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REPORT OF JOINT NUT/MCH MEETING ON THE EFFECTS OF
PHYSICAL WORK AND MATERNAL NUTRITION ON THE HEALTH OF THE CHILD

Geneva, 13-16 August 1985

NUTRITION UNIT
MATERNAL AND CHILD HEALTH UNIT
DIVISION OF FAMILY HEALTH
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Report of Joint NUT/MCH Meeting on the Effects of *Intelligence*
Physical Work and Maternal Nutrition on the Health of the Child *retardation*
- 2008

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1. The Nutrition and Maternal and Child Health Units of the World Health Organization jointly sponsored a workshop on the determinants of intrauterine growth and gestational duration from 13 to 16 August 1985. The List of Participants is given in Annex 1.

2. Discussion was structured around a pre-circulated document¹ that attempted a complete and methodologically critical review of recent research concerning putative determinants of low birth weight. For each determinant supported by adequately controlled studies, a best estimate was calculated of its quantitative effect on gestational age, gestational age-adjusted birth weight, premature delivery (PT), and intrauterine growth retardation (IUGR). Published data or estimates² of the prevalence of identified risk factors were used to derive their corresponding etiologic fractions (population attributable risks) for PT and IUGR. A set of pie diagrams was then presented to summarize the relative contribution of each determinant to PT and IUGR in developed and developing countries.

¹ Determinants of Intrauterine Growth and Gestational Duration: A Methodological Assessment and Synthesis by Michael S. Kramer, M.D.

² Determinants of Intrauterine Growth and Gestational Duration: A Critical Bibliography 1970-1984 by Michael S. Kramer, M.D. and Claire Sasportas, B.A., NUT/85.10.

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3. Following this discussion, participants drafted and revised two sets of recommendations pertaining to low birth weight (LBW). The first set contained an overall framework for WHO's role in coordinating the study and prevention of LBW, while the second concerned suggestions for future research. Although only the research component (the second set and recommendation no. 1 of the first set) was dealt with directly in the workshop, participants felt it essential to place research priorities within a more global perspective of low birth weight, i.e. its causal determinants, significance for infant and child health, prevalence in different settings, and prevention through public health policies and programmes.

4. The two sets of recommendations are shown below.

Recommendations for a Coordinated Low Birth Weight Programme at WHO

5. Within and between its programmes in Nutrition and MCH; WHO should continue to strengthen its efforts to improve infant and child health, growth, and development through the study and prevention of low birth weight (LBW).

6. It should continue current efforts to identify and quantify the causes of prematurity (PT) and Intrauterine growth retardation (IUGR), as well as the subtypes of IUGR, in both developing and developed countries. It should expand these efforts, however, in an attempt to establish direct links between these causal determinants and the important health outcomes of infant and child mortality, morbidity, and functional performance. In order to clarify the implications of research results for health policy and programmatic action, WHO should help investigators (especially those in developing countries) to enhance the methodologic rigour of their research through provision of consultations and advice in such areas as study design, data analysis, and suitable statistical software.

7. Many factors are strongly associated with PT or IUGR. Some appear to be direct causal determinants; others act indirectly by influencing the direct causal determinants. For several, however, the association with PT or IUGR arises entirely from confounding effects. Even though these latter factors have no true causal impact, they may nevertheless be valuable as "markers" or "indicators" of women at high risk for LBW. The LBW programme at WHO should foster the development and appropriate use of screening for risk, so that limited clinical and public health resources can be targeted to those women whose offspring will reap the greatest benefit in infant and child health.

8. The programme should monitor the prevalence of PT and IUGR in member countries, as well as the public health policies and interventions undertaken by those countries, to aid in interpretation of secular trends in prevalence. These data should be useful in evaluating country programmes' success or failure in meeting their health goals for the year 2000. Universal measurement of birth weight should, of course, receive first priority. Additional efforts to encourage the anthropometric indices would help clarify geographical differences in PT, IUGR, and IUGR subtypes. These measurements should be instituted routinely where feasible and otherwise introduced according to a sampling frame appropriate for monitoring geographic distribution and trends.

9. It should also foster the development of new cost-effective interventions to improve important health outcomes through prevention of PT and IUGR. Controlled intervention trials should focus on well-established modifiable determinants of PT or IUGR, selecting those with high etiologic fractions (population attributable risks). The interventions should be specific for the population concerned and should be aimed at several factors simultaneously, wherever possible. The cost-effectiveness of an intervention aimed at improving health outcomes through PT or IUGR must consider alternative interventions that may affect these outcomes through mechanisms other than preventing PT or IUGR.

General Recommendations for Future Research on the Causes and Health
Significance of Low Birth Weight

10. More research is required on the causes and prevention of low birth weight (LBW), with the highest priority given to modifiable factors of high prevalence for which data are currently inadequate to justify large-scale public health intervention. Controlled intervention trials aimed at known determinants contributing a high etiologic fraction (population attributable risk) for LBW should also receive high priority. Such trials will provide the best indication of the extent to which LBW due to these determinants can be prevented.

(a) A lower level of priority should be assigned to factors whose causal impact is uncertain, but whose low prevalence, suspected low relative risk, or fixed (non-modifiable) nature make them unlikely targets for future intervention.

(b) Research exploring the association between LBW and its known risk factors, i.e. those whose causal role is already well established, should receive the lowest priority. Repeated demonstration of known associations is wasteful of human and financial resources and should not be encouraged. On the other hand, determining the prevalence of known risk factors in specific populations should be extremely useful in quantitating their contribution to LBW in such populations and hence in formulating health policy and planning intervention programmes.

11. The methodologic review prepared for this meeting, after appropriate amendments recommended by the participants, should be made available to researchers and funding agencies interested in LBW. Future research in this domain should make better use of randomized clinical trials and (for observational studies) adequate measurement and statistical control for possible confounding factors. Descriptions of study target populations, sampling procedures, and participation and follow-up rates must be improved. Temporal and measurement variation of risk factors and outcomes should be measured and reported to enable better interpretation of both positive and negative findings.

12. Before major technical and financial resources are expended on large-scale studies on LBW, existing research and data bases should be examined and more thoroughly exploited. Suitability of such data bases, however, must be judged in terms of whether they meet the methodologic standards appropriate to the subject.

(a) Existing data can also be used to establish, guide, and hypothetically "test" intervention strategies through the development of computer-based simulation models that summarize the relationships between well-established risk factors (determinants), specific interventions, and LBW. Such models could be adjusted for the prevalence of the risk factors and the effectiveness and coverage of interventions.

13. Gestational duration should be considered separately from intrauterine growth in all future research on LBW. This requires valid and precise measurement of gestational age, preferably based on the date of the last menstrual period (LMP) as obtained early in pregnancy. Although the risk factors for IUGR and PT may overlap, the causes are often different. Far more is known about the "web of causation" for IUGR than for PT. Considering the high morbidity, mortality, and health care costs associated with PT, priority should be given to investigations of its determinants in both developed and developing countries.

- (a) Alternative methods of gestational age determination, such as clinical observations during pregnancy and assessments of development in the postnatal period, should be studied and compared to the "gold standard" of LMP when the latter is known with certainty. Research on the interrelationships between these measures should be undertaken in situations where ultrasound measurements are available. Developmental age, itself an important pregnancy outcome, should be distinguished from gestational duration, and evaluated for its prognostic importance.
14. Future research in IUGR should attempt to distinguish among various subtypes, such as "stunted" (proportional) IUGR vs "wasted" (disproportional) IUGR, since their determinants and prognoses may be different. This distinction requires careful measurement birth weight and birth length, preferably supplemented by head circumference, mid-arm circumference, and perhaps some index of body fat.
15. Future studies of risk factors for PT or IUGR should attempt to establish direct links with the important health outcomes of mortality, morbidity, and functional performance. This is especially true for intervention trials. Reduction in LBW will have true importance only to the extent that perinatal, infant, and child health is improved.
16. Studies of new hypothesized risk factors for PT or IUGR, or of those for which current evidence is insufficient either to rule in or rule out a possible etiologic role, should focus on populations in which the factor is both prevalent and potent (present in high dose), so that negative results can be safely extrapolated to populations in which the factor is less prominent. For specific nutrients, for example, preferred study populations are those with a high prevalence of PT or IUGR and evidence of deficiency states, not merely those with low dietary intakes or blood levels relative to established "normal limits".

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and Maternal Nutrition on the Health of the Child

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