

Network for Interventions against Maternal-Child Malnutrition in South Asia

Coordinator

Lars Åke Persson, MD, PhD, Professor, International Maternal and Child Health, Department of Women's and Children's Health, Uppsala University
E-mail: lars-ake.persson@kbh.uu.se

Swedish partners

- Lars Åke Persson, Paediatrician, epidemiologist and coordinator of the network. International Maternal and Child Health, Uppsala University
- Eva-Charlotte Ekström, PhD. Nutrition epidemiologist, responsible for micronutrient aspects in the project. International Maternal and Child Health, Uppsala University
- Samar Basu, PhD. Associate professor. Biochemist, Section of Clinical Nutrition Research, Department of Public Health and Caring Sciences, Uppsala University. Responsible for analyses of oxidative stress.
- Lars Lindholm, PhD. Health economist and responsible for the health economics evaluation of the intervention. Epidemiology and Public Health Sciences, Umeå University.
- Marie Vahter, PhD. Professor. Toxicologist, arsenic specialist. Metals and Health, Institute of Environmental Medicine, Karolinska Institutet. Responsible for aspects of arsenic exposure.

South Asian partners

- Shams El Arifeen, PhD. Child health epidemiologist and head, Child Health Programme, ICDDR,B: Centre for Health and Population Research, Dhaka, Bangladesh. Local principal investigator of the trial.
- Mushtaque Chowdhury, PhD. BRAC, Dhaka, Bangladesh. Responsible for BRAC's involvement in the project.
- Md. Yunus, MBBS, MPH. Public Health specialist, and Head, Matlab Health and research Centre, Matlab, Bangladesh. Responsible for health services and research in Matlab.
- Ruchira Naved, PhD. Gender specialist, Public Health Sciences, ICDDR,B. Responsible for social sciences aspects in the project.
- Motiur Rahman, PhD. Bacteriologist. Responsible for the intervention against bacterial vaginosis. ICDDR,B.
- Dewan Alam, PhD. Nutrition epidemiologist, responsible for dietary data collection in women and children. ICDDR,B.

International partners

- Kathleen Rasmussen PhD, Professor. Maternal nutrition specialist. International Nutrition, Cornell University, Ithaca, USA. Advisor for two research students.

- Ed Frongillo, PhD, Ass professor, statistician. International Nutrition, Cornell University, Ithaca, USA.
- Andrew Prentice, MD, PhD. Professor, MRC International Nutrition Group, London School of Hygiene and Tropical Medicine, London, UK. Responsible for studies of immune function.
- Sally McGregor, professor, child development specialist. International Child Health, Institute of Child Health, London, UK. Responsible for the child development component in the collaboration.
- David Dunger, MD, PhD. Professor. Paediatrician and genetics specialist. Department of Paediatrics, University of Cambridge, Cambridge, UK. Responsible for the gene-environment component.
- Bo Lönnerdal, PhD. Professor, nutrition biochemist. Dept Nutrition, University of California Davis, USA. Responsible for the nutrition biochemistry analyses.

Aims of the network

The aims of this network are

- To create a network of expertise from Sweden, South Asia and elsewhere in the field of maternal and child nutrition, intrauterine and child growth and development, for development and implementation of relevant intervention studies.
- To generate possibilities for research training in this research area at the represented universities.
- To develop workshops and other opportunities for information exchange and training in this problem area through the network.

Background

Poor maternal nutritional status remains an important determinant of long-term maternal health as well as of foetal growth and subsequent infant health and survival. It is estimated that nearly 20% of all births world-wide are born with low birth weight (LBW), most of which occur in the South Asian nations of India, Pakistan and Bangladesh. In Bangladesh, almost 50% percent of new-borns are LBW, mainly due to intrauterine growth restriction. The high proportion of foetal growth restriction is obviously contributing to the high prevalence of childhood undernutrition in Bangladesh, one of the highest seen anywhere. The South Asian undernutrition of children and women has sometimes been labelled the Asian Enigma, indicating both the unexpected high proportion of malnutrition, and the complexity of this lifecycle of malnutrition through generations. A logical priority time for an intervention in this vicious circle of malnutrition is during pregnancy, when a potential effect theoretically would benefit mother as well as foetus-child. By necessity interventions should be combined in this situation with every second child born with a low weight – in order to optimize effects and maybe achieving positive interactions between the interventions.

Though we know that maternal nutritional status is the main predictor of intrauterine growth in developing countries and that size at birth is an important determinant of infant growth and mortality, the results of nutritional supplementations to pregnant women in different parts of the world have been quite mixed. Similarly, the knowledge base is weak regarding the effect of interventions against some common infections in pregnancy, e.g. bacterial vaginosis. Further, there are reasons to believe that maternal work load, use of toxic products (e.g. smoking), chronic stress in pregnancy (especially domestic violence) and several other factors have an influence on foetal growth and development. Behind many of these factors the position of the women in the household, in the community and society is a strong determinant of this cycle of malnutrition.

During a 4-year period of work as director for the Public Health Sciences Division at ICDDR,B, Dhaka, Lars-Åke Persson took the initiative to initiate this network of scientists, and to develop specific intervention studies. An international workshop on Low Birth Weight at ICDDR,B in 1999 formed the background, and from 2001 a large inter-disciplinary intervention project is running, the MINIMat study (Maternal and Infant Nutrition Interventions in Matlab). A first joint meeting of the network was performed in October 2002, where the follow-up of functional consequences of the interventions for mother and child were discussed, as well as research training options for junior scientists from the region. The research projects has mainly been funded by UNICEF and DfID, while the networking and the research training lack organised funding and so far has been jointly achieved by support from the different participating departments and scientists. In May 2003 Persson returned to Sweden to take up the position as professor and chair in International Child Health at Uppsala University. He is keeping the role as the coordinator of the joint effort.

Joint research programme

We are performing *interventions in a cohort of pregnant women*, aiming at detailed knowledge about different combinations of interventions. Four combined interventions are conducted in a group of about 4,500 undernourished women who live in Matlab upazila, Bangladesh - the well-established field site of ICDDR,B: Centre for Health and Population Research. An on-going demographic surveillance program identifies pregnant women within 6-8 wk of conception. A government nutrition program provides a daily food supplement that contains 600 kcal to pregnant and lactating women. The interventions in the participating women focus food supplementation, different forms of micronutrient supplementation and treatment against the vaginal infection “bacterial vaginosis”, that is known to be associated to pre-term delivery. Women are carefully monitored by an extended antenatal control programme, including repeated ultrasound assessments of foetal growth, blood samples and interviews on dietary intake, work load, violence in the household, health problems etc. Birth weight is measured as well as maternal weight and health of mother and baby at birth. The weight and blood micronutrient status of mother is followed into the next pregnancy, and the child is followed by assessments of growth, morbidity, development, psycho-motor development and immune function. A sub-study deals with the gene-environment interaction on foetal and child growth.

Recruitment to the study was completed in October 2003, and the last birth is planned for July 2004. A first analysis of effects of the interventions will be performed in August-October 2004, focusing outcomes up to birth (gestational age at birth, size at birth). A special problem in this context is the wide-spread arsenic contamination of drinking water in Bangladesh, where a 30 million population currently are exposed to high arsenic concentrations, with potential but unknown effects on foetal development and survival. This is addressed in a sub-study. Analyses on the arsenic exposure of pregnant women through drinking water and eventual effects on foetal growth and survival are also due in 2004.

Current PhD students in the network

The following PhD students are working on various aspects of the collaborative project and receive training in Sweden.

- Dr Waheedul Hoque is working on effects nutrition interventions in pregnancy on the women's nutritional status, and possible effects into the next pregnancy. PhD student at International Maternal and Child Health, Uppsala University.
- Dr Anisur Rahman, working on arsenic exposure in pregnancy and effects on foetus and child. PhD student at International Maternal and Child Health, Uppsala University, and Metals and Health, Karolinska Institutet.
- Dr Rubina Shaheen working at health economics analysis of nutrition interventions in pregnancy and effectiveness in improving size and health at birth of the offspring. PhD student at Epidemiology and Public Health Sciences, Umeå University.
- Md Jakariya working on analysis of arsenic exposure in Matlab and effects of mitigation. PhD student at Metals and Health, Karolinska Institutet and at Royal Technical University, Stockholm.

Further one Bangladeshi research student work at biochemical issues of the project at University of California, Davis, and two Bangladeshi research students have PhD work related to the project at Cornell University, USA.

Annual meeting 2004: preliminary analysis of effects of combined nutrition interventions in pregnancy on birth weight and related outcomes

The third annual meeting of the network is planned for October 2004 in Dhaka and Matlab, Bangladesh, with participation of all members of the network. The meeting will be preceded by an intensive period of data management and analysis in August-September, including an analysis workshop in Uppsala the last two weeks of August 2004. A preliminary report will be produced for the October meeting in Dhaka, and this will be communicated to various stake holders (among those UNICEF and WHO) in a workshop during the annual meeting.

After this workshop an intensive period of report writing, production of scientific papers and conference reporting will take place. A special focus is the World Health Assembly 2005, where WHO is intending to discuss the issue of global foetal development, growth restriction and possible strategies to improve foetal health and development.