, the depressing effect of severe pre-eclampsia on foetal growth.

It is probable that the effect of any complication or disease on the pregnancy and on the weight of the baby may be modified by the general state of health of the mother. This may be overlooked by those obstetricians and paediatricians who take too narrow a view of the problem. This field is sufficiently important to warrant further investigation.

4.3 Care of low-weight babies

The aim is to save the lives of many children who without special care could not be expected to survive, by trying to neutralize as far as possible their initial handicaps.

It would be expected that before special care is planned for low-weight babies, good infant care is already available to all infants. This in itself will have a highly beneficial effect on the survival of many low-weight babies, especially among those weighing between 2000 and 2500 g at birth. The availability of such care is also essential for the healthy development of low-weight babies who have received special care.

All activities for the care of low-weight babies must be planned and carried out as part of a much broader programme of child care. Special care for these babies will not be of much value if the chances of later survival are not good because of deficiencies in other aspects of the public health programme, such as poor sanitation, a high incidence of malaria or other disease, lack of suitable provisions for immunization, etc.

One should avoid giving undue emphasis to the smallest babies before doing all that is possible to save the larger babies.

4.3.1 *Types of care*

Special care for low-weight babies does not necessarily mean incubator care. The needs of the majority of these infants can, in fact, be met through very simple means. This applies particularly to babies between 2000 and 2500 g who not only form the largest proportion of the group but also offer the best prospect for healthy development.

4.3.2 *Special care by simple means*

This can be given both in the hospital and at home. It involves lower expenditure and may be given to a great extent by less highly trained personnel than are required for more specialized types of care. All the basic principles of sound infant care will be applied with, in addition, certain simple measures particularly suited to the special needs of these infants. They may consist of providing extra heat if necessary, for example, by hot-water bottles, of advising the mother on artificial feeding if breast-feeding is not possible, and of all necessary precautions against the exposure of the infant to sources of infection.

In the hospital adequate facilities for preparation of food for those infants that cannot be breast-fed and for hand-washing must be available. Wash-basins must be conveniently located and have taps of a type which could not be instrumental in spreading infection, for instance, foot- or elbow-controlled. Where running water is not provided, facilities must be available for pouring clean water over the hands. It is commonly necessary to keep the low-weight babies in the hospital for a longer period than usual for the average newborn infant. An excellent method of giving simple care, while instructing the mothers in the management of their infants, is to have a room where the mothers look after their own babies under supervision. Some provision must be made for instructing each mother before she is given full responsibility for her infant. To avoid psychological disturbances in the mother she should be kept informed of the progress of her child and helped towards an understanding of its condition.

At home, the same kind of simple care can usually be given under proper supervision. There are obvious exceptions, such as when infection is present in other members of the household. Home care will be possible only if the need for special attention for the infant is recognized at birth or earlier and such attention promptly secured. Care will involve visits by personnel trained for the purpose. These need not be fully trained nurses or midwives but could be suitably trained auxiliaries, in which case consultation with and supervision by more highly trained personnel

should be readily available. Some material assistance may be necessary, such as the loan of simple equipment, etc.

4.3.3 *Specialized care services* [1]

These are services involving care in either an incubator or a heated cot and requiring specially trained personnel. They should be provided only if this can be done without neglecting health services with higher priorities and if adequately trained personnel are available. They are only necessary for a small percentage of the babies, and it should be remembered that these infants have a high mortality even under skilled supervision. Very small babies are also likely to develop physical and mental disabilities; for them adequate care and rehabilitation facilities must be provided.

4.3.4 *Follow-up services*

Whether low-weight infants are cared for in hospital or at home, follow-up services should be available for at least one year after birth.

These will consist of out-patient and home visiting services staffed by paediatricians and nurses. In order to avoid the danger of carrying infection, nurses should not be assigned to premature-ward duties and out-patient duties at the same time.

The chief function of these follow-up services is to continue to provide supervision of the babies and advice to the mothers during a period in which the risks, especially from infection, are still greater than in babies of normal birth weight. The information provided by these services on the survival and development of low-weight babies is of great value in assessing the results of the initial care.

4.3.5 *Pilot demonstration, teaching and research units*

In areas where it is not warranted to make specialized care services generally available, it might be desirable to establish a pilot unit for demonstration, teaching and research purposes.

The unit should be located near the obstetric and paediatric departments of a teaching hospital, preferably administered as part of a medical school. It must be under the direction of a paediatrician with special training. While it should have the equipment necessary for a high standard of specialized care, it should also provide simple care of the type which allows, for instance, for a smooth transition from specialized hospital care to care at home. The staff should be adequate in quality and number. Ideally the pilot unit would also be responsible for a service in a hospital

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[1] Detailed information on specialized premature care is readily available in the literature.

providing special care by simple means only; also for a home care service and for follow-up facilities.

An existing hospital service for premature babies could well be adapted as a pilot unit if it has a close relationship with delivery, paediatric and community health services.

One of the functions of the unit will be the training of all categories of personnel including auxiliaries,[1] both in-service training and refresher courses, and training in all types of care, specialized and simple, hospital and domiciliary. The unit should also provide simple and practical teaching for the mothers.

The research activities will include the testing of newer methods of care, both within and outside the hospital, the development of simple techniques adapted to local conditions, surveys, and the study of the most satisfactory methods for determining which groups of babies would benefit most from different types of care under prevailing local circumstances. Systematic clinical-pathological investigations of all infant deaths and regular discussions of these data are a most useful tool for research in this field.

4.4 Organizational aspects

When plans are made it will be necessary to know the extent of the problem. This calls for information already set out in section 4.1 (page 7), which may not be entirely available, but which must be developed. Statistical services should be promptly established. They will assist in the collection and analysis of data, as well as in assessing the efficiency of the service on the basis of numerical facts. In addition to the data already suggested, information should be obtained on the size and birth rate of the total population of the area concerned.

As already stated, some kind of a preventive programme can be carried out under almost any circumstances. When the incidence of low birth weight is high, simple public health measures can be expected in themselves to bring about an improvement, not only in reducing the incidence but also in saving many lives.

A preventive programme particularly aimed at this problem must be based on good knowledge of those factors which are locally associated with low birth weight. The content of a well-rounded preventive programme was discussed in detail by the WHO Expert Group on Prematurity.[2]

If countries with limited health services, personnel and budgets, wish to start a care programme for low-weight babies, they should begin with inexpensive simple services which do not require highly trained personnel.

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[1] A detailed discussion of the training and functions of auxiliary personnel under varying circumstances can be found in *Wld Hlth Org. techn. Rep. Ser.*, 1957, **109**; 1961, **212**.

[2] *Wld Hlth Org. techn. Rep. Ser.*, 1950, **27**, 6

A programme of care for low-weight babies will not be successful unless it is adapted to the basic health services of the country. The demands within a country, or lesser sub-divisions, for health programmes such as general medical care, control of the communicable diseases, environmental sanitation, maternal and child health, nutrition, health education, etc., have all to be considered by the public health administrator when planning services for the low-weight baby.

4.4.1 *The role of national, regional or local advisory committees*

In addition to government bodies such as departments of maternal and child health, national, regional or local committees can play a useful role in outlining areas of special interest. These committees may be sponsored by governments, or may be on a voluntary or a mixed basis. They are formed by leading specialists united by common interest in a given problem and by their expert knowledge of its various aspects. In connexion with the problem of low birth weight, membership would include public health administrators, obstetricians, paediatricians, nurses, midwives, nutritionists, epidemiologists, statisticians, social scientists, and representatives of non-governmental organizations which may have developed activities in this field.

The role of the committees will vary, depending on local circumstances. They may be interested only in research, and indicate areas most suitable for the study of a given problem, perhaps even being instrumental in obtaining the necessary funds to carry out the investigations. They may also be in constant advisory relationship to the government, through the representatives of the maternal and child health departments on the committees, and perform a valuable function of liaison.

Such committees already exist in several countries and in smaller administrative units. In some, their responsibilities are considerable. They are given facilities for investigation and access to data, and produce periodic reports.

Such bodies, being composed of leading specialists to whom the problem is of vital concern, play a very important role in stimulating interest in the field.

The Committee *recommends the setting up of such committees whenever possible.*

5. The Research Programme

The Committee heard with interest of the recent expansion of the international medical research effort envisaged by the Eleventh World Health Assembly,[1] and in view of this it was encouraged to set forth the following

[1] *Off. Rec. Wld Hlth Org.*, 1958, **87**, 32

list of subjects for research as being among those which can provide the knowledge needed to form efficient preventive and care programmes for low-weight babies. This list is by no means comprehensive, but includes some proposals that the Committee has felt would complement research already under way. The Committee *recommends that these and any other proposals for research in this field be thoroughly explored and subsequently acted upon.*

5.1 Research in public health practice

This includes:

research to find the most effective and economical ways of (*a*) caring for babies of low birth weight, including a reassessment of certain techniques now somewhat controversial, such as early or delayed feeding, use of incubator, value of breast-feeding by undernourished mothers, and (*b*) organizing services for them;

epidemiological studies of low birth weight, including the development of better methodology for such studies;

studies of the relation of cultural attitudes to problems associated with premature labour and babies of low birth weight.

5.2 Biological and clinical research

This includes:

the effect on birth weight of genetic, environmental, socio-economic and emotional factors, as well as the influence of work, bacterial or viral infections (especially inapparent and subclinical) and parasitic infestations, before and during pregnancy;

biological studies of the developing foetus (including the placenta) and of the infant of low birth weight;

methods for the accurate estimation of the degree of maturity and viability of the newborn infant and the length of gestation;

long-term studies to evaluate the results of saving infants born after short gestational periods and those of low birth weight.

5.3 The Committee *recommends that the WHO Study on Birth Weight be continued.* It suggests that, as far as is practicable, data should be obtained on the socio-economic status of the mothers. It also believes that the value of the Study would be enhanced if two areas were selected for more intensive investigation, one having a relatively low, and the other a high, incidence of low birth weight.