

**Proceedings of the
National Workshop**

on

**FOOD-BASED STRATEGIES
FOR IMPROVING NUTRITION IN BANGLADESH**

**Dhaka, Bangladesh
April 26-27, 1998**



FMRSP
Bangladesh
Food
Management
& Research
Support
Project



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National Workshop**

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**FOOD-BASED STRATEGIES
FOR IMPROVING NUTRITION IN BANGLADESH**

Edited by

Mr. M. Anwar Iqbal
Director, Nutrition
BARC

Dr. Carlo del Ninno
Consumption Economist
FMRSP- IFPRI

Dr. Shakuntala Haraksingh Thilsted
Nutrition specialist
The Royal Veterinary and Agriculture University
The Netherlands

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Abbreviations

<i>Agro-Ecological Zone</i>	—	AEZ
<i>Asian Vegetable Research and Development Center</i>	—	AVRDC
<i>Bangladesh Agricultural Research Council</i>	—	BARC
<i>Bangladesh Agricultural Research Institute</i>	—	BARI
<i>Bangladesh Agricultural University</i>	—	BAU
<i>Bangladesh Bureau of Statistics</i>	—	BBS
<i>Bangladesh Council for Scientific and Industrial Research</i>	—	BCSIR
<i>Bangladesh Institute of Development Studies</i>	—	BIDS
<i>Bangladesh Livestock Research Institute</i>	—	BLRI
<i>Bangladesh National Nutrition Council</i>	—	BNNC
<i>Bangladesh Rice Research Institute</i>	—	BRRRI
<i>Bangladesh Water Development Board</i>	—	BWBD
<i>Center for Natural Resources Studies</i>	—	CNRS
<i>Consultative Group on International Agricultural Research</i>	—	CGIAR
<i>Crop Diversification Program</i>	—	CDP
<i>Danish International Development Agency</i>	—	DANIDA
<i>Department of Agriculture Extension</i>	—	DAE
<i>Department of Environment</i>	—	DOE
<i>Department of Livestock Services</i>	—	DLS
<i>Directorate of Fisheries</i>	—	DOF
<i>Fisheries Research Institute</i>	—	FRI
<i>Food Management and Research Support Project</i>	—	FMRSF
<i>Government of Bangladesh</i>	—	GOB
<i>Government Organization</i>	—	GO
<i>Helen Keller International</i>	—	HKI
<i>High Yielding Variety</i>	—	HYV
<i>Institute of Nutrition and Food Science</i>	—	INFS
<i>Integrated Food Assisted Development Project</i>	—	IFADEP
<i>Integrated Pest Management</i>	—	IPM
<i>International Center for Leaving Aquatic Research Management</i>	—	ICLARM
<i>International Food Policy Research Institute</i>	—	IFPRI
<i>International Maize and Wheat Improvement Center</i>	—	CIMMYT
<i>Local Government Engineering Department</i>	—	LGED
<i>Ministry of Fisheries & Livestock</i>	—	MOFL
<i>Ministry of Food</i>	—	MOF
<i>Ministry of Land</i>	—	MOL
<i>National Plan of Action for Nutrition</i>	—	NPAN
<i>Non-Government Organization</i>	—	NGO
<i>Roads and Highways Department</i>	—	R&HD
<i>Small-Holder Livestock Development Project</i>	—	SLDP
<i>Small Indigenous-fish Species</i>	—	SIS
<i>United States Agency for International Development</i>	—	USAID
<i>Vulnerable Group Development</i>	—	VGD

Foreword

This workshop on “Food-Based Strategies for Improving Nutrition in Bangladesh” has been organized as a follow up to the “International Workshop on Prevention and Control of Micronutrient Malnutrition through Food-Based Action in the SAARC Countries” held in Dhaka in November 1997. During that workshop it was recognized that micronutrient malnutrition is a serious problem in the SAARC countries and that food-based approaches play a vital role in the reduction of malnutrition. It was also suggested to conduct regional workshops on the progress of food-based approaches for improving nutritional status.

The Workshop

The workshop on “Food-Based Strategies for Improving Nutrition in Bangladesh” was held in Dhaka on 26-27 April 1998 during the nutrition week at the Bangladesh Agriculture Research Council (BARC) with the financial support from USAID, FMRSP-IFPRI and DANIDA. There were two main goals that we wanted to accomplish during this workshop. The first was to discuss the experiences of specific programs and projects that are taking place in Bangladesh that use food based approaches for improving malnutrition. The second, was to conduct some in depth discussions on the main issues surrounding the malnutrition deficiency caused by inefficient and poor diets and the possible solutions. Ultimately, those efforts should help to formulate specific recommendations and follow up actions to strengthen food-based strategies for improvement of nutrition in Bangladesh.

In order to achieve the specific goals highlighted above, the workshop was structured in two main parts. During the first part a series of short technical sessions focused on specific food interventions were presented and discussed. During the second part, a series of group discussions and debates aimed at outlining the best possible strategies for improving nutritional status were held.

During the inaugural session of the workshop, chaired by Dr. A.M.M. Shawkat Ali, Secretary, Ministry of Agriculture, Dr. Z. Karim, Executive Chairman, Bangladesh Agriculture Research Council delivered the welcome address. The other speakers in this session were: Dr. Richard Brown, USAID Mission Director, Dhaka, Mr. Ove Fritz Larsen, Minister Counselor, Royal Danish Embassy, Dhaka, Mr. Satish Chandra Roy, Honorable State Minister, Ministry of Fisheries and Livestock, the chief guest Ms. Matia Chowdhury, Honorable Minister for Agriculture and Food. The inaugural session ended with a vote of thanks from Mr. M. Anwar Iqbal, Director, Nutrition, Bangladesh Agriculture Research Council.

The technical sessions were organized around five major themes in which thirteen papers were delivered and briefly discussed. The themes of the sessions were i) Background information on Nutrition and Agriculture in Bangladesh; ii) Vegetables related strategies; iii)

Fish related strategies; iv) Poultry and other food strategies; and v) Strategies for staples and limitation of staple based diets.

A very interesting a stimulation keynote speech on the private sector initiatives to prevent micronutrient malnutrition was delivered by Dr. Florentino Solon at the dinner that took place at the end of the first day of the workshop.

At the end of the five technical sessions the participants were divided into five groups to work on specific issues dealing with the micronutrient malnutrition as they present themselves in five different groups of foods. The participants were asked to identify the major problems, the undesirable situations and to provide specific recommendations. In order to facilitate the discussion, each group worked with the help of a facilitator and selected a spokesperson to present a summary of their discussion to the other participants in the following plenary session.

After the presentations of the findings of each of the five groups and a general discussion, Dr. Shakuntala Haraksingh Thilsted presented a table on recommended actions that she prepared with Dr. Carlo Del Ninno during the previous presentations. In this table the main key issues that were identified during the group discussions were presented along with a list of recommended actions and a list of agencies that should be involved in their implementation. The main characteristic of these issues is that they cut across the discussions on individual food types and therefore represent a common strategy that should be pursued to improve the nutritional status in Bangladesh. The key issues presented include: i) Diet diversification; ii) Production diversification; iii) Nutritional value of available food commodities; iv) From production to marketing; v) Home gardens; vi) Fish production and consumption; vii) Competition among alternative production alternatives; viii) Intrahousehold allocation; ix) Food fortification; and x) Availability of data.

A lot of progress was made during this workshop. The challenge now is to follow up on the recommendations that were presented with the formation of a committee and the initiation of research activities along the needs expressed and highlighted during the workshop.

The Proceedings

The purpose of this document is to record the discussions that took place during the workshop and to provide a sound basis for policy makers and implementers to design and implement specific food-based strategies that will improve nutrition in Bangladesh. The introduction, provided by Dr. Howdy Bouis, helps to put the issue relative to micronutrient malnutrition in the right national and international prospective describing major micronutrient deficiencies in developing countries and discussing possible interventions. In the second chapter the abstracts of the papers are presented along with a summary of the relative discussion that took place in each of the sessions. The keynote speech of Dr. Florentino S. Solon, Executive Director, Nutrition Center of the Philippines, Philippines, is provided in

chapter three. The recommendations of working group sessions, plenary session and final plenary discussion session are presented in chapter four. The program and the list of participants are included in the appendices.

Acknowledgements

There are many people that have contributed to the organization and the success of this workshop and the preparation of this document. First of all Dr. John Swanson, who launched the idea and convinced us to organize the workshops, and the other members of the of the organization committee, especially Mr. Nasim Ahmed from USAID and Dr. Mrinal Chowdhury from DANIDA. Then, there are all the people at BARC, where the event took place, that organized the venue and took notes; the facilitators from USAID Dhaka [Mr. Michael Foster, Sarah Lynch Necessary??], led by Dr. Sanaul Mostafa; the staff from the FMRSP-IFPRI office that provided the necessary logistical support and secretarial support and the people that reviewed this document Prof. Dr. Harun Yusuf. Finally, our thanks go to the financing institutions: USAID Dhaka, DANIDA and FMRSP-IFPRI and all the people that actively participated to the workshop and made it possible.

It remains that the views expressed in this document reflect only the interpretation of the authors and not those of any of the agencies involved and therefore, the final responsibility of the preparation of this document rests with the authors themselves.

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INTRODUCTION

Bangladesh Perspective

Widespread poverty in rural areas of Bangladesh, associated with landlessness, inadequate food, and poor health, care plays a crucial role in the high rates of undernutrition and nutrient deficiencies, especially among women and children. Rice-dominated diets consumed by the poor in the countryside do not supply all micronutrients required for a healthy life and productive activities. Children and women are particularly vulnerable to these deficiencies as they have relatively higher requirements for growth and reproductive functions. Maternal malnutrition, hard work during closely-spaced pregnancies, and repeated infections, all contribute to a high frequency of low birth weight infants.

About one-half of the total population of 120 million live in absolute poverty, defined as those consuming less than the minimum energy intake of 8.9 MJ/capita/d, while approximately one-fourth of the population consume less than 7.6 MJ/capita/d. At present, the average per capita energy intake is estimated to be around 80% of the level recommended by the Food and Agricultural Organization of the United Nations (FAO). (MOA 1996; BBS 1991)

The national nutrition survey conducted in 1981- 82 showed that the average food intake was 765 g raw food/capita/d, of which 60% was rice, 30% vegetables and 6% animal foods (Ahmed K and Hassan N; 1983). In terms of energy, over 80% of total energy intake came from rice. Survey results of the last twenty five years showed that food intakes have not changed much, except for a decrease in pulse and fish consumption and an increase in wheat and potato consumption. Oil consumption can greatly increase energy intake and consumption of animal based foods, milk and milk products could increase vitamin and mineral intakes, which remain very low.

Rice continues to be the dominant food in the Bangladeshi diet. This means that rice is the major source of energy as well as nutrients. However, some essential nutrients such as vitamin A, vitamin C, iron, calcium and zinc are not found in rice at all, or are found only in small quantities. These nutrients must be supplied by non-staple foods such as vegetables and fish. Since these foods are eaten only in small amounts, micronutrient deficiencies plague large groups of the Bangladeshi population. It is estimated that 60% of the total population of Bangladesh suffer from various micro-nutrient deficiencies; vitamin A, iron, and iodine deficiencies in women and children are particularly important.

In Bangladesh as in many low income countries, there is a close relation between local food production and the types of food eaten. In order to meet the food needs of the growing population, Bangladesh has focused on grain (predominantly rice) production which increased at an annual growth of 2.7% during 1975/76 to 1992/93 (MOA; 1996). At the

same time, a low priority has been placed on increased production of other foods, especially oils and pulses. A greater share of rice in the composition of agricultural production has not permitted for an improvement in the diversity of food consumption. This means that both undernutrition as well as micronutrient deficiencies continue to be grave problems which affect the well being of the Bangladeshi population as well as development of the nation.

Iron deficiencies during childhood and adolescence impair physical growth and mental development and learning capacity. In adults, iron deficiency reduces the capacity for physical labor. Pregnant women require iron to replace basal losses, to allow for the expansion of red cells and provide for needs of the fetus and the placenta¹. Iron deficiency is a leading cause of mortality during childbirth. Very low birth weight infants may have lower initial endowment of body iron and therefore need a dietary source earlier than normal infants. Children and adolescents have particularly high iron requirements during the period of rapid growth.

About 70% of women aged 15-45 and children aged 0-14 years, 80% of pregnant and lactating women have blood hemoglobin levels below the acceptable limit and suffer from anemia (GOB, 1995). The major underlying causes for this are dietary iron deficiency, improper absorption and utilization of consumed iron, and parasitic infection. Prevalence of anemia is relatively less in adult male, but still very high (about 40%) compared to that seen in developed countries (about 3%). According to a recent UNICEF estimate, anemia accounts for about 25% of all deaths among women in Bangladesh (UNICEF, 1991). The anemia situation more or less has remained the same over the past two and a half decades.

Vitamin A is required for general health and maintenance of growth. Controlled supplementation trials have repeatedly demonstrated that large declines in child mortality can be achieved by improving vitamin A status. Deficiency in vitamin A leads to increase in susceptibility of infections, sometimes associated with night-blindness which may eventually deteriorate in irreversible blindness. During pregnancy, additional vitamin A is needed for foetal growth and maintenance, reserves in the liver, and maternal tissue growth. Requirements are likewise higher during breast-feeding.

Every year thousands of children in Bangladesh die or go permanently blind due to lack of vitamin A. More than one million children have visible signs of vitamin A deficiency (indicating much higher levels of subclinical vitamin A deficiency) and about half of them suffer from night blindness (xerophthalmia). The situation has been improving since 1980. The present xerophthalmia prevalence rate (1.78%) is about half compared to that of 1982/83 (3.6%) (IPHN/UNICEF, 1989). Vitamin A deficiency is prevalent not only in children aged 6-71 months, but also in the older population. On the average, 1.61% of population aged 6 years and above suffer from night blindness (GOB, 1997). According to the World Health

¹ *FAO and WHO. 1988. Requirements of Vitamin A, Iron, Folate and Vitamin B₁₂. Report of a Joint FAO/WHO Expert Consultation.*

Organization, vitamin A deficiency should be considered a significant public health problem where xerophthalmia rates are above 1%.

Iodine deficiency is the greatest single cause of preventable brain damage and mental retardation in the world. Deficiencies in iodine that occur later in infancy and childhood have been shown to cause mental retardation, delayed motor development, growth failure and stunting, neuromuscular disorders and speech and hearing defects. Deficiencies in several other micronutrients, in particular zinc, may be similarly widespread with equally serious consequences for health. However, because there are no specific indicators to screen for deficiencies in these nutrients (other than a positive health response to supplementation), they have not received much attention.

According to the latest Iodine Deficiency Disorders (IDD) survey undertaken in 1993, about 69% of the population in Bangladesh are deficient in iodine, 47% have goiter of which 9% have visible goiter (Yusuf et. al., 1993). The goiter rate is higher in the flood prone areas, 51%. Women of child bearing age (15-44 years) and girls aged 5-14 is most affected; 56% of women and 53% of girls have goiter. The goiter situation is far worse now than before. Now prevalence of goiter among 5-14 year girls is about four times higher and that of women of reproductive age about two times higher compared to 1975-76 levels. In 1975-76 about 13% of 5-14 year girls and 25% of women (15-44 years) had goiters (Ahmad and Hassan, 1983). Low intake of iodine is the major cause of IDD, which is the result of very low iodine content in soil, food and water. Crops grown in such iodine deficient soil usually contain less iodine.

In Bangladesh, transportation, logistics and sometimes lack of institutional support render supplementation and fortification programs difficult to administer to the large number of persons facing high nutritional risk. Thus, there is considerable interest in food-based strategies to alleviate micronutrient malnutrition and interventions, which can complement supplementation and fortification programs and seek directly to improve dietary quality.

Food-based strategies promote the production of micronutrient-rich foods such as vegetables, fish, poultry, and fruits, either for commercial sale or for primary consumption by the producing households themselves (e.g. home gardening). Productions may be very profitable if conducted properly and therefore can lead to increases in income for farming households. Increase in income may be translated into higher expenditures on vitamin A and iron-rich animal products and fruits lacking in the basic diet. In addition, households, which also take their consumption needs into account in their cropping patterns and production decisions, might consume a greater share of their crop.

Potential benefits of increased production of micro-nutrient-rich foods depend on how their production affects household incomes, how their availability affects consumption among poorer households and individuals, and how available their micronutrients are to the body. NGOs often target women for food -based income generating activities as they have low access to productive assets and are highly vulnerable to micronutrient deficiency.

Studies have shown that women's access to income-generating activities might be associated with different consumption allocation decisions, putting more weight towards children's welfare. On the other hand, agricultural production is time-consuming and might detach women from child care and other activities, which are also crucial to children's welfare.

In order to address these issues, the government of Bangladesh as well as the bilateral agencies and Non-governmental organizations, both international and local have initiated programs and projects on food based strategies. In Bangladesh, numerous non-governmental organizations are jointly promoting nutrition education, which might lead eventually to greater demand for micronutrient-rich foods, especially for vegetables, which are considered as low-status food in rural areas.

The government of Bangladesh has introduced programs on crop diversification, horticulture, aquaculture, etc. Grameen Bank as well as a number of NGOs' program includes credit operations for women. Bangladesh Rural Advancement Committee (BRAC) has also program for homestead gardening, fisheries and poultry production through women. The Helen Keller home gardening and CARE Bangladesh focus on increasing production as well as consumption of vegetables, especially nutrient rich vegetables and fruits. Bilateral agencies, including the United States Agency for International Development (USAID) support through the International Center for Living Aquatic Resources Management (ICLARM) and the Asian Vegetable Research and Development Center (AVRDC). Danish International Development Agency (DANIDA) assisting to increase aqua-culture production and small scale extensive poultry production through the Mymensingh Aquaculture Extension Project (MAEP) and the Small Holder Livestock Development Project.

International Perspectives

In addition to a general problem of low energy intakes, nutritionists are increasingly giving high priority to malnutrition caused by poor dietary quality. Recently the International Human Nutrition Community has recognized malnutrition due to lack of micro-nutrients as a serious public health problem in developing countries. The World Bank study on malnutrition problem in South Asia discover that 5% of Gross National Product is lost each year due to the debilitating effects of iron, vitamin A, and iodine deficiencies alone.²

Extent of the Problem

Statistics are now compiled by the World Health Organization (WHO) on a regular basis. The magnitude of the micronutrient deficiency problem is enormously high. It is estimated that 2.1 billion people globally are iron-deficient and the problem is severe enough to cause anemia in 1.2 billion people. The problem for women and children is more severe because of

² *Enriching Lives: Overcoming Vitamin and Mineral Malnutrition in Development. Development in Practice Series. Washington, D.C.: The World Bank (1994).*

their greater physiological need for iron. Roughly 40% of non-pregnant women and 50% of pregnant women have anemia worldwide.

WHO estimates that around 1.5 billion people or one third of the world's population live in iodine deficient environments and are at the risk for IDD.

WHO reported in 1994 that 3.1 million pre-school age children had eye damage due to vitamin A deficiency and another 227.5 million are sub-clinically affected at a severe or moderate level. Estimates show that annually 250,000 to 500,000 pre-school age children go blind from this deficiency and about two-thirds of these children die within months of going blind.

Causes and possible solutions to the problem

A fundamental cause for micronutrient deficiencies is poor dietary quality. Non-staple foods, particularly animal products, are the rich sources of bio-available minerals and vitamins. Typically, the poor wish to consume more non-staple foods but simply cannot afford these high-calorie costly foods in sufficient amounts in their diets. Food expenditures are concentrated in the purchase of less expensive low-calorie staple food. This food may eliminate hunger, but is deficient in minerals and vitamins.

Nutritionists were once optimistic that supplementation and fortification programs could provide essential minerals and vitamins to high percentages of at-risk populations in developing countries and they could solve much of the micronutrient deficiency problem quickly and easily. However, although often cost-effective, some programs have sometimes proven difficult to implement and to sustain due to funding and institutional constraints.

Universal supplementation is an expensive and difficult task. In the case of iron, for which capsules need to be taken frequently, compliance is a problem. There is some risk of toxicity if capsules are taken too often. Where supplements are targeted, this involves the costs and associated logistical problems of identifying those in need.

Fortification is an alternative approach, which has been used successfully in developed countries. However, markets for foods are not as well developed in third world countries so that identifying appropriate food vehicles, processed by a relatively small number of manufacturers, is sometimes impossible. Where food vehicles are available and fortification statutes have been put into law, there is still a problem to ensure compliance with these laws.

Supplementation and fortification have the advantage that their successful implementation does not require a substantial change in individual behavior. These interventions treat the symptoms rather than the underlying causes of micronutrient deficiencies. This has led many to advocate the use of "food-based" interventions, such as nutrition education and promotion of home vegetable gardens, that address the underlying cause of micro-nutrient deficiencies which is poor quality diets. This approach, however, involves motivating people and bringing substantial changes in human behavior that can be both expensive and difficult.

The benefits of properly managed interventions can be quite high. The World Bank's 1993 World Development Report found micronutrient programs to be among the most cost-effective of all health interventions. The World Bank document about micro-nutrients (World Bank 1994) estimated that the deficiencies of vitamin A, iodine, and iron could cost as much as 5 percent of gross domestic product (GDP) in developing countries, but addressing the deficiencies comprehensively would cost less than 0.3 percent of GDP. Nevertheless, it is difficult for governments and international agencies to mobilize resources of the magnitude implied above, which are needed to address such a pervasive problem through the existing strategies.

Given the high payoffs to reducing micro-nutrient deficiencies and the initial disappointment with supplementation and fortification programs to solve the problem quickly and completely, several nutrition education and home gardening projects have been implemented, but only in a few cases has their effectiveness been carefully evaluated. There is now some consensus that a mix of several approaches is required in any of the third world country: i.e., supplementation, fortification, and promotion of breast-feeding, nutrition education, and home gardening and primary health education. However, there is little agreement on how best to allocate scarce funds among these strategies in specific settings.

One type of food-based strategy is to promote production of specific non-staple foods, which are rich in bio-available micronutrients. This strategy will have several effects. First, production of these non-staple foods will increase if they are profitable for farmers. Income of farmers will also rise, leading to increased consumption of non-staple foods. Second, farm households may eat disproportionately high amounts of the particular micronutrient-rich non-staple foods, which they produce, after income effects are controlled. Third, increased production should lower the market price of these foods which, in turn, would lead to increased consumption of the same.

Nutrition education, implemented in conjunction with production-promotion programs, may increase the magnitude of the three consumption-enhancing effects just mentioned by steering diets toward more nutritious choices within given budget constraints. This is the typical strategy employed in promotion of home vegetable gardening, which seeks to motivate production out of a desire for improved family nutrition as well as for greater household income. However, a plausible hypothesis is that production promotion strategies, motivated primarily by profit and increase household income, do not necessarily require complementary nutrition programs to be able to significantly improve micronutrient malnutrition for reasons outlined above.

This remains a hypothesis in that no careful study has been undertaken of the effects of commercial production of micronutrient-rich non-staple foods on micronutrient status. If production of specific food has particular benefits for micronutrient status and so public health, this externality may justify the investment of relatively more public resources in

promoting increased adoption and cultivation.

In comparing the relative potential benefits of various food products for improving public health, it is perhaps obvious that the outcome will depend on the combination of :

the potential of specific food products for improving household incomes through production and sale;

their bio-available micronutrient content and

their level of consumption (now and after income has gone up and the price has fallen) in the diets of those nutritionally at risk.

It is perhaps less obvious that the outcome will depend also on how production affects farm household and resource allocation, in particular women's (the primary caretakers of children) time allocation patterns and their control over household decision-making processes (e.g. amounts and which foods to sell, to keep, and to buy). An analysis of intra-household allocation may shed new light on identifying the poor and the nutritionally at-risk groups. The net benefits of technology adoption may well vary across individuals within households as well as across households. The distribution of micronutrients within the household may be critical, because some household members may have relatively greater micronutrient deficiencies in comparison with their needs. Infants and small children, particularly female, pregnant and lactating women and elderly household members may be differentially affected by micronutrient deficiencies. If the intra-household distribution of nutrients depends on relative bargaining powers of the members, children in households where women have greater power may receive more nutrients. Therefore, the agricultural technologies (e.g. through training and credit programs targeted at women; whether targeted at uneducated and resource-poor households or those more fortunate) affect the outcomes, both in terms of scope of adoption and diffusion of the technologies and in terms of effects on consumption and nutrition.

Conclusion

In summary, nutritionists perceive an enormous opportunity, for which new and compelling scientific evidence is rapidly accumulating, for improving nutrition and health in developing countries by reducing micronutrient malnutrition. Nevertheless, some frustration remains because well-developed tools appropriate in a developing country context do not exist to solve the problem of micro-nutrient deficiencies quickly at reasonable cost.

**Welcome Address by Dr. Z. Karim, Executive Chairman,
Bangladesh Agricultural Research Council, Dhaka**

*Mr. Chairman,
Chief Guest, Honorable Minister for Agriculture and Food, Matia Chowdhury,
Special Guest, Honorable State Minister for Fisheries and Livestock, Mr. Satish C. Roy,
Distinguished guests, Diplomats,
Ladies and Gentlemen,*

*Assalamu-Alaikum,
Good Morning,*

*On behalf of the Bangladesh Agricultural Research Council, USAID, DANIDA and IFPRI,
I welcome you all in the 2-days workshop on 'Food-Based Strategies for Improving Nutrition
in Bangladesh'.*

You all know that malnutrition is a serious problem in Bangladesh. Proper nutrition is essential for overall physical and mental development of the nation. Malnutrition is a major constraint for our social and economic development. Children and pregnant women may die because of malnutrition. Moreover, malnutrition is one of the main causes of physical and mental retardation of a large number of people of our country.

From a study, it could be observed that, nearly 65% of the children under five suffers from malnutrition in Bangladesh. More than 70% of pregnant women and mothers who are breast feeding their babies are the victims of malnutrition. Protein deficiency in our daily diet is the main cause of undernourishment. The situation is getting worse because of anemia due to iron deficiency and other diseases related to iodine deficiency.

Ladies and Gentlemen,

Realizing the importance of agricultural advancement to encounter malnutrition, the government of Bangladesh has prepared and approved "The National Food and Nutrition Policy" and The National Plan of Action for Nutrition. In the workplan, agriculture has been considered as one of the main sectors to play vital role in overcoming nutritional problems. In many agro-based developing countries of the world, food-based strategies have been successfully taken as one of the major ways to reduce malnutrition. We can meet our requirement of energy, protein, vitamin and other necessary minerals from food.

In Bangladesh perspective, food-based strategies are even more applicable for reducing malnutrition. More than 50% of the population is living below the poverty line in our country. Low-income people can not afford to buy synthetic vitamins and minerals. Therefore, the nation can not lead a healthy life as a whole. On the other hand, the limited land available for agricultural use in Bangladesh is fertile enough to produce a variety of crops. Our country has numerous rivers, canals, beels and water bodies that are the potential sources for fish culture. Other than these, some areas of our country, especially the hilly region are suitable for livestock development and the production of fruits and vegetables.

We can solve our malnutrition problem through utilizing all these potential resources. The National Agricultural Research System (NARS) has already developed different technologies for cultivation and management and many high yielding varieties of different types of pulses, oilseeds, fruits and vegetables. It has also innovated and introduced scientific homestead gardening. With the help of the Extension Department homestead gardening has already

gained popularity. Fish cultivation in rice field and ponds, and poultry farming are contributing significantly to the empowerment of women and other vulnerable groups. Similar activities will contribute more and more in future. We thank our development partners for their positive role in these regards. We look forward for their continuous co-operation in future as well.

Ladies and Gentlemen,

The workshop on “Food-Based Strategies for Improving Nutrition in Bangladesh” is going to take place as a part of the first national Nutrition week in the country.

Previously, we organized another workshop on “Prevention and control of Micronutrient Malnutrition through Food Based-Actions among SAARC Countries” with the assistance of FAO.

Today’s workshop is being organized through patronization of USAID, DANIDA and IFPRI. We would like to sincerely thank them all for their assistance.

We express our gratitude to the Honorable Chief Guest, Minister for Agriculture and Food, Matia Chowdhury and the Special Guest, Honorable State Minister for Fisheries and Livestock, Mr. Satish Chandra Roy for sparing their valuable time inspite of busy schedules.

We express our thanks to Dr. Brown and Mr. Larsen for their presence and active co-operation. Thanks to IFPRI for their support.

Distinguished guests, honorable speakers of the workshop, participants, ladies and gentlemen I thank you and welcome you all once again.

Allah Hafez.

**Speech by DR. Richard M. Brown, Mission Director,
USAID Mission in Bangladesh.**

*Mr. Chairman,
Honorable Minister for Agriculture and Food, Ms. Matia Chowdhury,
Honorable State Minister for fisheries and livestock, Mr. Roy,
Mr. Larsen,,
Dr. Z. Karim, Executive Chairman, BARC,
Excellencies, Distinguished Guests,
Ladies and Gentlemen.*

Good Morning,

It is a pleasure for me to be here and for USAID to be a supporting partner with the Bangladesh government, DANIDA, IFPRI and BARC in this important event.

I understand this workshop is an outgrowth of the FAO sponsored SAARC workshop held in November. That workshop pointed out the malnutrition problems for the south Asia region and described the importance of food based nutrition programs. This Workshop goes the next step by addressing food based nutrition issues in the Bangladesh context.

Malnutrition is truly the "hidden disaster" which continues to hold back economic development in Bangladesh. With the deaths of 600 children each day and with national stunting levels still close to 60%, the problem is serious. Malnutrition reduces physical and mental growth, adversely affects health and productivity, impacting on the economic development of families, the society and the nation as a Whole. It is the one area in which progress in the Bangladesh context has been particularly slow.

We welcome the steps being taken by the Bangladesh government to implement the national plan of action for nutrition (NPAN). We agree and support the overall goal of NPAN to improve the nutritional status of the people of Bangladesh and to eliminate malnutrition as a public health problem by the year 2010.

As Dr. Norman Borlaug pointed out on his recent trip to Bangladesh, the country's agriculture sector has made substantial progress, especially in food grain production but unfortunately due to the population pressure, progress in other diverse sub-sectors like fisheries, livestock, pulses, oilseeds and horticulture is not satisfactory. Nutrition problems still plague the country.

We have seen the long-term solution to this problem as a food-based approach. Pills and supplements are helpful as short and medium term interventions but for long term sustainable food security, the food-based approach offers the most promise.

We look at food security as having three components, availability, utilization, and access. Bangladesh is nearly self sufficient in cereal production, so with minor imports of cereals and a modest food-aid program availability is partially covered. However, increased production of food and further crop diversification is still required to meet the country's real requirements.

Utilization to us means nutrition. Is the food available nutritious? Cereals provide calories needed for energy, and some protein, but they fail to provide the balanced diet needed to eliminate malnutrition. Availability of other foods such as fruits and vegetables, fish, pulses, oilseeds, poultry and livestock needs to increase to provide balance to Bangladeshi diets.

Access means that people must have the means to obtain the foods, which are available. They need jobs and income to secure the food needed for a healthy diet.

The food-based approach to malnutrition addresses all three components of food security. By increasing production and diversity of foods, availability will increase. By emphasizing production of high value crops, fish and livestock production, the poor will have greater opportunities for employment, increasing their incomes giving access to available food. And finally, by focusing production on food items, which round out and balance diets, malnutrition can be done away with.

We have been supporting food based nutrition programs for several years. We have worked with BARC, research institutes, local and international NGOs and international agricultural research centers to expand production of vegetables and fish. The results are encouraging.

I was recently in the U.S. where I described Bangladesh as having one of most successful vegetable gardening programs in the world. Using an almost self sustaining approach and a far reaching NGO delivery system, more than 600,000 households are involved benefiting more than 3 million people. In addition to providing nutritious food for the families, a large percentage is marketed for income. A recent study about which you will hear later has shown that gardens alone nearly meet the WHO standards for vitamin A. And while Bangladesh have made strides in this area, it has done so using capsule distribution programs. This new information augurs well for Bangladesh being able to develop its own sustainable approach to vitamin A deficiency. Our deputy administrator, Ambassador Babbitt, who will be visiting us on the 8 - 10 May, is very anxious to see this program.

Now, we know what is needed, but how to incorporate the food based approach nation wide? Programs like the Helen Keller international homestead gardening program, ICLARM and AVRDCS work, the activities supported by DANIDA the World Bank and the Department of Agricultural Extension are all good introductory efforts. But more expansion and extension is needed.

Increased collaboration among agricultural scientists, extension workers and the nutritionists is urgent and important. Nutrition education programs at all levels are needed so people can participate in solving the malnutrition problems. Education on how to prepare foods, cooking foods such as Mug beans and high beta carotene tomatoes together resulting in a diet rich in iron, protein, and vitamin A needs further exploration. Better use of local traditional vegetables should be promoted. More efforts to expand crop diversification; especially the provision of fruits and vegetable crops on a year around basis is urgently needed.

Food preservation and storage facilities need a boost so that those foods produced and abundant during certain seasons can be available over a longer period, and so waste and losses can be minimized.

Finally, nutrition is a multifaceted subject. Improvement in nutrition cannot be achieved in isolation. There is a need to greatly strengthen the linkage between the three important sectors concerned with the improvement of nutritional status of the people, namely Agriculture, Food and Health.

The food-based approach is the most sustainable and self-reliant method for the prevention and control of malnutrition in Bangladesh. I encourage the NGO representatives, agricultural scientists, government officials, and donor organizations to keep wearing the nutrition hat as you work to increase agricultural production.

We wish this workshop every success in preparing truly actionable recommendations, which will effectively address this area of problem

Dhannabad, Khuda Hafez.

**Address by Mr. Ove Fritz Larsen, Minister Counselor,
Royal Danish Embassy Dhaka, Bangladesh**

*Mr. Chairman,
Honorable Minister for Agriculture and Food, Matia Chowdhury,
Honorable State Minister for Fisheries and Livestock Mr. Satish Chandra Roy,
Dr. Z. Karim, Executive Chairman, BARC,
Excellencies, Distinguished Guests,
Ladies and Gentlemen.*

Good Morning

It is indeed a pleasure and great honour for me to be present here today in connection with the inauguration of the National Workshop on Food-Based Strategies for Improving Nutrition in Bangladesh. It is also an honour for the Government of Denmark to be associated with this workshop. The workshop is held in connection with the first Nutrition Week in Bangladesh.

The Government of Bangladesh should be commended for putting focus on this important subject of nutrition.

Nutrition is a subject, which in my opinion has been given too little attention, not only in Bangladesh but all over the world. The main subject for discussions when the talk is about food – is normally the calorie intake, very seldom nutrition.

In Bangladesh where approximately 50% of the population is living below the poverty line and a big portion of those are living also below the so-called “hardcore” poverty line, the nutritional intake is even more important. We have a long way to go before everybody in Bangladesh is getting enough to eat, but we can lessen some of the effects if people get better nutritional food than they are getting today.

If we take a look at the children of Bangladesh, surveys have shown that more than 60% of all children are either undernourished or malnourished, which means that more than half of the children is getting a bad start in life. The children are the future of every country in the world and no country can afford to give the future a bad start.

I have been made to understand that the average height of the population in Bangladesh as one of the few countries in the world – is decreasing. We might assume that this is a result of insufficient food and insufficient nutritious food.

From what has just been mentioned, we can see that micronutrient malnutrition is a serious problem in Bangladesh. The primary underlying causes, to this effect, are identified to be low quality diet and lack of nutritional knowledge. In order to address the problem the government has been trying to diversify its agriculture and helping people to meet their basic nutritional needs.

The big task ahead of us is to make food available in sufficient quantities and with sufficient nutritional value.

The Government of Denmark is having the agricultural sector as one of our priority sectors in the development co-operation with Bangladesh. Not only because of the majority of Bangladesh’s population is living in the rural area and dependant on agriculture, but also because that through the agricultural sector it is possible to focus on poverty alleviation and on nutrition.

We are focusing on production of food that will improve the diet quality and nutrition through aquacultural projects with focus on involvement of people from rural areas without land or only small plots of land, through Small Holder Livestock projects with focus on poultry and egg production again involving people in rural areas without land or small plots of land or through home gardening activities with emphasis on growing of vegetables and fruits in order to give people a balance diet. The focus is on increase the production as well as increasing the consumption for the rural poor thus leading to improved nutrition.

We are also focusing on women in agriculture, recognizing the role they are playing in food production and through them increasing the food consumption in their own families, improving the quality of diet and leading to a better nutrition.

We focus on a number of other areas in the agricultural sector, which should improve the food production quantity as well as quality wise.

On research the Government of Denmark is supporting a number of Bangladeshi Ph.D. students and Danish Ph D students through our research program for developing countries. The Students are at present working on various nutritional projects. Some of the results of these projects we might be informed of during the deliberations over the next couple of days.

I am convinced that the present workshop will contribute to a higher level of knowledge about nutrition, of nutritional composition of the food people are eating and let us all work together in getting these information across to the people who will benefit from them.

Let me finish by wishing the workshop the best of success.

Thank you.

**Address by the Special Guest Mr. Satish Chandra Roy,
Honorable State Minister for Fisheries & Livestock, Government of People's Republic
of Bangladesh.**

*Mr. Chairman,
Honorable Minister for Agriculture and Food, Matia Chowdhury,
Distinguished guests and participants,
Ladies and Gentlemen,*

Good Morning,

I feel very proud and glad to be present at the inaugural session of the two days' workshop on "Food-Based Strategies for Improving Nutrition in Bangladesh". The main theme of this workshop is to ensure nutritional development of the people through food-based strategies. The pre-condition of improvement of nutritional level is to ensure balanced diet for everyone.

Ladies and Gentlemen,

It is known to all that the nutrition value of the food, especially consumed by the rural poor is insufficient and unbalanced. The main reason is that our largest share of food comes from rice. According to the specialists, about 65% of calories should come from foodgrains, 20% from protein and the rest 15 % should come from fats and oils. But we get about 84% of our calories from rice. Moreover, our daily animal protein intake is only about 44 g whereas the requirement is 98 g. Therefore, it is quiet clear that we have serious protein deficiency in our daily food intake which affects the growth of physical development.

Honorable guests,

The main sources of animal protein are fish, meat, eggs and milk. These are produced by the fisheries and livestock sector. Therefore, in the context of Bangladesh, the importance of this sector is enormous because, about 30% of the total agricultural production come from this sector. Moreover, about 25% of the rural population earn their livelihood from this sector. The landless, marginal and poor people, and the destitute women of this country earn considerable amount through fish culture, poultry and livestock farming. These help in reduction of poverty as well as alleviation of nutritional deficiency.

Ladies and Gentlemen,

Animal protein is a very important and desired nutrient. Obviously, the production cost of this is more than that of foodgrains. For this reason, animal protein remains beyond the reach of poor people. Therefore, fish production and animal stock are not just needed to increase but also to create employment opportunities and to increase the income level of the poor. In this respect, fisheries and livestock sector can contribute to a great extent.

Respected audience,

In the past, proper attention was not given to the fisheries and livestock sector although it is one of the potential sectors for overall improvement of the country. The present government has identified this sector as a potential area to overcome malnutrition and alleviate poverty in the country. Keeping this in mind, different programs have been taken to increase the production of milk, eggs and meat to meet the protein requirements, to increase the availability of draft power for cultivation and transportation and, to earn foreign currency through the development of these sectors.

Improved breed of livestock, fish production, animal feed, and, better health care and diseases prevention of the animals are the key activities for which human resource development and training of farmers are essential.

Programs are undertaken to ensure the supply and distribution of quality fish fry to solve the problem of intra-breeding. Initiatives have been taken to establish sanctuaries to ensure the growth and sustainable fish production in the open waterbodies. Demonstration farm management activities and training programs have been organized for the fishermen to disseminate the appropriate and sustainable techniques for quality fish cultivation. In addition to these, different areas along the coastal region have been identified as suitable for shrimp cultivation and programs have been undertaken to ensure environment friendly shrimp cultivation. Here, I would also like to mention that the present government has taken initiative to adopt a time-befitting livestock and fisheries policy to accelerate these sectoral development.

Distinguished guests,

The importance of the fish and livestock sector cannot be denied as it helps to alleviate poverty through the creation of employment opportunity and meeting the national demand for nutrition. Thus, this sector cannot be seen as less important than any other agricultural sector, especially the foodgrains sector. All the sectors in agriculture should be given equal priority to guarantee a balance diet for all. The limited land in the country should be used in such a planned way, that the use of land in one sector would not hamper the production in another sector. To meet this challenge, crop diversification and coordinated farming systems must be developed. Moreover, package programs embodying invented technologies for more fish and agricultural production should be disseminated among the poor farmers and fishermen through training to increase their income. In addition to creation of entrepreneurs, these packages should aim at expanding programs to alleviate poverty involving landless and marginal fish and livestock farmers, poor people and, destitute women.

I am very hopeful that, through this workshop we will get time-befitting and realistic policy recommendations which will help in formulating food-based strategies to meet the nutritional demand of the country

I wish the success of the workshop.

Sincere thanks to all.

(Translated from Bengali)

**Address by the Chief Guest Ms. Matia Chowdhury,
Honorable Minister for Agriculture and Food, Government of People's Republic of
Bangladesh.**

*Mr. Chairman,
Honorable State Minister for Fisheries and Livestock Mr. Satish Chandra Roy,
Distinguished guests and participants from local and international agencies,
Ladies and Gentlemen,*

Assalamu Alaikum,

I am happy indeed to be able to attend the National Workshop on “Food-based Strategies for Improving Nutrition in Bangladesh”. It is just the right time to organize such a workshop in the present context of the country’s socio-economic situation. On behalf of the Ministry of Agriculture and Food and myself, I convey my sincere thanks to the organizers of the workshop for their timely step.

We all know that food is of highest priority among all the daily necessities. We need food for living. And for good health we should have nutritious food. Though it is unfortunate, it is true that majority of the people have little knowledge about nutritious food. Besides, most of the people do not have the ability to take adequate nutritious food. For this reason the state of malnutrition is alarming in our country. As a result, the individual’s health and mental development is deteriorating. The impact of malnutrition extends to the family and to the national level obstructing the development process.

Almost all the poor people in the country suffer from malnutrition. The statistics shows that a person needs about 2300 kilocalories per day to maintain his/ her physical fitness. The findings show that, 52% of the population do not have the opportunity to acquire that many calories. All of them are below the poverty level. We can say that about 50% of the population are below the capacity to take needed calorie. The situation is worse in the rural areas. The people suffer from many related effects of malnutrition. The malnutrition has negative effect on child mortality, physical ability, mental growth and development.

Ladies and Gentlemen

The problem of malnutrition is increasing day by day. Our present Government is very conscious about the problem. The “Nutrition Week” being observed throughout the country for the first time during 23-29 April 1998, expresses the determination of the Government. The main purposes of observing the week are to create awareness among the people about malnutrition and inform them of the key food sources for overcoming malnutrition. It is needless to say that until now we are dependent on rice for the supply of energy. Rice may satisfy the appetite, but it cannot provide the necessary proteins needed for health and mental growth. There are many other cheaper food items from which we can ensure the availability of required proteins through effective promotion, development and management. People are being communicated these messages through the “Nutrition Week”. I am happy to know that today’s workshop is also a part of the week. I believe that the workshop will contribute to help reducing malnutrition by introducing alternate food items available in our country.

In this regard I would like to mention that, it is better to take food-based measures rather to take medicinal treatment and curative measures. Because food is the source for living and economic well being. It plays an important role in social, economic, political and national development. Only food can ensure protection against malnutrition and quality improvement.

Therefore, we must develop a proper system for food production, development, storage and management. As the first step, we need to ensure food production and availability at family level. In this context there is no other alternative but agricultural development. The agriculture sector must be diversified for increasing the production of various food items. The program should emphasize the extension of vegetables, poultry and fisheries sector in addition to normal crop production. We must ensure availability of food to the neglected mass through increasing food production.

Ladies and Gentlemen,

The change in food habit is also very important as crop diversification helps to maintain stability in food production and distribution. Our present government has approved national food and nutrition policy and integrated nutrition workplan for the improvement of food and nutrition situation in the country. Moreover, guidelines for balanced food intake have been developed and distributed to create awareness among the people. You would be glad to know that the present government has already approved all the policies related to nutritional development. The Bangladesh National Nutrition Council is being strengthened and expanded for better coordination of different nutritional programs. In addition, “Bangladesh Integrated Nutrition Project” is being implemented with the assistance from the World Bank. It is my firm belief that we will be able to solve the problem of nutrition to a great deal through the implementation of these programs in near future.

Ladies and Gentlemen,

We all know that in the past we achieved a great success in the production of foodgrains. We have also gained success in the fisheries and livestock development. It is a great challenge to achieve a balance between food demand and its production. To encounter the challenge, the private sector must come forward to work hand in hand with the government. I want to give assurance that the government will extend all required support needed to achieve the goal.

Ladies and Gentlemen,

I thank the organizers for arranging such a time-befitting workshop. I also extend my thanks to USAID, DANIDA, and IFPRI for their cooperation. I hope that, the recommendations that will come out of our active participation will be helpful to solve the problem of malnutrition in our country.

With this optimism, I declare the inauguration of this workshop.

Thank you all.

(Translated from Bengali)

**Vote of thanks by Mr. M. Anwar Iqbal, Director, Nutrition,
Bangladesh Agricultural Research Council, Dhaka.**

Mr. Chairman,

*Honorable Chief Guest, Minister for Agriculture and Food, Matia Chowdhury,
Honorable Special Guest, State Minister for Fisheries and Livestock, Mr. Satish C. Roy,
Diplomats and Representatives of various International Agencies,
Distinguished Guests,
Ladies and Gentlemen,*

Assalamu Alaikum,

At the beginning, I would like to thank you on behalf of BARC, USAID, DANIDA and IFPRI for your participation in the inaugural session of this national workshop.

We all know that, malnutrition is one of the major problems in Bangladesh. Food-Based Strategies, in other words, Agricultural sector can play an important role in preventing micronutrient malnutrition.

The presence of the Honorable Minister for Agriculture and Food, Matia Chowdhury in the inaugural session of this workshop demonstrates the importance given by the government on the subject. Honorable Minister, we express our deep gratitude and thanks to you for your kind presence. The importance of fisheries and livestock sector is significant to meet the protein requirements of the country. Honorable State Minister for fisheries and livestock, Mr. Satish Chandra Roy is present amongst us in the inaugural session of today's workshop. We are grateful to him for his kind consent to our invitation. Honorable State Minister, we express our gratitude and thanks to you for your kind presence.

I would like to express honest and sincere gratitude and thanks to the Secretary, Ministry of Agriculture, Dr. A.M.M. Shawkat Ali for kindly chairing the inaugural session of this workshop.

We are grateful to the members of the diplomatic mission and International agencies for their kind participation. We are happy indeed and I must thank Dr. Florentino S. Solon, Executive Director, Nutrition Center of Philippines who is present here to deliver keynote address. USAID, DANIDA and IFPRI are providing us the financial and technical support to organize this important workshop. We owe special thanks to them.

One of the major objectives of this workshop is to create awareness amongst the people about food and nutrition. In this regard, the role of journalists and mass media is crucial. Journalists of different newspapers, Radio & TV reporters extended their full co-operation to us from the very beginning of the workshop. I would like to cordially thank them all.

Officers and Staff of BARC extended their all out help and co-operation in organizing this workshop. I would like to express gratitude and thanks to all of them.

I would like to thank the honorable guests, participants of the workshop and experts for their kind presence.

Ladies and gentlemen, I would like to thank you all once again.

Khuda Hafez

TECHNICAL SESSION I : BACKGROUND INFORMATION ON NUTRITION AND AGRICULTURE IN BANGLADESH

Abstracts of papers presented

1. Extent and Trends in Malnutrition in Bangladesh

Dr. Nazmul Hassan

Institute of Nutrition and Food Science
University of Dhaka, Bangladesh

Malnutrition is widespread in Bangladesh. Theoretical considerations and empirical studies have identified several food and non-food factors to be the major constraints to better nutrition. The present paper relates to the former sets of constraint and deals with the quantitative aspect of the nutrition problem. Attaining self sufficiency in food for its fast growing population is the most critical challenge that Bangladesh has been facing with since its independence a quarter century ago. Successive five-year plans have accordingly set this to be one of the major goals of development, but so far only moderate progress has been achieved. There is still much to be done to attain this goal. This paper, to this effect, attempts to find out the existing inadequacies in the agricultural production to meet the nutritional requirements of its population in the light of past production performance and tries to identify the issues that agriculture will face for sustainable nutrition security of our population. In addition it will focus on the trends in malnutrition in terms of both input and outcome based indicators of nutritional status. The present analysis is based on the data from the Bangladesh Bureau of Statistics; large-scale nutritional surveys and micro studies.

2. Current and Future Trends in Food-Production and Consumption in Bangladesh.

Dr. M A Razzaque & Dr. Indrajit Roy
Bangladesh Agricultural Research Council
Dhaka, Bangladesh

The paper examines the scenario of food production in the country in the context of increasing demand for different food items and providing a nutritionally balanced diet for the population. The potential of growing non-cereal crops and options for their increased production has been discussed. The strategies for improving productivity of pulses and oilseed crops have been presented in detail. In attempts at diversification of food emphasis has been given on land and water use planning and changing of food habits.

3. Conceptual Framework for Agriculture and Nutrition Linkages.

Dr. Howarth Bois,
Research Fellow, IFPRI
Presented by
Dr. Benedicte De la Brier
Research Fellow, IFPRI

This paper review the important links between agriculture and nutrition and in doing so tries to elucidate what is known about the linkages between agricultural research, technological change in agriculture, and nutrition. A schema outlined the broad linkage between agriculture and the health and nutritional status of individuals, highlights the policies on which this paper focuses. There are three main pathways through which agricultural policies and programs influence the nutritional status of individuals: (1) in creased incomes and lower food prices, which permit increased food consumption; (2) effects on the health and sanitation environment at the household and community level, which may increase or reduce morbidity; and (3) effect on time- allocation patterns, particularly of mothers, which increase or reduce time spent on nurturing activities-time that is often related to women's control over household income and is an important determinant of women's nutritional status. Progress in nutritional improvement can be achieved only if progress in agricultural development is sustained.

Comments from the participants

The session was chaired by Prof. Harun K. M. Yusuf, Dhaka University. The discussion centered on the scenario of the production of cereals and vegetable. Dr. Singh noted that the trends in production of vegetable were positive but lack of awareness was responsible for low consumption. Dr. S.M. Monowar Hossain added that some of the vegetables showed a positive trend, while others had negative trend in terms of production. He also mentioned that farmers grew vegetables only if they found it profitable.

It was also remarked that surveys should include different income groups as well. Apparently, as income goes up, intake of vegetable goes down. This happens for two contrasting reasons: a) there is no money for vegetable, b) vegetables are not viewed as status food.

Dr. Razzaque noted that post harvest losses had tremendous impact on the level of food availability. Dr. Halim agreed that post harvest losses were important.

There was a discussion on the general need for agricultural research and the kind of research needed. Dr. Razzaque noted that the research done so far concentrated on favorable areas only and that it would be important to expand it to other problem areas like saline, coastal, and hill areas. Mr. Latif reiterated that the contribution of research institutes has been tremendous and that the research on hybrid technology for rice, maize and wheat are very important and that high level of production for rice with new technologies would be possible.

During a discussion on the third paper, it emerged that the production and consumption figures from BBS were not consistent with the data collected by sources like DAE, BIDS etc. It was asked to Dr. de La Briere if that was apparent in her analysis. The answer was that the data for villages in Manikgonj from Ganokalyan Trust were not at the national level. It showed that vegetable consumption increased and the households sold the surplus. The apparent conclusion was that if the technology was available households could increase the production and consumption of vegetables. With respect to the issue of iron and mineral consumption it was asked if fruit consumption could mitigate the problem. The answer from Ms de La Briere was that she had not looked at the data, but this was an important area of investigation and she hoped that agricultural intervention, like the adoption of vegetable in Manikgonj & Mymensingh, could help to mitigate iron and vitamins deficiencies.

The Chairman remarked that the availability of iron from plant sources (rice, wheat, fruits and vegetables) was poor, which could be improved by increasing intake of vitamin C simultaneously. He mentioned that for an effective mitigation of iron deficiency problem, consumption of animal protein must be increased side by side with increase of intakes of fruits and vegetables.

TECHNICAL SESSION II: VEGETABLES RELATED STRATEGIES**Abstracts of papers presented*****4. Strengthening Home Gardening in Bangladesh***

Mr. A. Zaman Talukder
Helen Keller International
Dhaka.

Malnutrition is a serious public health problem in Bangladesh. It retards child growth, increases the risk and duration of illness, reduces work output, and slows social and mental development. Malnutrition among women of reproductive age increases the risk of mortality during labor and delivery and puts their newborn children at risk of long-term deficiencies.

Diet diversification is arguably the most sustainable and affordable action to improve nutrition for the majority of the population, particularly for the poor. For poor households, vegetables and fruits are often the only reliable source of micronutrients in the family diet. The production of fruits and vegetables provides the household with direct access to important nutrients that may not be readily available or within their economic reach. Moreover, home gardening increases the diversity of foods available to the household which, in turn, leads to better utilization of nutrients, including calories. Recent findings from the National Vitamin A survey in rural Bangladesh demonstrate the important role of home garden in the prevention of vitamin A deficiency. The rate of night blindness (clinical vitamin A deficiency) among children from households with a garden was lower than for those from households without a garden. The average vegetable consumption in Bangladesh has been estimated at 32 gram, below than the estimated minimum intake set by FAO of 200 grams per capita per day. For the past 8 years, HKI has promoted a large-scale home gardening program that has covered poor households in 120 rural sub-districts of Bangladesh. This program which began as a pilot project involving 150 families, now targets more than 600,000 households throughout the country. The project includes a system to collect quantitative data to monitor project activities. Based on our experience, five key elements have been identified as being crucial to successful home gardening.

The first element is that community-based services to support home gardeners are essential for them to increase their production of vegetables. Community-based services to provide essential supplies such as seeds, seedlings and saplings, tend to encourage the production of vegetables and fruits throughout the year. Project experience suggests that community members, especially poor women with limited opportunities to earn their own income, can be trained to effectively produce high quality seeds in a nursery thereby spreading gardening to

other community members who purchase seeds from nursery holders for their own home gardens.

The second element is involvement and participation of the community in project design, implementation and evaluation. Having two-way channels for information exchange is instrumental for achieving sustainable and improving gardening practices.

The third element is technical assistance and training is important for gardening when new techniques are being promoted such as new or increased number of varieties or year round production.

The fourth element is nutrition education and social marketing for promotion of vegetable consumption within the gardening activity. Experience shows that counseling change feeding/eating behavior is generally an important component of food based strategies.

The last key issue is regular monitoring of the gardening activities. Monitoring serves as a tool for ensuring that activities are carried out as planned and to improve performance as required. It facilitates the identification of problems and the development of solutions based on sharing between the beneficiaries and the program managers.

5. Improving Nutrition through Increased Vegetable Production in Bangladesh.

Dr. D.P. Singh

Asian Vegetable Research and Development Centre
Dhaka office

The author brought about the importance of vegetables in human diet in Bangladesh. Intensive vegetable production is imperative for nutritional security, employment generation, poverty alleviation, increase farm income and export possibility. The production has to be increased from lesser land holding with limited water, nutrients and pesticides. The author further described significant achievements made in developing improved varieties of different vegetable crops, some even with very high beta-carotene contents (tomato). Major constraints that are prevailing were described viz. seasonality, abiotic stress & natural calamities, biotic stress, post harvest handling, pesticide residue, poor data base, lack of coordination etc. It was suggested that the research aspects might be prioritized involving the whole NARS. The research needs like diversification, biotechnology protected cultivation, hybrids, hydroponics for urban & periurban areas, integrated water nutrient management & IPM for major crop pests. For transferring the technology there is a great need of functional partnership with NGOs and private sector. The regular feed back is key factor for the success of transfer of technology.

Comments from the participants

Dr. S.M. Monowar Hossain chaired the session. Mr. Latifur Rahman asked Mr. Zaman about the coverage of households for homestead gardening. Mr. Zaman answered that at that time one third of the Thanas in Bangladesh were covered. Mr. Azad asked about the nutrient value of products consumed by the households and the prevalence of vitamin A deficiency in the project areas and how they compared to other countries. The answer was that they did not have specific data. He emphasized on nutrition education for households.

Dr. Majed asked if biotechnology and hybrid varieties were required and whether they were suitable in Bangladesh. Dr. Singh answered that he agreed to some extent that hybrid varieties were required, though biotechnology at this time was not very practical.

The chairman Dr. S. M. Monowar Hossain made following remarks:

- a) Research / intervention/ technology should be specific and region based.
- b) The present intake of vegetable was only 30 gm/capita/day.
- c) Diversity of vegetable production in terms of spices and variety according to different seasons should be initiated.
- d) β -carotene enriched tomato variety should be included in homestead approach to overcome vitamin D deficiency.
- e) Home gardening was an integrated approach of Agriculture/ Livestock, Poultry etc.
- f) Community based support services/ nursery and technical assistance were needed.
- g) Nutritional education and awareness programs to increase the intake of vegetable should be enhanced to reduce malnutrition.

Two issues were raised for the group discussion in the second day: (i) cooking practices; (ii) residual effects of pesticides.

TECHNICAL SESSION III: FISH RELATED STRATEGIES**Abstracts of papers presented****6. Culture Of Mola (*Amblypharyngodon Mola*) In Polyculture with Carps in Small Seasonal Ponds**

Ms. Nanna Ross

Research Department of Human Nutrition
The Royal Veterinary and Agricultural University

Small indigenous fish species (SIS) play an important role in the diet of the rural population in Bangladesh, not only as an animal protein source, but also as a source of a range of other essential nutrients, such as vitamin A, calcium and iron. Some SIS such as mola (*Amblypharyngodon mola*) is particularly rich in vitamin A (2000 RE/100 g raw edible parts). While other common SIS (for example puti (*Puntius ssp.*) and chanda (*Chanda ssp.*)) and carps contain insignificant amounts of vitamin A. Since, small fish are normally eaten with bones; they are also an important source of calcium compared to larger fish.

SIS aquaculture is suitable for home consumption since frequent (weekly or even daily) harvesting of small amounts of fish is possible because many of these fish species reproduce easily in the pond. By culturing SIS in polyculture with carps, the household can get double benefit. The household can increase nutrient intake by consuming the SIS, and at the same time increase income by selling carps. The culture of SIS can be compared to home gardening with regard to the beneficial effect of increasing food and nutrient intake since SIS are rich in minerals and vitamins. A steady supply and intake can improve the nutritional quality of the diet.

In May 1997 to February 1998, a field trial on polyculture of SIS and carps were conducted in Kishoreganj district, north-eastern part of Bangladesh. The aim of the field trial was to investigate the production potential and resource management of SIS-Carp polyculture in small seasonal ponds, and to survey the nutritional impact on farmers' families. Fifty-nine small seasonal ponds (212-850 m²) belonging to poor or marginal farmers were stocked with silver carp (*Hypophthalmichthys molitrix*), grass carp (*Ctenopharyngodon idella*), mrigal (*Cirrhinus mrigala*) and rui (*Labeo rohita*) in the ratio 8:4:4:1 and a density of 8500/ha. Thirty-four of the ponds were treated with rotenone and adult mola (25000/ha) from local supplies were stocked in polyculture with the carps (mola model). Twenty-five of the ponds were not treated with rotenone and native stocks of different SIS were left in the pond (mixed model). The culture period ranged from 181 to 240 days. The ponds were managed with low input of cheap, local feed (rice bran, duck weed, banana leaves) and fertilized with cow dung, urea and TSP.

The average production period was 7.0 months. There was no significant difference in the total fish production between the two production models, being 2.8 and 2.9 t/ha/7 months in the mola and mixed model, respectively. The carp production (silver carp, grass carp, mrigal and rui) was 2.4 t/ha/7 months in both mola and mixed model, with a non significant higher production of silver carp in mixed model ponds, and a non significant higher grass carp production in mola model ponds. Mola production was significantly higher ($p < 0.001$) in the mola model ponds (0.27 t/ha/7 months) than in mixed model ponds (0.04 t/ha/7 months) while production of other SIS was significantly higher ($p < 0.001$) in mixed ponds (0.41 t/ha/7 months) than in mola ponds (0.07 t/ha/7 months). The highest mola production obtained was 0.8 t/ha/7 months. However, the total production of all SIS was not significantly different; 0.34 t/ha/7 months in the mola model and 0.45 t/ha/7 months in the mixed model.

In the mola model, mola contributed with an average of 10.3 % of the average fish production; 2.9 % of the production was other SIS, which had entered the pond after rotenone treatment, most probably together with duckweed collected in rice fields.

In the mixed model, native mola contributed with 2.7% of the total fish production and other SIS with 13.5%. There was no clear co-relation between the carp production and the SIS production in the ponds, indicating that there is no negative or positive impact of SIS on the carps in the production models. The average profit was 770 US\$/ha/7 months, with no significant difference between the two production models.

Findings of the field trial as follows:

Mola production in the mola-carp polyculture in a small seasonal pond can cover as much as 50 % of the annual vitamin A recommended for a family of 6 persons, and at the same time income can be generated from the carp production.

The native stock of SIS can contribute significantly to the fish production and should always be protected. However, more nutritional benefits can be obtained by stocking SIS which have high vitamin A and mineral density.

Mola is a promising fish specie for culture in small seasonal ponds. It shows good production potential and tasty and nutritious.

Further data analysis will cover more details on fish production, pond ecology, seasonal variation in fish consumption and nutritional importance of fish species.

7. Studies on the Production Performance of some Small Indigenous Fish Species (SIS) in Bangladesh

Dr. M. Akhteruzzaman
Senior Consultant &
Raymond Anthony Felts
Francois Rajts
A. Malek Khan and
K.H. Arif

Integrated Food Assisted Development Project
(IFADEP) SP- 2, Dhaka

The small indigenous fish species (SIS) of Bangladesh are generally considered to be those fish, which can grow to a length of approximately 2-20 cm. at maturity. Some small indigenous species have high nutritional value in terms of both protein content and the presence of micro-nutrients, vitamins and minerals not commonly available from other low cost of foods of Bangladesh.

In the past, small species were abundant in the rivers, beels, jheels, canals, streams and ponds of Bangladesh. SIS were commonly caught by the large number of fishermen who were living in subsistence level. That was a major source of their protein intake. Since 1960's the production of small indigenous species has been decline despite their ability to reproduce quickly and withstand poor environmental conditions. Small indigenous species can be grown in ditches and shallow ponds, which are cheap to construct and approximate to the natural habitat of the fish.

Many research has been done into the culture of Indian major carps and Chinese carps, including induced spawning, selective breeding to produce hybrids with rapid growth characteristics and methods of polyculture but there is no serious attempt has been made to culture small fishes in Bangladesh or elsewhere. These small fish species offer tremendous potential both for restocking of open waters and for pond aquaculture. Taking all of the above into consideration, the 5 (five) species viz. Bata (*Labeo bata*), Bhagna (*Cirrhinus reba*), Mola (*Amblypharanygadon mola*), Punti (*Puntius sophore*)m Foli (*Notopterus notopterus*) were chosen for the study.

The trial was conducted for a period of eight months from May to December 1997 in the IFADEP- SP-2 Field Trial Centre of Jhenaidah, Natore and Rajshahi. Four different trials were undertaken, viz. Trial-1 was carried out with polyculture of Mola, Bata and Bhagna at a density of 10.2 and 1/m² (representing a stocking density of 1,30,00/ha) respectively. Trial-2 was carried out with mixed culture of Punti, Bata, Bhagna and Mirror carp at a density of 1.5, 2.1 and 0.2/m² (representing a stocking density of 47,000/ha) respectively. Trial-3 was carried out with Foli and GIFT Tilapia at a density of 1 and 0.5/m² (respectively, a density of 15000/ha) respectively. Trial-4 was carried out with mixed culture of Bata, Raj punti and Catla at a density of 3.1 and 0.2/m² (representing a stocking density of 42000/ha). The all four

trial were undertaken with supplemental feed comprising of rice bran and mustard oil cake (1:1 ratio) daily and pond were also fertilized with both organic (cowdung) and inorganic fertilizers (Urea and TSP, 1:1 ratio) at the rate of 20 kg and 2 kg/ha/day respectively. Fishes were harvested after 8 months rearing.

The total production ranged from 3043.67 kg to 4170.0 kg/ha with an average total production of 3728.4 kg/ha/8 months was obtained in polyculture of Mola, Bata and Bhagna (Trail-1). The yield of Punti, Bata, Bhagna and Mirror Carp (Trial-2) was ranged from 3308.5 kg to 5280.0 kg/ha with an average production of 4260.5 kg/ha/8 months. The average production of 2855.85 kg/ha was obtained with a mixed culture of Foli and GIFT, which was ranged from 1857.7 kg to 3860.0 kg/ha/8 months (Trial-3). The production of Bata Raj Punti and Catla was ranged from 1320.64 kg to 5640.60 kg/ha/6 months with an average production of 3323.6 kg/ha/6 months (Trail-4).

It is assumed that the production of SIS can be increased if proper management can be undertaken.

8. Nutritional and Economic Impact of Community Management Fisheries.

Mr. M. Mokleshur Rahaman
Center for Natural Resources Studies
Dhaka.

The paper presents the findings on the impact of various community-based fisheries management approaches being taken up and tested by the government and NGOs with active participation of local community including the traditional fishers. The approach is being tested in various types of water-bodies such as open beels, semi-closed beels, baors and rivers. The methodology and approach found to vary by water-body types as well as by locations. This paper highlighted some of the example of sites of open beel, semi-closed beels and baors. Also discussed about stocking approach and non-stoking approach for fisheries enhancement and management. Some of the results from stocking based baors and semi-closed beels and ecological based non-stoking open beels are also presented in this paper. In all the cases, enhancement of fish production and income of the local community was observed.

The findings of the various community-based fisheries management approaches showed positive results in terms of protection and management of aquatic resources with equitable distribution of benefits among the poor groups. From the ecological point of view, the intervention packages planned and implemented jointly with the local community found to have no adverse impact on the ecological functions and social systems. Rather the project

shows increase abundance of fish species some of which were almost absent in the demonstration sites before the implementation of the project. The project also proved to be a cost-effective way of protection and sustainable management of floodplain fisheries resources management. However, it would take time to standardize the management regime for various types of water-bodies located in different floodplains. Fish habitat restoration and enhancement through community managed approaches should be replicated in other floodplain sites. However, the success and future development of community managed approach would largely depend on the political commitment and co-operation among the ministries particularly the MOFL and MOL as well as between DoF-NGOs-Fishers community.

Comments from the participants

The chairperson Mr. Mirza Altaf Hossain remarked on the importance of transferring technologies to the beneficiaries in time. At the same time motivational programs should also be taken into considerations.

The participants raised several queries on the needs to increase fish production and consumption to meet the gap of protein requirement and the possibilities of using homestead ponds. It emerged from the discussion that there were some important issues that needed to be considered in order to increase production and consumption of fish. The issues listed were:

- a) Availability of fish seeds for small fish culture;
- b) Need for fish hatchery development;
- c) Utilization of homestead ponds;
- d) Utilization of small fish culture in rice field;
- e) Capture fisheries versus man made fisheries;
- f) Conflict in land use;
- g) Use of insecticides.

TECHNICAL SESSION IV : POULTRY AND OTHER FOOD STRATEGIES

Abstracts of papers presented

9. Semi -Scavenging Poultry Production in Household Nutrition: An Experience of Small-Holder Livestock Development Project (SLDP)

Dr. S. M. Ataur Rahman
P. S. O. BLRI Savar, Dhaka

SLDP has made a positive impact on the income of the beneficiary households. As income increased the member household invested a part of it in land, in livestock production, in improvement of houses and moveable properties and invested in human capital, which indirectly added to household nutrition. Moreover, 97.50% of beneficiary reported socio-economic improvement after the introduction of SLDP. Direct benefits of SLDP on household nutrition from the increasing intake of food items in their daily dishes of foods. It is observed that home-consumption of grains, eggs, chicken, meat, fish, vegetables and milk have remarkably increased after membership. Therefore, SLDP should be expanded in other parts of Bangladesh. Integration of other livestock species into the model, such as dairy cows, goats and ducks etc. is suggested to increase the income of the beneficiary household, which in turn, directly or indirectly would help to improve nutritional status of those families.

10. The Role of Fruits, Pulses, Oilseeds, Spices and Vegetables in Improving Nutrition Status in Bangladesh

Dr. M S Islam

Director

Mr. M J Hossain

Senior scientific Officer

Bangladesh Agricultural Research Institute

Joydebpur, Gazipur

The roles of fruits, pulses, oilseeds, spices and vegetables in improving nutrition status in Bangladesh have been initially reviewed. Fruits, spices and vegetables are the major sources of vitamins and minerals while oilseeds supply oils (major source of fats) and pulses supply cheapest sources of protein. Specific functions of protein, carbohydrates, fats, vitamins as well as mineral salts in human nutrition have been described. Contribution of different vegetables, fruits, spices, tuber and roots in supplying nutrients have been shown in various tables. Daily nutrition requirement of different categories of people have been estimated and

suggested to take to maintain a healthily, stout and energetic body. Topmost priority should be given to nutrition program which can make the rural people interested to grow nutritious vegetables, fruits, species etc on their homesteads and aware of taking cheap but nutritious food.

Comments from the participants

The session was chaired by Mr. M.A. Mannan, Secretary, BNNC. Dr. Monowar Hossain advised on the necessity to introduce those vegetable varieties that were not destroyed by poultry. Mr. Aminuzzaman mentioned that crude fibers should be included in our diet, because fibers used to play a very important role for clearing bowel and toxic substance from human body, which helps to prevent colon cancer. He also asked if there were any groups of poultry sellers. In replay to questions from the floor it was noted that there were no groups of poultry seller. Private veterinarians in the area vaccinate the poultry. It was however not clear how the poultry droppings were utilized.

Mr. Latifur Rahman questioned why the consumption of vegetable was not increased among the SLDP members? The answer was that local people prefer buying expensive food items like, animal protein, rather than buying vegetables when their income increases. But Dr. Monowar said that since poultry destroy vegetable gardens that might be the reason of reluctance on the part of SLDP farmers to grow vegetables. In response to a question, it was stated that test of the nutrient content of local fruits was done locally by BARI.

The discussion concluded that:

- ❑ Homestead production of vegetables, fruits, oil seeds & pulses should be increased to alleviate nutrition status of people, with special emphasis to children and pregnant women of Bangladesh.
- ❑ At village level each family should be provided with training on nutrition to make the people interested and aware of consuming cheap but nutritious food.

TECHNICAL SESSION V : STRATEGIES FOR STAPLES AND LIMITATIONS OF STAPLE BASED DIETS**Abstracts of papers presented****11. Enrichment of Food Staples through Plant Breeding: A New Strategy for Fighting Micronutrient Malnutrition¹****Dr. Howarth Bouis**

Research Fellow, IFPRI, Washington, D.C.

Presented by

Dr. Craig A. Meisner

CIMMYT, Dhaka

Taken together, mineral and vitamin deficiencies affect a greater number of people in the world than does protein-energy malnutrition. If farmers could be induced to grow commonly eaten food staple crops that fortify their seeds with essential vitamins and minerals, a significant, lower cost improvement in human nutrition might occur.

12. Nutrient Densities in Bangladeshi Rice**Dr. Nurul H. Choudhury**

Bangladesh Rice Research Institute

Joydebpur, Gazipur.

Rice comes from more than 50 modern varieties and thousands of local cultivars varying in nutrient densities constitute major portion of diet in Bangladesh. Starch content is similar for most of the varieties and energy content is around 356 Kcal/g. Rice starch is almost 100% digestible. Most rice has more than 25% amylose making them slowly digestible giving low glycaemic index. Protein is the second largest component varying from 7-8% in most of the varieties although a few varieties have as much as 10% protein. Lysine is the first limiting amino acid of rice protein and its content varies from 2.5-3.5 mg/g protein. True digestibility (TD), biological value (BV) and net porting utilization of most of the rice varieties vary from 94-97%, 76-80% and 70-75% respectively. Some high protein rice shows low values for all these parameters. Rice is also rich in B vitamins particularly in thiamin, riboflavin and niacin. Vitamins A and C are absent in rice. It is also rich in iron but bioavailability is poor due to presence of phytic phosphate. More than 50% vitamins and minerals are lost during milling and cooking of rice.

¹ This review was adapted from SCN news, publish by the United Nations Administrative Committee on Cooperation- Subcommittee on Nutrition.

13. Importance of Diet Diversity for Improved Nutrition

Dr. Shakuntala H. Thilsted

Research Department of Human Nutrition
The Royal Veterinary and Agricultural University

In Bangladesh, local food production is closely linked to food intake and therefore the foods which are eaten, especially by the rural poor depend on the locality and season. Rice is the main crop and the major food eaten, at least twice every day. With rice, small amounts of vegetables, roots and tubers and fish are eaten. In addition, even smaller amounts of pulses, spices, fruits and oils are consumed. Rice contributes with over 80% of the total energy intake and 60 % of the total protein intake. Nutrients, such as vitamin A, vitamin C, calcium, iron and zinc not found in rice or found only in small amounts must be supplied by the other foods. Since few other foods are eaten in very small quantities, the nutrient densities of these foods must be high in order to meet the recommended intakes.

A food consumption study conducted in Manigonj in 1995/96 showed that in October/November, the average total vegetable intake was 129 g raw edible vegetables/person/d, of which 30 g (23%) were green leafy vegetables (GLV). Vegetable intake was higher in February/March; 216 g raw edible vegetables/person/d, but with no increase in the GLV. A greater intake of GLV, also in relation to total vegetable intake will increase the diet diversity and at the same time better meet the needs for essential vitamins and minerals. The average total fish intake was 55 g raw edible fish/person/d, of which small fish made up 28 g (51%), contributing considerably towards the diet diversity. Some of these small fish can supply large amounts of vitamin A, calcium, iron and zinc. For example, an intake of 28 g/d of mola (*Amblypharyngodon mola*) will meet the full Vitamin A recommended dietary allowance of a 4 - 6 years old child. Thus greater diversity in the diet, especially in nutrient dense GLV and small fish will supply more essential nutrients, leading to improved nutrition. In Bangladesh, focus should therefore be given to agricultural systems that prioritise increased production of GLV and small fish.

Comments from the participants

Professor Md. Shams-ud-din chaired the session who noted that zinc was one of the micronutrients and asked whether its deficiency was a problem or not. He also asked whether increase in zinc content would affect the contents of other nutrients. It was answered that zinc was a very important element for human nutrition. Its requirement was very low and as such, deficiency symptoms were not yet evident in Bangladeshi population. Increased content of any mineral might affect other nutrients. Therefore, this subject should be investigated further. Small amount of zinc content would not affect rather improved the diet said by Dr. Monomer. He also added that further testing would be required.

In reply to a query, Dr. Moister said that breeding of vitamin denudes varieties of staple food crops would be useful and important for low cost and sustainable alternative towards reducing micronutrient deficiencies.

Mr. Aminuzzaman asked whether loss of thiamine from parboiled rice was less in modern milling than from non-parboiled rice. The reply was that thiamin loss was lower in parboiled rice than in non-parboiled rice.

Mr. Latifur Rahman asked if there were any studies/analysis done on nutrient availability in our diet (rice, vegetables, wheat etc) after consumption. The answer was negative.

Dr. Monowar Hossain informed the audience that the protein content of Hobigonj rice variety was very high. That was a local variety known differently in different areas.

It was asked that whether yields of green leafy vegetable (GLV) increased during Oct-Nov as reported. The answer was that the information so far collected from Oct./ Nov. and Feb/ March confirmed that.

KEY NOTE SPEECH

THE FOOD-BASED APPROACH TO PREVENTING MICRONUTRIENT MALNUTRITION IN THE PHILIPPINES: PRIVATE SECTOR INITIATIVES

Dr. Florentino S. Solon

President and Executive Director
Nutrition Center of the Philippines
Manila, Philippines

As we proceed with our campaign against micronutrient malnutrition, it may be appropriate to review a few fundamentals. In this way, we may be able to have a better appreciation of the perspectives from which we pursue our food-based undertakings.

Let me cite, in this regard, the summary report of the 1995 international workshop on Food-Based Approaches to Preventing Micronutrient Malnutrition held in 1995. The report presents a system model for food-based strategies, which shows where food systems - production, acquisition and utilization of food - affect human nutrition and health. As described by the report, these food systems are composed of complex and varied elements (labor, capital, knowledge, seed stock, etc.) and have sub-systems which cover a wide range of activities from the growing of food plants and the physiologic utilization of nutrients derived from these foods.

Under food production, for instance, are activities related to land use and tenure, soil management, crop and livestock breeding and management, and harvesting. Food acquisition concerns post-harvest activities (processing, transport, storage, marketing, etc.) while food utilization has to do with preparation, processing and cooking of food, including food decision-making, preferences and cultural influences and access to health care, sanitation, energy and knowledge. These food-subsystem components are said to be often overlapping and interlinking, in that cropping systems under food production, for instance, are directly affected by marketing conditions under food acquisition which also influence household food decision-making in food utilization.

The report likewise presents several environments surrounding these food systems, as follows: bio-physical (e.g. location, climate, soil type); social (customs and traditions); economic (cost of food, shelter, labor, etc.); public health (health care, disease exposure, water quality, etc.); and policy (government subsidies, incentives and disincentives).

The system is similar in presentation to the basic concept of nutrition, which is defined in *Nutrition and its Disorders* (McLaren & Meguid, 1988) as "the process by which the organism utilizes the nutrients in food". The concept presented in the book is that of an Agent-Host-Environment system wherein the Host is the human body; food is that part of the Environment normally consumed; and the Agent (or Nutrient) is that part of the food which nourishes. Nutrient is described as consisting of macronutrients (carbohydrates, fats

and proteins) and micronutrients (vitamins and minerals).

These systems concepts provide the framework for a food-based approach to the prevention of micronutrient malnutrition, as actively pursued in the Philippines by non-government and other private organizations in coordination with the national and local governments.

Allow me to present some of the initiatives in this approach undertaken by the Nutrition Center of the Philippines (NCP) as a member of the private sector.

Micronutrient malnutrition in the Philippines

Four nationwide nutrition surveys conducted in 1978, 1982, 1987 and 1993 by the Food and Nutrition Research Institute of the Department of Science and Technology revealed the extent of the nutritional inadequacy, in quantity and quality, of the Filipino diet.

The picture of micronutrient deficiency is particularly disturbing. The 1993 survey shows the following data: 1) about 20 million Filipinos suffer from iron deficiency anemia, 2) the average prevalence rate of goiter among 7-year-old school children and among pregnant and lactating mothers is 6.9%, and 3) vitamin A deficiency, as shown by the blood level of preschoolers in 11 out of 15 regions, is prevalent particularly in depressed urban and rural communities. We have given priority attention to the deficiencies of these three micronutrients - iron, iodine and vitamin A - because they seriously affect the survival and development of our women and young children.

The survey data also reveal that micronutrient intake of Filipinos is short of the recommended daily intake by 20% for vitamin A and 40% for iron (with low bio-availability because the food sources are of plant origin)

As in other countries, strategies adopted to combat micronutrient deficiencies in the Philippines include the following:

- 1) dietary diversification/ nutrition education i.e. effective changes in dietary behavior through information, education and communication;
- 2) food fortification i.e. addition of micronutrients to food to enhance its quality;
- 3) vitamin and mineral supplementation; and
- 4) public health and disease control measures.

Our interest here is in the first two interventions, which are food-based strategies designed to increase the intake of micronutrient-rich food.

First, a word on the organization I represent. The Nutrition Center of the Philippines is a private non-stock, non-profit foundation established on July 2, 1974 to assist in the national effort to improve the nutritional status of the country's population.

The Center has a three-fold mission:

- i. mobilize resources from private and other sectors in support of the national nutrition program through direct participation or financial/material assistance;
- ii. implement programs and projects that will raise the nutritional status of the Philippine population; and
- iii. contribute to manpower development in the field of nutrition and related concerns.

To fulfill its mission, the Center has adopted the following thrusts:

- i. undertake nutrition programs and projects that can serve as models of efficient and effective delivery systems;
- ii. conduct research and evaluation on the efficiency of field operations and impact of selected NCP projects;
- iii. serve as a training center for nutrition program planners and implementers from the Philippines and other developing countries in Asia and other parts of the world;
- iv. intensify the information, education and communications effort to increase nutrition knowledge and promote change of nutrition behavior among the target populations; and
- v. promote the integration of plans and programs of key sectors of national development.

The following are some of the Center's projects on Dietary Modification/ Nutrition Education:

Teacher-Child-Parent (TCP) Project. The TCP is an approach to health and nutrition education in elementary schools, using an organized system of relaying messages from school to the home, with the pupil serving as the communication channel. Messages are integrated in the school curriculum and designed not only for the child's learning but also for practical application at home through suggested activity exercises for parents and other family members.

These activities are incorporated in modules designed to guide parents and pupils as well as teachers in school and homeyard food production, among other food-based projects. The principal messages relayed to parents concern home and community food security, specifically the promotion of bio-intensive and other methods of gardening designed to increase production of nutritious fruits and vegetables at home and in the community. TCP encourages the setting up of a barangay nursery and communal garden, and facilitates, in coordination with the Department of Agriculture, the distribution of planting materials to target families.

Started in the early '80s as part of a follow-up NCP information package for a Nutrition Information Series for Teachers (NIST), the TCP is now a project of the Department of Education, Culture and Sports (DECS) with NCP still providing technical assistance. It has been institutionalized in the national educational system and has expanded its modules to facilitate the integration of nutrition concepts in the elementary school curriculum at different grade levels (3 to 6). It is a program component of the "Education for All" program in the Philippines, which was promulgated by Presidential Proclamation 480 for nationwide implementation

MACK-P Promotion: A brief but intensive social marketing campaign using a multi-media approach and supported by the community and local government can have a significant influence on food choices, consumption and production. This was the finding of a communication research study in the early 1990s which sought to increase by 25% the consumption of MACK-P (malunggay, alugbati, camote tops, kangkong and pechay) or the vitamin A-rich green leafy vegetables commonly grown in the country. With NCP as project manager, the study was conducted in collaboration with the 'Vitamin A Expert Group (VAEG) of the National Micronutrient Action Team under the National Nutrition Council, Academy for Educational Development, Inc. in Washington D.C., U.S.A and the city government of Cagayan de Oro in Northern Mindanao where the social marketing project was carried out. Primary target groups of the social marketing campaign were 1-6 year-old children, school children and their parents, and pregnant and lactating women. The project used a media mix of radio (the primary medium), TV, cinema and interpersonal communication, backed up with merchandizing activities and non-traditional use of radio (interview, live coverage, etc.).

The project objective was significantly achieved among preschoolers and pregnant and lactating women in the area covered by the campaign.. Results confirmed the importance of the role of mass media in promoting health and nutrition, and of the active participation of teachers, schoolchildren and parents in the campaign for home consumption and production of vitamin A-rich vegetables. The study also showed the sufficiency of indigenous plant foods to meet vitamin A needs especially in many rural areas in the country where animal sources of preformed vitamin A are expensive or not readily available. It demonstrated the effectiveness of, and the need to encourage, concerted interpersonal efforts of various sectors at the local government level.

Use of Stable Isotopes in Vitamin A Studies. Part of the general effort against vitamin A deficiency, this study was started in 1996 as a joint undertaking of NCP and the Human Nutrition Research Center on Aging at Tufts University in Boston, Massachusetts, USA. The stable isotope dilution method is designed to measure vitamin A status through a quantitative estimate of total body stores of vitamin A. It is considered the most promising indirect approach to vitamin A assessment.

Specifically, the study sought to determine whether the provision of yellow fruits and vegetables rich in pro-vitamin A carotenoids would increase liver stores of vitamin A in Filipino schoolchildren.

Results showed that feeding vitamin A-deficient children (25 in the experimental group and 25 in the control) with yellow and orange vegetables and yellow and orange fruits daily with an oil-based preparation significantly increased the serum retinal and serum vitamin A carotenoids of those in the experimental group.

This implies that a proper selection of vitamin A carotenoids and preparation when consumed daily in adequate amounts, will provide effective vitamin A protection to individuals.

Information, Education and Communication Materials. IEC products of the Nutrition Center include the following materials using the food-based approach:

Barangay Nutrition Manual. This comics- illustrated manual was made available in 7 major Philippine dialects and was the principal reference material of the Barangay Nutrition Scholar, a village volunteer in nutrition, who used it as a comprehensive guide in organizing the community and rendering food and nutrition services.

Prescription Pads. Another highly illustrated set of information sheets, the pads present doctor's reminders on health and nutrition, These pads consist of sets of developmental prescriptions (for maternal and child psychological-social development) and food and nutrition pads (one kind for pregnant./lactating mothers and another for four-month to four-year old children, providing them dietary guides.

Advertising/ Promotions. The NCP conducted a multi-media campaign in the mid-eighties, which consisted of a TV spot series, produced in collaboration with J. Walter Thompson (Philippines),Inc., on nutritious and indigenous foods. The campaign won the 1985 Philippine Board of Advertising Award for Excellence and the 1984 and 1985 Catholic Mass Media Award for Best Public Service.

A continuing educational effort uses a variety of communication vehicles to reach the general public. Aside from extensive use of the broadcast media radio and TV to promote nutrition concepts and services, NCP regular activities include the production of an annual desk or wall calendar designed as a teaching and learning guide for target users. Also produced were Nutri-shirts, attractively designed T-shirts featuring drawings of nutritious and indigenous fruits and vegetables.

IEC Guides. In the process of development is a package of nutrition education materials for dissemination in the elementary schools through the TCP approach. One of these materials is the Homeguide for Nutritious Family Meals, a handy reference for parents planned to be more specific, procedural and illustrative than previous materials. The major thrust of the material will not only be to increase awareness of existing malnutrition problems but also to help specific targets identify solutions and make these solutions work through practical

application. Included in the package will be the School Guide, Caregiver's Guide, flipcharts, posters, wall dikit (a monitoring tool), and radio/TV infomercials. Development of these materials is a joint DECS-NCP effort with fund support from Procter & Gamble Co. This further gives us a laudable model of GO-NGO-Industry alliance.

Food fortification

MSG Fortification with Vitamin A: Among the earliest NCP undertakings in vitamin A fortification was that on the food seasoning monosodium glutamate (MSG). Implemented in the seventies, the pilot project sought to test the effectiveness of fortified MSG under normal and commercial conditions in reducing the prevalence of vitamin A deficiency. MSG was selected as a vehicle on the basis of survey results showing the frequency of consumption of the food seasoning in Filipino households. Detailed analysis of the pre- and post-survey indicated the feasibility of the project. The MSG manufacturers, however, desisted from pursuing the project because of an organoleptic problem due to certain product changes, which were feared to affect the market. **Margarine Fortification with vitamin A.** One of the highlights of the NCP experience in food fortification is the fortification of margarine (Star brand, formerly produced and distributed by Procter & Gamble, Philippines) with vitamin A. The margarine, a shelf-stable, non-refrigerated, and coconut oil-based product, has been popular in the Philippines since 1931, controlling about 90% of the local market. It is consumed by about 80% of the population, of whom 37% are children below twelve years old, mostly from the lower income groups.

A double-masked, randomized field trial was started in February 1992 on 581 3-6 year-old schoolchildren in Silang, Cavite province. At intervention, each subject was given a 250-gram canister of margarine (either fortified or non-fortified) per week for a period of six months. Although the same brand available in the market, the Star margarine used in the field trial had a higher vitamin A (retinol palmitate) content, increased from 131 RE to 431 RE per serving. The product also contained 3.0 mg thiamin, 50 ug cholecalciferol and 326 ug of beta-carotene (as colorant) per serving. One serving (15 grams or approximately one tablespoon) of the fortified product provided 115% of the recommended daily allowance for children three to six years old.

The field trial revealed a significant increase of the mean serum retinol and a 60% decrease in the prevalence of low serum retinol. The significant improvement in the vitamin A status of subjects brought unprecedented recognition from the Department of Health which placed a seal with the words "Accepted by the Department of Health" on the label of Star margarine. Now a part of DOH policy, award of this seal of recognition guarantees that the product is not only safe to eat but also fortified with micronutrients within acceptable levels approved by the DOH.

To make the fortified product more accessible to low income groups, the manufacturer has developed, upon the recommendation of NCP, a 15-gram canister size of the product called

Micro-Nutripak Star Margarine. The new canister size makes available a serving of the product at a more affordable price and has become another popular addition to the original sizes of 100 gm and 200 gm canisters. Distribution of the product, all sizes of which come in protective colored plastic containers, is backed up with a multimedia social marketing campaign.

The fortification of Star margarine and its success in the market can be credited to the close collaboration and cooperation among government, non-government organization and private industry. The suitability of the product as a fortification vehicle derives from the following factors: 1) the coconut oil-based product appears to be the right carrier of fat-soluble vitamin A, 2) the general use of the product as a fresh spread rather than as a cooking item provides an added conservation factor in vitamin A activity, 3) the shelf-stable and non-refrigerated nature of the product is suited to low-income households in high risk areas, 4) the product is centrally produced in Manila, thereby minimizing operational problems in the supervision of fortification.

Wheat Flour Fortification with Vitamin A. Advocacy on wheat flour fortification in the Philippines was conducted in June 1994 with some of the 12 flour millers in the country. Six of these millers were amenable to fortification with vitamin A, provided no organoleptic change in the product would occur. Two of the six volunteered to demonstrate the fortification to the other members of the wheat flour industry.

With the support of the two large flour millers, the NCP study on the fortification of wheat flour started in 1995. The study sought to fortify wheat flour with vitamin A and to determine the stability of wheat flour with vitamin A during storage and throughout the baking process in the preparation of pandesal, the most popular bread in the country. The methodology involved the addition of the vitamin A fortificant (retinol palmitate 250 SD) to the wheat flour.

Results showed that from the original amount of vitamin A added to the flour, 64.2% was left. In the fortified flour stored for two months, 81% of the vitamin A was retained in the first month and 66% in the second month. Pandesal baked from the fortified flour also showed a retention of 80% of the vitamin A in the first month and 71% in the second month after fortification. One serving (two pieces or 50-60 grams) of pandesal baked from the fortified flour provides 15-30% of the Recommended Dietary Allowance for vitamin A. The added cost of fortification was less than a centavo to the flour, and less than half a centavo to the pandesal.

Upon acceptance of the results by the two millers, wheat flour fortification will be implemented in the second phase of the program, when fortification quality will be monitored while the vitamin A fortified wheat flour is already in the market and at factory and baker's level. The results will also be disseminated to the other wheat flour millers who have committed to the fortification program, and advocacy will be continued to make them and the

rest of the millers fortify their products. The advantages will be evident to them when it is considered that no equipment or parts will be needed in addition to those already in use by the millers. The only economic burden will be the cost of the imported fortificant particularly for large quantities of flour, but this may be offset by tax incentives from the government in the form of reduced taxes on the importation of the fortificant.

When the technical and operational processes of fortification are stabilized, a controlled field trial of bread baked from the fortified flour will be conducted in the third phase of the program.

Fortified Foods in the Market. The Philippine Nutri-Foods Corporation, established about 20 years ago as an NCP subsidiary, also produces and markets fortified complementary and supplementary food products for preschoolers and school children. These food products are intended to meet the needs of government agencies (health, social welfare, and education) which conduct feeding programs using ready-to-cook foods in schools, health and day care centers and for relief operations in disaster-stricken areas.

Salt Iodization Program. The NCP was commissioned by the Department of Health in 1994 with UNICEF support to conduct a survey of the salt industry in three Luzon provinces considered key areas of the industry. Results of the study would be used to identify specification requirements of iodination machines, indicate possible locations of iodination plants, and to help in upgrading salt production for increased supply and demand of iodized salt.

The work was later expanded to cover the Visayas and Mindanao regions. The survey results were added to DOH and UNICEF resources in locating and assisting producers in their salt iodination efforts, and were used as valuable reference in effecting the passage of the salt iodination law in the Philippine Congress.

Prospects

The food-based projects implemented by the Nutrition Center illustrate the role of private organizations in the campaign against malnutrition. The food-based approach evidently has the following advantages in the Philippines:

- i. The country abounds with fish, fruits and vegetables and other food sources that can be applied to improve the nutritional status of the population;
- ii. Many facilities for a food-based strategy in combating malnutrition have been started or are already in place, such as home and community gardens, feeding programs, fortification projects and nutrition education materials, and may only require a little more effort and resources to achieve sustainability.

The private sector can certainly do much to increase production, distribution and consumption of food sources of macro- and micronutrients. The search for more vehicles for food fortification will have to be intensified in private industry circles. Much of this effort, however, is already done in coordination with the government, specifically the Department of Agriculture, Health, Social Welfare and Education and with local governments. This follows the established principle that initiatives of the private sector can be fully effective only when these are responsive to national policy and integrated into the national plan of action.

In brief, prospects of the food-based approach may be considered bright in a country where the Nutrimint is abundant and the Host is exerting every effort, at various levels and in various sectors, to improve the Environment. A close interlinking of systems and subsystems must be maintained to ensure the success of the campaign against micronutrient malnutrition.

RECOMMENDATIONS FOR IMPLEMENTATION OF AGRICULTURAL POLICIES.

A. Working Group Session

The participants were asked to work in-groups to identify specific policy recommendations designed for improving nutrition.

The objectives of the working sessions were to review the most recent knowledge and thinking related to food-based approaches to improve nutritional situation in Bangladesh and then to come up with specific recommendations as strategies to be implemented by the concerned agencies.

This working session of the workshop followed a participatory approach in four different steps. First, the core topic of the seminar reviewed the most recent information and knowledge on five major food groups with presentations by the resource persons and subsequent discussions. Second, five groups each moderated by one of the participants had the tasks to define the problem situation and recommendation to take measures and mentioning the concerned agencies as possible implementers. Third, the respective spokesperson of the group presented the group's findings to the plenary session for discussions leading to consensus. Lastly, based on the subject-specific discussions earlier, the workshop entered into a general discussions for recommendations and agreed on a plan of actions for the post-workshop follow-up.

To get the discussion started the participants received a set of guidelines. These guidelines included a list of issues, implementing actions and problems that had surfaced during the technical sessions.

Each group had a chance to discuss and organize their thoughts with the help of Dr. Sanaul Mostafa, the main facilitator, and additional facilitators provided by USAID.

B. Plenary Session

Mr. M. Anwar Iqbal, Director (Nutrition), BARC, chaired the plenary session that followed the group discussions. In this session, each group presented the results of their discussion to the rest of the participants. Their reports are summarized below.

Group 1. Vegetables and Fruits

Facilitators: Mr. Lutfur Rahman, USAID
Dr. D.G Singh, AVRDC.

Presenter: Dr. Monowar Hossain, BARI.

Problem Situation

The participants described the situation covering production, supply and consumption related issues.

Production

Scarcity of adequately trained human resources, limited technological varieties accompanied with its slow transfer, excessive use of pesticides and inadequate coordination between the relevant agencies are the reasons for lower production level. Inadequacy of good quality seeds at the local level, and insufficient research and extension support through sustainable institutions were mentioned as additional reasons.

Supply

The supply is reduced by huge post-harvest losses, inadequate marketing activities, low accessibility to markets and inadequate information on utilization of resources. Poor infrastructure hampers easy availability or endangers the marketing of the perishable goods. Storage facilities are not sufficient as well.

Consumption

Poor nutritional awareness, traditional cooking habits, poor availability of products and excessive use of pesticides are affecting consumption patterns in the case of vegetables and fruits. Low purchasing power and poor publicity are still the reasons for undesirable consumption behavior. Non-equity in intra-household food distribution is still a reality.

Key Issues

- Low production and availability
- Low accessibility
- Limited nutrition education
- Limited technology and slow adoption
- Excessive use of pesticides
- Marketing constraints
- High post-harvest and cooking losses
- Lack of intra and inter institutional coordinations
- Poor data base in the areas of production and utilization
- Inadequate trained human power

Present undesirable situation

- ❑ Limited varieties and production technologies
- ❑ Availability of good quality seeds in proper time at local, grassroots level
- ❑ Bioti- and abiotic stresses
- ❑ Lack of infrastructure support
- ❑ Lack of organizational support for research and extension
- ❑ Low purchasing power
- ❑ Perishable nature of products
- ❑ Lack of awareness
- ❑ Non-equity in intra-household distribution
- ❑ Low education level
- ❑ Poor publicity
- ❑ Heavy post harvest losses
- ❑ Lack of storage, transportation and communication

Recommendations

- ❑ Vegetables and fruits should be incorporated in the CDP-DAE and NGOs program activities
- ❑ Home gardening programs should be strengthened on AEZ basis (BARI, NGOs & GOs)
- ❑ Vegetable seeds and planting materials should be multiplied scientifically and made available timely
- ❑ Indigenous vegetables and fruits should be conserved and promoted (GOs/ NGOs)
- ❑ Nutrient contents of different fruits and vegetables should be analyzed before and after cooking (INFS and HKI + other NGOs)
- ❑ Post harvest losses should be reduced by improved methods of marketing, packaging and transporting (GO/ NGOs)
- ❑ Small scale household level processing and preservation should be promoted (BARI, BCSI, BAU, NGOs)

- ❑ Planting of nutrient dense fruit trees should be encouraged (GO/ NGOs)
- ❑ Development of HYV and hybrids resistant to be stresses (BARI Program)
- ❑ Specialized personnel should be provided (TT on V&F, DAE + NGOs)
- ❑ Data base program should be reorganized and strengthened (BBS, DAE, BARC)
- ❑ Human resource development (BARC, BARI, NGOs)
- ❑ Strengthening coordination among the agencies (GO/ NGOs)

Group 2. Fish

Facilitator: Ms. Raka Rashid, USAID.

Presenter: Mr. M. Mokhlesur Rahman, CNRS.

Problem Situation

Unlike vegetables and fruits, fish related issues were mainly discussed from production and consumption perspectives.

Production

The production of fishes is negatively affected by limited availability of fingerlings, insufficient use of existing water bodies (public water reservoirs, borrow pits, rice fields, etc.), hindrance to water bodies for fishermen, poor technology and information dissemination on integrated farming and excessive use of insecticides/pesticides. Production through modern inputs and participation of the private sector are inadequate.

Consumption

There exists a big gap between production and requirement. Consumption of marine fishes is still not widespread. Cooking habits and nutritional awareness regarding choice of fish species is inadequate. Fish marketing is also not well-organized. Fish has become unaffordable by the poor as well.

Key issues

- ❑ Limited availability of fish fingerlings/ fries
 - ❑ Small Indigenous-fish Species
 - ❑ Quality carp fingers
- ❑ Under utilization of public water bodies that is borrow pits

- ❑ Use of rice field for fish culture
- ❑ Consumption of marine fishes
- ❑ Integrated farming
- ❑ Use of insecticide/ pesticide
- ❑ Dissemination of available information and technology
- ❑ Raising awareness
- ❑ Nutritional values of different fish species
- ❑ Current cooking practices
- ❑ Access to fish by the poor
- ❑ Access to fish resources by the poor

Situation Analysis

- ❑ Gap between availability and requirement of fish
- ❑ Sub-optimal utilization of resources
- ❑ Marketing of fish, particularly marine fish
- ❑ Lack of inputs
- ❑ Limited participation of private sectors

Recommendations

- ❑ Make borrow pits and ditches available for fish culture by the poor (Action to be taken by the DOF, LGED, R & HD, BWBD in collaboration with NGOs)
- ❑ Simplify existing procedure for access to public water bodies (action to be taken by MoFL/ MoL)
- ❑ Improve dissemination of existing knowledge/ new technology about integrated farming (action to be taken by FRI/ DOF/ DAE/ DOL/ BIRRI/ BARI/ NGO)
- ❑ Promotion and protection of SIS and conservation of bio-diversity (action to be taken by DOF/ FRI/ DOE/ NGO)
- ❑ Promotion of IPM (action to be taken by DAE/ BIRRI/ BARI/ NGOs)

- ❑ Develop database on nutritive values of fish (action to be taken by DOF/ Research organization)
- ❑ Encourage wider participation of private sector in fisheries production and marketing (action to be taken by DOF/ FRI/ Banks)

Group 3. Rice, Wheat and other Cereals

Facilitator: Mr. Michel Foster, USAID

Presenter: Dr. Md. Salahuddin, BLRI.

Problem Situation

The situation is characterized by sub-optimal use of land leading to insufficient production. Again the production cannot be fully utilized due to high post-harvest losses. People consume too much rice since they have limited choices due to financial hardships. The cooking habit causes the release of excess water full of nutritional elements from boiled rice.

Present undesirable situation

- ❑ Over intake of rice
- ❑ Limited choice
- ❑ Economic constraints
- ❑ High post-harvest loss (quantity)
- ❑ Cooking method: excess water discarded
- ❑ Unknown side effects
- ❑ Sub-optimal land use

Recommendation

Rice and wheat

- ❑ 80% of consumption by product use. Use of bran for animal feed, potential for bread and biscuits
- ❑ Diversify diet and intake of rice products :
 - ❑ Nutritional awareness (long term)
 - ❑ Availability of income to purchase other commodities

Maize

- ❑ β -carotene/(-) protein
- ❑ Human/ animal feed
- ❑ Land available (north)
- ❑ Flour mix
- ❑ Strengthen education media
- ❑ Alternative to rice and other cereals in suitable lands
- ❑ Food aid in wheat (soybean non-cereals)
- ❑ VGD change from wheat (rice + cooking oil + pulses)

Policy and research

- ❑ Genetic manipulation of cereals to enrich vitamin contents
- ❑ Vitamin C enrichment in rice through up-stream research
- ❑ Education
 - ❑ Urban/ rural
 - ❑ School
 - ❑ Rich/ poor
- ❑ Integrate nutrition in all projects planned
- ❑ Reach food safety in a balanced way
- ❑ Pricing : security of output price

Group 4. Poultry and Livestock

Facilitator: Ms. Sarah-Ann Lynch, USAID

Presenter: Dr. Abdur Razzaque, BARC.

Problem Situation

Livestock and poultry sector's problem was characterized by low breeding and productivity. Scarcity for quality feed in the process of growth, veterinary care and insufficient financial support are crucial issues. Research and extension services fall behind expectations. Linkage with the market and inadequate knowledge about marketing, specially grading, quality control, pricing, etc. are yet to be developed. Lastly, people who plan to take initiatives require specialized management skills to run livestock and poultry ventures.

Key issues

- Breeding
- Feeding
- Veterinary care
- Management
- Marketing
- Financial Support
- Research and extension Linkage

Present undesirable situation/ constraints suitable

- Lack of suitable breeds (low productivity)
- Feed scarcity (poultry feed, greens, for agricultural fodder, quality feed, etc.)
- Inadequate veterinary coverage
- Lack of proper marketing system (grading, storage, pricing, quality control)
- Poor education extension and research linkage

Recommendations

- Establish suitable breeding policy
- Introduction of HYV fodder (DLS, BLRI, NGOs)
- Utilization of unused crop land for livestock feed (DLS, DAE, BLRI, BARI)
- Establishment of feed industry by products (private and public sectors)

- ❑ Feed quality control (DLS)
- ❑ Improve veterinary services (vaccine, diagnosis etc.) (DLS)
- ❑ Develop marketing system (GOB/ Private sector)
- ❑ Provide financial support (loan and easy access to institutional credit) (Bank, NGOs)
- ❑ Improve education extension and research linkage (BARC, BAU, DLS, BLRI, NGOs, BBS)
- ❑ Develop insurance policy (MOFL)
- ❑ Provide institutional support (species-wise)

Group 5. Pulses, Species and Oilseeds

Problem Situation

Pulses: People consume less than required and do not even know why it is needed. They also prefer rice than pulses. The production depends on seasonal variability and does not keep pace with the growth of population.

Species: Low consumption due to lack of main ingredients (beef, chicken, fish, vegetables and oil). Lack of knowledge about the nutritional value of spices leads to unbalanced food habits. However, food habits are changing gradually.

Oil Seed: Oil consumption is less than required. People are not aware of the utility of oil for human body. The production is also not enough and preference goes to mustard oil over sunflower or sesame oil although they are more profitable and easier to process.

Key Issues

- ❑ Low consumption of oil
- ❑ Preference for mustard oil
- ❑ Low production of oil
 - ❑ Most potential : sunflower oil
 - ❑ multiple seasons
 - ❑ profitable
 - ❑ somewhat risky
 - ❑ Good potential : sesame oil
 - ❑ grown in summer season
 - ❑ easy processing

- ❑ Constraints to consumption
 - ❑ Low income to buy oil (also vegetables and fish)
 - ❑ Lack of knowledge about the need of oil in the diet

Present undesirable situation

Pulses

- ❑ Lower consumption than is required
- ❑ Preference for rice over pulses (boro rice pushes out pulses)
- ❑ Need to take advantage of opportunities (seasons and land) to grow pulses
- ❑ Production cannot keep up with population growth
- ❑ Can be too problematic because of marketing, seasonal and preference issues. Focus on other products?

Spices

- ❑ Low consumption due to lack of main ingredients (e.g. beef, chicken, fish, vegetables and oil)
- ❑ Lack of knowledge
- ❑ Food habits are strong, but can change (some changes started)
- ❑ Best potential : home gardening

Recommendations

- ❑ Increase overall oil production, focus on sunflower and peanut oil on marginal lands
- ❑ Educate population on ways to improve nutrition through small dietary improvements (changes in cooking practices, etc.)
- ❑ Undertake studies to look at constraints of dietary habits, especially for the use of oil.
- ❑ Improve marketing of pulses, including taking advantage of seasonal and land opportunities to increase production and make it profitable for farmers
- ❑ Look at oil and spices in conjunction with other foods

C. Plenary Discussion Session for Specific Recommendations

The final plenary discussion session was chaired by Dr. Z. Karim, Executive Chairman, BARC. In this session, Dr. Shakuntala Thilsted presented a summary of the results and recommendations derived from the previous plenary session. The presentation was based on a table (see Table 1 below) containing a list of key issues, main recommendations and proposed implementing agencies.

Table 1: Recommendations for Action

Key Issues	Recommended actions	Implementing Agencies
<p><i>Diet diversification</i></p> <p>a) Increase the consumption of key commodities:</p> <p>b) Vegetables</p> <p>c) Fruits</p> <p>d) Small fish</p> <p>e) Pulses</p> <p>f) Oils</p> <p>g) Spices</p> <p>h) Animal products</p> <p>i) Wheat</p>	<p>Determine nutritional content of commonly eaten foods in Bangladesh. (Update and expand food composition tables).</p> <p>Take into account local eating habits, knowledge and perceptions. Consumption of oil and spices cannot be taken out of context of cooking habits</p> <p>Promote education campaigns to teach people to consume other acceptable foods in addition to (with) rice (e.g. simple sauces and weaning foods):</p> <p>a) Explain the nutritional value of foods: e.g. vegetables are not poor man's food</p> <p>b) Nutritional education in media and schools</p> <p>c) Cooking and feeding practices targeted to women</p> <p>Include other foods in the PFDS, (add oil and pulses to the VGD program)</p>	<p>INFS, Dhaka University in collaboration with donors</p> <p>Some study carried out by local or international organization</p> <p>MOF, MOA, MOH, NGO's, university departments. Some dissemination activities could be carried out by extension agents, provided they receive proper training.</p>
<p><i>Crop diversification</i></p> <p>Stimulate the production of other food commodities besides rice</p> <p>(Improved rice production technology is also needed: increased yields might free up land for other uses).</p>	<p>Expand land under production using:</p> <p>a) Fallow land and riverbanks</p> <p>b) Expanding irrigation</p> <p>c) Cropping intensification</p> <p>Increase yields by:</p> <p>a) Improving quality of seeds</p> <p>b) Making available better seeds to farmers</p> <p>c) Controlling and reducing use of pesticides (IPM is a viable alternative)</p> <p>Provide support to farmers to promote commodities with credit and training.</p> <p>Include fruits and vegetables in the GOB plan</p> <p>Select alternative viable foods</p> <p>a) Oils: Sunflower</p> <p>b) Toxin-free kheshari</p>	<p>Expand role of extension services to promote alternative crops</p> <p>Research institutions to provide better varieties and more appropriate technologies</p>
<p><i>Nutritional value of available food commodities</i></p>	<p>Breed for varieties with higher nutritional content, e.g. rice and wheat with high iron. Expand vegetables (especially leafy vegetables).</p>	<p>CGIAR in collaboration with NARS</p>

Key Issues	Recommended actions	Implementing Agencies
<p>From production to marketing:</p> <p>a) High post harvest losses</p> <p>b) Lack of adequate food storage and processing</p>	<p>Develop techniques for handling harvested products</p> <p>Promote food storage and processing</p> <p>Promote home processing of perishable foods. That is fruits and vegetables</p>	<p>National Agricultural Research Institutions and Universities</p> <p>NGOs and community based institutions</p>
<p>Home gardens</p> <p>How to expand the use of home gardens</p>	<p>Select the vegetables and fruits that are more nutrient dense (GLVs)</p> <p>Promote location specific varieties</p> <p>Provide access to seeds and other inputs</p> <p>Expansion of the growing season</p>	<p>NARs to provide seeds</p> <p>Role of local and central institutions together with the NGOs (DAE and others)</p> <p>Involve private sectors in the provision of quality seeds</p>
<p>Fish production and consumption</p> <p>a) Increase production and availability of fish in the market, especially small fish.</p> <p>b) Increase catch of fish from Bay of Bengal</p>	<p>Improve the management of public water bodies by implementing appropriate legislation for:</p> <p>a) Lease agreements</p> <p>b) Access rights</p> <p>Promote culture of private fish ponds</p> <p>Promote fish processing and marketing (drying) for private sector</p>	<p>MOF and local governments could stock and control of public water bodies</p> <p>Ministry of Fish and Livestock</p>
<p>Competition between alternative production systems</p> <p>Improve farming systems management and compatibility with fisheries and other sectors</p>	<p>Promote the development of compatible production strategies that will help to integrate farming and fishing</p> <p>Develop chicken feeds and utilization of chicken dropping as fertilizer for home gardens</p>	<p>Fisheries Research Institutes</p> <p>DAE and Ag extension</p> <p>NGOs</p>
<p>Intra-household allocation</p> <p>How are food resources shared in the household?</p> <p>Are children and women especially pregnant and lactating women getting a fair share?</p>	<p>Promote projects that target children, mothers and other vulnerable individuals.</p> <p>Promote educational campaigns to expand the access of food consumption by all members of the household</p> <p>Work with men's groups for nutritional education</p>	<p>Women and Welfare Department, MOF, NGOs</p> <p>Train and use extension agents to disseminate key nutrition concepts</p>
<p>Fortification</p> <p>Increase the intake of critical micronutrients by fortifying specific food items</p>	<p>Decide what is the problem to be addressed, study effectiveness and acceptability</p> <p>a) Vitamin A, b) Iron, c) Zinc, d) Iodine</p> <p>Identify key commodities consumed by a large share of the population</p> <p>Identify the vehicle and verify if it can be fortified</p>	<p>Studies of feasibility and acceptance by university departments</p>
<p>Availability of data</p> <p>There is no comprehensive data set. Every agency has a small data set used for their own impact evaluation</p>	<p>Promote coordination among different agencies</p> <p>Share available data</p> <p>Improve the quality of new data sets</p>	<p>All agencies</p>

The table, prepared by Dr. Carlo del Ninno and Dr. Shakuntala Thilsted during the previous sessions, makes an attempt to generalize the issues emerged during the previous discussions, cutting across specific food issues. It includes a summary of the recommendations proposed, along with a list of suggested implementing agencies, to solve the key issues mentioned during the workshop. The link between the various key issues is evident. Diet and crop diversification, improvements of marketing, expansion of home gardening and fish production were all obvious choices, but the workshop also came to the realization that it is not possible to improve and expand the production of all crops at the same time. It is necessary to complement those actions with alternative strategies, including the production of fortified foods or the fortification of commonly eaten foods itself. Moreover, it might also be necessary to make some hard choices between alternative production strategies. Finally, it was also recognized that the dynamics of intra-household allocation play a major role in the nutritional status of individuals and that the continuation of research and the sharing of information and data sets are crucial for a better understanding of the causes of malnutrition in Bangladesh.

General Comments

After the presentation of the summary table, the discussion continued and a series of comments were made. These comments have been summarized below as follows:

1. There is competition for resources between different groups of products. Priorities are to be set. Feasibility is to be determined and priority should be set in terms of the poor people.
2. Commodity-wise recommendations are to be given. Rice and animal products should get priority.
3. Composition of food in terms of diet and its preparation should gain more importance than an individual food item.
4. Increase of production is mentioned everywhere. The scarcity of land resources is not sufficiently considered. The change from one crop to the other might be a solution under scarce land resources. Some land is still available which can be transformed from single to triple cropping.
5. Reduction of pesticides-related production is necessary.
6. Since some diversified products are not remunerative, farmers should be given incentives to produce crops of nutritional relevance.

7. Research support for better and viable technology would bring benefits in the long-run.
8. Fruits and vegetables should be included in the existing CDP program.
9. Home gardening should be stressed during the summer.
10. A policy shift regarding the control over the water bodies from the Ministry of Land to Ministry of Fisheries is necessary.
11. Rice-fish culture should be promoted with active role of DAE.
12. Both male and female persons should be involved in the awareness campaign regarding cooking habits.
13. Research should be undertaken on the selection of items to be fortified. Checking whether some items are fortified needs to be determined as well.
14. More coordination between agencies including extension agencies and NGOs are recommended.
15. Preservation of food items needs to be considered. Killing of rats as an agenda? Control over diseases of rice, other crops, poultry, etc.?
16. Food quality control mechanisms should be introduced.
17. Any nutrition-related action plan should be related to the action plan of other agencies or Ministries following the spirit that the existing plan should be strengthened possibly by adding more points.

Follow up Actions

At the end of the workshop it was agreed that:

- a) A committee should be formed to design a course of action for following up on the recommendations presented during the workshop;
- b) Research activities should be initiated to provide the necessary feedback to relevant institutions and people for strategic planning.

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APPENDIX 1 : PROGRAM

NATIONAL WORKSHOP

ON

FOOD-BASED STRATEGIES FOR IMPROVING NUTRITION IN BANGLADESH

(26 – 27 April 1998)

Venue : BARC, Farmgate, Dhaka.

Organized by : BARC, USAID, DANIDA & IFPRI

Day One : 26 April '98

09:00 am **Registration**

10:00 am **Inaugural session**

11:10 am Tea Break

Technical Session - I : Background Information on Nutrition and Agriculture in Bangladesh

Chairperson : Prof. Harun K.M. Yusuf, D.U

Rapporteurs : 1. Dr. Muslemuddin Miah, CSO (Soils), BARC
2. Dr. Md. Amiruzzaman, BARI

11:30 am Extent & Trends in Malnutrition in Bangladesh – Prof. Nazmul Hassan, Institute of Nutrition and Food Science (INFS), University of Dhaka.

11:45 am Current and Future Trends in Food Production and Consumption in Bangladesh – Dr. Abdur Razzaque & Dr. Indrajit Roy, BARC

12:00 pm Conceptual Framework for Examining Agriculture and Nutrition Linkages – MS. Benedicte De la Briere, IFPRI

12:15 pm Discussion

01:00 pm Lunch and prayer Break

Technical Session – II : Vegetable – Related Strategies

Chairperson : Dr. S.M. Monowar Hossain, BARI

Rapporteurs : 1. Dr. Sk. Matin Rahman, PROSHIKA
2. Mr. Md. Zaher, FRI, Mymensingh

- 02:00 pm Strengthening Home Gardening in Bangladesh - A. Zaman Talukder, HKI.
- 02:15 pm Improving nutrition through increased, vegetable production in Bangladesh – Dr. D. P. Singh, AVRDC.
- 02:30 pm Discussion
- 03:00 pm Tea Break

Technical Session - III : Fish – Related Strategies

Chairperson : Mr. Mirza Altaf Hossain, BIRTAN

Rapporteurs : 1. Dr. Khabir Ahmed, BARC

2. Ms. Talhat Begum, BIRTAN

- 03:15 pm Culture in Seasonal Ponds, Small Indigenous Fish – Dr. Nanna Ross, The Royal Veterinary and Agricultural University, Denmark
- 03:30 pm Small Indigenous Fish Culture in Bangladesh, Integrated Food-Assisted Development Project – Dr. M. Akhteruzzaman, Senior Consultant, Fisheries, IFADEP SP-2
- Impact of Community Fisheries, Mr. M. Muklesur Rahman, Center for Natural Resources Studies (CNRS)
- 04:00 pm Discussion
- 05:00 pm **End of First Day**
- Evening session :**
- 07:30 pm Reconvene at Serai Restaurant – Snacks and Movies
- 08:00 pm Key Note Speech : Dr. Florentino Solon, Executive Director, Nutrition Center of the Philippines, Manila
- 09:00 pm Dinner

Day Two : 27 April '98

Technical Session – IV : Poultry and Other Food Strategies

Chairperson : Mr. M. A. Mannan, BNNC

Rapporteurs : 1. Dr. Qazi Kamaruddin, BARC
2. Dr. Mohd. Salahuddin, BLRI

09:00 am Small-Holder Livestock Development Project, – Dr. S.M. Ataur Rahman, BLRI, Semi-Extensive DANIDA supported Poultry Production Project

09:15 am Fruits, Pulses, Spices, Oil Seeds – Dr. Shahidul Islam, BARI.

09:30 am Discussion

Technical Session – V : Strategies for Food Staples and Limitations of Staple-Based Diets

Chairperson : Prof. Md. Shams-uddin, BAU, Mymensingh

Rapporteurs : 1. Mr. Md. Abu Mohammad, MoF&L
2. Dr. Asirul Haq, BINP

10:00 am CGIAR Plant Breeding Strategies for Micronutrient-Dense Food Staples (rice and wheat) – Dr. Craig A. Meisner, CIMMYT

10:15 am Nutrient-Densities of Bangladesh Rices – Dr. Nurul Hoque Chowdhury, Bangladesh Rice Research Institute

10:30 am Importance of Diet Diversity for Improved Nutrition, Dr. Shakuntala Haraksingh Thilsted, The Royal Veterinary and Agricultural University, Denmark

10:45 am Discussion

11:30 am Tea Break

11:45 am **Group Discussions : Recommendations for Implementation of Agricultural Policies and Projects for Improved Nutrition**

Facilitator : Dr. Sanaul Mostafa, C/o USAID/IFPRI

11:45 am Group 1. **Vegetables and Fruits**
Facilitator : Jointly by Mr. Latifur Rahman, USAID & Dr. D.G. Singh, AVRDC
Presenter : Dr. Monwar Hossain, BARI

Group 2. **Fish**
Facilitator : Ms. Raka Rashid, USAID
Presenter : Mr. M. Mokhlesur Rahman, CNRS

Group 3. **Rice, Wheat, Other Cereals**
Facilitator : Mr. Ibrahim Khalil, USAID
Presenter : Dr. Benedicte Dela Briere, IFPRI

Group 4. **Livestock, Poultry**
Facilitator : Mr. Michael Foster, USAID
Presenter : Dr. Md. Salahuddin, BLRI

Group 5. **Pulses, Spices, Oil Seeds**
Facilitator : Ms. Sarah-Ann Lynch, USAID
Presenter : Dr. Abdur Razzaque, BARC

01:30 pm Lunch & Prayer Break

02:30 pm **Plenary Session : Recommendations for Implementation of
Agricultural Policies and Projects for Improved
Nutrition**

Presentation of Group Reports – Group leaders

Chairperson : Mr. M. Anwar Iqbal, Director (Nutrition),BARC

Rapporteurs : 1. Mr. Bishajit Bhattacharja, DLS
2. Dr. Moslemuddin Mia, BARC

04:00 pm **Plenary Discussion Session and Specific Recommendations and
Follow up Mechanism**

Chairperson : Dr. Z. Karim, BARC

Rapporteurs : 1. Mr. M. Anwar Iqbal, BARC
2. Mr. Abdur Rouf, MoA

06:00 pm **Closing Formalities**

APPENDIX 2 : LIST OF PARTICIPANTS

Name & Designation	Address & Telephone no.
Mr. Rafiqul Islam Director (Operation)	AP (Dhaka) Ltd. 8/1, 8/2, Armanian street, Dhaka –1000 Phone : 235894, 236931(off), 833189 (Res)
Dr. D.P. Singh	AVRDC , 42/1A, Road-7, Block-H, Banani Phone : 605461
Mr. Md. Abdul Mannan Secretary	Bangladesh National Nutrition Council, (BNNC) 19/1 Rasulbagh, Mohakhali, Dhaka. Phone : 884395/882850
Dr. Z. Karim Executive Chairman	BARC , Farmgate, Dhaka Phone : 814032
Mr. M. Anwar Iqbal Director (Nutrition)	BARC , Farmgate, Dhaka Phone : 9112815
Dr. A. Razzaque CSO (Crops)	BARC , Farmgate, Dhaka Phone : 9126663
Dr. Khabir Ahmed PSO (Fisheries)	BARC , Farmgate, Dhaka Phone : 814032
Dr. Quzi M. Qamaruddin PSO (Livestock)	BARC , Farmgate, Dhaka Phone : 325061-5/119
Dr. Moslem Uddin Mia PSO (P & E)	BARC , Farmgate, Dhaka Phone : 325061-5/123
Dr. Wais Kabir PTO,	BARC , Farmgate, Dhaka Phone :
Mr. Aminuzzaman Faroque Sr. Training Officer	BARC , Farmgate, Dhaka Phone :
Dr. M. Shahidul Islam Director (SS),	BARI , Joydebpur Gazipur Phone : 837247 (R), 9332340 (DG)
Dr. Md. Amiruzzaman PSO Post Harvest Technology Division	BARI , Joydebpur, Gazipur Phone : 0681/2091/421, 822043 (Res)
Dr. S.M. Monowar Hossain CSO Horticulture Research Division	BARI , Joydebpur, Gazipur Phone : 9004172 (Res)
Mr. A.K.M. Kohinoor Scientific Officer (Ph.D Student)	BAU , Mymensingh Phone : 091/55696
Dr. Md. Shams-Ud-Din Professor & Head, Dept. of Food Technology. & Rural Industries	BAU, Mymensingh-2202 Phone : (091) 55695 to 55697/ Ext. 2238
Dr. Omar Haider Chowdhury Research Director	BIDS E-17, Agargaon, Sher-E-Bangla Nagar, Dhaka, Phone : 323058,9112318,818920
Dr. Asirul Huq Deputy Project Director (Training)	BINP , 9/5 Iqbal Road, Mohammadpur, Dhaka Phone : 9123470 (off)/822833 (Res)
Mr. Mirza Altaf Hossain Director	BIRTAN , Room No. 637, 5th floor, Building 2, Khamarbari, Dhaka, Phone : 9117862, 9006904 (res)
Mr. Talhat Begum PSO	BIRTAN , Room No. 637, 5 th floor, Building 2, Khamarbari, Dhaka, Phone : 9117862

Name & Designation	Address & Telephone no.
Dr. S.M. Ataur Rahman PSO	BLRI C/o. DANIDA Phone : 834357 (DG), 9332827
Dr. Mohd. Salauddin PSO (Poultry Production)	BLRI , Savar, Dhaka Phone : 834357
Prof. M. Salar Khan Research Consultant	BNH, BARC , Farmgate, Dhaka Phone : 9111273
Mr. Sunil Kumar Biswas PSO, (Ph.D Student)	BRRI , GQN Division Joydebpur, Gazipur
Dr. Nurul Haque Chowdhury CSO	BRRI , Joydebpur, Gazipur Phone : 9333098/2681/2265,9350122
Dr. M. A. Mannan Ex-DG	BRRI , Joydebpur, Gazipur Phone : 9118277 (Res)
Dr. Shakuntala Haraksingh Thilsted	C/o. DANIDA
Ms. Nanna Ross	C/o. DANIDA, Dhaka
Mr. Thomas Schoetzel Project Coordinator Micronutrient Initiative	C/O. HKI , House no. 40, Road no. 14A, Dhanmondi, Dhaka Phone : 816156/814234/9882076 (Res)
Ms. Sylvia Islam Development Adviser	CIDA C/o. Canadian High Commission House no. 16A, Road no. 48, Gulshan, Dhaka Phone 9887091
Dr. Craig A. Meisner	CIMMYT , Dhaka
Mr. M. Muklesur Rahman Executive Director	CNRS , 4/6, Block-B (Ground Floor) Lalmatia, Dhaka, Phone : 9129047
Mr. Md. Nasiruddin Bhuiyan Addl. Director	DAE , Kahamarbari, Dhaka Field Survices Wing Phone : 823146
Mr. Mujibur Rahman Chowdhury Addl. Director	DAE , Kahamarbari, Dhaka Food Crops Wing Phone : 9118164
Ms. Susanne Thomsen Junior Adviser	DANIDA , MAEP-II, P.O. Box 33, Mymensingh-2200 Phone : 091-55318
Mr. Erik H.J. Kens Training Adviser	DANIDA , PBAEP, Box 12, Patuakhali Phone : 0441-2501
Mr. M.A.Halim Financial Officer	Delegation of the European Commission H-7, Rd-84, Gulshan-2, Dhaka Phone : 884730-1/607016
Mr. Mesbahuddin Ahmed Deputy Chief (Training & Cordinate)	Department of Fisheries Ramna, Dhaka, Phone : 9561437
Dr. Babu Bishajit Bhattacharja SSO (Animal Nutrition)	Dept. of Livestock Services (DLS) Krishikhamar Sharak, Shar-E-Bangla Nagar, Dhaka Phone : 9115936
Prof. H.K.M. Yusuf Department of Biochemistry	Dhaka University, Dhaka Phone : 865406 (off),862721 (Res)
Ms. B.N. Nahar Programme Officer	FAO House No. 37, Road 8, Dhanmondi, Dhaka, Phone : 818015-8
Dr. Carlo del Ninno Consumption Economist	FMRSP-IFPRI , House # 9A, Road # 15 (New) Dhanmondi, Dhaka Phone : 823763/823793/9119206

Name & Designation	Address & Telephone no.
Md. Naser Farid Asstt. Chief,	FPMU, Food Ministry Abdul Gani Road Phone : 9560404, 9556033,9550634
Mr. Mohd. Zaher Sr. Scientific Officer	FRI, Mymensingh 091/54874 (DG)
Mr. Tofazzal Hossain, Head, Seed and Marketing Disision	GKF College Road, Alamnagar, Rangpur Phone 383081, (NWD) 4893,802690
Ms. Linnda Kiess Country Director	HKI, House no. 40, Road no. 14A, Dhanmondi, Dhaka Phone : 816156/814234, 9882076 ®
Mr. Aminuzzaman Talukder Project Manager	HKI, House no. 40; Road no. 14 A Dhanmondi, Dhaka Phone : 816156, 814234
Ms. Shaheen Ahmed Head (Foods Nutrition)	Home Economics College Nilkhet, Dhaka Phone : 865953 (Res)
Dr. S.K. Roy Scientist	ICDDR, B Mohakhali, Dhaka Phone : 871751-60
Dr. S.D. Tripathi Project Leader	ICLARM Bangladesh Office, House no. 75, Road no. 7, Block-H, Banani, Dhaka, Phone :871151/873250
Dr. M. Akhteruzzaman Senior Consultant (Fisheries)	IFADEP, SP-2
Ms. Benedicte Dela Briere Research Fellow.	IFPRI, House # 9A, Road # 15 (New) Dhanmondi, Dhaka Phone : 823763/823793/9119206
Mr. Nurul Islam Mallik PSO	IFST, BCSIR, Mirpur Road, Dhanmondi, Dhaka – 1205 Phone : 500078-9 (off)
Prof. Kamaluddin Ahmad Ex-Director	INFS, Phone : 861645/9661920-4939 (Res)
Prof. Nazmul Hassam	INFS, Dhaka University Phone : 9661900/6259
Prof. M. Abdullah	INFS, Dhaka University Phone :
Dr. Mark Prein Program Leader	Integrated Agriculture-Aquaculture Program, ICLARM Headquarters, Manila, Philippines Phone :
Mr. Amal Krishna Ray Research Programme Leader	MCC 1/1, Block-A, Asad Gate Road, Mohammadpur, Dhaka 1207 Phone : 9116441/9117065
Mr. Md. Abu Mohammad Deputy Chief	Ministry of Fisheries & Livestock Bhaban no. 6, Room no. 516 Phone : 862783 (off); 866735 (Res)
Mr. Md. Abdur Rouf Assistant Chief , Planning Division	MOA, Bangladesh Secretariat, Dhaka Phone : 867132 (req.)
Dr. Sanaul Mostafa Executive Director	Network for Research and Training (NRT), H-49, Rd 28 Phone : 882713-4, 9886011-12 (Res)
Dr. Florentino Solon Executive Director	Nutrition Center of the Philippines C/o. DANIDA
Ms. Mamtaz Mannan Deputy Chief (Crops)	Planning Commission Sher-E-Bangla Nagar, Dhaka Phone : 9114864
Dr. Sk. Matiur Rahman Health & Nutrition Coordinator	Proshika, I/1Ga, Mirpur-2, Dhaka Phone : 803398/805812

Name & Designation	Address & Telephone no.
Mr. Ove Fritz Larsen Minister Counsellor	Royal Danish Embassy House 1, Road 51, Gulshan, Dhaka Phone : 882599,882699,881799
Dr. Mrinal Kanti Chowdhury Programme Officer	Royal Danish Embassy House 1, Road 51, Gulshan, Dhaka Phone : 882599,882699,881799
Mr. Katija Kongsbak Research Assistant	Royal Vet. and Agril University, Denmark Phone : 4535282506
Mr. Ole Hels Ph.D Student	Royal Vet. and Agril University, Denmark Phone : 4535282533
Dr. Kyaw-Myint Project Officer	UNICEF, BSL Office Complex 1 Minto Road, Dhaka Phone : 9336701-3
Dr. Yukihiro Shiroishi Project Officer, Health & Nutrition	UNICEF, BSL Office Complex 1 Minto Road, Dhaka Phone : 9336701-3
Mr. Md. Ibrahim Khalil Project Management Specialist	USAID, American Embassy, Dhaka Phone : 884700/833214 (Res)
Dr. Richard M. Brown Mission Director	USAID, Dhaka Phone : 884700-22
Ms. Anne Aarness Deputy Mission Director	USAID, Dhaka Phone : 884700-22
Ms.Sarah-Ann-Lynch Project Development Officer	USAID, Dhaka Phone : 884700-22
Dr. John B. Swanson Food Security Team Leader	USAID, Dhaka Phone : 884700-22
Dr. Flynn Fuller Sub-Team Leader, Food Security Team	USAID, Dhaka Phone : 884700-22
Mr. Richard Rousseau Sub Team Leader, Food Security Team	USAID, Dhaka Phone : 884700-22
Mr. Latifur Rahman Project Management Specialist, Food Security Team	USAID, Dhaka Phone : 884700-22
Mr. Nasim Ahmad Project Management Specialist Food Security Team	USAID, Dhaka Phone : 884700-22
Mr. Michael Foster PAR Team Member	USAID, Dhaka Phone : 884700-22
Dr. Iqbal Kabir Nutrition Specialist	World Bank, 3A Paribag, Dhaka Phone : 861056-69/814544
Dr. Ratu G. Shaha National Health Coordinator	World Vision of Bangladesh House No. 27, Road No. 16 (new) Dhanmondi, Dhaka Phone : 817983-7