# MULTI-CENTER INITIATIVE FOR EVALUATION RESEARCH AND CAPACITY BUILDING FOR MICRONUTRIENT DEFICIENCY CONTROL PROGRAMS.

Project supported the Micronutrient Initiative
undertaken by the
Department of International Health and Development,
Tulane University School of Public Health and Tropical Medicine,
New Orleans.

JBMason, Principal Investigator

## FINAL REPORT

### TO THE MICRONUTRIENT INITIATIVE

**(MI File: 5600-0007-35-300)**

**5 December 2003**

Final Technical Report
Reviewed and Approved
9 Dec 2003

5 December 2003

## SYNTHESIS

Micronutrient programs expanded rapidly in the 1990's, in a majority of developing countries. Bringing together the experience in initiating and implementing these, and assessing their probable impact, was timely for putting forward tested approaches where these worked, and suggesting new ones where needed. At the same time, the capacity in affected countries for intervention needs to expand in line with program needs. This project laid out the knowledge base for designing such programs, and suggested next steps, with particular attention to capacity building. In doing this, it started a network among a number of institutions in twelve countries in Asia (plus South Africa), which is poised to move ahead in enhancing the capacity in these and additional countries.

The research carried out by national institutions, with support from Tulane through this project, established the state of the art in large scale interventions to address deficiencies of iodine, iron, and vitamin A. These findings were synthesized in a preparatory workshop hosted by the Institute of Nutrition at Mahidol University (INMU), Thailand, and then presented and discussed at an international meeting, with more than a hundred participants, held as part of the International Union of Nutritional Sciences four-yearly Congress in August 2001. The results are now being published and disseminated through the UNU Food and Nutrition Bulletin (in print, web, and CD form). This includes three synthesis papers, based on the material presented and additional research, jointly with INMU and University of the Philippines, Los Banos (UPLB), concerning respectively the initiation, implementation, and impact of programs. Eleven country case studies are included. These provide a definitive overview of the status of programs, and point to the next steps needed for a sustained impact on micronutrient deficiencies.

These found that systematic application of conventional procedures for project initiation worked and can be further applied. Implementation was generally successful in rapidly increasing coverage, but (for vitamin A doses) new distribution methods may need to be developed, and for iodized salt attention is needed to monitoring, quality control, and reaching underserved populations. Iron deficiency programs have lower and varying coverage, and need further technical developments, including exploration of fortification of staple foods in Asia. Although initial data collection was usual, further data with suitable design for assessing impact is scarce. While it is plausible that vitamin A supplementation has contributed to bringing clinical vitamin A deficiency to very low levels (less than 1%), impact on the more extensive sub-clinical deficiency is unclear. Iodized salt has been clearly associated with sustained falls in iodine deficiency disorders (IDDs), mainly measured by goiter, and the issue is sustaining and increasing coverage. Impact of iron supplementation on anemia has not been widely demonstrated, although in certain countries (Thailand, Vietnam) significant improvements have been seen.

Considerable numbers of people will need to be trained for sustaining and expanding deficiency control programs. The needs at different levels were assessed, and proposals

written and submitted (to the Global Alliance for Improved Nutrition—GAIN – and to CDC). As yet these await funding support. Materials from the project – as being published, and related documents – have been distributed to training institutions. The capacity building strategy envisages triangular links, with Tulane (and other developed country institutions, e.g. Emory) working with the more advances centers (e.g. continuing with INMU and similar centers), to then support the development of less experienced institutions. Four proposals for follow up, two for capacity building on behalf of the multi-center group, and two for development of assessment methods, are being pursued.

## BACKGROUND AND OBJECTIVES.

This project was part of a larger effort entitled 'Multi-Center Initiative on Successful Micronutrient Programs', for which financial support was also obtained from CDC[1]. UNICEF collaborated at various stages. The centers directly involved were Institute of Nutrition at Mahidol University (INMU), Thailand; University of the Philippines (UPLB), Los Banos, Philippines; Public Health Program, University of the Western Cape (UWC), South Africa; and Department of International Health, Emory University. The other ten countries and their institutions represented were also seen as part of the multi-center effort. A list is given in Annex 1.

The project was started to build on the increasing experience in planning and implementation of micronutrient deficiency control programs, which accelerated in the 1990's, such that by 1999 a majority of countries were known to have adopted policies for tackling these deficiencies. Countries in Asia were well covered. It was argued that developing national case studies of operational programs, and synthesizing the lessons, would provide important guidance for future successful micronutrient programs. A focus on program initiation, implementation, and impact was adopted as a guiding structure.

The project objectives overall were to initiate a process through which the implementation and impact of micronutrient deficiency control programs can be better understood and to enhance, through relevant research and surveillance, the capacity-building of a number of countries institutions.

The specific objectives were: a) to identify the need and methods of the capacity-building for a number of national institutions; b) to build an agreement on methods to be used for program evaluation by national institutions; c) to develop a network of communications and share research methods and results; d) to assist the countries representatives to prepare proposals for the funding support; and e) to design projects for the evaluation to be implemented by late 2001.

## DESCRIPTION OF ACTIVITIES.

When the activities began in early 2001, it was decided among the sponsors (MI and

[1] 'Successful Micronutrient Programs'. ASPH/CDC (S1508-20/20)

CDC), with UNICEF, to use the August 2001 International Union of Nutritional Sciences International Congress of Nutrition, as a focal point for the project. (Preliminary actions and contacts had begun in late 2000, with the CDC funding). The concept was developed to bring together a substantial number of national institutions (about 12) in Asia and South Africa, and to work with these in developing methods and applying these to evaluation of programs; these then provided case studies for presentation and later dissemination, developed by the national institutions, with inputs from Tulane faculty and staff, and from collaborators from INMU, Bangkok, with whom a sub-contract was passed to support their work. This oriented the objectives towards building the network, and initiating first evaluations within the preparatory work for the presentations at IUNS in 2001.

Initial steps involved identifying suitable programs in Asian countries, and institutions to work with in studying these. Our main collaborator to begin this process was INMU, with whom arrangements were made to provide inputs to certain countries and collaborating centers; similar arrangements were later made with UPLB. Visits were paid to almost all the collaborating centers so identified (see list in Annex 1). Identification was facilitated through contacts with UNICEF offices, and from previous work, in collaboration with UNICEF and the Asian Development Bank (ADB), as described in Mason, Hunt, Parker, and Jonsson (2001)[2]. MI provided useful contacts through their New Delhi office. Information was compiled on the stage of development and knowledge of ongoing programs, from which a selection was made of candidates for case-studies. From this, case-study development was invited from institutions in twelve countries: Bangladesh, Cambodia, China, India, Indonesia, Laos, Myanmar, Philippines, South Africa, Sri Lanka, Thailand, Vietnam.

A workshop, hosted by INMU in Bangkok in June 2001, provided guidance for work-in-progress, and refined the agreed structure for presentation at the forthcoming international meeting scheduled for August 2001. In particular, a detailed outline was agreed for the methods for research, and for compilation of material for the papers, which was crucial not only for the case-studies themselves, but also for the subsequent synthesis of the lessons. This outline is given in Annex 2. MI participated actively in this process (T Schaetzel and S Bulusu). Work in progress (e.g. given as powerpoint presentations) was adapted for presentation in Vienna, and also provided some material for the final publications.

The Bangkok meeting initiated discussions on needs for capacity building in the different countries, ways in which this was being undertaken, and how this might be strengthened. An assessment was initiated of human resource availability and needs; however it proved difficult to gain data on most of the participating countries, and this quantitative aspect was given lower priority. The project activities themselves provided in-service training

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2 Mason, J.B., Hunt, J., Parker D. & Jonsson, U. (2001) Improving Child Nutrition in Asia. Supplement to *Food and Nutrition Bulletin*, **22**, (3) 5 – 73 Sept. 2001. United Nations University Press, Tokyo.
[ http://www.adb.org/Documents/Books/Nutrition/Improving_Child/default.asp ]

to a substantial number of national staff in the participating countries, from faculty and staff from both Tulane and INMU. A session of the Vienna workshop was devoted to 'Capacity Building for Nutrition Programs' (see Annex 4, pp17-19). Papers and presentations were prepared on capacity building by INMU and UP Los Banos, and these papers are attached:

Capacity Building Needs for Micronutrient Deficiency Control Programs in Asia. Winichagoon, P

Capacity Building for Nutrition Programs in the Philippines. Prof. Ma. Antonia G. Tuazon, Ph.D.

The report of the Bangkok preparatory meeting was distributed in draft as background for the international workshop. The full report (61 pages) is available on our website at www.tulane.edu/~internut/publications/wkshpreport-bkk.doc . The contents are shown attached here in Annex 3. Working groups on capacity building met as part of this preparatory meeting, recommending methods and approaches, as referred to on pp 23-27 of the report of the preparatory meeting.

The preparatory meeting reviewed the work already begun to develop case studies, and this continued in the intervening time up to the IUNS meeting in Vienna.

The 'Workshop on Successful Micronutrient Programs' was held as an International Union of Nutritional Sciences (IUNS) Satellite Meeting at the International Nutrition Congress, Vienna, Austria, on 24-26 August 2001. The meeting was convened jointly by Mahidol and Tulane Universities. Some 100 people participated, of which 25 were specific invitees; the presenters were sponsored by the organizers, with a number of participants supported by MI, as well as by other collaborators, UNICEF in particular. The agenda and briefing material is in Annex 4. The first session included all the case material and synthetic discussion on Successful Micronutrient Programs. The second session addressed Capacity Building for Nutrition Programs.

The meeting was briefed on the work then under way by an 'Enabling Group', initiated by the Bill and Melinda Gates Foundation following a meeting in Seattle in July 2001, to develop new activities in micronutrient fortification which later led to the Global Alliance for Improving Nutrition (GAIN). The group (responding to a suggestion at the July Seattle meeting) reached consensus on a statement that was conveyed to the Enabling Group, expressing their views – which included those of substantial number of representatives from developing countries – on priorities and ways ahead in this field. The statement is attached as Annex 5.

Following the meeting, work continued in several ways. First, additional information was needed to complete a number of the case studies, and consultation with authors continued, including some visits from INMU (Drs Winichagoon and Yhoung-Aree) and UPLB (Dr Tuazon) to nearby countries (in the context of other travel). Second, a number of proposals were developed for follow up, as discussed in the next section. Third,

during and following the meeting, the lessons to be drawn by synthesizing the experience were pulled together, and three papers drafted on the topics. The synthesis papers and country case studies as finalized are listed in Annex 6. Drafts of the case studies were put on the website as they progressed, and can be viewed at www.tulane.edu/~internut/trial/IUNS.htm . Considerable delay was experienced in finalizing some case studies, due to communications with a number of countries, and the needs for validating some aspects of the information presented at the Vienna meeting.

Agreement was reached with the editors of the UNU Food and Nutrition Bulletin (a peer-reviewed journal) to publish the synthesis papers and the set of eleven country case studies as a Supplement to the Bulletin, with funding from the Micronutrient Initiative. An editorial group was established, with Profs Martorell (Emory) and Soekirman (IBP, Indonesia) overseeing the synthesis papers; and with Prof Mason, Ms M Deitchler, and Ms E Mathys as guest editors for the country case studies. Subsequently, due to increased costs associated with the UNU Food and Nutrition Bulletin supplements, and in light of the considerable useful detail and associated length of the case studies, it was decided to publish the synthesis papers and summaries of the country studies in print form, and to publish the full case studies on the UNU website of the Food and Nutrition Bulletin; this material will also be provided in CD form for readers outside N America and Europe. Additional copies will be provided (through the Micronutrient Initiative) to interested parties in developing countries. The print version will be in a regular issue of the UNU Food and Nutrition Bulletin in March 2004.

The abstracts of the three synthesis papers, as accepted for publication, provide a summary of the overall conclusions. These are given in Annex 7, which also contains the summaries of the country papers (as available on 5 December 2003). We stress that methods for program initiation and implementation have worked well, following the conventional approach including surveys, national workshops, and external assistance in most cases. Iodine fortification of salt has expanded greatly, with demonstrable impact, although there are still issues to be solved to reach those most in need. Vitamin A capsules distributed twice-yearly have reached high coverage, but new approaches are needed as National Immunization Days decline; while clinical deficiency is falling, effects on the far more prevalent sub-clinical deficiency have not been widely demonstrated. Iron supplementation is the least extensive, and probably additional approaches, especially achieving iron-fortification of rice, are required to improve iron deficiency in the most affected populations.

The synthesis papers (especially the third) stress the importance of more and better evaluation of large scale operational programs, and suggest priorities for applying these. This is drawn from the experience documented in the country papers, and as presented and discussed in the Bangkok and Vienna meetings. Application of these methods was put forward in a number of the proposals developed during this project, see next section.

More details are in the abstracts and the papers themselves (on the web as given above).

## DEVELOPMENT OF PROPOSALS FOR CAPACITY BUILDING AND EVALUATION RESEARCH

This Multi-Center Initiative built a network and consortium of more than ten institutions, most in developing countries. The Micronutrient Initiative, the Centers for Disease Control, and UNICEF, were part of the consortium involved in the multi-center initiative. The core institutions, as the project evolved, were Tulane; Emory (Dept of International Health); INMU, Thailand; UPLB, and Food and Nutrition Research Institute (FNRI), Philippines; UWC, South Africa; Center for Food and Nutrition Policy Studies, Agricultural University, Bogor, Indonesia. The School of Public Health, UC Davis, also participated. Associated institutions, doing research into programs, participating in the meetings and contributing material, were from Bangladesh, Cambodia, China, Laos, Myanmar, Sri Lanka, and Vietnam (see participants in Annex 1). These agreed to try to continue to work together, as discussed in some detail in Bangkok and Vienna. A statement laying out some principles was put forward to the (then) Enabling Group developing the Global Alliance for Improved Nutrition under the auspices of the Gates Foundation (see Annex 5). It was agreed that Tulane would take the lead in trying to raise funds to implement the capacity–building and evaluation research on which there was general consensus. Moreover, it was felt that enough detail had been laid out in the papers emanating from the research and meetings that support should be sought as a consortium, as well as from individual countries on their own initiatives. This led to the development and promotion of several proposals, as part of or as a direct result of the multi-center initiative, four on behalf of the consortium.

The first follow up was for capacity building and research with three countries (Philippines, Thailand, and Vietnam), supported by MI under the title 'Multi-Center Micronutrient Project for Enhancing capacity and Effectiveness of Micronutrient Programmes in South East Asian Countries' (MI 10-0004-1-3). This was implemented in 2002, and is reported on separately[3]. Six professionals from these countries participated in a 2 month special program in Tulane, with participatory research in evaluation data analysis, seminars and coursework.

The proposals for which funding is being sought are contained in full in the Appendix (available separately), and are as follows.

1. **National Capacity-Building For Sustainable Micronutrient Deficiency Control Programs: Concept Paper.**[4] December 2002 (summary in Annex 8). This proposal was developed from earlier drafts, starting in July 2001 after a meeting convened by the Gates Foundation in Seattle, which led to the formation of the Global

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[3] Report in preparation.

[4] This concept paper was put forward on behalf of a consortium of universities working in micronutrient nutrition: Tulane University, School of Public Health and Tropical Medicine, New Orleans; Emory University, Rollins School of Public Health, Atlanta; Institute of Nutrition at Mahidol University (INMU), Thailand; Center for Research and Development in Nutrition (CRDN) and Dept Nutrition, Agricultural University, Bogor, Indonesia; University of the Philippines, Los Banos (UPLB) and Food and Nutrition Research Institute (FNRI), Philippines; Public Health Program, University of the Western Cape, Capetown. Work is done in collaboration with MI, CDC, UNICEF, UC Davis, and CFNI.

Alliance for Improving Nutrition (GAIN). The December 2002 concept note was put forward to the Secretariat of the GAIN, on behalf of the consortium formed in the course of the Multi-Center Initiative (as indicated in the footnote) and formed the basis for a discussion in Atlanta in early 2003, by Drs Mason and Martorell (Emory) with the GAIN secretariat. At this time we were advised that the GAIN was focussing on generating proposals for national fortification programmes, and was not yet open to considering this type of capacity-building. We were advised also that the scope of the project – involving a substantial number of institutions in developing countries – was likely to be too extensive for GAIN, and that if and when GAIN activated its previously announced window for supporting capacity building it would need a lower budget, and hence fewer institutions, than proposed (see page 14 of GAIN proposal). As of 5 December 2003, this grant opportunity has not been announced, and no Requests for Proposals have yet been issued for which this proposal would be eligible.

2. **Enhancing Micronutrient Programs in Developing Countries: Research plan as submitted to ASPH/CDC Cooperative Agreement.** June 2002. This follow up proposal was invited by CDC, after their acceptance of a letter of intent. The proposal was approved, but funds were not available: by that time the funding for micronutrients through this mechanism had been greatly (and unexpectedly) reduced; two proposals were approved (the other was from Emory), and only one funded. Attempts were made, encouraged by CDC, to combine with Emory, however the funds were too limited. Most of our training materials were provided to Emory for their inclusion in the materials under preparation. A summary of the proposal, as accepted by CDC, is included in Annex 8, and the full proposal in the Appendix. This proposal also envisaged supporting the work of the consortium. The concepts in this proposal, as in the complementary first proposal, are considered valid and efforts will continue to identify support.

3. **New methods for assessing micronutrient deficiencies.** Two proposals were promoted to develop methods that could be more widely applicable to evaluation of micronutrient programs. Constraints to obtaining better and more accurate data on these are considered to relate in part to their complexity and the need to draw, and for both anemia and vitamin A deficiency new techniques are becoming available and need field testing.

a) The first attempt here was to put forward a letter of intent (unsolicited) to CDC through the ASPH mechanism. This was not accepted. The letter is included in the Annex 8 for information.

b) The second approach was incremental, stemming from reaching agreement with an instrument manufacturer to use equipment on loan to test its applicability to survey measurement of hemoglobin levels, hence anemia. The method is quick and non-invasive, and the manufacturer's tests had indicated reasonable sensitivity and specificity in a laboratory setting. A second method, for quantifying night blindness with an innovative approach, also showed encouraging results in a lab setting. The hope is to test these two methods together. The current stage is that ethical clearance is being obtained for a preliminary test here, followed by field testing in collaboration with CFNI in

Jamaica; for this funding will need to be identified. A description of the proposal and research design is in the Appendix.

4. **Capacity building for fortification programs in Indonesia.** A request was received for assistance in developing a training program to support a national effort in fortification in Indonesia. This came from the newly-formed National Fortification Coalition. After a preliminary visit by JM in August 2003 (combined with other travel), UNICEF recruited Ms Mathys, from Tulane Department of International health, to work out a proposal. This proposal is designated:

**Koalisi Fortifikasi Indonesia (KFI): Training in Support of the National Micronutrient Fortification Strategy for Indonesia: Training Schedule Summary, Training Schedule and Curriculum Guide**. *Developed by*: Ellen C. Mathys, MPH & John B. Mason, PhD, Tulane University.

The proposal, contained in the Appendix, was submitted to GAIN for funding. As we understand it, this funding was not forthcoming, but based on this a training program has been launched internally in Indonesia; some training materials were provided by Tulane. The format can provide a model for similar training elsewhere, and we will find out the lessons learnt and evaluations of the course.

In sum, a number of efforts have been made, and are continuing, to identify funding for continued capacity building along the lines developed and agreed during this project. At the same time, individual country institutions have been helped in developing their own proposals through the consultations – at meetings and by email – that went into the development of the proposals described above. The Regional Food and Nutrition Training Program at UPLB, Philippines, have incorporated a number of the concepts into their teaching; as has the Institute of Nutrition at Mahidol University (INMU), in Thailand. Materials have also been shared and are in use. Part of this was supported by MI under the project 'Multi-Center Micronutrient Project for Enhancing capacity and Effectiveness of Micronutrient Programmes in South East Asian Countries'.

## SUMMARY OF RESULTS AND NEXT STEPS.

The project gave a definitive overview of the current status of micronutrient programs in Asian countries (applicable elsewhere), in terms of how existing programs are developed, initiated and implemented. Understanding of their impact is less advanced, but it is likely that when well implemented most programs have a useful effect. The state of the art, in these terms, has been written up both synthetically, to draw the lessons, and details have been provided in eleven country case studies. This material and its interpretation provides guidance for now extending interventions and increasing the effectiveness. These papers will be published in March 2004 in the UNU Food and Nutrition Bulletin (March 2004), and pre-publication versions are available on the Tulane website (see Annex 7 for synthesis papers), as are the case studies: www.tulane.edu/~internut

Equally important, the project created and set in motion the work of a number of leading

institutions in nutrition, with a focus on micronutrients. A group of these formed an informal consortium, participating in proposal development, which will be activated once funding is secured, which is now the priority. Methods needed – for initiating, implementing, and evaluating programs have been laid out based on the work of this project, and are about to be published in a form ensuring wide circulation in developing (as well as industrialized) countries (using print, web, and CD).

Formats for training have been suggested, in the context of national planning for micronutrient programs (focusing on fortification) in Indonesia; and for developing knowledge and skills of professionals and trainers (see the report on the MI-supported 'Multi-Center Micronutrient Project for Enhancing capacity and Effectiveness of Micronutrient Programmes in South East Asian Countries', in preparation).

This experience provides a basis for enhancing the abilities of these and other institutions in this field. The next steps, for sustainably and effectively addressing micronutrient deficiencies, are to apply these capabilities to: making *established* programs more effective and sustainable; developing *innovative* new approaches where the problems are *not* being adequately controlled by existing methods; *initiating* programs where these are not yet established in deficient populations.

**ANNEXES.**

1. List of participants in the Preparatory Workshop (Bangkok, June 2001) and IUNS Satellite Meeting (Vienna, August 2001)

2. Guidelines for case-study paper preparation for Vienna meeting.

3. Contents of Report of Preparatory Workshop on Multi-Center Initiative on Capacity-Building and Evaluation Research for Micronutrient Deficiency Control Programs. Nakhon Pathom (Bangkok), ThailandJune 12-14, 2001. M. Deitchler, P. Winichagoon, and J. Mason. August 2001.

4. Agenda and briefing materials for IUNS Satellite Meeting on Successful Micronutrient Programs and on Capacity Building for Nutrition Programs, 24-26 August, 2001.

5. Statement from participants from developing countries at the Satellite Meeting held at the 17th IUNS International Congress of Nutrition, on 'Progress in Public Nutrition – Successful Micronutrient Programs', Vienna, 24-26 August 2001, convened by Tulane and Mahidol Universities, supported by CDC, MI, and UNICEF

6. List of papers forthcoming in Food and Nutrition Bulletin, March 2004, on 'Successful Micronutrient programs'.

7. Abstracts of synthesis papers:

*Lessons from Successful Micronutrient Programs.*
*I. Program Initiation.* Deitchler M, Mason J, Mathys E, Winichagoon P and Tuazon MA.
*II. Program Implementation.* Deitchler M, Mathys E, Mason J, Winichagoon P and Tuazon MA.
*III. Program Impact.* Mason J, Deitchler M , Mathys E, Winichagoon P and Tuazon MA

*Country paper summaries*
Fighting Micronutrient Malnutrition In Bangladesh: Progress Made Over The Decade. Hossain M and Hussain T

Programs for Micronutrient Deficiency Control in Lao PDR. S.Naphayvong, P.Vongvichit, and M.Deitchler

The National Salt Iodization Program, The Philippines. Tuazon MA and Habito RCF

Indicative Impact, Policy, and Program Implications of the Philippines Vitamin A Supplementation Program. MRA Pedro, RL Cheong, JR Madriaga, CVC Barba Micronutrient Programs in South Africa Witten C, Jooste P, Sanders D and Chopra M

Case studies on successful micronutrient programmes: The Sri Lankan experience. Piyasena, C

Current situation and status of micronutrient policies and programs in Thailand. Winichagoon, P, Pongcharoen, T and Yhoung-aree, J

Successful Micronutrient Programs: Micronutrient Deficiency Control Strategies in Vietnam. Ninh NX, Khan NC, Vinh ND and Khoi HH

To come: Cambodia, China, Indonesia

8. Summaries of proposals

1. To Global Alliance for Improved Nutrition (GAIN) – based on first draft July 2001. *National Capacity-Building For Sustainable Micronutrient Deficiency Control Programs: Concept Paper*. 20 December 2002. JBMason.

2. Proposal to CDC through ASPH Cooperative Agreement – Sections taken from: *Enhancing Micronutrient Programs in Developing Countries*. Research plan as submitted to ASPH/CDC Cooperative Agreement JBMason, 6 June 2002.

3. Letter of Intent. *Improved Methods for Surveys of Micronutrient Status*

John B Mason, Principal Investigator, Ellen Mathys, Co-Principal Investigator
19 February 2003

4. *Capacity building for fortification in Indonesia.* Ellen Mathys and John Mason. November 2002. See Appendix.

**NOTE. Full proposals are provided separately in the Appendix. Other attachments are two papers on capacity building, in Thailand and the Philippines.**

## *Annex 1: List of participants*

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** Vienna only

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## *Annex 2.*

**OUTLINE FOR CASE-STUDIES ON SUCCESSFUL MICRONUTRIENT PROGRAMMES**

1. ***Context, background, problems addressed.***

   *a) Brief country description:* demography (numbers, growth, urban/rural, mortality rates, trends); economic activities, assets, income/caput; major political events; development situation and policy, macroeconomic/structural adjustment; poverty focus, e.g. basic minimum needs (like Thailand).

   *b) Health and nutrition policies:* main features of current/planned health policy, e.g. health sector reform (including e.g. packages of health activities; decentralisation; changes in health sector budget) plus brief recent history; main features of nutrition policies/programmes (e.g. community-based/service delivery; micronutrient programmes); relationship of health and nutrition policies to overall development policy (e.g. integral part/objective; being privatised; etc); indicators of access to services (e.g. immunization coverage, ante-natal care), of community-based programmes (e.g. including growth monitoring).

   *c) Extent, distribution, and trends in micronutrient deficiencies*: most countries have some survey data on clinical or biochemical assessments of VAD, IDDs and anemia (of the twelve: clinical VAD, 8; low serum retinol, 8; IDDs, 9; anemia, 10). These can usually be used to show prevalences and numbers affected by biological group, geographical area, and occasionally by some measure of socio-economic status. Trends are more rarely available, requiring surveys comparable through time, but if feasible can be particularly informative. Deficiencies other than VAD, IDD and iron (e.g. rickets) should be described here. Causes of micronutrient deficiencies should be outlined (maybe using the UNICEF food-health-care framework).

   *d)* Rationale for choosing the stories highlighted in the case study.

2. ***Initiation and Implementation:*** for *each* programme separately (unless integrated description works better) e.g. IDD control programme, VA supplementation programme, etc.

   *a) how programme started* - how decisions were made to initiate the programs and to institutionalize them at national level;

   *b) coalitions formed* (govt/health, industry, academia, etc); roles of international agencies;

   *c) programmes implemented.* Separately for vitamin A, iodine, and iron, the programs should be described in terms of:

   - program design, coverage, targeting, resources/head (intensity: personnel, funds, supplies), quality control, trends in implementation (sustainability); legislation, budget allocations, assignments of responsibility;
   - systems for programme delivery (service- and community-based), integration with broader programmes;
   - organizational arrangements at different administrative levels;
   - role of private sector, methods of their involvement; import issues;

- is there distinction between research/advocacy and implementing (line agency) institutions, and what are the relative roles?

3. ***Relation of programs to change in outcomes***. In some cases concurrent changes in implementation and outcomes can be seen; in some others specific evaluation studies have been done. These need to be assembled. A careful examination of the plausible relation between programs and outcome should be undertaken where feasible, in some cases leading to estimates of the extent of the programs effects on the deficiencies. Opportunities and approaches for firming up such estimates in the future should be suggested.

4. ***Lessons for strengthening sustainable and effective programs.*** The conclusions should focus on the programmatic and contextual factors that lead to successful program implementation; the constraints as applicable that prevented this; the issues for sustaining the programs until the problems are solved, and/or phasing into longer term methods (e.g. moving from supplementation to fortification); and the lessons for wider application.

## *Annex 3*

**REPORT OF PREPARATORY WORKSHOP ON MULTI-CENTER INITIATIVE ON CAPACITY-BUILDING AND EVALUATION RESEARCH FOR MICRONUTRIENT DEFICIENCY CONTROL PROGRAMS**

Nakhon Pathom (Bangkok), Thailand. June 12-14, 2001

Prepared and edited by: M. Deitchler, P. Winichagoon, and J. Mason August 2001

Report available: www.tulane.edu/~internut/publications/wkshpreport-bkk.doc

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List of Tables and Figures

## *Annex 4.*

**IUNS Satellite Meeting on**
**Progress in Public Nutrition**
**24-26 August, 2001**
**Venue: Austria Center [same as IUNS/International Nutrition Congress]**
**Green Level, Room M**

*Meeting held under the auspices of the Society for International Nutrition Research [SINR, a division of the American Society for the Nutritional Sciences], supported by the Micronutrient Initiative and the Centers for Disease Control, in collaboration with UNICEF. The meeting is convened by the Department of International Health & Development, School of Public Health & Tropical Medicine at Tulane University; and the Institute of Nutrition at Mahidol University.*

Proposed Agenda

Day 1: Friday 24 August 2001

Session 1: **Successful Micronutrient Programs**: Selected country case studies on topics of program initiation, implementation, and impact; programs include one or more of vitamin A deficiency control [supplementation and/or fortification], IDD control [iodized salt], and iron deficiency control [supplementation and/or fortification]. A copy of the proposed outline for the written case studies, on which the presentations will be based, is given at the end of this agenda.

Chair: Lindsay Allen, University of California, Davis

| | |
|---|---|
| 9:00-9:30 | Welcome & Opening Address |
| 9:30-11:00 | Presentation of Country Case Studies*<br>•Viet Nam by Dr. Nugyen Xuan Ninh, NIN<br>•India by Dr. Vijayaraghavan, NIN & Ms. Shashi Prabha Gupta, Min Human Resources Dev.<br>•Cambodia by Dr. Poly Ouk, MoH |
| 11:00-11:30 | Refreshment |
| 11:30-1:00 | Case Study Presentations (cont.)*<br>•Sri Lanka by Dr. Chandrani Piyasena, MRI & Dr. Dammika Gunaratne, MoH<br>•Bangladesh by Dr. Shah Ali, INFS<br>•Lao, PDR by Dr. Sivilay Naphayvong, MoH |
| 1:00-2:00 | Lunch |
| 2:00-3:30 | Case Study Presentations (cont.)*<br>•China by Dr. Yin Shian, Chinese Academy of Preventative Medicine<br>•Thailand by Drs. Pattanee Winichagoon & Jintana Yhoung- Aree, INMU |

•South Africa by Dr. David Sanders & Ms. Chantell Witten, UWC

3:30-4:00 Refreshment

4:00-5:30 Case Study Presentations (cont.)*

•Indonesia by Dr. Soekirman, IPB & Dr. Suroso Natakusuma, Food Fortification Commission

•Philippines by Dr. Corazon Barba, FNRI & Dr. Maria Antonia Tuazon, UPLB

•Central America by Dr. Omar Dary, INCAP/PAHO

*Authorship for presentation of case studies is tentative

Day 2: Saturday 25 August 2001

Session 1 (cont.): **Successful Micronutrient Programs**

9:00-10:00 Synthesis & Lessons from Case Studies, Introduced by Dr. John Mason, Tulane University

Discussion

10:00-10:30 Refreshment

Session 2: **Capacity Building for Nutrition Programs**

Chair: Dr. John Mason, Tulane University

10:30-11:30 Summary: Brief Presentation on Country Capacity & Future Needs by presenters of country case-study (see guideline at end)

11:30-1:00 Experience and Current Needs for Program Implementation and Evaluation in Asia by Dr. Soekirman, IPB, Indonesia

***Discussion***

Experience and Current Needs for Program Implementation and Evaluation in Southern Africa by Dr. David Sanders, UWC, South Africa

***Discussion***

Experience and Current Needs for Program Implementation and Evaluation in Central America by Dr. Reynaldo Martorell, Emory University and Dr. Omar Dary, INCAP/PAHO

Discussion

1:00-2:00 Lunch

2:00-3:00 National Capacity Building in the Context of the Micronutrient Coalition – Briefing on Micronutrient Consultation convened by Bill & Melinda Gates Foundation, Seattle 25-26 July 2001

Introduced by Dr. Venkatesh Mannar, Dr. Reynaldo Martorell, and Dr. Abe Parvanta
*Additional topics stemming from the Micronutrient Consultation are being suggested and will be communicated before or at the meeting.*

3:00-3:30 Refreshment
3:30-5:00 Discussion

Day 3: Sunday 26 August 2001

Session 2 (cont): **Capacity Building for Nutrition Programs**

9:00-10:00 Conclusion

Session 3: **Progress in Public Nutrition**

10:00-3:00 Follow-up to meeting in Montreal in 1997. Presentations by: S. Gillespie, IFPRI; U. Jonsson, UNICEF, M. McLachlan, World Bank; V. Quinn, AED; and D. Sanders, UWC. Note the report of the 1997 meeting is in the UNU Food and Nutrition Bulletin (1999) Fall 20: 3, pp. 339-343. The headings for strategic themes used for presentations here were: Advocacy; Capacity Building; Training and Education; Research Agenda; Materials on Public Nutrition.

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Revised Outline for Case-Studies on Successful Micronutrient Programmes 25 June 2001

GIVEN IN ANNEX 2, ABOVE

*********

**MULTI-CENTER INITIATIVE ON SUCCESSFUL MICRONUTRIENT PROGRAMS: FOR REVIEW OF COUNTRY EXPERIENCES, AND FOR FUTURE OPERATIONAL RESEARCH AND CAPACITY-BUILDING.**

**Satellite Meeting at International Congress of Nutrition, 'Progress in Public Nutrition: session 2 -- Capacity Building for Nutrition Programs': preparation.**

For the session on capacity building, here are some suggestions for information from those participants from countries contributing case-studies on micronutrient programs -- this should be *additional* to the case-studies presented in the first session. The main case-study covers current micronutrient programs -- how these were initiated, implemented, and their impact. Looking to the future we need to consider three related matters, under the heading of capacity-building.

1 A What is the current national capacity for developing, designing, managing, and monitoring nutrition programs in general, and (as far as this can be distinguished) micronutrient deficiency control programs?
B How many people are being trained, and hired into positions, each year?
C Hence, what are the needs for building this capacity in the future?

2 A What is the national capacity for evaluating the impact of nutrition programs (again, in general and as feasible specifically for micronutrient programs);
B for carrying out operational research on existing programs; and
C for testing efficacy of interventions at a pilot scale?

3 A What designs are being used, or should be developed, for evaluation and operational research into micronutrient programs?
B Hence, what results could be obtained in the next 3 years (or so), and
C what support would be needed to achieve this?

(This is not strictly capacity, but is important for planning future research in the Multi-Center Project.)

Participants are requested to compile information on current and needed capacity. Ideally, this should be in the form of a short paper that should be brought to the meeting. Participants will be asked to provide a brief summary of the paper (5 minutes or so), and then participate in a discussion on needs for future capacity building. The first topic (above) refers to capacity -- mainly human resources -- for nutrition programs. Tsecond then focuses down on capacity for operational and evaluation research
The third topic is somewhat different: we need to consider the research designs that could be followed in the next few years, to understand better the impact of large scale operational programs, as was discussed at the Bangkok meeting. Here the outcomes include established biological effects (including haemoglobin, iodine status, serum retinol, growth), and on human function and development (including birth weight, cognitive and motor development, and educability). It is suggested that you focus on possible research designs to evaluate selected impacts, and that the discussion should then go into how these plans could be developed, and how results could be compared and coordinated in the future.

The first two questions suggested above can be matched to indicators of capacity. The following tables may be helpful for this.

| 1. **CAPACITY FOR PROGRAM DESIGN AND MANAGEMENT.** | **Possible information and indicators** |
|---|---|
| A What is the current national capacity for developing, designing, managing, and monitoring nutrition programs in general, and (as far as this can be distinguished) micronutrient | - Positions established, maintained, and filled at different levels; qualifications of personnel; career development<br>- Programs funded (budgets) and implemented; legislation passed and enacted. |

| | |
|---|---|
| deficiency control programs? | |
| B How many people are being trained, and hired into positions, each year? | - National: numbers of people trained at different levels in relevant topics; courses (subjects, levels), number faculty teaching and qualifications; learning materials available; short courses and orientation workshops held; distance learning available, outreach; certification; continuing education available and follow up support.<br>- Decentralized (e.g. province): short courses and orientation workshops held/planned; numbers (and who) trained by distance learning methods; linkages with provincial education/training institutions, courses established, faculty oriented.<br>- Are there unfilled positions; or are graduates having difficulty finding posts? |
| C Hence, what are the needs for building this capacity in the future? | - Are people trained in the right topics, to the right levels?<br>- Do more people need to be trained? At what levels? How many?<br>- Do more posts need to be established? At what levels? Where (national, sub-national)? |

| 2. **CAPACITY FOR OPERATIONAL AND EVALUATION RESEARCH** | **Possible information and indicators** |
|---|---|
| A. What is the national capacity for evaluating the impact of nutrition programs (again, in general and as feasible specifically for micronutrient programs); | - National: numbers of people trained at different levels in relevant topics; courses (subjects, levels), number faculty teaching and qualifications; learning materials available; short courses and orientation workshops held; distance learning available, outreach; certification; continuing education available and follow up support.<br>- Decentralized (e.g. province): short courses and orientation workshops held/planned; numbers (and who) trained by distance learning methods; linkages with provincial education/training institutions, courses established, faculty oriented. |
| B. For carrying out operational research on existing programs; and | |
| C. For testing efficacy of interventions at a pilot scale? | |

## Annex 5

***Statement from participants from developing countries at the Satellite Meeting held at the 17th IUNS International Congress of Nutrition, on 'Progress in Public Nutrition – Successful Micronutrient Programs', Vienna, 24-26 August 2001, convened by Tulane and Mahidol Universities, supported by CDC, MI, and UNICEF.*** *Countries participating/represented: Bangladesh, Cambodia, Central America (INCAP countries), China, Indonesia, Laos, Philippines, South Africa, Sri Lanka, Thailand, Vietnam. This note was drafted by the group, which agreed to distribute it as a draft in this form. The statement responded to a discussion at the Micronutrient Consultation in Seattle on 25-26 July 2001*

5 Sept 2001

Micronutrient deficiencies are widespread in developing countries, affecting more than one-third of the world's population, particularly women and children. Their functional consequences such as learning disabilities, lower work productivity, higher morbidity and mortality, negatively affect the social and economic development of the countries.

The past century has witnessed unprecedented improvement in health worldwide, with spectacular declines in young child mortality and increases in life expectancy in developing countries. A significant part of this progress has resulted from the Child Survival Initiative with its promotion of new and improved technologies, notably the Expanded Programme on Immunization and Oral Rehydration Therapy. These successes notwithstanding, over 95% of young child deaths still occur in developing countries, the great majority being related to underlying malnutrition. Similarly, inequalities in health are increasing rapidly, particularly between industrialized and developing countries, but also between rich and poor groups within countries. Moreover, there is increasing evidence of stagnation or even reversals of this progress with, for example, immunization coverage rates declining in Asia and Sub Saharan Africa – especially where the capacity of health systems to support continued implementation of programmes has not been deliberately or strongly developed. Such considerations have led to an increasing recognition -- for example within many international agencies such as WHO -- of the central role of human resource development for strengthening health systems and for continued delivery of health technologies, including those known to be effective in controlling micronutrient malnutrition.

Malnutrition in women and children results from a broad range of causes at global, national, household and individual levels and its elimination requires a wide range of actions. Viewed in this context, the elimination of micronutrient malnutrition is only one part of the solution. However, it is an important and worthwhile goal that we support for several reasons:

- Important, adverse consequences for human health can be avoided
- Cost-effective strategies are available to make a difference
- Demonstration of success will encourage societies to apply the lessons more broadly

*The need for a broad approach.*

The populations of almost all poor countries suffer from multiple micronutrient deficiencies. For many reasons efforts to prevent these deficiencies have to date mainly focused on single nutrients. There has been little effort to develop an integrated approach that includes the assessment of the overall micronutrient situation in specific locations, and the delivery of appropriate amounts of all nutrients that are lacking. This initiative provides an ideal opportunity to focus on the integrated approach that is crucial for optimizing the benefits of fortification for human populations.

Current knowledge, technology and experiences on food fortification strongly support the view that food fortification is feasible and applicable. It is a sustainable, low cost , easily manageable intervention. Moreover this food-based approach of fortification can be complementary with other approaches, notably supplementation – and it should not detract from these efforts.

Strengthening capacity for micronutrient fortification has the potential to enable sustained improvements in nutrition for much of the world's population. It is important that this specific focus not only avoids conflict with other nutrition programs – including those that provide other means of control of micronutrient deficiencies – but that it also strengthens capacity for ensuring that countries improve nutrition in general, including through other complementary programs. This requires that we identify the capacities that need to be in place for effective micronutrient fortification programs, and how building these capacities fits within the broader mandate of local institutions. It is important to address how a focus on fortification can strengthen, and avoid erosion, of other important programs and resources. This identification should be done before or at the same time as major new investments are planned in fortification.

*Capacity building as focus.*

In the effort to rapidly expand food fortification to deliver essential micronutrients to vulnerable populations, the challenge is to move to sustainable, nationally-run programs. This can be ensured only if capacity to assess needs, initiate, manage, monitor and evaluate programs is built up. Emphasis from the start on support for systems and for local capacity and operational research, based on state-of-the-art knowledge, will produce results that are more self sustaining and flexible, leading to long-term effectiveness. Country capacity involves factors such as human resources, infrastructure, and empowerment.

Capacity building for effective management of micronutrient programs must deliberately address identified gaps in competences in developing countries in the general areas of policy development and analysis, program planning and design, implementation, monitoring, evaluation and advocacy. Of special concern is developing national capacity for designing and conducting evaluations/operations research. It is envisaged that such efforts would contribute to expanding knowledge and deepening appreciation for what works and what does not -- in nutrition program management in particular, and in other key sectors ( e.g. education, child development) -- thus creating a policy and political environment that will support and sustain effective programs.

Capacity building strategies must be based on short and long term objectives. These will

determine who should be involved, and require an examination of what capacities exist, which need to be strengthened, and which do not exist at all. Approaches should both develop explicit initiatives for this purpose, targeted at specific areas of capacity weakness or gaps; and be organized to progressively adapt program implementation as it progresses, so that those involved continue to learn as they work.

Short term capacity building should address the immediate nutrition issues. This is relevant particularly in developing countries where several urgent nutrition problems exist, while human resources tend to be limited. However, good nutrition should be a long term goal for any population. Therefore, capacity building must be developed with a longer term perspective: not only is enhanced and expanded competence in nutrition seen as crucial, but it should also be recognized that leadership must be built up over time, to deal with emerging issues and to ensure continuing capacity. The support needed includes technical and financial inputs.

Countries are responsible for the design and execution of nutrition programs and for their sustainability. Thus, we envisage that countries will apply directly for support of their programs to the Global Alliance. However, we also envisage that some critical assistance is best provided at regional level for several reasons:

- Experiences and successes with programs vary across countries and important lessons need to be shared widely
- Developed (north) as well as developing countries (south) have centers of excellence that would permit effective collaboration in the service of programs across regions (e.g. south-north-south collaboration).
- Economies of scale could make delivery of technical assistance and other inputs more cost-effective at global and regional level (e.g. fortification technology; regional laboratories; assessment, surveillance and monitoring tools; some types of training, etc).

*Integrating fortification with other programs*

It is important to consider micronutrient interventions as one category of intervention within a broader public health context of addressing malnutrition, which requires a multi-sectoral approach. Fortification is a powerful strategy to address the more urgent micronutrient needs but it cannot be considered alone.

In planning for food fortification, links with other institutional components in a system should include the following assessments:

1. Research and Development: number, qualifications, performance (e.g. research output) etc. of staff; opportunities for improvement; competences in terms of equipment and institutional environment to carry out research and development for fortification programs.
2. Training and Education: training needs and means of improving the training in formal and informal education institutions (advanced degree, diploma, refresher. etc).
3. Policy and Planning: how the fortification plan should be supported by authorities in terms of regulatory enforcement, policy and budget.

4. Program: how fortification links with other existing nutrition programs; what institutions (including industry) are appropriate for carrying out fortification.

*Early Implementation Steps*

The task of project preparation [including proposal writing] even in most developed countries, requires great skill and verbal agility. The difficulty of the task is further compounded when it must be written in a language other than one's own – such skills are still quite rare in many developing countries.

In order to minimize inequality and to ensure that even the poorest of the developing countries is given a fair chance to compete for Coalition funding, we suggest that the Coalition facilitate the country proposal process in the following ways (at the same time as helping to build the capacity to meet these needs from countries' own resources):

- Provide potential applicant countries with guidelines describing the proposal process in clear, simple and direct language
- Encourage Coalition members working on the ground in the applicant country to assume an "active role" in assisting the applicant in drafting the proposal
- In the event of there being no Coalition members currently working in the applicant country, arrange for such assistance to be provided by staff from another country in the immediate region.
- If assistance cannot be provided from the sources described above, the Coalition should make appropriate arrangements to provide assistance.

Keeping in view the above rationale, this proposal urges the Coalition to support and require that all national, regional, and global intervention proposals include a strong capacity building component with clearly defined criteria and guidelines.

## *Annex 6.*

**PAPERS FOR FOOD AND NUTRITION BULLETIN.**

### Synthesis papers

1. Deitchler M, Mason J, Mathys E, Winichagoon P and Tuazon MA.
*Lessons from Successful Micronutrient Programs. I. Program Initiation.*
[Files: Initiation Paper _ text.doc; Initiation Paper _ tables and figures and map.doc; Introduction to three synthesis parts.doc. Size: 8,160 words; 12 tables, 1 figure, 1 box]

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[File: Bangladesh Paper.doc. Size: 3,800 words. No tables or figures.]

2. Poly, O (2001)
*The Micronutrient Deficiency Control Program in Cambodia.*
[File: C:\micronutrs\succ mnps\countries\Cambodia Paper.doc. Size: 4,000 words. No tables or figures.]

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## Annex 7

**ABSTRACTS FROM SYNTHESIS PAPERS AND COUNTRY PAPER SUMMARIES.**

*Lessons from Successful Micronutrient Programs. I. Program Initiation.*
Deitchler M, Mason J, Mathys E, Winichagoon P and Tuazon MA. Forthcoming in UNU Food and Nutrition Bulletin, March 2004.

Internationally recognized research findings on the potential health benefits of preventing micronutrient deficiencies – especially reduced child mortality from vitamin A and prevention of *in utero* developmental damage and mental retardation from iodine – contributed to raising awareness and commitment of many governments to deficiency reduction or near elimination. The procedures undertaken to decide on large scale programs followed conventional patterns, in the twelve countries included in this study, from Asia plus South Africa. Thus a sequence of national surveys, institutional arrangements through technical committees, legislation, incorporation of programs into national plans, and external assistance, was similar for all three micronutrients. Vitamin A supplementation twice-yearly to children, then to women *post partum*, has reached national scale. Iodized salt is universally adopted at national scale in most countries, with a need for continuing efforts to reach underserved populations. Iron programs, usually aiming at daily supplementation during pregnancy, have been pursued but with less intensity. However, it is clear that these procedures have succeeded in creating a rapid expansion of large-scale deficiency control programs, which while evolving are generally being maintained.

*Lessons from Successful Micronutrient Programs. II. Program Implementation.* Deitchler M, Mathys E, Mason J, Winichagoon P and Tuazon MA. Forthcoming in UNU Food and Nutrition Bulletin, March 2004.

National programs for vitamin A supplementation and iodization of the salt supply were launched and sustained with high (but not universal) coverage in most of the countries studied. Iron programs (requiring daily or weekly supplementation, in contrast to vitamin A) had lower coverage and acceptance, mainly through antenatal care. Constraints to supplementation were of supply, awareness of health staff and communities, and (for vitamin A) insecurity with phasing out of the National Immunization Days, which have been a major vehicle for distribution. Administration to women *post partum* becomes even more important, and needs greater coverage. Iodized salt programs have expanded well with good inter-agency collaboration and local management, supported by legislation (which may need strengthening); constraints remain in terms of too many salt producers, inadequate quality, import issues, and prices. More integrated, multi-faceted programs are wanted, and priority to developing and implementing fortification – especially in finding effective ways to iron-fortify rice. Data are lacking, with fewer surveys once programs start, constraining monitoring and program control and adaptation. Nonetheless, interventions appear to have gone to scale remarkably successfully.

*Lessons from Successful Micronutrient Programs. III. Program Impact.* Mason J, Deitchler M , Mathys E, Winichagoon P and Tuazon MA. Forthcoming in UNU Food and Nutrition Bulletin, March 2004.

Micronutrient deficiency control programs have been greatly extended at national level in the last 10-15 years. However, rigorous evaluation of these is scarce, so that conclusions on impact are tentative and based mainly on indirect evidence. The coverage of vitamin A capsule distribution programs has exceeded 70% in most study countries. In countries implementing national iodized salt programs, the coverage reaches 60-90% of households with adequately iodized salt. Of the three micronutrients, coverage of iron tablet supplementation is the least well documented due to inadequate program monitoring systems and population survey data. Vitamin A capsule supplementation of pre-children 6-59 months of age has plausibly contributed to the reduction in clinical VAD and its near-elimination in many countries. The impact of VAC supplementation on children's biochemical vitamin A status (serum retinol) in national programs may be less. National data on salt iodization show a consistent relation to reduced prevalence of IDD symptoms (goiter); cretinism and other results of iodine deficiency are almost certainly falling too. The evaluation of salt iodization program impact on biochemical iodine status is limited by a lack of data. Though trials have demonstrated the efficacy of iron supplementation in reducing the prevalence of anemia, the interpretation of national-level data is not so clear. Given the substantial financial and technical commitment required to implement national micronutrient deficiency control programs, it is vital that investment enable the evaluation of impact of these programs. It is becoming increasingly important to collect data on sub-clinical deficiency (e.g. biochemical) to assess program impact.

Full papers are available at
www.tulane.edu/~internut/publications/mns-synth1.doc and synth2 & 3. synth0 is the introduction.

# FIGHTING MICRONUTRIENT MALNUTRITION IN BANGLADESH: PROGRESS MADE OVER THE DECADE

Hossain M[1] and Hussain T[2]

## Summary

In last decade, Bangladesh made substantial improvement in food production. But, people still suffer from imbalance in nutrient intake characterized by protein and micronutrient deficiencies. Over the decade (1991-1999) stunting and underweight among under-5 children were decreased (stunting: 71% to 55%; underweight: 72% to 61%). Women show average pregnancy weight gain of <6 kg. Over half of the adult population is undernourished with 10% suffering from severe malnutrition.

The government operates nationwide programs for control of vitamin A deficiency, iodine deficiency disorders (IDD) and iron deficiency anemia (IDA). However, achievement in the latter is yet unsatisfactory. Vitamin A deficiency was a gigantic problem with 3.6% children (6-59 mo) having nutritional blindness during 1982-83. In 1999, the prevalence was 0.3%, and vitamin A capsule (VAC) distribution coverage was almost 100%. However, some children (22%) still have low serum retinol concentration, and few lactating mothers (2.7%) and non-pregnant non-lactating mothers (1.7%) show night blindness. Iodized salt usage rate is satisfactory (>85%). However, a substantial number of poor and uninformed people still use cheaper non-iodized salt, which comes through illegal importation from neighboring India. IDA in Bangladesh is estimated to cause an annual loss equivalent to 2% of GDP. Although recent nationally representative data on IDA control programs are not available, a recent report (1997) concluded that 49% of pregnant women and 53% of preschool children are anemic. Due to programmatic difficulties in the current methods of iron distribution and patient compliance, the emerging food fortification technology may be a good alternative. However, wheat flour as food vehicle will not be a universal choice here; possibilities for rice or potato need to be investigated.

Bangladesh has positive cultures, policies, programs and institutions to support breastfeeding. Prolonged breastfeeding up to the second year of life is common (97%); but both early and late start of complementary feeding are still problems. Exclusive breastfeeding rate in first 6 months is 55%; some infants (22%) are given only liquids or rice water in addition to breast milk, while 6% receive no complementary food at all. Despite reasonable achievements to solve various nutrition problems, Bangladesh still shows the highest level of malnutrition in the world. Therefore, the country needs large-scale studies to get a clear picture on the dimension and nature of the nutritional problems. Capacity building of the existing nutrition institutions of the country is urgently needed. There is opportunity for the whole world to learn from Bangladesh through working with the local institutions.

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[1] To come

[2] Professor Dr Tehmina Hussain is Secretary, Ministry of Primary and Mass Education, Government of the People's Republic of Bangladesh

# PROGRAMS FOR MICRONUTRIENT DEFICIENCY CONTROL IN LAO PDR

By[3]: S.Naphayvong, P.Vongvichit, and M.Deitchler

## Summary

This paper addresses iodized salt and vitamin A supplementation programs. The case study aims to describe these programs, and to document the story leading to program initiation, to describe the challenges and successes met in program implementation as well as to provide data on the extent of impact achieved.

High rates of micronutrient deficiencies have been documented in recent years in the Lao, PDR. Prior to adoption of national micronutrient deficiency control programs in the country, approximately 95% of school age children were reported to have sub-optimal iodine status (UIE < 100μg/l) and 65% of children were reported to have severe deficiencies in iodine (UIE <20μg/l). Night blindness among children 24 to 71 months was estimated as 0.7%, and among lactating women was reported as 5.7%.

The Lao government responded to reports of widespread micronutrient deficiencies in the country by adopting national programs for iodized salt and vitamin A supplementation. Both the iodized salt and vitamin A supplementation program have been consistently implemented since initiation and, though having faced various constraints and challenges in program implementation, have each achieved notable success in program delivery.

The iodized salt program has already achieved a high level of impact nationwide, all recent coverage and prevalence data available show high use of iodized salt (> 75% households using adequately iodized salt in 2000) and low rates of iodine deficiency (27% UIE < 100μg/l). Data from the vitamin A supplementation is more difficult interpret, most coverage data available show the program to be achieving high rates of capsule coverage to children (>70% for almost all rounds and years of capsule distribution). However, a national survey in 2000 showed 44.7% of children less than five years to have marginal deficiencies in vitamin A (serum retinal <20μg/dl) and more than seven percent of children under five years to have deficient vitamin A status, as indicated by serum retinal <10μg/dl.

The consistent implementation of the iodized salt and vitamin A supplementation program is evidence of the Lao government's commitment to controlling micronutrient deficiencies in the country. The national government's collaboration with international and bilateral agencies, as well as with foreign governments, in the design and implementation of the program has facilitated program delivery. The various successes already achieved by the programs are due largely to the collaborative efforts of the bodies to establish appropriate systems for enhanced program delivery, monitoring and evaluation. However, some aspects of both the iodized salt

[3] S Naphayvong and P Vongvichit are with the Ministry of Health, Vientiane, Lao PDR; M Deitchler was with the Department of International Health and Development, Tulane School of Public Health and Tropical Medicine, New Orleans, USA, and is now with the FANTA project in Washington DC.

and vitamin A supplementation program still need further development. Increased capacity for improved program delivery and enhanced systems for monitoring and evaluation of each of the programs are desired. Ensured sustainability of currently implemented programs and identification of a longer-term strategy for control of vitamin A deficiency are additional program concerns.

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## THE NATIONAL SALT IODIZATION PROGRAM, THE PHILIPPINES

Tuazon MA and Habito RCF[4]

### Summary

Iodine deficiency disorders (IDD) remain a public health problem in the Philippines. From 1987, the prevalence of goiter has been on the rise and the latest National Nutrition Survey(NNS) conducted by the Food and Nutrition Research Institute(FNRI) of the Department of Science and Technology (DOST) in 1998 revealed that 36 out of every 100 6-12 year old children were suffering from moderate to severe IDD based on urinary iodine excretion levels.

As a response to this problem, the Government of the Philippines (GOP) enacted a law on December 20, 1995 known as Republic Act 8172, II entitled "An Act Promoting Salt Iodization Nationwide and For Other Purposes." Also known as ASIN Law, it mandates that all salt producers and traders make iodized salt available to all Filipinos.

For the nationwide implementation of the National Salt Iodization Program (NSIP), intersectoral organizational machinery was created with the main responsibility vested on the Department of Health (DOH). The program has also four main components, namely: 1) production, 2) marketing and distribution, 3) promotions and advocacy, and 4) management and coordination.

An in-depth assessment of the NSIP showed the following strengths:

- Strong political commitment of national leadership in addressing IDD
- Availability of local technology for salt iodization
- Responsive participation of private industry, NGOs and other relevant sectors
- Promotional and advocacy efforts have contributed to generation of much needed resources and political will and support
- Regular consultation and dialogues have effectively contributed to issue resolution and forged alliances

However, there are still a number of weaknesses that need to be addressed.

- Availability of iodized salt is still a bottleneck

[4] Regional Training Program on Food and Nutrition Planning, College of Human Ecology, University of the Philippines, Los Banos

- Nationwide compliance and enforcement of the ASIN Law needs to be strengthened particularly the implementation of the regulation and monitoring scheme. The personnel and testing facilities of BFAD, as primary agency responsible, should be upgraded
- Information dissemination targeting consumers should be intensified to bridge the gap between awareness and utilization of iodized salt

Furthermore, the government can consider utilizing existing network such as the NFA system for importation and distribution of iodized salt nationwide while at the local level, the takal system of selling iodized salt provides a workable and acceptable system for marketing iodized salt.

It is also evident that a stronger government-private sector-NGO partnership has to be forged where sharing of resources and expertise can take place if the NSIP is to be sustainable.

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## INDICATIVE IMPACT, POLICY, AND PROGRAM IMPLICATIONS OF THE PHILIPPINES VITAMIN A SUPPLEMENTATION PROGRAM

MRA Pedro, RL Cheong, JR Madriaga, CVC Barba[5].

**Summary**

The Philippine government addresses vitamin A deficiency with the implementation of a universal twice-yearly high-dose (200,000 IU) vitamin A supplementation (VAS) program for 1-5y old children. The program, which started in 1993, has been a centerpiece in the country's nutrition efforts. The paper reviews the vitamin A supplementation policies and program in the Philippines from the general guidelines, administrative documents and records of implementing and cooperating agencies such as the Department of Health (DOH) and Helen Keller International, and a cost-effectiveness analysis by a Philippine Cost-Effectiveness Study Team; as well as examining program impact from results of the 1993 and 1998 National Nutrition Surveys. The review drew significant program and policy implications. Among the programmatic changes was the shift from being centrally-managed by DOH to being a program devolved to local government units (LGUs). A declining coverage of target children after the early years reflected the lack of a smooth transfer of program ownership to LGUs. On the other hand, a preferential access to the program by children from poor households was apparent in some provinces. The 1993 and 1998 National Nutrition Survey results revealed indications of positive impact of the VAS program: a shift to the right in the distribution of plasma retinol among 0-5y old children between 1993 and 1998, and between children without and with vitamin A supplement in both years. This was despite the overall increase in low serum retinol from 35% to 38% over this same time [1]. In further studies [2], the main impact was shown to be in the most deficient areas; but possibly only persisting for four months after the dose. This suggested that thrice-yearly vitamin A capsule distribution might be advisable.

[5] Food and Nutrition Research Institute – Department of Science and Technology, Metro Manila, Philippines

[1] Food and Nutrition Research Institute (FNRI). Philippine Nutrition Facts and Figures. FNRI-Department of Science and technology, Government of the Philippines, 2001.

[2] Madriaga, JR, Pedro, MRA, Barba, CVC, Habito, RCF, Deitchler, M, and Mason JB. The Impact of the National Vitamin A Supplementation Program on Subclinical Vitamin A Deficiency in Pre-school Children in the Philippines. Presented at XXI IVACG Meeting, February 2003.

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## MICRONUTRIENT PROGRAMS IN SOUTH AFRICA

Witten C[6], Jooste P, Sanders D and Chopra M

### Summary

South Africa is a middle-income country, however persistent social and economic inequalities have resulted in large numbers people living in poverty. National surveys have consistently found more than a quarter of children stunted in 1994, rising to over 40% in many rural areas. Marginal vitamin A deficiency (serum retinol <20ug/dl) was prevalent in 33% of preschool children (6-72 months of age) [1]. Even after a universal salt iodisation programme over 10% of school children were iodine deficient. The South African Government has recognized malnutrition as a key priority issue and developed an Integrated Nutrition Programme (INP). Micronutrient malnutrition control is one of the focus areas of the INP to address micronutrient deficiencies in the population through a combination of strategies, namely, supplementation, food fortification, the promotion of dietary diversification and related public health measures [2, 3, 4].

In order to support the implementation of the focus areas of the INP (on micronutrient and other deficiencies), the Department of Health placed considerable emphasis on the development of a coordinated intersectoral approach to solving nutrition problems in South Africa through community-based nutrition projects (CBNP). A number of general management aspects were identified as constraints in the implementation of CBNPs which included: complex financial procedures and delays in funding, lack of staff, inadequate staff training and inadequate technical support. This highlights the crucial gap between policy and successful implementation [5].

The Department of Health has had relative success with mandatory salt iodisation since 1995. However, small weaknesses still exist in the national salt iodisation programme, such as domestic use of non-iodated agricultural salt in 6,5% of households [6]. The 1999 National Food Consumption Survey (NFCS) findings indicated that one out of two children had a dietary vitamin A intake of less than half of the recommended level. The Department of Health set out a policy for a supplementation programme as a primary prevention strategy, to form part of routine mother and child health services. This programme targets all children aged between 6 and 60

[6] C Witten, D Sanders, and M Chopra are with the University of the Western Cape, School of Public Health; P Jooste is with Medical Research Council, Tygerberg

moths, and post-partum women in the 6-8 weeks period after delivery [7]. Based on the findings of the NFCS, it was recommended that maize and wheat flour be fortified with amongst other nutrients vitamin A and iron, to provide a person of 10 years and older, with 25% of their RDA, respectively, from 200g raw maize/wheat flour [8].

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## CASE STUDIES ON SUCCESSFUL MICRONUTRIENT PROGRAMMES: THE SRI LANKAN EXPERIENCE


Piyasena, C[7]


## Summary


Sri Lanka has achieved considerable successes in the sphere of community health services owing


[7] Medical Research Institute/Ministry of Health, Sri Lanka.

the well established network of primary health care workers. Over 90% immunisation coverage has been achieved while growth monitoring is successfully implemented even at the remote village level. Advances have also been achieved in the related sectors. For example, approximately 75% of Sri Lankan population have safe drinking water supply. The food authority has implemented wide range of regulations by the food act ensuring food safety and hygiene. The food and agriculture policy has taken different dimensions during the last few decades, moving from the objective of self sufficiency towards a free market economy and liberalization of foreign exchange transactions, thereby increasing private sector participation and privatisation of state enterprises.

While low food acquisition power is a key factor exposing the poor sections of the community at a greater risk of micronutrient deficiencies, wrong beliefs and lack of knowledge have contributed to the present pattern of food consumption. Addressing issues of food quality, in line with goals set up by WHO and UNICEF, national policy makers endorsed and adopted a declaration and plan of action for virtual elimination of vitamin A deficiency, virtual elimination of iodine deficiency, and reduction of iron deficiency in women by one third.

Clinical vitamin A deficiency is not commonly seen in Sri Lankan children. The latest survey in 1995/96 revealed that 36% of Sri Lankan preschool children had suboptimal serum vitamin A levels, with the prevalence of night blindness (0.8%) and Bitot's spots (0.8%) indicating vitamin A deficiency as a moderate public health problem in the country. Control measures have been implemented for some years, such as free distribution of milk, vitamin A supplementation, diagnosis and treatment of VAD at school medical inspections and hospitals, and provision of supplementary food fortified with vitamin A. Following the 1995/96 survey, vitamin A policy was reformulated, and the provision of vitamin A megadose routinely to children and postpartum mothers was introduced. Achieved coverage rates have not been reported.

IDD has long been recognized as an endemic problem in south west wet zone of Sri Lanka. Provision of potassium iodide to pregnant women and adolescent girls in high risk areas was among the early interventions initiated in 1950s. Surveys at that time revealed increase prevalence of goitre in spite of interventions, indicating causes other than the iodine deficiency, or ineffective intervention. Studies showed that prevalence of goitre remained high in school children (19%) and pregnant mothers (63%). Based on these findings a national programme on salt iodization was adopted and the universal salt iodisation law was enacted from 1995. A follow up national IDD survey (2000) indicated a reduction in prevalence in one district (Kalutara) where the IDD control programme had been implemented for more than 5 years, although the national prevalence showed an increase of IDD from 19% to 21%. Moreover, highest prevalence was observed in north-central province, previously a non-endemic area. Same study led to estimates of the prevalence of IDD from urinary iodine assays showing that mild, moderate and severe iodine deficiency prevalences were 22%, 7% and 1.4% respectively. In pursuing improvement of the situation, Sri Lanka has identified the need of determining TSH levels of newborns, developing a database on iodine content of foods, goitrogens in local foods and the effect of fertilizer, pesticides and insecticides on the bioavailability of iodine in food.

Anaemia is known as a major public health problem in Sri Lanka affecting all segments of the population, contributing to increased morbidity and mortality rates. Anaemia prevalence in 1973

was estimated as 38% in men, 68% in women, and 70% in primary schoolchildren and 52% in preschool children. Pregnant women recorded a prevalence of 60% in 1988/89. In 2001 a prevalence of 32% was estimated among non pregnant women, 30% among pregnant women, 22% in adolescents, 21% in primary school children and 30% in preschool children. Operational studies done on the iron supplementation programme have indicated that further strengthening is required to achieve the optimal results. A comprehensive national strategy was formulated, including iron folate supplementation to all pregnant women, antihelminthic useand malaria control, promotion of dietary diversification, IEC campaigns to improve compliance, provision of safe drinking water and sanitation and proper monitoring and further research to improve efficiency and effectiveness. Additional target groups to be included were infants, pre-school children, school children, non pregnant women, and displaced persons. The possibility of iron fortification as a strategy has been looked into. Challenges ahead for an optimal control are proper monitoring and evaluation, securing adequate human resources, improving bioavailability of foods, promoting food based methods and issue related to iron fortification.

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## CURRENT SITUATION AND STATUS OF MICRONUTRIENT POLICIES AND PROGRAMS IN THAILAND

Winichagoon, P, Pongcharoen, T and Yhoung-aree, J[8]

**Summary**

Thailand has set goals for alleviating three major micronutirnet deficiencies, which since early 1980s have been regarded as major public health problems. Vitamin A deficiency has improved along with the reduction of protein-energy malnutrition among young children and mothers. Iodine and iron deficiency, however, have needed additional efforts, through salt iodization and supplementation programs respectively, during the last two decades. Currently, clinical micronutrient deficiencies have become scarce and the severity of persisting deficiencies declined to the subclinical level. These remain a significant challenge.

Iron supplementation is the major program addressing anemia during pregnancy. The anemia surveillance system has been an integral part of the efforts to alleviate anemia among school-aged children and pregnant women. Village health volunteers provide the major resource, in identifying pregnant women and advising them to attend antenatal care, as well as promoting safe delivery in hospital. Daily iron supplementation has been provided throughout pregnancy, however adherence to supplementation is not monitored. Severe anemia among pregnant women has substantially declined as a result of an improved referral system, and ensuring compliance to iron therapy. There has not been specific program for anemia during infancy and preschool years, nor for adolescent girls. Meanwhile, weekly supplementation in primary schools has been piloted, but not yet expanded nationwide.

Legislation of iodization of salt has been a major step forward as a nationwide strategy to alleviate iodine deficiency. Continued attention is still needed to ensure the sustainability of salt

[8] Institute of Nutrition, Mahidol University (INMU), Nakhon Pathom, Thailand.

iodization and household consumption. Cyclic monitoring of the iodine deficiency situation has been launched and data on urinary iodine from pregnant women and school children are being used to monitor the situation. Fortification of various foods, for addressing multiple micronutrient deficiencies, has been studied and some products have been commercialized. Partnerships among government, private and academic sectors have been established since the early stage of the program. Private sector and academic institutions have worked together to formulate the products, and government sectors assist in promoting the use of fortified foods. Systematic evaluation of these programs will be useful in elucidating lessons learned from Thailand.

* * *

## SUCCESSFUL MICRONUTRIENT PROGRAMS: MICRONUTRIENT DEFICIENCY CONTROL STRATEGIES IN VIETNAM

Ninh NX, Khan NC, Vinh ND and Khoi HH[9]

**Summary**

Vitamin A deficiency (VAD), iron deficiency anemia (IDA) and iodine deficiency disorders (IDD) have been reduced during last decade but still remain issues in Vietnam. Since early 90's, the Ministry of Health has implemented a nation-wide program on VAD control. An implementation network has been set up from commune to central levels by a strong preventive health structure with the active participation of mass organizations. A comprehensive strategy has been developed including nutrition education; universal distribution of VA capsules to target children in combination with National Immunization Days) (NIDs), and to lactating mothers in community; promotion of production and consumption of Vitamin A-rich foods at a household level. The data in 1994 and in 2000 showed that prevalence of clinical xerophthalmia is lower than the cut-off point established by the WHO of a public health problem, however sub-clinical VAD is still high (11% in children and 50% in lactating mothers).

The highly vulnerable groups for IDA are women of childbearing age and children (53% of pregnant, 40% of nonpregnant women and 60% of children <24mo old suffered from IDA in 1994). The IDA control program has been carried out with two activities: supplementation of women with iron and folic acid tablets and providing them nutrition education, together with the prevention of intestinal parasites, especially hookworm. However the program has been implemented in only 1282 out of more than 10,000 communes in the whole country so far; moreover there is no policy for iron supplementation in <2 y children.

IDD are also very widespread in Vietnam. More than one quarter of school age children have goiter in 1995 (27%), reduced to 14.9% in 1998. There is geographic/ecological variation in goiter prevalence. Since 1999 universal salt iodization has been adopted by Government

[9] National Institute of Nutrition (NIN), Hanoi, Vietnam

legislation. By 2001, at country level, 61% of households use iodized salt while the rate was rather low in the Mekong Delta River and about 30% of households in this region was reported as low level of urinary iodine (urinary iodine <10mcg/dL).

In the coming years, greater attention should be paid to more sustainable measures. Food fortification of micronutrients may play as an important approach. Iron fortified fish sauce which proved both efficacy and effectiveness in community-based trials will be developed to larger scale while other vehicles such as sugar, instant noodle, processed complementary foods should be considered for micronutrient fortification. As committed by National Nutrition Strategy ratified by the Government, we are ongoing to combine different strategies to maintain the success and further sustainable achievements.

* * *

To come: Cambodia, China, Indonesia.

## APPENDIX TO FINAL REPORT

### PROPOSALS GENERATED BY

### SECTION 2

# MULTI-CENTER INITIATIVE FOR EVALUATION RESEARCH AND CAPACITY BUILDING FOR MICRONUTRIENT DEFICIENCY CONTROL PROGRAMS.

Project undertaken by
the Department of International Health and Development,
Tulane University School of Public Health and Tropical Medicine,
New Orleans.

**JBMason**

1. To Global Alliance for Improved Nutrition (GAIN) – based on first draft July 2001. ***National Capacity-Building For Sustainable Micronutrient Deficiency Control Programs: Concept Paper***. 20 December 2002. JBMason.

2. Proposal to CDC through ASPH Cooperative Agreement – Sections taken from: ***Enhancing Micronutrient Programs in Developing Countries***. Research plan as submitted to ASPH/CDC Cooperative Agreement JBMason, 6 June 2002.

3. ***Development of Non-Invasive Field Methods for Population Surveys of Micronutrient Status (Iron and Vitamin A) in Developing Countries.*** J Mason and A Bailes, 9 Sept 2003

4. ***Capacity building for fortification in Indonesia.*** Ellen Mathys and John Mason. November 2002.

5 December 2003

# PROPOSAL

## Development of Non-Invasive Field Methods for Population Surveys of Micronutrient Status (Iron and Vitamin A) in Developing Countries

**J Mason and A Bailes, 9 Sept 2003**

## Introduction

A striking observation from recent global micronutrient surveys (Mason et. al., 2001, 2003) is the lack of suitable survey data for understanding trends in anemia and vitamin A deficiency (VAD). This results in part from inadequacy of measurement methods suitable for population-based surveys. In principle, measurements of micronutrient status should as far as possible assess function, by non-invasive methods suitable for use in surveys with defined and representative samples (e.g. DHS or UNICEF MICS). Correctly standardized, these should produce results that are comparable across countries and through time. As examples of the current problem, from the 500 or more data-points accumulated on anemia, very few are from surveys representative of national populations, and virtually none are comparable for trend estimation. Serum retinol results (which are less common) are difficult and controversial to interpret (one reason is that vitamin A liver stores and tissue concentrations are not closely related to serum levels); much more useful would be functional tests. We propose that suitable non-invasive methods could now be developed and validated based on emerging technologies.

For anemia, we have recently secured a loan of experimental non-invasive portable equipment, which has been tested (by the manufacturer) once on a limited sample in the field (with promising results). We have agreed with the manufacturer to explore further tests in a variety of sites to ascertain the suitability for survey work. For vitamin A, better measurement of rates of dark adaptation (which measures vitamin A function in the retina) has been shown to be feasible using laptop computers, again now suitable for field-testing.

We propose a three stage research and development project to validate and adapt these methods for future population estimates, eventually contributing to improving the effectiveness of programs for controlling micronutrient deficiencies. The first two stages are described here, taking about six months, based on which wider application can be designed and implemented in a third phase. Iron and vitamin A are the priorities to be tested, and these can be done within the same surveys. The first stage involves a rapid testing of equipment in a small number of cases, which can be done in New Orleans. The second stage would extend this to one field site (one or two clinics; Jamaica with CFNI is suggested), where the prevalences of deficiency are substantial, linking the testing of new equipment to estimates of anemia that are anyway being done; a sample of around 100 cases is envisaged. This should provide crucial information of the validity of the newer methods with respect to both 'gold standard' lab methods and field methods (HemoCue). Dark adaptation would also be assessed and compared with serum retinol in a sub-set of the same blood samples.

**Current methods.**

*Anemia.* Anemia prevalences are quite widely reported for a variety of age-gender-groups, cut-offs, measurement methods, and sampling (usually convenience, often from clinics) and generally it has been impossible to analyze trends or even differences between groups. The most that could be said on trends in *The Micronutrient Report* (Mason et al, 2001) was there was little evidence for change. The UN system (based on WHO data: ACC/SCN, 2000) concluded 'trends [in anemia] could not be assessed anywhere, owing to the lack of repeated comparable national surveys of anemia. Moreover, different methods for sampling, assessment, and classification render data difficult to use. One thing is clear, however: anemia remains a major problem with serious consequences'. More recently a few national examples of probably genuine (but unexplained) improvement in anemia have been identified, in Thailand, Vietnam, and Bangladesh, which merit further investigation. However, in general the situation is such that even if a successful set of interventions for iron were applied, no one would know of it because of absence of reliable baseline data. Among the many causes of this situation, tackling two could make a substantial difference. First is to obtain hemoglobin data on defined and representative samples; second is to apply widely suitable standardized methods. These two are linked, as the best hope for getting population data would be for using a non-invasive method in on-going large-scale surveys.

Progress has been made in recent years with the adoption of the HemoCue for assessing hemoglobin by a colorimetric micro-method using finger prick capillary blood collection. Cost is one constraint (the cuvettes containing the reagent are disposable), but the invasiveness is more crucial: obtaining blood even by finger-prick is resisted and disturbing to household surveys. Another issue of emerging importance is the increasing prevalence of HIV/AIDS. Non-invasive means of measurement would eliminate the need to draw blood, increasing the safety of field workers and the acceptability of surveys. (In a manual for field workers by PATH/USAID (1997), nine methods are listed for assessing anemia status, of which only one is non-invasive, clinical diagnosis of pallor; this test is semi-quantitative, difficult to standardize, and not considered suitable for population assessment.)

The new method for measuring anemia non-invasively, whose testing is proposed here, uses an instrument that can estimate hemoglobin (Hb) from light scattering at specific wavelengths (near infra-red) through the finger. Part of the development would be to calibrate and field test the instrument to account for differences in skin thickness, skin color, etc. The manufacturer has loaned a Non-Invasive Blood Monitor (NIBM) to Tulane at no cost for this purpose.

A second method (using pallor) that can be readily tested for feasibility is to take a digital image of the subject's tongue (including a color scale) and then use digital imaging software to match the color of the tongue to the scale. This would give a quantitative value to determine estimate anemia. However, this is proposed only as a back up.

In the validation, the non-invasive method(s) will be compared with both routine laboratory hemoglobin measurements on venous blood samples, and with Hemocue estimates.

*Vitamin A.* Clinical VAD (defined as eye signs) has a low prevalence (around 1% in children) and is usually recorded as presence or absence of Bitot's spots (X1B) and/or night blindness (XN), from examination and interview. Sub-clinical VAD is assessed from serum retinol measures, the prevalences (usually around 30%) being given normally below 20 mcg/dl (mild-moderate) and 10 mcg/dl (severe). However the interpretation and responsiveness to intervention of serum retinol is problematic, in part because the relation of serum retinol to functional deficiency is unclear. Measurement of night blindness might be an appropriate alternative as it gets directly at tissue retinol availability (at least in the retina), avoiding some issues of liver stores and homeostasic mechanisms. While night-blindness estimates continue to be relatively common, the results vary greatly: for example recent results from India push the reported national prevalences as high as 22% in 10-14 year olds, compared to previous estimates of clinical VAD (XN + X1B) for S. Asia of 1%. Rate of dark adaptation might be a better continuous measure, rather than yes/no for night blindness, showing milder levels of VAD with an analytically more useable prevalence.

Night blindness and dark adaptation have been used in various ways for some time. Techniques include maternal/guardian reports of night-blindness; psychophysical assessment of visual threshold (e.g. locating objects in dim light); and measuring pupillary response. A number of studies have examined the relation of these measures of dark adaptation to vitamin A status, assessed by diet and serum retinol, with varying results on balance showing the expected relations.

In our hands, preliminary tests of symbol recognition in dim light (using computer images), based on published methods, are encouraging that a continuous measure of rate of adaptation can be reliably and quite simply produced. This could provide population-level estimates that should be related to vitamin A status, and it is proposed this should be validated (against serum retinol, which is the only option) alongside the anemia evaluation. The dark adaptation method is non-invasive, relatively rapid, and suitable for field application in routine population-based surveys. Linking this to the anemia measurement validation will add only marginal costs, much less than setting up testing separately.

**Objectives**

1. To validate non-invasive methods for micronutrient deficiency assessment (iron and vitamin A) for use in population surveys: specifically a non-invasive blood monitor (NIBM) and a dark adaptation rate assessment method, with respect to standard methods (e.g. HemoCue and serum retinol).

2. To set up protocols for field work in sample surveys, and apply these to new estimates of prevalences of deficiency in one developing country (in phase 2), and;

3. To set up surveys of anemia and sub-clinical VAD using these methods in one or more additional countries, in collaboration with local institutions (phase 3, not budgeted here), leading to:

4. Wider application of non-invasive methods to tracking trends in these micronutrient deficiencies in an expanding number of countries; if they work, these methods would replace current invasive techniques, and lead to a greatly expanded knowledge of trends in deficiencies, hence to more effective control measure.

**Research Design.**

*Phase 1 – equipment test.* An initial test phase is planned to verify that the NIBM and its associated software work properly. This could be accomplished in 2 – 3 weeks in New Orleans, LA, collaborating with routine blood testing in a local clinic. A small number of cases would be sought, perhaps ten or so. Ten to twenty NIBM readings per person would be performed at the time that blood is drawn, where samples are being collected for lab analysis. Each NIBM reading takes about 30 seconds; multiple readings are indicated because it appears that there is significant random error, showing up in repeated readings on the same subject. Results from the lab tests will be compared with NIBM readings. This will ensure that the field study (phase 2) is viable, and allow trouble shooting of the equipment in consultation with the manufacturer (already one unit has been replaced).
The digital imaging method of assessing pallor (using a digital camera and image processing software) will be set up for field use and tested in phase 2.

The software for measuring dark adaptation has been tested on a small number of normal subjects, showing that it is sensitive to variation (presumably due to factors other than VAD). Some fine-tuning is needed before this is ready for field testing in phase 2.

*Phase 2 – pilot field study.* The study is proposed in collaboration with the Caribbean Food and Nutrition Institute (CFNI), an office of the Pan-American Health Organization in Jamaica. This is considered suitable as anemia is a widespread problem in the Caribbean, so that a range of hemoglobin levels exists. Tulane Dept of International Health and Development has worked with CFNI in the past (e.g. a jointly course is held in May), and CFNI has lab facilities, field staff, and undertakes studies routinely throughout the Caribbean.

Five tests are proposed: (1) Venous blood, laboratory test (2) Venous blood (same sample), Hemocue; (3) Capillary blood (blood drop), Hemocue; (4) Non-invasive, NIBM; and possibly (5) Non-invasive, pallor measurement using digital imaging. Of these, (1), (2), and (4) are the crucial ones (work elsewhere shows little difference in HemoCue readings between venous and capillary blood). The study design envisages taking NIBM measurements on adults attending clinics in poorer areas (where anemia is expected to be high – the national estimate is around 30%) who are anyway having blood

analyzed for hemoglobin. Other details will be recorded, such as age, gender, and health status. Values of NIBM readings will be analyzed with reference to both laboratory and HemoCue estimates. Regression is likely to be useful analytically to calibrate the NIBM, and investigate correction factors that may be needed depending on other variables measured. Sensitivity and specificity will be calculated, and estimates made of the likely errors in estimating population hemoglobin means and anemia prevalences.

There will be two tests to compare for vitamin A deficiency: (1) Serum retinol, as a lab test; (2) Non-invasive assessment of rate of dark adaptation. The dark adaptation rate measurement will be first tested on a small sample of children, probably in a school, to check the local application of the method. The test itself only takes a few minutes (in a darkened room), and opportunities will then be sought in collaboration with local clinics to validate these estimates when blood is being drawn and sub-samples can be provided for serum retinol estimation (which can be done in the CFNI labs in Kingston). Analyses similar to those for hemoglobin will be done. While VAD is thought to be lower in Jamaica than anemia, present indirect estimates are around 10%, and this needs to be checked.

These results will lead to the design of the survey application studies in phase 3.

*Phase 3 – testing survey application.* The third step will be to test the method(s) deriving from the pilot studies, on a larger population, as part of a large scale population survey already going into the field. This would be a national or large-area survey, preferably of nutrition (e.g. DHS or MICS). The aims are: to test the applicability of the non-invasive methods in the field as used by enumerators, with additional training, in such surveys; and to calibrate the methods with an adequate sample size to determine the confidence intervals for Hb concentrations and anemia prevalences and VAD prevalences, for the non-invasive methods against lab tests or HemoCue, to be done on a sub-sample. An associated aim is to obtain a much-needed population level assessment of anemia (and VAD) prevalences, useful in their own right for policy and program planning. For example, a comparison with the 1997 micronutrient survey of Jamaica would be timely. It will depend on the results of the pilot whether the non-invasive methods (4 & 5) should be compared with lab tests on venous blood (1), or HemoCue on capillary blood (3); the latter would be more feasible for a sample survey of the population.

The details will be worked out from phase 2, and from opportunities yet to be identified for linking with future planned surveys. In this proposal funds are not specified for phase 3. However an illustrative work plan is included in the work plan section.

For extending the testing to other settings – for which the manufacturer has informally indicated a willingness to loan additional sets of equipment – other possible sites to be considered are in southern Africa in collaboration with the University of the West Cape, in the Philippines in collaboration with the University of the Philippines Los Banos, and in Thailand with Mahidol University. With all of these Tulane has worked on micronutrients in the past, and has continuing links.

**References**

ACC/SCN (2000). Fourth Report on the World Nutrition Situation. Nutrition throughout the Life Cycle. ACC/SCN, Geneva.

Mason, J.B., Lotfi, M., Dalmiya, N., Sethuraman, K., and Deitchler, M.; with Geibel, S., Gillenwater, K., Gilman, A., Mason, K., and Mock, N. (2001). *The Micronutrient Report: Current Progress in the Control of Vitamin A, Iodine, and Iron Deficiencies.* Micronutrient Initiative/International Development Research Center, Ottawa, Canada. ISBN 1-894217-18-7.

Mason J, A Bailes, M Beda-Andourou (Cobb), T Curtis, M Deitchler, L Foster, M Hensley, P Horjus, C Johnson, A Mendez, M Munoz, J Rivers, and G Vance. (2003). The State of the World's Micronutrients. Draft report to MI. February 2003.

PATH (1997). Anemia Detection Methods in Low Resource Settings: A Manual for Health Workers. Mimeo. PATH, Seattle.

**Budget**

*Phase 1 – equipment test*

| | |
|---|---|
| PI, 1 weeks. | $2,755 |
| PI, fringe | $559 |
| Research assistant, 1 month. | $5,250 |
| Res. asst. fringe | $1,255 |
| Admin costs (15%) | $1,473 |
| Total | $11,292 |

*Phase 2 – pilot field study*

| | |
|---|---|
| PI, 4 weeks | $11,003 |
| PI, fringe | $2,234 |
| Research assistant, 3 months | $15,750 |
| Res. asst. fringe | $3,764 |
| CFNI researcher, 2 months | $6,000 |
| CFNI lab assistant, 2 months | $3,000 |
| Supplies and equipment | $2,800 (see details below) |
| Travel (air, 3 trips) | $1,500 |
| Travel (in-country) | $2,000 |
| Admin costs (15%) | $7,208 |
| Total | $55,259 |

*Supplies and equipment.*

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|---|---|
| HemoCue supplies | $500 (Note: CFNI has the instrument itself) |
| Serum retinol assays(100) | $1,000 |
| Laptop (VAD) | $1,000 |
| Digital camera | $200 |
| Software (Photoshop) | $100 |
| Total | $2,800 |

| **Work Plan** | **Week** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Task** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | | | | | | | | | | | | |
| **1. Equipment test** | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| - Arrange NIBM reading with 10 existing blood draws (Tulane lab or local physician) | * | | | | | | | | | | | |
| - Perform readings | | * | | | | | | | | | | |
| - Obtain lab results | | * | * | | | | | | | | | |
| - Assess NIBM | | * | * | | | | | | | | | |
| - (Write-up?) | | | * | | | | | | | | | |
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| **2. Pilot Field Study - Jamaica** | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| - Development of survey protocol | * | * | | | | | | | | | | |
| - Obtain human subject clearance | * | * | | | | | | | | | | |
| - Make arrangements with ANC clinics | | * | * | | | | | | | | | |
| - Arrange needed supplies | | * | * | | | | | | | | | |
| - Perform NIBM / pallor / vitamin A readings: assuming minimum 10 cases/day (total 50-100) | | | * | * | * | | | | | | | |
| - Obtain lab results | | | | * | * | * | | | | | | |
| - Analysis of results | | | | | | * | * | * | | | | |
| - Write-up of results | | | | | | | | * | * | * | | |
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| | Week | | | | | | | | | | | | | | | | | | | | | | | |
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| **Task** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
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| **3. Full Study** | | | | | | | | | | | | | | | | | | | | | | | | |
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| - Development of survey protocol | * | * | * | | | | | | | | | | | | | | | | | | | | | |
| - Obtain human subject clearance | | * | * | * | | | | | | | | | | | | | | | | | | | | |
| - Make arrangements with sample/cases to take measurements | | | * | * | * | | | | * | | | | * | | | | | | | | | | | |
| - Identify lab | | | * | | | | | | | | | | | | | | | | | | | | | |
| - Arrange needed supplies | | | | * | | | | * | | | * | | | * | | | | | | | | | | |
| - Perform NIBM / pallor / vitamin A / Hemocue / blood draws: assuming minimum 15 cases/day | | | | | * | * | * | * | * | * | * | * | * | * | * | * | (*) | (*) | | | | | | |
| - Obtain lab results | | | | | | * | * | * | * | * | * | * | * | * | * | * | * | (*) | (*) | | | | | |
| - Analysis of results | | | | | | | | | | | | | | | | | * | * | * | * | (*) | (*) | | |
| - Write-up of results | | | | | | | | | | | | | | | | | | | * | * | * | (*) | (*) | |
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Koalisi Fortifikasi Indonesia (KFI)

# Training in Support of the National Micronutrient Fortification Strategy for Indonesia

## Training Schedule Summary, Training Schedule and Curriculum Guide

*Developed by*:

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*In collaboration with*:

Koalisi Fortifikasi Indonesia (KFI)

*With support from*:

United Nations Children's Fund (UNICEF) Indonesia

November 19, 2002

# KOALISI FORTIFIKASI INDONESIA (KFI)
# TRAINING CURRICULUM IN SUPPORT OF THE NATIONAL MICRONUTRIENT FORTIFICATION STRATEGY FOR INDONESIA

## TRAINING SCHEDULE SUMMARY

| MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY |
|---|---|---|---|---|---|
| **DAY 1 0/0/03**<br><br>*Module 1:*<br>Welcome<br><br>*Module 2:*<br>National Nutrition Situation | **DAY 2 0/0/03**<br><br>*Module 3:*<br>Policies and Institutions in Food Fortification in Indonesia<br><br>*Module 4:*<br>Review of Experience in Micronutrient Deficiency Control Programs in Indonesia | **DAY 3 0/0/03**<br><br>*Module 5:*<br>Fortification Program Design and Management (1): Introduction | **DAY 4 0/0/03**<br><br>*Module 6:*<br>Research Methodologies for Micronutrient Malnutrition (I): Introduction | **DAY 5 0/0/03**<br><br>*Module 7:*<br>Research Methodologies for Micronutrient Malnutrition (II): Assessment of Population Micronutrient Nutrition Status | **DAY 6 0/0/03**<br><br>*Module 8:*<br>Research Methodologies for Micronutrient Malnutrition (III): Assessment of Dietary Intake |
| **DAY 7 0/0/03**<br><br>*Module 8:*<br>Research Methodologies for Micronutrient Malnutrition (III): Assessment of Dietary Intake (continued)<br><br>*Module 9:*<br>Monitoring and Evaluation of Food Fortification Programs (I): Introduction | **DAY 8 0/0/03**<br><br>*Module 10:*<br>Monitoring and Evaluation of Food Fortification Programs (II): Analysis of Program Function and Impact | **DAY 9 0/0/03**<br><br>*Module 11:*<br>Research Methodologies for Micronutrient Malnutrition (IV): Qualitative Research Techniques<br><br>*Module 12:*<br>Report Writing and Proposal Development | **DAY 10 0/0/03**<br><br>*Module 13:*<br>Presentations and Synthesis | **DAY 11 0/0/03**<br><br>*Module 13:*<br>Presentations and Synthesis | **DAY 12 0/0/03**<br><br>*Module 14:*<br>Micronutrient Fortification in Indonesia: The Way Forward<br><br>Evaluation |

## TRAINING CURRICULUM IN SUPPORT OF THE NATIONAL MICRONUTRIENT FORTIFICATION STRATEGY FOR INDONESIA

### TRAINING SCHEDULE

**DAY 1: MONDAY, 0/0/03**

| **Module 1** | **Welcome** | **Facilitator** | **P.I.C.** |
|---|---|---|---|
| 8:00 – 8:30 | Welcome and Introductions | | |
| 8:30 – 9:00 | Overview of Training | | |
| **Module 2** | **National Nutrition Situation** | **Facilitator** | **P.I.C.** |
| 9:00 – 10:00 | Malnutrition in Indonesia: What Do We Know About the Problem? | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 10:45 | Overview of Malnutrition: Macronutrient and Micronutrient Malnutrition | | |
| 10:45 – 12:00 | Micronutrient Deficiencies: Causes, Effects, Assessment, Prevention and Management | | |
| 12:00 – 1:00 | *Lunch* | | |
| 1:00 – 2:30 | Strategies for Micronutrient Deficiency Control | | |
| 2:30 – 2:45 | *Break* | | |
| 2:45 – 3:00 | Sources of Secondary Data on Nutritional Status | | |
| 3:00 – 4:00 | Guided Practical Exercise: Secondary Data Research and Retrieval | | |

**DAY 2: TUESDAY, 0/0/03**

| **Module 3** | **Policies and Institutions in Food Fortification in Indonesia** | **Facilitator** | **P.I.C.** |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 9:00 | National, Regional and International Conferences | | |
| 9:00 – 10:00 | Government, Academic, Non-Governmental and Industrial/Trade Institutions | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 11:30 | Review of National Food Fortification Policy | | |
| 11:30 – 12:00 | Public-Private Partnership | | |
| 12:00 – 1:00 | *Lunch* | | |
| **Module 4** | **Review of Experience in Micronutrient Deficiency Control Programs in Indonesia** | **Facilitator** | **P.I.C.** |
| 1:00 – 1:30 | Principles and Stages of Program Development | | |
| 1:30 – 2:30 | Review of Program Experience | | |
| 2:30 – 2:45 | *Break* | | |
| 2:45 – 3:30 | Program Implementation: Comparative Studies | | |
| 3:30 – 4:00 | Role of Information Systems in Program Evaluation | | |

**DAY 3: WEDNESDAY, 0/0/03**

| **Module 5** | **Fortification Program Design and Management (I): Introduction** | **Facilitator** | **P.I.C.** |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 10:00 | Evaluation of Alternative Interventions | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 12:00 | Cost Analysis | | |
| 12:00 – 1:00 | *Lunch* | | |
| 1:00 – 3:30 | Guided Practical Exercise: Cost Analysis and Fortification Calculations (Excel, PROFILES?) | | |
| 3:30 – 4:00 | Discussion of Practical Exercise | | |

**DAY 4: THURSDAY, 0/0/03**

| Module 6 | Research Methodologies for Micronutrient Malnutrition (I): Introduction | Facilitator | P.I.C. |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 10:00 | Introduction to Information Systems | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 12:00 | Types of Surveys | | |
| 12:00 – 1:00 | *Lunch* | | |
| 1:00 – 2:30 | Study Design | | |
| 2:30 – 2:45 | *Break* | | |
| 2:45 – 3:30 | Guided Practical Exercise: Sampling (Excel) | | |
| 3:30 – 4:00 | Discussion of Practical Exercise | | |

**DAY 5: FRIDAY, 0/0/03**

| Module 7 | Research Methodologies for Micronutrient Malnutrition (II): Assessment of Population Micronutrient Nutrition Status | Facilitator | P.I.C. |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 10:00 | Biochemical and Functional Indices of Micronutrient Deficiencies | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 11:00 | Biochemical and Functional Indices of Micronutrient Deficiencies (cont'd) | | |
| 11:00 – 11:30 | Data Collection Instruments for Micronutrient Malnutrition Data in Indonesia | | |
| 11:30 – 12:00 | Critical Evaluation of Secondary Micronutrient Status Data | | |
| 12:00 – 1:00 | *Prayer* | | |
| 1:00 – 2:00 | *Lunch* | | |
| 2:00 – 3:30 | Guided Practical Exercise: Analysis of Population Prevalence, Distribution and Severity of Micronutrient Deficiencies (SPSS) | | |
| 3:30 – 4:00 | Discussion of Practical Exercise | | |

**DAY 6: SATURDAY, 0/0/03**

| **Module 8** | **Research Methodologies for Micronutrient Malnutrition (III): Assessment of Dietary Intake** | **Facilitator** | **P.I.C.** |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 10:00 | Dietary Data Collection Strategies | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 12:00 | Dietary Data Collection Strategies | | |

**DAY 7: MONDAY, 0/0/03**

| **Module 8 (continued)** | **Research Methodologies for Micronutrient Malnutrition (III): Assessment of Dietary Intake (continued)** | **Facilitator** | **P.I.C.** |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 9:30 | Data Collection Instruments for Dietary Intake in Indonesia | | |
| 9:30 – 10:00 | Critical Evaluation of Secondary Dietary Data | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 12:00 | Guided Practical Exercise: Analysis of Dietary Micronutrient Intake and Consumption of Fortified Foods (SPSS) | | |
| 12:00 – 1:00 | *Lunch* | | |
| 1:00 – 1:30 | Discussion of Practical Exercise | | |
| **Module 9** | **Monitoring and Evaluation of Food Fortification Programs (I): Introduction** | **Facilitator** | **P.I.C.** |
| 1:30 – 2:30 | Monitoring and Evaluation | | |
| 2:30 – 2:45 | *Break* | | |
| 2:45 – 3:15 | Monitoring and Evaluation of Fortification in Indonesia: Institutional Roles, Responsibilities and Guidelines | | |
| 3:15 – 4:00 | Quality Assurance Monitoring | | |

**DAY 8: TUESDAY, 0/0/03**

| **Module 10** | **Monitoring and Evaluation of Food Fortification Programs (II): Analysis of Program Function and Impact** | **Facilitator** | **P.I.C.** |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 10:00 | Analysis of Program Function and Impact | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 12:00 | Guided Practical Exercise: Analysis of Program Function (SPSS) | | |
| 12:00 – 1:00 | *Lunch* | | |
| 1:00 – 3:30 | Guided Practical Exercise: Analysis of Program Impact (SPSS) | | |
| 3:30 – 4:00 | Discussion of Practical Exercise | | |

**DAY 9: WEDNESDAY, 0/0/03**

| **Module 11** | **Research Methodologies for Micronutrient Malnutrition (IV): Qualitative Research Techniques** | **Facilitator** | **P.I.C.** |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 10:00 | Qualitative Research Techniques | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 12:00 | Qualitative Research Techniques | | |
| 12:00 – 1:00 | *Lunch* | | |
| **Module 12** | **Report Writing and Proposal Development** | **Facilitator** | **P.I.C.** |
| 1:00 – 2:30 | Report Writing and Proposal Development | | |
| 2:30 – 2:45 | *Break* | | |
| 2:45 – 4:00 | Report Writing and Proposal Development | | |

**DAY 10:** **THURSDAY, 0/0/03**

| Module 13 | Presentations and Synthesis | Facilitator | P.I.C. |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 9:15 | Presentation 1: Review and Synthesis of Secondary Research | | |
| 9:15 – 10:00 | Presentation 2: Sampling | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 11:00 | Presentation 3: Analysis of Nutritional Data | | |
| 11:00 – 11:45 | Presentation 4: Analysis of Dietary Data | | |
| 11:45 – 12:45 | *Lunch* | | |
| 12:45 – 1:30 | Presentation 5: Analysis of Program Function | | |
| 1:30 – 2:15 | Presentation 6: Analysis of Program Impact | | |
| 2:15 – 3:00 | Presentation 7: Analysis of Program Impact | | |
| 3:00 – 3:15 | *Break* | | |
| 3:00 – 4:00 | Discussion of Research Area Presentations | | |

**DAY 11:** **FRIDAY, 0/0/03**

| Module 13 | Presentations and Synthesis | Facilitator | P.I.C. |
|---|---|---|---|
| 8:00 – 8:30 | Warm Up, Feedback and Day's Overview | | |
| 8:30 – 9:15 | Presentation 8: Cost Analysis | | |
| 9:15 – 10:00 | Presentation 9: Cost Analysis | | |
| 10:00 – 10:15 | *Break* | | |
| 10:15 – 11:00 | Presentation 10: Setting Dosing Levels and Quality Assessment | | |
| 11:00 – 12:00 | Discussion of Industry Area Presentations | | |
| 12:00 – 1:00 | *Prayer* | | |
| 1:00 – 2:00 | *Lunch* | | |
| 2:00 – 2:30 | Synthesis | | |
| 2:30 – 2:45 | *Break* | | |
| 2:45 – 4:00 | Synthesis | | |

**DAY 12: SATURDAY, 0/0/03**

| **Module 14** | **Micronutrient Fortification in Indonesia: The Way Forward** | **Facilitator** | **P.I.C.** |
|---|---|---|---|
| 9:00 – 9:30 | Warm Up, Feedback and Day's Overview | | |
| 9:30 – 11:30 | Work Plan for Proposal Development Period | | |
| 11:30 – 12:00 | Evaluation | | |

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

# KOALISI FORTIFIKASI INDONESIA (KFI)

## TRAINING CURRICULUM IN SUPPORT OF THE NATIONAL MICRONUTRIENT FORTIFICATION STRATEGY FOR INDONESIA

### CURRICULUM GUIDE

**Module 1: Welcome**

**General Objective:** To welcome participants and commence the training.

**Specific Objectives:**

- *To introduce organizers, trainers and participants*
- *To discuss the role of the training, specifically the development of the capacities of a core group of individuals to support the implementation of the Country Investment Plan*
- *To provide an overview of the training, including: the schedule, objectives of each module, expectations and responsibilities of participants and mechanisms for evaluation*
- *To discuss the objectives and activities to be undertaken in the post-training period, highlighting how each stage of the training is designed to provide participants with skills essential to proposal development. These post-training activities include: detailed analysis of national nutritional situation; population-based nutritional status research; detailed review of dietary consumption data; population-based dietary intake research; national consultative meeting; and development of proposals for program funding*

**Training Materials:** Training Schedule Summary, Training Schedule, Curriculum Guide, Country Investment Plan (CIP)

**Participant Competencies:**

1. To know the names and backgrounds of the training organizers, trainers and participants.
2. To know the objectives, expectations, schedule and mechanisms for evaluation of the training, and to be able to use "Participant Competencies" for self-evaluation.
3. To understand how the workshop serves as the foundation for activities in the post-workshop period, including: training of others, population-based research and proposal development for funding of a National Micronutrient Fortification Strategy.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 2: National Nutrition Situation**

**General Objective:** To enable participants to interpret population-based data on nutritional status in terms of prevalence and distribution of deficiencies and impacts on public health, and locate such data in secondary resources.

**Specific Objectives:**

- *To review current knowledge about the prevalence, distribution and severity of malnutrition in Indonesia, highlighting variation by: geographic area, age, gender, pregnancy/lactation status, socioeconomic status, and other important determinants*
- *To review literature estimating the public health impact of malnutrition in Indonesia (including mortality, morbidity, development and function)*
- *To distinguish between macronutrient and micronutrient malnutrition*
- *To discuss vitamin A, iron, iodine, zinc and folic acid deficiencies in Indonesia in terms of: causes, vulnerable groups, impacts on health and function, assessment techniques, strategies for prevention, and case management*
- *To discuss the roles of food-based interventions (dietary diversity/nutrition education and food fortification) and non-food based interventions (supplementation, immunization and other public health interventions) in a national nutrition strategy, stimulating discussion about the rationale for food fortification as a long-term priority intervention relative to other types of micronutrient deficiency control programs*
- *To undertake a Guided Practical Exercise (#1) in which participants navigate internet-based sources of secondary data relative to malnutrition, micronutrient malnutrition and nutritional programs in Indonesia*

**Training Materials:** Country Investment Plan, UNICEF framework of determinants of malnutrition, micronutrient malnutrition reference materials, Guidelines for Guided Practical Exercise #1

**Participant Competencies:**

1. To be able to identify the major public health impacts of malnutrition, including micronutrient malnutrition, and describe the potential benefits of the elimination of malnutrition in Indonesia.
2. To be able to distinguish between macronutrient and micronutrient malnutrition and cite common forms of each.
3. To be familiar with, and to know where to retrieve reference materials and secondary data about, the prevalence, distribution and severity, causes, impact on health status and function, assessment techniques, common strategies for prevention and case management, and established guidelines for interpreting micronutrient malnutrition prevalence data.
4. To be able to cite advantages of fortification as the long-term priority micronutrient deficiency control strategy.

**Module 3: Policies and Institutions in Food Fortification in Indonesia**

**General Objective:** To equip students with an understanding of the institutional and policy environment of food fortification in Indonesia.

**Specific Objectives:**

- *To discuss key national and international conferences and conference declarations, including: the World Food Summit (1996), the World Summit for Children (1990), the World Declaration and Plan of Action for Nutrition (1992), and the Manila Declaration on Food Fortification Programs for Eliminating Micronutrient Deficiencies (2000)*
- *To discuss the roles, responsibilities and strengths/capacities of key Government, Academic, Non-Governmental and Industrial/Trade Institutions, including: the National Fortification Commission (NFC), Ministry of Health (MOH), Ministry of Industry and Trade (MOIT), National Agency of Drug and Food Control (NADFC), Agricultural University of Bogor (IPB), the Indonesian Fortification Coalition (FKI), the Iodized Salt Producers Association, Wheat Flour Producers Association, Food and Beverages Producers Association, Complementary Food Producers Association, Sugar Producers Association, Cooking Oil Industries Association, and their member corporations*
- *To familiarize participants with legal documents and legislation embodied in national fortification policy and governing the development, implementation and monitoring/evaluation of food fortification programs in Indonesia, including: National Food and Nutrition Plan of Action for Healthy Indonesia 2010 (NFNPA), the National Development Program (PROPENAS),the Country Investment Plan (CIP), Indonesia Food Legislation 1996, Consumer Protection Act, the Codex Alimentaire*
- *To discuss the effects of trade regulations and relationships on fortification, including: the World Trade Organization (WTO), and the Indonesian National Standards (SNI)*
- *To discuss the experience public-private partnership in micronutrient food fortification in Indonesia to date, comparing to selected examples from other countries*
- *To orient participants to relevant sources of secondary information on policy*

**Training Materials:** World Declaration and Plan of Action for Nutrition, Manila Declaration, CIP, NFNPA, PROPENAS, resource materials on wheat four fortification and salt iodization in Indonesia, list of relevant secondary sources

**Participant Competencies:**

1. To be familiar with the principal instruments of national micronutrient nutrition policy, and be able to locate additional information through secondary resources.
2. To be able to describe the outputs of national, regional and international conferences regarding micronutrient deficiency control programs, particularly food fortification.
3. To be able to identify the roles and responsibilities of Government, Academic, Non-Governmental and Industrial/Trade institutions pertaining to micronutrient policy and programs.
4. To be able to discuss how fortification affects, and is affected by, the trade environment.
4. To be able to describe the importance of public-private partnership in food fortification and Indonesia's experience with this collaboration to date.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 4: Review of Experience in Micronutrient Deficiency Control Programs in Indonesia**

**General Objective:** To strengthen the participants' capacity to evaluate micronutrient control programs in terms of their implementation, impact and cost, through the collection and critical review of program-based and population-based secondary data.

**Specific Objectives:**

- *To review the stages of development of a micronutrient fortification program*
- *To discuss the criteria for selection of an appropriate food fortification vehicle*
- *To review briefly the experience to date with vertical micronutrient deficiency control programs in Indonesia (wheat flour, complementary foods and salt), including: constraints to implementation, barriers to impact, and cost issues*
- *To stimulate discussion among participants about the principal gaps in program coverage among vulnerable groups in Indonesia, as a foundation for a National Micronutrient Fortification Strategy*
- *To review lessons learned from other countries in which similar challenges have been faced and solutions identified*
- *To orient participants to relevant sources of secondary information*
- *To briefly discuss the role of information systems in program evaluation*

**Training Materials:** CIP, Fortification Rapid Assessment Tool (FRAT); resource materials on experience with wheat flour fortification and salt iodization in Indonesia (including data sets and evaluation literature), list of relevant secondary sources

**Participant Competencies:**

1. To be able to discuss the stages of development of a national fortification program.
2. To be able to discuss the criteria for selecting an appropriate vehicle for fortification.
3. To be able to describe the large-scale micronutrient control programs that have been undertaken in Indonesia, including: supplementation, fortification and IEC campaigns, and be able to locate additional information through secondary sources.
4. For the principal fortification programs discussed, to be able to discuss the estimated impact of these programs, and identify the constraints to program implementation and impact, and discuss their relative costs and cost effectiveness.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 5: Fortification Program Design and Management (I): Introduction**

**General Objective:** To equip participants with a theoretical and practical introduction to the factors that are considered in designing and managing micronutrient fortification programs and establishing fortification policy.

**Specific Objectives:**

- *To discuss the food fortification programming cycle (assess/analyze, explore feasibility, enable partnerships and commitment, design/implement/monitor, and monitor/document/ evaluate)*
- *To provide a framework for understanding how alternative micronutrient control programs are evaluated for funding and implementation, including: efficacy/ effectiveness, national/local capacity to implement and manage, and cost*
- *To review the theory of cost analysis, identify data requirements and discuss how cost analyses are used to make decisions about fortification programs*
- *To conduct a Guided Practical Exercise in which participants calculate costs per expenditure category and total costs, cost effectiveness analysis, cost/benefit analysis, net present value and internal rate of return for fortification programs*
- *To conduct a Guided Practical Exercise (#2) in which participants select fortificants and calculate dosing levels based upon a range of determining factors including: cost, stability in storage, stability in transport, stability in household preparation, consumption, bioavailability and bioefficacy*
- *To orient participants to relevant sources of secondary information*

**Training Materials:** CIP, PROFILES (?), resource materials on fortification programs for financial calculations, Guidelines for Guided Practical Exercise #2

**Participant Competencies:**

1. To understand the food fortification programming cycle.
2. To be able to identify the factors that are considered in the selection among alternative micronutrient deficiency control programs by policymakers.
3. To be able to calculate the incremental costs, cost effectiveness analysis, cost/benefit analysis, net present value and internal rate of return for a range of fortification programs, and identify the data requirements for a project monitoring system to undertake these calculations.
4. To be able to select appropriate fortificants for fortified food commodities.
5. To be able to discuss how program implementation data, cost data, and quality assurance data should be used to construct a comprehensive and effective monitoring system.
6. To be able to make recommendations regarding a dynamic public-private and international partnership in cost-sharing to ensure long term sustainability of a micronutrient fortification program in the private sector.
7. To be able to calculate an appropriate dosing level for a given percentage of RDA of a target group, given assumptions about consumption (by groups vulnerable to deficiency as well as groups vulnerable to toxicity), stability, bioavailability and bioefficacy.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 6: Research Methodologies for Micronutrient Malnutrition (I): Introduction**

**General Objective:** To enhance participants' capacity to design a research study based upon a particular set of objectives in micronutrient research, utilizing nutritional status, dietary intake and household expenditure data where appropriate.

**Specific Objectives:**

- *To discuss the importance of the Assessment, Analysis and Action (AAA) cycle*
- *To distinguish between screening, growth monitoring, surveys and surveillance*
- *To discuss population assessment, program monitoring and impact evaluation in terms of: types of research questions, and level (e.g., program, population) of data collection*
- *To discuss the contribution of nutritional status surveys, dietary intake surveys, and household expenditure surveys to a comprehensive micronutrient information system, including: population situational analysis/needs assessment, micronutrient fortification program design, program monitoring and impact evaluation*
- *To review the study designs utilized in nutrition research (including experimental, quasi-experimental and non-experimental), factors that should be considered study design, and implications of study design for the attribution of causality*
- *To explain types of sampling strategies and sample size calculation procedures (including estimated prevalence of outcomes, level of confidence, level of precision, design effect and desired level of disaggregation), and illustrate procedures through guided practical calculation exercises*
- *To undertake a Guided Practical Exercise (#3) on sampling procedures and calculations.*

**Training Materials:** Resource materials on research, nutrition information systems and monitoring and evaluation, Guidelines for Guided Practical Exercise #3

**Participant Competencies:**

1. To know the importance of the AAA cycle.
2. To be able to distinguish between screening, growth monitoring, surveys and surveillance.
3. To be able to distinguish between population assessment, program monitoring and impact evaluation in terms of: types of research questions guiding the research, types of data collected and level of data collection.
4. To be able to discuss the contribution of nutrition status surveys, dietary intake surveys and household expenditure surveys to a comprehensive micronutrient information system.
5. To be able to identify the differences between experimental study design, quasi-experimental study design and non-experimental study design, citing an example of each and stating the implications for the attribution of causality.
6. To be able to select an appropriate study design based upon: objectives of the research, level of certainty required, and whether causality is to be determined.
7. To be able to calculate required sample size for a range of studies and sampling procedures (e.g., random, systematic, cluster) depending upon estimated prevalence of outcomes, level of confidence, level of precision, design effect and desired level of disaggregation.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 7: Research Methodologies for Micronutrient Malnutrition (II): Assessment of Population Micronutrient Nutrition Status**

**General Objective:** To enhance participants' capacity to design a research study pertaining to micronutrient malnutrition status, including: evaluating secondary data, selecting an appropriate data collection strategy, calculating required sample size, data collection, data analysis and data interpretation.

**Specific Objectives:**

- *To review measurement techniques issues for a core set of functional and biochemical indices of micronutrient status, including: night blindness, serum retinol, haemoglobin, ferritin, cognitive score, goitre (thyroid enlargement), iodized salt (proxy), school performance, urinary iodine, serum folate*
- *To review threats to validity in the collection and analysis of these data, including: reporting bias, recall bias, seasonality, regression to the mean, discrepancies in weights/measures, and sampling bias*
- *To review the principal research instruments used to collect nutrition-related data in Indonesia, including: the National Household Health Survey (SKRT), the National Socio-Economic Survey (SUSENAS), the National Dietary Consumption Survey (SKG), the Demographic and Health Survey (DHS), facility-based surveillance systems and other sub-national population-based surveys, highlighting the coverage, types of data collected, periodicity and sampling design*
- *To discuss how to critically evaluate secondary micronutrient status data*
- *To undertake a Guided Practical Exercise (#4) on analysis of micronutrient data to describe the prevalence and distribution of micronutrient deficiencies*

**Training Materials:** Current reports from relevant national nutrition surveys, resource materials on analysing nutritional data, Guidelines for Guided Practical Exercise #4

**Participant Competencies:**

1. To be able to identify the contributions of existing sources of nutrition and food consumption data at the national and sub-national levels in Indonesia.
2. To be able to discuss measurement techniques, including methods to maximize data quality and minimize measurement error, for a core set of micronutrient status indices.
3. To be able to undertake a basic analysis of population data, and interpret the results, for description of the prevalence and distribution of micronutrient malnutrition.
4. To be able to critically evaluate secondary micronutrient status data.

## Module 8: Research Methodologies for Micronutrient Malnutrition (III): Assessment of Dietary Intake

**General Objective:** To enhance participants' capacity to design a research study pertaining to dietary intake, including: evaluating secondary data, selecting an appropriate data collection strategy, calculating required sample size, data collection, data analysis and data interpretation.

**Specific Objectives:**

- *To discuss data collection strategies for collecting dietary data, including: number of eating occasions, 24 hour recall, food frequency questionnaire and household food expenditure surveys, and to discuss guidelines for selecting an appropriate strategy depending upon objective of the research (e.g., to quantify micronutrient intake or to identify potential vehicles for fortification)*
- *To discuss how to critically evaluate secondary micronutrient status data*
- *To review the study designs utilized in dietary intake research and the factors that are considered in selecting a study design*
- *To explain sample size calculation procedures*
- *To undertake a Guided Practical Exercise (#5) on analysis of dietary consumption data to quantify the intake of fortified foods, and estimate consumption of specific micronutrients*
- *To discuss principles for the interpretation of micronutrient malnutrition data to estimate micronutrient intake and identify potential vehicles for micronutrient fortification*
- *To review the principal research instruments used to collect dietary data in Indonesia, including the National Socio-Economic Survey (SUSENAS) and the National Dietary Consumption Survey (SKG), highlighting the coverage, types of data collected, periodicity and sampling design*
- *To discuss appropriate reference values of dietary nutrient composition and human nutrient requirements for analyzing micronutrient intake*
- *To review techniques for establishing a table of reference local weights and measures, including measures used for market exchange as well as preparation and consumption*

**Training Materials:** Current reports from relevant national dietary surveys, resource materials on analysing dietary data, reference tables, Guidelines for Guided Practical Exercise #5

**Participant Competencies:**

1. To be able to select an appropriate study design and data collection strategy based upon: objectives of the research, unit of analysis (e.g., individual or household), and whether causality is to be determined.
2. To be able to calculate required sample size given a study design, estimated prevalence of outcomes, levels of confidence and precision required, design effect, and desired level of disaggregation.
3. To be able to undertake a basic analysis of population dietary data, and interpret the results, for description of the correlates and determinants of micronutrient consumption.
4. To be able to critically evaluate secondary dietary data

**Module 9: Monitoring and Evaluation of Food Fortification Programs (I): Introduction**

**General Objective:** To enable participants to develop a basic monitoring and evaluation system for micronutrient fortification, including the identification of appropriate indicators, establishment of a reporting system and development of an approach to analysis of program and population data for evaluation.

**Specific Objectives:**

- *To discuss the types of questions that M&E systems are designed to answer related to process (e.g., is the fortification program functioning as intended?), outcomes (e.g., are the intended reductions in the prevalence of micronutrient deficiency taking place?), and impact (e.g., is this reduction in the prevalence of micronutrient deficiencies due to the consumption of foods fortified by this program?).*
- *To distinguish between monitoring and evaluation, and discuss the roles of each in the AAA cycle and in project management and funding cycles.*
- *To distinguish between inputs, processes, outputs and outcomes, and clarify the uses of each type of variable in micronutrient fortification M&E systems.*
- *To discuss the differences in M&E systems at the levels of port, factory, market and community, and clarify the anticipated roles and responsibilities of Governmental (e.g., National Agency for Drug and Food Control), Non-Governmental and Industrial institutions in reporting systems.*
- *To discuss the procedures for quality assurance (QA) for major fortificants.*

**Training Materials:** Resource materials on monitoring and evaluation, resource materials on monitoring quality of major fortificants

**Participant Competencies:**

1. To be able to discuss the importance of program monitoring and program evaluation in micronutrient fortification programs.
2. To be able to define the types of data collected (input, process, output, outcome), and the level of data collection (program, population), and to be able to provide examples of each from micronutrient fortification programs.
3. To be able to describe the mechanisms for conducting monitoring (e.g., quality assurance) at the levels of port, factory, market and community.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 10: (II): Monitoring and Evaluation of Food Fortification Programs**

**Analysis**

**General Objective:**

**Specific Objectives:**

- *To discuss the types of analyses that are conducted in program monitoring and in program evaluation*
- *To discuss the importance of disaggregating assessment and analysis by vulnerable groups*
- *To undertake a Guided Practical Exercise (#6) on basic analysis of program-based data to examine whether program processes met objectives*
- *To undertake a Guided Practical Exercise (#7) on basic analysis of population-based data to examine whether intended changes in micronutrient status took place, and whether the changes appear to be causally linked to program exposure*

**Training Materials:** Resource materials on monitoring and evaluation, Guidelines for Guided Practical Exercise #6, Guidelines for Guided Practical Exercise #7

**Participant Competencies:**

1. To be able to conduct basic quantitative analyses of program-based data to examine whether program function met pre-established program function objectives.
2. To be able to conduct basic quantitative analyses of population-based data to examine whether program exposure led to changes in population outcomes in target groups, i.e., a program impact evaluation.

**Module 11: Research Methodologies for Micronutrient Malnutrition (IV): Qualitative Research Techniques**

**General Objective:** To enhance participants' capacity to utilize qualitative research techniques to collect, analyze and interpret high-quality and useful information in micronutrient nutrition research.

**Specific Objectives:**

- *To review qualitative research techniques utilized in participatory rural appraisal (PRA) research, including: key informant interviews, focus group interviews, ranking, mapping and proportional piling*
- *To identify the roles for qualitative research in complementing quantitative data regarding micronutrient nutrition status and dietary consumption, including: the sociocultural determinants of food habits relative to vulnerable groups, perceptions of fortified foods and barriers to their consumption, and perceptions of IEC campaign messages*
- *For each of these techniques, to discuss how the data is analyzed and interpreted*
- *To discuss data quality issues and strategies for minimizing sources of error in qualitative research including methods of triangulation with qualitative and quantitative secondary data*

**Training Materials:** Resource materials on qualitative research techniques

**Participant Competencies:**

1. To be able to select appropriate qualitative research techniques based upon: objectives of the research, and types of information needed.
2. To be able to utilize a core set of qualitative research techniques – including key informant interviews, focus group interviews, ranking, mapping and proportional piling – appropriately, to minimize sources of error and enhance complementarities to nutrition and dietary intake research.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 12: Report Writing and Proposal Development**

**General Objective:** To enable participants to develop a clear and effective proposal, including a familiarity with the administrative, technical and financial components.

**Specific Objectives:**

- *To review the components of a research proposal, including the administrative components, the technical narrative, and budgetary components*
- *To discuss the variation in guidelines for proposal development for potential donor institutions*
- *To discuss the principles for effective technical narrative development*

**Training Materials:** Proposal guidelines from potential donors

**Participant Competencies:**

1. To be able to participate in the development of well researched and documented, effective research proposals for funding of a national micronutrient fortification strategy in Indonesia.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 13: Presentations and Synthesis**

**General Objective:** To synthesize the content and skills of the training for all participants, as the Research participants present the results of their individual research and analyses.

**Specific Objectives:**

- *To discuss presentations by participants on their individual research and analyses.*
- *To utilize the presentations to illustrate the linkages between each of the activities, including: review and synthesis of secondary research, analysis of nutritional data, analysis of dietary data, analysis of program function, analysis of program impact, cost analysis, and setting dosing levels and quality assessment*
- *To lay the foundation for effective and collaborative working relationships among participants in all phases of activities*

**Training Materials:** Materials for participant presentations

**Participant Competencies:**

1. To be able to deliver a clear, focused and effective presentation on the results of a research activity, and make appropriate recommendations based upon those results.
2. To be able to articulate the appropriate uses of all phases of research, including secondary research, analysis of nutritional data, analysis of dietary data, analysis of program function and analysis of program impact, in the development of national micronutrient fortification programs.
3. To be able to effectively articulate and advocate for fortification as a relatively cost-effective mechanism to reduce the prevalence of micronutrient malnutrition in vulnerable groups in Indonesia.
4. To be able to draw upon the knowledge and skills developed in the training for one's responsibilities over the research and proposal development period.
5. To be able to draw upon the resources provided in this training in additional training activities as required over the coming months.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**Module 14: Micronutrient Fortification in Indonesia: The Way Forward**

**General Objective:** To prepare the Work Plan for participants over the proposal development period.

**Specific Objectives:**

- *To identify planned activities, develop a tentative schedule for undertaking those activities, allocate responsibilities and mechanisms for coordination, and establish reporting mechanisms*
- *To request that trainees complete a training evaluation*
- *To bring the training to a close*

**Training Materials:** Materials for development of the Work Plan

**Participant Competencies:**

1. To be able to articulate participant responsibilities over the proposal development period, and draw upon the skills and knowledge derived in the training to undertake those activities.
2. To be able to describe the capacities and contributions of other members of the Core Team and draw upon those capacities in proposal development.

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

## KOALISI FORTIFIKASI INDONESIA (KFI)
## TRAINING CURRICULUM IN SUPPORT OF THE
## NATIONAL MICRONUTRIENT FORTIFICATION STRATEGY FOR INDONESIA

### CRITERIA FOR TRAINER SELECTION

| | |
|---|---|
| Module 1: | National, Core member of KFI with active role in training as well as research and proposal development |
| Module 2: | National, Academic with expertise in community nutrition, background in population research, Internet literate |
| Module 3: and food | National, Academic (or Industry or Government?) with expertise in nutritional policy, detailed knowledge of policies in Indonesia as well as institutions involved in nutrition, food and food fortification in Indonesia |
| Module 4: programs in | National, Academic/Industry/Government with expertise in food fortification in Indonesia, active involvement in CIP (and evaluation of fortification programs Indonesia to date, including costing) |
| Module 5: programs | National (Industry) or External, Expertise in financial analysis of fortification |
| Module 6: (including | External, Academic/Research Center, Expertise in epidemiological research study design, sampling and analysis). |
| Module 7: (including | External, Academic/Research Center, Expertise in epidemiological research study design, sampling and analysis), expertise in nutrition. |
| Module 8: (including research. | External, Academic/Research Center, Expertise in epidemiological research study design, sampling and analysis), expertise in dietary |
| Module 9: research, Indonesia. | External, Academic/Research Center, Expertise in monitoring and evaluation and knowledge of reporting systems for fortification programs in |
| Module 10: research. | External, Academic/Research Center, Expertise in monitoring and evaluation |
| Module 11: | External, Academic/Research Center, Expertise in qualitative research. |
| Module 12: | External, Academic/Research Center, Experience in proposal development for large-scale projects |

Module 13: National, Core member of KFI with active role in training as well as research and proposal development

Module 14: National, Core member of KFI with active role in training as well as research and proposal development

Module 15: National, Core member of KFI with active role in training as well as research and proposal development

## KOALISI FORTIFIKASI INDONESIA (KFI)
## TRAINING CURRICULUM IN SUPPORT OF THE
## NATIONAL MICRONUTRIENT FORTIFICATION STRATEGY FOR INDONESIA

### CRITERIA FOR PARTICIPANT SELECTION

Participants will constitute a Core Team of individuals who will occupy key roles in developing proposals for the implementation of a multi-year National Micronutrient Fortification Strategy. Thus, this training is the first stage of their employment with the Koalisi Fortifikasi Indonesia (KFI). The training is designed to provide this Core Team with the skills and knowledge necessary to undertake activities leading to the development of effective proposals.

Participants will be selected based upon their capacity to serve on the Core Team for the duration of the proposal development period. They may be drawn from collaborating institutions such as Academic Institutions and Research Centers, from Government ministries, or from Industry and Trade Associations involved in food fortification. They should possess expertise that prepares them to undertake the activities required for proposal development.

The activities of the Core Team for the nine month proposal development period include:

- Detailed review and analysis of micronutrient malnutrition in Indonesia as a foundation for a situational analysis and needs assessment, where not already completed for the Country Investment Plan
- Dietary assessment, with particular attention paid to the quantification of micronutrient intake and the identification of potential vehicles for fortification
- The development of micronutrient fortification programs based upon population prevalence of micronutrient deficiencies, dietary consumption patterns, technological factors such as selection of appropriate fortificants and cost
- Detailed financial analysis of strategies proposed for budget development
- Development of proposed monitoring and evaluation systems for proposed programs
- National consultation meeting to promote participation and consensus among stakeholders
- Proposal development and submission to potential donors

Participants will be designated for two basic areas: Population Research and Technology. The Population Research participants will undertake a detailed review of secondary nutritional and dietary data where required. These participants will also undertake primary nutritional and dietary research. Additionally, these participants will develop the monitoring and evaluation systems included in proposals.

The participants in the Population Research area should meet the following criteria:

- Formal commitment to complete planned activities for KFI
- Professional experience in research, including a basic knowledge of epidemiological methods and quantitative analysis (including SPSS or similar statistical software)
- Working knowledge of Excel
- Internet literacy

Technology participants will develop sustainable, cost-effective, safe and technically sound fortification technologies. These participants will also undertake cost analyses of these strategies for program design and the development of budget proposals. The participants in the Technology area should meet the following criteria:

- Formal commitment to complete planned activities for KFI
- Professional experience in food technology, including a basic knowledge of micronutrient fortification technology
- Basic experience with financial management
- Working knowledge of Excel
- Internet literacy

*Prepared by: Ellen C. Mathys, Tulane University DRAFT 12/8/03*

**KOALISI FORTIFIKASI INDONESIA (KFI)**
**TRAINING CURRICULUM IN SUPPORT OF THE**
**NATIONAL MICRONUTRIENT FORTIFICATION STRATEGY FOR INDONESIA**

**MATERIALS FOR GUIDED PRACTICAL EXERCISES**
**(ONLY INITIAL THOUGHTS: GUIDELINES MUST BE DEVELOPED SEPARATELY)**

Guided Practical Exercise #1: Secondary Data Research and Retrieval

- Participants should be given several research questions that they must answer through a review of recommended secondary sources.
- A reference list of relevant secondary sources may be distributed.
- As time allows, this exercise should include both internet-based and literature-based sources.

Guided Practical Exercise #2: Cost Analysis and Fortification Calculations

- Participants should be given the necessary data to conduct a basic cost analysis for a fortification program.
- The calculations should be conducted using the Microsoft Excel software package (PROFILES?).

Guided Practical Exercise #3: Sampling

- Participants should be given the necessary information to calculate required sample sizes for research studies.
- The calculations should be conducted by hand or using the Microsoft Excel software package.

Guided Practical Exercise #4: Analysis of Population Prevalence, Distribution and Severity of
Micronutrient Deficiencies

- Participants should be given a simple dataset to analyze, including biochemical and functional indicators of micronutrient status in vulnerable groups, as well as other independent variables such as age, gender and geographic area.
- Participants should be given several research questions that they must answer through the analysis.
- The analysis should be conducted using the SPSS software package.

Guided Practical Exercise #5: Analysis of Dietary Micronutrient Intake and Consumption of
Fortified Foods

- Participants should be given a simple dataset to analyze, including dietary intake data and indicators related to fortification.
- Participants should be given several research questions that they must answer through the analysis.
- The analysis should be conducted using the SPSS software package.

# CAPACITY BUILDING FOR NUTRITION PROGRAMS IN THE PHILIPPINES.

Prof. Ma. Antonia G. Tuazon, Ph.D.

Director, Regional Training Programme on Food and Nutrition Planning, and
Dean, College of Human Ecology, University of the Philippines at Los Banos, Laguna, Philippines.

Paper presented at the IUNS Satellite Meeting on Progress in Public Nutrition: Capacity Building for Nutrition Programs, Vienna, Austria, 24-26 August 2001

## Introduction

The Medium Term Philippine Food and Nutrition Plan, also known as the Philippine Plan of Action for Nutrition (PPAN), serves as the country's blueprint in undertaking impact programs towards nutrition improvement by different sectors in the country. The National Nutrition Council (NNC) is the agency responsible for the formulation of the PPAN. The current PPAN (1999-2004), as with plans of previous years, has embodied human resource development (HRD) as a primary support mechanism. This enabling mechanism aims to build and develop knowledge, attitudes, and skills of all individuals and groups involved in planning, implementation, monitoring, and evaluation of nutrition programs at different levels.

The NNC Secretariat, in cooperation with the Regional Training Programme on Food and Nutrition Planning (RTP-FNP) of the University of the Philippines Los Banos (UPLB), organized a two-day consultation workshop on the human resource development enabling mechanism of PPAN in February 2000. Participants from the main national implementing agencies for nutrition, i.e. the Departments of Health; Agriculture; Education Culture and Sports; Social Welfare and Development; and Interior and Local Government, representatives from regional, provincial, and city offices and non-government organizations came together to conduct an in-depth discussion and planning of HRD needs for the PPAN. The results of the workshop revealed the need for training among nutrition program implementors on a number of specific activities related to the impact programs identified in the PPAN. While the identified training targets include a large number of frontline workers, a pressing need for enhancing the competencies of researchers, program planners, and trainers on nutrition program management, monitoring, and evaluation was also recognized.

This paper focuses on the current national capacity for designing and managing nutrition programs in the Philippines. A brief discussion is given on the different agencies involved in these activities. The discussion also provides an estimate of the number of personnel occupying existing positions and a general description of their academic qualifications. Capacity for evaluation of nutrition programs and operational research is briefly discussed. Future training needs and topics are also identified that can hopefully serve as a basis for planning activities towards building up of the national capacity in implementing nutrition programs and to enhance future efforts to evaluate impacts of nutrition interventions, especially those targeting micronutrient malnutrition.

## Organizations Involved in Program Design and Management

The NNC is the lead agency responsible for the formulation of guidelines on nutrition program management by local government units, as well as the coordination, monitoring and

Guided Practical Exercise #6: Analysis of Program Function

- Participants should be given a simple dataset to analyze, including program-related variables pertaining to inputs, processes and program outputs.
- Participants should be given several research questions that they must answer through the analysis.
- The analysis should be conducted using the SPSS software package.

Guided Practical Exercise #7: Analysis of Program Impact

- Participants should be given a simple dataset to analyze, including program-related variables pertaining to program outputs and utilization, and population-level variables such as biochemical and functional indicators of micronutrient deficiency.
- Participants should be given several research questions that they must answer through the analysis.
- The analysis should be conducted using the SPSS software package.

- morbidity for diarrhea and acute respiratory infections
- infant and child mortality
- prices of basic food commodities
- occurrence of natural and man-made disasters
- local socio-economic indicators.

The local nutrition action officer monitors nutrition program implementation and reports these through the accomplishment and submission of monitoring and evaluation forms to the regional nutrition program coordinator of the NNC. Regional technical working groups, composed of representatives from regional offices of NNC members, facilitate the review and assessment of existing nutrition and nutrition -related policies and programs. Most evaluations of nutrition programs have focused on process and output indicators. In general, the impact of nutrition programs on biological effects and functional consequences of micronutrient deficiencies have not been included in program evaluations.

One of the major functions of the Food and Nutrition Research Institute is to conduct a periodic appraisal of national, regional, and provincial nutrition conditions through the National Nutrition Surveys, which are conducted every five years. These national surveys include collection of data on dietary intake, anthropometric measurements, biochemical and clinical assessments that are disaggregated at the national, regional and provincial levels (FNRI, 2000). Nutrition data collected by the FNRI have served as valuable sources of information for program planning and implementation and also for instruction in academic institutions.

The academe, through the College of Human Ecology in U.P. Los Banos (CHE-UPLB), has provided opportunities for training and postgraduate degrees for nutrition professionals from the Philippines as well as other countries in the Asia-Pacific region. To date, 290 have completed MPS-FNP degree since 1978. The MPS-FNP is an 18-month course under the IHNF and administered by the UPLB Graduate School. Similarly, 129 middle- and senior- level professionals from the Philippines and other Asian countries have completed the Short- term Course on Food and Nutrition Program Planning and Management (STC-FNPPM) since 1998, a three-month course conducted by the RTP-FNP. In the Philippines, graduates of the MPS-FNP and the STC-FNPM are currently employed in various government agencies (e.g. NNC, FNRI, health offices at provincial and community levels, Departments of Agriculture and Social Welfare and Development, National Economic and Development Authority, and the academe) that are involved in nutrition program management, implementation, and evaluation. The IHNF also offers the M.S. in Applied Nutrition and the Ph.D. in Human Nutrition degree programs.

In addition, an 11-day training course on the design and conduct of training programs with particular focus on food and nutrition was conducted by the Department of Agricultural Education and Rural Studies (UPLB) for 21 trainers from Bangladesh, China, Indonesia, Sri Lanka, Vietnam, and the Philippines.

**Identification of Targets for Capacity Building**

The PPAN Training Pyramid was devised to help define the types or categories and number of workers involved in nutrition. The pyramid divides workers into three groups: category 1 includes the nutrition program implementors at different levels, category 2 includes researchers, program planners and trainers, while category 3 includes policy and decision makers. The training pyramid has facilitated targeting and discussion of HRD needs at different levels. Using this graphical tool, capacity-building initiatives for program design and management can focus on category 2 workers (researchers, planners, trainers) who are largely responsible for

Various key players in developing, designing, and management of nutrition programs have been identified at various levels, as follows.

At the national level, the NNC Central Office has 27 technical staff positions. At the regional level, NNC has a nutrition program coordinator and a nutrition officer posted in 14 out of 16 regions of the country. Individuals occupying technical positions at NNC are holders of at least a Bachelor of Science degree. Around 15 technical staff in the central and regional offices have completed the Master of Professional Studies in Food and Nutrition Planning (MPS-FNP) and at least 8 have taken the Short-Term Course in Food and Nutrition Program Planning and Management (STC-FNPPM) at UPLB.

On the other hand, the Food and Nutrition Research Institute (FNRI) has 150 technical positions at various levels. As with the NNC, technical staff of FNRI are at least graduates of the Bachelor of Science degree in nutrition or related fields. Some staff members of FNRI have postgraduate degrees (including Ph.D., M.Sc., MPH), with at least five staff who have completed the MPS-FNP. A number of FNRI staff have also attended short training courses overseas.

In UPLB, the Institute of Human Nutrition (IHNF) in the College of Human Ecology has 12 faculty positions. Of this number, three Ph.D. holders (1 in Nutrition, 1 in Food Science and an adjunct professor with a Ph.D. in Nutrition), one holds the Doctor of Medicine and Master of Human Nutrition degrees, two are graduates of the MPS-FNP degree program, four are holders of Master of Science degrees (2 in Institutional Management, 1 in Extension Education, and 1 in Biochemistry), one with a Masters in Public Health, and one who completed the Bachelor of Science in Nutrition degree and is currently pursuing the MS in Applied Nutrition.

The Regional Training Programme on Food and Nutrition Planning (RTP-FNP) under the College of Human Ecology taps the expertise of at least 10 faculty from the IHNF and from the Colleges of Economics and Management, Public Affairs, Agriculture, and Development Communication. RTP-FNP also has five technical staff, who are involved in research and training activities of the programme. Of this number, three have Masters degrees (2 in Applied Nutrition and 1 in Development Communication) and two have Bachelor's degrees (1 each in Nutrition and Economics).

Local government units (LGUs) at the provincial, city, and municipal levels account for the largest number of existing positions involved in nutrition program planning and management, with an estimated number of 1500 city/municipal nutrition action officers (C/MNAOs) and 78 provincial nutrition action officers. The provincial, city, and municipal nutrition action officer positions are generally occupied by local government personnel who have at least a Bachelor's degree, and many have also - completed the Doctor of Medicine degree, as the P/C/MNAO positions are often assigned to the heads of the local health units. Many of these personnel have been in their positions for a number of years and may be functioning in a number of capacities apart from their responsibilities related to nutrition programs.

The Department of Health (DOH) - Nutrition Service was recently abolished in line with the reorganization and streamlining of the department. The functions of the Nutrition Service have been subsumed under the Family Cluster of the Bureau of Disease Prevention and Control. No detailed data could be obtained from the DOH on the number of existing positions involved in nutrition programs.

The rate by which new government positions for

## Current Capacity for Operations Research

In 1990, three operations researches were conducted on the delivery of growth monitoring and promotion in a few selected provinces near Metro Manila (Barba et al., 1990; Loyola and Ramos, 1990; Raneses et al, 1990). These operations researches were conducted by the DOH- Nutrition Service in collaboration with the University of the Philippines. The researches revealed gaps in the delivery of growth monitoring and promotion in health centers and highlighted several areas for improvement of service delivery. Other than these efforts, however, there are no known operations researches on nutrition programs in general, or on specific micronutrient interventions conducted on a regular basis as part of program evaluations,

## Capacity Building for Program Design and Management: Future Training Needs

General areas for future training for planners, researchers, and trainers include topics related to program implementation and those related to program design, management, monitoring and evaluation. For nutrition program managers at municipal! city/ or provincial levels, in capacity building efforts may focus on the following topics:

- Nutrition-in-Development
- Formulation of Local Nutrition Action Plans
- Nutrition Situation Analysis it
- Problem Identification
- Nutrition Program Management and Guidelines
- Nutritional Assessment Methods
- Survey Methods
- Quality Assurance
- Reporting & Documentation of Micronutrient Intervention Programs
- Nutrition Advocacy
- Resource Generation

For regional and national program planners, researchers, and representatives from the academe, capacity-building efforts may focus on the following topics:

- Nutrition Program Management & Guidelines

- Problem Identification

- Research Design

- Quantitative and Qualitative Research Methods

- Operations Research Methodology

- Monitoring, Documentation, and Evaluation of Micronutrient Intervention Programs

- Data Management, Analysis, and Interpretation

- Nutrition Advocacy

- Use of Computer Software in Nutrition Data Analysis ,

In summary, an existing organizational structure, linkages between various government - agencies, and a general blueprint for nutrition improvement supports the current national I fA, capacity for nutrition program design and management. However, there is a need to strengthen and build up the current capacity, particularly in program evaluation and operations research. Creation of new government positions for nutrition program managers is desirable but may not be feasible in the short term because of budgetary constraints. Future capacity-building efforts in the short and medium term can focus on planners, researchers, and the academe as this category of workers in nutrition has a significant influence in program implementation, particularly those targeting micronutrient malnutrition.

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4. National Nutrition Council. 1995. *Philippine Plan of A ction for Nutrition,* 1993-1998. Manila.
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# CAPACITY BUILDING NEEDS FOR MICRONUTRIENT DEFICIENCY CONTROL PROGRAMS IN ASIA

October 2001

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Institute of Nutrition, Mahidol University, Bangkgok.
Paper prepared for IUNS workshop, August 2001, updated after the meeting.

## Introduction

Micronutrient deficiencies are widespread in developing countries. Iron, iron and vitamin A deficiencies are the most common micronutrient deficiencies in Asia. Millions of children and women are affected by single or multiple deficiencies, resulting in compromised development. Knowledge on the functional consequences of these problems are well recognized, and possible solutions are available at research scale. Implementing the strategy as a large scale, public health program has been on-going in several countries in Asia and with variable success. During the last ten years the efforts have been accelerated, addressing vitamin A and iodine deficiencies, but less so for iron and other micronutrients.

The challenges remain how to move nationally run micronutrient control programs (particularly those which have lagged behind) and how to sustain the efforts that have been actively implemented during the decade. Capacity building in program development, monitoring and evaluation will be significant investments for developing countries. The objective of this paper is to document the current capacity and capacity building needs in relation to program development, operation research and program evaluation of micronutrient deficiency control programs in Asia. Nine countries, namely, Bangladesh, Cambodia, China, Indonesia, Laos, Philippines, Sri Lanka, Thailand, Vietnam, participated in the Multi-center Initiative on Successful Micronutrient Programs, and these exchanges contributed to the material here, which was initially based on experience from Thailand.

It should be recognized that existing capacity in many countries is not necessarily prepared for the micronutrient programs. This is more so for personnel at peripheral levels. For example, the most peripheral personnel in the system are midwife or trained public health officers, as is the case for Thailand. It is unlikely that they have specific knowledge on micronutrients, hence strengthening on micronutrient issues is needed. Particular attention is paid here to capacity for initiating and running food fortification programs.

## Nature of and considerations for capacity building needs for micronutrient control programs

### *1. Program availability*

Programs on micronutrient control in participating countries are variable. Where program exist, program performance, judged by coverage and impacts vary considerably. Thus, capacity building will have to consider both the *types* of capacity and *number* of personnel needed to carry out program in the short run. For countries where programs exist and function reasonably, additional capacity is needed for improving and maintaining programs, as well as ensuring sustainability of the efforts.

2. *Categories of institutions*
   - Country focal point institution is generally considered having the most capacity in micronutrient programs. Capacity building of this group of institutions in parallel to capacity building for program implementation sector will be essential for sustaining the country capacity. The level of capacity needs thus would be expected to be more sophisticated and specialized than the other two categories.
   - Country institutions complementing the efforts (institutions providing allied fields). These institutes may offer degree training in food, nutrition and allied fields.
   - Capacity within the implementation sectors (program planners, managers) – This include personnel in the health delivery system, possibly, agricultural extensionists, community development workers, and primary education system. Since most countries in Asia implement nutrition programs through the health system, the target for capacity building may primarily be health personnel. The range of background education can be wide, ranging from Master's and Bachelor's degree levels to diploma or certificate. Personnel from allied fields, such as agriculture and education, may also require specific, higher education in applied food and nutrition subjects, but numbers required may be more limited than the major implementing agencies. Examples are:
     - Medical officers and public health nurses at district or provincial levels (depends on each country's structure) – i.e., at least Bachelor's degree graduates.
     - At lower functionary levels, it includes practical nurses, midwives, sanitarians – with certificate or diploma level education.

3. *Key partners in program*
   - Academe
     - research in development of fortified food, other interventions
     - operations research (where no capacity exists in the implementation sector, academic resource could be mobilized)
     - evaluation research (design, laboratory determinations, data collection & analysis)
   - Private sector
     - production, distribution & marketing of fortified products
     - from Thai experience, private sector can also be partner in research during the development phase of the fortified products by providing facility for food processing.
   - Public sector
     - program development (assess needs, planning of action plans [implementing channel, manpower, supply, equipment], monitoring system)
     - operation research, with academe where capacity non-existent)
     - program evaluation (built-in evaluation [data from monitoring system that are relevant for program evaluation], and facilitate external evaluator)

4. *Context:* Implications for readiness of fortification program
   - Range of country's service infrastructure (centralized to decentralized). This may determine the capacity building needs since the composition of partners or stakeholders are likely to differ. For example, in the centralized system,

program planning and technical inputs may only be required at the central program planning units. In decentralized system, capacity would be needed at several functionary levels.

- Socio-cultural context (eating culture: range from home-cooking, ready-to-cook/ready-to-eat, to processed food/products). This point pertains more specifically to fortification. For example, where home cooking predominates and capacity in fortification does not exist (e.g. Laos, Cambodia), fortified products are more likely to be imported. However, capacity will be needed on quality assurance that the product contains the nutrient and level as defined.

5. ***Sequence of intervention development***
   Program formulation relies importantly on the development of effective intervention. Essential steps include research development (e.g. iron fortification of staples or condiments), efficacy and acceptability study (multiple fortification, sprinkles for complementary foods— field tested in controlled situation), and expansion to large scale program (whereby monitoring and evaluation system and model will be crucial to assess program effectiveness).

**Capacity needs as identified from Bangkok workshop, June 2001**

1. *Approaches to and needs for operational/evaluation research.* Operational research was defined as study into how to implement an intervention efficiently and effectively. Specific challenges in supplementation and fortification program operation were identified. For iron and vitamin A supplementation, operational problems were largely related to supply and distribution, and compliance (in case of iron supplementation). For salt iodization, problems relate to availability and affordability and quality of iodized salt, packaging, transport and storage. Poor or lack of political commitment, enforcement of law and mechanism for sustainability remain the challenges.

2. *Capacity needs for biochemical assessments of vitamin A (serum retinol by dry blood spot), iron (hemoglobin and transferrin receptor), and iodine (urinary iodine).* Functional indicators that may be useful for program evaluation included: clinical signs, infant and maternal mortality, selective dietary intakes, infections (parasites and others), motor and cognitive development and learning ability/school performance. Since laboratory set up is costly undertaking, mechanism for collaboration and transfer technology among participating institutions may be the most cost-effective approach.

3. *Capacity building for micronutrient program development* needs to include policy formulation, plan formulation, technology development (for assessment, analysis, and action), advocacy and management, resource allocation, monitoring and evaluation. Personnel need training include specialists at central level and generalists at peripheral levels.

4. *Strategy for capacity building to meet the needs* may include short and long term training and degree program, both within country and across or exchange among participating countries, possibly be, south-south, north-south collaborations. For in-country training, capacity building for core trainers and cascade training was

suggested. Training methods may be problem-oriented training, development of user-friendly training materials and guidelines for program development, interactive learning modules, distance learning modules. Provision of incentive schemes for career path development and support for infrastructure development will be necessary both for effective program implementation and sustainability.

**Country capacity needs (as presented at IUNS Satellite Meeting in Vienna)**

Data presented in the meeting mostly indicated types of capacity needed, but not numbers of people concerned. Available results are shown in table 1. This may be due to the lack of knowledge on what is the appropriate proportion of personnel needed to carry out various components of the programs. In the UNU meeting on advanced training for nutrition, ratios of various levels of capacity per 5 million population were suggested based on expert opinion (in FNB 1997). The figures were from expert opinion and not very specific as to some specialized area needed for micronutrient program.

Building capacity for program is not a one time undertaking since program evolves and aim for sustainability.

**Table 1 Current national capacity for program development and evaluation**

| Country | Implementation | | | Research/planning | |
|---|---|---|---|---|---|
| | Central (program planners) | Intermediary functionaries (LGU, prov, dist) | Community (village workers / Volunteers) | Focal institute | Other institutes |
| Bangladesh | | | 45,000 | | |
| Cambodia | 9 | 3000* | 0* | | |
| Philippines | 27 | 28/1500/78 | BNS (?) | (UPLB/FNRI)2 7/150 | |
| Thailand | 40 | 36/75/7000 | 700,000 | (INMU)50 | |
| Vietnam | 14 | 183/8000* | 40,000* | | |

* # mobilizer/facilitators from FNB-Reta project

Notes:

1. Data from Vienna reports (Philippines, Cambodia, Vietnam)
2. Thailand add by PW, estimating what exist in current program
3. Laos and Bangladesh provided data on # produced/yr by relevant institutions eg. Inst. PH/Trop Health, , but not specific to nutrition

## APPENDIX TO FINAL REPORT

### PROPOSALS GENERATED BY

# MULTI-CENTER INITIATIVE FOR EVALUATION RESEARCH AND CAPACITY BUILDING FOR MICRONUTRIENT DEFICIENCY CONTROL PROGRAMS.

Project undertaken by
the Department of International Health and Development,
Tulane University School of Public Health and Tropical Medicine,
New Orleans.

**JBMason**

1. To Global Alliance for Improved Nutrition (GAIN) – based on first draft July 2001. ***National Capacity-Building For Sustainable Micronutrient Deficiency Control Programs: Concept Paper.*** 20 December 2002. JBMason.

2. Proposal to CDC through ASPH Cooperative Agreement – Sections taken from: ***Enhancing Micronutrient Programs in Developing Countries.*** Research plan as submitted to ASPH/CDC Cooperative Agreement JBMason, 6 June 2002.

3. ***Development of Non-Invasive Field Methods for Population Surveys of Micronutrient Status (Iron and Vitamin A) in Developing Countries.*** J Mason and A. Bailes, 9 Sept 2003

4. ***Capacity building for fortification in Indonesia.*** Ellen Mathys and John Mason. November 2002. Culminated as input for KFI contract to advance food fortification in Indonesia 5 December 2003 Ellen

Section 1

**NATIONAL CAPACITY-BUILDING**
**FOR SUSTAINABLE MICRONUTRIENT DEFICIENCY CONTROL PROGRAMS:**
**CONCEPT PAPER.**[1]

20 December 2002. JBMason

**Summary.**

Micronutrient deficiencies affect a huge number of people – particularly women and young children in poor countries – with extensive effects on health. Effective solutions are available for many of these at low cost, notably food fortification, with supplementation in the interim. An important constraint to rapid adoption of large scale programs is the limited capacity of institutions in affected countries for developing these. Research and development, and evaluation of on-going programs, must also be supported to ensure rapid effective application of existing technologies. This proposal aims to address these gaps, for a number of countries mainly in Asia and Sub-Saharan Africa.

We propose that a university-based consortium contribute through a series of partnerships, often 'triangular', in which centers from industrialized countries link with more advanced centers in the developing world, to work with institutions and programs in the poorest countries. This will provide large enough scale to have a major impact. The university consortium has begun work in Asia with support from CDC, MI, and UNICEF, and this proposal is for an expansion for the next several years, and to include further countries.

Activities are described under the headings of human resources development and applied/operational research. Important aspects within these are to foster the development of
partnerships among the private and public sectors and civil society; to link research findings (including evaluations) to policy and program improvement; and to contribute directly to the development of projects (e.g. through situation analyses) while local capacity is being established.

Three components are therefore proposed:
- human resource development, capacity-building, training;

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1 This concept paper is put forward on behalf of a consortium of universities working in micronutrient nutrition: Tulane University, School of Public Health and Tropical Medicine, New Orleans; Emory University, Rollins School of Public Health, Atlanta; Institute of Nutrition at Mahidol University (INMU), Thailand; Center for Research and Development in Nutrition (CRDN) and Dept Nutrition, Agricultural University, Bogor, Indonesia; University of the Philippines, Los Banos (UPLB) and Food and Nutrition Research Institute (FNRI), Philippines; Public Health Program, University of the Western Cape, Capetown. Work is done in collaboration with MI, CDC, UNICEF, UC Davis, and CFNI.

- applied/operational research, monitoring and evaluation;
- linkages to program design and development.

Human resource development will provide training at various levels (up to post-graduate, and with distance learning for in-service personnel). The participating training institutions will developed their own faculty, materials and procedures to be teaching in this area, and be able to rapidly help create capacity in other countries, as well as having taught a significant number of people (estimated as some 200 at post graduate level, and more than 400 in short courses and workshops). The institutions will contribute to assessments and program design to fill gaps while further capacity develops.

Applied/operational research will use mechanisms such as inter-institutional partnering, a small grants program, and coordination of results. Priorities are: assessments, ways of creating partnerships, evaluations of current programs, research and development, testing efficacy, monitoring evaluation and operational research on large-scale programs, assessing human effects.

Linkages of research findings to policy and program development will be fostered through encouraging collaboration between research institutions, governmental and non-governmental implementing agencies, and the food and milling industries; supporting national mechanisms, notably national fortification coalitions, through methods including workshops and cross-country exchanges; synthesizing and sharing results across programs and countries.

* * *

**Background.**

Micronutrient deficiencies are extensive in developing countries, and their elimination would reduce the disease burden by an estimated 18%[i]. Around 200 million pre-school children are affected by at least one deficiency, and probably 100 million by multiple deficiencies; women of reproductive age are similarly affected, with resulting damage to unborn children becoming a major concern. Iodine, iron, and vitamin A deficiencies are probably the most common[ii]. Lesser known deficiency disorders, such as of zinc, and rickets, are being uncovered and will need to be tackled. Solutions to these problems in some situations are available and becoming widely applied; in others remedies still need to be developed[iii]. In general, deficiencies are being addressed through fortification and large-scale supplementation, the latter with a focus on children and women[iv]. This proposal refers primarily to fortification, in line with the aims of the GAIN.

Program implementation has accelerated in the last ten years for addressing vitamin A and iodine deficiencies, less so for iron and others. For instance, 27 countries by 1998 had policies and/or legislation for tackling all three deficiencies; many more for tackling at least one – as examples, over 70 countries have legislation for iodized salt[v], and over 50 were exploring iron fortification[vi].

The challenge now is to move to sustainable, nationally-run, programs that are shown to be effective. This requires building the capacity in countries to design, implement, and evaluate effective programs, in this context for fortification. The level of funding for nutrients themselves is relatively small on a per person basis – about $0.3 per person/year for multiple fortification, for instance[vii]. Thus the costs of supplies are less than with other health or nutrition programs, certainly in relation to possible impact, and should not be the overriding constraint. A significant investment is needed in developing capacity to assess needs, and to initiate, manage, monitor and evaluate programs. Expertise in operational research is required to identify and solve bottlenecks in program implementation.

At this point in time, probably the most promising opportunity available for rapidly improving nutrition (and hence health) lies with large-scale food fortification. This needs to go through the process of research and development, acceptability and efficacy testing, and large scale application with effectiveness monitoring (illustrated in Annex 1). This process is at different stages in different countries, and experience can usefully be shared between these – not all countries need to undertake all the stages of research and development. However, fortification of common foodstuffs may not reach all of the most vulnerable groups, notably pregnant women and infants in many societies, who will continue to require special interventions (including supplementation) for some time to come. Young children may be better reached through specially designed fortified complementary foods rather than through fortification of staple commodities (e.g. wheat flour). Comprehensive plans for addressing micronutrient deficiencies, even though fortification may be the main thrust, will need to include such considerations.

It will be important to learn and apply the lessons from technical (and substantially vertical) interventions in the past – immunization and oral rehydration therapy are clear examples. Emphasis from the start on support for systems and local capacity will produce results that are more self-sustaining, moreover with flexibility for adaptation. Added to this many countries are starting to decentralize their political and service organizations, leading to a greatly expanded need for training and capacity development to run programs, including those that tend to have a large vertical element (like fortification).

With such considerations in mind, there is a wide consensus that a rapid and systematic expansion of micronutrient programs is eminently feasible, building on recent experience. A statement put forward by a group of people from many countries involved in micronutrient nutrition, at a workshop held at an international conference in Vienna in August 2001 (IUNS), articulated this[viii]. The statement, attached as Annex 2, was drafted responding to a suggestion at the Seattle meeting on micronutrients in July 2001 hosted by the Gates Foundation, and was earlier transmitted to them. It is increasingly recognized that new forms of collaboration will need to be fostered, as partnerships between public and private sectors, and NGOs. The coalitions for fortification promoted by the GAIN will in many countries be a new initiative, and will require particular attention within the current proposal.

This proposal suggests an investment in building the capacity of national institutions in a substantial number of countries for the development, design, implementation, and

monitoring/evaluation of micronutrient deficiency control programs, with an emphasis on fortification. This is to ensure the sound technical foundation for these programs, through human resource development and operational research based on state-of-the-art knowledge, leading to sustainable programs with long term effectiveness. Most countries tackling micronutrient deficiencies have training and research institutions involved in the subject, together with government departments, non-governmental organizations, and the food industry. However, the numbers of people trained and experienced in the subject is much less than required for expanding programs, or even for their maintenance without reliance on external sources. This expertise and experience is needed particularly for assessments, program development and design, program supervision, and monitoring and evaluation. The proposal envisages a collaboration between centers in the industrialized world with centers in SE Asia and Southern Africa – in fact strengthening and expanding a consortium that has already begun (as a multi-center initiative[ix]) – with extension to other areas becoming possible as capacity expands.

The consortium consists of university and research/training institutions, all currently engaged in teaching and research in micronutrients, usually in the context of public health. It has undertaken preliminary work, in developing case-studies of successful micronutrient programs and assessing capacity-building needs in a number of countries, with funding and technical support from CDC, MI, and UNICEF. A meeting was held in June 2001 at INMU in Bangkok, where current programs in ten countries were reviewed (under the general headings of: initiation, implementation, and impact), subsequently written up and presented as case studies at a workshop ('Successful Micronutrient Programs') at the August 2001 IUNS meeting in Vienna. These are now being finalized for publication with a synthesis on the lessons derived, available in their present stage of editing on www.tulane.edu/~internut , with publication expected in 2003 in UNU Food and Nutrition Bulletin[x]. This meeting also produced the statement given in Annex 2.

Universities have a particular role in this process because their primary mission is human resources development and capacity building, and research; their comparative advantage is having the skills, experience, and materials for this. The universities and research institutions participating in this consortium all have a track record of international work in nutrition, and within this in micronutrients.

The three elements proposed, and described in later sections, are:

- human resources development;
- applied/operational research;
- linkages to program design and development.

**Objectives.**

Long-term objectives, for a substantial number of countries in Asia and Southern Africa, are as follows:

1. To contribute to sustained reduction of deficiencies of micronutrients, especially among children and women, leading to improved human health and function (physical and cognitive development, educational achievement, productivity).

2. To help establish and strengthen national capacities in nutrition for assessment, program development, implementation, monitoring, and evaluation of effects, so that fortification programs for micronutrient deficiency control achieve wide coverage and are sustained and permanently established.

In support of these objectives:

3. To develop human resources through training, exchanges, workshops, distance learning, materials development, and other methods;

4. To facilitate sound and relevant operational and evaluation research by national institutions to ensure program effectiveness, and to identify common patterns by synthesis across studies, both to improve programs, and to elicit new knowledge of impact on human function.

5. To facilitate flows of resources for fortification programs, through contributing to needs assessments, evaluation to identify effective approaches, and preparation of proposals for interventions.

Quantitative goals can be proposed at several levels: for process indicators of micronutrient deficiency control programs themselves; for trends in biological outcome indicators, resulting from interventions; and for the capacity-building outputs of this project. Outputs are proposed here in terms of numbers of people trained and research undertaken in the section on *implementation*. At a later stage, these can be elaborated using additional indicators of capacity and research output. Overall, four institutions acting as focal points for training in Asia and Africa (referred to as focal institutions) will be strengthened, supported by two in the US, and they in turn will work with a further three each (making twelve) to upgrade the latter's capacity.

Six institutions are directly involved: Tulane University, Department of International Health and Development, New Orleans (contact: J Mason); Emory University, Department of International Health, Atlanta (R Martorell); Institute of Nutrition at Mahidol Unversity, Bangkok (P Winichagoon); Center for Research and Development in Nutrition, and Department of Nutrition, Agricultural University, Bogor, Indonesia (Soekirman); University of the Philippines, Los Banos (UPLB: Ma Tuazon, R Habito) and Food and Nutrition Research Institute (FNRI: C Barba, R Pedro), Manila, Philippines; Public Health Program, University of the Western Cape,

Capetown (D Sanders). Others, starting with those involved in the recent work in Asia (from Bangladesh, Cambodia, China, India, Laos, Sri Lanka, Vietnam) will benefit from the project, through sending people to regional training, access to materials, participation in distance learning, support for operational research, and in related ways. Countries in Southern Africa will be assisted through connections with the University in Capetown.

**Description of Proposed Project Activities.**

Activities are proposed under the primary headings of human resources development and applied research. Important aspects within these are to foster the development of partnerships among the private and public sectors and civil society; to link research findings (including evaluations) to policy and program improvement; and to contribute directly to the development of projects (e.g. through situation analyses) while local capacity is being established. The *modus operandi* will involve institutional partnering, sharing resources and jointly undertaking these activities; a multi-stage organization is envisaged whereby centers from industrialized countries link with the more advanced centers in the developing world, to work with institutions and programs in the poorest countries. While starting with six institutions, these activities can be expanded to others. Moreover, a wider range of countries will benefit from participating in the training and research, probably beginning with those others participating in the multi-center initiative that led to the workshop in 2001 (see section *'implementation'* below).

*Human resources development.*

The capacities needed are for large-scale program design and implementation for fortification to combat micronutrient deficiencies. This involves assessment, program planning, negotiation and forming inter-institutional partnerships, program management, evaluation and applied research. Enhancing skills and competencies requires courses, learning materials, exchanges, and workshops. This takes place mainly at country level, by the focal institutions, coordinated regionally and globally. Envisaged in each country is one (to begin with) institution that provides training in a number of ways. A somewhat standardized set of courses and approaches should be developed, such that similar key expertise is instilled in each country. This will benefit from sharing a consistent set of materials, albeit with country-specific case study materials (which can also usefully be shared). Development of distance learning materials and methods will be a priority, also best developed by collaboration between institutions.

The participants in training exercises should be from public, private and non-governmental organizations, and the process should both foster partnerships and explore ways in which these can be created and managed. This will be expanded as experience is acquired. In this and other subject areas the comparative advantages of different institutions will be employed.

Building on the current coursework available in the participating institutions, the curriculum of training available (which may be compressed for short courses and workshops, and built on for distance learning application) would include the following topics:

- assessment and survey methods, measurements, indicators, etc;
- program design and implementation, including partnership development;
- food technology/fortified foods development;
- program management;
- evaluation and research design, analytical methods;
- operational research methods, epidemiology of malnutrition, ;
- public nutrition policies and programs, with emphasis on micronutrients;
- plus basic general courses like epidemiology and biostatistics, nutrition, food science and technology.

Types of training would include:

- short courses and executive courses/workshops for senior officials and management;
- degree-seeking courses up to Master's level;
- in-service distance-oriented learning, at various levels, for in-service personnel[xi].

A considerable amount of the needed material is available in the participating institutions for short courses/workshops and degree courses, and part of the investment needed is to organize and combine these, although some new material will be required. A proportion is already available in distance format, either print or CD/web. More effort will be required to convert materials into distance learning format, and this represents a potentially important aspect for expanding capacity proposed for support in this project.

Resources for training fellowships, participation in short courses and workshops, and faculty exchanges, will need to be included in the budget. Fellowships will be needed at several levels, especially for regional and international courses as envisaged in the overall strategy. Past investment in the advanced developing country institutions (e.g. INMU, but the others as well) needs to be sustained by supporting the present generation of junior faculty and graduate students to complete their education with the most advanced training, which is still in the industrialized world. Short courses would typically be three to eight weeks, regional or national. (Three weeks would be equivalent to 6 credits in the US system.) The regional training course in UP Los Banos is an example. These are suitable for: (a) orientation of professionals (early to mid-level, usually) who already have graduate training in a relevant area, to specifics required for program development in micronutrients, assessment, evaluation, etc; and (b) add some specific skills for graduate students in related programs. These should generally be developed out of the standard courses, condensing materials for broader but less in-depth offerings. Special programs are effective for orienting faculty and fostering collaboration, bringing professionals and junior faculty to a center (in US, or advanced developing country), a few at a time, to participate in regular coursework and work with faculty in specific research projects[2].

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2 This was done by Tulane in March-April this year for six people from the Philippines, Thailand, and Vietnam, with support from MI.

Distance learning is developing in most of the participating institutions. It is envisaged that this will be applied both to sharing resources for regular training, and extended as an important method for peripheral staff development, as in-service training (self-study with short interactive seminars).

Workshops (of one week or less) aim to provide a means for a group to address specific issues – which could be strategy development, or exploring evaluation results, for example – or to orient professionals in some specific techniques. This can be part of a broader process – for instance a workshop to start off, or complete, a longer training or research exercise. In the present context, they may provide an important means of fostering partnerships for fortification programs.

Within the three years proposed, all the participating training institutions will have gained experience and have developed faculty, materials, coursework and procedures; they will be creating further capacity for training in other participating (less advanced) countries (see *inter-institutional partnering*, below). This multi-stage approach will accelerate the numbers of people trained to sustain effective programs. As approximate examples, some 200 Master's level students should be trained (with this area as their major concentration) during this period in the six institutions, with more than 400 people participating in short courses/orientations.

Certification would be important, to ensure that the abilities in this area are recognized, which in turn will assure quality and attract students. This can range from certificates for initial training through to degrees; and accreditation should be organized so that training experience can accumulate, leading to higher qualifications. Sets of skills, with some degree of standardization, should be recognized; possibly IUNS might be the appropriate international body to explore this with.

*Applied/operational research.*

In the first instance, the priority approaches and issues related primarily to fortification are likely to be:

1. assessment of needs, baseline estimates, evaluations of current programs;
2. extension and quality control (including at the community-level) e.g. of iodized salt;
3. testing acceptability and efficacy of fortified foods (e.g. fortified products), followed by large-scale program development and monitoring implementation and effectiveness;
4. developing new approaches to fortification (presently applies particularly to iron);
5. overcoming technical and policy barriers to fortification;
6. developing, testing and applying products fortified with multiple micronutrients;
7. conducting research into human effects, interactions (between nutrients, and with other factors), to improve understanding of effectiveness.

A number of mechanisms are envisaged to foster and support this research, which will also feed back to benefit human resource development by facilitating practical application of learnt skills. In sum these are:

- inter-institutional partnering;
- grants program: mechanism for funding applied research proposals from institutions in the countries.
- research coordination, to ensure that technical progress is shared; and e.g. to elucidate patterns of response to study effectiveness, impact on human function and development; interactions between nutrients, and with other factors.

First, *inter-institutional partnering* (for human resource development and research) would be in several ways: 'north-south' – meaning between the industrialized country institutions and those in developing countries; 'south-south', between the more advanced developing country institutions and others; and 'triangular', involving industrialized country-based institutions working with those more advanced in developing countries, to assist the less advanced: this in practice is what was begun in the multi-center project led by Tulane and INMU (Institute of Nutrition at Mahidol University, Bangkok). This intermediate phase is important before the more advanced developing country institutions have the complete capacity to operate alone[xii].

Similarly, the CDC IMPACT program is working with Emory to address the training needs of national micronutrient programs; Tulane is also affiliated with the program. Some of the proposed activities are to assess the tools and guides that are under development; to examine the national and regional priorities; and plan to maximize the ability and resources to support these activities.

Second, a *grants program* is proposed to support program-related research. Part of capacity needed is the ability to design and carry out relevant operational research. A potentially effective input would be to establish a grants program to foster such research. The grants would be to developing country institutions (not necessarily restricted to the more advanced focal institutions, see section on *participants* below), of moderate scale (in industrialized country terms), to support research with the dual purpose of getting the research done, and allowing experience to be gained by these institutions. The research would be carried out through the institutional partnering process described earlier. The funding process would involve peer review and some competition for the support. The research topics would be selected to contribute regionally-relevant questions, as well as to the country-specific issues, by having an agreed set of topics that were currently relevant in general terms. An example might be effective means of fortifying rice with iron, which is applicable to many countries in Asia, but can be researched at national level.

This program would be an important route to getting needed operational research done. It continues the philosophy of trying to advance the field by working with and through local institutions, avoiding parachuting in to conduct studies with inadequate attention to fostering sustained institutional development. Organizational meetings among the collaborators are proposed.

As another example, there are urgent needs for national survey data in many countries, for baseline needs assessments, and overall evaluation. While the implementation of these might be funded by a different mechanism, the grants program could contribute to their design and analysis for purposes of developing fortification programs.

Third, the *coordination and interpretation of results* should lead to findings that are more broadly applicable to programs. This will increase the economy of research, by ensuring that lessons learned in one area become applied elsewhere. Results on effectiveness of large-scale programs, and associated operational research to identify problems and remedies, will be crucial for trouble shooting and improving interventions. Simply applying efficacious methods blind on a wide scale -- without evaluation -- can lead to major opportunities missed. Even now there is hardly any information on the effectiveness of most micronutrient programs. Programs are being launched in the reasonable expectation of impact; but assessing if that impact is occurring is the best way of detecting problems -- which may be in implementation, they may be due to unexpected interactions with other conditions, or for many other reasons. A further important point is that the effects on human function can eventually be assessed from looking at a pattern of responses in a number of program; because the designs cannot be randomly controlled for ethical and other reasons, evidence-based decisions will benefit substantially from this approach.

*Linkages to program development.*

Ensuring timely application of scientific findings to policy decisions and program design and management requires deliberate attention. *First*, the organization at country level of development, testing, and application of methods must involve the different actors from an early stage. Typically, research institutions are separate from industry and from governmental agencies implementing programs, but these need to be working closely together through the process of research and development, testing and large-scale application (Annex 1). Certain organizational arrangements should be supported by this project – for example ensuring that the different interested groups have a say in the capacity-building and small grants components; and that the implementers (public and private sectors, NGOs) contribute to decisions on which activities get supported. There should be continuity from testing to large-scale evaluations.

*Second*, national mechanisms should be established for regular program and research reviews -- in this context, the national fortification coalitions will be a key mechanism. The project will facilitate workshops and informal meetings to share results can be effective. External input (e.g. from other universities participating in the consortium, 'south-south' or 'north-south') will help to ensure that important results and their implications are brought out, examined and validated, and applied to adjusting existing programs or launching new ones. Fostering collaboration with the food and milling industries will be a priority. For example, recently CDC, MI and Emory have joined forces to reach out to the milling industry in order to create a public-private-civic sector alliance that would support the movement towards *Universal Flour Fortification.*

*Third*, related to the above, one feature of the institutional partnering envisaged here is to aid interpretation of findings. It is often the case that results from primary analysis are suggestive of important conclusions, but the local group may need wider scientific support to press for the changes implicitly needed (for example this can apply when for example an evaluation of a large program indicates need for adjustment), or may not have the experience and skills for confirmatory analysis to allow more soundly based recommendations.

*Fourth*, international communications (regional and global), as workshops, publications, and sharing of results (including web-based), are a well-established mechanism for airing and refining findings. Workshops such as the 'Successful Micronutrient Programs' meeting held at the IUNS in Vienna (August, 2001) are an example. A further meeting in 2005 at the next IUNS is foreseen. Similar fora, such as regional nutrition congresses, national meetings, and others, can be used.

*Implementation.*

The present consortium was formed for the project entitled 'Multi-Center Initiative on Successful Micronutrient Programs: for Review of Country Experiences, and for Future Operational Research and Capacity-Building', supported by MI and CDC, in collaboration with UNICEF.

The institutions represented – both governmental and university, plus certain international NGOs – were asked to assess their needs for capacity building in the future, for training and operational research. These assessments, although incomplete, have contributed to the current proposal, as has the statement from the meeting (Annex 2).

In the industrialized countries, the lead institutions in this proposal are:

- Department of International Health and Development, School of Public Health and Tropical Medicine, Tulane University, New Orleans; and
- Department of International Health, Rollins School of Public Health, Emory University, Atlanta.

In addition, a number of others have been involved in previous work, and are expected to participate in different roles, including University of California, Davis.

The following institutions in developing countries participated in the multi-center project, and have expressed interest in continuing such work, with a focus on fortification. The first four are the focal institutions in the present proposal.

1. Institute of Nutrition at Mahidol University (INMU), Thailand;
2. University of the Philippines at Los Banos (UPLB), and Food and Nutrition Research Institute (FNRI), Philippines;
3. Center for Research and Development in Nutrition (CRDN), and Agricultural University (IBP), Bogor, Indonesia;

4. Public Health Program, University of Western Cape, S Africa;
5. Institute of Food Science and Technology (IFSN), Dhaka, Bangladesh;
6. National maternal and Child Health Center, MoH, Cambodia;
7. Institute of Food Hygiene and Preventive Medicine, Chinese Academy of Preventive Medicine, Beijing, China;
8. National Institute of Nutrition (NIN), Hyderabad, India;
9. Nutrition Section, Ministry of Health, Laos;
10. Medical Research Institute (MRI), Sri Lanka;
11. National Institute of Nutrition (NIN), Vietnam.

In the Philippines (UPLB) regional courses on Food and Nutrition Planning are held regularly, providing an opportunity to include additional coursework on micronutrients and fortification; a start was made on this with faculty exchanges with Tulane in early 2002 supported by MI. In Thailand also courses can be developed in this direction, again with input from junior faculty who participated in the Tulane program; INMU has considerable capacity in food science as well as nutrition, which can be applied to training in the region. Both UPLB and INMU have established links with other countries in the region (e.g. with Bangladesh, Cambodia, China, Laos, Vietnam). In southern Africa, the program at University of the Western Cape has extensive experience of training in this context, and links will be established with nearby countries to expand capacity for their national programs.

A training program has been planned with CDRN/IPB in Indonesia and Tulane for 2003, in order to initiate a preparation process for a longer term program of fortification, instigated by the Indonesian Fortification Coalition (Koalisi Fortificasi)[xiii]. This is the subject of a separate proposal to GAIN. It will provide useful experience for other such short courses, and perhaps an example of a process for preparing national plans by first developing the national capacity to do this.

The procedures for implementing the project would be a progressive development of courses (materials, faculty) of the different types (modules in graduate programs, short courses, workshops). Part of this will draw upon material currently in use, others may require initial research – in particular on fostering partnerships [3]. Together the six institutions in this proposal cover the range of relevant topics (e.g. in nutrition, food science and technology, assessment, evaluation); if these are found to need strengthening additional collaboration will be sought. A set of courses and materials applicable to fortification for micronutrient deficiency control will be produced, tested, and applied to the training of a substantial number of people. The formats will be designed for training in the different contexts of short and longer courses and workshops, as well as for in-service use in a distance-learning format. Distance learning will use both internet and CD-based material, as well as print-based – the Public Health Program at the University of the Western Cape (South Africa) has print materials for in-service training of health system personnel, which provide a good model for nutrition. It is expected that training

3 For example, Cambridge University has initiated an international business leadership forum and post graduate training program aimed at cross-sector partnerships – see http://www.cpi.cam.ac.uk/pccp/home.html

programs could be started based substantially on existing materials early in the project, and be upgraded as the project progresses.

The participants in training programs would be those already having responsibility for program development – public and private sectors and NGOs – and those preparing for careers in this field. Workshops are aimed at orientation of those already working in the field (or about to) at relatively senior levels. Distance learning for in-service training will require agreements with agencies and employers to release staff time. A recent regional training exercise (in the Middle East) on cross-sectional survey methods for micronutrient assessment emphasized the need for sustained, more comprehensive national capacity building curriculum and courses. This stressed that to be cost-effective, training strategies will need to incorporate distance learning and computer technologies to build regional and national capacities for eliminating micronutrient malnutrition

Research needs and opportunities will be identified as fortification programs begin to be developed and expanded. Under this proposal the necessary skills for such research will be provided from the outset through the training. The applied research component – supported by small grants – will provide information for planning fortification programs, for monitoring, and evaluating effectiveness.

It is also proposed that the focal institutions be responsible for increasing the capacity (for training and applied research) of additional institutions in their region, at a rate of one per year for each institution. Thus an additional 12 countries will have been brought up to this level over the three year period. In many cases this can involve strengthening ties that already exist – e.g. INMU with Laos and Cambodia, UPLB with Bangladesh.

In sum, the activities for each institution involve training at post-graduate level, short courses, workshops, exchange visits, and undertaking applied research projects. Estimates of outputs over the three year period are as follows:

not my satisfactory spec

People trained (post-graduate): 200-250
Participants in short courses: 120
Participants in workshops: 300
Faculty with new skills
- Developing country focal institutions: 12
- New developing country institutions: 36

Exchanges/visits
- From developing country focal institutions to US: 12
- From developing country focal institutions to new countries: 36
- From US to developing country focal institutions: 24
- From US to new countries: 12

Applied/operational research projects: 12

At a later stage, these output estimates can be elaborated using additional indicators of capacity.

**Resource Requirements.**

In round terms, the activities described above would require six people (full time equivalents), one in each of the institutions, with funding for fellowships, participation in short courses and workshops, travel for exchanges, preparation of materials, small research grants, and other expenses. The estimated costs are from $200,000 to $400,000 per institute per year, totaling approx. $1.6 million per year, or $5 million over 3 years. This estimate includes fellowships for post-graduate training for 144 people in the developing country focal institutions, and 72 in the US-based ones; participation in short courses for 120 people, and in workshops for 300; grant support for research; exchanges of staff; materials; and administration.

Not a request for PM

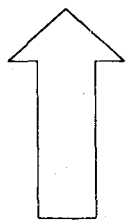
Annex 1

**Sequence of intervention development, and examples of current status of interventions**

Large scale programs

Effectiveness m&e, to build improvement and sustainability

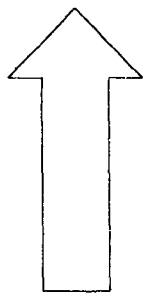
- VAC distribution
- iodized salt



Trial/pilot.

Efficacy and acceptability research

- VA fortification (esp. oil, otherwise with multi)
- multi fortification of commercial foods
- multi 'sprinkles'
- multi supplementation esp. in pregnancy



Research and Development

- iron fortification of staples, esp. rice
- iron in salt

## Annex 2

**Promoting fortification to improve nutrition.**

*Statement from participants from developing countries at the Satellite Meeting held at the 17th IUNS International Congress of Nutrition, on 'Progress in Public Nutrition – Successful Micronutrient Programs', Vienna, 24-26 August 2001, convened by Tulane and Mahidol Universities, supported by CDC, MI, and UNICEF. Countries participating/represented: Bangladesh, Cambodia, Central America (INCAP countries), China, Indonesia, Laos, Philippines, South Africa, Sri Lanka, Thailand, Vietnam. This note was drafted by the group, which agreed to distribute it in this form. The statement responds to a discussion at the Micronutrient Consultation in Seattle on 25-26 July 2001*

5 Sept 2001

Micronutrient deficiencies are widespread in developing countries, affecting more than one-third of the world's population, particularly women and children. Their functional consequences -- such as learning disabilities, lower work productivity, higher morbidity and mortality -- negatively affect the social and economic development of the countries.

The past century has witnessed unprecedented improvement in health worldwide, with spectacular declines in young child mortality and increases in life expectancy in developing countries. A significant part of this progress has resulted from the Child Survival Initiative with its promotion of new and improved technologies, notably the Expanded Programme on Immunization and Oral Rehydration Therapy. These successes notwithstanding, over 95% of young child deaths still occur in developing countries, the great majority being related to underlying malnutrition. Similarly, inequalities in health are increasing rapidly, particularly between industrialized and developing countries, but also between rich and poor groups within countries. Moreover, there is increasing evidence of stagnation or even reversals of this progress with, for example, immunization coverage rates declining in Asia and Sub Saharan Africa – especially where the capacity of health systems to support continued implementation of programmes has not been deliberately or strongly developed. Such considerations have led to an increasing recognition -- for example within many international agencies such as WHO -- of the central role of human resource development for strengthening health systems and for continued delivery of health technologies, including those known to be effective in controlling micronutrient malnutrition.

Malnutrition in women and children results from a broad range of causes at global, national, household and individual levels and its elimination requires a wide range of actions. Viewed in this context, the elimination of micronutrient malnutrition is only one part of the solution. However, it is an important and worthwhile goal that we support for several reasons:

- Important, adverse consequences for human health can be avoided
- Cost-effective strategies are available to make a difference
- Demonstration of success will encourage societies to apply the lessons more broadly

*The need for a broad approach.*

The populations of almost all poor countries suffer from multiple micronutrient deficiencies. For many reasons efforts to prevent these deficiencies have to date mainly focused on single nutrients. There has been little effort to develop an integrated approach that includes the assessment of the overall micronutrient situation in specific locations, and the delivery of appropriate amounts of all nutrients that are lacking. This initiative provides an ideal opportunity to focus on the integrated approach that is crucial for optimizing the benefits of fortification for human populations.

Current knowledge, technology and experiences on food fortification strongly support the view that food fortification is feasible and applicable. It is a sustainable, low cost, easily manageable intervention. Moreover this food-based approach of fortification can be complementary with other approaches, notably supplementation – and it should not detract from these efforts.

Strengthening capacity for micronutrient fortification has the potential to enable sustained improvements in nutrition for much of the world's population. It is important that this specific focus not only avoids conflict with other nutrition programs – including those that provide other means of control of micronutrient deficiencies – but that it also strengthens capacity for ensuring that countries improve nutrition in general, including through other complementary programs. This requires that we identify the capacities that need to be in place for effective micronutrient fortification programs, and how building these capacities fits within the broader mandate of local institutions. It is important to address how a focus on fortification can strengthen, and avoid erosion, of other important programs and resources. This identification should be done before or at the same time as major new investments are planned in fortification.

*Capacity building as focus.*

In the effort to rapidly expand food fortification to deliver essential micronutrients to vulnerable populations, the challenge is to move to sustainable, nationally-run programs. This can be ensured only if capacity to assess needs, initiate, manage, monitor and evaluate programs is built up. Emphasis from the start on support for systems and for local capacity and operational research, based on state-of-the-art knowledge, will produce results that are more self-sustaining and flexible, leading to long-term effectiveness. Country capacity involves factors such as human resources, infrastructure, and empowerment.

Capacity building for effective management of micronutrient programs must deliberately address identified gaps in competences in developing countries in the general areas of

policy development and analysis, program planning and design, implementation, monitoring, evaluation and advocacy. Of special concern is developing national capacity for designing and conducting evaluations/operations research. It is envisaged that such efforts would contribute to expanding knowledge and deepening appreciation for what works and what does not -- in nutrition program management in particular, and in other key sectors (e.g. education, child development) -- thus creating a policy and political environment that will support and sustain effective programs.

Capacity building strategies must be based on short and long term objectives. These will determine who should be involved, and require an examination of what capacities exist, which need to be strengthened, and which do not exist at all. Approaches should both develop explicit initiatives for this purpose, targeted at specific areas of capacity weakness or gaps; and be organized to progressively adapt program implementation as it progresses, so that those involved continue to learn as they work.

Short term capacity building should address the immediate nutrition issues. This is relevant particularly in developing countries where several urgent nutrition problems exist, while human resources tend to be limited. However, good nutrition should be a long term goal for any population. Therefore, capacity building must be developed with a longer term perspective: not only is enhanced and expanded competence in nutrition seen as crucial, but it should also be recognized that leadership must be built up over time, to deal with emerging issues and to ensure continuing capacity. The support needed includes technical and financial inputs.

Countries are responsible for the design and execution of nutrition programs and for their sustainability. Thus, we envisage that countries will apply directly for support of their programs to the Global Alliance. However, we also envisage that some critical assistance is best provided at regional level for several reasons:

- Experiences and successes with programs vary across countries and important lessons need to be shared widely
- Developed (north) as well as developing countries (south) have centers of excellence that would permit effective collaboration in the service of programs across regions (e.g. south-north-south collaboration).
- Economies of scale could make delivery of technical assistance and other inputs more cost-effective at global and regional level (e.g. fortification technology; regional laboratories; assessment, surveillance and monitoring tools; some types of training, etc).

**Integrating fortification with other programs**

It is important to consider micronutrient interventions as one category of intervention within a broader public health context of addressing malnutrition, which requires a multi-sectoral approach. Fortification is a powerful strategy to address the more urgent micronutrient needs but it cannot be considered alone.

In planning for food fortification, links with other institutional components in a system should include the following assessments:

1. *Research and Development*: number, qualifications, performance (e.g. research output) etc. of staff; opportunities for improvement; competences in terms of equipment and institutional environment to carry out research and development for fortification programs.
2. *Training and Education*: training needs and means of improving the training in formal and informal education institutions (advanced degree, diploma, refresher. etc).
3. *Policy and Planning*: how the fortification plan should be supported by authorities in terms of regulatory enforcement, policy and budget.
4. *Programs*: how fortification links with other existing nutrition programs; what institutions (including industry) are appropriate for carrying out fortification.

**Early Implementation Steps**

The task of project preparation [including proposal writing] even in most developed countries, requires great skill and verbal agility. The difficulty of the task is further compounded when it must be written in a language other than one's own – such skills are still quite rare in many developing countries.

In order to minimize inequality and to ensure that even the poorest of the developing countries is given a fair chance to compete for Coalition4 funding, we suggest that the Coalition facilitate the country proposal process in the following ways (at the same time as helping to build the capacity to meet these needs from countries' own resources):

- Provide potential applicant countries with guidelines describing the proposal process in clear, simple and direct language
- Encourage Coalition members working on the ground in the applicant country to assume an "active role" in assisting the applicant in drafting the proposal
- In the event of there being no Coalition members currently working in the applicant country, arrange for such assistance to be provided by staff from another country in the immediate region.
- If assistance cannot be provided from the sources described above, the Coalition should make appropriate arrangements to provide assistance.

Keeping in view the above rationale, this proposal urges the Coalition to support and require that all national, regional, and global intervention proposals include a strong capacity building component with clearly defined criteria and guidelines.

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4 Refers to GAIN.

***Endnotes***. Note: most references can be accessed through the website: www.tulane.edu/~internut

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