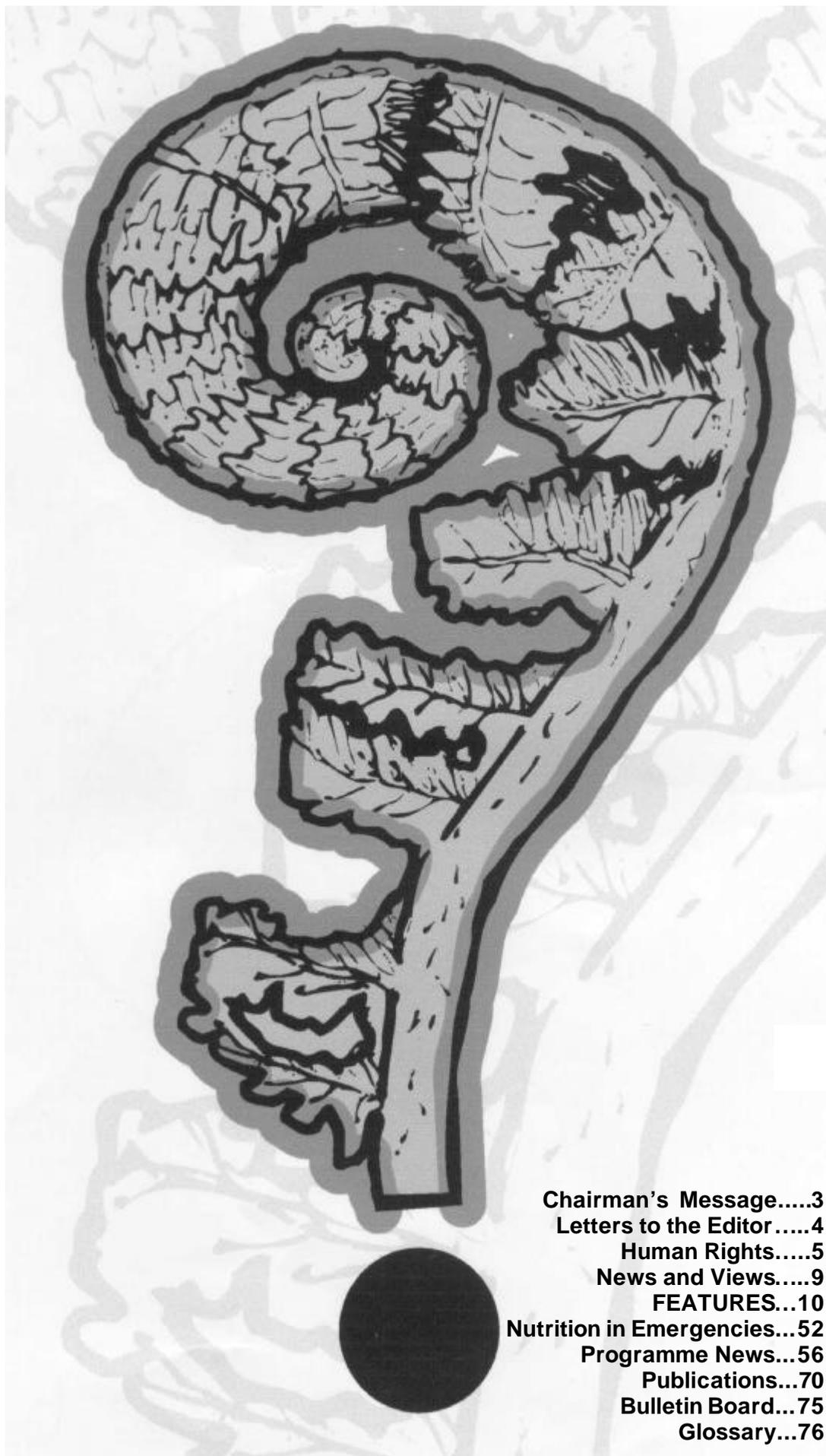




SCN NEWS

a periodic review of developments in international nutrition compiled from information available to the ACC/SCN



Chairman's Message.....	3
Letters to the Editor.....	4
Human Rights.....	5
News and Views.....	9
FEATURES...10	
Nutrition in Emergencies...	52
Programme News...	56
Publications...	70
Bulletin Board...	75
Glossary...	76

**Administrative Committee on Coordination
Sub-Committee on Nutrition
(ACC/SCN) THE UN SYSTEM'S FORUM FOR NUTRITION**

The Administrative Committee on Coordination (ACC), which is comprised of the heads of the UN Agencies, recommended the establishment of the Sub-Committee on Nutrition (SCN) in 1977, following the World Food Conference. This was approved by the Economic and Social Council of the UN (ECOSOC). The UN members of the SCN are the ADB, FAO, IAEA, IFAD, IFPRI, ILO, UN, UNAIDS, UNDP, UNEP, UNESCO, UNFPA, UNHCHR, UNHCR, UNICEF, UNRISD, UNU, WFP, WHO and the World Bank. From the outset, representatives of bilateral donor agencies have participated actively in SCN activities. The Secretariat is hosted by WHO in Geneva.

The *mandate of the ACC/SCN* is to serve as the UN focal point for harmonizing nutrition policies and strategies throughout the UN system, and to strengthen collaboration with partners for accelerated and more effective action against malnutrition. The *aim of the SCN* is to raise awareness of and concern for nutrition problems at global, regional and national levels; to refine the direction, increase the scale and strengthen the coherence and impact of actions against malnutrition worldwide; and to promote cooperation among UN agencies and partner organizations. The SCN's annual meetings have representation from UN Agencies, donor agencies and NGOs; these meetings begin with symposia on subjects of current importance for policy. The SCN brings such matters to the attention of the ACC and convenes working groups on specialized areas of nutrition. Initiatives are taken to promote coordinated activities -- inter-agency programmes, meetings, publications -- aimed at reducing malnutrition, primarily in developing countries. The SCN compiles and disseminates information on nutrition, reflecting the shared views of the agencies concerned. Regular reports on the world nutrition situation are issued. Nutrition Policy Papers are produced to summarize current knowledge on selected topics. *SCN News* is published twice a year, and the *RNIS* (Refugee Nutrition Information System report) is published quarterly.

SCN NEWS *Editor: Judith Pojda, PhD*
Cover illustration by Marie Arnaud Snackers

SCN News is issued twice yearly by the Secretariat of the UN ACC/SCN Sub-Committee on Nutrition. Your contributions to future issues would be most welcome. **SCN News** aims to help the sharing of experience in nutrition. If you wish to receive additional copies of the **SCN News**, or would like to suggest other names for our distribution list, please write to us or visit our website at: <http://www.acc.unsystem.org/scn/>

Chairman: A: Namanga Ngongi
Deputy Executive Director
World Food Programme
Via Cesare Guilio Viola 68
Parco de Medici, 100148 Rome, Italy
Telephone: 39 06 5613 2001, Fax: 39 06 5613 2834
Email: namanga.ngongi@wfp.org

Technical Secretary: Sonya Rabeneck
ACC/SCN c/o World Health Organization
20, Avenue Appia
CH-1211 Geneva 27, Switzerland
Telephone: 41 22 791 0456, Fax: 41 22 798 88 91
Email: accscn@who.int

SCN NEWS provides information on issues of importance in the field of international nutrition. All manuscripts submitted for consideration are peer-reviewed, although publication is not guaranteed. Overall editorial control is retained by the SCN Secretariat. Every effort is made to ascertain the validity of the information contained in SCN publications. Contributing authors are responsible for the accuracy of references. Manuscript guidelines are available. Items published by the SCN Secretariat do not imply endorsement of views given, nor necessarily the official positions taken by the SCN and its member agencies concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The status of quotes and other material is generally indicated in the text and/or sources.

Readers are encouraged to review, abstract, reproduce or translate this document in part or in whole, but as copyright holder, the UN ACC/SCN Secretariat requests due acknowledgement. Use other than for education or non-commercial purposes requires explicit prior authorization in writing from the ACC/SCN Secretariat. Original illustrations are the sole property of ACC/SCN.

©UN ACC Sub-Committee on Nutrition, 1999

***We gratefully acknowledge funding assistance from the
Government of the Netherlands and USAID
for the preparation and printing of this issue of SCN NEWS.***



**This issue of the *SCN News*
is dedicated to the memory of
Dr Abraham Horwitz
(1911 - 2000)**

A Memorial

It is with deep regret that I learned of the death of Dr Horwitz on 10 July. He was 89 years of age. He was buried in Chile, his native country. The Pan American Health Organization held a memorial service in his honour.

The influence Dr Horwitz has had in shaping the SCN is unmistakable. His presence at the 27th SCN Session was electrifying, not only for old colleagues and acquaintances, but also for newcomers to the SCN such as myself. He will be sorely missed by the entire nutrition community. On behalf of the SCN I wish to extend heartfelt condolences to the family of Dr Horwitz.

— Namanga Ngongji, SCN Chair

The "Health and Nutrition" community will by now have heaped many compliments on the late Dr Horwitz. Wise, thoughtful, patient, knowledgeable and much more, all fully justified. Yet this small dapper gentleman was also a "mover and shaker" of immense catalytic capability — he made people think, he overcame inertia, he got things done. But he never claimed the limelight and never lost sight of the basic purpose of the UN and bilateral agencies that formed the SCN. When I walk up our chilly Scottish hillside, now and then I will smile at his memory and recall the kindness he displayed to me as a postgraduate student and again many years later at the AGN and SCN.

—Leslie Burgess, Former SCN Chair

There will be many well-deserved tributes to Abraham Horwitz for his vision, leadership, wisdom, dedication, modesty, and generous spirit. However, his permanent legacy lies in his development of the health service in Chile, his building of PAHO, his indispensable support of INCAP, his making PAHEF successfully proactive, his chairmanship of the AGN and, of course, his long stewardship of the SCN. The example of his life will continue to inspire us all.

—Nevin Scrimshaw, UN University

I read so much about him and his accomplishments before I met this extremely humble man. I have continued to benefit from the many memorable statements and words of wisdom he has passed on over the years. Though we shall miss him, his stature and impact will live on.

—Ruth Oniagn'o, Former AGN Vice Chair,
Jomo Kenyatta University

Abraham Horwitz was an inspiring figure for me from my early years; he visited my home as my father's friend and supervised his medical thesis. I followed his career with admiration. His commitment in advancing nutrition and public health worldwide in favour of the underserved was unrelentless. He practiced what he preached. He set a standard which will not easily be surpassed. I hope we will be able to preserve his legacy and follow his mandate to redouble our efforts in improving humankind through better nutrition.

—Ricardo Uauy, Former AGN Chair, University of Chile

I had the privilege to meet Dr Abraham Horwitz on a couple of occasions. He will be remembered for his dedication to his responsibility and strong sense of integrity in scientific thought and action. His single-minded commitment to give mankind the right to address malnutrition and health problems is something that all of us must try to emulate in our own small way. His efforts to steer the younger generation to fight malnutrition are again marks of a great human being with vision. We will cherish these ideals and try to live up to them.

—Kraisid Tontisirin, Director, Food & Nutrition Division, FAO

Although I admired Dr Horwitz for so many personal and professional characteristics, it was his concern for humanity that drew me to his office for informal chats whenever the occasion permitted. I counted on his wisdom, fairness and ability to see the larger picture to guide me in difficult and sensitive decisions, whether they concerned micronutrients or the politics of international agencies. I will truly miss this humanitarian, scholar, gentleman and friend.

—Barbara Underwood, President, IUNS

Dr Horwitz will be remembered for his constancy in promoting public health concerns, particularly those that were neither popular nor easily solved. His insistence on the highest standards for scientific inquiry and rigorous program implementation have been critical elements in the success of nutrition programs world-wide. His dedication to the International Vitamin A Consultative Group and development programs will be sorely missed.

—Frances Davidson, USAID

messages from the retiring & Incoming Chairs



From L-R: Richard Jolly, Abraham Horwitz, A. Namanga Ngongi.

—From Richard Jolly:

It is with sadness that I announce the death of Dr Abraham Horwitz, SCN Chair Emeritus. He had sown many seeds in the international nutrition arena. We have all been fortunate enough to reap some of the harvest from those seeds, and there will be much more to come. In tribute to Dr Horwitz, friends & colleagues have spoken of how he 'practiced what he preached', how he 'nurtured greater harmony of nutrition policies and activities for the UN system', and how he was – 'always concerned for the well-being of those less fortunate than himself'. Nutrition was more than epidemiology, research and science to Dr Horwitz – it was a way of life and a priority for life. He will remain an inspiration for future generations of nutrition students and professionals working in international nutrition. The SCN was privileged to have Dr Horwitz present at our Session this past April in Washington, DC, to attend the 4th Annual Horwitz Lecture given by Deepa Bhat, a young graduate student at the beginning of her career.

I thank UNICEF and the World Bank for hosting our week-long 27th Session. During the symposium portion of the meeting we were privileged to hear from F H Abed, Executive Director of BRAC, the 27 year old multifaceted grassroots development organization in Bangladesh; Kul Gautam, Deputy Executive Director of UNICEF; Eduardo Doryan, Vice President at the World Bank; and P e r

Pinstrup-Andersen, Director-General of the International Food Policy Research Institute. Speaking on the topic of "Nutrition Stocktaking and the Challenges for the 21st Century", all four distinguished guests encouraged participants with past and present examples of agency cooperation, and presented future challenges to the nutrition community. They encouraged the SCN to produce a new set of goals, targets and strategies around which political, corporate, and civil society leaders and the media can be mobilized. Aligned with this thinking I am pleased to announce that the ACC/SCN Strategic Plan (see Programme News section) was adopted by acclamation during the Session. The Plan outlines strategies to strengthen leadership and coordinate the agencies' efforts to support countries in their actions to end undernutrition.

I congratulate the *SCN News* for addressing the role of biotechnology and its links with nutrition. Genetic modification, once a futuristic concept, is now a present reality. It is obvious that

plant breeding, especially to increase the micronutrient density of staple grains, provides possibilities to alleviate undernutrition. Timely and accurate information on this topic is crucial for all of us. Furthermore, agriculture is not just productivity, it is a way of life. Seeds are sown, we reap the harvest. The nurturing process must not be forgotten.

I am grateful for the opportunity to have served since 1996 as the SCN Chair and I thank everyone from all the UN agencies, bilaterals and NGOs, who have assisted me to further the visibility of the ACC/SCN in this new millennium. I wish the incoming Chair, Dr Ngongi, all the best in his new role. I have no doubt that under his leadership the SCN will become increasingly unified and ever more active in its efforts to help the UN and the international community to work for the elimination of malnutrition by responding to nutritional problems around the world.

—From Namaga Ngongi:

I look forward to serving the nutrition community as your new Chair. As you may know, I presently serve as Deputy Executive Director of the World Food Programme. The SCN has provided much useful support to the humanitarian agencies over the years, and the WFP has benefited greatly from this support. During my

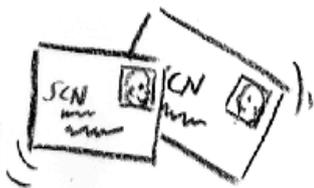
**...redouble your efforts in nutrition...
be bold and imaginative.**

term as Chair, I intend to return the support by focusing on practical tripartite solutions to the very real problems and challenges faced every day by hungry people who are not in a position to exercise their right to food.

I am delighted that at its 27th Session, the SCN established a Working Group on Nutrition and HIV/AIDS to tackle issues related to this serious threat to life itself, particularly with regard to its devastating effects on the African continent. Next year's SCN symposium on "Nutrition and HIV/AIDS" will provide new insights into what the nutrition community can do to help improve the quality of life for victims with the disease. It will be a great pleasure to see all of you at the 28th SCN Session to be hosted by WFP in Nairobi from 2-6 April 2001.

In memory of Dr Horwitz may we continue to be bold and imaginative in our approach to nutrition problems, particularly with respect to nutrition and HIV/AIDS.

LETTERS TO THE EDITOR



"...Since the summary of activities on CRONOS appeared in the *SCN News* [No.19] I have received now two inquiries [regarding large research projects] from Africa....this shows how effective notes in the *SCN News* can be to encourage networking....

Noel Solomons, MD, CeSSIAM

"...I have recently coordinated the formulation of a National Nutrition Policy which has been approved by the Government. I am now in the process of establishing a National Nutrition Agency to be located at the Office of the Vice President. I am very excited about it all because finally, nutrition in the Gambia is being seen as an issue of development, rather than just health or agriculture. With regards to the Baby-Friendly Community Initiative, countries from the African sub-region will be visiting the Gambia to learn about it to be replicated in their countries. This was a result of a visit to the communities by the UNICEF Regional Nutrition Advisor who thereafter became an advocate for the BFCI....sustainability of the project is now confirmed with communities still committed even after almost five years of implementation. Our Vice President designated all the 12 communities as Baby-Friendly during World Breastfeeding Week in 1999. The ceremony was attended by the Ministers of Finance, Education, and senior officials from government and NGOs, and included representatives of FAO, UNICEF, WHO, and village chiefs, etc. A large billboard at the entrance of each of the village will now tell you that "You are now entering a Baby-Friendly Community" together with the village name and the BFCI logo which is a picture of a mother, father and baby. We have now started expanding as [more] communities request the project. The community members already trained wish to be used as voluntary resource persons....You are welcome to visit the Gambia and these communities any time....

Isatou Jallow Semega-Janneh

[Ed. Note: Isatou delivered the 2nd Dr Abraham Horwitz Lecture, "Breastfeeding: from Biology to Policy" at the SCN annual session in 1998 in Oslo.]

Adieu Lilian Tendayi Marovatsanga. It was shocking news to me. I could only know her at the time of her death as I am a new reader of the *SCN News*. We Africans have lost another hero of our time. I sympathize with the family of our pioneering "first" food scientist....We pray that another hero shall be sent to us to fill the vacuum created. Our task ahead is based on Dr Marovatsanga's work towards a world where "access to nutrition and safe food is the right of every individual" as indicated by Prof. Ruth K. Oniang'o from Jomo Kenyetta University (*SCN News* No. 19, p12).

*Okoro AEE, UDI General Hospital
Enugu State, Nigeria*

[Note: Many thanks to all of our readers who took the time and effort to respond to our survey included in the last issue of the *SCN News*. Your responses gave our Secretariat and donors valuable information. Our direct mailing list is now comprised of almost 6,000 readers; 68% live in developing countries. Below are several comments from our readership survey.]

"I would like you to continue sending us the hard copy of the *SCN News* because most of the people in the developing world have not been connected to the internet, while others have no access to computers at all. I hope to use the information for my own benefit and that of the communities I intend to serve as soon as I complete my studies..." (Kenya)

"I have recommended *SCN News* to many colleagues in Africa and elsewhere, especially those who find it difficult to access costly material or the internet. Please keep it coming." (Scotland)

"Impressive and informative publication. It enriches our library and information services in the university." (Bangladesh)

"*SCN News* is written in a style that even people with English as their second language find it easy to understand. It is not gobbled up with technical jargon but informs effectively on relevant topical issues in nutrition." (South Africa)

"....The *SCN News* helps me to advise all kinds of people [in my peasant farming community], especially young adolescent females....[Through the *SCN News*] I learned about breastfeeding...and that skimmed and condensed milk are not recommended for feeding infants under six months....The *SCN News* points to the vital role the UN plays." (Ghana)

Free/Low Cost Newsletters

Erratum: The last issue of the *SCN News* (p11) inadvertently gave only part of an "Information Sheet", produced by the Nutrition Society, which lists sources of low cost English language books and other training materials. The full list of sources is available on <www.nutsoc.org.uk/careers.htm>. Also on this website are additional, recently-updated Information Sheets listing free/low cost newsletters (as announced in *SCN News* No. 16) and postgraduate and short training courses in nutrition. Please send corrections or additions for any of these sheets to annburgess@sol.co.uk.

Human rights



[Ed. Note: "The World Food Summit's renewed focus on the right to adequate food and the UN Secretary General's reform proposals calling for the mainstreaming of human rights in all UN activities have, among other initiatives, created an overall environment providing new impetus for bringing ethics and rights to the fight against hunger and poverty" (SCN Working Group on Nutrition, Ethics & Human Rights, 1999). In each issue of the SCN News we will try to bring you up-to-date news on the right to adequate food and practical rights-based programming information.]

The International Project on the Right to Food in Development

A new momentum and dynamic for change has been developing in the past four years since the World Food Summit broke with conventional rhetoric and called for a clarification of the content of the right to food and the means for its realization. There is an urgent need for further research, capacity-building, advocacy and action. It is against this background that the *International Project on the Right to Food in Development* <<http://www.nutrition.uio.no/iprfd>> was established at the University of Oslo in April 2000, as a collaborative arrangement between the Norwegian Institute of Human Rights and the University's Institute for Nutrition Research, with start-up funding from the Norwegian Ministry of Foreign Affairs. Among its early activities, the Project facilitated two international encounters: one with independent experts to review the state of conceptualization and operationalization of the right to food; the second with professionals from international agencies and human rights bodies to discuss the contribution of international development, humanitarian and human rights organizations and institutions for operationalizing the right to food and nutrition.

The 1st International Encounter on the Right to Food & Nutrition: Review & Outlook (Oslo, 18-21 June 2000)

The *First International Encounter* was held in cooperation with the World Alliance for Nutrition and Human Rights (WANHR), FoodFirst Information and Action Network (FIAN), and the Institut International Jacques Maritain (IIJM). It gathered more than 40 professionals from over 15 countries in Africa, Asia, the Americas and Europe, working in the fields of food, nutrition, health and other development related areas, humanitarian action and international law in universities and research institutions, non-governmental and civil society organizations, and some in government services and multilateral agencies. The Encounter took stock of developments with ESCRs in general; assessed progress with the right to food since the World Food Summit; devoted a considerable part of its time to the question of operationalizing the right to food and nutrition from both a legal and developmental perspective and, in this context, discussed research and capacity-building priorities[^], and discussed the next steps to be taken.

Perhaps the most remarkable outcome of the First Encounter was the spontaneous creation of 'clusters' of people deciding to continue to work together on specific issues that had arisen during the meeting. After the first steps in this direction had been taken at the meeting itself, a couple of weeks later five e-mail discussion groups were formally established (<<http://www.adobe.ecircles.com/magic/d.cgi?k=klkp3pBovcC>>) to advance and expand work in the areas of legislation, protection, indicators, capacity-building and country case studies. These *theme-specific clusters* were complemented by a general Encounter follow-up e-group. The Encounter thus turned into something like a 'standing workshop' or a set of '*standing workshops*' to ensure that the momentum created in Oslo will be maintained and work in specific areas will advance and expand. The Encounter has therefore *consolidated an international network for research, capacity building, advice and advocacy* devoted to the promotion and implementation of the right to food.

As a result of the discussions, the International Project will also seek to serve as *a clearinghouse for research and capacity-building* in different parts of the world. This will be done in close contact with the Office of the High Commissioner for Human Rights, with relevant UN agencies, and probably also with the forthcoming Special Rapporteur on the right to food that the UN Commission on Human Rights has decided to appoint, as well as with the Commission-appointed Independent Expert on the right to development.

While the meeting did not formally make recommendations for the future Project activities, certain areas emerged from the discussions as having particular urgency. They include work on right-to-food related indicators; framework legislation; the compilation of case studies similar to an effort now under way at Harvard for the right to health; a review of teaching/training materials; and the preparation of a manual on the practical application of the General Comment No. 12 in the operationalization of the right to food and nutrition.

The 2nd International Encounter on the Right to Food & Nutrition: Operationalization (Geneva, 21-22 August 2000)

The Second Encounter was held in cooperation with the Office of the High Commissioner for Human Rights and the Working Group on Nutrition, Ethics and Human Rights of the UN ACC/Sub-Committee on Nutrition. It provided an educational opportunity as personnel from international organizations shared their experience with rights-based approaches to food, nutrition, health and broader development problems. Participants examined and assessed practical ways to implement and operationalize the right to food in their agencies. The agenda included: (i) an introduction to the right to food and nutrition and a review regarding its operationalization; (ii) experiences, opportunities and obstacles concerning the operationalization of a rights-based approach; (iii) cooperation, coordination and functional division of labour among intergovernmental organizations and institutions on the right to food and ways of strengthening their role in advancing the implementation of the right to adequate food. Both Encounter conferences produced inputs for the Third Consultation on the right to food to be held by the High Commissioner for Human Rights in fulfilment of her mandate received from the World Food Summit.

An Approach to Human Rights-Based Programming in UNICEF (Eastern and Southern Africa)

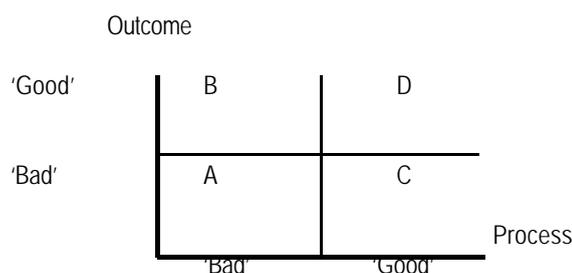
By Urban Jonsson, 2nd International Encounter on the Right to Food in Development, Geneva, 21-22 August 2000

[Ed. Note: The following is an extract from Dr Jonsson's presentation at the 2nd Encounter; the background document may be found at the website <<http://www.nutrition.uio.no/iprfd>>.]

Basic Needs vs Human Rights: ...Language reflects ingrained perceptions, conceptions, attitudes and the pattern of likely decisions and actions. The shift from a basic needs approach to a human rights approach requires a change of language to reflect the paradigm shift. The following table exemplifies some differences between the two approaches:

Basic Needs Approach	Human Rights Approach
Needs are met or satisfied.	Rights are realized (respected, protected, and fulfilled).
Needs do not imply duties or obligations although they may generate promises.	Rights always imply correlative duties or obligations.
Needs are not necessarily universal.	Human rights are always universal.
Basic needs can be met by goal or outcome strategies.	Human rights can be realized only by attention to both outcome and process.
Needs can be ranked in a hierarchy of priorities.	Human rights are indivisible because they are interdependent. There is nothing like 'basic rights'.
Needs can be met through charity and benevolence.	'Charity is obscene in a human rights perspective'. (I. Kant)
It is gratifying to state that "80% of all children have had their needs met to be vaccinated."	In a human rights approach, this means that 20% of all children have not had their right to be vaccinated realized.
It is an excuse to state that the "government does not yet have the political will to enforce legislation to iodize all salt."	This means that the government has <i>chosen</i> not to carry out its duty and has instead chosen not to enforce legislation to iodize all salt.

Development Means Both Outcome and Process: Development requires the satisfaction of two conditions: the achievement of a certain outcome and the establishment of an adequate process to achieve and sustain that outcome. Most of the World Summit for Children's (WSC) goals including the health and nutrition goals are specific desirable outcomes. Effective development demands a high quality process by which the outcome is achieved. Participation, local ownership, empowerment and sustainability are essential characteristics of this process. Level of outcome and quality of process define a two-dimensional space for social action. This is illustrated as:



Most development starts at A; the ideal final stage is D. Many development programmes have become trapped in one of the two areas represented by B or C. A good outcome at the expense of, for example, sustainability (an aspect of the good process) (B) is as useless as a good process without any significant outcome (C). Some immunization programmes have become trapped in B; while some area-based, community-oriented programmes that never moved to scale, have been trapped in C. Outcome-focused approaches have been preferred by many economists and development agencies. 'Utility' as an outcome is a central theme in neo-classic economics. Process-focused approaches have been favoured, in contrast, by many NGOs. Many small area-based programmes have established high quality processes, but at a relatively high cost per person. However, few of them have expanded to any larger scale with significant outcomes. The *outcome* is most often a final manifestation of interaction among causal factors at immediate, underlying and basic levels. The *process* is as important as the *outcome* (but not more important!). In this proposal focus is given to decision-making and learning of individuals and groups of individuals. The decision-making aspect is described as a cyclical process of assessing the problem, analyzing the causes of the problem and taking informed actions to address the problem (Triple A Cycle). The learning aspect is reflected in the iterative nature of the Triple A process, i.e., re-assessment, better analysis, improved action, etc.



Good Programming and Human Rights Programming: In the work to operationalize a human rights approach to programming (HRAP) it was discovered that most of the components or aspects of 'good programming' would be necessary components of HRAP. In other words: good programming does not mean HRAP, but a HRAP requires the elements of good programming.

Good Programming

1. People cannot be developed; they must develop themselves. People, including people who are poor, should be recognized as key actors in their own development, rather than passive beneficiaries of transfers of commodities and services.
2. Participation is crucial, both as an end and as a means. Participation, however, should not only be seen as 'they' participate in 'our' programme or project, but rather that 'we' behave in such a way that 'we' are allowed and invited to participate in 'their' development efforts.
3. 'Empowerment' is important, but is not a strategy. 'Empowerment' and 'disempowerment' are aspects of any strategy, such as advocacy, capacity building or service-delivery.
4. Role or stake-holder analysis is very useful for social mobilization, programme development and evaluation, because it identifies clear accountabilities in the community and society.
5. Pure top-down approaches should be rejected because they deny the principle of 'people as actors'. Pure bottom-up approaches should be rejected because they are utopian. It is not either/or; it is both. It is the synergism between appropriate top-down and bottom-up approaches that should be promoted.
6. Programmes should be developed on the basis of a situation analysis that identifies priority problems and their immediate, underlying and basic causes. Immediate, underlying and basic causes should be addressed, either simultaneously or in sequence.
7. Goal setting is important. The necessity for scaling up needs to be considered at the planning stage. Efforts should promote positive changes that are sustainable.
8. All possible partnerships should be explored with strategic allies including donors and NGOs, etc. Also through the linkages to other development efforts, it is often possible to leverage additional resources.

Human Rights Programming

1. People, including people who are poor, are subjects of rights. It is therefore logical to recognize people who are poor as key actors in their development, by empowering them to claim their rights.
2. Participation, including children's and women's participation, is a human right enshrined in many conventions; a right often violated. In a human rights perspective, participation is both a necessary outcome and a necessary aspect of the process.
3. Human rights imply dignity and respect for the individual. This means self-esteem and equality. Circumstance and chance should not dominate one's life. A HRAP implies a people-centered approach to development, in which outside support should be catalytic and supportive to people's own efforts.
4. Most stake-holders, although not all, are duty-bearers. An important step in a HRAP is the identification of key relations between the child as a claim-holder and all duty-bearers. Such an analysis is similar to, but is more than, a stake-holder analysis.
5. A HRAP requires respect for local knowledge and the dignity of people. A HRAP implies a people-centered approach to development in which outside support is only catalytic and supportive to people's own efforts. On the other hand, in many communities, human rights values need to be promoted 'from above' because they are not yet internalized.
6. A HRAP requires an understanding of causes at all levels — immediate, underlying and basic. The internalization of human rights values makes it inescapable that the basic or structural causes are addressed. The indivisibility of human rights also emphasizes the simultaneous attention to causes, at all levels, including the basic level.
7. The realization of human rights requires both the achievement of desirable outcomes and a good process, through which the outcome is achieved, reflecting human rights values. In that sense a HRAP implies goals (outcomes). But 'the end does not justify the means'. That is why there must be simultaneous attention to both outcome (goal) and process.
8. A country's human rights realization must come from within, and be supported from outside. The United Nations has an obligation to promote human rights. The UN Reform emphasizes this challenge and UN cooperation through the UN Development Assistance Framework is therefore of particular importance.

There are, however, other examples of principles that many associate with 'good programming' that are not useful or even rejected in a human rights approach to programming. For example, the principle of 'low cost — high impact' has often been regarded as a good principle. It often means that a large number of 'beneficiaries' are covered at a low cost per person. Such a utilitarian approach must sometimes be rejected in a HRAP. Addressing some gross violations of a few children might be given priority over addressing less severe violations of a larger number of children in a human rights perspective. Morality sometimes leads to a different set of priorities than those of an economic analysis.

Step-wise Programming Approach: Based on the principles discussed earlier, a step-wise programming approach is outlined. The linkages between the steps are important and sometimes the result of the work in one step will require review of the work in the previous step. The description of the steps will be reviewed and improved upon as experience is gained from practical applications.

1. Causality Analysis

Before anything can be done with a problem, the problem must be recognized as such at some level of society. Advocacy and social mobilization are useful strategies in increasing the awareness of a problem. We assume here that adequate awareness of a particular problem exists at the level of society, where actions to address the major causes of the problem(s) can and should be pursued. The first step, then, is to identify these causes. Without a reasonable consensus on the causes of a problem, there is not likely to be any consensus later on about how to solve the problem. Identification and analysis of the causes of a problem are very much facilitated by the use of an explicit conceptual framework.

When all the major causes at immediate, underlying and basic levels have been identified, the state of each variable is assessed (measured or estimated). Typical variables include mortality, nutritional status, health status, education, income, food etc. It is now possible to analyze the qualitative and quantitative relationships among the variables. This analysis should start from the ultimate outcome, i.e. the top of the conceptual framework and continue down the hierarchy of causes (focussed analysis). First the relationships between the ultimate outcome and the immediate causes are analyzed; second the relationships between immediate and underlying causes; and last the relationships between underlying and basic causes. A focussed analysis will help to limit the analysis to only those causes that actually influence the selected outcome in the situation at hand and will, therefore, not include all possible causes and processes in society. This is essential in order to make the exercise manageable. Reaching a consensus regarding the principle factors and processes affecting realization of children's human rights offers enormously improved opportunities to achieve a more systematic and logical integration of programming for children. This is particularly important if the problem – as is normally the case – requires coordinated actions by many partners at different administrative levels. The Causality Analysis will produce a list of rights that either are violated or at risk of being violated together with the major causes of these violations. This is an example where a human development analysis assists and adds value to a human rights analysis.

2. Role or Pattern Analysis

Human rights represent relationships between claim- or right-holders (subjects) and duty-bearers (objects). Often a particular duty-bearer cannot meet his/her obligations because some other rights of the duty-bearer are being violated. Parents without resources cannot be criticized for not affording expensive school-fees. These relationships form a 'pattern' in society linking individuals and communities to each other and with higher levels of society. The work to identify duty-bearers for a particular right benefits from the earlier causality analysis. For example, low school enrolment may be caused by lack of schools or school fees which are too costly, which in turn are results of unequal allocation of funds to a particular area and a policy of school-fees, which in turn may be the result of some more basic causes. Such an analysis will help in identifying

duty-bearers at different levels of society. Focusing on specific priority problems will also help to reduce the Role/Pattern analysis to a limited set of claim-duty relationships that are likely to be most critical in the given situation. If not limited, there is a risk to end up with a very large number of claim-duty relationships and actors, who will not be possible to involve and support in programme planning and implementation. In a human rights perspective, two questions should be asked for each particular right; (i) who are the objects; i.e. against whom is the right/claim held; who are the correlative duty-bearers?, and (ii) can the right be realized through stronger respect/protect or facilitation/fulfillment? The purpose of the Role/Pattern Analysis is thus to arrive at a list of the most crucial claim-duty relationships for each particular set of selected rights violations.

3. Capacity Analysis

If a child's rights are violated and the main duty-bearers are identified, the next step is to analyze why they, i.e., the duty-bearers, do not seem to be able to perform their duties as expected. We call this capacity analysis. Capacity-building is a central concept in most programming discussions and considerable efforts have been made to define and clarify what this should mean in various contextual applications. In assessing capacity and in planning for capacity development, the following are normally considered as the key elements.

- a. **Responsibility/Motivation/Leadership:** the acceptance or position of a person/organization that they **should** do something about a specific problem. Strong motivation is an important component of leadership. Some people are motivated to do things others may not expect from them.
- b. **Authority:** the legitimacy of an action. A person/organization has the authority to take action if they feel or know that they **may** take action. Laws, tradition and culture determine to a large extent what is permissible or not permissible.
- c. **Resources:** The resources available to individuals, households, organizations and society as a whole may generally be classified into three types:
 - ♦ Human Resources — skills, motivation, willpower, knowledge, experience, time, commitment...
 - ♦ Economic Resources — land, natural resources, means of production (tools, equipment), technology, income, credit...
 - ♦ Organizational Resources — formal and non-formal organizations like family, extended family, clan, NGOs, administrative structures, institutions, etc.
- d. **Communication:** Communication skills and access to information and communication systems are crucial in order to 'connect' key actors into functional networks able to address development issues. Communication 'transforms' capabilities into capacity, i.e., puts available resources to work. A systematic communication analysis is often lacking in capacity development efforts and needs to be more strongly pursued – particularly in a human rights approach to programming. This analysis will result in the identification of capacity gaps of each duty-bearer or group of duty-bearers for each identified right.

4. Candidate Strategies and Actions

For each violated right and specific duty-bearer, actions are selected to contribute to closing the capacity gaps. Often the same action will contribute to empowering a duty-bearer to meet several duties in relation to the realization of more than one right. This step will result in a list of candidate actions.

5. Partnership Analysis

The work and plans of all relevant partners, including the Government, NGOs, other UN partners, bilaterals and others are carefully reviewed. Discussions with key partners will result in an agreement on 'who will do what'.

6. The UNICEF Country Programme of Cooperation

The final step is to aggregate all the activities into programmes and projects. This is an important as well as a difficult task. This aggregation/clustering can be done in several ways. No clear generic advice is possible at this stage. Country offices are encouraged to experiment and learn from practice. The activities may be clustered by sector (health, education, etc.), generic strategy (advocacy, information, education, training and service-delivery), theme (e.g., survival, development, protection and participation or phases of the life-cycle), or by theme based on human rights categories (e.g., respect, protect, and fulfil). For each of these, further clustering can be made by geographic area, level of society, or level of causality.

News and Views

Food and Nutrition CD-ROM United Nations University

The Food and Nutrition Library CD-ROM 1.0 2000 edition contains 260 publications (28,000 pages) in the fields of food and nutrition, food policy, and nutrition research, including the *Food and Nutrition Bulletin*. The project was initiated and coordinated by the United Nations University Press and the Humanity Libraries Global Help Projects in cooperation with many organizations and agencies. The objective of this cooperative project is to provide those involved in the areas of food, nutrition, and basic needs with access to a comprehensive CD-ROM library containing multidisciplinary insights and solutions. The CD-ROM is available at minimal cost for distribution in developing countries.

Contact: The UNU, 53-70, Jingumae, 5, chome, Shibuyaku, Tokyo 150-8925 Japan; tel: (813) 3499-2188; fax: (813) 3499-2828; email: unucdrom@hq.unu.edu
Or Humanity Libraries Project, c/o Global Help Projects vzw & Humanity CD, Ltd., Oosterveldlaan 196, B2610 Antwerp, Belgium; tel: (32) 3448 0554; fax: (32) 3449-7574; email: humanity@globalprojects.org



Integrating Vitamin A with Immunization An Information and Training Package CD-ROM

Heller Keller International and WHO Department of Vaccines and Biologicals have developed a new CD-ROM called *Integrating Vitamin A with Immunization: Information and Training CD-ROM*. Since 1994 WHO/UNICEF policy promotes the integration of vitamin A supplementation with immunization services in areas where vitamin A deficiency is a public health problem. Designed for programme planners and managers this CD-ROM contains the essential information for the administration of vitamin A supplements with routine immunization services, National Immunization Days, and the treatment of sick children. The contents of the CD-ROM include sections on advocacy, science, operations and references. The distribution of this CD-ROM has been made possible by the Micronutrient Initiative (Canada).

Contact: WHO Dept of Vaccines and Biologicals, CH-1211 Geneva 27, Switzerland; fax: (41 22) 791-4193; email: vaccines@who.int



"Management of Severe Malnutrition: A manual for physicians and other senior health workers"

The French, Spanish and English versions of WHO publication, *Management of Severe Malnutrition: A manual for physicians and other senior health workers* (see SCN News 18, p99) are now available online in the Publications and Documents and NHD Activities and Output sections of the Nutrition for Health and Development site at <<http://www.who.int/nut/>> They may also be accessed directly at <http://www.who.int/nut/manage_severe_malnutrition_fra.pdf> (Note: change to esp.pdf for Spanish version, and eng.pdf for the English version.)

Welcome to ID21: the Development Research Reporting Service
UK Department of Development, Institute of Development Studies

Researchers and NGOs produce a constant stream of development research findings, but all too often those who implement development policy are unaware of this knowledge. To bridge this gap, the UK Department for International Development is backing an Internet-based system which links development research directly to policymakers and practitioners around the world. Hosted by the Institute of Development Studies, the initiative is known as ID21 — or Information for Development in the 21st Century. Its key feature is a searchable online collection of short, one-page (500 word) digests of the latest social and economic research studies across 30 key topic fields. All their services are FREE and located at <<http://www.id21.org>> You can also receive an email newsletter called *ID21NEWS* which brings you regular updates of the latest research findings. To subscribe to *ID21NEWS* send a blank email message to: id21news@ids.ac.uk and in the SUBJECT field include the words: Subscribe id21news.



**High-Protein, High-Yielding Corn Developed
Future Harvest**

The International Maize and Wheat Improvement Center (CIMMYT), based in Mexico, has developed a high-protein, high-yielding corn (maize) which is expected to prevent undernutrition among millions of people worldwide. Corn lacks two essential amino acids — lysine and tryptophan, the building blocks of protein. This new “quality protein maize” or QPM, obtained by traditional plant breeding methods, contains these amino acids, making its protein content nearly equivalent to cow’s milk. Eleven developing countries are growing QPM and producing seed for future crops. It is projected that farmers in many more countries will plant QPM over the next several years. The yield from QPM trials is 10% greater than some of the best local hybrid varieties. QPM in animal feed fattens pigs and poultry twice as fast and more efficiently than animals fed on conventional maize. As incomes rise, especially in Asia, researchers expect that the use of maize in animal feed will increase by more than 3% each year between now and the year 2020.

Early funding for CIMMYT for this research was provided by UNDP. CIMMYT is also funded by the 58 members of CGIAR and this project continues to be supported by the Nippon Foundation. Dedicated scientists, Dr Evangelina Villegas, former CIMMYT cereal chemist, and Dr Surinder Vasal, CIMMYT maize breeder, were co-recipients of the World Food Prize for their more than almost continuous work over the past 30 years on developing QPM. Dr Villegas, the first woman ever to receive the World Food Prize, stated, *“It is easier and less expensive to convert to more nutritious varieties of maize than to change or supplement the diet. I have seen problems from malnourishment in many countries around the world. In hospitals in Ghana, I saw children dying because they didn’t have nutritious food. I know our enhanced protein maize will not solve all of the world’s nutrition problems, but it is a major improvement.”*

Future Harvest is a nonprofit organization which supports research, promotes partnerships, and sponsors projects that bring research results to rural communities, farmers, and families in Africa, Latin America and Asia. It is an initiative of 16 food and environmental research centers that receive funding from the CGIAR. Contact: internet site <<http://www.futureharvest.org>>



“Golden” Rice — More Iron and Vitamin A from GM Rice

Researchers have succeeded in genetically modifying rice to enhance its vitamin A and iron content. This research has been conducted at the Swiss Federal Institute of Technology in collaboration with the University of Freiburg. Conventional rice grains contain a substance called phytic acid that can prevent iron absorption. Rice grains do not contain beta-carotene, the precursor of vitamin A. This is one reason why anaemia and vitamin A deficiencies are widespread in regions where rice is the principal staple food. This new modified rice, called “golden” rice because of its yellowish colour contributed by its beta-carotene content, could potentially improve the vitamin A and iron status of malnourished people. Researchers are now incorporating the vitamin A genes into high yielding rice varieties at CGIAR’s International Rice Research Institute in the Philippines. The private company, AstraZeneca, acquired the commercial rights to Golden Rice in the North, promising to make this technology freely available to farmers in the South. The company speculates that it could have vitamin-A rice in farmers’ fields as early as 2003. Many opponents of GM foods feel this does not leave enough time to undertake the socioeconomic, human health and ecological impact studies necessary to ensure the public’s wellbeing. One reason the public researchers sold the commercial rights to Golden Rice may be the prohibitive cost of legal and licensing fees involved in obtaining all the patents required to produce the rice.

Contact: “FoodToday”, European Food Information Council, 1 place des Pyramides, F-75001 Paris; Fax +33 1 40 20 44 41; email: eufic@eufic.org; website: <<http://www.eufic.org>> Information on Golden Rice can also be found at <<http://www.biotech-info.net>>



Nutrition and Agriculture

Ethics, environmental safety, economic development, intellectual property rights...scientists, litigators, consumer activists, NGOs, industry representatives...put them all together in a conference room, mention Genetically Modified Organisms (GMOs), and global warming takes effect: heated debate, agreement, disagreement, uncertainty, and inability to separate issues which are subject to scientific analysis and those which are related to values, beliefs and politics. A legion of questions surround GM foods. Is GM technology fundamentally different from genetic modification through conventional breeding? Are GM foods safe for humans? What are the benefits and risks of biotech farming? Are current food regulatory systems adequate for GM foods? Should GM foods be labelled? Should other stakeholders besides scientists decide if GM foods are safe? Will GM foods feed the world? Improve health?

This SCN News does not have answers to those questions, but provides our readers with as much information about the inter-relationship among GMOs, nutrition, and agriculture as possible in these few pages. Many professionals argue that GM technology is an essential part of future food production, while others opt to solve world food shortages by redistribution, better prevention of loss during storage, alternative farming methods, and applying a rights-based approach to food security. This feature brings together a variety of viewpoints. The links between nutrition and agriculture and the contributions of the international agricultural research community to improved agricultural productivity are identified. Perspectives on the equity (or inequity) of the world food system, the right to food, and the dimensions of food security are presented in several of the articles. The feature defines GM foods, their usefulness for developing countries, GM crop concerns, and safety mechanisms. New paradigms for sustainable agriculture are reported in order to stimulate innovations in this area. The multifunctional nature of world trade and food production and the role of the World Trade Organization are also discussed in this issue. It is hoped that "Nutrition and Agriculture" will serve as a reference point for the exchange of experiences among professionals involved in nutrition programs and projects related to both sectors.

Timeline—High Points in Plant Breeding

~30,000 yrs ago	wheat was brought from the Middle East
1570	potatoes brought from South America
1694	discovery of sexual reproduction in plants
1719	first recorded plant hybrid
1799	first report of a cereal hybrid
1866	Mendel publishes his work with pea crosses
1876	Crossing between species — leading to triticale (wheat x rye)
1900	Start of hybrid maize breeding in the USA
1927	Mutation via x-rays
1953	DNA structure discovered by Watson and Crick
1970	DNA moved between unrelated organisms
1983	First genetically modified plant: tobacco
1990	First genetically modified cereal

Source: *The Crops Guide to Biotech* (2000) Surrey, UK.

GM in the Mainstream Worldwide

Country	Hectares (million)
Globally	40.0
United States	29.0
Argentina	6.7
Canada	4.0
China	0.3
Australia & South Africa	0.2
Mexico, Spain, France, Portugal, Romania, Ukraine	<0.1 each

Principal GM Crops Grown

soybeans
corn (maize)
cotton
canola (rapeseed)
potato
squash
papaya

Source: James C (1999) *Global Review of Commercialized Transgenic Crops*. Ithaca: ISAAA.

Improving Human Nutrition Through Agriculture: The Role of International Agricultural Research

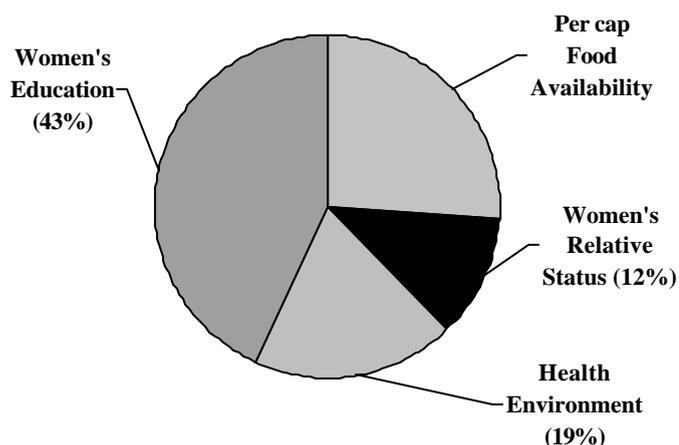
By Lawrence Haddad, IFPRI

How Agriculture Affects Nutrition

The contributions of international agricultural research to major increases in agricultural productivity and incomes in the developing world have been well documented.¹ It is also clear that agricultural research has contributed to significant reductions in malnutrition. For example, a recent study found that increases in per capita food availability were responsible for nearly one quarter of the decline in child undernutrition rates over the past 25 years (Figure 1). But how specifically does agriculture affect nutritional status? Does what people and their communities grow make a difference to what they and their communities eat? This is probably the link that most people have in mind when they think about agriculture and nutrition linkages. But there are at least nine pathways which can be grouped into generic and specific effects.

Generic effects are not sector-specific: any sector that employs a large percent of a malnourished population in a labor-intensive fashion will generate income and employment and would have such impacts. Specific effects are generated because food—not something else—is being grown. Generic effects include (1) income generation for those engaged in the sector and those linked to it, (2) time allocation effects—how compatible are activities in the sector with time investments in nutrition? (3) impacts on household decision-making—does innovation in the sector draw influence away from nutrition decision makers? (4) energy and nutrient expenditures—for certain individuals do the activities in the sector result in the use of more nutrients than they generate? (5) health environment effects—how large are the negative effects on the health environment of the production processes in the sector?

Fig 1. Agriculture's Contribution to Reductions in Child Undernutrition, 1970-95.



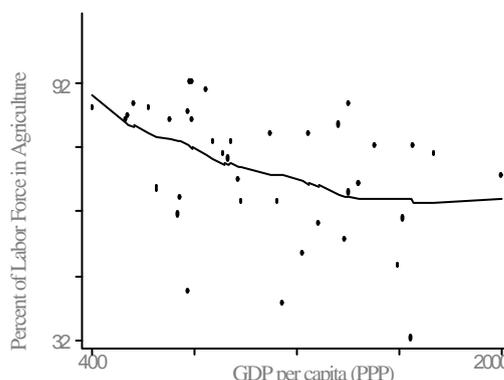
Source: Smith & Haddad (1999)

Specific effects include (6) declines in food prices—to what extent does an increase in food productivity lead to a decline in food price? (7) own-consumption—to what extent does the production of certain foods influence their consumption within the grower households and within the grower community? (8) processing and preparation—how can these methods be designed so as to minimize nutrient loss? and (9) plant breeding—what can traditional and biotechnological methods do to improve the food itself to make it more nutritious?

Income Impact of Increases in Agricultural Productivity

Agriculture is an important sector in the poorest countries of the world, and for the poorest members of those countries. Figure 2 illustrates that for countries with GDP per capita below \$2000 (at purchasing power parity, 1990) large percentages of the labor force remain employed in agriculture. Agriculture is not necessarily the main source of income for these individuals and their families, but it does engage a large proportion of working men and women. As such, agriculture is an important source of income for individuals directly engaged in it. Recent research has shown² that increases in agricultural output lead to large second-round increases in the rural economy. These effects arise in the sectors that supply the agricultural sector with goods and services and via the demand from those rural non-farm sectors that need further goods from agriculture. In some cases these second-round effects are 50-80% larger than the initial growth in agricultural output. These increases in incomes are important for nutrition in that they enable individuals to purchase more nonfoods and also diversify the diet, and this tends to imply a greater dietary quality. It is important not to equate increases in income with increases in

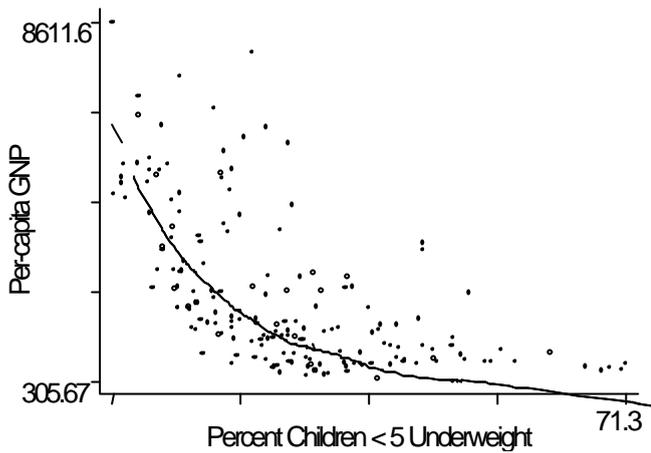
Fig 2. Percent of Labour Force in Agriculture, 1990.



Source: World Development Indicators (1999)



Fig 3. Per Capita Income and Nutrition are Linked, but Not Tightly.



Source: Smith & Haddad (1999).

nutrition, however. At the macro level, Figure 3 shows the enormous range in underweight rates for similar levels of per capita GDP (PPP) for 63 developing countries³. At the micro level, recent work (Table 1) reminds us that up to 40 percent of households that are above the poverty line contain stunted children.⁴

Changing Time Allocation Patterns

Any activity undertaken by parents or child care-takers is a potential competitor with time devoted to the care of the child. The magnitude of the payoffs to increased time for care (primarily feeding and hygiene behaviors and interactions with the child) in terms of improved cognitive development and achievement is only now being appreciated by the wider development community.⁵ The provision of care to children takes time, and poor people have little non-work time. New technology or institutional arrangements—whether in agriculture or not—will likely affect time allocation patterns of care-givers in unforeseen ways. It is important to try to identify these effects in advance. Results from a vegetable and fruit intervention in Nepal suggest that time allocated to child care was reduced for some households.⁶

Changes in Household Decision Making

If one rejects the notion that household members act “as one” (or in a unitary fashion) when it comes to their preferences about resource allocation within the household, then a powerful alternative model is one where household decisions are influenced by the bargaining power and positions of household members. In general, women with larger asset-holdings—one measure of bargaining power—make nutrition a higher priority within the household. We need to be aware as to how innovations—whether agricultural or not—might affect such fallback positions and therefore how they might affect decision-making within the household.⁷

Table 1. Stunted Children in Non-Poor Households.

Country	Percent of Households Above Poverty Line With a Stunted Preschool Child
Jamaica	6
Kenya	31
Nepal	43
Pakistan	41
Vietnam	45

Source: Appleton & Song (1999)

Table 2. New Activities May Have Negative Impacts on Energy Expenditures: example from Ghana.

Effect of a 10 hour increase per week in	Impact on Body Mass Index of Women (>18yrs of age)
Agricultural work	-0.49
Non-agricultural work	+0.86

Source: Higgins & Alderman (1997)

Impact on Nutrient Requirements

A much overlooked area of research is the impact of new technologies and activities on energy and nutrient expenditure. One of the few studies out of the social sciences on this subject is by Higgins and Alderman.⁸ They ask the question: how does the level of activity in agricultural and non-agricultural activities affect the nutrition status of women in Ghana? They find (Table 2) that women’s body mass index is negatively affected by agricultural work and positively affected by non-agricultural work. The significance of this result is magnified by new studies linking poor female nutritional status with low birthweight, and by research linking intrauterine stress to the likelihood of succumbing to diet-related chronic diseases in later life.

Health Impact

Productive activities in any sector run the risk of generating negative impacts on health. The same applies to agriculture. Whether it is irrigation systems that affect the population of malaria-carrying mosquitoes or the population of vectors of schistosomiasis, or inorganic fertilizer use that requires direct handling for precision fertilization or the pesticide that is used in ever-increasing quantities because insects build up resistance; the dangers are there. Note that there can also be positive nutrition spin-offs to some of this activity—for example the use of irrigation water for non-irrigated crops. For the most part the international agricultural community is sensitive to these negative externalities and is busy working on methods of insect control and fertilizer and water use that minimize such negative health impacts.⁹

Impact on Food Prices

In general, increased food production is good for urban consumers, because it will lead to lower food prices. As markets become increasingly liberalized and as transport costs are reduced, price formation depends less and less on local conditions. Hence in some of the better-off developing countries, the price effect of improved agricultural production is likely to be diminished. The numbers of urban poor are increasing so rapidly, however, that even small decreases in food prices will have large aggregate impacts.

Because the livelihood strategies of the poor are so complex, it is difficult to anticipate the total impact of increased food productivity on the rural poor. For the net buyer of food who is also a net seller of labor (a typical wage earner), the news is good: food prices are lower (assuming consumers capture some of the gains in productivity) and the demand for labor is higher (assuming agriculture and other non-farm rural activities are labor intensive), thus generating higher wages. But for the net seller of food who is also a net buyer of labor, is the decrease in the food price and the increase in labor costs compensated for by an increased demand for the food and the lower non-labor costs of production?

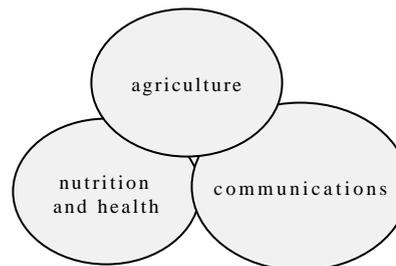
Impact on Food Consumption from Own-Production

Two examples from recent IFPRI work show the possibilities and highlight the limitations in interventions designed to affect what people eat through what they grow. First, in urban Uganda, an IFPRI-UNICEF study found that the preschool children in families with non-commercial garden plots were much less stunted than their counterparts in families without gardens—controlling for income, assets, education and a host of other factors. These garden plots made the difference to the diets of the families.¹⁰ In Bangladesh a study showed that innovations in vegetable technology did not result in a significant increase in vegetable consumption of adopting households.¹¹ The direct impact of new fishpond technologies on diet quality was also negligible and may even have been negative as the large fish grown in ponds were consumed instead of the smaller fish that were more micronutrient-dense (note that the fishpond technology did have a positive impact on diet quality through modest increases in income).

There is a large literature base on the subject of food-based interventions for reducing undernutrition, particularly regarding micronutrient malnutrition. In general there is a relatively small set of documented interventions, few of which have been assessed in a rigorous way.¹² Some of the interventions show a lot of promise, particularly for vitamin A.^{13,14} They share a number of characteristics: (a) nutrition and health expertise in problem assessment and in related disease control (e.g., to control for *Ascaris* and

hookworm infestation that affects absorption of nutrients), (b) the utilization of new agricultural/horticultural technologies, (c) a social marketing/nutrition education component and (d) attention given to the institutional factors necessary for such partnerships to form and flourish (Figure 4). The outlook for fruit and vegetables as a way of combating iron deficiency is less positive.¹² For populations that cannot afford animal products, and do not have the institutional structures to undertake daily iron supplementation, the options are rather limited.¹⁵

Fig 4. Food-based Micronutrient Interventions: the need for institutional partnerships.



Post-Harvest Activities and Nutrient Availability

There are many ways in which post-harvest activities such as storage, commercial processing, in-home processing, and preparation can affect nutrient availability, including (1) increasing the general use of nutrient-rich foods (e.g., beta-carotene-rich varieties of sweet potato), (2) increasing the nutrient density of foods consumed by infants, and (3) decreasing nutrient losses from the processing of widely available foods. The successful application of such techniques to orange and yellow flesh varieties of sweet potatoes that are richer in beta-carotene has helped to generate a direct nutrition impact in Kenya.¹⁴

Plant Breeding

Breeding maize for higher quality proteins is an early example of the approach. Unfortunately the rapidly changing consensus in the nutrition community as to the limiting factors in the diet (from protein to calories and micronutrients) made the quality protein maize (QPM) experience somewhat demoralizing for the plant breeding community.¹⁶ (*ed. note: see p10 for new QPM developments*). Despite this recent history, a new generation of plant breeding efforts is now underway.¹⁷ The focus this time is not on protein, but on micronutrients. There are three broad goals and two broad technologies. The goals are (a) increase the micronutrient concentration in the crop, (b) decrease the concentration of absorption inhibitors such as phytic acid, and (c) increase the concentration of promoter compounds (for iron and zinc in particular) such as sulphur-containing amino acids.¹⁸ The new approach uses two technologies: traditional breeding (looking for naturally occurring genetic variation in micronutrient content) and biotechnology (genetic modification of foods and the creation of new foods).



The breeding approaches face many challenges. Can cultivars be found that are high in micronutrient density with (a) little or no yield tradeoff so that farmers will be interested in adopting them, (b) little impact on consumer acceptability, and (c) no negative impact on bioavailability (for the strategies that seek to increase micronutrient density). These challenges are similar to those faced by other food-based interventions.

The Role of the Consultative Group on International Agricultural Research (CGIAR)

Sixteen international agricultural research centers make up the global network known as the CGIAR. CGIAR's mission is to contribute to food security and poverty eradication in developing countries through research, partnership, capacity building, and policy support. The CGIAR promotes sustainable agricultural development based on environmentally sound management of natural resources. The CGIAR was established in 1971 and is an informal association of 58 public and private sector members (see <<http://www.cgiar.org/centers.htm>>).

The CGIAR micronutrients project involving several of the centers is beginning to produce some promising results.¹⁹ First, two high-yielding, high-iron rices were identified among improved lines already being tested. A human subject feeding trial is planned for 1999-2000. Secondly, a rat bioavailability trial on 24 select genotypes of beans from one center found substantial variation in iron concentration and a constant level of bioavailability. Compared to the traditional breeding work, the biotechnology work is at a much earlier stage, but it is yielding results that are promising. Work by the Swiss Federal Institute of Technology's Institute for Plant Sciences and the Rockefeller Foundation has demonstrated some success in introducing genes into a rice variety such that iron and vitamin A concentrations are increased (see p10). The Swiss team plans to collaborate with the CGIAR International Rice Research Institute (IRRI) to test the health and environmental consequences of the technology, to evaluate the acceptability of the rice to farmers in terms of yield impacts, and to determine consumer preferences.

The above example is of a publicly-funded initiative. But much of the biotechnology work is being undertaken by the private sector. Here the challenges are for policymakers to search for innovative ways to ensure that the benefits from this work flow to malnourished individuals.²⁰ Is the CGIAR doing enough via these links to enhance the nutritional impact of its work?

A review of CGIAR resource allocation by commodity (Figure 5) is not too instructive in this regard, because of the indirect effects of agricultural productivity on nutritional status. It is not clear for example, that the nutrition impact of CGIAR spending would be enhanced by a move away from cereals to livestock. A breakdown of spending by

region indicates that resource allocation does not match the location of undernutrition very well (Figure 6). For example, Asia contains 70 percent of the stunted children in the world, but receives 32 percent of CGIAR resources. Again, however, there may be factors that explain this apparent mismatch. For example, the national agricultural systems might be playing a much larger role in Asia than elsewhere, or perhaps the CGIAR's resource allocation reflects the trends in undernutrition (undernutrition numbers are getting worse in sub-Saharan Africa, and slowly better in Asia). It would be interesting to match the CGIAR resource allocation by region to poverty numbers by region, but unfortunately poverty rates do not yet exist at regional aggregate levels.²¹

It is surprising how infrequently CGIAR documents mention malnutrition. The CGIAR's 1998 annual report mentions malnutrition only twice, and the medium term plans of the majority of the 16 centers do not mention malnutrition, although most of them do list poverty and food insecurity as guiding principles for setting research priorities. On the other hand, the CGIAR has endorsed a nine-center study, coordinated by IFPRI via its Impact Assessment and Evaluation Group (IAEG), to assess the poverty impact of international agricultural research and to identify a series of best practices for future embodiment into a CGIAR poverty

Fig 5. Resource Allocation Within the CGIAR, by Commodity

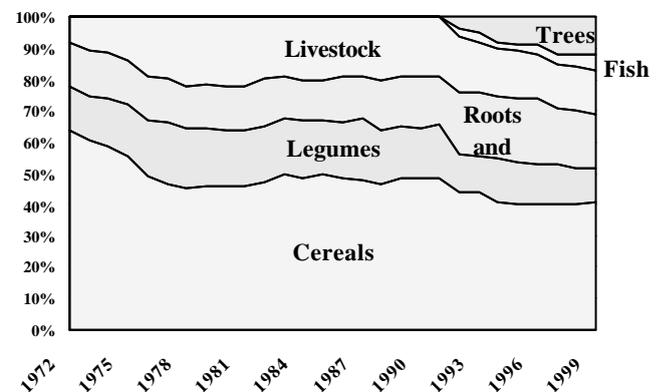
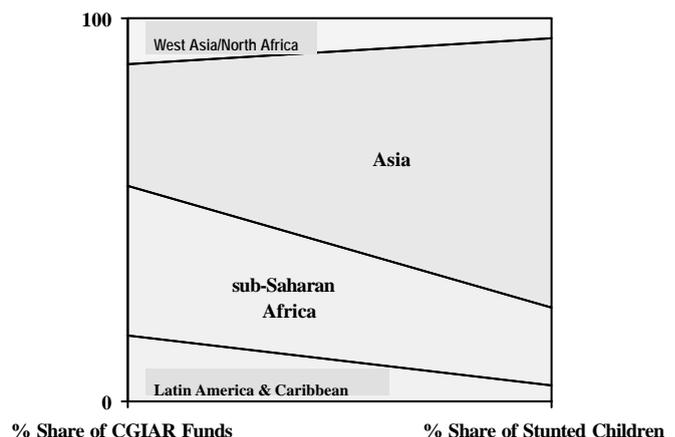


Fig 6. Regional Allocation of Undernutrition & CGIAR Resources, 1995



monitoring system.²²

The last CGIAR-wide meeting on international agricultural research and human nutrition was held in February 1984 at the International Livestock Center for Africa (ILCA) in Addis Ababa (now incorporated into the International Livestock Research Institute or ILRI). The participants of that workshop made 14 recommendations to the CGIAR community.²³ To what extent has the CGIAR been able to adopt the recommendations from 1984? A workshop organized by IFPRI and hosted by IRRI in 1999 reviewed progress made during the past 15 years and concluded with the following statements.

- ◇ Few of the recommendations from the 1984 workshop had been adopted.
- ◇ Nevertheless, a surprising amount of nutrition-relevant work was being undertaken at the 11 international agricultural research centers attending—much of it explicitly focused on nutrition—but that it was one of the CGIAR's "best-kept secrets".
- ◇ The CGIAR's interest in the direct impacts of agriculture on nutrition could increase given its new emphasis on poverty impacts.
- ◇ There were many more opportunities for accelerating reductions in malnutrition if only the two communities could find additional ways to work together.
- ◇ The traditional plant breeding approach has answered most of the scientific questions, with the exception of the results of human feeding trials.
- ◇ The non-staple food-based approaches held promise but holistic design was key—involving agriculture, communication and nutrition professionals from the beginning—as was a rigorous design of impact assessment.
- ◇ While improving the micronutrient content of the diet through agricultural research is crucial, agricultural research must not focus solely on this dimension of nutritional status.
- ◇ An improved conceptual framework for linking agriculture and nutrition concerns was necessary.
- ◇ Advocacy on the potential contributions that agriculture could make to accelerating reductions in malnutrition would be important for the more medically-minded in the nutrition community and the more productivity-minded in the agricultural community.
- ◇ While it is more difficult to evaluate the impacts of food-based approaches on nutrition status, researchers must come up with innovative and credible ways of estimating the cost-effectiveness and sustainability of these interventions.

A consensus emerged that the CGIAR can do more to identify, in advance, the types of agricultural research that will have a larger impact on nutrition status. Whether it chooses to then undertake this kind of research will depend on the tradeoffs with other goals, such as productivity, which affect other dimensions of human welfare. If

malnutrition is to be substantially diminished in the next generation, agriculture has to be a part of the solution and not part of the problem. We feel it has the potential to be a much larger part of the solution, but only time and good science will tell.

References

1. Kerr J and Kolavalli S (1999) Impact of Agricultural Research on Poverty Alleviation: Conceptual Framework with Illustrations for the Literature. *Environment and Production Technology Division Discussion Paper*, Washington DC.
2. Delgado C, Hopkins J, Kelly V, et al. (1998) Agricultural Growth Linkages in Sub-Saharan Africa. *IFPRI Research Report 107*. Washington DC.
3. Smith L and Haddad L (1999) Explaining Child Malnutrition in Developing Countries: A Cross-Country Study. *FCND Discussion Paper*, 60. IFPRI: Washington DC.
4. Appleton S and Song L (1999) Income and human development at the household level: evidence from 6 countries. University of Bath, Economics Department. Bath, England.
5. Engle PL, Menon P, and Haddad L (1999) Care and nutrition: Concepts and measurement. *World Development*. Forthcoming.
6. Paolisso M, Hallman K, Haddad L and Regmi S (2000) Does Cash Crops Production Detract From Child Care? Evidence from Rural Nepal. University of Maryland. Department of Anthropology. Mimeo.
7. Quisumbing A and Maluccio J (1999) Intrahousehold allocation and gender relations: New empirical evidence. IFPRI mimeo.
8. Higgins P and Alderman H (1997) Labor and Women's Nutrition. The Impact of work effort and fertility on nutritional status. *Journal of Human Resources* XXXII (3).
9. Lipton M and de Kadt E (1988) Agriculture-Health Linkages. Offset Publication No. 104. WHO:Geneva.
10. Maxwell D, Levin, C and Csete J (1998) Does urban agriculture help prevent malnutrition? Evidence from Kampala. *Food Policy* 23(5).
11. Bouis H, et al. (1999) Commercial Vegetable and Polyculture Fish Production in Bangladesh: Impacts on Income, Household Resource Allocation and Nutrition.
12. Ruel M and Levin C (1999) Food Based Approaches. In: *Nutritional Anemias* edited by U. Ramakrishnan. CRC Press.
13. Smitasiri S and Dhanamitta S (1999) Sustaining Behavior Change to Enhance Micronutrient Status: Community - and Women-Based Interventions in Thailand. OMNI Research Report Series No. 2. International Center for Research on Women, Washington DC.
14. Hagenimana V and Anyango Oyunga M (1999) The Effects of Women Farmers' Adoption of Orange-Fleshed Sweet Potatoes: Raising Vitamin A Intake in Kenya. Research Report Series No. 3. International Center for Research on Women, Washington DC.
15. Gillespie S (1997) Major Issues in Developing Effective Approaches for the Prevention and Control of Iron Deficiency. IFPRI mimeo. Washington DC.
16. Tripp R (1990) Does nutrition have a place in agricultural research? *Food Policy*: December:467-474.
17. Graham R and Welch R (1996) Breeding for Staple Food Crops with High Micronutrient Density. Agricultural Strategies for micronutrients. Working Paper 3. IFPRI: Washington DC.
18. Ruel M and Bouis H (1998) Plant Breeding: A Long-Term Strategy for the Control of Zinc Deficiency in Vulnerable Populations. *American Journal of Clinical Nutrition* 68:(2S).
19. CGIAR (1998) CGIAR Micronutrients Project Newsletter. October Update.
20. Pinstrup-Andersen P (1999) Modern Biotechnology for Developing Country Agriculture. 2020 Brief. IFPRI: Washington DC.
21. World Development Indicators (1999) The World Bank: Washington DC.
22. Hazell P and Haddad L (1999) The Impact of Agricultural Research on Poverty Reduction. Phase II Proposal to the IAEG. IFPRI: Washington DC.
23. Pinstrup-Andersen, P., A. Berg, and M. Forman. 1984. International Agricultural Research and Human Nutrition. IFPRI: Washington DC.

Contact: Lawrence Haddad, Director, Food Consumption and Nutrition Division, International Food Policy Research Institute, 2033 K St, NW, Washington, DC 20006-1002 USA; phone: 1-202-862-5600; fax:1-202-467-4439; email: <l.haddad@cgiar.org> web: www.ifpri.org >

"Humans have intervened in plant evolution over the last 10,000 years by selecting and growing plants that they desire in their diet." (see p.25)



World Food System: Resilient for the Rich, Stubborn for the Starving

By Kirit S Parikh

Indira Gandhi Institute of Development Research

The 'right to food' is in the UN charter. Every signatory government is thus obliged to provide adequate food to all its citizens. Mankind has made remarkable progress in the 20th century. More people than ever before live longer, are healthier -- and eat better and more nutritious food. Yet, by the most recent FAO (1999) estimate, about 790 million persons are food-insecure (Table 1), and the SCN estimates that about 150 million children suffer chronic undernutrition.¹ Why do these conditions persist? Why haven't the efforts of many well-meaning people, organizations and governments failed to eradicate hunger?

The difficulties of ensuring food security for poor persons may be appreciated better by examining the world food system. No matter what kind of shock it suffers: a weather shock, a policy shift by a major country, or dramatic changes in behaviour patterns, the burden of adjustment is always passed on to poor persons. They do not have adequate purchasing power and are not served well by the system. They are too weak to affect it, yet, ironically they are most affected by the system. The system is resilient for the rich, but stubborn for the starving. In an increasingly globalizing world where the role of technical progress (such as in biotechnology and genetically modified crops) dominates, it is likely that the power of multinationals and of technologically advanced countries will increase, while the basic human rights of food-insecure people remain unfulfilled.

Food Security is a Problem of Poor Persons

The definition of food security elaborated at the World Food Summit is quite comprehensive. Food security is a state in which all people have physical and *economic access* to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (*author's emphasis*). I would add that food should be provided to all as it is their human right. How this is accomplished, through the market mechanism or through government ration shops, is not fundamental to the notion of food security, as long as the indivisibility of human rights is respected, promoted and realized.

One has to note here that the key word is *economic access*. Once one has economic access, i.e., enough purchasing power, other conditions get fulfilled in most normal situations. The present world food system normally functions efficiently at least in an economic, but not a moral sense. It provides reasonable prices for a wide variety of "adequate" foods to those who can afford to pay for it. Economic access is also not limited to monetary access. It includes access to land, to credit, to education and to health services.

Hunger is primarily a problem for people living in poverty, and not one of food production. Thus, it is generally assumed that if all the poor are given additional income, more food would be demanded *and produced*. But if more food is produced because farmers are given higher prices, the poor whose incomes have not changed would continue to remain hungry. Thus, food security can be provided to individuals either by increasing their monetary income or by decreasing the price at which "adequate" food is made available to them. Similarly, when food prices increase, as is likely with trade liberalization, the hungry may become hungrier. For the South, world agricultural trade liberalization has led to the acceleration of the rural exodus and further impoverishment of small family farmers. This is due primarily to the lack of strong compensatory regulations to protect them against undue competition from cheaper, imported, subsidized goods.

A country's food security is a matter of poverty and underdevelopment. If the country has enough income, it need not be self-sufficient. It can import the food it needs. But if it is poor and deficient in food production, it becomes more vulnerable to transient influences that reduce domestic production or increase world market prices. The food production potential of the world, even without invoking exotic technologies, is so large^{2,3} that the inability to produce food at any cost is not likely to threaten the food security of the rich nations.

Chronic and Transient Undernutrition

What constitutes "adequate" food intake is no longer a matter of contention among nutritionists. Previously, Sukhatme and others⁴ pointed out the difficulties of defining this, noting that metabolic rates, and thus calorie intakes vary across similar individuals (in height, weight, and gender) and also across time for a given individual. Most recently, the UN High Commissioner of Human Rights' Committee on Economic, Social and Cultural Rights, General Comment 12 (see *SCN News* No. 18 p.41, paragraphs 6-9) defined "adequate" food:

....The right to adequate food shall therefore not be interpreted in a narrow or restrictive sense which equates it with a minimum package of calories, proteins and other specific nutrients....The Committee considers that the core content of the right to adequate food implies: The availability of food in a quantity and quality sufficient to satisfy the dietary needs of individuals, free from adverse substances, and acceptable within a given culture; The accessibility of such food in ways that are sustainable and that do not interfere with the enjoyment of other human rights....Dietary needs implies that the diet as a whole contains a mix of nutrients for physical and mental growth, development and maintenance, and physical activity that are in compliance with human physiological needs at all stages throughout the life cycle

and according to gender and occupation....

Table 1. Prevalence of food-insecure persons in developing country regions

Sub-Region	% food insecure population		Number of food insecure persons (millions)
	1979-81	1995-97	1995-97
Central Africa	36	48	36
East Africa	35	42	78
South Africa	32	44	35
West Africa	40	16	31
NE & North Africa	9	9	33
East Asia	29	14	177
South Asia	38	23	284
SE Asia	27	13	68
Caribbean	19	31	9
Central America	20	17	6
South America	14	10	33
All developing regions	29	18	792

Note: Numbers do not add up to the total because of the Oceania region.
 Source: Adapted from *The State of Food Insecurity in the World (SOFI)* (1999) FAO, Rome.

In addition to the millions who suffer from persistent hunger, many others who normally get enough to eat live precariously on the margin of subsistence. They are vulnerable to many external influences which can easily reduce their food consumption and make them join the ranks of the hungry. A major threat to the already inadequate food consumption of the poor is from a drop in real income. Analysts have underlined that to deal with persistent hunger is to deal with poverty and underdevelopment.

Will increased supply eliminate hunger?

It is often argued that if only more food were produced, hunger would disappear, yet we observe hunger amidst abundance in the world. To better understand why this is so, and to explore the impact of additional supply, my colleagues and I created scenarios using the Basic Linked System (BLS) of national agricultural policy models of different countries linked together through trade and aid. The BLS was developed at the International Institute for Applied Systems Analysis (IIASA) with the help of a large number of collaborating institutions around the world.⁵⁶ The national models and the linkage of them is such that there is no *free lunch*, unaccounted supply sources, or demand sinks in the system either at national or global levels. A solution for the model is determined after accounting for each country's policy response to world market prices, trade flows, domestic prices, consumption, and production over a number of years.

The first simulation assumes that a hypothetical country

enters the market with a firm intention of selling, at any price, 50 million tonnes of wheat each year which it gets as "manna from heaven" to help poor importers. It does not give it free to others but sells it on the world market in exchange for nonagricultural goods. Not to give a large shock to the system, this added supply increases gradually over five years and remains at the level of 50 million tonnes a year thereafter. A series of adjustments begins as soon as the first additional supplies appear on the market. The international market response is rapid. The major wheat exporters reduce their exports by increasing their stocks, and importers increase their imports. Yet the quantity is too high to be completely absorbed at prevailing prices. Initially the wheat price drops, but this is followed by a substantial recovery at a later date. The second-stage adjustment on the part of the exporting countries, after reducing their exports, is to reduce their production as well. This happens with different time lags, different speeds, and different intensities. This is the general response of all exporters. The real advantage seems to be in the beef market. In almost all countries there is an upward shift in feed consumption: either wheat is directly used as animal feed or producers substitute wheat for coarse grain production. Beef production and exports in the exporting countries and imports in the importing countries go up, and for some years after the shock an upswing in the beef market is created, until prices and production begin to adjust. After some years the price of wheat on the world market recovers even though every year the "manna from heaven" continues to augment supply. The impact on the hungry is miniscule as very little of this additional supply reaches the poor. In fact, the reduction in the number of poor is just 2.5%. This adaptive nature of the world food system explains its resilience to shocks but also its stubbornness with respect to hunger (Figure 1).

If the rich turn to vegetarianism, will it help the poor?

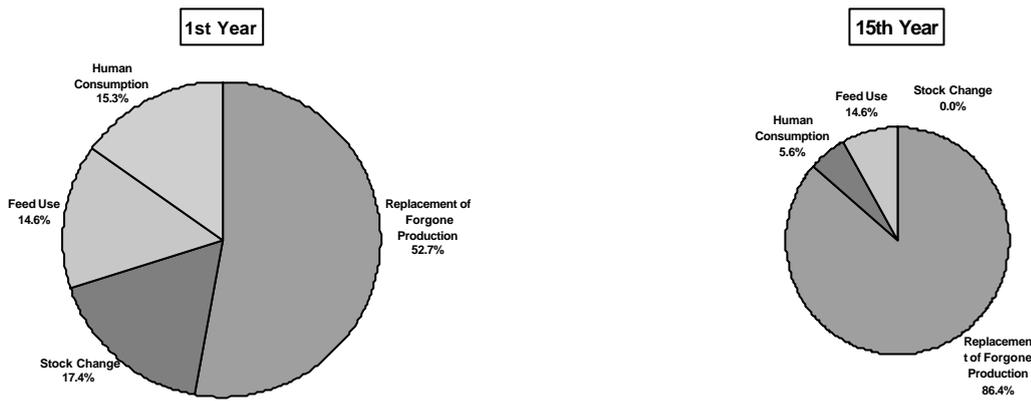
Sometimes it is argued that if only the rich were to eat less meat so that we feed people not livestock, hunger would disappear. A scenario which could free 75 million tonnes of grains to be used as feed is one in which OECD countries reduce meat consumption by half and replace the calories by cereals. As can be expected from the 'manna from heaven' scenario, this also has meager impact on world hunger (Table 2).

Table 2. Resilient for the rich/stubborn for the starving

Scenarios	Persons Hungry	
	5 th year	15 th year
Reference Scenario (million)	580	530
	% Change over time	
50 million tonnes wheat more in the world	-2.2	-1.6
50% Less Meat Consumption in OECD	5.0	-1.2



Fig 1. Where do the 50 million tonnes of wheat go?



Is the burden of adjustment always shifted to the poor?

In a set of weather shock simulations we introduced crop failure in different groups of countries. A 5% reduction in crop yields for three years was assumed. Whether crops fail in OECD countries or in developing countries, the number of hungry people in the developing countries increases. The burden is always shifted to the poor (Table 3).

Table 3. Burden shifted to the weak: the poor adjust

Weather Shock Scenarios: 5% Reduction in Crop Yields		
	Persons Hungry (millions) (% change over scenario)	
Weather Shock in:	North	South
All developing countries	4.8	5.1
India	6.4	6.4

**Agricultural trade liberalization, growth and hunger:
Is the price right?**

Additional advice often given to eliminate hunger is to "get the prices right". Agricultural trade liberalization is advocated in order to get prices right. The farmers would get world prices for their output and would have the incentives to produce more. To examine this, in three different scenarios agricultural trade was liberalized over a five year period by different groups of countries, namely OECD, less developed countries (LDCs) and all market economies (ALL). The results, 15 years after the process was begun, were compared with a reference scenario.

As expected, agricultural gross domestic product (GDP) increased in some countries but decreased in others. The farmers respond to prices. The estimated price elasticity of supply (i.e., percentage increase in agricultural output with one percentage increase in agricultural prices) in the models were around 1.0 for Turkey, Pakistan and Argentina, 0.75 for Brazil, 0.67 for Kenya and Egypt, 0.35 for Indonesia and 0.3 for Thailand. Substantial increases in agricultural GDP did

not result in substantial increases in aggregate GDP. Increase in agricultural GDP required additional investment which came at the cost of investment in non-agricultural sector. The higher food prices resulted in increased hunger in many countries as the hungry are often net purchasers of food. Even 15 years after the agricultural trade liberalization was initiated, which stimulated higher agricultural production, the impact on hunger was miniscule (Table 4). The impact on farm income and food security across countries were mixed (Table 5).

Table 4. Does agricultural free trade reduce hunger?

Agricultural Trade Liberalization scenarios by:	Persons Hungry*	
	% Change Over Reference Scenario	
	5 th year	15 th year
OECD	+ 2.6	+ 3.4
-LDC	- 4.2	- 6.4
-ALL	+ 1.1	- 0.3
-Europe	+ 1.2	+ 1.5
-United States	- 0.2	+ 0.4

*in countries with detailed models.

Thus the world food system by itself cannot be expected to provide food security to all. Special efforts both at the national and international levels have to be made. The transition to a liberalized trade regime can pose many new threats to food security. Developing countries need the policy flexibility and help from developed countries and global institutions to deal with them.

Conclusion

Hunger is beyond the reach of the invisible hand. No matter how powerful the invisible hand becomes through globalization and liberalization, it will still be unable to reach all hungry persons.⁷ The prospects of biotechnology and genetically modified (GM) foods

Table 5. Agricultural trade liberalization by OECD

Country	Relative Income Per Capita Agr/Non.Agr.	Persons in Hunger during transition
Argentina	Gains	More
Brazil	Gains	More
Mexico	Loses	More
Egypt	Gains	Insignificant
Kenya	Gains	Less
Nigeria	Loses	Less
India	Gains	More
Indonesia	Gains	Insignificant
Pakistan	Gains	More
Thailand	Gains	More
Turkey	Gains	More
USA*	Insignificant	Not Relevant
Canada	Gains	Not Relevant
Australia	Gains	Not Relevant
New Zealand	Gains	Not Relevant
Austria	Gains	Not Relevant
EC	Loses	Not Relevant
Japan	Loses	Not Relevant

provide an opportunity to deal with hunger, yet at the same time pose a threat to the hungry. If the new technology is shared, if the poor can access it freely, then not only will more food be produced, but it should be cheaper and more accessible. On the other hand, if the gains of GM are appropriated by the rich, then the poor will remain food-insecure. The fact also remains, however, that there is no historical proof that any technological innovation on its own has been, or is, capable of solving a problem — such as hunger — that is so deeply socially rooted in our societal structure. While the invisible hand of the market does not reach the poor, the visible hand of the State has too often turned into an instrument of rigidity, inefficiency and oppression. Perhaps when the UN's human rights approach to adequate food is fully operationalized, then the world food system will become resilient for all people.

References:

1. ACC/SCN (2000) *Fourth Report on the World Nutrition Situation*. Geneva: ACC/SCN in collaboration with IFPRI.
2. Linnemann H, de Hoogh, J, Keyzer MA and van Heemst HDJ (1979) *MOIRA: A Model for International Relations in Agriculture*, North Holland, Amsterdam.
3. Higgins GM, Kasam Shah, MM and Fischer G (1980) *Potential Population Supporting Capacities of Lands in the Developing World*, FAO/UNFPA, Rome.
4. Sukhatme PV(1978) Assessment of Adequacy of Diets at Different Income Levels *Economic and Political Weekly*, Special issue, August.
5. Parikh KS and Wouter T (1986) *From Hunger in Abundance to Abundance Without Hunger* Executive Report 13, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria.
6. Fischer G, Frohberg K, Keyzer MA and Parikh KS (1988) *Linked National Models: A Tool for International Food Policy Analysis*, Kluwer Academic Publishers, Dordrecht.
7. Fischer G, Frohberg K, Keyzer MA, Parikh KS and Tims W (1991) *Hunger: Beyond the Reach of the Invisible Hand* RR-91-15, International Institute for Applied Systems Analysis, Laxenburg, Austria.

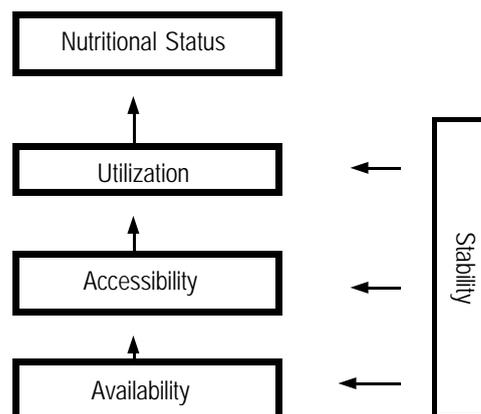
Contact: Dr Kirit S Parikh, Director & Vice Chancellor, Indira Gandhi Institute of Development Research, Gen. Vaidya Marg, Goregaon (East), Mumbai 400 065, India; Phone: +91 (22) 840 0918; Fax: +91 (22) 840 2752; email: kirit@igidr.ac.in

Four Dimensions of Food and Nutrition Security: Definitions and Concepts
 by R Gross, H Schoeneberger, H Pfeifer, HJ Preuss

Evolution of Food & Nutrition Security Concerns

Global FNS has more than 50 years of history and a sequence of definitions and paradigms. After the historic "Hot Springs Conference of Food and Agriculture" in 1943, in which the concept of a "secure, adequate, and suitable supply of food for everyone" was accepted internationally, bilateral agencies of donor countries such as the USA and Canada, which were created in the 1950s, started to dispose of their agricultural surplus commodities overseas. In the 1960s, when it was acknowledged that food aid may be a barrier to development for self-sufficiency, the concept of food for

Fig 1. Conceptual Framework of Food Security & Nutrition





emergencies and even famines were not caused as much by shortfalls in food production as by sharp declines in the purchasing power of specific social groups. Therefore, food security was broadened to include both physical and economic access to food supply. In this decade, poverty alleviation and the role of women in development were promoted. In the 1990s, concrete plans were defined to eradicate or at least reduce hunger and malnutrition drastically. In addition, the human right to adequate food and nutrition was internationally reaffirmed and committed national governments to a more proactive role.¹ Finally, diminishing international public support by donor agencies led to a reduction in food aid for crisis management and disaster mitigation.

Definition of Food and Nutrition Security (FNS)

The definition of FNS has evolved considerably over time.² The starting point of 'Food Security' was food availability to balance unequal food distribution regionally and nationally. It was rapidly accepted, however, that availability, though a necessary element, is not sufficient for food security because food may physically exist but be inaccessible to those most in need. According to an accepted definition, food security is "the access by all people at all times to enough food for an active, healthy life".³ Food is defined in this article as any substance that people eat and drink to achieve an adequate nutritional status (maintain life and physical, cognitive, and social development). As a result, safe and clean water is an essential part of food commodities. Food has to meet physiological requirements in terms of quantity, quality, and safety and to be socially and culturally acceptable. In the case of food aid, only food that does not change eating behaviors and is socially and ecologically adapted should be distributed to meet the physiological needs of the target groups. As a result, the following definition perhaps best comprises the current understanding:

"Food security is achieved, if adequate food (quantity, quality, safety, socio-cultural acceptability) is available and accessible for and satisfactorily utilized by all individuals at all times to achieve good nutrition for a healthy and happy life."⁴

The definition of food security stated above emphasizes the 'stability', 'availability', 'accessibility', and 'utilization' of food. The inclusion of utilization underlines that 'nutrition security' is more than 'food security'. The concept of FNS has four dimensions: 1. Categorical dimension; 2. Socio-organizational dimension; 3. Managerial dimension; and 4. Situation-related dimension.

The Categorical Dimension: The Elements of FSN

Figure 1 refers to the first dimension and illustrates the relationship among the categorical elements within the conceptual framework of food security. Two determinants

influence the framework: a **physical** and a **temporal determinant**. The **physical determinant** is the food flow: *Availability* → *Accessibility* → *Utilization*.

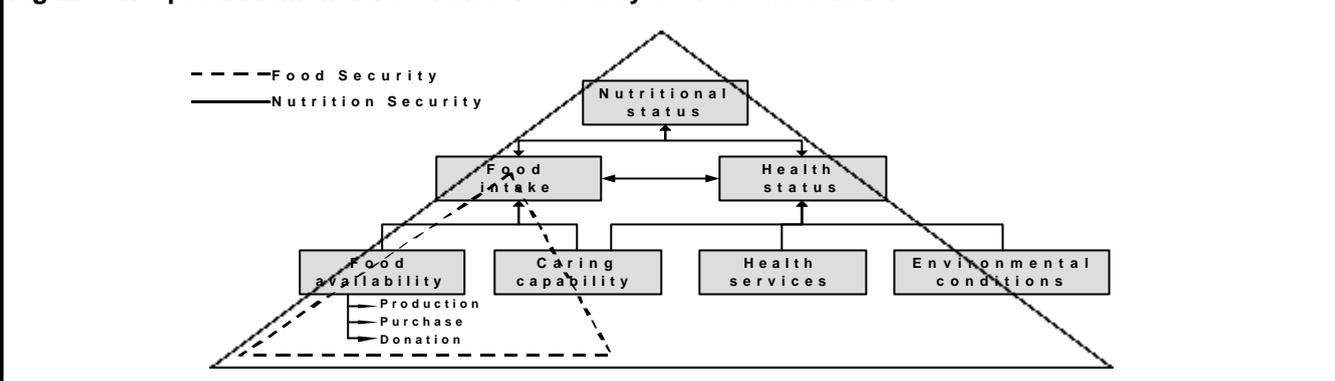
Availability is achieved when adequate food is obtainable by the public. Access is ensured when all households and all individuals within those households have sufficient resources to obtain appropriate foods (through production, purchase or donation) for a nutritious diet. Adequate utilization refers to the ability of the human body to ingest and metabolize food. Nutritious and safe diets, an adequate biological and social environment, and proper nutrition and health care ensure adequate utilization of food in order to promote health and prevent disease. In most cases, utilization is only discussed from a **biological** perspective. Food, however, also has an important **social** role in keeping families and communities together. In situations of food insecurity, this role can be achieved only when sufficient culturally adapted food is available within households and communities to meet its biological and social needs.

Stability refers to the **temporal determinant** of FNS and affects all three physical elements. It is important to distinguish between chronic food and nutrition insecurity (e.g. repeated food shortages before harvest "seasonality") and transitory food and nutrition insecurity (e.g. due to natural and man-made disasters).⁵

The conceptual framework for the analysis of malnutrition has been developed by UNICEF⁶ and is widely accepted internationally. Although mainly used in the context of undernutrition in rural areas of developing countries, it is also applicable to overnutrition in an urban context. According to this framework, the two immediate causes of malnutrition are (1) inadequate dietary intake and (2) unsatisfactory health status. In developing countries, infectious diseases, such as diarrhoeal diseases (DD) and acute respiratory diseases (ARI), are responsible for most nutrition-related health problems. Readily available adequate food, appropriate health systems and a "healthy" environment are ineffective unless these resources are used effectively. As a result, the absence of proper care in households and communities is the third necessary element of the underlying causes of malnutrition. Finally, this conceptual framework recognizes that human and environmental resources, economic systems and political and ideological factors are basic causes that contribute to malnutrition.

This conceptual framework relates the causal factors for undernutrition with different social-organizational levels. The immediate causes affect individuals, the underlying causes relate to families, and the basic causes are related to the community and the nation. As a result, the more indirect the causes, the wider the population whose nutritional status is affected. Figure 2 depicts a simplified causal model of linking nutritional status with ecological determinants at household level.⁷ Again in this conceptual

Fig 2. Conceptual Framework of Nutrition Security at Household Level



framework, the nutritional status is an outcome of food intake and health status. The underlying causes of health — environmental determinants and health services — have been depicted in different boxes due to their different natures. A reduced state of health may be due in part to tenuous access to nutrition care, poor housing and/or environmental conditions, and is possibly worsened by malnutrition, which predisposes individuals to disease. The distinction between health services and the environment is necessary to select appropriate intervention strategies.

The four underlying determinants of food intake and health status are influenced by four factors. In addition, each determinant has several contributing factors. For example, as shown further in Figure 2, food availability is affected by food production, purchase and/or donation. This conceptual framework emphasizes the difference between 'food security' and 'nutrition security.' The first refers to the area of causes and effects of *food availability*, here illustrated as the small, dotted triangle. The latter refers to the entire relationships, depict in the large, lined triangle. Figure 2 suggests a further important point that should be taken into consideration when designing programs. The less direct the relationship between a causal factor of malnutrition and the nutritional status, the more time is required to improve the situation. **The two described, most commonly used conceptual frameworks show significant differences. The food security framework emphasizes an economic approach in which food as a commodity is a central focus. The malnutrition framework adopts a biological approach in which the human being is the starting point. Both frameworks, however, promote an interdisciplinary approach to ensuring FNS. Both acknowledge that food alone is not sufficient to secure a sustainable satisfactory nutritional status and, therefore additional aspects such as health and environment must be considered. (Ed. Emphasis)** As a result, nutrition is the function of food intake and health status. The conceptual framework of FNS integrates the food security and the malnutrition frameworks. Although each starts from a different conceptual perspective, both arrive at similar program design by using common instruments and processes.

The Socio-Organizational Dimension: FSN in Different Social Levels

As indicated in Table 1, the second dimension relates to the categorical elements of FNS, which are relevant to all levels of the social organizations, from the individual and the household (*micro level*), to the community (sub-district, district and province) representing the (*meso level*), the nation and the global level (*macro level*). The relative importance of each element of malnutrition, however, changes with the level of social organization. At higher levels of social organization the overall political, economic and ecological conditions become more important. Given the diverse nature of the determinant factors of human nutritional status, and the different levels of society in which they interact, FNS will necessarily have to involve aspects of both the natural sciences as well as social sciences. As a result, the relevance of FNS at all socio-organizational levels and the interaction between these levels stresses the importance of an interdisciplinary approach of FNS.

Merging of the categorical and the socio-organizational dimensions: *availability, accessibility, utilization* of food and the *stability* of these three elements differ in their nature, causes and effects at the *macro, meso* and *micro* level. For example, food may be available in a country but not in certain disadvantaged districts or among discriminated population groups. The seasonality of food availability and utilization, due to cyclic appearance of diseases, may be a rural but not an urban phenomenon. The same merger could be illustrated on the malnutrition framework with its categorical elements: *food, care, health, and environment*. These four categories, however, have a different impact at

Table 1. Levels of social organization.

MACRO	World	
	Region	
	Nation	
MESO	Community	<ul style="list-style-type: none"> — province/city — district/town — village/suburb
MICRO	Household/Family	
	Individual	



different socio-organizational levels.

**The Managerial Dimension:
FNS in the Project Cycle Management**

The third dimension refers to the **managerial aspect** of FNS projects and programmes. Management follows the classical project cycle, which may have different names in different organizations (e.g., UNICEF uses Triple A or AAA – Assessment, Analysis, Action; the German Agency for Technical Cooperation (GTZ/DWHH) uses: Project Cycle Management or PCM). All development agencies, however, agree that programme implementation follows a cyclic learning process consisting the following steps:

Assessment → Analysis → Planning → Intervention → Monitoring & Evaluation (or Re-assessment).

Problems and potential solutions are identified through assessment. With adequate information, the causes of problems and their causal relationship should be identified. Feasible solutions can then be elaborated through a comprehensive analysis that includes all programme participants. This process is essential to implement the efficient, sustainable, and acceptable actions required to improve the FNS situation of the targeted risk groups.

Merging the three dimensions of FNS (categorical, socio-organizational, and managerial) has the consequence that the instruments and processes have to be selected specifically for assessment, implementation and evaluation considering availability, accessibility, and utilization. Assessment of food availability at the **macro** level will differ when applied to food availability at **meso** or **micro** levels. The same observation applies for instruments and processes selected for programme implementation at the three levels. Despite these differences, all elements are interrelated vertically and horizontally by nature, cause and effect. For example, inappropriate assessment of food availability may lead to the formulation of ineffective interventions that actually reduce access and utilization. FNS is a complex system. Food and nutrition insecurity at different socio-organizational levels is caused by different factors and requires specific solutions. In consequence, an effective FNS programme requires a holistic programme approach. During all stages of the PCM/AAA there is a need for continuous information collection to define targets,

to select appropriate interventions, and to monitor and evaluate programme progress, process and impact. Table 2 provides selected examples of assessment instruments sustaining to the different elements of FNS at macro, meso, and micro levels.

At the **macro** level, some agencies have created data collection systems to assess the food security situation in risk countries and regions.⁸ Perhaps the most simple information source are precipitation records, which can help to predict future food production. Food balance sheets provide information on food availability at national level. The World Food Programme (WFP) developed the Vulnerability Analysis and Mapping (VAM) project to analyze the vulnerability to food insecurity of target populations. A prominent part of VAM is related to food availability. The Demographic and Health Survey (DHS), funded by USAID, provides health data for many countries for national policy design. FAO has developed the Global Information Early Warning System (GIEWS), which collects data related to temporary food insecurity. Under the leadership of WHO, several health surveillance systems have been developed and implemented to monitor the epidemiology of selected diseases. All these initiatives are currently coordinated by FAO as a comprehensive Food Insecurity and Vulnerability Information and Mapping System (FIVIMS).

At the **meso** or sub-national level, food market surveys provide data on the availability of food. Qualitative surveys, such as food focus group discussions, give other information on the accessibility of food for those in greatest need. District health surveys describe health conditions that may reflect food utilization problems. For quantitative situation analysis, for example, food and nutrition security programmes assisted by GTZ use the standardized BASELINE survey method.⁹

Finally, agricultural production surveys, intra-household food frequency interviews, immunization surveys, and anthropometric surveys in children under five can be used to assess the availability, accessibility, and utilization of food and its stability at **micro** level.

Using the systematic approach outlined above, Table 2a shows some examples of interventions in the four

Level	Availability	Accessibility	Utilization	Stability
MACRO	Precipitation Record Food Balance Sheets	Vulnerability Analysis & Mapping	Demographic & Health Survey	Global Information Early Warning System
MESO	Food Market Survey	Food Focus Groups	District Health Surveys	Anthropometric Surveys: Women & Children
MICRO	Agricultural Production Plan	Intra-household Food Frequency Questionnaires	Immunization Charts	Weight Charts for Pregnant Women

MACRO	Family Planning Programme	Food Stamp Programme	Safe Motherhood Programme	Savings and Loan Policy
MESO	Small-Scale Irrigation Project	School Feeding Programme	Measles Immunization Campaign	Community Planning Committees
MICRO	Use of Fertilizer	Lactation Consultant Programme	Latrine Construction, Growth Charts	Food Storage

categorical elements of FNS at different socio-organizational levels. At the **macro** level, in addition to a sound agricultural price policy that boosts agricultural production,^{10,11} family planning programmes may be important to insure food availability on a longer term.¹² Food stamp programmes can increase food accessibility for the most vulnerable groups. National safe motherhood programmes can reduce foetal malnutrition and therefore increase the utilization of food by small children. The formulation of a rigorous savings and loan policy, within the national banking system, can assist small enterprises and help to reduce seasonal food insecurity. Small-scale irrigation projects, school feeding programmes, measles immunization campaigns, or the creation of community planning organizations are instruments to achieve food security at the **meso** level. Finally, increasing the area of agricultural production through the use of fertilizers, the construction of latrines and food stores, and providing breastfeeding consultants or support groups for young mothers are all examples of FNS interventions at the **micro** level. The systematic approach shown in Tables 2 and 2a uses the same instruments and processes for assessment and intervention if the four categorical elements of the Malnutrition Framework (*Food, Care, Health, Environment*) are inserted in the tables above. Therefore, both frameworks -- *Malnutrition* or *Food and Nutrition Security* -- are useful for FNS programme design.

**The Situation-Related Dimension:
FNS in Different Stages of Insecurity**

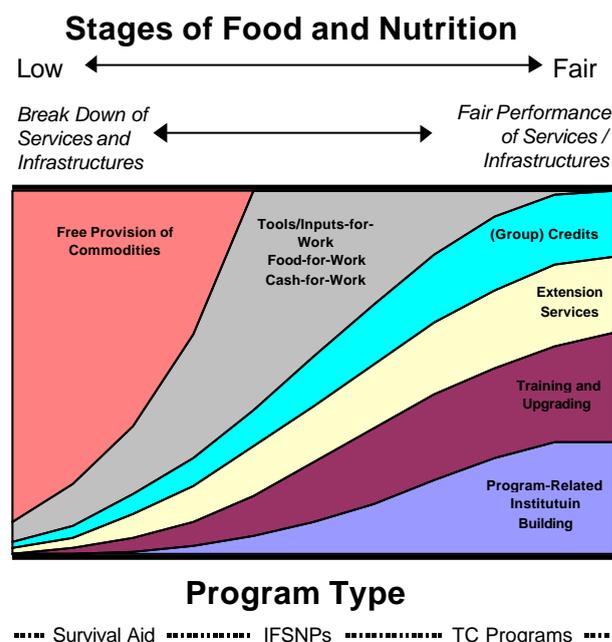
The situation-related status of a program is the fourth dimension of FNS. As FNS effectiveness increases, the situation will change over time from emergency to more secure conditions. Figure 3 depicts an example of different interventions at the **meso** level according to the level of food and nutrition security. The left side of the figure shows very high food and nutrition insecurity, i.e., emergency situation. In these circumstances, relief programmes have to provide emergency aid and distribute basic commodities such as food or medicine. These programmes need to react rapidly and flexibly to secure the survival of the people. Once survival of the most vulnerable is ensured, measures can be implemented to build a basis for sustainable development that relies on the capacity of the people. In this phase Integrated Food and Nutrition Security Programs (IFNSP) are required. Self-help measures such as cash-for-work, food-for-work, tools or inputs-for-work can be used to construct basic infrastructure (drinking water supply, latrines, small irrigation channels, reforestation, health and nutrition posts, etc.). At this point, the people may have adequate energy but the quality of their food may still be insufficient. As a result, specific micronutrient interventions may be required.

The right side of the figure reflects a much improved nutritional situation that allows the implementation of the classical instruments of technical cooperation (TC), e.g.,

the implementation of credit and saving programmes, training and upgrading technical expertise, and institution building. In summary, depending on the stage of FNS at national level, different strategies and measures have to be implemented to increase the FNS situation within a whole country. Figure 3 may create the impression that there exists a continuum of insecurity situations from emergencies to stable conditions, which require a phasing from relief actions to integrated FNS programmes, to conventional technical cooperation. These different stages of insecurity, however, may occur in a country at the same time, requiring all different forms of assistance programmes simultaneously.¹³

In conclusion, FNS has evolved to a very complex area of development strategy. The increasing population and shrinking natural resources will challenge us to respond to secure food and adequate nutrition not only for today, but for tomorrow.

Figure 3. Significance of Implementation Tools at Meso Level in Different Stages of Food and Nutrition Security



References

1. ACC/SCN (1999) Human rights and the right to adequate food: SCN's 26th Symposium Report. ACC/SCN: Geneva.
2. Haddinnott J (1999) Operationalizing Household Food Security in Development Projects: An introduction. In: *Technical Guide for Food Security*. IFPRI: Washington DC.
3. Campbell CC (1991) Food insecurity: a nutritional outcome or a predictor variable? *Journal of Nutrition* 91:408-415.
4. Kracht U and Schulz M (1999) Food security and nutrition: the global challenge. Lit-Verlag: Germany.
5. Maxwell S and Frankenberger T (1992) Household food security: Concepts, indicators, measurements. International Fund for Agricultural Development: Rome.
6. UNICEF (1990) Strategy for improving nutrition of children and women in developing countries. UNICEF: NY.
7. Gross R, Schultink W, Kielmann AA (1999) Community nutrition: definition and approaches. In: *Encyclopedia of Human Nutrition* eds. Sadler MJ, Strain JJ, Caballero B. Academic Press Ltd: London.
8. Slack AT (1999) Food and Nutrition Security Data on the World Wide Web. In: *Technical Guide for Food Security* IFPRI: Washington DC.



9. Gross R, Kielmann AA, Korte R, Schoeneberger H, Schultink W (1997) Guidelines for nutrition baseline surveys in communities. *Southeast Asian Journal of Medical Medicine and Public Health Supplement*. SEAMEO-TROPED and Deutsche Gesellschaft für Technische Zusammenarbeit (GZT): Bangkok.
10. Bale MD and Lutz E (1981) Price distortions in agriculture: an international comparison. *American Journal of Agricultural Economics* 63:8-22.
11. Bautista RM (1990) Price trade policies for agricultural development. *World Economics* 13:89-109.
12. Longhurst R (1985) Agricultural strategies, food and nutrition: issues and opportunities. *Nutrition and Health* 4:83-94.
13. Preuss HJ A (1999) Plädoyer für eine entwicklungsorientierte Nothilfe. *Entwicklung und ländlicher Raum* 33:9-11.

Contact Information: Rainer Gross and Hans Schoeneberger are senior nutritionists of the GTZ. Hans Pfeifer is director of the Food and Agriculture Development Center of the German Foundation of Development (ZEL-DSE). Hans-Joachim Preuss is the director of programmes and projects of the NGO Deutsche Welthungerhilfe/German Agro Action (DWHH). Contact: Dr Gross, Dept de Nutricao, Faculdade de Saude Publica, Universidade de Sao Paulo, Av. Dr Arnaldo 715, CEP 01246-904, Sao Paulo, Brazil; Phone: 55 11 30667762; Fax: 55 11 30667705; email <urgross@attglobal.net>

Agricultural Biotechnology by Charles J Arntzen

Florence Ely Nelson presidential Chair in Plant Biology, Arizona State University
President Emeritus, Boyce Thompson Institute for Plant Research, Inc.

Crop Domestication, Genetics, and our Food Supply

To understand the challenges of modern crop genetic improvement, it is important to consider the changes that have occurred to plant species in their conversion to a food source. Humans have intervened in plant evolution over the last 10,000 years by selecting and growing plants that they desire in their diet. We have directed processes of change in the crops we grow and are, in turn, affected by the changes that occur. Creation of crops that provide our food supply has been a very dynamic and rapid process of evolution, which parallels the development of human societies.

Potato (*Solanum tuberosum*) provides a useful example of crop domestication. This species and its relatives evolved in the central Andes Mountains of Peru and Bolivia. More than 100 wild species of tuber-bearing *Solanum* can still be found in South America. Chemical analysis of these plants show that the tubers contain many toxic chemicals, including glycoalkaloids (which give a bitter taste), saponins, phytohemagglutinin, proteinase inhibitors, sesquiterpene phytoalexins and phenols. These chemicals provide the plant protection for attack by fungi, bacteria and insect pests. They probably also deterred our ancestors who began trying the tubers as a food source at least six-thousand years ago. The way these early peoples overcame the bitter taste and toxicity of the early potato is still reflected in customs of modern Andeans when they collect wild tubers and make a product called *tunta*. The bitter tasting potatoes are spread on the ground at high altitudes to freeze, and then are walked upon to break them up. Lying in the dry air and going through cycles of freezing and thawing results in a "freeze-dried" product which is then placed in a depression along a running stream. The flowing water leaches out over 90% of the toxic chemicals, leaving the *tunta* for consumption.

It is likely that our ancestral "farmers" would taste the potatoes they collected, and occasionally find one that was less bitter, and establish a selection for that plant. This

early domestication led to preferred "varieties" which could be grown at lower altitudes (which did not have the cold, dry nights needed for *tunta* preparation). Several thousand varieties of potatoes are grown today in the Andean region, each with various flavors and nutritional value; these represent the trial and error selection of many farming generations. By 1570 early explorers who came to South America had developed a taste for the domesticated potato and brought one or a few varieties to Europe, from whence it was transferred to North America and other parts of the world. Today, potato is the world's fourth most important food crop (after wheat, maize and rice).

Scientists interested in how foraging humans developed agricultural societies have documented similar examples of crop domestication over the last 10,000 years. The adoption of new foods by other cultures has also been studied, with examples of slow acceptance. Tomatoes, which also originated in South America, are one example. In the nineteenth century, Europeans and Americans believed tomatoes to be deadly poisonous. In 1820, New York State forbade tomato consumption and only relented when Colonel Robert Johnston announced that he would eat an entire bag of them outside the courthouse in Salem, New Jersey. Two thousand people turned up to watch him die, while a band played a funeral march. But Johnston ate the lot and announced: 'This luscious, scarlet apple will form the foundation of a great garden industry.'

There are also examples of recent crop domestication. In World War II, oil-seed rape was grown in Europe to provide lubricating oil for machines. Crop breeders recognized that the plant was a good oil producer, but it contained two chemicals which are toxic to humans: erucic Acid (a C22: a fatty acid) and glucosinolates. (Glucosinolates are the chemicals that give the pungent flavor to horseradish, mustard, and other plant relatives of oil-seed rape.) Using a process called mutation breeding, geneticists identified plants with mutated genes for the synthesis of the toxic chemicals. Using these plants in a breeding program, they developed the widely grown oil-seed rape varieties that are

the source of toxin-free edible oils for human consumption in Europe and most of the rest of the world.

Unintended Outcomes of Crop Domestication & Agricultural Responses

The domestication of virtually all of the world's major crops has involved the selection of varieties that have lost their genetic capacity to make toxic chemicals. While this is clearly of advantage for human nutrition, it leaves the plants with a greatly reduced defensive capacity against their natural pathogens and predators (fungi, bacteria and insects). (Toxic chemicals are nature's pesticides within plants; weeds, which often have a bitter taste due to the presence of these chemicals, also often resist attack better than crops.) About 300 years after potatoes were introduced into Europe, the crop was attacked by a late blight disease (caused by an oomycete, Kingdom Stramenopila, called *Phytophthora infestans*) in the devastating Irish Potato Famine of 1845 and 1846. *Phytophthora* had probably been a pathogen on other hosts, but mutations in the microbe allowed it to alter its host range to potato plants, and especially the "chemically weakened" domesticated varieties. It is thought that potato late blight probably met success as a pathogen on *Solanum tuberosum* for the first time in the United States in the early 1800's, but did not immediately cause a major disease outbreak (perhaps due to continued evolution of the pathogen). Because potato tubers can easily be infected, it seems likely that an infected tuber went from the USA to Europe sometime before 1845, with disastrous consequences first in Ireland and later on the continent. Potato late blight is a global problem for potato breeders today, and is countered by the use of fungicides and continued efforts to breed resistant potato varieties.

Agricultural specialists have developed many chemical strategies to try to improve plant defenses against pathogens and predators. In the nineteenth century, various "pesticide" formulations were developed to try to protect potatoes, grapes, and other crops. These have included plant sprays containing copper or arsenic, or nicotine in tobacco juice. (Nicotine, a toxic alkaloid found in tobacco, is similar in chemistry to compounds found in other members of the family *Solanaceae*, including some of those that have been selected during domestication of family members tomato and potato. It is ironic that we have first caused genetic removal of a "defense" molecule, and then sprayed it back on plants!) In the twentieth century, improvements in chemical synthesis allowed the development of many new classes of synthetic pesticides that are now used internationally, and comprise an agricultural market of over US\$20 billion. In spite of this huge investment by farmers to fight crop disease and insects, these agents still are the primary cause of reduction of crop yields! Many of these pesticides have actions that mimic, at least partially, the actions of the defense chemicals that were originally in our food crops,

but have been lost during domestication.

Using Transgenic Technology to Restore Food Crop Defenses

In the late 1970s and early 1980s, molecular biology techniques were being developed to isolate fragments of DNA which contained the genetic information of individual genes, and to move these genes from one species to another. By the 1980s a gene from a human virus had been moved to yeast to allow the production of a new, safe vaccine to prevent Hepatitis B infections. A human gene for insulin had been transferred to bacteria to create a new and much safer way to protect diabetics. With a large and growing use of biotechnology making important contributions to human health through new pharmaceuticals, agricultural specialists in the early 1980s directed their attention to how the methodologies could be utilized in crop improvement. They were fortunate in that many of the cell biology tools needed for transfer of genes to plants were already in use in conventional crop breeding.

The growth of plant cells in culture has been an important area of plant research for over fifty years. A major milestone in plant biology was the demonstration that plant cells are *totipotent*, that is, an isolated plant cell has the complete genetic "blueprint" within its nucleus to allow it to divide and grow to form a new plant. Isolation of one or a few crop cells, and then regeneration of this material into intact plants has been exploited by crop technologists for improvement of many species. "Curing" plant varieties of virus infections to make disease-free breeding stock routinely makes use of plant tissue culture. Treatment of plant cells in culture with mutagenic chemicals has been commonly used to create genetic change which would provide a beneficial trait when the cells were regenerated back into intact plants. It was, therefore, only a small conceptual step to adapt plant cell culture systems to new techniques for introducing DNA. The first successes using gene transfer into plants were reported in 1983. Five years later the first plants derived from this approach were in field trials, and by 1996 the first new crops derived from plant genetic engineering were in the marketplace.

Crop breeders have used gene transfer technology to modify domestic potatoes, and some genetically modified varieties are now commercially available. One of the first targets chosen was insect resistance, since insect losses (especially to potato beetle) are among the most important reasons for farmers' yield losses, and prevention of the problem requires applications of insecticides one or more times during the growing season in commercial potato production areas. In addition, attack of tubers by insect larvae is a significant loss of the stored food in lesser developed countries that do not have the sophisticated storage facilities that are common in the developed world. The strategy that was first used for creating insect resistant potatoes involved the transfer of a gene from a bacteria



that is pathogenic against insect larvae (but which is harmless against birds, fish and animals). The bacterium, called *Bacillus thuringiensis*, produces a protein in nature (the Bt protein). When the gene for this protein was moved to plants, the plants also produce the Bt protein. When an insect larvae eats either the bacterium or plant tissue containing the Bt protein, the digestive process of the insect is interrupted and the insect dies. Many farmers have enthusiastically adopted this approach to reducing crop losses, and have in parallel reduced their use of chemical insecticides.

Crop breeders have also used gene transfer to add traits to several other crops to improve their value to farmers who buy the seed. Maize, soybeans, cotton and some vegetables are currently available from seed companies in the United States and several other companies. The use of biotechnology-derived new cotton varieties has seen particularly rapid adoption in the US and China. The reason for this relates to farmers' difficulties in growing this high value crop; competition from troublesome weeds and insects eating the valuable fibers in developing flowers sometimes cause devastating economic losses. New varieties of cotton with new genetic components have provided relief from some of these problems, and have resulted in dramatic reductions in pesticide use and improved profitability for US farmers (Figure 1).

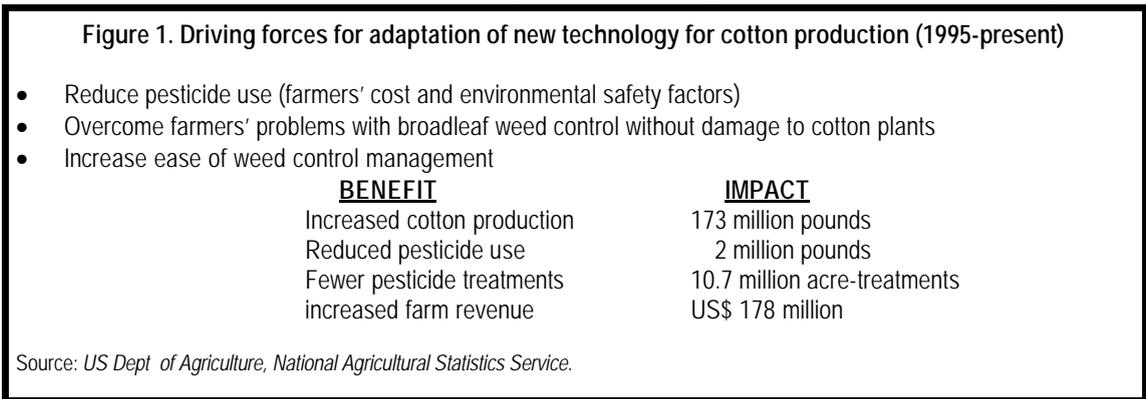
Next Generation Agricultural Biotechnology Products

The genetically modified crops, which are now commercially available, have largely been created to provide farmers with production advantages, such as reduction in use of costly pesticides, easier weed control, or protection from viral diseases. In coming years, many more diverse products will be possible. For example, public funding and philanthropic sources have helped develop plants that are enriched in essential micronutrients to alleviate vitamin A and iron deficiencies (two major problems in the developing world). Other studies are exploring which constituents of plant foods may have beneficial value as anti-cancer benefits (or other positive health values); it is likely that our domestication of crops has resulted in the reduction of some chemicals that are of direct value to our health, and that new crop breeding tools can restore these valuable constituents of our food supply.

Another area in which plant biotechnology is likely to have a global impact in the next decade is in the area of new vaccine technology. It is estimated by WHO that more than five million children in developing countries die each year from common diseases; the most dominant are diarrhea and respiratory infections. Although preventative medicine has proceeded rapidly in the last decade as biotechnology has been applied to create new vaccines, the new products are comparatively expensive for lesser developed countries. For this reason, a novel strategy has been developed for vaccine production that uses transgenic plants which contain genes derived from bacteria or viruses that cause human disease. These "transgenes" cause the plant to produce a protein that is the "antigenic signature" of the disease. Using mice as an animal model, it has been shown that consumption of transgenic plant samples as food triggered an oral immune response to the "signature protein."

The research on plant-based vaccines has progressed to the point that two human clinical trials have been conducted in the United States. Both were conducted after the U.S. Food and Drug Agency evaluated the protocols and gave their approval. Vaccines to prevent diarrhea were chosen for these early studies since this is the cause of approximately 2.5 million cases of infant mortality on an annual basis, with most deaths occurring in the developing world. Both of the human studies have now been completed in "Phase I trials" that have verified the safety and efficacy of the approach.

To accomplish oral immunization of infants using transgenic food, it has been necessary to select an appropriate crop plant which can be grown in most developing countries, and which is eaten uncooked (to avoid destruction of the vaccine proteins by heat). Efforts are underway to develop both tomatoes and bananas for this purpose. Current research efforts are identifying ways to prepare a dry formulation of vaccine-containing tomato extract using common food processing technology, and to cause the appropriate proteins to accumulate in the banana fruit so that infants could be fed an "edible vaccine" in a banana baby food puree. In both cases, the desired outcome is agriculture and food-based technologies, which are readily available in all developing countries. The use of transgenic plants to



produce and deliver oral vaccines also has applicability for novel strategies for disease prevention in animals, thereby improving the safety of our food supply, and stability of animal production.

Summary

Of all the technologies used to increase the global food supply in the last millennium, plant genetics and crop breeding have had the greatest impact. In the last half of the last century, these fields of science have increasingly adopted cellular and molecular techniques for "conventional breeding" of food crops. In addition, over the last two decades, direct manipulations of DNA to create "transgenic crops" have added a new tool to crop improvement. The outcome of the new technologies has been dramatic increases in crop yield; global per capita food production has increased 140% over the last fifty years during a period when global population has doubled to our current level of about six billion persons. However, continued technology advances are needed to ensure an adequate food supply for the anticipated four billion additional inhabitants that will populate this planet in the next fifty years. Preferably, these advances will increase the yield of crops per unit of currently available

arable land, thereby preventing the further degradation of ecosystems not now used for farming. Genetic technologies offer our best opportunity to increase yields while protecting the environment. In addition, genetic technologies will allow us to improve foods for improved nutrition and health maintenance.

Bibliography

Johns T (1990) *The Origins of Human Diet and Medicine*. University of Arizona Press, Tucson.
Wong SY, Ho KS, Mason HS, and Arntzen CJ, Edible Vaccines. *Science & Medicine* 5:36-45.

Contact: Dr CJ Arntzen, Florence Ely Nelson presidential Chair in Plant Biology at Arizona State University, USA, and the *President Emeritus* of the Boyce Thompson Institute for Plant Research, Inc., a not-for-profit corporation affiliated with Cornell University. Dr Arntzen's career spans industry, academia, and government service. He has held positions with the USDA, with The DuPont Company as Research Director, and as Deputy Chancellor for Agriculture at Texas A&M University. He is a member of the US National Academy of Sciences and a foreign member of the National Academy of Sciences of India. He has served on the editorial board of *SCIENCE*, as chair of the US National Institute of health's National Biotechnology Advisory Board and on scientific advisory boards of biotechnology companies. Contact Dr Arntzen, Boyce Thompson Institute for Plant Research, Inc., Tower Rd, Ithaca, NY 14850 USA; Phone: 607-254-1301; Fax: 607-254-6779; email <cja7@cornell.edu > Website: <<http://bti.cornell.edu>>

GM Foods: Areas of Concern by Suman Sahai, President, Gene Campaign, New Delhi, India

Genetic engineering, also called genetic modification or genetic transformation, is a revolutionary new technology. It allows scientists to change the characteristics of living organisms by transferring genes from one organism, across species barriers, to another, to create a genetically modified organism (GMO). Genetic modification technology can transfer genes between organisms that cannot breed in nature. Thus, genes from humans have been put into mice, from fish into tomatoes and from bacteria into cotton producing transgenic organisms.

GM technology has been most successfully applied to the field of agriculture giving rise to what are called GM crops or transgenic crops. The other area of application is in the production of vaccines and medicines. The field of vaccine production has been interesting because it is now possible to introduce vaccine-producing genes into plants like bananas and potatoes as well as in the milk of animals like sheep and goats. This has significant implications for developing countries where immunization against common diseases like polio, cholera, hepatitis has proven to be difficult and expensive. One of the major problems has been maintaining a reliable cold chain from the origin of vaccine production to the villages

where it is required. Having a vaccine present in foods such as bananas or potatoes, which can be grown everywhere, would make the availability of vaccines in interior, inaccessible areas quite easy. This would make a major difference to rural health.

Whereas the application of GM technology to the field of vaccines and medicines has gained public acceptance, its application to agriculture and food production has raised a swarm of controversy. Resistance to GM foods is strongest in Europe, followed by Japan and the US, where large scale demonstrations and protests target the practitioners of GM technology, both in the laboratory and in the field.

The opposition is aimed at two aspects of GM technology. One is the science itself, primarily its safety, the other is the policy governing the use of GM technology. There are misgivings about the Intellectual Property Rights (IPR) regime associated with it and the ironclad control of the multinational corporate sector. It is undeniably true that GM technology has the potential to increase food production and improve the nutritional quality of food; however, it is not being used by its dominant practitioners, the private corporations, to produce either more or better food. It is only the public research institutions, financed by public



money, that are trying to apply GM research to crops of interest to poor farmers in developing countries. The Rockefeller Foundation has financed research which will add vitamin A and iron to rice, improving the micronutrient content of this widely-consumed cereal. Research institutes in India are working to include protein genes from Amaranth (*Chaulai*) into potatoes in order to increase the nutritional quality of this primarily carbohydrate food. Public sector institutions in other developing countries are now beginning to apply GM technology to rice, cassava, yam, and sorghum to produce improved varieties that will increase the production of staples needed by the poor. Despite its promise, however, there are real and credible concerns about GM crops.

Direction of GM Research

The fact is that the life science corporations like Monsanto, Novartis, Aventis and DuPont control research on GM crops primarily because of the enormous resources they command. The focus of their research is on commercial agriculture and the goal is to maximize corporate profits. Corporate research is not targeted towards the needs of small farmers. GM crops are not targeted towards helping to alleviate hunger and poverty. GM crops are also a problem area, if one looks at it from the point of view of sustainable agriculture. The increase in the number of GM varieties might strike a further blow to genetic diversity in the field and exacerbate genetic erosion. Loss of genetic diversity in food and cash crops has been well documented following the introduction of high-yielding varieties at the time of the green revolution. GM crops might strengthen this trend.

If we look into the direction of corporate funded GM research, we find that the focus of the research is on commerce, not on food. The bulk of the research in the private sector is aimed at herbicide-tolerant varieties of soybean; Bt corn (corn with a bacterial gene for disease resistance); Bt cotton (a cotton variety carrying the same bacterial gene for resistance against the bollworm pest) and the flavour-savour tomato (a product designed for increased shelf-life). If there is research on corn, then the research is targeted at yellow maize, which is used for animal feed and for making sugar-syrup. This research is not targeted at the white maize, which is a staple food in Africa and which is very susceptible to disease.

Apart from fears about its safety, the public rejection of GM crops is strongly influenced by the perception that GM crops are neither targeted at farmers nor at hunger but only at maximizing corporate profits. This technology is today fully controlled by six multinational corporations through instruments of protection like Intellectual Property Rights and trade secrets. In such a situation, it is only logical that society will judge this technology to see whether it can address social goals, whether it can address the needs of developing countries where widespread hunger persists,

and whether it can help to increase productivity for small farmers. Society, before accepting this technology, will determine whether these crops will have any role to play in increasing food and nutritional security for the vulnerable populations of the world.

The opponents of GM technology legitimately ask: Why doesn't GM research target food crops? Why are there no research investments in legumes and pulses, in sorghum, millet and yams? In many developing countries a legume called *Lathyrus sativus* (known as *khesari dal* in India) is eaten since it grows on marginal lands and provides much needed protein. *Lathyrus sativus* contains a toxin gene and prolonged consumption leads to a wasting of the limbs, a condition called Lathyrism. Why isn't GM research targeting crops like *Lathyrus*? Also, there is no significant work being done by the corporate sector on drought resistance and salinity tolerance.

Making GM Researchers More Responsible

If the direction of privately funded research is not satisfactory, in what way should it be improved?

1. Research funds and new technologies must address hunger and the crop needs of small farmers.
2. Private and public sector partnerships should be forged. These structures must target food crops for developing countries because we have seen that the private sector on its own has not paid any attention to crops relevant to the poor.
3. Private corporations should be called to share GM technology with responsible scientists for use in developing countries. It is an atrocious situation that six corporations control a technology with the potential for alleviating hunger and yet this technology is not being applied towards these goals.
4. New collaborations should be established between diverse players like public research institutions, international institutions, NGOs and industry to spread the benefits of new research.

In addition to forging new collaborations, it is crucial that the level of public spending in agricultural research be increased. Regrettably, in the last years we have seen a sustained withdrawal of funds from public sector research. This is a highly detrimental development and targeted against the ongoing struggle in developing countries to achieve food security. Public research funds should not be withdrawn from food and from agricultural research. This is particularly true as research on pro-farmer, pro-poor, pro-developing country crops is not being undertaken by the private sector.

Safety and Sustainability of Food Production

With respect to GM foods, there are widespread concerns that are being raised, primarily in two areas, the first

concerning *human health*, the other concerning the *environment*. A third area of concern in this context, of special relevance to developing countries, is its impact on *sustainable food production* and self reliance of farmers. Our experience of the Green Revolution showed that with the introduction of new technology, like high-yielding varieties, small farmers tended to get marginalized. GM crops will also tend to marginalize small farmers. In addition, GM technology will establish the dominance of corporations, more so if the kind of IPR regimes and seed patent demands are acceded to. This will result in seed production and ultimately food production being controlled by corporations, posing a great threat to self reliance in developing countries and their ability to feed themselves. Finally, the introduction of GM crops will strike at sustainable food production by increasing genetic erosion in the field, unless we take very determined steps to counter this effect.

Human Health Concerns

Antibiotic markers. There is great concern about the potential damage to human health that could be caused by the resistance induced by antibiotic markers that are used in breeding GM crops. Although there is little evidence so far that ingestion of antibiotic markers is harmful, it must be said that consumption of GM foods is a very new phenomenon and it is theoretically possible that the effects, if there are any, have not yet appeared. No one is testing for negative effects, nor are there any testing procedures available for examining the long term effects of eating GM foods containing antibiotic marker genes. In the public interest, it would be wise to act according to the Precautionary Principle in this case, and ban the use of antibiotic markers. These markers are not essential to the production of GM crops and several alternatives exist. In Europe, clearance to GM crops is not given if they contain antibiotic markers.

Allergenicity/toxicity. Other concerns for human health relate to the fears that these novel foods could be allergenic and/or toxic. Such fears have been raised primarily by the Brazil nut episode. Allergic reactions known to Brazil nuts was transferred into soybeans when a Brazil nut gene was used to produce a GM soybean variety. The blood serum of people with known allergies to Brazil nut showed a positive response to the GM soybean. Similar kinds of allergy transfer could happen if peanut genes were transferred into another food crop. Given the severe allergic reactions known against peanuts, near fatal allergies could be caused if the novel GM food containing peanut genes was consumed unknowingly.

Environmental Concerns

Horizontal gene transfer. With respect to the environment, concerns have been expressed about genetic pollution by genes being transferred along with pollen. The extent of pollen transfer is different under different climatic

conditions. Pollen will travel great distances under dry, arid conditions and shorter distances in wet humid conditions. What we do know is that horizontal gene transfer actually happens. According to Tappeser and colleagues (Institute for Applied Ecology, Germany), "Horizontal gene transfer is now recognized to be the main avenue of exchange of genetic material in the microbial world and of the exchange and spread of antibiotic resistance genes." Michael Syvanen (Nature Biotechnology, 1999) provides evidence that mechanisms for the transfer of antibiotic genes (markers) to bacteria in nature do exist. Evidence that gene transfer happens in the field by transfer of pollen, comes from the well documented transfer of genes from oilseed rape (canola) to its relative, the wild radish. Gene transfer through pollination is known between wheat and rye and between different varieties of oilseed rape, especially low erucic acid and high erucic acid varieties. Although we know that horizontal gene transfer actually happens in the field, we do not know the implications of this kind of gene transfer. There is a need for a far greater number of studies, especially for crops of relevance to the developing countries. Pollen transfer and gene transfer studies to date have only been performed on the crops grown in industrial nations. Developing countries must compile baseline data for the crops that are important to them, and under their climatic conditions.

Negative Impact of Structural Change

Another important environmental concern relates generally to the application of new technologies. Past experience shows us that whenever structural change has been brought into rural areas, the impact on the environment can be destructive. We should be very careful that biotechnology does not repeat this experience. This technology should be very precisely targeted so that its use is aimed to reduce poverty and to minimize the damage to the environment.

In order to counter increasing genetic erosion and maintain genetic diversity in the field, our efforts will have to be directed to developing multi-strategy agricultural technologies that are based on genetic diversity and environmentally sound practices. Only then will we have an approach that will be far superior to the kind of single point, single crop approach that we are using today.

Is GM Technology Necessary For India?

Post-harvest losses: When assessing the relevance of a new technology, it is crucial to ask whether this technology really brings significant gains or whether the problems can be solved more efficiently or more cheaply by alternative or conventional approaches. In India, where post harvest losses run from about 15-30 %, the question to ask is: should India invest in GM technology to increase food production, or should it be investing its scarce resources into improving post-harvest technologies to minimize losses? Should we not be investing in better storage, better



transportation, processing and increasing the shelf life of perishable foods? This means the food that has actually been produced in the field is not wasted but reaches the consumer and brings benefit to the farmer.

Research focus: If GM research is to be conducted, then research priorities must be clearly set. The target must be food crops of relevance to small farmers and the poor, and those crops where conventional breeding has not been successful. The most obvious of these crops is pulses. We have had no major breakthroughs in legume research through conventional breeding and pulses remain a problem area. Pulses are especially important for a largely vegetarian country like India where it is the only source of protein for many people. GM research targeted at pulses would make sense, but GM research targeted at commodities or non-edible plants, as is the case in a premier research institution in Delhi, makes a mockery of science and the social responsibility of science. Public money must be conscientiously and carefully spent to achieve the maximum public good.

And finally, in focusing the direction of GM research, it would be important and meaningful to consult with researchers and with small farmers, especially women. This will help to identify the needs of farming communities and the kinds of improvements they are looking for. What are the problems they face in cropping patterns? What sort of crops would help to produce more food and better food as seen from their perspective? This could be an important contribution in giving greater relevance to the direction of GM research.

GM disease resistance: Is the Bt route of disease resistance the only way to introduce disease resistance or are there more effective approaches? Should we not invest in developing biocontrol agents, biopesticides and sophisticated Integrated Pest Management (IPM) techniques? Work on bio-intensive IPM systems using biopesticides and closely related synthetic analogues are now showing promising results. For instance, 'Spinosad', developed by Dow Agrosiences, is a bio-insecticide developed from the fermentation of a fungus species. Another agent called azoxystrobin is a fungicide and is a synthetic analogue of a natural fungal metabolite. The Bt approach is showing that insects are quickly developing resistance. It is now recommended that Bt crops be grown in large refuges where vulnerability of the pest can be contained. Is this really a viable approach for India, where every inch of arable land is needed to produce food? Can we afford to divert land to maintain this artificially constructed, disintegrating method of introducing disease resistance?

How to Improve the Safety of GM Foods

Human toxicity and allergenicity tests for novel proteins that are expected to be expressed should become an integral part of testing GM crops. The example of Brazil nut allergens being transferred to other crops where the Brazil

nut gene was transferred, thus evoking allergies, points to the need for caution particularly since some food allergies, such as that in peanuts, can be life threatening.

Information concerning potential allergens and toxins should be compiled and made available to researchers, regulators and to the public.

The use of genes/proteins that are known to cause allergies, should be avoided unless there are overwhelming health benefits.

Clear and precise labeling of GM foods should be mandatory at the level of crop and farm produce as well as for processed products.

Banning the use of antibiotic markers. Antibiotic markers only help to indicate whether the gene of interest has been transferred into the new crop or not. They are not essential to the transgenic crop and can very easily be avoided. On the basis of the Precautionary Principle, and to assuage public fears, antibiotic markers should be replaced by existing alternatives.

Stringent pre-release assessment is necessary in order to improve the safety of GM crops and minimize the possibility of environmental damage. Before release of a crop, data should be collected and evaluated for certain essential features:

- ◇ Characteristics of the GM plant *before* genetic modification.
- ◇ Innovative traits the GM plant has acquired.
- ◇ Characteristics of the new GM plant.
- ◇ Relevant ecological data about the intended sites of release. Climate data needs to be collected about temperature, rainfall patterns and wind flow, to know the environmental conditions in which the variety is to be released.
- ◇ Most importantly, the presence of wild relatives must be assessed in the region where the GM variety is to be released.

Safety tests for GM variety. It is important to routinely evaluate the outcome of genetic modification on human health and the environment. More fundamental research is needed on how genetic modification takes place, so that we are better able to predict and control how genes express themselves. For example, the current GM crops designed for increased pest resistance are not sufficiently selective and specific for the major pests. The risk of damage to the beneficial insect and bacterial flora and fauna in the environment can not be assessed. Once the transgenic line is created, it must be very critically assessed agronomically, physiologically, and in all the other ways that new varieties are tested after conventional breeding.

Radical review of guidelines. Recent analysis of GM technology has shown that presumed principles of risk assessment and regulatory guidelines that are in place are

extremely vague and/or defective. Benbrook (2000) has pointed out that most studies on risk assessment were done only after the guidelines were in place. Less than 10% of the references covering seven major risk areas appeared before 1990. The "Substantial Equivalence" theory (that GM produced food and conventionally produced food are substantially the same, and so need not be treated as 'novel') was put in place in the mid-eighties, long before most of the important risk concerns had been studied. Pollen transfer studies will have to be conducted longitudinally over several seasons for each crop, before we can begin to understand the dynamics of pollen/horizontal gene transfer. In addition, conclusions about large scale releases usually cannot be extrapolated from small scale, controlled field studies.

Protecting Centres of Diversity. Regions that are centers of origin of particular crop plants or where genetic diversity of those plants is found, or where wild relatives of crop plants are known to occur, must be treated with the utmost caution. Related species and wild relatives will be the natural recipients of the foreign genes contained in transgenic crops. Since genes can not be recalled once they are released into the environment, and we do not fully understand the consequences of foreign gene transfer, we must proceed with caution.

Regions that are the centers of origin of GM crops should not grow these transformed crops until solid data is available about the impact of genes transferred from GM crops into wild relatives. In fact, invoking the Precautionary Principle is recommended to avoid the introduction of GM crops in the areas where their wild relatives are to be found.

Policy Concerns Governing GM Technology

At the level of the policy governing GM technology and general access to it, there are grave objections, and unless these objections are addressed it is unlikely that this technology will gain acceptance.

Transparency. The purveyors of GM technologies and products are quite rightly accused of a severe lack of transparency in their operations. It is necessary to *create open and transparent systems* so that reasonable *data is accessible to the public* and debate on GM risks and benefits should be public. It is also important that *field trials of GM crops be conducted by independent experts*. At the moment the trend is in-house testing so that the agencies interested in releasing a particular variety conduct their own trials.

Equity. A near fatal flaw in the practice of GM technology is the impression of overwhelming *corporate greed* that has been firmly entrenched in the public's mind. Launching the concept of the 'terminator' technology to induce seed sterility as an instrument of establishing complete control over farmers' seed has caused the kind of public outcry that such a notion of greed deserves. The use of sterile

seed technologies as an instrument of control must be banned (see SCN News No. 19 p.9).

'Variety' not 'Sequence' protection. The kind of protection that plant breeders and companies are requesting for new plant varieties should be limited to Plant Breeder's Rights and not to patents, or even to the trade secrets that are applied to gene constructs.

Benefit sharing. It is well known that it is often varieties belonging to farmers, bred by farmers and maintained by farming communities, that form the basis of high yielding varieties, and equally so of GM crops. GM crops are based on varieties bred by somebody else, by some other people, by farming communities, and this must be acknowledged. The profits that are derived from a GM crop must be shared with the farming communities whose land species or varieties have been used as basic material.

Exemption from IPR regimes for poor farmers: Private corporations should be willing to share GM technology for use in developing countries where the acute need for producing more food and better food remains a critical requirement.

Improving access to the new technology. Access of developing countries to the new technology is being limited by two emerging trends: a decline in the importance of public sector agricultural research centers; and the escalating importance of IPR in agricultural biotechnology. Since the 1960s, national and international research centers have played a vital role in the improvement of agriculture via technological inputs and breeding material. This was possible because a) these centers had a mandate to support the growth of agricultural development in developing countries and b) these centers were at the forefront of technological advance. They had both the technology and desire to transfer it to developing countries. Now agricultural biotechnology research is almost exclusively carried out by firms in developed countries. A handful of these firms have a stranglehold on new agricultural technologies. Much of this control is maintained by patents. Consequently, a number of commercially important technologies are already closed to newcomers.

Conclusion

At the end of the day, developing countries will make a very simple decision. If GM technology helps to produce more food, if it helps to increase farm employment, if it supports sustainable agriculture and the livelihoods of the farming community, then the technology will be accepted. If, however, it only serves to increase corporate profit and marginalize our poor even further, then it will not be accepted.

For further information on the Gene Campaign or material referred to in this article contact: Dr Suman Sahai, President, Gene Campaign, J235/A Sainik Farms, New Delhi 110062, India; Phone: +91 11 651 7248; Fax: +91 11 696 9716; email <drsahai@nde.vsnl.net.in>



Biosafety Regulations in South Africa Regarding Genetically Modified Organisms

*by Professor Jennifer Thomson
University of Cape Town, South Africa*

The South African Committee for Genetic Experimentation (SAGENE) was established in the late 1970s soon after genetic engineering first began. It developed guidelines initially for the safe use of bacteria in laboratories and more recently for work with all genetically modified organisms, including plants. Members were nominated by the statutory councils (Agricultural Research Council, Council for Scientific and Industrial Research, Foundation for Research Development and the Medical Research Council), the Department of National Health and Population Development, the Department of Environmental Affairs and Tourism, the Committee of University Principals, the Southern African Institute of Ecologists and Environmental Scientists, the Industrial Biotechnology Association of Southern Africa, and a legal representative with knowledge of environmental issues. Most, but not all, of the members nominated by these bodies had a working knowledge of genetic engineering.

For many years the committee dealt with all requests for permission to carry out laboratory, glasshouse or field trials with genetically modified organisms (GMOs). However, as the volume of work increased, each request was handled by an *ad hoc* sub-committee consisting jointly of SAGENE members and outside experts. There existed a voluntary code of conduct with which applicants had to comply but SAGENE was simply an advisory body, having no "teeth" to enforce compliance. By the 1990s, as most of the applications for trials dealt with plant material, SAGENE's role was to advise the Department of Agriculture of the merits of each application. The conditions under which trials were conducted were laid down and monitored by the Department of Agriculture.

Applications increased from one or two per year in 1990 and 1991 to more than 40 in 1999. The majority were for field trials, most of which were for insect resistant cotton and maize, and herbicide resistant maize and soybean. In theory, SAGENE's role came to an end on 23 May 1997 when the GMO Act was passed. In practice, however, this was far from the case and it continued to act, albeit on an *ad hoc* basis until mid-1999. Why was this? SAGENE had recommended that the members of the Executive Council, the body that had to appoint the Advisory Committee and the Registrar, and the body that would formally approve trials or commercial releases, be nominated by the various government departments involved. Politicians, however, saw the situation differently and thus the present Executive Council consists of officers of each of five government departments (Agriculture; Arts, Culture, Science and Technology; Environmental Affairs and Tourism; Health; and Trade and Industry). As a result the Executive Council only held its first meeting late in 1999 when the Registrar

was appointed, and the Advisory Committee was eventually appointed in February 2000. The Registrar falls under the Genetic Resources Directorate of the Department of Agriculture.

The powers and duties of the Executive Council include the following:

- ◇ deciding on the issue of permits to undertake field trials or commercial releases of GM crops
- ◇ overseeing the office of the Registrar
- ◇ liaising with other countries, especially neighbouring countries
- ◇ advising the Minister of Agriculture
- ◇ ensuring law enforcement according to the GMO Act.

The Registrar's duties include the following:

- ◇ administration of the Act
- ◇ issuing permits
- ◇ being pro-active on violations of the Act (which can result in fines and imprisonment)
- ◇ appointing inspectors to monitor field trials
- ◇ ensuring that the conditions of permits are complied with.

The Advisory Committee consists of up to eight members knowledgeable in the field and two persons from the private sector with knowledge of ecology and GMOs. Their functions include the following:

- ◇ advising the Minister of Agriculture and Executive Council on environmental impacts of the introduction of GMOs
- ◇ consideration of all matters pertaining to the contained use of GMOs, GMO imports and exports
- ◇ consideration of all matters regarding regulations and guidelines
- ◇ liaison with international groups working in similar areas
- ◇ obtaining outside input and information as they see fit.

Field inspectors are appointed by the Registrar to ensure that trials are carried out in accordance with the Act. They have to maintain records and can issue warrants for violations of the Act. They conduct routine inspections of all field trials. The people who carry out the field trials are responsible for ensuring that measures are taken to avoid adverse impacts on the environment, but liabilities for damage caused by GMOs have to be borne by the users. On 26 November 1999 the GMO Act Regulations were published. These state the following:

- ◇ A permit is required to import, export, develop and use GMOs. Certain crops are, however, exempt from

this due to their prolonged use in South Africa. These include insect resistant cotton and maize, and herbicide resistant maize and soybeans. It is likely that more crops will be added to this list as we gain more information on their use and safety.

- ◇ Academic and research facilities are exempt from the permit requirement but they are all required to be registered with the Registrar. All researchers are required to conduct a risk assessment of projects and records of these are required to be maintained in the facility.
- ◇ Information provided gives the time frames for applications, necessary data and fees involved.
- ◇ Public notification of trials and general news releases are the responsibility of the applicant. Notice has to be placed in three different newspapers in the area affected and copies submitted with the relevant application. Any comments or objections received from the public are referred by the Registrar to the Executive Council who decide on a course of action.
- ◇ Any accidents have to be reported immediately to the Registrar and measures must be taken to avoid these.
- ◇ In order to avoid negative impact on the environment, or human and animal health, effective waste management is required.

What happens when an application is received by the Registrar for Genetic Resources? S/he appoints a sub-committee, usually consisting of three scientists, knowledgeable in the field in question, one of whom is appointed as the chair, to review the application. The scientists convey their opinions to the chair who submits a report to the Registrar. S/he then submits a recommendation to the Executive committee who finally makes a decision as to whether the trial may or may not proceed. The GMO regulations stipulate that this process should take no longer than three months.

Each application is reviewed case-by-case, although when applications are received for a second or third trial of the

Table 1 Biosafety risk assessment of Bt cotton in South Africa.

Food Safety	Finding
Metabolic and physical changes in plant	None
Expression levels of the introduced gene in plant during the different growth stages	Low expression - stable
Foreign protein levels in food-grade oil and feed cake derived from cotton seeds	None in oil, low in cake
Toxicity	Toxic to lepidopteran insects i.e. the target insects
Allergenicity	None
Changes in nutrition and composition	Substantially equivalent to unmodified cotton
Changes in digestibility and digestion properties	None
Foreign protein activity in consumers and processed oils/feeds	None
Unexpected products	None
Stability of the introduced gene	Stable for seven generations in SA and longer in the USA and Australia
Environmental Impact	Finding
Spread of gene (pollen, seed or vegetative propagation)	No negative impact
Cross pollination to weeds or natural flora	No compatible local relatives; not invasive
Effect on insects, birds and other consumers	Only lepidopterans affected; renews biodiversity (insects and birds) in and around crops due to reduced use of insecticides
Effect on sustainable agriculture	Positive; less input and "peace of mind" management
Effect on soil, water and air	Positive; less pesticide load
Socio-economic effects	Benefits rural, small-scale farmers
Stability	Stable for ten years world-wide
Other specific concerns e.g. development of insect resistance	Compulsory integrated pest management to minimize development of resistance is required

Source: Personal communication with M. Koch, President, Innovation Biotechnology Co., South Africa.

same crop a process of "fast-tracking" is possible to accelerate the process. What are the issues that the panel of scientists take into account when reviewing an application for a field trial? They include the following:

- ◇ What is the potential for provoking toxic or allergic reactions in humans or animals?
- ◇ How stable is the introduced gene?
- ◇ What is the potential of the plant to exhibit pathogenic properties?
- ◇ Can the crop cause damage to agricultural commodities?
- ◇ What is the 'weediness' potential of the plant compared to traditional varieties?
- ◇ Can the introduced gene be transferred to sexually compatible plants, and if so, what could the consequences of such transfer be?
- ◇ In the case of insect or disease resistant plants, what effects could the transferred gene have on non-target organisms?
- ◇ What impacts could the plants have on agricultural practices, including Integrated Pest Management (IPM) and resistance management?

An example of a biosafety risk assessment can be seen



in Table 1.

The GM Debate in South Africa

The debate on the pros and cons of GM crops and foods began in South Africa in the beginning of 1999. It was soon realized that the issues differed markedly from those in the Northern Hemisphere. While Europeans and North Americans enjoy an average of 3,500 calories per day, people living in sub-Saharan Africa eke out an existence on two-thirds of that amount. Tim Dyson (1999) has calculated that this subcontinent will have a shortfall of 88.7 million tons of grain by the year 2025. Of course, the use of GM crops is not the only answer to our current and future food shortages, but it would be foolish to rule out their use simply because the affluent first world does not want them.

Indeed, small scale farmers in South Africa have been reaping the benefits of planting insect resistant cotton since 1997. In that year, six farmers took part in the trials. In 1998, 75 were involved and by 1999 a massive 405 farmers were increasing their yields due to these new seeds. It is hardly surprising, therefore, that in July 1999, at the Southern African Economic Summit, the Minister of Agriculture, Thoko Didiza, came out openly in favour of GM crops for sustainable agriculture in South Africa.

References

Dyson, T (1999) World food trends and prospects for 2025. Proceedings of the National Academy of Sciences 96:5929-5936.

Contact: Professor Jennifer Thomson is Head of the Dept of Microbiology at the University of Cape Town, Private Bag Rondebosch 7701, South Africa. She was a member, and one-time Chair, of SAGENE from the early 1980s until it ceased to exist in 1999. Phone: 021-650-3269; Fax: 021-689-7573; Email: <jennyt@iafrica.com> or <jat@molbiol.uct.ac.za>

Contributions of Agroecologically-based Agriculture to Meeting World Food Needs by Norman Uphoff and Olivia Vent Cornell International Institute for Food, Agriculture and Development (CIIFAD)

The Context: More People on a Declining Natural Resource Base

Projections differ as to just when in the next century food producers around the world will need to be providing twice the present level of agricultural output to meet the requirements of a larger and, everyone hopes, more prosperous population. In part, such increases are necessary to satisfy the already considerable unmet food needs that a humane world cannot leave unattended. There is no doubt that sooner or later a huge increase in food production must be accomplished. Whether the target date is 2030 or 2050 is less important than how we can meet this immense challenge of doubling the world food supply.

Unfortunately, by the middle of the next century, there will be about one-third less arable land available per capita, and a similar reduction in the availability of water for agricultural purposes. Major increases in the productivity of both land and water will thus be needed if food supply is to be doubled with less of both these crucial natural resources. Also, unless great protective efforts are undertaken and successful, there will be continuing reductions in biodiversity, which is the source for the genetic material needed to make further advances in plant and animal breeding. There could also be accelerated global climate change.

Problems with 'Doing More of the Same'

New agricultural technologies developed and extended

over the past three decades have contributed to unprecedented growth in world food production. Without the fruits of the Green Revolution, there would be large food deficits, and adverse environmental impacts from bringing large areas of less suitable land under cultivation. However, there are reasons for concern that this pattern and path of agricultural development may not be the best or the only way to promote agriculture in the future.¹ Over the past decade, yield increases from the Green Revolution technologies have been decelerating, and in some cases stagnating.² The highest yields are being obtained by using ever larger inputs of fertilizer and irrigation water, which in many places have passed the point of diminishing returns.

Water depletion and soil erosion have already emerged as serious problems for industrial agriculture. Falling water tables in the Indian Punjab, in the North China plains, and in the Great Plains of the United States, for example, could shut down "thirsty" production practices in the decades ahead. Controls are being placed on modern agriculture to reduce chemical runoffs, residues and toxic build-ups from use of agrochemicals and chemical fertilizers, especially the application of large quantities of inorganic nitrogen.

Can future world food needs be met by more of the same kind of agricultural investments promoted over the past three decades, or should policy-makers and producers be looking for other ways that are environmentally sustainable, economically efficient, and socially fair to increase world food supplies? Do such alternatives exist?

Biotech Not Likely to Meet All Food Needs

Biotechnology is regarded by some as a means for

achieving large future increases in agricultural production. But major benefits from biotechnology remain still largely over the horizon. Given the incentives and predominance of the private sector in this domain, few biotechnology investments are currently aimed at increasing yields in the Third World.³ Further, increasing supply does not by itself get food to those who need it most. Unless the poor have access to the technology and other resources needed to produce their own food or to earn income otherwise, aggregate increases in production do not benefit the most needy. There could yet be some advanced technological breakthroughs that transform production possibilities in agriculture. But given the critical importance of food to human well-being and to maintaining economic vitality, it is hardly advisable to put all of our agricultural eggs in the biotechnology basket. Neither the traditional mainstream paradigm nor the biotechnology paradigm therefore appear to be sufficient.

So What Can Be Done?

In April 1999, a conference was held on "Sustainable Agriculture: Evaluation of New Paradigms and Old Practices" at the Rockefeller Foundation's international center at Bellagio, Italy. Organized by the Cornell International Institute for Food, Agriculture and Development (CIIFAD) and faculty at the University of California, Berkeley, participants assessed the potentials of agricultural production strategies based on agroecological concepts and concerns. These are strategies that rely more on better management of plant, soil, water and nutrient resources than on investment of capital; more on local resources than on external inputs; and more on the support of biological processes than on chemical inputs or engineering applications.

An agroecological approach seeks to maintain the continuous flow of ecological services from the landscape, including cropped, grazed and fished areas. Protecting soil from erosion, retaining and storing water, filtering it to improve its quality, harboring fauna that pollinate flora, buffering temperature changes, and other services are given little consideration, let alone compensation, in the way that most agriculture is presently conceived, evaluated and managed.

The central message from the conference — for governments, researchers, donor agencies, and farmers -- was that there are numerous promising alternatives to mainstream agricultural research and development that are worth investigating and supporting. Indeed, taking these alternatives seriously -- and refining, adapting and disseminating them -- may determine whether the people of this world can successfully meet their needs for nutrition and at the same time maintain a livable natural and social environment in the 21st century.

Reasons for an Agroecological Approach

An estimated one billion people -- one-sixth of the world's population, and a much greater percentage of the poor -- live and work in situations where their farming, herding or fishing operations cannot benefit much from mainstream agricultural technologies. Factors such as landholding size, inadequate rainfall or groundwater, poor soil fertility, adverse topography, and remoteness from markets, infrastructure and institutions make these technologies unavailable or not appropriate. This should come as no surprise since most modern technologies have been developed and tested to succeed under more-favored rather than under less-favored conditions.

Solutions developed for larger-scale operations are not well suited for these farmers. In India, for example, fully 75 percent of the 106 million landholdings are one hectare or less. The average household in developing countries, most of which are still largely agriculturally-based, spends 50-70 percent of its income on food, while poorer families spend as much as 85-90 percent. No national or international effort to improve food security or alleviate poverty can be successful without increasing the productivity of these small family enterprises.

Experiences Justify More Attention and Investment

Thus far the investments made in alternative agricultural approaches have been minimal, a tiny fraction of the resources that have gone into mainstream agriculture. Most have come from farmers themselves, augmented by resources from concerned research institutions, NGOs and universities. Nonetheless, reports of experiences in Africa, Asia and Latin America indicate that given suitable support, most smallholders should be able to feed their own households and communities and raise incomes. Numerous agroecological farming systems can increase production beyond subsistence needs so that these households can contribute to national food security, including the feeding of growing urban populations, and even to exports of high-value products.

Africa

The Centre for Environment and Society at the University of Essex (UK) presented a review of 45 initiatives at the Bellagio conference. These were initiatives for sustainable agriculture alternatives in 17 countries across Africa. About 730,000 farm households with between 600,000 and 900,000 hectares of land under agroecological practices were involved in these initiatives. Yield was increased for maize and bananas by 50-100 percent; sorghum and millet by 30-100 percent; and potatoes by 200 percent. The lowest yield increases were in the range of 5 to 10 percent. Additional benefits were diversification of production and



the restoration of land productivity.

During a 60-year period in Kenya's semi-arid Machakos district, households invested in a variety of land improvement practices, coupled with changes in cropping patterns in response to market opportunities. The practices included terracing, confining cattle and using their manure, tree planting and hedgerows, water harvesting in ponds and other structures. Most were developed by farmers and carried out largely without government direction or support. These labor- and management-intensive innovations enabled households in Machakos to raise their agricultural productivity per hectare by 11 times, well ahead of the five-fold increase in population during this time.⁴

In Douentza district of Mali, an even more arid area with rainfall as low as 150 mm per year, a 9- to 11-month dry season, and frequent droughts, the Unitarian Service Committee of Canada has been working with 18 villages since 1987. A combination of soil and water conservation practices has shown that millet and sorghum yields can be reliably increased by at least 50%, which would make the population in this remote area at least self-sufficient, and vegetable gardens and fruit trees further contribute to food security in this remote area.

In Madagascar, a system of rice intensification (SRI) is being promoted by Association Tefy Saina, a Malagasy NGO. By changing plant-soil-water-nutrient management practices, SRI can greatly increase yields of rice, even on very poor soils. Where yields of irrigated rice have averaged about 2 tons per hectare, yields with SRI range from 4 to 10 tons and even higher at a wide variety of elevations and rainfall levels, without requiring new seeds or use of chemical fertilizers.

The International Center for Living Aquatic Resources Management (ICLARM) has been working with small farmers in Malawi to introduce aquaculture in an integrated manner. Farm ponds are located next to vegetable gardens to recycle nutrients. Hundreds of smallholders now produce on average between 1.35 to 1.65 tons of fish per hectare per year from their ponds. This is 50 to 80% more than the average yield for the 48 most productive specialized fish farms in southern Malawi: 0.9 tons. The ponds generate three times more net income for a household than maize and other crops. Moreover, the system is spreading from farmer to farmer.

The International Centre for Research on Agroforestry (ICRAF) is countering soil fertility constraints in Africa through a variety of means. During a two-year fallow period, the leaves and roots of leguminous shrubs accumulate about 200 kg of nitrogen per hectare. When these are incorporated into the soil, the land can support two or three subsequent maize crops with a doubling to

quadrupling of maize yields. About 10,000 farmers in southern Africa are now using sesbania, tephrosia, gliricidia and other leguminous species this way. This practice gives as much nitrogen per hectare as US\$240 worth of fertilizer.⁵

Latin America

The international NGO, World Neighbors, started working with communities in Guatemala around San Martin Jilotepeque in 1972, and in Honduras around Guinope in 1981, using soil conservation measures, nutrient amendments, and other improvements in management. Some remarkable increases were achieved on small farms, averaging 0.5 and 2.5 hectares respectively, in the two countries, with topography, soils and rainfall that are otherwise quite limiting. Within 7-8 years, maize yields with the two programs went from 0.4-0.5 tons per hectare to 2.5 tons, a huge jump. Bean yields in this period advanced similarly, from 0.15 tons to 0.85 tons.

In the Andean region, another World Neighbors program has worked with farmers to utilize a leguminous plant, lupine, known locally as *tarwi* by ploughing it into the soil as a green manure. Potato yields have been increased from the traditional average of 2 tons/hectare to 8 tons.

Brazil has seen a very widespread adoption of green manures and cover crops (GMCC), which increase biological activity and water retention in the soil. An estimated 400,000 farmers are now using versions of this technology in southern Brazil. Some farmers use mechanical equipment and herbicides, but others are developing more environmentally-friendly methods. Since 1987, maize yields have risen from 3 tons per hectare to 5 tons, and soybeans from 2.8 tons per hectare to 4.7 tons.

Asia

In Bangladesh, a rice-fish program funded by British aid and the European Union and administered by CARE, is currently working with about 150,000 rural Bangladeshi households to expand rice production within integrated farming systems that also practice integrated pest management (IPM) using few external inputs. By raising rice yields from 3.8 tons per hectare to 4.1 tons with 18-30 percent lower costs of production, incomes of participating farmers are 50 percent higher than those of control farmers in the area, who have similar assets but do not participate in the project. The program is now scaling up to involve one million households.

A similar program of integrated crop and pest management has been operating in Sri Lanka, with management by CARE and technical support from the Natural Resources Institute of U.K. Like IPM programs in Indonesia and Bangladesh, this also uses the Farmer Field School

methodology, which develops farmers' observational and analytical skills rather than just teaching them pest control. Rice yields of farmers using methods learned in the field schools were 11 to 44% higher than for untrained farmers in the 1997-98 season, with lower costs of production raising net incomes by 38 to 178%. Similar gains were recorded from IPM training and methods for vegetable crops. Farmer to farmer diffusion is spreading these practices rapidly with surveys showing 55,000 farmers now using the methods after 4,287 farmers had been trained.

In the Philippines, a simple soil conservation technology of establishing natural vegetative strips is enabling hillside farmers, who previously diminished soil fertility by their cropping, to build up soil resources and raise their yields of maize. The strips can also be planted with fruit trees and other crops of economic and nutritional value.

Importance of Participatory Processes

These and other case studies also highlight the importance of the way in which these innovations were evolved and diffused. In almost all cases one finds an impressive social organization, whether formal or informal, built on existing knowledge, roles, rules and incentives in rural communities, also inventing new roles and relationships where needed. The case studies also demonstrated the productivity of farmer participation and leadership in these processes. Farmer-centered research and extension should not be a passing fashion in development projects, but a long-term strategy for improving agriculture in its many dimensions.

Supportive Actions

Policies: For promising programmes such as those noted here to achieve national scope and impact, appropriate policies, research, and institutional arrangements are critical. Few technologies will spread very far by themselves, especially if they elicit resistance from powerful sectors. Some of the practices described here provide farmers with alternatives to ones that are profitable for commercial interests; or they may empower and embolden rural people in some oppressive political systems, which can evoke a political backlash. Policy analysis and reform will thus need to be part of the innovation process. And then, getting such policies accepted and acted upon in the field by government personnel will remain a challenge.

Research Needs: Areas for research in the agricultural realm with active farmer participation include: nutrient cycling and application; agroforestry; aquaculture as an integrated component in farming systems; green manures, cover crops and improved fallows; composting and mulching; biological means to control pests, diseases and weeds; the contributions of animals to integrated farming systems; and land and water management, particularly

including water harvesting and small-scale catchments.

In the socioeconomic realm, studies need to be done with farmers on the adoption and adaptation of agroecological technologies, as well as on disadoption of technologies, when this occurs. There was evidence in the case studies of rapid and broad spread of some practices, but also instances of slow or halted adoption, and even abandonment of others when conditions change. "Sustainability" is not an intrinsic characteristic of any technology or practice, but rather a reflection of its "fit" with environmental, economic, political and social conditions, which are themselves continually changing.

Institutional Re-orientations: In order to support processes for farmer-centered research and extension, the following questions remain: What kinds of policies are most supporting or constraining for farmer initiative? What institutional requisites and impediments affect these processes? How can markets be developed most favorably for sustaining the development and extension of such processes?

There is need to reorient existing agricultural extension systems and personnel to support participatory technology development and dissemination, moving away from top-down instruction of farmers, to facilitation of learning by farmers, researchers and extensionists together. One area for innovation is to involve rural schools and school teachers in processes of experimentation and evaluation. This would reinforce parental participation and better prepare the next generation of farmer-experimenters.

REFERENCES:

1. Conway G (1997). *The Doubly Green Revolution: Food for All in the 21st Century*. Penguin Books: London; reprinted by Cornell University Press in 1999.
2. Pingali P, Hossein M, and Gerpacio RV (1995). *Asian Rice Bowls: The Returning Crisis*. CAB International, with IRRI: Wallingford, UK.
3. Ruttan VW (1999). Biotechnology and Agriculture: A Skeptical Perspective. World Wide Web AgBioForum (<http://www.agbioform.missouri.edu/BioForum/General/archives.html>)
4. Tiffen M, Mortimore M, and Gikuchi F (1994). *More People, Less Erosion: Environmental Recovery in Kenya*. St. Martin's Press: NY.
5. Kwesiga FR, Franzel S, Place F, Phiri D and Simwanza CP (1999). *Sesbania sesban* improved fallows in Eastern Zambia: their inception, development and farmer enthusiasm. *Agroforestry Systems* (in press).

Note: The report of the Bellagio conference on Sustainable Agriculture is available from the Cornell International Institute for Food, Agriculture and Development, Box 14, Kennedy Hall, Cornell University, Ithaca, NY 14853, upon request (ciifad@cornell.edu). Most of the papers presented at the conference will appear in a special issue of *Environment, Development, and Sustainability*, to appear in summer 2000.

Contact: Dr Norman Uphoff, Director, CIIFAD, Cornell University, Ithaca, NY 14853 USA; Email: ntu1@cornell.edu; or contact Olivia Vent, Communications Associate, CIIFAD, Cornell University; phone: 607-255-9401; email: ohv1@cornell.edu



The Role of Animal Source Foods in Improving Micronutrient Nutrition In Kenyan Children by Susan Johnson

A controlled intervention research study, funded by the Global Livestock Collaborative Research Support Program (GL-CRSP) of the United States Agency for International Development (USAID), is now in its final year of data collection in rural Kenya (Embu District, Eastern Province). The controlled feeding intervention study was stimulated by the consistent findings in the Human Nutrition CRSP studies in the 1980's. These studies in Egypt, Kenya and Mexico were observational and longitudinal using a common design and methodologies showing that the intake of animal source foods (mainly meat) were positively associated with physical growth, cognitive development, physical activity, and school performance and negatively associated with morbidity and anemia. The relationships remained significant even after statistically controlling for total energy intake, socioeconomic status (SES), parental education, social factors, and other confounders. These findings were particularly important because they emphasized that diet quality, as characterized by intake of animal source foods (ASF) and bioavailability of iron and zinc, played an important role in the health and growth and development of children.

The current Global Livestock-CRSP study is a collaborative effort between the University of California at Los Angeles (UCLA) and Davis (UCD) and the University of Nairobi, School of Medicine, Departments of Pediatrics and of Applied Nutrition Program in the College of Agriculture, as well as the Kenyan Ministries of Health, Education and Agriculture, at national, provincial and district levels. Because previous results were based on observational studies in which other important factors were confounded with the availability of ASF, it was felt that a controlled intervention study was needed to provide a causal link. Also, a controlled intervention study would provide much more powerful evidence of the value of ASF than the observational correlation study, not only for theoretical reasons, but also because the findings would have direct policy implications for promoting ASF as part of a comprehensive food-based intervention to improve micronutrient nutrition.

For young children, ASF, primarily meat, eggs and milk, offer a logical and sustainable food-based approach to preventing and ameliorating multiple micronutrient deficiencies. Meat, fowl or fish in addition to high quality protein, contains heme protein with bioavailable iron, zinc, and vitamin B₁₂. The presence of heme iron improves the bioavailability of iron and zinc from cereal and other plant sources. Milk offers calcium and vitamin A in concentrated form and eggs provide vitamin A as well. Furthermore, the amounts of such products required to be consumed in the

context of children's' diets are quite small for the relatively large payoff in terms of micronutrient and total nutritional well being. Household production and utilization of small livestock and other small animals can play a major role in this connection.

When considering interventions to improve micronutrient intakes, it is important to note that multiple deficiencies are common and that interventions focusing on only one or two micronutrients may not alleviate the functional deficits. Animal products have the potential to increase virtually all the nutrients of concern. Thus, foods such as milk and meat, in addition to plant-based foods, provide a package of highly available micronutrients.

Controlled Intervention Study Design

The GL-CRSP study was launched in May 1997. The sample enrolled was composed of all children enrolled in the Standard I (first grade) in twelve elementary schools in three sub-locations of the Embu district. The average size of a standard I classroom is 40-45 children between the ages of six and eight, thus a sample of about 525 children was enrolled. Based on previous work in Embu during the Nutrition CRSP, the Standard I children were found to have daily energy intakes that were only 78% of the recommended intakes, with 6.0% of kcals from ASF in the sample. Iron, zinc, calcium and vitamin B₁₂ intakes were below 2/3 of RDA in 67%, 100% and 96% respectively. Stunting, anemia, and low ferritin values were prevalent.

Each of the 12 elementary schools was randomly assigned to one of the four interventions with all Standard I classrooms at a given school assigned to the same intervention. Prior to the first term, before the intervention began, baseline observations of children were made of classroom attention, playground behavior and activity. Cognitive, reading, writing, and mathematic abilities were tested. Blood samples were collected for hematological and micronutrient analysis, health histories, a physical examination and anthropometry measures (height and weight for age, arm and head circumference, triceps and subscapular fatfolds) were carried out. Following baseline examination of stool samples for ova and parasites, universal deworming with mebendazole was carried out. All observations were repeated regularly. Cognitive testing and classroom and playground activity observations are measured once per three-month term. Anthropometry, food intake, and morbidity are measured monthly. Vision and hearing tests are administered to each child. Parental heights are also being recorded. The children will have been supplemented in their Standard III classrooms and

the repeaters who remained in grade I or II continue to be fed, observed and measured.

The three feeding intervention groups receive a morning meal at school when school is in session. The control group participates in all of the measurements and observations, but does not receive a school feeding. At the end of the study, the control group will be compensated in-kind for foodstuffs foregone by the child. The basic food for all three intervention groups is *githeri*, a vegetable stew composed of maize, beans, a small amount of fat and some greens. For the meat intervention, finely ground meat is added to the stew. The milk intervention group receives 250 ml of milk in addition to the basic *githeri*. The 'extra energy' group is given the *githeri* with extra oil to equalize the number of calories in other feedings. The energy available to each child in all three experimental conditions equals 350 kcal. The exact composition of the feedings are being analyzed for micronutrients and phytate one to two times per year. Children are observed during the school feeding in order to determine whether they are eating the food provided to them. Leftover food is weighed, measured and recorded. In order to determine what children consume in addition to the school feedings, food intake is measured every month for each child by using a 24-hour semi-quantitative recall. This method has been validated against a 7-day weighted method.

Behavioral and cognitive assessments are carried out in the classroom and playground and are based on time sampling to derive estimates of child physical activity and social interaction and attentiveness in the classroom. The reliability and validity of these measures have been documented in previous research by the Nutrition CRSP. Cognitive assessments consist of the Ravens Progressive Matrices and the Verbal Meaning Test, an assessment designed for Eastern Africa and used extensively in this population. Because family background has an important effect on children's behavioral and cognitive competence, the socioeconomic level of the family and the parent's reading and writing literacy are being tested by previously validated instruments in this population.

Phase II: Sustainable Community Interventions

Food-based approaches offer sustainable solutions to problems of micronutrient deficiencies and the health problems associated with malnutrition. The second phase of the Global Livestock CRSP Child Nutrition Project would address the challenges of sustainable community interventions. Food provides many other nutrients that cannot be supplied in micronutrient supplements. International development has been highly successful at lowering the costs associated with cereals to supply energy for the world's growing populations. A secondary effect of this success, however, has been that their lower costs and greater availability have made cereals the predominant diet of the poor. In fact one can envision that a lack of dietary diversity is associated with poverty. Livestock and agriculture enterprises can serve as useful components of food systems

to diversify diets and address micronutrient deficiencies. The role of animals, especially small livestock, in solving micronutrient problems and the provision of energy and excellent quality protein has not been fully appreciated as a nutritional intervention. Understanding the impact of even small quantities of ASF on the development of children would better inform the international development community about the appropriate role of these foods in the development agenda.

The results of the GL-CRSP controlled intervention study will form a measure of the potential for interventions that enhance animal food consumption. The goal of the GL-CRSP is to develop an ability to define the food systems of communities, analyze the constraints on the delivery of micronutrients to humans, and predict the potential effectiveness of an array of potential interventions for donors. It is anticipated that the introduction of even modest increases in animal products can enhance child health, growth, and development. Data analyses which tests this hypothesis will be completed this coming year.

S Johnson is a Programme Coordinator for GL-CRSP. Charlotte G Neumann, MD, MPH is Professor of Public Health and of Pediatrics at UCLA and has conducted field research in India, Ghana, and Uganda over the past 30 years. She has focused on the interaction of malnutrition, infection, immune function, and on functional consequences of moderate PEM and micronutrient deficiencies on pregnancy outcome, child health, growth and cognitive function. She and Prof. N Bwibo, MBBS, MPH, University of Nairobi School of Medicine, co-direct the GL-CRSP Project. Contact the Global Livestock CRSP, University of California-Davis, Davis, CA 95616 USA; Phone: (530) 752-1721; Fax: (530) 752-7523; Email: <glcrsp@ucdavis.edu> Web Site: <http://glcrsp.ucdavis.edu>



An Activist's Handbook on Genetically Modified Organisms and the WTO
by M Stilwell & B Van Dyke
Center for International Environmental Law

The purpose of this 17 page handbook is to help activists effectively protect the consumer's right to know about genetically modified organisms in the face of the World Trade Organization counter-pressures. The handbook examines the relationship between GMO labelling schemes and the relevant rules of the WTO. The aim is to expose possible conflicts between these trade rules and GMO labelling schemes and to suggest interpretations of WTO rules that allow GMO labelling schemes to operate without undue interference by the international trade system. This handbook shows activists how to argue that WTO rules are not an impediment to effective, mandatory GMO labelling.

Matthew Stilwell is Managing Attorney, Center for International Environmental Law in Geneva, and Brennan Van Dyke is Director of the Center's Trade & Investment Programme, consultant to the United Nations Environmental Programme on Economics and Trade, and Adjunct Professor of Law.

For copies: Consumer's Choice Council, 2000 P St NW Ste 308, Washington DC 20036-6923 USA; Phone: 202 785 1950; Fax: 202 452 9640; Email: <consumer@ibm.net>; Website: <http://www.consumerscouncil.org>



A Cure for World Hunger? — A Consumer Perspective on GM Foods
 by *Marilena Lazzarini, Executive Director Brazilian Institute for Consumer Defense (IDEC)*
 and *Lynn Silver, Professor, Universidade de Brasília*

Foods derived from biotechnology: are they the answer to world hunger or just another way for chemical industry giants to sell more herbicides? Consumers around the world are protesting the hasty incorporation of this new technology into our children's lunchboxes, and scientists are divided on the issue of the risks and benefits. In Brazil commercial scale planting and marketing of these foods is suspended as a result of a class action suit by our organization, the Brazilian Institute for Consumer Defense. The court's ruling blocked a government decision to authorize marketing of GM soybeans, and holds that any such products must undergo full environmental impact evaluation and that adequate provisions for labelling must be in force prior to any marketing. Proposals for a moratorium on these foods are under consideration in Brazil's Congress. The state of Rio Grande do Sul has banned biotech plants and other states and cities are considering similar measures.

As of March 2000, 733 experimental environmental releases of transgenic plants had been authorized by the government of Brazil and not a single one of the products tested offers significant benefit to the consumer. More than half – 59% -- are plants which are resistant to herbicides produced by the same company, and almost all the rest are plants which produce insecticidal proteins of Bt (*Bacillus thuringiensis*, a natural bacteria used by organic farmers to control pests). At the time of requests for commercial approval to the Brazilian Government, little or no data to support claims of reduced use of pesticides or other herbicides was submitted.

Ethically there is clearly a lack of congruence of benefits and risks in the current applications of food biotechnology. The biotech industry and some farmers stand to benefit from this new technology, while consumers and/or the environment will face most of the known or unexpected risks. Why should society at large run any risks, however small or unpredictable? Who will weigh the risks and benefits to reach a regulatory decision? What values will be used in the equation?

Whereas a new drug that will be used by thousands or at most millions of people in milligram quantities must demonstrate benefit, and undergo extensive toxicological evaluation and studies of safety and efficacy in animals and humans, new biotech foods that will be eaten by the kilo by virtually the entire population, are incorporated into the food supply with only the most superficial of evaluations. Most of these are performed under the concept of "substantial equivalence", a non-scientific approach to evaluating safety invented to facilitate the marketing of these products.

Continuing the analogy, a drug which has no benefit to consumers, whatever its risks, could theoretically not be marketed under current regulatory frameworks, yet the new biotech foods are being eaten by hundreds of millions with little evaluation of benefit or of safety. The consumer of a new drug is generally ill, and may accept certain risks, predictable or unpredictable as the price of treatment with a new drug. But most consumers of food are healthy, have a range of traditional food alternatives, and are unwilling to accept any food associated risks, be they known risks or unpredictable ones. Current practice in countries such as the USA, therefore, represent a clear double standard in the regulation of novel technologies that will be consumed by human beings.

The social consequences of the new technology have been grossly ignored by scientists. An attempt has been made to quickly force-feed these technologies onto the market, limiting consumer choice and right to full disclosure of information. The legal measures by IDEC Brazil, combined with the reluctance of European and Asian consumers to accept foods derived from biotechnology, have blocked the attempt to 'force-feed' GM foods to consumers, and have forced the international community to take a closer look at the issue. Consumers are using their purchasing power to say no. Supermarket chains and food industries in many countries are now purchasing GMO-free foods.

While the rhetoric of ending world hunger is widely disseminated by the biotech industry, in reality, the current crop of biotech foods doesn't pretend to address hunger or malnutrition. The main roots of hunger lie in the distribution of wealth and the models for social and economic development – and not primarily in the lack of food production. In many developing countries, including Brazil, small farmers are being progressively forced off their land and replaced by agro-business operations. The displaced rural population has swelled giant urban conglomerations in São Paulo, as well as in Nairobi and México City, which have become progressively more violent, contributing to grave social instability in the developing world.

What will be the impact of biotechnology? If it contributes to making agriculture more expensive and difficult for the small farmer, and more dependent on imported technologies such as seeds and agro-chemicals, than it may do more to exacerbate hunger than to alleviate it. Consumer organizations want new technologies which can contribute to sustainable development and to safer and more nutritious foods. Integrated pest management, organic agriculture, and other approaches which reduce

use of pesticides and herbicides are of great interest and appear to us to be far more promising tools for reaching our goals than biotechnology.

While we don't rule out the possibility that GM foods may provide benefits for humanity in the future, we believe that only those products which offer clear benefits to consumers or to the society in general should even be considered. In those cases, full pre-approval environmental impact and toxicological evaluations should be conducted. The right of consumers to know what they are eating should be respected at all times by appropriate mandatory positive labelling identifying GM foods. Traceability and labelling are indispensable not only to assure consumer choice, but also to identify any unexpected post-marketing adverse reactions as well.

Until such time as there are clear benefits, rigorous guidelines on evaluating safety for human consumption and for the environment, and mandatory labelling, most consumer organizations the world over will recommend that people "just say no" to these products and support national moratoria. Since even the guidelines from the *Codex Alimentarius* Task Force on Foods Derived from Biotechnology will take at least four years to be developed, as well the mandatory labeling, we believe there is a moratoria of at least five years duration on commercial scale cultivation and marketing should be implemented.

Contact: Marilena Lazzarini, Executive Director, IDEC-Instituto Brasileiro de Defesa do Consumidor, Rua Dr Costa Júnior, 194, Agua Branca, Sao Paulo/SP – Brasil CEP:05002-000; Phone: +55 11 38624266; Fax: +55 11 38629844;email: <idec@uol.com.br> OR <mlazzarini@uol.com.br> Website <www.idec.org.br>

***The World Trade Organization (WTO):
What it is and How it works
by Eugenio Díaz-Bonilla, IFPRI***

Some demonstrators speak louder than others, and the message heard around the world during the December 1999 World Trade Organization's (WTO) Seattle Roundtable negotiations was that the WTO was an international organization run by unaccountable international bureaucrats. The WTO was accused of dictating rules that violated the sovereignty of individual countries; making food unsafe; polluting our air; and killing endangered species. Under the guise of free trade, the WTO was said to exist only for the benefit of a handful of greedy multinational corporations supported by corrupt governments (presumably the latter indictment included the US, European and other industrialized countries).

Food security, poverty, and the environment were all key issues in the debate about trade and agricultural policies. The public deserves to know: are the WTO's trade policies hurting more than helping food security in poor developing countries? Are poor consumers and poor producers negatively affected by the policy changes related to the WTO agreements? How, and to what extent, is the WTO trying to shape the agricultural sector? It is important for people working on nutrition and food-related issues to have an adequate perception of what the WTO is and does.

Background

At the end of WWII, a pressing question for the US, its allies and, in fact, the whole world, was the design and implementation of an international political, military and economic architecture to prevent similar tragedies, and, in addition, facilitate global economic prosperity. The political and military components were based on different alliances and organizations, like NATO in Europe. The economic

element was to be anchored on three main institutions: the International Bank for Reconstruction and Development (better known later as the World Bank), the International Monetary Fund (IMF) and the International Trade Organization (ITO). While the Bank focused on the reconstruction of what had been damaged by the war and subsequently moved to providing long-term financial support for developing countries, the IMF and the ITO tried to address what was widely perceived as key economic reasons leading to the military conflict: trade disputes and trade protectionism (which would be avoided in the future by the operation of the ITO), and balance of payments problems, aggressive devaluations and financial crises (which would be eliminated by the financing and supervision of the IMF).

The vision of a peaceful and prosperous world built upon a set of politico-military alliances and an increasingly integrated world economy in which freer trade and capital flows would expand supported by the operation of multilateral economic organizations, was not without opposition in the US and the UK (the main architects of the post-war international system), and elsewhere as well. Just looking at economic issues, there were different criticisms. Strong *laissez-faire* advocates opposed those organizations as an interference in the operation of free markets. On the other side of the spectrum, economic nationalists wanted protectionist policies. The left did not like the vision of an increasingly integrated world economy either. In the Leninist tradition, the expansion of capitalism worldwide could only lead to crises and war among the imperialist powers. In this view, to believe that world economic integration could proceed simply by establishing some multilateral institutions to alleviate the



problems created by markets or to manage the conflicts among competing economic powers was, at best, naïve. In addition, a world of capital mobility and freer trade flows conflicted with the leftist notion (prevailing mainly outside the US) of a centrally planned economy as the only way to achieve equity and efficiency.

Political nationalists considered that rather than furthering international integration and then setting up global institutions to manage the expanded interaction, it was better to cut or at least reduce foreign ties. These groups in the US would advocate isolationism as the general rule, and unilateralism (i.e., the right to intervene alone in foreign affairs), when the US deemed appropriate. All in all, they were opposed to using US money for international organizations and foreign aid, and were concerned about loss of sovereignty. Outside the US there were also different voices criticizing an international system that was perceived as an instrument of political and economic domination by the US. Notwithstanding the opposition, the World Bank and the IMF were eventually launched as full-fledged international organizations in the Bretton Woods Conference of 1944, and later evolved mainly as institutions addressing problems in developing countries. The ITO, however, never got off the ground. The US Congress was concerned about the encroachment of its legislative prerogatives. And the strong US tradition of isolationism and unilateralism, always suspicious of anything resembling a world government, converged with the lack of support from the business sector concerned about government planning and control of the economy, to suppress the legislation that would have launched the ITO.

A more circumscribed set of trade rules (as opposed to the broader ITO charter that covered also other issues), however, survived as the General Agreement on Tariffs and Trade (GATT) signed in 1947. The structure and content of GATT basically reflected much of the experience that the US and some European countries had developed in their own trade agreements and foreign commercial affairs. A small secretariat for the GATT was established in Geneva, where the different countries party to the agreement could discuss differences and, eventually resort to the GATT dispute settlement mechanism, if those disagreements were not resolved bilaterally. (It is important to note that under GATT, the arbitration decision could be blocked by the party that lost the argument. This possibility was eliminated with the adoption of the new trade system in 1995 and the creation of the WTO.) In addition, several rounds of trade negotiations were completed under GATT, which reduced tariffs further, and expanded and clarified some of the legal texts. The last round of negotiations, known as the Uruguay Round, began in 1986 and ended in 1994. It represented a major updating and expansion of the GATT, encompassing other areas such as services and intellectual property rights, and finally leading to the creation of the World Trade Organization in 1995.

Most of the arguments discussed about half a century ago, reappeared in the debates in many of the countries participating in the negotiations. This time, however, the creation of the WTO and the different trade-related legal instruments were approved by the member countries. As of April 2000, the WTO has 136 members, ranging from the richest and most powerful countries, to some of the poorest in the world (such as Haiti and Mozambique). It also has 35 countries with observer status, including Russia, China, Ukraine, Taiwan and Vietnam, among others. All observers, except five (Ethiopia, Cape Verde, Bhutan, Yemen, and the Vatican), have applied for membership and are at different stages of accession.

WTO: What is it and how it works

The WTO system can be seen as having three components: 1) a set of rules agreed upon by all member countries on how to conduct trade and trade-related activities; 2) a place where countries can directly and freely discuss with other members their trade concerns and try to resolve, through consultations or arbitration, trade disputes emerging from the application of that set of rules; and 3) a forum to continue negotiations regarding the expansion or redefinition of trade rules and new trade-related issues. What follows are clarifications about the nature and operations of WTO.

The substantive work of the WTO is carried out by the member countries through public officials representing the respective governments, and not by international bureaucrats. Because of the nature of the WTO activities (basically consultations and negotiations between governments), they cannot be carried by international personnel. The governments of the member countries make the decisions through their duly appointed officials. Only the arbitration procedure, called dispute settlement mechanism, is operated by non-government staff (discussed below). Furthermore, in contrast with other international organizations, like the IMF or the World Bank, where countries also make the decisions through the Board of Directors, but do not participate in the daily work, most WTO operations are conducted directly by the governments themselves through the participation of their public officials as members of the different governing bodies and working groups. Whether any particular government accurately represents the views of the people of a given country is an issue that the political processes of that country must address, and cannot be solved by the WTO.

Although the WTO is a one-member, one-vote organization, in practice it does not work on the basis of voting. The decisions (except, again, the arbitration procedure) are taken by consensus. This approach tries to balance two realities: that the developing countries are the numerical majority of the WTO membership, but that the largest proportion of world trade takes place among industrial countries, basically the US, the European Union,

and Japan. It is unrealistic to assume that the industrial countries will make their trade systems dependent on a world majority rule. But at the same time, the reality of the large number of developing countries, which was not the case under GATT, cannot be ignored. The WTO is trying to develop and adopt procedures to accommodate both realities. Industrial countries know that they can no longer make decisions among themselves and expect automatic acceptance from the rest. At the same time it is acknowledged that a negotiating proposal cannot be drafted by individual representatives of the 136 WTO member countries. Some of the smaller countries do not even have offices in Geneva (the WTO headquarters) or staff to participate in the working groups. The issue is how to ensure transparency, access and participation for the official delegations, particularly in the case of the poorer countries. This is an altogether different matter from the claims of some NGOs that the WTO is not democratic because they do not participate (see below).

The WTO legal framework is part of the domestic legal systems of all its member countries. The argument that WTO administers a supranational law, which encroaches upon the sovereignty of the member countries and tramples upon their domestic laws, is plainly wrong. The truth is that the WTO legal system is "the law of the land" in all of the member countries. In every case it has become a domestic law through the specific internal procedures followed by each member country.

The WTO dispute settlement mechanism is an arbitration procedure agreed by all member countries. The WTO cannot force the country losing an arbitration to change the domestic laws and regulations that did not comply with WTO obligations, neither does it impose "stiff financial penalties" for noncompliance. Disputes arise when countries differ on the application of the WTO legal framework. In such cases, members have agreed to use the WTO dispute settlement mechanism. As with other international arbitration systems, the WTO mechanism is placed outside the domestic institutions of any of the parties to the dispute --no country wants to have its differences with another nation decided by domestic institutions of the other party. Contrary to some assertions, only the member countries, through their duly appointed officials to the WTO, can put in motion the arbitration procedure: neither multinationals, nor members of the civil society for that matter, can initiate the complaint.

Once the Dispute Settlement Body, which is made up of all WTO Members, has adopted a decision that finds a member country not in compliance with some aspect of the WTO agreement, there are three alternatives. First, the member country can change its offending practice, but the WTO cannot force it to do so. Second, the country at fault could offer the complaining country market access in a different product that would be equivalent to the value of trade lost because of the offending practice. These

compensations are defined and accepted by the countries in dispute. If they still cannot reach agreement, the only alternative is for the complaining country to withdraw equivalent trade concessions from the country found at fault. These trade sanctions are defined and administered by the complaining country, not the WTO. The sanctions are not "stiff" financial penalties, but are simply the withdrawal of trade concessions previously agreed upon.

The dispute settlement process already provides information to the public. Members of civil society can participate in the dispute settlement process. The panel members that act as arbitrators, are selected, with the approval of the countries party to a dispute, from a pool of experts approved by WTO member countries. The terms of reference for the panel are agreed by the member countries party to the dispute. NGOs could and do work directly through the political process in member countries to influence all aspects of national decisions regarding trade, including the composition of panels. NGOs have been particularly active in the US and the European Union, and have been complaining or responding parties in more than 90% of all cases considered by the WTO dispute settlement process.

The decisions of the panels, including detailed summaries of the points made by the different parties in their submissions (confidential or not), are public and available on the WTO web page (<http://www.wto.org>). NGOs have been able to make independent presentations through member countries such as in the US shrimp-turtle case. Additionally, the Appellate Body in this case ruled that panels could accept documents put forward by NGOs directly. The panels in the dispute settlement process can call expert witnesses from any source, governmental or nongovernmental. The US government has suggested that all submissions be made public and that panel hearings be open to the public. WTO members may eventually accept these suggestions, but it can be argued that they are incremental improvements in a system that is now fairly transparent.

A different issue is whether panels should be independent from the member countries' party to a dispute and mandated to hear NGO presentations. In fact, NGOs that criticize what they consider to be WTO secrecy and lack of democracy and ask for their own direct access to WTO deliberations, appear to be placing themselves in similar standing to governments representing the member countries. Of course, neither NGOs nor other private sector groups can be granted such status, and the democratic approach to influencing a government's position is through the domestic political process. Developing countries also have opposed the possibility of direct presentations by NGOs because they feel the dispute settlement process could be swamped by presentations from well-financed NGOs from developed countries and, if panels are forced to consider all those arguments, poor countries would not



have the economic and legal resources to answer them all, further tilting the process against the weaker parties.

The WTO does not impose free-trade values over other important societal values, such as protecting food safety, clean air, or endangered species. Rather, the WTO holds that in pursuing environmental or consumer protection objectives, foundational values of every civilized society such as the rule of law, nondiscrimination, and due process cannot be overlooked. The argument that the WTO is affecting food safety, polluting the air, and killing sea turtles stem from misrepresentations of the rulings in three notorious cases: the beef-hormone case against the European Union, and the shrimp-sea turtle case and the gasoline case against the US. In all three cases the final arbitration rulings made clear that all countries have the right to choose the level of protection they desire. The rulings also stressed that such non-trade concerns must be pursued in ways that respect the rules accepted by all WTO Members.

WTO members can have higher standards for food safety than those accepted by international organizations. The WTO legal framework already includes the Precautionary Principle. Suppose that the *Codex Alimentarius* of the Food and Agriculture Organization has standards for residues of chemical product "X", based on the impact of that product on an average person; suppose further, that a country

wants stricter limits on residues, based, say, on the impact on infants. The WTO regime absolutely allows the use of such higher levels of protection. It requires only a study showing that the residue levels applied are in fact related to the level of protection desired.

Article 5, paragraph 7 of the Sanitary and Phytosanitary Agreement of the WTO expressly allows member countries to adopt temporary measures where relevant scientific evidence is insufficient, but also indicates that they "shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time". Other WTO principles, such as non-discrimination between foreign and domestic producers, must also be observed when applying higher standards or resorting to the Precautionary Principle.

Without rule-based and open trade, the global system could go back to the rule of the strongest and wealthiest countries. Developing countries only stand to lose if such a reversion to old-style power politics occurs.

Contact: Eugenio Diaz-Bonilla is a Research Fellow in the Trade and Macroeconomics Division at the International Food Policy Research Institute (IFPRI), 2033 K St, NW, Washington DC 20006-1002 USA; Phone: 202-862-5662; Fax: 202-467-4439; Email: <e.diaz-bonilla@cgiar.org> Web: <www.cgiar.org/ifpri/>

World Trade, Food Production and Multifunctionality A Statement Prepared by the Food & Agriculture Working Group of the Transatlantic Environmental Dialogue (TAED)*

Introduction

Governments have reached a critical stage in the development of agricultural policy. New negotiations to further liberalize agricultural trade will have a significant global impact on the future of agriculture. The European Union (EU) and the United States (US) both have a central role and responsibility in this process. As major producers, exporters and consumers of agricultural products, their approach will also greatly influence the development of agriculture in other countries. Thus the EU and US need to consider both the domestic and external impacts of their respective agricultural policies, as well as the likely impact of further trade liberalization.

In considering these issues the question must be asked whether agriculture can be considered mainly in terms of commercial production and trade, or whether a wider range

of concerns needs to be taken into account, and if so, how? Polarized debates about 'free trade' versus 'protectionism' are already surfacing, in particular, with regard to the stated non-trade concerns of some agricultural producers, including the EU. This paper outlines essential elements required to ensure that agriculture is both multifunctional and sustainable. Achieving this will require substantial reform of US and EU farm policy.

What is Multifunctionality?

As well as producing supplies of food and fiber, agriculture also affects other aspects of quality of life. Agriculture can support the vitality of rural communities through maintaining family farming, rural employment, and cultural heritage. It also can make positive contributions to biological diversity, recreation and tourism, soil and water systems, bioenergy, landscape, food quality and safety,

*TAED is a broad-based forum of 'civil society' NGOs based in the EU and the US. TAED has established working groups to consider issues such as climate, biodiversity, trade and toxins. The statement serves to stimulate substantive discussion between the EU and US on the issue of multifunctional and sustainable agriculture in the context of proposed further liberalization of agricultural trade. This is to be negotiated at the WTO and can be expected to have significant global impact on the future of agriculture.

and the welfare of animals - but none of these outcomes are automatic, they often require policy mechanisms to facilitate them.

The term multifunctionality reflects these diverse elements, although the relative importance of the various functions of agriculture differs between localities, regions, countries and groups of countries. The basic fact that agriculture serves multiple functions is widely recognized. As early as 1992, world governments at the Rio Earth Summit, recognized the *"multifunctional aspect of agriculture, particularly with regard to food security and sustainable development"* (Agenda 21, Chapter 14).

In March 1998 the OECD stated:

"Beyond its primary function of producing food and fibre, agricultural activity can also shape the landscape, provide environmental benefits such as land conservation, the sustainable management of renewable natural resources and the preservation of biodiversity, and contribute to the socio-economic viability of many rural areas.... Agriculture is multifunctional when it has one or several functions in addition to its primary role of producing food and fibre." (OECD Declaration of Agricultural Ministers Committee)

Despite such acknowledgments, the term multifunctionality has proved controversial for fear that it may be misused by governments. This mistrust has prevented a serious discussion of how the concept can be used to inform policy development. While multifunctionality should not be used to defend or justify every aspect of the EU's Common Agricultural Policy (CAP), neither should it be used as an excuse by the US to avoid serious debate on the substantive issues.

Multifunctionality and Trade Policy

Some view multifunctionality as an attempt to justify 'special treatment' for agriculture in trade policy. However, the fact that agriculture provides our essential need for food and occupies an extensive amount of land, requires that it not be treated just like any other industrial product within the trade system. Agricultural policies and related international trade agreements do not just influence the 'commodity' aspects of agriculture (i.e. the production of food, feed and fiber), but also the many other functions it provides to society. To ensure that trade policy will facilitate secure supplies of food that are produced in a sustainable way, this reality needs to be fully taken into account during WTO negotiations on agriculture.

The 'built-in agenda' of the WTO requires agriculture negotiations to begin in 2000. The failure to agree a broader agenda in Seattle means that negotiations will now proceed on the basis of Article 20 of the Agreement on Agriculture (AoA) which recalls that:

"commitments under the reform programme should be made in an equitable way among all Members, having regard to non-trade concerns, including food security and the need to protect the environment..."

Multifunctionality, although not specifically mentioned, will therefore play a part in the negotiations. It should also inform national agricultural policy development and promote Sustainable Agriculture and Rural Development (SARD) (see Appendix to this statement).

Delivering Multifunctionality

In order to move beyond the current stalemate over the term multifunctionality, governments and NGOs must pursue the following key objectives in relation to policy development.

1) Promote food security: A key function of agriculture is to ensure secure and stable supplies of food. Yet, food insecurity is still a major problem, particularly in the developing world. A range of trade policy measures - which could vary depending on levels of development - should therefore be available for use by governments to pursue food security objectives. For example, the possibility of being able to exempt life-forms from patenting if this conflicts with the maintenance of traditional farming practices that are important for food security (such as saving seed from one season to the next). Also important is effective provision of food aid, as defined by the 'Marrakech Decision' agreed as part of the Uruguay Round of trade negotiations. Governments need to ensure that Net Food Importing Developing Countries (NFIDCs) are effectively compensated for changes in markets and food supplies, resulting from trade agreements, that adversely affect their food security. In this respect, the precarious food supply situation of NFIDCs and Least Developed Countries (LDCs) suggests that the volatility of world food prices, the deteriorating terms of exchange, and the increasing concentration of agricultural markets in the hands of a few multinational companies has not provided an appropriate framework for achieving food security.

2) Recognize differences: Large differences in the degree and nature of multifunctionality exist between regions and between farm types within regions. For example, the availability of agricultural land and its proximity to local communities differs substantially between the EU and the US. This has produced different approaches to agriculture, environment and related policies. Not all of these produce the same degree or types of outcome.

Multifunctionality requires policies tailored to the specific circumstances of different countries and regions. Governments must therefore have the appropriate degree of policy flexibility - in accordance with their level of development - to pursue SARD. A 'one-size-fits-all' model of agriculture is inappropriate and cannot reflect the



natural, social and cultural diversity that exists around the world. A one-dimensional approach to the liberalisation of agricultural trade would therefore be detrimental to the pursuit of SARD.

3) Promote sustainable agriculture: Financial support to farmers should not be supplied simply to promote food production, or to compensate for liberalization or price reduction due to policy changes. In principle, it should be 'de-coupled' from production and 're-coupled' towards achieving social and environmental objectives and to promote sustainable, multifunctional agricultural practices. Some exceptions from 'de-coupling' should be allowed in cases where the maintenance of certain benefits depends upon the use of particular production systems. For example, the maintenance of some habitats is dependent upon grazing, from which supports can be difficult to de-couple. Support should be directly linked to the achievement of such specified benefits. Payments to farmers should promote sustainable, multifunctional agriculture and be set at levels no higher than is required to meet the desired objectives.

It is necessary to evaluate the actual, as well as the intended effects of agricultural policies. In particular, it is important to assess their impact upon SARD and other relevant concerns, e.g., the impact on forests. Such impact assessments should be an integrated component of national and international policy and should also inform decision-makers considering new policy initiatives.

Sustainability and multifunctionality require that environmentally damaging and other harmful subsidies should be phased out and replaced by policies and mechanisms that promote SARD. Ideally, policy instruments should integrate environmental, social and economic objectives and promote innovation. Environmental and animal husbandry standards should not be lowered or adversely affected as a result of trade policies.

Alongside government support for multifunctionality, consumer demand for nature conservation and animal welfare may require new agricultural processes, products and services. Labelling is an important tool in enabling consumers to distinguish these in the marketplace. Trade rules should not impede the development of both voluntary labelling schemes (e.g., organic food) and mandatory labelling (e.g., GMO foods).

4) Promote Agriculture and Rural Development (North and South): Domestic support to farmers should be linked to the rural development benefits that agriculture can provide and payments should be set accordingly. For example, some regions risk abandonment if agriculture is not supported, which could lead to intensification of land use and increased urban population pressure elsewhere. Such domestic support should also promote local

processing and marketing, and seek to improve the gross margins received by farmers and rural communities for their products.

Export support mechanisms and dumping have a detrimental impact on agriculture and rural communities in third countries. Such export subsidies or export credit arrangements should be abolished and the funds redirected to help promote multifunctional and sustainable agriculture. The EU and the US have a responsibility to address all forms of export support. Where necessary, assistance should be offered to those NFIDCs that may be adversely affected by related policy changes.

The concentration of market power, for example, in food processing and retailing can be detrimental, especially for small-scale farmers and rural communities. The vertical, horizontal and global integration of agriculture, together with new issues such as patenting, has the potential to conflict with multifunctionality. EU and US companies are leading these developments. National, bilateral and international strategies are needed to limit excessive concentration of power in the agricultural sector.

5) Minimize Trade Distortions: It is not possible to fully achieve SARD solely through 'non-trade distorting' means. There are few policy measures that have absolutely no impact on production and trade. However, in order to minimize the impact of domestic agriculture on third countries, the pursuit of SARD should preferably be based on policies that are 'least' or 'minimally' trade distorting.

Developing and least developed countries should be afforded greater scope and flexibility than developed countries to use measures such as tariffs to achieve or maintain SARD, because they are less able to afford domestic support. This accords with the concept of 'special and differential treatment' for developing countries that has been accepted by the WTO's membership and could vary depending on levels of development.

6) Respect Cultural Values: Multifunctionality respects different societies' attitudes towards a range of agricultural issues. These may include a skepticism about intensification and new technologies; support for animal welfare; a commitment to the maintenance of small-scale, mixed farming; support for the livelihoods and rights of indigenous communities; and the fact that, in many countries, women traditionally play a primary role in food production.

Conclusions

- The EU and the US have a pivotal responsibility in determining how agriculture will affect people, animals and the environment, both nationally and internationally. They must work together constructively to develop, implement and support policies that promote multifunctional and sustainable agriculture.

- Multifunctionality is crucial to SARD and other non-trade concerns, both nationally and internationally. It must therefore be a key component of the WTO negotiations on agriculture.
- Multifunctionality demands reforming many current policies (e.g., eradicating harmful export support and environmentally damaging domestic subsidies) rather than defending them.

APPENDIX

Multifunctionality complements the objectives of sustainable agriculture and rural development (SARD) which is recognized by the FAO and within Agenda 21.

The FAO Council has defined SARD as:

... the management and conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable (FAO 1989).

The FAO goes on to explain that:

"Policy intervention for SARD is necessary because of market and policy failures. Markets fail when prices do not reflect the real values of resources, goods or services. That means that producers and consumers get the wrong signals about relative scarcities. Sources of market failure include attenuated property rights, externalities, imperfect information, monopolistic competition, and imperfect and distorted capital markets. A form of market failure especially important for SARD is unequal market power, whereby the needs of the poor are swamped by the greater purchasing power of the rich. This inequality is especially severe in relation to the needs of poor people yet unborn and

substantially neglected in today's markets."

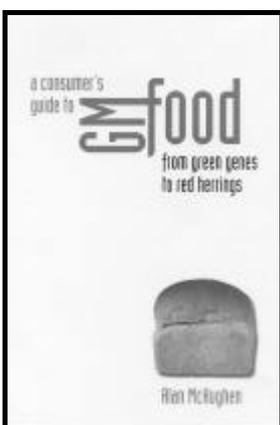
Source: Hardaker B (1997) Guidelines for the integration of sustainable agriculture and rural development into agricultural policies. FAO agricultural policy and economic development series 4: Rome.

Agenda 21, Chapter 14

14.2. Major adjustments are needed in agricultural, environmental and macroeconomic policy, at both national and international levels, in developed as well as developing countries, to create the conditions for sustainable agriculture and rural development (SARD). The major objective of SARD is to increase food production in a sustainable way and enhance food security. This will involve education initiatives, utilization of economic incentives and the development of appropriate and new technologies, thus ensuring stable supplies of nutritionally adequate food, access to those supplies by vulnerable groups, and production for markets; employment and income generation to alleviate poverty; and natural resource management and environmental protection.

14.3. The priority must be on maintaining and improving the capacity of the higher potential agricultural lands to support an expanding population. However, conserving and rehabilitating the natural resources on lower potential lands in order to maintain sustainable man/land ratios is also necessary. The main tools of SARD are policy and agrarian reform, participation, income diversification, land conservation and improved management of inputs. The success of SARD will depend largely on the support and participation of rural people, national Governments, the private sector and international cooperation, including technical and scientific cooperation.

For further information about the work of the Transatlantic Environmental Dialogue and how to participate see the TAED website at <www.taed.org> or contact Peter Hardstaff, Trade Policy Officer, RSPB, The Lodge, Sandy Bedfordshire SG19 2DL UK; Phone: 01767 680551; Fax: 01767 691178; Email: <pete.hardstaff@rspb.org.uk>. Also contact Flavio Luiz Schieck Valente, MD, Global Forum on Sustainable Food and Nutritional Security c/o Agora – Segurança Alimentar e Cidadania, SGAN 905 Conuunto B, 70790-050 Brasilia, DF Brasil; Phone: +55 61 347 4914; Fax: +55 61 274 8822; Email: <globforum-foodsec-en-l@allernex.com.br> <agora@tba.com.br> Web: <<http://globalforum.org.br>>



A Consumer's Guide to GM Foods: from green genes to red herrings by Alan McHughen, University of Saskatchewan

Book Review by Lynn Silver, MD, MPH, University of Brasilia

Professor McHughen's book starts by asserting that it will 'enable you to make an informed choice to support, or reject GM, conventional and organic foods.' Unfortunately, like most things written about biotechnology this impressive opening is misleading propaganda. The book is an impassioned and ironic defense of biotechnology from someone who has apparently dedicated much of his life to its use in agriculture. It is clearly in favor of foods derived from genetically modified organisms (GMOs), against labelling, and against many additional regulatory measures under discussion internationally.

The text is easy to read and has lots of valuable information on basic genetics and the development of genetic engineering in agriculture. It has clear, useful explanations of aspects of the technology as well as conventional techniques which preceded genetic engineering. McHughen tells the tale from an "insiders" perspective of someone who has accompanied the development of the field and this leads to valuable insights to how things got to be the way they are. Some nonsense from both sides is debunked. He also treats like nonsense other issues that are not nonsense and makes several



misleading and unscientific affirmations. For example, that the composition of GM and non-GM similar products is identical except for inserted gene products (only some components are actually checked), or that any significant health effects would have been detected for the products already on the marketplace (not necessarily true at all - long-term effects can be very difficult to detect, a situation made more difficult since there is no way to know who was exposed and who wasn't in the US, although any high incidence of acute ill effects probably would have been detected).

The book is permeated by a defensiveness of biotechnology. Almost every chapter aims to show why there is little or no problem. While McHughen does call attention to some real problems, the cavalier attitude of many biotech scientists and their desire to leave their imprint on the universe is perhaps best captured by the title of one sub-chapter, in rather poor taste *"Shooting your DNA load: a human designed machine."*

If the book's goal is truly to inform choice the language is a bit surprising. Its suggestion to the consumer who doesn't want to eat GMO food is *"Emigrate to a desert island and take up residence in a remote mountain tree."*

The recent Joint FAO/WHO Expert Consultation on Foods Derived from Biotechnology¹ *"did not consider environmental safety issues"* and *"did not consider non-science aspects such as socio-economics, risk management and public acceptance."* Similarly, Professor McHughen's vision appears to be shaded by the same blinders that have characterized the discourse of most scientists on this issue, which is to consider that only biology is science. Economics, sociology, and other areas of social sciences are "non-scientific". If a new technology contributes to increasing economic dependence or excluding small farmers in developing countries this is non-scientific and obviously not important enough for consumers to worry about. These issues receive only superficial and distorted comments in the book. The fact that the consumer movement was born from an initiative of communities to buy only from companies that respected the 40 hour workweek -- in order to protect the workingman of the day, is apparently lost on the author, who purports to be a consumer advocate. A serious analysis of these issues would truly have been an important contribution.

Curiously, the author documents from personal experience many of the issues which have been the basis for criticisms of GM products. But he then proceeds to reach conclusions that are sometimes difficult to fathom. He tells the story of the early generation of attempts to use genetic modification

for important aims like increasing nitrogen fixation in order to reduce the need for fertilizers, and how that generation did not prosper and yielded to the generation of herbicide resistant products that are primarily of interest to giant chemical companies because they increase the sales of their brand of pesticide. But he doesn't seem to acknowledge that this is a legitimate basis for consumer rejection.

One of the most striking stories in the book was his application to the FDA for approval of GM linseed for human consumption a so-called "voluntary consultation": *"The FDA didn't want to see our actual data, they merely wanted to know that we conducted the experiments to compile the data and that we interpreted the results as benign....I compiled a dossier for the FDA and submitted it. It was five pages long... the FDA issued a letter, saying that the voluntary consultation was complete. Trifid (GM linseed) was essentially approved for human consumption in the USA."* No mention is made of any kind of toxicological evaluation of the gene products or whole food. The product is not approved for human consumption in Europe. Our experience has shown that products with far greater human consumption than linseed, such as soybeans or bt-corn have similarly been marketed with limited and incomplete evaluation both of overall composition and of toxicological profile of the inserted gene products (no sub-acute, chronic or reproductive toxicity, for example). Yet the author affirms further that his objective *"is to remind consumers that the current regulatory framework, largely invisible to the public eye, is extremely efficient in identifying and eliminating undesirable new foods"* or *"All GM products must undergo a rigorous health and safety evaluation before entering the marketplace"*.

Does he mean the five pages he sent to the FDA?

Some of the logical inconsistencies are disturbing. For example, where the author acknowledges that food maldistribution and not production may be the cause of hunger and famine and then goes on to say: *"Food distribution requires a long term political solution. While we wait, people starve. GM technology is a tool we can use to immediately feed people."* If maldistribution is the root cause of hunger, what makes the author think that GM foods -- even more of them -- will be any more justly distributed than non-GM foods? He dismisses the story of deaths from tryptophan produced from Showa-Denko's genetically modified bacteria as one of the red herrings. But only after providing a good detailed description which shows just the contrary -- that years after the deaths of dozens it is still not clear whether the problem was in the genetically modified organisms or in changes in the purification process or in the interaction between the two factors. The company was not willing to open up access to full evaluation. The detailed description provided is a perfect case study demonstrating a product that should never have been on the market. The author does point this

¹ FAO/WHO (2000) Safety aspects of genetically modified foods of plant origin. Report of a Joint WHO/FAO Expert Consultation on Foods Derived from Biotechnology: Geneva.

out and says that the product lacked benefit, and he notes the importance of labelling, which was the way that the epidemic was clarified. In pharmaceuticals this is fairly automatic since batch number permits tracing of raw materials and ingredients must be listed.

Other important issues such as emergence of resistance to inserted toxins of *Bacillus thuringiensis*, for example, are recognized as relevant but relegated to "management issues" which shouldn't affect our acceptance of the product, although in many countries there is virtually no such management capacity. A recent test case in Brazil demonstrated that even regulations (as required in the US) regarding the establishment of reservoirs are highly unlikely to be guaranteed in practice abroad.

An important point made in the book is that if society doesn't finance independent research in agriculture the interests of giant multinationals will inevitably dominate the new technologies. This has been clear in many countries, where independent or public researchers seeking to meet the real needs of their nations are being slowly starved of funding and displaced into working on the research agenda of giant chemical companies.

There is a long section on labelling in which the author concludes that mandatory labelling of foods derived from GMOs will not enable informed choice, which is ludicrous, but legitimately points out the expense in segregation of agricultural commodities, which is true, and unavoidable if effective labelling is to be used.

The author defends the process of genetic modification and wants to shift the focus to the product – an argument widely used by industry. In truth the critics of GM foods are divided. Some are opposed to GM technology in general based on ethical or religious perceptions. For these people clearly the focus is on the morality of the process. But most critics of GM foods are in reality concerned more with the health, environmental, and socio-economic impacts of the products and their use.

Near the end the Professor renews our hope of a common ground when he suggests that maybe humanity doesn't need to choose between being strictly veggie or organic

versus slavery to high tech intensive agriculture. "Surely there is a middle ground, where we identify and restrict the nastier chemicals, minimize other chemicals, and employ approved crops and sustainable agricultural practices."

McHughen asks in the final chapter: What is the single greatest food-related threat to public health? His answer is that the greatest real damage is chronic anxiety over diet. We must beg to differ – the greatest threat throughout all time and today is hunger. The current crop of GM foods offers little to assuage hunger and maldistribution of food.

Prof. McHughen is right that other, graver, immediate threats to human health clearly exist. But the GM debate is really about something much more long term. It is about society creating rules for the new millenia, about when and how modifying existing life forms will be permitted. It is the extraordinary velocity of potential change brought about with GM technology that forced the debate at this point in time and on these symbolic products. GM pharmaceuticals didn't provoke the same debate because the first generation had clear benefits for consumers and they were not released into the environment. Critics ask what benefit must you show, and for whom, for society to even consider such products? What risks are acceptable, and to whom? Will current GM foods truly fill the bellies of the hungry or will they fill the pockets of giant corporations and leave the hungry hungrier? This question was asked in July by the District Attorney in the judgement of an injunction suspending the use of GM soybeans in Brazil. The jury is still out on whether biotechnology will contribute to relieving world hunger or aggravate existing injustice in agricultural production and distribution.

Reading this book will give you useful information but you probably won't be much closer to an informed answer to many crucial questions for the GM debate. For more information you can consult many of the internet sources listed in Dr McHughen's book: e.g., <www.rafi.org>.

A Consumer's Guide to GM Food: from green genes to red herrings (published as *Pandora's Box* (019-850674-0) in the US) by Dr Alan McHughen, Oxford University Press, 019-850714-3, 256 pages, -US\$16.00, is available from: CWO Dept, Oxford University Press, Saxon Way West, Corby, Northants NN18 9ES, UK; Phone: +44 1536 454534; Fax: +44 1536 454518; Email: book.orders@oup.

I C R W
International Center for Research on Women

Focusing on Women's Work

Over the last two decades, the nutrition of young children and mothers around the world has improved, thanks to research, policy changes and programmatic investments. Rates of malnutrition, however, remain high or have worsened in some areas and for some population groups.

These trends suggest the need to initiate a new generation of improvements in nutritional status. Recent intervention research conducted by ICRW in Ethiopia, Kenya, Tanzania, Peru and Thailand suggests how these trends might be reversed. These studies approached reducing



micronutrient malnutrition from the perspective of women—as caregivers and agricultural producers, economic actors and decision-makers. Through a participatory process, trial interventions were developed that focused on improving agricultural production, food processing and feeding practices, and building women’s capabilities as decision-makers and community leaders. The studies measured nutrition outcome in terms of dietary intake and nutritional status.

The trial interventions in the three African studies focused exclusively on food production, post-harvest processing, and care and feeding practices. In Ethiopia, women who participated in a dairy goat development project received additional inputs in the form of technical training in vegetable production and using locally available foods to prepare nutritionally enhanced meals, health and nutrition education, and seeds. In Kenya, new varieties of orange-fleshed sweet potato were introduced to women farmers. Agriculture extension agents trained the women in how to produce and use the new varieties to prepare foods for home consumption and market sales, as well as health and nutrition education to encourage consumption. The

Tanzania team adapted an earlier enclosed solar dryer (that reduced seasonal variations in food availability) in response to women’s preferences for smaller models that they could own as individuals and for choices in construction materials (mudbrick or wooden). This technology-focused intervention was completed by health and nutrition education.

In all three studies, children’s nutritional intake improved significantly as compared to the control groups. In Ethiopia, factors that reduced risk of vitamin A deficiency included ownership of cattle (an indicator of wealth), milk consumption, food frequency scores and the presence of a home garden. While there are limitations to the studies, these results, achieved in less than two years, suggest that agricultural interventions can yield measurable nutritional benefits within a reasonable amount of time by investing in women’s capabilities.

Summary reports of each country study as well as an overarching research synthesis (Charlotte Johnson-Welch) and a paper that describes the conceptual framework (K. Kurz and C. Johnson-Welch) are available on the ICRW website (<http://www.icrw.org>) in the “What’s New” section. Hard copies can be requested by contacting Brij Mathur (bmathur@icrw.org). Please indicate which report you would like to receive.

W o r l d v i s i o n

Nutrition and Agriculture: World Vision Mozambique

In March of 1998, World Vision Mozambique began implementation of a 30 month CIDA-funded (Canadian International Development Agency) nutrition and agriculture project in remote villages of four districts in Tete Province. The project goal is to improve the health and nutritional status of children under five years and women through decreasing micronutrient deficiencies (vitamin A and iron) and diseases which affect nutritional status, as well as by building capacity in the health and agricultural sectors.

A key element to the Tete Nutrition and Health project is the integration of agriculture with nutrition and health activities in order to increase access to, and the consumption of nutritious foods among target groups. Project agricultural technicians and health staff receive training in key nutritional messages which they in turn use to train community health volunteers (CHVs), farmers and families within the project communities. CHVs are selected by community members and receive training in breastfeeding, complementary feeding, micronutrient nutrition (vitamin A and iron), maternal nutrition, immunization, and sanitation and hygiene. Each CHV works with a group of 10-20 families within the community, providing health and nutrition education. The families of growth faltering children are referred to CHVs for nutrition education and rehabilitation sessions. These families are also referred to agricultural technicians so they may benefit

from agricultural training within farmers’ groups.

CHVs are also invited to become members of farmers groups. They provide farmers with education on the nutritional value and preparation methods for micronutrient rich crops such as vitamin A-rich pumpkin and dark green leafy vegetables, mango and papaya, and orange-fleshed varieties of sweet potato. Agricultural technicians promote the sale of seeds, seedlings and runners for these crops, and train farmers and CHVs in new cropping techniques to improve yields. Extensionists also work with farmers and CHVs to increase their production of food sources rich in oil and/or protein such as groundnut and beans. There are a total of 238 farmers groups (approximately 20 farmers per group) working with agricultural technicians during the wet season (Nov-Mar).

During the dry season (Apr-Oct) agricultural technicians work with a select number of approximately 1,300 farmers, known as **contact farmers**, to provide them with the intense one-on-one training required for successful dry season farming. Technicians train farmers in improved water storage and use, such as inexpensive dams, irrigation pumps and canals to improve production of micronutrient rich crops during the dry season. Each contact farmer in turn works on average with two neighboring farmers, known as **influenced farmers**. CHVs

continue to provide nutrition education to contact and influenced farmers through farmer field days, when information and demonstrations on new cropping techniques, irrigation methods and nutrition and health is shared with them.

The project has a limited duck and goat restocking component whose beneficiaries are the community's most needy women -- widows with young children and the very poor. Health staff invite these women to become CHVs as a strategy to reach the most needy in the community with health and nutrition messages. Project staff have emphasized gender issues. The project currently has women agricultural extensionists working in all project districts; 40% of all contact farmers are women; 40% of all

CHVs are men; and at least one "gender monitor" staff person in each district is appointed to monitor gender-related indicators. A rapid mid-term assessment was conducted to measure the impact of project strategies in agriculture and infant feeding practices on child nutritional status. Results should be available shortly.

For more information please contact Dr. OmoOlorun Olupona, National Health and Nutrition Director, World Vision Mozambique, Av. Paulo Samuel Kankhomba 1170, Caixa Postal 2531, Maputo, Mozambique; Phone: 258-1-422922; Fax: 421466; email: <OmoOlorun_Olupona@wvi.org>

HEARTH Programme: World Vision Canada, Guatemala and Honduras

In 1999 World Vision Canada initiated the HEARTH program in conjunction with its field partners in Guatemala and Honduras. This program is based on a positive deviant model that identifies well-nourished children within poor communities, and determines the beneficial feeding practices of their families that contribute to their nutritional well-being and health. From these practices, a supplementary menu is developed and taught to the mothers of malnourished children by community volunteers. In conjunction with HEARTH, several productive projects have been established, including family garden and poultry initiatives designed to enhance food security and broaden the food base of participating families. These projects produce a small, ongoing supply of vegetables and eggs that are used as a source of food, rather than being sold for extra income. Participating families are also taught how to incorporate the foods they grow into their diet – a strategy that has contributed to the sustainability of these production initiatives.

In the area where one HEARTH project operates, most Guatemalan families travel annually to coffee plantations to take part in the coffee harvest. Conditions at these coffee plantations often lead to poor health, and do not contribute significantly to family income. This year, 36 of 40 families in one Guatemalan community chose to remain in their community rather than emigrate to the annual coffee harvest. This choice was made possible mainly through the increased knowledge, enhanced food security, and broadened food based provided by HEARTH and its production initiatives. Upon their return, families that did take part in the coffee harvest asked to be included in the HEARTH program to avoid leaving their community next year. This provides one example of the program's beneficial impact on participating families, and the empowerment of communities to sustain positive change.

Contact: Dr Gretchen Berggren, HEARTH Model consultant, Apartment #115, 14455 Preston Rd, Dallas, Texas 75240 USA; Phone: 972 726 9971; Email: <gberggren@aol.com> or Naomi Klaas, World Vision Canada, 6630 Turner Valley Rd, Mississauga, Ontario, Canada L5N 2S4; Phone: 905 821 3030; Fax: 905 821 1825; Email: <naomi_klaas@worldvision.ca>



Local Sourcing of Inputs for Seeds & Tools Bahr El Ghazal, South Sudan — Save the Children (SC)

It has been two years since a famine in Bahr-el-Ghazal (BEG), southern Sudan, resulted in an estimated 70,000 deaths in excess of the rate that would be expected in an average year. In the intervening two years, SC (UK) has distributed seeds and tools as a key part of a broader range of food security interventions both in BEG and Upper Nile regions. Other interventions include the provision of fishing equipment and the supply of veterinary services.

The Seeds and Tools Package: Based on regular consultations with local communities, a package of inputs tailored to regional needs is put together each year. The package aims both to provide some diversity within the diet and, to produce a variety of crops that can be harvested at different times and thus spread the risk of food insecurity in an area that is susceptible both to floods and drought. Sorghum, groundnuts, simsim (sesame), maize and rice



were distributed for the year 2000 planting season. Those targeted included families whose crops were destroyed by floods and pest infestations in 1999, and returnee families.

Sourcing of Inputs: In southern Sudan there is practically no manufacturing capacity other than through small numbers of local artisans. Previous attempts by SC (UK) to produce tools using local blacksmiths ran into a number of problems, the most important of which was simply a lack of capacity. For the 2000 programme, a compromise was reached: locally-produced samples of the tools required were replicated by manufacturers in Kenya and then transported into Sudan. Almost 400 metric tonnes of seed for distribution were sourced within SC (UK's) operational areas of BEG. Although there are significant food deficits in these areas, ranging from 9-21%, surplus areas do exist. The advantages of local sourcing are (a) that locally-appropriate varieties are secured and reproduced, (b) that cash or other resources used to procure the seed are injected into the local economy, and (c) that costs are greatly reduced as the seed does not have to be transported as far. Two methods were used to secure the seed: local purchase, and "food-for-seed" swaps.

Food-for-Seed Exchanges: Following a successful trial in 1999, SC (UK) and WFP collaborated in arranging food-for-seed exchanges in 2000, whereby for every bag or sack of seed that was presented, double the amount of relief food was provided to the supplier. Initially it was assumed that this project would attract surplus producers who would accept food as an alternative form of payment to cash or barter items. However the seed swaps attracted a middle-ranking socioeconomic group who typically did not produce a surplus of grains, but produced enough to last until the "hunger gap". For these farmers, exchanging the last of their food stocks as seed for twice that quantity of food from WFP was a useful way of stretching their food stocks longer into the year.

One risk with such a strategy is that "seed" intended to be food may not be of the high quality required for seed for planting. Time constraints meant that SC (UK) was not able to implement the desired level of quality control on the seeds. Furthermore, the NGO was unable to ensure that the seed had been stored in good conditions. Results of germination tests received after the seed had been distributed indicated that over 25% of the samples were slightly below Kenyan standards for seed germination. In one of the lesser-affected areas, the community was unwilling to swap their seed for food. They preferred monetary exchange, however, and a compromise was reached by increasing the exchange rate to 3:1.

Local Purchases: Local purchases, although successful in terms of acquiring sufficient amounts of seed, were beset by administrative and practical headaches. In preparation for the purchases, SC (UK)'s Sudanese field officers gathered information on the quantities of seed that might be available for purchase from farmers and local authorities

throughout the region. Because trade in BEG is still at very basic levels, the NGO had to deal directly with individual farmers and traders who could only provide a few sacks or, at most, 10 MTs each. This meant that sourcing was very time-consuming and labour intensive.

Meetings were held with suppliers and local authorities to fix purchase prices in each of the counties covered; the prices were generally set at or close to prices prevailing on the few local markets in the area. However, because funds from donors to purchase the seed were only made available about six weeks before the time for planting, it was not possible to purchase the seed directly after the harvest. By the time it was finally possible to purchase the seed, in many cases it was found that the quantities promised were not available and the prices that had been previously agreed were unacceptable to the suppliers who argued that increased scarcity should have resulted in higher prices being paid. Resolving these problems required highly mobile and reactive field staff with very good negotiating skills.

As with the seed swaps, the timing of funding and therefore of procurement meant that proper standards of quality control and storage could not be ensured. Unless donors can reduce the time between submission of proposals and the release of funds, this will continue to be a problem with local purchases in areas with well-established suppliers. One further difficulty was the issue of exchange rates: in BEG there is no formal means of exchanging currencies. SC (UK) overcame this by setting prices in US\$ which were equivalent to a fair price in local currency exchanged at local traders' rate, and subsequently negotiating assurances from local authorities to allow farmers to exchange hard currency on the market. In conversations with suppliers after payments in US\$ were made, many of them indicated that they would take the currency to Uganda -- approximately 400 miles away -- to purchase various goods for trading.

Conclusion

SC (UK)'s experience in BEG has shown that local sourcing of seed can be successful even within a year or two of a famine. It is certainly not an easy option, especially in an area with such under-developed markets as southern Sudan, and the requirements in terms of time and labour are greater than for importing. Possibly the most important factor is having the resources for acquiring the seed in good time, so that prices can be fixed and seed quality can be ensured. However, local sourcing has a number of advantages in terms of seed varieties, cost efficiency and, particularly, in terms of providing a boost for the local economy, which mean that agencies should have to justify why they would not undertake local sourcing as a first option.

Agriculture in Emergency Situations *Oxfam — Operation Lifeline Sudan*

The basic tenets for response in emergencies revolve around relief, rehabilitation and reconstruction. No one is going to argue with such symmetry. More debatable are the circumstances in which we are increasingly asked to operate. This piece – which aims to highlight some of the problems involved in emergency agriculture programmes -- is written from an East African perspective, the seat of much of our emergency responses over the last 20 years.

The region provides examples of areas where, because of structural issues, a humanitarian response is the norm. For example, in Somalia, parts of the country are, for all practical purposes, without coherent government. The lack of 'safety nets' in this type of environment requires humanitarian agencies to view food security issues on a long term basis. The role of aid agencies is growing and sliding, seemingly in an intractable manner, into becoming the "government" in certain settings. This governance is seen as institutionalizing assistance in some quarters, and it is at this juncture that the policies and practices we have promulgated in the agricultural sector must surely be questioned.

Farming. Tried and tested, or tired and temporal? In southern Sudan and northern Uganda there are increasing reports that seed distributions are (probably) not always the most effective way to mitigate future crises. Over the last three years seeds distributed in certain areas were found *not* to be the source of any grains in the harvest, although we, the aid industry, claimed that the harvests were successful partly because of our efforts. There is a danger that we are no longer analyzing a problem and looking for a coherent response, but rather that we are presenting solutions and looking for problems. Moreover, distributions of any type of input (including seeds and tools) are invariably problematic and the wider social issues must be taken into account. Ideally, input work should seek change in the underlying structural causes of food deficits.

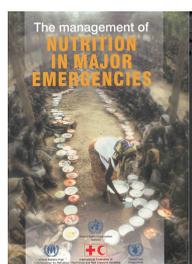
Livestock: Invariably, water has been seen as the inhibiting factor for pastoralist communities. What has become apparent is the increasing nature of "commercial pastoralism", often of an exploitative nature which may be detrimental to the long term well being of subsistence systems. There are also societies where cattle ownership is predominantly used to exude wealth rather than improve food security. The requirement to take an all-encompassing approach is clearly apparent. Short-term fixes can often be the root of a future crisis. By taking a holistic approach, the role of animals within the differing classes of a community can be considered. Fodder production (and sale) can be brought into the equation and used to create income for poorer/marginalized people. Social aspects of ownership should be considered and the contribution of animals to the food economy placed in context for all in the community.

Non-Cultivated, Indigenous, Wild Foods: Apart from fishing and beekeeping, this remains a heavily stigmatized area, ripe for exploitation. Indigenous coping mechanisms clearly include the use of "non-cultivated" crops, and this could be further used to improve food security. It is interesting to note that one year after the Bahr el Ghazal famine, southern Sudan produced 87% of its own food, and received only 13% in food aid. Aspects of food insecurity in some regions of Kenya can be plotted to the creep of maize into dryland areas where good cropping years have become sparse. Indigenous crops from similar climatic regimes may be more successful. Species falling under this category may also become income generating possibilities.

Appropriate Technology: Appropriate technology does not just mean machines worked by the elements, people or animals. Some of the most appropriate technology comes through skills-development. Simple acts such as introducing the drilling of seed rather than broad-casting can have a major impact on crop yields. The harvesting and processing of crops, cultivated or otherwise, can reap huge benefits in covering the hunger gaps between harvests. Infrastructure must also be considered. It is not a coincidence that areas with continual "emergencies" are, so often, difficult to access. The development of primary and secondary market linkages to allow trade will have broad benefits. For example, help is needed by those areas unable to trade or preserve a seasonal surplus, such as Tharaka in Kenya with its mangoes. Programmes should also consider the alleviation of food deficits during a seasonal calendar.

New Thinking: Nutritional thinking has started to influence how humanitarian agencies respond to long term emergencies. Some areas are now using a broader approach than the standard seed and tool distributions. The old adage, "Give a man a fish, he eats for a day. Teach a man to fish, he eats for life." is outdated. The pressure on fish stocks is such that all those fishing can no longer survive. Agriculture's role in emergencies must be seen in its ability to influence wider issues in the short term while seeking to mitigate longer term problems. Pressure on resources will not diminish. Water and land will become a source of conflict, and the role of agriculture within this scenario must not be undervalued. We must learn from the past, develop innovative approaches to sustainable development, and train in appropriate ways so that expeditious use of resources does not become exploitation. Humanitarian aid agencies must also consider wider social issues including the role of the women, climatic changes and the fragility of the environment.

Submitted by Paul Crook, Oxfam—Operation Lifeline Sudan. <<http://www.oxfam.org.uk>>



“The Management of Nutrition in Major Emergencies”

WHO

in collaboration with UNHCR, International Federation of Red Cross and Red Crescent Societies and WFP

All major emergencies, by definition, threaten human life and public health. They often result in food shortages, impair the nutritional status of a community, and cause excess mortality in all age groups. Nutrition is, therefore, a key public health concern in emergency management. WHO's newly updated *Management of nutrition in major emergencies* is intended to help health, nutrition and other professionals involved in the management of major emergencies that have nutritional implications, whether at the local, national or international level.

The newly published manual replaces the 1978 edition, and reflects scientific and conceptual advances in understanding prevention, causes and treatment of malnutrition in emergencies. It reflects the input of a wide range of individuals and agencies. One of the major conceptual advances incorporated is that emergency management is viewed as a multi-sectoral venture; ministries and departments of local government need to plan and work together for emergency prevention, preparedness, response and rehabilitation. Safeguarding the nutritional status of the population also requires a holistic and proactive approach, which implies more than food distribution and health protection. Action is called for in the areas of environment, population, economic and human development, land and water management, production and trade, services, human rights, governance, empowerment and growth of civil society.

The book covers the concepts, principles, and precise measures needed to ensure adequate nutrition in both the relief phase and the subsequent rehabilitation and development phases. Details range from a list of the equipment needed for a weight-for-height survey, through a diagram illustrating arrangements for ration distribution in camp situations, to instructions for preparing feeding mixtures for the treatment of specific deficiency diseases. Throughout, particular attention is given to conditions in developing countries, where inadequate nutrition and infectious diseases can make populations especially vulnerable to malnutrition in emergencies.

The book has seven chapters. The first, on meeting

nutritional requirements, explains the importance of nutritional assessment as a fundamental tool for calculating food needs, monitoring the adequacy of food access and intake, and ensuring adequate procurements. The chapter also sets out recommendations for mean daily per capita intakes of energy and protein and for micronutrients and other specific nutrients. The major nutritional deficiencies are covered in chapter two, which includes detailed information on the signs, symptoms, prevention, and treatment of protein-energy malnutrition, iron-deficiency anaemia, vitamin A deficiency, iodine deficiency disorders, beriberi, pellagra, and scurvy. Chapter three describes the methodology for measuring malnutrition. Information includes target audiences for assessment, advice on body measurements and clinical indicators of malnutrition, and precise instructions for conducting rapid nutritional surveys, individual screening, and nutritional surveillance.

Chapter four provides a detailed guide to the planning, organization, and delivery of general feeding programmes. Topics covered include basic requirements for suitable food commodities, principles of good organization and coordination, and the composition of a general ration calculated to meet the populations' minimum requirements for energy, protein, fat, and micronutrients. Guidelines for selective feeding programmes are presented in chapter five, which covers both the supplementary feeding of vulnerable groups and the therapeutic feeding of individuals suffering from deficiency diseases.

In view of the close link between infectious diseases and malnutrition, chapter six offers advice about organizing services to ensure priority immunizations and to monitor and treat infectious diseases commonly seen in developing countries. The book concludes with advice on the planning, administration, and logistics of emergency preparedness and response programmes, emphasizing the need to detect vulnerability to nutritional deficiencies and monitor early warning indicators.

The essential purpose of this manual is to help build national capacities and human resource

development within the country. Thus, the manual could be used as a framework for developing teaching modules and training programmes.

Food security assessments are not within the scope of the manual. Some topics mentioned in *Management of Nutrition in Major Emergencies* that would have deserved fuller coverage include:

- infant and young child feeding in emergencies;*
- validated reference values to interpret anthropometric measurements of children 0-5 months old;**
- validated indicators for anthropometric measurements in adolescents and in pregnant women;
- nutrition in elderly populations;
- cost-effectiveness of different nutritional interventions. (The use of an economics approach to humanitarian interventions is a new

concept, and one that is gaining acceptance as humanitarian resources dwindle.)

Many of these topics, particularly those related to anthropometry, are not fully covered due to the lack of scientific evidence.

*10 Guiding Principles for feeding are included in an annex. Full details will be available in 'Guiding Principles for feeding infants and young children in emergencies (document in preparation, will be available from WHO NHD).

**It has become common to exclude infants from 0-5 months of age from anthropometric surveys as it is commonly recognized that children up to 6 months tend to be less malnourished than older infants. Nevertheless, because infants of that age group are at risk of malnutrition in certain situations, WHO recommends, at least initially, the inclusion of the 0-5 month age group in surveys.

Management of Nutrition in Major Emergencies is available from Marketing and Dissemination, World Health Organization, 1211 Geneva 27, Switzerland. The price of the book is Sw.fr. 72 (US \$64.80), in developing countries Sw.fr. 50.40. Newly published related WHO publications include: *Rapid health assessment protocols for emergencies* (1999); *Community emergency preparedness: a manual for managers and policy-makers* (1999); *Management of severe malnutrition: a manual for physicians and other senior health workers* (1999).

Programme news

Agencies report on nutrition activities

S C N

ACC/SCN Strategic Plan

At the ACC/SCN 27th Session, SCN members adopted by acclamation a Strategic Plan to mobilize the effort required to meet the challenges and new opportunities for nutrition. Part 3 of the Strategic Plan is reprinted below. It will form the basis for operational plans for the SCN for the next ten years. Part 4 is also included as it describes the implications for the structure and function of the SCN. The full text is available at <<http://acc.unsystem.org/scn>>

PART 3 -- STRATEGIC ACTIONS

12. In accord with the stated mandate, three main areas for action can be identified. These are: (i) Promote harmonized approaches among the UN agencies, and between the UN agencies and governmental and non-governmental partners, for greater overall impact on malnutrition. (ii) Review the UN system response to malnutrition overall, monitor resource allocation and collate information on trends and achievements reported to specific UN bodies. (iii) Advocate and mobilize to raise awareness of nutrition issues at global, regional and country levels

and mobilize accelerated action against malnutrition. These three functions are all vital and of equal importance and can be seen as a triangle, one dependent on the other.

13. These areas of strategic action relate to global, regional and national levels. However, it is recognized that the SCN is primarily a global forum. It can impact on regional action by improved involvement of regional agency representatives in SCN activities, exchange of information through its regular publications, and through inputs from regional entities in the SCN's global work. The SCN will

develop ways to interact constructively with regional nutrition fora. The SCN itself does not have a country-level presence. Nevertheless a particularly important focus is to facilitate UN agency collaboration *in support of* country action particularly in the context of the United Nations Development Assistance Framework (UNDAF) and Comprehensive Development Framework (CDF) processes. To measure progress, identify problems and maintain accountability in SCN activities, a streamlined monitoring and evaluation system will be implemented. It will be based on a biennial work programme, prepared on the basis of the *Strategic Plan* to reflect specific outputs and outcomes, with measurable indicators and time frame. The annual report of the SCN will indicate progress against these agreed milestones.

PROMOTION OF HARMONISED POLICIES AND PROGRAMMES FOR GREATER IMPACT

14. The SCN will promote convergence between the policies and programmes of UN agencies, and between agencies and other development partners through four key actions:

- *The SCN will work through the agencies to ensure that nutrition receives consistent and coherent attention* in the UNDAF process, by ensuring that training programmes (eg, for managers at the UN Training College in Turin) have a strong nutrition component, proposing nutrition indicators for the common country assessments (CCAs), and providing guidelines for theme groups on nutrition. The SCN will monitor pilot initiatives to integrate nutrition into the UNDAF process in selected countries, and prepare case studies, sectoral briefs and guidelines based on these experiences for wide dissemination.
- *Linking theory and practice.* Through its symposia and working groups, the SCN will strengthen the bridge between the science and the practice of nutrition by providing a forum for systematic review of the policy and programmatic implications of new nutrition research findings. Through reflection on programmatic experience, new areas for

research will also be identified.

- *Sharing information about good practice.* Drawing upon regional and country level experience, the SCN will disseminate information on good field practice and programmatic innovations through annual sessions, workshops, worldwide web and publications. This process will build consensus on programmatic approaches among key players in nutrition worldwide.
- *Signalling the need for norms and standards.* The SCN will identify for the attention of technical agencies or other bodies critical areas where norms and standards are missing or out-of-date and holding programmes back. This includes (especially) identifying knowledge gaps and significant areas in dispute or controversy; as well as identifying areas requiring operational research, and facilitating this work.

REVIEW OF THE UN SYSTEM RESPONSE TO MALNUTRITION

15. Since its inception, the SCN has been tasked with the responsibility to oversee the UN response to the malnutrition problem. It must answer the question *is the UN system meeting the malnutrition challenge with sufficient resources, allocated effectively and efficiently?* Over time, specialized agencies and other UN bodies have been given responsibility to monitor progress toward the achievement of specific targets, such as those agreed at the 1990 World Summit for Children, the 1992 International Conference on Nutrition and the 1996 World Food Summit. The SCN will complement these initiatives in the following four ways:

- *Keeping score.* The SCN will develop a tool for reporting on the magnitude of the nutrition challenge and countries' responses to it, in the style of the *Progress of Nations* which ranks countries according to performance.
- *Keeping a watching brief on resources devoted to nutrition.* The SCN will maintain a database on country and regional level capacity in nutrition in the UN system, and report on trends in such capacity at regular intervals. It will collate and disseminate information on the actions of various

UN bodies and partner organizations with regard to innovation, experimentation, scaling up, quality control, and monitoring and evaluation of nutrition-relevant actions.

- *Making information count.* The SCN will facilitate global and country level decision making to achieve nutritional goals, by supporting the development and use of global and national databases and information sharing through, for example, the Food Insecurity and Vulnerability Information Management Systems (FIVIMS) initiative, part of the follow-up to the World Food Summit. This will include the introduction of indicators of performance of countries in reducing food insecurity and malnutrition.
- *Reporting on progress.* The SCN will serve as a clearing house for reports on actions against malnutrition and progress achieved, disseminate standard definitions of indicators, catalogue the response of UN governing bodies to reported trends, and monitor follow-up action.

UN system response to malnutrition so as to deliver key nutrition messages to global, regional and national leaders.

- *Reframing the issues.* The advocacy strategy will include working with partners on global initiatives focusing on emerging nutrition issues. Such campaigns will serve to reframe and reposition nutrition issues, build new partnerships, and inject renewed vitality into the fight against malnutrition and poverty. An example of an appropriate first theme might be the intergenerational transmission of poverty through growth failure.
- *Disseminating success stories.* The SCN will capture and disseminate successful examples of nutrition directed efforts that have significantly reduced malnutrition, especially where these can be scaled-up by national governmental agencies, and promoted by UN agencies and others.

ADVOCACY AND MOBILIZATION

16. The multifaceted nature of the nutrition problem means that it requires attention from a wide range of agencies, but is seldom the primary concern or chief focus of the agendas of those agencies. Furthermore, there are no simple, direct and quick solutions to the malnutrition problem. It requires people working together over a period of time to achieve sustainable results. Ongoing advocacy, to keep nutrition in the eye of decision makers at all levels is therefore an essential activity for a body charged with co-ordination of the UN system response to nutrition. The SCN will intensify its advocacy activities in three ways:

- *Recognizing nutrition as a human right and elevating nutrition as a development imperative.* The SCN will implement a systematic campaign to position nutrition as a key development problem and human rights challenge, and advocate for increased attention to nutrition in UN assemblies and other international and regional fora. It will make strategic use of information generated through its review of the

PART 4 -- IMPLICATIONS FOR THE STRUCTURE AND FUNCTION OF THE SCN

17. *The SCN's tripartite nature* – From its inception in the 1970s the SCN has pioneered the bringing together of three clusters of participants. These are the UN agencies, other international and regional development finance institutions, and intergovernmental bodies; the bilateral donor governments; and civil society, including international non-governmental organizations (NGOs), academic institutions and other civil society representatives. The SCN annual sessions will include parallel meetings for each of the three clusters; a public symposium, working group and business meetings will be open to all participants. The SCN will make special efforts to ensure a reasonable balance of participants from the developing world at its meetings. The work of the SCN is based on the principle of consensus-building and inclusiveness and this will continue.

18. The NGOs can provide a broad spectrum of scientific, technical and service expertise to link the SCN to civil society. This includes, for example, links to academics and technical groups, international

NGOs, and emergency and disaster relief service groups. The NGOs provide a conduit not only for extending the SCN to civil society but also to provide feedback as a credible voice of the people the agencies' programmes are meant to serve. They may provide independent review at several levels, such as technical and scientific soundness of publications, projects and programmes, and an onsite analysis of needs, opportunities and constraints to agency programme effectiveness and their implementation with a human rights context.

19. The SCN acknowledges the commercial private sector as an important actor engaged in nutrition related activities. The SCN will seek to engage this sector so as to maximize positive nutrition impacts. The SCN will develop guidelines for such participation in its meetings, above all being open and clear about potential conflicts of interest.

20. *The Working Groups* – The working groups are at the heart of the SCN. Through working groups, participants take an active role in the work programme of the SCN to achieve the harmonizing, information sharing, advocacy and review tasks in the substantive areas deemed of greatest importance by the collective SCN body. The working groups will host workshops as an integral part of the annual sessions of the SCN. Generic terms of reference for working groups further explain their mandates and responsibilities.

21. *The Chair* – The SCN Chair provides outstanding leadership in the field of nutrition. The Chair advocates and mobilizes actors and actions aimed at accelerating the reduction of malnutrition and the achievement of global goals. Specifically the Chair maintains regular high-level interaction with the ACC, ECOSOC, and other UN bodies, bilaterals and the NGO community and engages all bodies that have a role in the reduction of malnutrition worldwide. The Chair guides the SCN in developing a strategic approach to bringing substantive nutrition matters to the attention of the ACC .

22. *The Steering Committee* – A Steering Committee of not more than nine members (composed of at least five UN agencies, and at least one each from

the bilateral and NGO clusters) under the leadership of the SCN Chair, will guide and monitor the implementation of the *Strategic Plan*. The Steering Committee will monitor the implementation of recommendations arising from working groups. Steering Committee members will be appointed by the Chair for a two to three year period after broad consultation with the SCN. Membership is rotational. One of the UN agencies on the Steering Committee should represent the 'smaller' agencies.

23. *Distinguished Nutrition Advocates* – The nutrition field is very broad, involving many sectors, and influenced by socio-economic processes over a wide front. SCN participants collectively do not possess all the knowledge needed to address all issues. There is also a need for an independent voice in the SCN to inform and guide its work, to bring to the SCN's attention emerging issues and to assist the Chair in the implementation of the SCN's advocacy efforts. To meet these needs the SCN will benefit from the involvement of up to four distinguished experts in relevant fields. These advocates will bring global excellence in nutrition and development research and practice, and have outstanding records in development leadership. They will be appointed by the SCN Chair for a two to three year period after broad consultation with the SCN.

24. *The Secretariat* – The Secretariat carries out the tasks assigned to it by the SCN, supports the Chair in executing his or her executive functions, facilitates the work of the Steering Committee, and acts dynamically to strengthen networking and follow-up. A key task is the organization and follow-up of the annual sessions and working group activities, and preparation of reports for the ACC. The Secretariat is also responsible for managing a peer review process in support of SCN publications to ensure their high quality.

Ed. Note: Summaries of the ACC/SCN Working Groups will be printed in the December issue of the SCN News. Full reports are posted on our Website <<http://acc.unsystem.org/scn>>

United Nations Department of Economic and Social Affairs

As part of the preparations for the high-level segment of the substantive session of the Economic and Social Council in 1999, a meeting of a panel of experts, sponsored by the Department of Economic and Social Affairs of the United Nations and the World Bank, focused on the theme: "**Food security, basic infrastructure and natural resources as imperative dimensions of poverty eradication strategies**".

Hunger and Poverty

By the year 2025, as many as 1 billion people out of the estimated 8 billion world population, could suffer from malnutrition. While in relative terms there has been some progress over the last forty years, in absolute terms, the number of undernourished people has diminished very little. The situation is particularly worrying in Africa, where population growth (2.6% towards 2020) exceeded the food production capacity. 70% of the poor people in the developing world live in rural areas, with a high proportion of extremely poor. In the urban setting, food security problems relate to inadequate purchasing power rather than rising food prices or supply difficulties. The panel stressed the need for further research and action, in as much as hunger is the first obstacle to ending poverty. In addition, development strategies should focus on investing in the poor and in their food security.

Basic Infrastructure for Access to Food

Without basic infrastructure, poor families have little resilience to shocks and cannot build assets for their future. In the developing world, particularly LDCs, there are massive differences between infrastructures in rural and urban settings. Low-income populations in many cities experience difficulties in accessing urban infrastructures, due *inter alia* to inadequate public transportation. Thus, there is a need for basic infrastructures, in particular: a) physical infrastructures, such as roads, water management and storage facilities; b) social infrastructures, such as schools, other training facilities, as well as healthcare institutions; c) nutritional infrastructures, e.g. access to the right kind of food, especially for children. In this regard, it was noted that in the early 1990s, 1.6 billion people were at risk of iodine deficiency and 2 billion were affected by iron deficiency. The panel agreed that

decentralization and community-based approaches were more effective than top-down bureaucratic mechanisms. Also, an adequate urban planning for cities should take into account proper access to basic services by the poor.

Environmental Concerns and Poverty Eradication

By the year 2020, 2.5 billion more people would have to be fed, which would require long term growth in agricultural output. As most of existing areas are already under cultivation, solutions must come primarily from rising biological yields. Doubling yields in complex farming systems without damaging the environment is an enormous challenge; hence, the need to improve the profitability of agriculture through the use of biotechnologies. Since most of the poor lived in rural areas where their economy and their survival depend exclusively on natural resources, namely on "biomass" resources (water, wood, crops, etc.) and as degradation of these natural resources increase and, consequently poverty, the panel stressed the need for an ecological definition of poverty, based on biomass resources to meet basic survival needs.

The Role of Women

Recognizing that women are the main caretakers of household food security, hunger and poverty eradication strategies need to target women. Development initiatives should also take into account the role of women farmers as users and carers of the natural environment. These policies could be enhanced and sustained with the empowerment and advancement of women. Education of girls had proved to have positive results in future earning potentials, better health, smaller families and decreasing hunger. On the basis of a rights-based approach, it was stressed that it was necessary to promote and support conditions where girls could go to school.

The panel made a number of recommendations, among which:

At the country level

States and international development agencies should:

- ◇ place a major emphasis on the development of lasting community infrastructure build around local agriculture production and getting food to the market;
- ◇ finance the creation of schools and health centers in both urban and rural settings, providing special attention to girls and women, including pregnant and breast-feeding mothers;

- ◇ address poverty alleviation through regeneration of ecological wealth, in particular water;
- ◇ reduce the ecological "footprint" of the cities through increased urban planning and environmental protection (i.e. recycling of water and solid waste products); increased technical assistance from the developed world in this field is highly needed.
- ◇ engage in significant land redistribution programmes;
- ◇ develop sustainable agricultural production systems capable of doubling outputs, which requires increased public agricultural research and stronger partnership with the private sector;
- ◇ engage in decentralization and promote programmes that delegate the responsibilities for revenue raising, expenditures and decision-making to local communities (participatory democracy).

NGOs and the civil society should:

- ◇ sensitize people and involve communities in natural resources management, thus increasing the sense of ownership and reducing the misuse of government funds;
- ◇ publicize success stories of development initiatives;
- ◇ increase partnership with international agencies for both emergency programmes and development projects.

At the regional level

- ◇ in absence of a major regional integration process, sub-regional cooperation among LDCs and South-South cooperation should be strengthened and supported by developed

countries;

- ◇ given the links between poverty eradication and agricultural development, the latter, as well as agro-industries, should be a priority for Africa, as stated by the Tokyo International Conference on African Development (TICAD-II, held in 1998).

At the international level

- ◇ the international community should pursue and strengthen its efforts to provide emergency food aid to countries in need;
- ◇ the issue of extreme poverty in least developed countries should be high on the international agenda, and donor countries should maintain a high level of ODA, in particular to LDCs;
- ◇ developing countries should have improved access to markets for their agricultural production;
- ◇ the United Nations and the World Bank should work towards ensuring a global right to survival for the world's poor;
- ◇ United Nations agencies and Bretton Woods Institutions should increase their cooperation and build up a real partnership, together with NGOs, on poverty eradication through its various forms, including combining food aid and development strategies;
- ◇ ECOSOC should increase visibility in his field and lead the work at the international level, with specialized agencies and financial institutions reporting to the Council on their field activities.

Contact: Alfred R Haemmerli, Chief, Development Cooperation Policy Branch, ECOSOC, UN, Rm DC1-1454, 1 UN Plaza, New York, NY 10017 USA; Phone: 212 963 5796; Fax: 212 963 2812; Email: <haemmerli@un.org>

I A E A

International Atomic Energy Agency

Isotope Based Techniques in Support of Human Health Investigations in Latin America

Nuclear and isotopic techniques are valuable tools in human nutrition studies. They have also served to develop models for 'Physiological Reference' in support of radiological safety issues, and for monitoring health in ageing (e.g. osteoporosis and body composition) populations. Isotopes, both radioactive and non-radioactive, enable detailed evaluations of nutrient intake, status of

micronutrients, body composition, energy expenditure, and nutrient bioavailability, i.e., the proportion that is absorbed and utilised by the body. Isotopic methodologies have been currently used in a number of Coordinated Research Projects and Technical Cooperation Projects in the IAEA's Nutrition Programme. Deuterium kinetics is a reliable technique to measure breast milk intake, infant

growth and development. Field studies are being conducted to generate new data on growth of children in the developing countries in collaboration with the WHO Growth Monitoring Programme. This technique has also been used to assess nutritional impact of several nation-wide food supplementation programmes during pregnancy, lactation, and childhood. The doubly labelled water (DLW) technique combines ^{18}O and deuterium kinetics to measure human energy expenditure in free-living subjects. A number of studies are being conducted to investigate the magnitude and causes of obesity in developing countries using DLW.

In order to address the problem of micronutrient malnutrition in several developing areas around the world, isotope aided methods are used to measure:

- 1) bioavailability of iron and zinc in traditional foods, fortified food products, and supplements,
- 2) vitamin A stores in mothers and children in support of efforts to alleviate vitamin A deficiency,
- 3) interaction between essential micronutrients (iron, zinc, selenium, vitamin A, folate, etc.) in vulnerable population groups. In addition,
- 4) ^{13}C -labelled substrates are being used to examine causes of infection by *Helicobacter pylori* (urea breath test), and poor assimilation of macronutrients, as consequences of diarrhoeal disease, in children from several developing countries.

In Latin America, the IAEA has been assisting many countries in the use of both radioactive and stable isotopes in a variety of nutrition studies through its Coordinated Research Projects (CRP) and Technical Cooperation (TC) Projects. Isotopic techniques enable detailed evaluations of i) nutrient intake, ii) status of micronutrients, iii) body composition, iv) energy expenditure, and v) nutrient bioavailability, which are essential for monitoring and evaluating national nutrition intervention schemes.

Some examples of TC Projects in Latin America include:

- ◇ In Peru, a *model project* (1994-1997) where isotopic techniques were used to assess and monitor nutritional improvements in underprivileged children participating in a national school breakfast programme, a supplementation programme for pre-school age children, and in women receiving iron fortified flour from socio-economically depressed regions.

- ◇ In Chile (1994-1999) a project entitled "*Isotopes in Nutrition*" aimed at reducing national zinc deficiency by identifying appropriate sources of zinc in the national diet, and to update the national database on human energy requirements.
- ◇ Also in Chile (1999), a second project on "*Mineral Interaction in Vulnerable Groups*" investigating interactions between essential (iron, zinc) and toxic (cadmium, lead) elements, for improving the efficacy of national nutritional and environmental programmes.
- ◇ A Regional Latin America Project (1999) on "*Isotopes for Evaluating Nutrition Intervention Programmes*" initiated with the participation of Argentina, Brazil, Chile, Cuba & Mexico. Validated isotopic techniques are being used to assess current nutrition intervention programmes in the region in order to: optimize the programmes and improve the impact on the nutritional status and long term health of the population; to evaluate national supplementary feeding "*take-home*" programmes for mothers and children, measuring their effects on body composition, lactation performance and changes in energy expenditure; evaluate iron and zinc supplementation programmes by using stable and radioactive isotopes; and evaluate the impact of food assistance to pre-school children attending day care centres by measuring energy intake, energy expenditure and body composition.
- ◇ A CRP with almost exclusive Latin American participation on "Isotopic Evaluations of Maternal and Child Nutrition to Help Prevent Stunting" was recently completed. Deuterium kinetics proved to be a reliable technique to measure breast milk intake, infant growth and body composition in the region.
- ◇ Latin American countries are also active participants in the Agency's current Nutrition CRPs, namely "*Applications of Nuclear Techniques in the Prevention of Degenerative Diseases in Ageing*", "*Isotopic Evaluations in Infant Growth Monitoring in Collaboration with WHO*" and "*Use of Isotopic Techniques to Examine the Significance of Infection and Other Insults in Early Childhood to Diarrhoea Morbidity, Mal-Assimilation and Failure to Thrive*".

Contact: Dr. G.V. Iyengar, International Atomic Energy Agency, Head, Nutritional and Health Related Environmental Studies Section (NAHRES) Division of Human Health, Wagramer Strasse 5, A-1400 Vienna, AUSTRIA; Email: <v.iyengar@iaea.org>

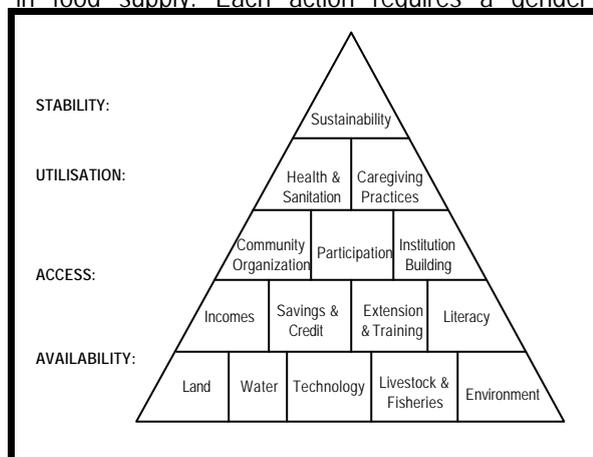
I F A D

International Fund for Agricultural Development

General Overview of IFAD's Work Related to Food Security

IFAD's mandate within the UN system is "to work with developing countries to alleviate rural poverty, and to reduce food insecurity and malnutrition". In part, IFAD implements this mandate by providing loans to governments of developing countries. These loans are used to finance agricultural development projects in rural areas. Much of the work of IFAD staff resides in the conception and design of these projects. IFAD describes Household Food Security (HFS) as "...the capacity of households to procure a stable and sustainable basket of adequate food". More important than any specific definition of HFS is that issues of food availability, access, utilization and stability be addressed in the design and implementation of IFAD projects. Many actions contribute to building HFS and each action requires a gender perspective to hold the structure together (see figure). Many IFAD projects promote actions such as agricultural extension services to increase food availability; rural savings and credit to improve access to food and crop storage facilities for stability in food supply. Each action requires a gender

perspective to assess the different opportunities and impacts for men and women. In IFAD's structure, the 'Gender and Household Food Security Desk' is comprised of three persons: the Technical Advisor, a Consultant for Social Dimensions, and an Associate in Nutrition and Public Health. This 'Desk' reports to the director of IFAD's Technical Advisory Division which is under the Programme Management Department. Currently, IFAD is increasingly interested in demonstrating project impact. To estimate impact, it is necessary to establish key indicators of food security, and to measure these indicators at baseline, mid-term review and during the final evaluation. The Gender & HFS Desk is committed to ensuring that anthropometric indicators are included at baseline in 10 new projects during the year 2000. Already this year the Desk participated in a Rapid Nutrition Survey in Morocco that included anthropometric indicators for a sample of 740 children. The Gender & HFS Desk has also recently published "*Rural Women in IFAD's Projects: The Key to Poverty Alleviation*" and "*Household Food Security and Gender: Memory Checks for Programme and Project Design*". IFAD has been serving as a task manager with FAO and WFP in preparing a document entitled "*Toward System-Wide Guidance on HFS and Nutrition*". IFAD's ongoing activities include developing a knowledge base on gender and HFS which includes an intranet website and CD-ROM set.



Contact: Dr Eve Crowley, Technical Advisor, IFAD, via del Serafico No. 107, 00142, Rome, Italy; Phone: 39 06 5459 2452; Email: <e.crowley@ifad.org> OR Sean Kennedy, APO, IFAD Nutrition; Phone: 39 06 5459 2514; Email: <s.kennedy@ifad.org>

W F P

World Food Programme

Capacity Building in Nutrition

The demand for basic technical information is increasing in WFP, especially as we move to a cluster structure whereby more tasks will become the responsibility of the field offices. To strengthen WFP's knowledge base, and to make it more accessible, the WFP Food and Nutrition Handbook

was prepared. Using this handbook as a resource document, a set of training materials has been designed which covers fundamental nutrition knowledge relevant to WFP staff. The training is a two-tier process. The first stage is to conduct training in eight WFP regional offices. Twenty participants will

be trained from offices in the region. The first training took place in Nairobi in April 2000, which was followed by one in Uganda in August. The second stage is to bring the training to Country offices using the training packages designed and using WFP Staff with nutrition expertise where it is available.

Contact the Nutrition Unit in WFP, Phone: 39 06 6513 2718; Fax: 39 06 6513 2837; Email: <anne.callanan@wfp.org>

W H O — E U R O

First Food and Nutrition Action Plan

On 14 September 2000 during WHO-EURO's Regional Committee meeting, the *First Food and Nutrition Action Plan* for the European Region was unanimously approved by its 50 Member States. A WHO Ministerial Conference is planned for 2005 in order to assess the progress made by Member States and the impact of the Food and Nutrition Action Plan.

The action plan will serve as a guide for all countries, according to their various cultures and social, legal and economic environments, to develop policies to reduce the burden of food-related ill health and its concomitant cost. This includes developing a comprehensive, multisectoral approach to food and nutrition issues; national food and nutrition monitoring systems, a relevant scientific knowledge base, advisory and coordinating mechanisms in countries, and finally, national action plans on food and nutrition.

The action plan provides a unique framework within which WHO Member States can begin to address the issue. The framework consists of three strategies:

- ◇ a food safety strategy, highlighting the need to prevent contamination, both chemical and biological, at all stages of the food chain;
- ◇ a nutrition strategy, to ensure optimal health, especially in low-income groups and during critical periods throughout life, such as infancy, childhood, pregnancy and lactation, and old age;
- ◇ and a sustainable food-supply (food security) strategy to ensure enough food of good quality, while helping to stimulate rural economies and to promote the social and environmental aspects of sustainable development.

The latest draft of the Plan can be found on the WHO-EURO Website <<http://www.who.dk>>

I F P R I

International Food Policy Research Institute

Nutrition Trends, Policies and Strategies in Asia and the Pacific The ADB-IFPRI RETA Initiative

As the *Fourth World Nutrition Situation Report* shows, the nutrition situation in Asia remains very serious. The 1990s saw some progress but not enough to make a significant dent in the problem. Three quarters of all underweight under-fives (180 million) in the world are in Asia. Maternal malnutrition leads to substantial incidence of low birthweight babies (25-50 percent in South Asia) that have higher risk of dying compared to normal birth weights.

Around 35-55 percent of children are underweight in South Asia and Indochina, and 15-40 percent in Southeast Asia. Southeast Asia is improving, but too slowly relative to long-term patterns of economic growth. The vast majority of people suffering from micronutrient deficiency disorders (especially vitamin A, iron and iodine) are in Asia. Substantial progress has been made with vitamin A and iodine deficiency disorders, but not iron. More

than half of global deaths of mothers during pregnancy or immediately following birth are in Asia; globally almost one fourth of these preventable deaths are associated with severe iron deficiency anemia.

Between 1996 and 1998, the Asian Development Bank (ADB) and the United Nations Children's Fund (UNICEF) collaborated with seven Asian countries, responding to the challenge of child malnutrition. These seven countries contain two-thirds of the world's malnourished children. By regional technical assistance (RETA), an important policy process was built within governments. This process developed and endorsed ten-year investment plans for children through interagency steering committees led by the planning commissions.

This has now been followed with a second RETA, with the ADB collaborating with a team led by the International Food Policy Research Institute (IFPRI) including international nutrition specialists from the University of California at Davis, University of Toronto, University of North Carolina and the Micronutrient Initiative in Ottawa. This second RETA intends to build upon this policy process and extend the perspective to include nutrition-relevant policies that will sustain life-long health, productivity and achievement.

The aim of the RETA is to assess nutrition status in the region and identify priority strategies and policy options. The specific objectives are to:

- ◇ assess progress made in reducing malnutrition in the region and the benefits of such reduction;
- ◇ link priority strategies to reduce child malnutrition developed under the first RETA with women's health and nutrition programs and with early childhood development programmes, and develop strategies for public nutrition addressing the needs of adults;
- ◇ assist developing countries with major nutrition problems in formulating priorities for nutrition policy and regulatory reform, implementing cost-effective programs, and identifying vulnerable groups for public sector intervention;

- ◇ support regional and subregional dialogue on the priorities for public nutrition, the roles of governments and external donors (including the ADB), as well as public and private sectors; and
- ◇ develop a set of principles for preparing the ADB's nutrition policy paper.

The proposed RETA is addressing complementary themes that will help to complete a regional picture on key issues and approaches to improve nutrition throughout the life cycle in a sustainable manner. Case studies have been prepared, along with the following papers on a variety of issues:

- ◇ Options for Interventions to Improve Human Nutrition: A Review of Efficacy and Effectiveness
- ◇ The Nutrition Transition and Diet-Related Chronic Disease in Asia: Implications for Prevention
- ◇ Building Capacity to Improve Nutrition
- ◇ Food Policy and Nutrition Security
- ◇ Regional Approaches to Fortification of Staples and Complementary Foods

An Integrated Report is currently being developed which draws on the work of both RETA projects. A draft of this report will be reviewed by representatives from several countries in Asia and the Pacific along with a steering committee within the ADB, and discussed at a Regional Seminar to be held in Manila in late August 2000. This integrated report will in turn serve as the basis for the development of a nutrition strategy for the ADB.

For more information, please contact Stuart Gillespie, IFPRI, 2033 K St NW, Washington DC 20006 USA; Phone: 202 862 5638; Fax: 202 467 4439; Email: <s.gillespie@cgiar.org>; Web: <www.ifpri.org>

*Improving the Nutritional Status of Children by Transforming
Poverty Alleviation Programmes in Honduras*

In Honduras, IFPRI is working with the Family Allowance Program (PRAF) to improve the nutritional status of children in the rural southwest of the country, where up to 60% of children aged 12-71 months are stunted and the prevalence of malnutrition has been increasing over the past decade. The new PRAF project is based on a decision to transform a previous short-term poverty alleviation program into one that can contribute to a longer-term strategy of creating a new generation of healthy, educated young adults in a highly disadvantaged area of the country. Currently, over 70% of households in this area have insufficient means to assure an adequate diet.

The new project has been funded in large part from a concessional loan from the Inter-American Development Bank and aims to establish whether public funds are best spent on direct transfers to poor households, or on improving the ability of the health services to deliver effective support to vulnerable groups or both. Seventy municipalities out of a total of nearly 300 in the country have been targeted on the basis of exceptionally high rates of stunting recorded in the 1997 National Census of First-Graders' Height. Of these seventy municipalities, twenty will receive a package of household-level interventions including a cash transfer: the Health and Nutrition Allowance. This allowance, worth just under US\$50 per annum per beneficiary, will be paid to all pregnant women and mothers of children 0-35 months of age (up to two transfers per household), on the condition that they remain up-to-date on antenatal care, vaccinations, and growth monitoring. The value of the allowance is intended to compensate women for the loss of one day's work each month when they are expected to present at the health center. Currently, less than half of all pregnant women in the intervention area receive five or more antenatal checks, and only 68% of children under 3 regularly attend growth monitoring.

In a further ten municipalities, the government health centers will receive a cash transfer averaging approximately US\$6,000 per annum, which they will use to improve the quality of the services they provide to pregnant and lactating women and children aged 0-35 months. The exact value of the transfer depends on the size of the facility's target population and the number of staff employed. All the health centers will receive training in quality planning,

and will develop an expenditure plan for the additional funds in conjunction with newly formed local Committees for Health Improvement. Part of the payment will be conditional on the service obtaining an adequate rating from a random sample of facility users. In addition, the project will work towards the expansion of the community-based growth promotion program known as *AIN/comunitario*, originally developed by the USAID-funded BASICS program in conjunction with the Ministry of Health. The AIN combines successful elements from previous community-based nutrition programs in Indonesia, Tamil Nadu, and Tanzania, and has been heralded as a breakthrough in community nutrition. In twenty other municipalities, all the interventions described will be implemented, leaving twenty municipalities that will serve as control communities. The allocation of the seventy municipalities to the four groups was decided in an open session by lottery.

The project will also implement a number of complementary education interventions focused on children aged 6-12 years. The health and nutrition interventions enjoy the strong support of the Ministry of Health, in addition to that of the ministry to which PRAF itself belongs, the Office of the Presidency. The International Food Policy Research Institute has been contracted by PRAF to assist with the targeting strategy, provide technical advice and analysis on appropriate interventions, develop a system for routine monitoring of program delivery, and design and implement an objective impact evaluation. All the interventions will begin in August 2000. Prior to this, a complete household census will be undertaken in the municipalities selected to receive the household allowances, and an extensive baseline survey will be conducted in a random sample of 80 households in each of the seventy municipalities. The baseline survey will cover areas such as: anthropometric status of children under 5; child feeding and hygiene practices; demand for health services, and quality of care from the service-user's perspective; women's time use, and household expenditures on food and other consumables. An interim impact evaluation survey will be conducted one year after the baseline survey, and a "final" impact evaluation survey will be conducted after two years. Constant monitoring of process and impact will be begin as soon as the interventions are delivered.

Contact IFPRI's web-site at <www.ifpri.org> for further information.

International Union of Food Science and Technology***New Initiatives at Chilean Meeting***

The International Union of Food Science and Technology announced the development of a broad range of programmes aimed at the international food science and technology community at its recent Governing Council meeting in Chile. The meeting, held at the invitation of SOCHITAL, The Chilean Association of Food Science and Technology, was in conjunction with the XI Latin American, Caribbean Seminar and XIII National Congress of Food Science and Technology, in which the IUFOST Governing Council members participated. Some highlights of the meeting are listed below.

The Korean Organizing Committee has developed an excellent and well-rounded programme for IUFOST Congress XI under the title Paradigm Shift - Harmonization of Eastern and Western Food Systems. The second circular is now available. Five short courses have been added to the pre-Congress Programme and other ways of distributing short courses and scientific information, for example, through videotape or internet, are being explored. Development of smaller congresses, on a yearly basis, in association with trade exhibitions, is moving forward. Preliminary discussions are underway with Egypt and South Africa. IUFOST will work with its other members to establish these annual regional congresses.

The joint IUFOST/IFT Electronic Magazine, entitled *The World of Food Science*, has been officially launched. This magazine incorporates news from our reporters and associates around the world and covers such topics as regulatory affairs, in-depth country reports, hot topics, business developments and much more. Internet Discussion groups related to topics such as hygiene, functional foods, labelling, management problems of small and medium enterprise are being established. These discussion groups will produce information statements issued by IUFOST, through the Academy and Scientific Council. An impressive number of databases have been added to the IUFOST homepage. More are

being incorporated into the site on a continuing basis. IUFOST will consider consultancy listings in the form of "yellow pages". Individuals in related industry, services, labs will be invited to advertise.

An overall strategy for food science and technology is needed and efforts have begun to bring together leading scientists and industry to debate and plan for the future. Scientific and technological needs from the perspective of developing countries including post harvest, food quality, food safety and transportation are being investigated. The emphasis will be on export activity as it provides the revenue base. The need to harmonize regulations is being considered.

Another working party is examining the scientific needs of developed countries. This will be addressed with the objective of developing a strategic plan for food science and technology that will incorporate national, regional and international needs. Identifying food-related problems, research needs and ultimately providing recommendations for national strategy consideration on such issues as nutrition, hygiene, and food engineering is the final objective.

Significant progress has been made in the area of IUFOST education initiatives. A working group on core curricula has been established and material is being gathered from members. IUFOST partnership in an education website is being explored. Discussions with the United Nations University are underway. A proposed core curricula and non-academic training guidelines project, Definition of Professional Terminology, is a joint venture with IUNS. There is need for a compilation of food science/food technology terminology to be prepared and distributed in major languages.

Contact: J Meech, Secretary-General, IUFOST, 522 Maple Ave, Oakville, Ontario, Canada L6J 2J4; Phone: 905 815 1926; Fax: 905 815 1574; Email: <iufost@inforamp.net> Web: <www.inforamp.net-iufost>

U S A I D

United States Agency for International Development

LINKAGES

LINKAGES (USAID's Breastfeeding, Complementary Feeding, and Maternal Nutrition Project) has undertaken four applied research projects to identify program strategies that are most effective in bringing about positive behavior change and improved health of infants and women of reproductive age. Behavior change strategies being tested in community-based studies include mother-to-mother support groups, home visits, informal contacts, counseling, modified trials of improved practices, "positive deviance" and social marketing. A brief description of each study follows.

Study 1: Testing the La Leche League model in Guatemala: Does mother-to-mother breastfeeding support work?

This is the first study to rigorously test the most well-known and widespread strategy for promoting breastfeeding: mother-to-mother support groups pioneered by La Leche League International. For the past ten years, La Leche League Guatemala has trained and supported more than 200 volunteer breastfeeding counselors in low-income, peri-urban areas of Guatemala. The study uses a pre-/post cross-sectional design to compare 650 infants less than six months of age and includes a census, a survey of mothers, and interviews with breastfeeding counselors. One hundred additional breastfeeding counselors will be trained as part of the study. Timeline: 9/99-9/01

Study 2: Informing Zimbabwean women about HIV transmission through breastfeeding: Does counseling affect infant feeding decisions, skills and behaviors?

LINKAGES is conducting research through the ZVITAMBO (Zimbabwe Vitamin A for Mothers and Babies) Project to understand the context within which women make infant feeding decisions in countries where HIV prevalence is high. Information was gathered to assess costs associated with each feeding option; the availability of replacement foods; potential stigmatization of women who choose not to breastfeed; and caregivers' ability to properly

breastfeed, express and heat-treat breastmilk, and prepare commercial infant formula. This information was used in developing an intervention to inform women of infant feeding options. Timeline: 2/99-2/01

Study 3: Improving breastfeeding and complementary feeding practices in Vietnam: How does a positive deviance approach work?

Save the Children's "positive deviance" programme in Vietnam helps parents of poorly nourished children learn how the parents of positive deviant children are able to keep their children well nourished, in spite of tremendous poverty. A large part of this study on positive deviance focuses on complementary feeding of children 6-24 months of age. Several sub-studies focus on the breastfeeding practices of mothers of infants 0-6 months of age and the impact of their labor outside of the household on breastfeeding practices. Timeline: 4/99-4/01

Study 4: Improving micronutrient status of women of reproductive age in Bolivia: Does social marketing of a micronutrient supplement work?

This research tests whether increasing the availability of a commercial, low-cost multiple vitamin and mineral supplement (*VitalDía*) affects use of the supplement by women of reproductive age in the Department of Santa Cruz, Bolivia. *VitalDía* is being promoted through the media, workshops, seminars, and point of sale materials. The overall social marketing strategy also includes an information campaign to raise awareness among women, particularly focusing on pregnant and lactating women, about the importance of nutrition to their health, emphasizing the consumption of fruits and vegetables. Timeline: 7/98-6/00

Contact: LINKAGES, AED, 1825 Connecticut Ave, Washington DC 20009 USA; Phone: 202 884 8000; Fax: 202 884 8977; Email: <linkages@aed.org>

M I

Micronutrient Initiative

Bangladesh National Nutrition Programme

The World Bank has approved the first phase of a National Nutrition Program (NNP) in Bangladesh, expected to cover the entire country within the next 12 years. Building on the existing Bangladesh Integrated Nutrition Project, the program includes a broad array of community-based and national activities, with a micronutrient component that may be the most extensive in any large scale nutrition program in the world.

The micronutrient component, developed with assistance from MI, and representing the country's national micronutrient strategy, emerged from the work of a National Micronutrient Committee established with MI assistance. The component includes antenatal and postpartum micronutrient supplementation, vitamin A capsule distribution, and, for the first time, supplementation for adolescent girls and newly married women.

The NNP gives significant attention to food fortification - of wheat flour and edible oil - and calls for modernization of the salt industry to improve iodization activities in the country.

Community-based nutrition services in every village participating in the program will include home garden activities to increase the consumption of micronutrient-rich foods and improve household food security. This activity, originally introduced into the project by MI and Tufts University, and employing an approach developed by Helen Keller International, has become a model for home garden programmes worldwide.

Launched March 20, 2000

***Ending Malnutrition by 2020:
An Agenda for Change in the Millennium***

*Final Report to the ACC/SCN by the Commission
on the Nutrition Challenges of the 21st Century*
Chaired by Professor Philip James

Copies are available. Please write to the ACC/SCN Secretariat, send an email <accscn@who.int> or download from our Website at <<http://acc.unsystem.org/scn>>

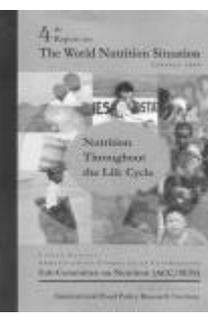
Testing of a Micronutrient Drink in Bangladesh

This study is being carried out by MI in collaboration with BRAC (the largest indigenous NGO in the world). It will employ a drink produced by Procter and Gamble and schools established by BRAC. In large part, because of BRAC's contributions, over a quarter of adolescent girls in rural Bangladesh are now attending school and the numbers are increasing rapidly. Many BRAC schools already provide nutrition counselling (recently evaluated with MI/Tufts assistance.)

The MI/BRAC study will assess the extent to which BRAC can attract non-school going adolescent girls to the schools for brief periods during the day to consume the drink and receive nutrition education messages. The study also will compare the acceptability and "drawing power" of the drink with that of capsules. If effective, this intervention may become an important element in Bangladesh's national effort to combat malnutrition.

Contact: Ibrahim Daibes, MI, c/O IDRC, PO Box 8500, 250 Albert St, Ottawa Ontario, Canada K1G 3H9; Phone: 613 236 6163; Fax: 613 236 9579; Email: <idaibes@idrc.ca>. For a full listing of MI publications, and to order your copies, follow this link to <http://www.idrc.ca/booktique/index_e.cfm>

The Fourth Report on the World Nutrition Situation



This book is part of a series of ACC/SCN reports initiated in the mid-80s on the nutritional status of populations in developing countries. It provides important information for the many individuals, institutions, governments and NGOs working to accelerate nutrition action. This report focuses on nutrition throughout the life cycle and provides the latest statistics in areas such as undernutrition, micronutrients, infant feeding and refugees. Please see our Publications Order Form or download from the web at:

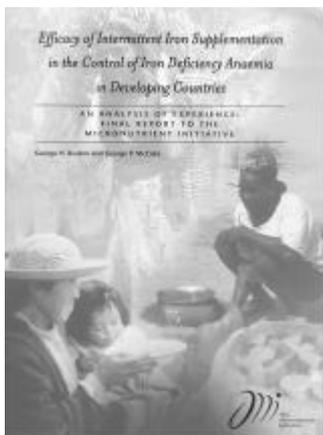
<<http://acc.unsystem.org/scn>>

Publications

Efficacy in Intermittent Iron Supplementation in the Control of Iron Deficiency Anemia in Developing Countries

by George H Beaton and George P McCabe

*Review by Eva-Charlotte Ekström, PhD
Scientific Consultant, ICDDR,B, Bangladesh*



This is the much awaited report on the collective experience of studies comparing effectiveness of daily vs. intermittent iron supplementation. Studies were undertaken as a response to the so called "mucosal-block -theory". The theory was developed

from two studies on rats, showing that administration of iron on an intermittent basis could yield net absorption as great as, or greater than, daily dosing. The hypothesis was that after intake of first supplements the intestinal mucosa would be blocked for absorption of subsequent iron supplements. By timing supplementation frequency to mucosal turnover a larger efficacy might be achieved.

The "mucosal-block-theory" appeared at a time when poor effectiveness of iron supplementation programmes was much discussed. One of the major reasons suggested for poor effectiveness was proposed to be the pregnant women's limited compliance. This in turn was explained by the side-effects that iron supplements may produce. An intermittent dose-schedule was thus hypothesized to both improve compliance (fewer tablets to be taken and less problems with side-effects) as well as efficacy per dose of iron taken.

The mucosal-block hypothesis created much interest in the international nutrition community and a large number of studies addressing the theory were undertaken. Thirty trials were identified and the analysis in this report is based on results from 22

completed studies. For 14 of these, complete data sets were made available for pooled analyses. The others contributed to a meta-analysis.

The report compares weekly and daily supplementation schedules in terms of effect on hemoglobin concentration, anemia prevalence and iron stores. The analyses are divided into three population groups, pregnant women, adolescents and school children, and pre-school children. Only a small difference in hemoglobin concentration was found after supplementation. The overall estimated difference was 2.17 g/L. This difference is smaller than the proposed level of 5 g/L as the smallest difference of biologic importance set by INACG in 1984. However, it is interesting to notice that this small difference in hemoglobin concentration corresponded with a significant increased risk of anemia in the weekly group. A relative risk of 1.34 (CI 1.20-1.49) was found. Examining the different population groups separately a statistically significant increased risk of anemia was found for pregnant women (RR 1.29, CI 1.10-1.51) and for adolescents and school children (RR 1.44, CI 1.33-1.56) but not among pre-school children (RR 1.06; CI 0.84-1.34).

Interestingly, it appears that degree of "control" of supplement intake was associated with absolute impact on anemia. It is hardly surprising that in studies where tablet intakes were supervised or "under control" a larger absolute impact on anemia was observed. Low compliance has been proposed as one of the reasons for limited effectiveness of programmes to reduce anemia prevalence. The pooled analyses provide evidence to support this hypothesis. While level of supervision had little effect on relative efficacy among pregnant women, it appeared that under highly controlled conditions among adolescents and school children the impact of

weekly approached that of daily supplementation.

The authors conclude that both of the treatments are efficacious but weekly supplementation is likely to be less effective except in situations where supervision is feasible with weekly but not with daily. Weekly supplementation is particularly disadvantageous during pregnancy and in situations where the prevalence of anemia is high. The authors recommend that daily supplementation should continue to be the recommended dose frequency for pregnant women. For adolescents, school and pre-school children weekly supplementation should only be used where a high level of compliance may be assured.

The report is interesting and comprehensive, both in describing the background for the studies as well as in analyzing the data and in interpreting them. The discussion offers insight into most of the current issues related to anemia control. The statistical approaches used are exhaustive. However, a public health based analysis of potential importance was found missing. While the distinction between prevention and treatment is frequently mentioned, no comparison is made between weekly and daily supplementation in their effectiveness in preventing anemia among initially non-anemic individuals, and their effectiveness in treating anemia among initially anemic individuals. However, a comparison between prevention and curative effectiveness would only be meaningful if screening and application of different treatment alternatives for anemic and non-anemic individuals are considered in programmes. This may not be the case in most low-income countries.

While the rationale to define "efficacy" as the "maximum achievable effect under research or ideal condition", and "effectiveness" as "how well can the beneficial effect be achieved under normal (non research) conditions" is an understandable effort to make it clear that the report may not predict programme effectiveness, it may add to the confusion. The reason is that the trials were, as spelled out by the authors, of mixed designs. In the supervised trials the observed effect is only due to biologic factors, i.e., truly optimal conditions (high compliance), and thus efficacy trials. However, the other trials are of intent-to-treat design and the final effect is both influenced by biologic factors and behavioral factors (compliance): effectiveness trials. Without differentiating between biologic effect and effect of compliance it is difficult to evaluate the mucosa-block-theory. Furthermore, for programmes, it is important to distinguish limitations in efficacy from that of effectiveness as they imply different actions. To make the necessary differentiation between effectiveness in programmes from that in research, "programme effectiveness" could be used.

The authors conclude that the mucosa-block-theory is flawed. It is important to recognize other merits of the theory. Maybe its greatest contribution has been to draw attention to iron supplementation and initiate renewed efforts in advancements towards the prevention and control of iron deficiency anemia.

ISBN 1-894217-08-X published by MI (1999), 138pp, US\$20.00, available from IDRC, PO Box 8500, Ottawa, Canada K1G 3H9; or order from the Web <<http://www.idrc.ca/booktique>>

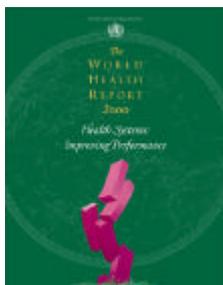


Agricultural Biotechnology and the Poor
An International Conference on Biotechnology
Edited by GJ Persley and MM Lantin
Convened by the Consultative Group on International Agricultural Research and the US National Academy of Sciences

This conference, held in October 1999, responded to the pressing need for an open, inclusive, and participatory debate on potential benefits and risks of biotechnology, grounded in scientific evidence, and concerned with the common good. The proceedings document these science-based discussions on the topics of controlling environmental risks, minimizing health risks, minimizing social risks, ethics and biotechnology, intellectual property rights, public concerns, and public/private research. An entire section analyzes the opportunities and constraints for agricultural biotechnology in China, India, the Philippines, Thailand, Brazil, Costa Rica, Mexico, Egypt, Iran, Jordan, Kenya, South Africa and Zimbabwe. This

234 page book is available from: Consultative Group on International Agricultural Research, 1818 H St NW, Washington DC 20433 USA, or check the website: <<http://www.cgjar.org/biotech/bioconf.htm>>

**The World Health Report 2000
Health Systems:
Improving Performance**



WHO has performed an expert analysis of the increasingly important influence of health systems in the daily lives of people worldwide. Health systems provide the critical interface between life-saving, life-enhancing interventions and the people who need them. If health systems are weak, the power of these interventions is likewise weakened, or even lost. Health systems thus deserve the highest priority in any efforts to improve health or ensure that resources are wisely used. This report aims to stimulate a vigorous debate about better ways of measuring health system performance and thus finding a successful new direction for health systems to follow. WHO hopes to help policy-makers weigh the many complex issues involved, examine their options and make wise choices.

ISBN 92 4 156198 X WHO, Geneva, -US \$10.20, developing countries -US\$7.15; order from <bookorders@who.int> or view the full report <www.who.int/whr>

The Progress of Nations 2000

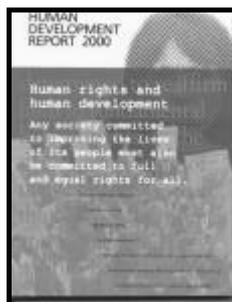


This publication records the world's progress towards giving all children the chance to live a life of dignity and opportunity. It captures the slow but

steady progress girls and women make as they overcome inequality and discrimination. It also records the devastating speed with which HIV/AIDS has become the greatest catastrophe facing Africa and the rest of the world. This issue celebrates the power of immunization and sets out a new agenda for vaccines. The final chapter reports global statistical profiles which continue to show great disparities between countries. This publication seeks to put an end to the intolerable inequities which exist by exposing them to the conscience of the world community.

Contact: UNICEF, Div of Communication, 3 UN Plaza, NY NY 10017 USA; Email <pubdoc@unicef.org>

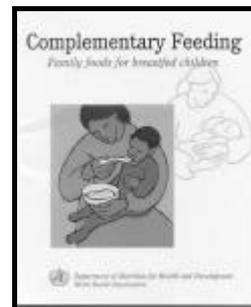
Human Development Report 2000



Support for human rights has always been integral to the mission of the United Nations. This *Human Development Report 2000* is about human rights and human development. It clearly underlines the fact that human rights are not a reward of development but that they are critical to achieving it. The report cites and examines many examples of egregious human rights violations across the world. It is not aimed, however, at producing legalistic rankings of the worst offenders; it is intended to help promote practical action that puts a human rights-based approach to human development and poverty eradication firmly on the global agenda.

ISBN 0 19 521679 2 UNDP, 1 UN Plaza, NY NY 10017 USA; order from UN Publications, Rm DC2-853, Dept DO99; Phone: 800 253 9646; Email: <publications@un.org>; Web: <http://www.un.org/Publications>

**Complementary Feeding:
Family foods for breastfed children**



This document provides a practical guide to the introduction of complementary foods into the diets of breastfed children aged 6-24 months. Addressed to health workers in developing countries, the book translates the latest scientific knowledge into clear and simple messages suitable for use when counselling families and communities. Major emphasis is placed on the preparation of foods that are clean, safe, and nutritionally adequate for healthy growth and development. Using a question-and-answer approach, information in the book ranges from diagrams showing the energy, protein, and micronutrient needs of young children, through discussion of the nutrient value of common foods, to recipes for preparing nutritionally adequate meals based on local staples.

WHO/NHD/00.1, WHO Geneva, Dept of Nutrition for Health and Development, 20 Avenue Appia, CH-1211, Geneva 27 Switzerland; Web: <http://www.who.int>

Nutrition in South-East Asia



A comprehensive nutrition profile has been assembled for the WHO South East-Asia Region. This book examines nutrition indicators specific to this Region and their shift over a period of time. The information presented is derived from eight inter-country meetings on nutrition conducted in the Region during 1995-

99 as well as various national and international sources. This profile highlights the achievements, constraints, as well as the challenges and the actions required for future nutritional strategies in the countries of WHO/SEARO. It is hoped that Member countries may revise their programmes and prioritize and implement their National Plans of Action for Nutrition at the beginning of the 21st Century in line with the declaration of the 1992 International Conference on Nutrition.

SEA-NUT-148 WHO (2000), Regional Office South-East Asia, Indraprastha Estate, New Delhi 110002, India; Web: <<http://www.who.int>>

Prevention and Control of Iron Deficiency Anaemia in Women and Children



This document is based on the presentations, discussions and background papers presented during the UNICEF/WHO Regional Consultation on the Prevention and Control of Iron Deficiency Anaemia in Women and Children held in Geneva on 35 February 1999. The report contains seven main sections which includes information on the nature of and general prevalence of iron deficiency anaemia globally, and more specifically, on the situation in the countries of Central and Eastern Europe (CEE), the Commonwealth of Independent States (CIS) and the Baltic region. It outlines the causes and consequences of iron deficiency anaemia relevant to pregnant women, women of childbearing age and children less than two years of age. The report emphasizes the need and rationale behind an integrated strategy for control and prevention using multiple interventions such as improved young child feeding practices, dietary education,

fortification, supplementation, infection control, monitoring and linkage to other programmes. An entire section is dedicated to the importance, relevance and potential of wheat flour fortification to make a major contribution in reducing iron deficiency/iron deficiency anaemia. Recommendations for the CEE/CIS Region are clearly outlined in the report.

UNICEF (1999) Div of Communication, 3 United Nations Plaza, H9F, NY NY 10017 USA; Email: <pubdoc@unicef.org> Web: <www.unicef.org>

Anemia Testing Manual for Population-Based Surveys by A. Sharmanov



This manual was prepared under the auspices of the MEASURE DHS+ project (funded by USAID) which assists developing countries in the collection and use of data to monitor and evaluate trends in population, health and nutrition. The main objectives of MEASURE DHS+ are to provide decision-makers with information useful for informed policy choices; to expand the international population and health database; to advance survey methodology; and to build capacity for high-quality demographic and health surveys. Experiences in anaemia-testing training are summarized in this manual. It is written primarily for health investigators and lays out a standardized approach for hemoglobin testing using the HemoCue system. Particular attention is paid to biohazardous waste disposal and safety precautions when taking blood. Descriptions of the protocols for hemoglobin testing and biohazardous waste disposal are

illustrated with colour photos of the procedures. Following the standardized protocols and guidelines presented in this manual could help in collecting accurate population-based data on anaemia prevalence, as well as ensuring protection of human subjects from blood-borne infections and other biohazards.

Macro International Inc, 11785 Beltsville Dr Ste 300, Calverton MD 20705 USA; Phone: 301 572 0200; Fax: 301 572 0999; Email: <reports@macroint.com> Web: <<http://www.macroint.com/dhs/>>

REPORT on the Global HIV/AIDS Epidemic—June 2000



This report sets out our current level of knowledge about the epidemic at the start of the 21st century. There is now compelling evidence that the trend in HIV infection will have a profound impact on future rates of infant, child and maternal mortality, life expectancy and economic growth. It demonstrates that lowering incidence and mitigating the epidemic's impacts must be a nationally driven agenda. The report describes other vital elements proved to be successful such as social openness, countering stigma and the engagement of all sectors. Estimates in 1991 predicted that by the end of the decade in Sub-Saharan Africa, 9 million people would be infected and 5 million would die — it was a threefold underestimation. Countries that have adopted forward-looking strategies to fight the epidemic are reaping the rewards in the form of falling incidence.

ISBN: 92 9173 000 9 UNAIDS/00.13E (2000), UNAIDS, 20 Avenue Appia, 1211 Geneva 27 Switzerland; Phone: +41 22 791 4651; Fax: +41 22 791 4165; Email: <unaids@unaids.org> Web: <<http://www.unaids.org>>

**Overcoming Child Malnutrition in Developing Countries
Past Achievements & Future Choices
by L Smith & L Haddad**



In order to reduce malnutrition, one must understand its complex and interrelated causes. They range from factors as broad as political instability to those as specific as diarrhoeal disease. Policymakers and researchers endlessly debate which of the many causes of malnutrition are most important, and which areas of intervention will be most successful in reducing it. This **IFPRI 2020 Discussion Paper No. 30** stresses that any comprehensive strategy for resolving the problem of child malnutrition must include actions to address both its underlying and basic causes. The study employs nationally representative data on child underweight from the period 1970-1995 to undertake cross-country regression analysis of the determinants of child malnutrition. The study's purpose is to determine which of the various broad determinants of child malnutrition are most important in each region of the developing world. The report also aims to unravel the answers to a number of puzzling questions currently under debate: 1) Why has child malnutrition been rising in Sub-Saharan Africa? 2) Why are child malnutrition rates in South Asia so much higher than those in Sub-Saharan Africa? 3) How important a determinant of child malnutrition is food availability at a national level? 4) How important are women's status and education? 5) How important are national political factors and income, and through which pathways do they affect child malnutrition? Addressing these questions should help

policymakers direct resources effectively to reduce child malnutrition as quickly as possible.

Contact Bonnie McClafferty at <B.McClafferty@CGIAR.ORG> or see <http://www.cgiar.org/IFPRI/pubs/catalog.htm#top>>. Also see *Explaining Malnutrition in Developing Countries: A Cross-Country Analysis* by L. Smith & L. Haddad. Research Report No. 111 (Washington DC: IFPRI, 2000).

**Best Practices and Lessons Learned for Sustainable Community Nutrition Programming
By KS Ndure, MN Sy, M Ntiru, and SM Diène**

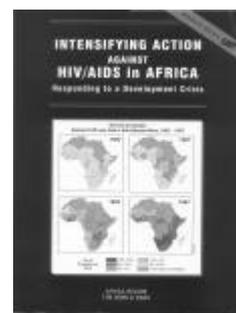


The unique feature of this document is that from beginning to end, it presents lessons learned from diverse African experiences: basic elements, effective strategies, and necessary steps to sustainable community nutrition programming. Successful interventions are conceived of and implemented in a decentralized manner, centering around the community and encouraging community participation in every step of planning, implementation and decision-making. Carefully linking interventions with other development sectors can lead to positive outcomes. This document includes a practical, five-step approach to establishing community nutrition programmes. It provides guidance for improving effectiveness and suggests ways that governmental and NGO actors can collaborate effectively. This document would be useful for programme planners and managers, central and district level

nutritionists, and funding agencies.

Contact: AED, SARA/SANA, 1875 Connecticut Ave NW, Washington DC 20010 USA; Phone: 202 884 8815; Fax: 202 884 8400; Email: <mntiru@smtp.aed.org>

Intensifying Action against HIV/AIDS in Africa



The World Bank details its strategic plan in the fight against HIV/AIDS in Africa in this document. To stimulate and support implementation of the strategy, the Bank has established a multisectoral AIDS Campaign Team for Africa. The team will provide a variety of services including: equipping and supporting Bank country teams to mobilize African leaders and other sectors to intensify action against HIV/AIDS; and retrofitting projects with HIV/AIDS components where possible. The team also plans to explore the feasibility of building an AIDS impact assessment module into existing environmental and/or social assessment processes; and to collect and disseminate information on the progress of the epidemics, country-by-country statistics, and best practices. It is expected that the Bank's partnership with UNAIDS will be strengthened and expanded, as well as its partnerships with other key agencies, NGOs and bilaterals.

The International Bank for Reconstruction and Development/The World Bank (2000) Office of the Publisher, 1818 H St NW, Washington DC 20433 USA; Fax: 202 522 2422.

Nutrition Works and International Health Exchange

Nutrition Works and International Health Exchange are compiling a register for food and nutrition specialists. The register will support recruitment to food and nutrition posts for the following agencies as well as for IHE's wider client base: the World Food Programme, Action Against Hunger, Concern Worldwide, Oxfam, and Save the Children. If you have expertise in any of the following areas, and are available for either long or short-term postings to hear from you: public nutrition, nurse/nutrition, food security, food aid, or food logistics. Both emergency and development expertise is required. Jobs may include the management or implementation of food distribution and feeding programmes (therapeutic and supplementary), food security assessments, nutritional surveys, project planning and evaluations.

Contact: Patrick Brooke, International Health Exchange, London SE1 7AE, UK; Phone: 00 44 207 620 3333; Email: <pat@ihe.org.uk>

GLOSSARY

Antibiotic Resistance Markers: GM usually employs virus genes to "smuggle" in the inserted genes. Antibiotic resistance genes are used as markers to track the gene carrying the trait being transferred.

Biotechnology: Overall term for the scientific techniques that use living cells and organisms to produce new foods and chemicals for both medical and agricultural uses. The term **bioengineered foods** is also used for crops and processed foods produced this way.

BST: (recombinant Bovine Somatotropin, **rBST**, also called Bovine Growth Hormone, **rBGH**), the first genetically engineered animal hormone approved in the United States, is used to boost milk production in cows. Sold by Monsanto, it is banned in Canada and the European Union. *Codex Alimentarius*, the UN food standards body, has not certified that BST is safe.

Bt: *bacillus thuringiensis*, is a natural bacteria used by organic farmers to control pests. Bt-engineered crops (e. g. corn, potatoes) produce this toxin throughout the plant. Studies show that pollen from Bt corn can kill Monarch butterfly caterpillars and that Bt crops may be toxic to beneficial insects.

Gene/DNA: A section of DNA that codes for a specific biochemical function in a living organism, **DNA** is

the double helix molecule that transmits hereditary traits contained in genetic material in chromosomes.

Genetic Engineering (GE): also known as gene splicing or recombinant DNA technology, takes the DNA of genes from one species and inserts them into another species to transfer a desired trait. **Genetically engineered (GE) foods** are those grown from seeds or containing ingredients altered through this process.

Genetically Modified Organisms (GMOs or GM): A plant, animal, bacteria or other life form that has had its DNA artificially altered by new processes known collectively as genetic engineering.

GM Crops: The main GM food crops now in commercial cultivation are soya, corn (maize), canola (rape seed) potatoes and tomatoes. In the pipeline are rice, sugar beets and other foods. Animal feed is the principal market for GM crops. Genetic modification is generally used to improve plant resistance to pests and weed-killers. Whether destined for human or animal consumption, the environmental impact of GM crops is the same.

GM Foods, Gene Foods: Foods containing genetically modified ingredients, derivatives of GM ingredients or GM enzymes. Soybeans and corn are the most

extensive GM crops and their derivatives can be found in an estimated 60% of all processed foods.

Novel Foods: Term used by the European Union and others for GM foods.

Precautionary Principle: Under the Rio Declaration of the 1992 UN Conference on Environment and Development (the Earth Summit), governments must take a "better safe than sorry" approach to potential environmental and health risks, in which the burden of proof for a product's long-term safety falls to its producer.

Substantial Equivalence: The concept, used by the biotech industry and many regulatory agencies, that the composition of GM foods is not chemically different from conventional ones in ways that could affect their safety or nutritional value, and therefore require no special safety testing or labelling.

Transgenic: *trans* means "crossing from one place to another" and *genic* refers to genes. Adjective for an organism carrying foreign or artificially inserted genetic material.

"Terminator" Technology: Experimental technology that alters plant reproduction so that harvested seed will be sterile if farmers attempt to replant it.