

## Executive Summary: Indo-US Workshop on Nutrition and Health of Women, Infants, and Children

A three-day Indo-US Workshop on "Nutrition and Health of Women, Infants, and Children" was organized at the National Institute of Nutrition (NIN), Hyderabad by the Indian Council for Medical Research (ICMR), the National Institute of Child Health and Human Development (NICHD) of the United States' National Institutes of Health (NIH), the U.S. Agency for International Development (USAID), and the United States Embassy, Science Office, New Delhi. Support for the workshop was provided by an Indo-US consortium composed of the NICHD, the Office of Dietary Supplements (ODS), and the Fogarty International Center of the NIH, USAID, the U.S. Centers for Disease Control and Prevention (CDC), and the ICMR. The meeting, convened at the NIN, Hyderabad, from February 10 to 12, 2000 was intended to review the nutrition problems of mothers and children and to explore the possibilities for collaborative research and interventions.

### Opening Session

The meeting was opened with welcoming remarks from Dr. Kamala Krishnaswamy, Director, NIN and Ms. Linda Morse, Director, USAID, New Delhi. Dr. Krishnaswamy emphasized the need to exchange ideas and experiences, and the importance of using the bilateral views and plans generated during the meeting to foster future research and intervention implementation. She highlighted the transgenerational impact of nutrition problems and the interaction between prenatal malnutrition and adverse birth outcomes including low birth weight (LBW). She emphasized the need to address the problem of micronutrient malnutrition, in particular, and factors affecting nutrient bioavailability from indigenous foods, including interactions between nutrients. She expressed the need for a comprehensive review of the antecedents of infectious diseases, including nutrition, and their role in childhood and maternal morbidity and mortality. Dr. Krishnaswamy concluded by strongly encouraging the formulation of community-oriented and community-owned interventions centered on food-based strategies—ranging from agricultural innovation to the development of food fortification technologies—to improve nutrition status.

Ms. Linda Morse welcomed the participants on

behalf of the cosponsoring US agencies. Mentioning that USAID has been India's partner in several endeavors over a 40-year period, she welcomed the expansion of Indo-US collaboration in the field of nutrition. Referring to the recently concluded second National Family Health Survey, Ms. Morse expressed concern at the high levels of anemia in children indicated by preliminary reports from ten states. As USAID's mandate is to support programs, policies, and research that contribute to improved health of women and children, she hoped that discussions of this workshop would contribute to developing collaborative research protocols in areas of mutual interest.

At the behest of the ICMR and the meeting organizers, Dr. Yvonne Maddox, Deputy Director, NICHD and Acting Deputy Director, NIH, and Professor B.N. Tandon, Director, Pushpawati Singhanian Research Institute, agreed to co-chair the meeting.

In her introductory remarks, Dr. Maddox emphasized the longstanding and continuing commitment of NIH-sponsored research programs to the elucidation of the role of nutrition in the health and development of women, infants, and children. She assured the assembly that the US participants anticipated a very productive meeting that would provide the basis for future collaborative projects. She concluded by expressing her confidence that, as with past and current Indo-US collaborative ventures, this activity would receive the highest priority in the NIH.

Dr. Tandon highlighted the nutrition problems of women and children in India. Citing a quotation of Mahatma Gandhi, Dr. Tandon said that knowledge should flow from all directions and at the same time we should be firmly anchored in our culture and traditions. Dr. Tandon observed that India's ability to solve the problems of malnutrition is limited not by lack of research data, but rather by concomitant problems of unchecked population growth, illiteracy (particularly among women), shortages of safe drinking water, environmental pollution, and the increasing gap between the rich and the poor. He opined that, having achieved moderate success in tackling nutrition problems, it was time for Indian scientists and healthcare providers to re-assess and redefine the Indian agenda to expand that

effort and to further the understanding of the role of nutrition in the health of women, infants, and children.

### Keynote Presentations

Dr. C. Gopalan, President of the Nutrition Foundation of India, presented an overview of the history of nutrition research and interventions in India. He observed that over the last 50 years following independence, India has made substantial progress in reducing the ravages of malnutrition. Among the success stories are increased life expectancy and the elimination of the florid forms of nutrition deficiency disorders like kwashiorkor, keratomalacia, beriberi, and pellagra. Dr. Gopalan emphasized that, in the Indian experience, these successes were achieved through food-based dietary and environmental improvements, rather than through the distribution of synthetic micronutrients or other types of dietary supplementation such as fish protein concentrates.

He noted, however, that despite these striking improvements, the nation is now carrying the double burden of substantial linear growth retardation in children along with obesity and other nutrition-related problems. More specifically, a critical need exists for valid and reliable methods for data collection on the nutrition needs of women before and during pregnancy and the impact of maternal status on infant mortality and low birth weight (LBW). Regarding LBW, Dr. Gopalan expressed concern that current estimates of LBW incidence, which are entirely based on hospital data, may be an underestimation of the true magnitude of the problem, particularly in light of the knowledge that many births and most early childcare occur in community-based settings.

Dr. Gopalan stressed that diversification of diets, rather than multiple micronutrient supplementation with synthetic nutrients, offers the best opportunity for a sustainable solution to India's problems of micronutrient deficiency. As an example of the potential problems of supplement-based, rather than food-based, interventions, he observed that the untested use of an arbitrary cocktail of multiple micronutrients in pregnancy among poor populations would be unethical, unscientific, and unsustainable.

In setting research priorities to achieve the goal of food-based solutions, Dr. Gopalan highlighted the importance of studies to increase knowledge of factors such as nutrient interactions affecting bioavailability of micronutrients in indigenous foods. He concluded by identifying several areas of research and programmatic priority with regard to micronutrient status of Indian women including:

- assessment of current micronutrient status of Indian women;
- investigation of the effects of pregnancy on micronu-

trient status, and the relationship of micronutrient deficiency to pregnancy outcomes and LBW;

- definition of micronutrient requirements of Indian women during pregnancy;
- an update of the food composition database for indigenous foods of India including the identification and cataloging of bioactive phytochemicals in foods;
- development and safety evaluation of genetically modified (GM) foods designed to increase micronutrient content of Indian diets;
- identification of ways to formulate acceptable low-cost special recipes for vulnerable groups using traditional foods.

After providing an historical overview of our understanding of the importance of nutrition in the international setting, Dr. Barbara Underwood, Scholar-in-Residence, Institute of Medicine, National Academy of Sciences and President, International Union of Nutritional Sciences, focused her keynote address on the current critical research issues in international nutrition. Noting the obstacles presented by resource limitations and unchecked population growth, she observed that malnutrition and concomitant growth stunting in children continues to be a significant concern particularly in the countries of South Asia and sub-Saharan Africa.

Although significant global progress has been made in reducing infant and child mortality, Dr. Underwood reported that rates remain alarmingly high in many areas of the developing world, especially in countries of South Asia. She highlighted the importance of infectious diseases and their interaction with nutrition status as critical factors in this trend. She also emphasized the importance of maternal nutrition in the high incidence of intrauterine growth retardation (IUGR) leading to LBW, which continues to be a burgeoning public health problem in the countries of Asia and more particularly in India.

Noting a lack of direct evidence for specific mechanisms, Dr. Underwood reinforced the importance of micronutrient deficiencies in infant mortality and congenital birth defects. She observed that deficiencies of trace minerals (e.g., zinc, iodine, and iron) and deficiencies in vitamin A, folic acid, and/or riboflavin have significant impact on the high incidences of adverse birth outcomes in Asian children. She reported that 60% of the children are also underweight and that there is a high incidence of deficiencies of zinc, selenium, folate, calcium, and other micronutrients.

In describing the complexity of the problems associated with nutrition-related disease, Dr. Underwood stressed that women's education and poverty are critical cofactors which, along with reliable and valid indices of nutrition status, need to be considered in the planning of research and programs designed to improve pregnancy outcomes, particularly through the reduction of IUGR.

Dr. Victor Barbiero, Chief, Health and Population Program, USAID, and Dr. Padam Singh, ICMR, offered their perspectives on current research priorities.

Dr. Barbiero outlined the major areas of interest to USAID as applied and operations research, prevalence/epidemiology/sequela studies, application of new tools and technology, and the role of the private sector. In the areas of applied and operations research, USAID is interested in issues such as vitamin A and maternal mortality, zinc and child morbidity/mortality, iron deficiency anemia, improving maternal nutrition and child nutrition, breastfeeding, reduction of LBW, community level MinPak, and improving vitamin A intake at the community level. USAID promotes vitamin A as an important child survival intervention and considers it important to understand the prevalence and distribution of vitamin A deficiency, anemia, maternal/adolescent undernutrition, and LBW. With respect to new tools and technology, Dr. Barbiero mentioned the need for rapid diagnostic testing including developing new diagnostics where required and the need for new formulations of multiple micronutrients. He also highlighted the potential role of the private sector and the NGOs in preventing micronutrient deficiencies.

Dr. Padam Singh delineated some research priorities from the perspective of ICMR. He stressed three areas: the role of nutrition in the incidence of LBW infants, the role of malnutrition in children 6 months to 2 years of age, and the need to identify appropriate community-based interventions. The possibility of intervention through antenatal measures is another area that needs to be explored. In the case of specific micronutrient deficiencies, Dr. Singh emphasized the need for improvements in existing supplementation programs for pregnant women, community-based evaluation of double-fortified salt, and possible effects of zinc supplements in the first four months of pregnancy. Dr. Singh also identified several other ICMR priority areas including nutrition surveillance, problems of the aged, osteoporosis, effects of changes in lifestyle, food fortification, food safety, nutrient composition of genetically modified foods, and a re-examination of the appropriate revision and use of the Indian Recommended Dietary Allowances (IRDA).

The Director-General of the ICMR, Dr. N.K. Ganguly emphasized the importance of developing a database to increase public access to published and unpublished research data. He stressed the need for expanded training opportunities to meet the demand for more scientists and the coincident requirement to provide more laboratory and animal research facilities and capacity on a priority basis. Dr. Ganguly highlighted the need for an expanded research effort to support science-based policy on food safety, food fortification, and the appropriate and

safe application of biotechnology for the remediation of nutrition problems indigenous to the Indian experience.

Ms. Veena S Rao, Joint Secretary, Department of Women and Child Development, spoke about the issues involved in prioritization of research areas emphasizing the essential role of fundamental rights in community-based research and programs. Ms. Rao encouraged increased emphasis on programs and solutions to problems specific to three high-priority areas: adolescence, the needs of pregnant and lactating women, and surveillance to continuously monitor the incidence of malnutrition in infants and children. She suggested that an important component of efforts to improve health at the community level will be the reinforcement of accountability at the grass-roots level. Toward this end, a clear linkage must be established between behavioral modification programs and positive outcomes, e.g., improved child health, reductions in LBW. She also emphasized the importance of research and the need for science-based programs that address key national priorities including reduction in the incidence of micronutrient deficiency and obesity, food fortification, the effects of changes in lifestyles and dietary habits, and the role of traditional and tribal foods in the health of women, infants, and children.

### **Plenary Session I: Nutrition, Women's Health, Pregnancy Outcome, and Fetal Development—Including the Role of Specific Micronutrient Deficiencies in Adverse Birth Outcomes**

Topics addressed included the impact of infectious disease and micronutrient status on birth outcomes including their association with LBW, with or without prematurity, and the impact of LBW and prematurity on neurological development. U.S. and Indian participants presented in each subject area to provide context and perspective.

#### **A. Nutrition, Women's Health, Pregnancy Outcome and Fetal Development**

Robert Goldenberg, University of Alabama at Birmingham, USA

Prema Ramachandran, Planning Commission, New Delhi

Dr. Goldenberg reviewed data on factors, including nutrition deficiencies, related to the growing prevalence of prematurity, which is approaching 10% of U.S. births. To date, low maternal weight or failure to gain weight has been the most consistent nutrition-related predictor of such adverse birth outcomes as prematurity and LBW. He observed that in developed countries none of the interventions reviewed, including supplementation with protein, folic acid, or total energy, have shown consistent

direct effects on prematurity. Iron and zinc supplementation have been associated with some beneficial effect. For example, in studies of women in Thailand, zinc supplementation was found to have a marginal effect on LBW. Additionally, in studies in the developing world, the provision of increased calories to women with normally low dietary intake and high energy expenditure due to continuation of manual labor during pregnancy, has been shown to have a positive impact on birth weight. Dr. Goldenberg concluded his presentation with a discussion of the importance of reproductive tract infections in the incidence of adverse birth outcomes, particularly LBW and prematurity.

Dr. Ramachandran presented data on the effects of maternal nutrition status and antenatal care on LBW. Inadequate dietary intake, increased physical activity, adolescent pregnancy, short interpregnancy interval, and pregnancy during lactation are some of the factors associated with deterioration in maternal nutrition status and increased risk of LBW. Early detection of anemia aimed at effective treatment, coupled with appropriate antenatal care, has been shown to result in significant improvement in maternal hemoglobin level and birth weight. Dr. Ramachandran advocated a "holistic" approach to address the problems of LBW including identification of risk factors in pregnant women, provision of appropriate nutrition intervention, and adequate antenatal care.

#### **B. Perinatal Risk Factors for Adult Disease**

Benjamin Caballero, Johns Hopkins University, USA

Kamala Krishnaswamy, NIN, Hyderabad

Tracing the evolution of the so-called "Barker hypothesis" on "fetal programming," Dr. Caballero emphasized the preconceptional nutrition status of the mother as a potentially important controlling factor in later-life diseases. He cited a study conducted on Pima Indians in the U.S. wherein the importance of breastfeeding in postponing maturity-onset diabetes was established. He hypothesized that using the data available on high prevalence of IUGR and LBW, major epidemics of chronic adult diseases in developing countries might be predicted.

Dr. Krishnaswamy presented preliminary data collected by researchers at the NIN and other Indian centers on the developmental aspects of body composition and fat mass of adolescent girls in relation to their previous malnutrition during infancy. She suggested that of those born with malnutrition, the ones acquiring increased fat during adolescence may be at greater risk for chronic diseases of adulthood. She summarized studies in which the results of oral glucose tolerance test (GTT) in children were associated with diabetes in adulthood.

#### **C. Nutrition, Infectious Disease, and Immunity: An Overview of the Problem**

Kenneth Brown, University of California at Davis, USA

P. Bhaskaram, NIN, Hyderabad

Dr. Brown spoke about the effects of infection on nutrition and showed how abnormal lactose to mannitol ratio, an indicator of disturbed intestinal function, continued after an episode of recent diarrhea. Similarly, higher interleukin 1 (IL-1) response in children with growth retardation has been shown to be indicative of the metabolic costs involved in mounting an immune response. Infections per se may contribute to increased turnover of protein and thus increased requirement. Dr. Brown cited studies in which zinc supplementation was found to be consistently associated with reductions in infections, especially in experimental animals. These data highlight the confounding effect of infection on nutrition status and in the control of micronutrient deficiency and the resultant morbidity.

Dr. Bhaskaram highlighted the mutually adverse interactions of malnutrition and infection. The immunomodulating effects of vitamin A, iron, and zinc and the effects of infections like measles in aggravating malnutrition were specifically emphasized. Cellular immune suppression in iron deficiency and the role of zinc in proliferation of T cells and thymulin levels were discussed.

#### **D. Prevalence of Clinical and Subclinical Micronutrient Deficiencies**

Usha Ramakrishnan, Emory University, USA

G.S. Toteja, ICMR, New Delhi

Indira Chakravarty, All India Institute of Hygiene and Public Health, Calcutta

Dr. Ramakrishnan reported estimates of subclinical vitamin A deficiency in the range of 28–38% in some areas of the developing world. Similar or much higher prevalence of other micronutrient deficiencies like riboflavin, vitamin B<sub>12</sub>, and iron could coexist in populations with vitamin A deficiency, as evidenced from the Honduras experience. The public health approaches to control these deficiencies could include supplementation, fortification, and other food-based strategies. She noted that the lack of evidence for a direct effect of zinc deficiency appears to be due to the limited reproducibility of data at the national level and difficulties in assessing zinc status due to the absence of sensitive and specific indices of zinc status, particularly at the population level.

Dr. Toteja presented preliminary data on micronutrient deficiencies collected from 16 districts in India as part of the ICMR district nutrition profile project. Adolescents were found to be most affected by iron deficiency anemia. He concluded that public awareness of

potential deficiencies of micronutrients such as vitamin A is limited. Dr. Toteja suggested that, based on available data, appropriate intervention models could only be developed and tested for control of the major micronutrient deficiencies.

Dr. Chakravarty also provided baseline data on the prevalence of some nutrition deficiencies in some districts of Eastern India. Apart from protein-energy malnutrition, deficiencies of iron, iodine, and vitamin A are major problems in these areas. Dietary intakes, along with social variables and cultural practices, are currently being investigated as possible causes. Age-dependent prevalences of deficiencies along with anthropometry were also presented.

Following the plenary presentations, the conference participants were assigned to one of three workshop sessions focused on the role of diet and nutrition at various developmental stages. After the deliberations of these groups, the conference was reconvened for the second plenary session, which included the presentation of summary statements from each of the three working groups (Appendix A), and closing remarks.

## **Plenary Session II: Presentations on Nutrition Research Methodology**

Topics covered in the second plenary session included recent developments in research methodology. Presentations were focused on the review of current methods for the assessment of nutrition status (particularly micronutrients), with specific reference to maternal nutrition and research relevant to the improvement of pregnancy outcome and fetal development.

### **A. Recent Developments and Methods for Nutrition/Micronutrient Status Assessment and Measurement**

B. Sivakumar, NIN, Hyderabad

Dr. Sivakumar summarized various blood and urine indicators available for the assessment of micronutrient status and presented data on the prevalence of subclinical vitamin A deficiency in children. He noted that deficiencies of vitamin A, B-complex vitamins, iron, and iodine are important from the point of view of public health. The need for critical evaluation of cut-off values for subclinical deficiency was suggested.

### **B. Methods for the Measurement of Nutrition Impact and Adaptation of Laboratory Methods into Field Setting to Enhance and Support Community-based Nutrition Research**

Noel Solomons, Center for Studies of Sensory Impairment, Aging, and Metabolism, Guatemala City, Guatemala

Dr. Solomons addressed conceptual issues related to the development and use of laboratory and field-based methods of nutrition assessment. He focused particular attention on the need for sensitive and specific biomarkers that not only reflect short- and long-term intake patterns, but also represent a biologically relevant activity. The need for biomarkers was defended both in terms of assessment of status and as documentation of the efficacy of interventions. Within that context, he discussed both measurement and interpretation issues.

In his discussion of field methods, Dr. Solomons described several currently available methods including multiple examples of tests using dried blood spots with capillary serum. Evidence was presented of the development and utility of biomarkers reflecting functional endpoints including immune indicators, cytokines, acute-phase proteins, and retinol excretion. Dr. Solomons commented on the utility, reliability, and validity of available methods for testing human milk, urine, buccal mucosal cells, and thiobarbituric acid reactive substances (TBARS, an index of antioxidant activity) as functional indices of nutrition status. Stable isotopic methodologies, particularly those used for the assessment of zinc, iron, calcium, and deuterium-labeled retinol and carotene were highlighted. In addition to his coverage of methods that might be appropriately applied in the field analysis of nutrition status, Dr. Solomons also offered his thoughts on issues related to design and implementation, including the ethics, safety, logistics, and feasibility of field studies employing such techniques.

### **C. Paradigm Shift of Nutrition from Farm to Consumer with Interphasing of Primary Processing in India**

V. Prakash, Central Food Technological Research Institute, Mysore

Emphasizing Indian success in the production of essential commodities such as fruits, vegetables, meat, poultry, and dairy products, Dr. Prakash observed that to build on these successes a need exists to address problems associated with post-harvest loss, the chain of intermediaries from food producer to consumer, and the need for new strategies to stabilize food byproducts and to create markets. He encouraged the empowerment of local farmers to allow them to assume larger roles as traders, entrepreneurs, and wholesale distributors of their commodities. To address indigenous food and nutrition shortcomings, he endorsed an increase in the interface between the large food processing sector and smaller regional or local producers and distributors. He strongly advocated the promotion of awareness as essential for the improvement of food habits, and noted that traditional food processing methods, like parboiling rice, could help preserve food quality. He cautioned that an

over-reliance on supplementation and a lack of attention to the factors influencing nutrient bioavailability in foods could hinder India's short- and long-term progress towards the eradication of micronutrient deficiencies. Dr. Prakash emphasized the important role of women in food acquisition, distribution, and preparation. He also recognized the role of women as a potentially powerful entrepreneurial resource because women can help increase the visibility of indigenous solutions to national and regional food problems through increased attention to national nutrition standards.

In his endorsement of a National Nutrition Initiative, Dr. Prakash suggested the goal of anemia eradication by 2005 should be a centerpiece. As part of the national effort, he also called for an increased emphasis on the prevention of foodborne illnesses. He also supported the use of food-based strategies, including fortification, to address nutrition inadequacies. He proposed that a long-term emphasis on food-based strategies be coupled with the short-term use of food fortification. He noted that such a strategy would require an alliance among government and consumer groups, the food industry, and other relevant organizations. Such an alliance would also help prevent and eliminate micronutrient deficiencies, thereby enhancing the health of the Indian population.

### Closing Session

During discussion following the workshop summary presentations, the following priorities emerged as key areas to emphasize through an enhanced Indo-US collaboration on nutrition research and interventions:

- development, evaluation, and implementation of home-based management strategies for children with severe-grade malnutrition;
- establishment or strengthening of four to five regional laboratories and animal research facilities to provide an expanded research and monitoring infrastructure;
- increased attention to the role of traditional remedies and tribal practices in food-based approaches;
- identification and remediation of environmental factors affecting health and nutrition;
- research on novel approaches to prevention and management of LBW babies. Noting that the present capacity in India to determine the incidence and outcomes of LBW is limited because 70% of the births occur at home, a need exists for the development of sensitive and accessible field-tested methods for assessing nutrition status of LBW infants.
- examination of the ICDS program to determine if action should be taken whenever growth faltering is noted, i.e., rather than monitoring growth every month, it might be done every three months;
- telescoping issues of empowerment and cost at the program level;
- increased emphasis on the identification of local community-based rather than regional or national center-based solutions to nutrition problems;
- behavioral research to increase understanding of the role of family dynamics in nutrition problems and to inform the development of culturally relevant behavioral programs to change attitudes of family members towards prospective mothers and mothers;
- increased emphasis on appropriate, sensitive methods of nutrition assessment. For example, the application of stable isotopic studies would be particularly useful in:
  - integrated studies to increase the understanding of the relationship between energy requirements, body composition, endocrine changes, and micronutrient status in children and adolescents (particular in the context of attainment of menarche),
  - studies to increase the understanding of factors impacting on bioavailability of micronutrients, e.g., iron and zinc, in foods indigenous to the Indian experience.

During the closing session, Dr. Barbiero thanked the NIN and ICMR for their gracious hospitality and for creating a forum for the frank discussion of future Indo-US research priorities. From Dr. Barbiero's point of view, the conference identified nine specific areas for future collaborative research:

- the relationship between LBW and nutrition,
- breastfeeding (including the timing of appropriate complementary feeding),
- surveillance systems for determination of regional distribution of malnutrition,
- logistic- and supply-related operations research,
- anemia (both in terms of strategies to improve iron status and its impact on birth outcomes),
- the role of and processes for the enrichment of food,
- evaluation of the safety and potential use of genetically modified foods,
- increased attention to nutrition of adolescents girls, and
- the interface between family and community dynamics and nutrition

Dr. Barbiero also noted that challenges remain in the enhancement of the scientific-programmatic interface, and in the establishment of scientific bases for supplementation and food-based approaches to improve child survival, including the role of vitamin A. Dr. Barbiero said that important next steps will be to prioritize and better define the research ideas and discern the specific options for cooperation and support. This could be done through an Indo-US Joint Working Group on Maternal and Child Health and nutrition research.

Citing his personal journey, Dr. Kalyan Bagchi of the Nutrition Syndicate, New Delhi, reviewed the oppor-

tunities, challenges, ecstasies, and agonies that have arisen over the last 50 to 60 years in the field of nutrition in India. He gave a synopsis of the workshop's deliberations beginning with the inauguration, keynote addresses, and the prioritization of the research activities as presented in the workshop session summary statements. He stressed that the links between reproductive health and nutrition should not be forgotten. He concluded that political commitment and social mobilization are absolutely essential for improving the nutrition status of the population.

Dr. Yvonne Maddox initiated closure of the meeting by offering her deep appreciation to the meeting organizers and participants for a productive and enlightening program. She reconfirmed the commitment of the NICHD and the U.S. participants to ensure that the conference results are converted into a joint program of action involving Indian and U.S. scientists. She endorsed the constitution of a Joint Working Group to assist in the identification of the most important priority areas of mutual interest and to stimulate investigator-initiated

collaborative research to address these priority areas. Citing the success of the existing Joint Indo-US Program on Contraception and Reproductive Health Research, Dr. Maddox noted that such a mechanism will allow the development and subsequent support of collaborations between US and Indian investigators.

Dr. Prema Ramachandran, who co-chaired the last day of the conference, reemphasized the importance of identifying and prioritizing key areas for collaborative research. She also endorsed the formation of a Joint Working Group with support from both the United States and India. She reminded the group of the critical importance of improving the nutrition status of women and children, as they represent the future of a healthy society.

Mr. N.C. Saxena closed the meeting by proposing a vote of thanks on behalf of the ICMR to all those, especially the NIH, USAID, and the NIN, who had helped in the organization and successful completion of the conference. He also proposed that the deliberations of this meeting be published as proceedings in a recognized international journal of nutrition.