

**National Conference
on
Nutrition and HIV/AIDS:
From Knowledge to Action**

**Thursday, February 14- Friday, February 15, 2008
Pride Hotel, Nagpur**

Conference Report

**Sponsored By
International Life Sciences Institute-India (ILSI – India)**

**Co-sponsored By
National Aids Control Organization
National Aids Research Institute
National Institute of Nutrition
World Health Organization – Country Office for India
UN World Food Program
Global Alliance for Improved Nutrition
AVERT Society, USAID/India**

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Preface

International Life Sciences Institute-India had organized a Conference on '**Nutrition and HIV/AIDS: From Knowledge to Action**' which was cosponsored by National Aids Control Organization, Ministry of Health, National Aids Research Institute, National Institute of Nutrition, World Health Organization, UN World Food Program, Global Alliance for Improved Nutrition, AVERT Society, USAID/India. Perhaps the Conference was the first in India to discuss the importance of nutrition to people living with HIV/AIDS (PLHA).

While treatment, care and support had been given attention, it was not until recently that the importance of good nutrition to develop immunity and delay the progression from HIV to AIDS, was recognized. The Conference, after extensive deliberations, underlined the critical need of good nutrition to PLHA and strongly suggested that the ART Centers should have nutritionists to advise the infected people.

Most of the infected people are economically vulnerable. A commendable initiative has therefore been taken by Tamil Nadu and all its 16 ART Centers now provide appropriate nutrition to PLHA, along with medication. Nutrition requirements of PLHA, in respect of both, macronutrients as also micronutrients, are more than for uninfected people because HIV itself causes malnutrition. Attention also requires to be given to the contents of nutrition taking into consideration the health status of the patients.

The ART Centers will be able to develop considerable data about the effect of nutrition on the state of the disease identifying particularly the role of proteins, vitamins and minerals in enhancing immunity and slowing down progression from HIV to AIDS. With good nutrition it will be possible for PLHA break the vicious cycle of malnutrition.

The Report of the Conference will be discussed with concerned Institutions and Government Departments to expedite its implementation. There are organizational issues that need to be addressed. But, surely, if there is sincere commitment, positive outcomes will follow. At the present state of scientific knowledge a person infected with HIV remains infected for life. But it is undoubtedly possible, with good nutrition, to enable him live a near normal life.

D H Pai Panandiker
Chairman
ILSI-INDIA
April 2, 2008

Acknowledgements

ILSI-India is grateful to the following organizations for their support and assistance in organizing the Conference: National Aids Control Organization of Ministry of Health and Family Welfare; National Aids Research Institute and National Institute of Nutrition of Indian Council of Medical Research; World Health Organization – Country Office for India; UN World Food Program; Global Alliance for Improved Nutrition; AVERT Society, USAID /India.

It is also grateful to the members of the Technical Advisory Committee for their suggestions in evolving the scientific program and their full involvement in other organizational matters. The Technical Advisory Committee was chaired by Mr D H Pai Panandiker and following were the members: Dr. Parmeet Kaur, Chief Dietitian, AIIMS; Dr. Minnie Mathew, Senior Adviser (Program), World Food Program; Dr. Rajan Sankar, Senior Manager Regional Representative, GAIN; Dr B. Sesikeran, Director, National Institute of Nutrition; Dr. Jotna Sokhey, ADG; National AIDS Control Organization, Ministry of Health and Family Welfare; Dr. Rajiv Tandon, Senior Advisor, Child Survival, Office of Population, Health & Nutrition, USAID / INDIA, Dr. R. J. Yadav, Deputy Director, National Institute of Medical Statistics; and Dr. Shariqua Yunus, National Consultant – Nutrition, Office of the WHO Representative to India,

Rekha Sinha
Executive Director
ILSI-India
April 2, 2008

National Conference on Nutrition and HIV/AIDS: From Knowledge to Action

Nutrition and HIV/AIDS : A Strategic Framework for Action

A National Conference on “Nutrition and HIV/AIDS: From Knowledge to Action” was organized by International Life Sciences Institute – India (ILSI-India) on 14-15 February 2008 in Nagpur sponsored by ILSI-India and cosponsored by National AIDS Control Organization (NACO), National AIDS Research Institute (NARI), National Institute of Nutrition (NIN), Country Office for India of World Health Organization (WHO), UN World Food Program (WFP), Global Alliance for Improved Nutrition (GAIN) and AVERT Society, USAID-India.

The Conference was addressed by a number of experts from international organizations, medical professionals, NGOs working with people affected with HIV / AIDS (PLHA), R&D institutions, nutritionists etc. The Conference discussed the socio economic status of PLHA in India, nutritional assessment of PLHA, measurement of malnutrition and focused on evidence based nutrition intervention as a tool to improve immunity, health and quality of life of PLHA.

Introduction

Key Findings

A person infected with HIV remains infected for life. Clinically the primary targets of HIV are CD4 or T Cells. The infection results in progressive decline in CD4 count below 200 a stage declared as AIDS.

HIV infection enhances the nutrient requirements including energy requirement by increasing the resting energy expenditure, reducing dietary intake, causing nutrient mal-absorption and loss, opportunistic infections and due to various side effects of Anti Retroviral Drugs. HIV progressively weakens the immune system and results in malnutrition; in turn, malnutrition worsens the effect of HIV and contributes to more rapid progression to AIDS. There is clinical evidence to show that nutrition intervention can break this cycle, support therapy and help people living with HIV to manage symptoms and reduce susceptibility to opportunistic infections such as Tuberculosis (TB), Diarrhea, and Pneumonia etc.

Majority of PLHA are from economically vulnerable households with poor nutrition status.

Importance of Nutrition

Good nutrition is a vital component of an effective strategy to control HIV/AIDS because it helps maintain desirable bodyweight, minimize health problems arising due to HIV like diarrhea, muscle wasting, or weight loss, build strong immune system through provision of different vitamins and minerals in the diet and promote better compliance with medical treatment.

Initiatives by States

The importance of nutrition strategy has been well recognized in India. Tamil Nadu has made nutrition a component of an integrated program of prevention, care, support and treatment with free nutrition supplement at all its 15 ART centers. This has produced commendable results and other States according to their specific needs should adapt the model. What is really called for is strong commitment and complete coordination between stakeholders – public and private.

The Strategic Framework for Action

Taking note of the expert presentations and the comments from the participants, the Conference outlined a strategic framework for action by different agencies to slowdown the progression from HIV to AIDS in infected people and to eliminate, as far as possible, new infections.

- 1. Nutritional Assessment shall be a part of clinical evaluation of HIV +ve patients accessing the services at any level or facility, for example. ART Centers, ICTC, TB Programs, Hospitals.**
- 2. Every ART center in the country should have in the team a professionally trained Nutritionist / Dietician adequate to handle the respective patient load.**
- 3. A standardized and validated protocol shall be followed by the trained nutritionist to make the nutritional assessment.**
- 4. WHO recommendations adapted to regional and individual needs can be used for nutrition advice to the patient**
- 5. Breast feeding and infant and young child feeding practices should be as per evidence based protocols,**
- 6. Coordination with the Clinician to address the nutritional requirement of the patient based on the phase of the disease is essential and critical for effectiveness of interventions.**
- 7. Early aggressive nutrition intervention before a patient goes into a negative nitrogen balance is a must, especially in children.**
- 8. It should be ensured that at least 1 RDA of relevant micronutrients is met through diet or supplements.**
- 9. Supplements (Capsules, tablets and sachets) should be administered whenever a patient has feeding difficulty or food based approach is not effective.**
- 10. Physical activity should be advised to maintain the required energy balance and to avoid lipodystrophy and insulin resistance syndromes.**
- 11. Public private partnership should be forged to develop low cost ready to use products (food, beverages and supplements) for the special needs of PLWHA.**
- 12. APL families with a HIV+ person in their household should have access to PDS for their food needs without any stigmatization i.e. without being openly identified.**
- 13. Nutrition counseling of HIV patients has demonstrated that is an effective tool to**

manage HIV/AIDS problems. It brings about behavioral changes and is sustainable. The objectives of counseling is to maintain adequate diet and nutrition care, meet special nutritional needs (e.g. children, HIV exposed infants, pregnant women), manage opportunistic infections / symptoms and manage interaction between drug, food and nutrition.

Advice should be in the form of individualizing meal plans for increasing the calorie and meal intake, modifying the diet plan in situations like anorexia, oral ulcers, diarrhea, tuberculosis, anemia etc. High fat diet and alcohol consumption should be discouraged as they have shown to lead to fall in CD4 counts. Families should be ultimately helped to manage themselves with support through counseling and providing self-management tools.

The entry points for nutrition counseling could be ART Centers, ICTC, TB Programs, Hospitals, ICDS, schools, PLHV networks, RCH, OVC programs and home visits. Nutritional counseling materials developed by WFP / WHO can be used for guidance / advice.

14. Counseling shall lay stress on food safety and hygiene and safe drinking water. It is important that boiled water should be recommended for consumption. This will reduce food and water borne illnesses.
15. Research programs should be prioritized to fill the gaps in knowledge on the best practices for nutrition support in HIV/AIDS.
16. . HIV/AIDS Bill 2006 should be tabled and made into an Act of Parliament at the earliest.
17. Mass Media should be utilized as a tool to create awareness on methods for preventing new HIV infections, and for educating PLWHA and their families on the importance of nutrition and food and water safety in improving immunity, weight gain, over all health and delaying the progression of HIV to AIDS.
18. Social Marketing of nutritious and fortified food products and supplements especially designed for PLWHA should be encouraged.
19. State AIDS Control Societies should set up Monitoring Committees to keep track of the implementation of the *Strategic Framework* and the result there from.
20. Access to PDS should be provided also to hospitals other than ART centers treating HIV patients.
21. District level networks including ARTs, NGOs, SHG (self help groups) should be set up to coordinate activities to deal effectively with the local problems in relation to HIV / AIDS.

The Conference underlined the need to organize workshops / conferences in different parts of the country periodically to assess the implementation of the recommendations and to review progress.

Opening Session

Mr D H Pai Panandiker, Chairman, ILSI-India delivered the opening address. He made the following points in his address:

- HIV/AIDS is a global health problem, which has penetrated every continent and every community. It is difficult to make precise estimates of the incidence because all cases are not reported due to the stigma attached to this health problem. Of the reported 39.5 million people living with HIV/AIDS worldwide, in 2006, about 4 million people were in South East Asia Region. **(Annexure - 1)**
- The first reported case in India was in 1986. Since then the virus has spread all over the country but is concentrated in six States. The highest prevalence is found in Mumbai Karnataka corridor, the Nagpur area of Maharashtra, the Nammakkal district of Tamil Nadu, coastal Andhra Pradesh and parts of Manipur and Nagaland.
- The National Family Health Survey which brought out its report last year estimated that the incidence of HIV/AIDS is the highest in the age group 30-34 and 35-39 at 0.64 and 0.53 per cent in men, and 0.45 and 0.23 among women. The incidence is higher in urban than in rural areas.
- Since the first reported case of HIV/AIDS, efforts have, no doubt, been made by governments at the Center and the States to control the disease, starting with the National AIDS Control Program. In 1991 the strategy was revised to focus on prevention, awareness and surveillance. National AIDS Control Organization (NACO) came to be established as the central coordinating agency along with State level organizations and ART centers.
- HIV induced deficiency of cellular immunity makes the infected individual susceptible to opportunistic diseases like pneumonia, tuberculosis, etc. Once infected with HIV a person remains infected for life. Clinically the primary targets of HIV are CD4 or T Cells. The infection results in progressive decline in CD4 count below 200 a stage declared as AIDS. In the absence of treatment, the average time between HIV infection and progression to AIDS is around 10 years. The object of this Conference is to look at nutrition as a strategy to enable people living with HIV/AIDS lead a normal and productive life.
- HIV progressively weakens the immune system and results in malnutrition; in turn, malnutrition worsens the effect of HIV and contributes to more rapid progression to AIDS. There is clinical evidence to show that nutrition intervention can break this cycle and help people living with HIV to manage symptoms and reduce susceptibility to opportunistic infections. **(Annexure 2-3).**
- Good nutrition is therefore a vital component of an effective strategy to control HIV/AIDS because
 1. First, good nutrition helps to maintain desirable bodyweight for adequate energy level, increased productivity and a general sense of well being

2. Second, good nutrition helps to minimize the health problems arising due to HIV like diarrhea, muscle wasting, weight loss and fever
 3. Third, good nutrition helps to build strong immune system through provision of different vitamins and minerals in the diet
 4. Fourth, good nutrition helps promote better compliance with medical treatment
- It is no wonder that in May 2006 the World Health Assembly passed a Resolution on HIV/AIDS urging Member States to make nutrition an integral part of their response to HIV/AIDS by identifying nutrition intervention for immediate integration into HIV/AIDS program. The UN General Assembly held a comprehensive review of the progress achieved in realizing the targets set out, and in the political Declaration on HIV/AIDS, resolved “to integrate food and nutrition support, with the goal that all people at all times will have access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences, for an active and healthy life, as part of a comprehensive response to HIV/AIDS.”
 - The importance of nutrition strategy has been well recognized in India. In 2004 World Food Program signed an agreement with NACO to provide technical expertise in nutrition for people living with HIV/AIDS. Tamil Nadu has made a great headway bringing nutrition within the fold of an integrated program of prevention, care, support and treatment. In 2007 the Tamil Nadu Government in partnership with WFP launched the free nutrition supplement support program at all its 15 ART centers. This is possibly one reason why the number of people living with HIV/AIDS in Tamil Nadu seems to have declined.

There is however not enough appreciation among many States of the importance of nutrition, and, as such, in their HIV/AIDS program nutrition is not yet an important component. Partly, this shortcoming is also because of lack of financial resources, lack of strong commitment, and lack of coordination among different stakeholders. These limitations need to be overcome.

- An important question that has to be addressed is the kind of nutrition that is desirable. People living with HIV/AIDS (PLHA) require up to twice the daily calorie intake to protect themselves from the danger of HIV related malnutrition. Of special importance are vitamin A, vitamin C, vitamin E, B Group Vitamins, and minerals like selenium, zinc and iron.
- The diet for people living with HIV/AIDS should consist of vegetables, fruits, nuts, lean meat, apart from staple foods. Since most of the infected people will not be able to have access to nutritious foods, which are also expensive, the deficiency in vitamins and minerals will have to be made good through food fortification. In cases where the intake of food is low due to disease or medication, vitamin and mineral supplements would become necessary. WHO has also developed guidelines regarding infant and young child feeding in the context of HIV.
- Most of the people infected by HIV belong to highly vulnerable households and food security consequently becomes an important policy target. Therefore:
 1. It is important to ensure access to food and food supplements at all time

2. It is important to ensure adequacy of food complying with nutrient and safety requirement.
3. It is important to engage people living with HIV/AIDS in activities that would earn an income for them and sustain food supply in the long run in stead of depending on governmental agencies for all time. That will restore their self-confidence.

People in the economically vulnerable households will have to be provided food free of cost at least for some time. It is therefore important to build competency for nutrition support so that the right kind of food reaches the right people at minimum administrative cost. But in the long run it is desirable that people who do not have an adequate income should be trained to work or engage in self-owned self-managed micro businesses that will generate adequate income for the household.

- The critical role of nutrition is not well understood or appreciated even by people living with HIV. Besides, the stigma that goes with the disease weakens the will to live. Hence counseling is vital to provide the psychosocial support and, with the knowledge of and recourse to good nutrition, improve the quality of life.
- It needs to be understood that the support that is called for is not only from government agencies. There is abundant scope for the NGOs and industry to share responsibilities. A number of NGOs have made excellent contribution in the national effort to control HIV/AIDS. Industry has still to participate in adequate measure. I would like to mention that food industry in particular should develop specialized foods for the infected people to be sold at subsidized prices.
- As the title of the Conference suggests we have to gain knowledge with a view to initiate action. We have here amongst us many experts from all relevant disciplines to discuss all the pertinent issues concerning nutrition and HIV/AIDS. We should therefore be able to develop a constructive and practical action-specific framework that will be useful in ensuring a normal and productive life to the people living with HIV/AIDS.

Dr. G M Tewari, President, ILSI-India proposed Vote of Thanks: He thanked NACO, NIN, NARI, WHO, WFP, GAIN and AVERT Society, for actively supporting the Conference. He also thanked speakers, media and the participant for their efforts. He commended Indian scientific community and government and for their dedication to eliminating HIV/AIDS from the country. Nutrition, he said, is an important tool in management of HIV/AIDS and hoped that evidences presented during the Conference would further corroborate this. He also urged the participants to deliberate on nutrition guidelines for PLHA, and role of different stakeholders in implementing nutrition guidelines, research and nutrition counseling of PLHA

Session I

Current Status of HIV/AIDS in India

Dr Minnie Mathew, Senior Program Advisor, UN World Food Program, chaired Session I.

I.1 Socio Economic Background of Affected People

Dr Mariamma Thomas, Deputy Director, National Institute of Medical Statistics, New Delhi made a presentation on “*Socio Economic Background of Affected People*”. She informed that People Living with HIV (PLHA) have lower socioeconomic status and are likely to die earlier than those who have higher levels of wealth and education. In fact, the susceptibility to opportunistic infections amongst the former is much greater than those in the latter group. In addition, there are ethnic and racial differences which come in the way of receiving health care services including treatment with Highly Active Antiretroviral Therapy (HAART). The health costs of also vary because of differences community services disease stage and transmission categories, social and economic factors such as employment and support of a living-in partner.

Dr Thomas mentioned that the major source of information on HIV infected in India is the HIV sentinel surveillance (HSS). Two major groups included in HSS were the STD patients and ANC women. Information on the age and socioeconomic characteristics of the individuals such as education, occupation, migration status and place of residence is also collected in HSS. The educational and occupational background of STD patients and ANC women who participated in HSS during last five years had been studied to know socio-economic status (SES) of the HSS population. Analysis was carried out separately for STD patients and ANC women in high prevalence and low-moderate states. Since occupation is a good determinant of SES, descriptive analysis on occupational background had been carried out to understand SES of HSS population and HIV prevalence among them derived to assess the spread of infection in different occupational groups. Correlation of the socio economic factors on HIV positivity among ANC attendees and the STD patients also had been assessed using multivariate logistic model.

Results

SES of the people participating in HSS over past five years was found to be similar. Majority of the STD clinic attendees were agricultural / unskilled workers and housewives. In high prevalence states around 36% were agricultural/unskilled workers and around 28% were housewives and in low prevalence state the two groups respectively accounted for around 19% and 41%. Other occupational groups attending the STD clinics in high prevalence states were drivers/cleaners, industry/factory workers (around 8% each), service (6%), business (5%), students (4%) and 3% each of hotel staff and unemployed. Distribution of similar occupational groups in low-moderate states was service (around 10%), business (around 8%), 6% each of industry/factory workers and students, around 5% driver/cleaner, 4% unemployed and 2% hotel staff. The range of HIV prevalence among STD patients in high prevalence states in past five years for different occupational groups was driver/cleaner: 19-22 percent, Hotel staff: 15-21 percent, business: 15-19 percent, industry/factory workers: 11-19 percent, agricultural/unskilled workers: 16-18 percent, unemployed: 12-15 percent, service and housewives: 10-13 percent and students 4-7 percent. Similar distribution in low prevalence states was driver/cleaner: 3-5 percent, Hotel staff: 3-5 percent, business: 2-3 percent, industry/factory workers: 3-4 percent, agricultural/unskilled workers: 2-3 percent, unemployed: 2-4 percent, service and housewives:

1-3 percent and students 1-2 percent.

Occupation of spouse was recorded in case of ANC women. Majority, more than 50% in high prevalence states were agricultural/unskilled workers. Driver/Cleaner, service and business groups each accounted for 10-12 percent.

In low-moderate states agricultural/unskilled workers were: around 40%, business 20%, service 15%, industry/factory workers 10%, drivers/cleaners 9%, unemployed 4% and 1% each of hotel staff and students.

HIV prevalence in all occupational groups in high prevalence states varied between 1% and 2% over past five years and in low prevalence states it was less than 1% in all groups.

Analysis of HSS 2002 data revealed that the likelihood of sero-positivity among STD patients is higher in 20-44 age group compared to below 20 years ($p < 0.05$ in high and low epidemic zone). There is an inverse relationship between education and likelihood of sero-positivity ($p < 0.05$ in high epidemic zone only). Migrants seem to be at higher risk of HIV infection compared to non-migrants in all three epidemic zones ($p < 0.05$ in high and moderate epidemic zones). Among the four occupation groups (unskilled, drivers/cleaners, Business/Industrial workers and service), drivers/cleaners are at higher risk (OR=1.2) to HIV infection compared to unskilled workers in high and low level epidemic states. However, in moderate level epidemic states the odds ratio for all the three groups was 1.5 compared to unskilled workers. Among HIV positives from ANC attendees statistically significant likelihood was found only for occupation of husband as drivers/cleaners in low epidemic zone. No other variables were found to have significant correlation for HIV infection in general population. Further analysis is required using VCTC and PMTCT data to compare and conclude the SES of HIV infected in India.

Annexure I-1 gives the Tables on SES of STD Patients, SES of ANC Women and HIV Prevalence among different occupational groups of STD Patients.

Discussions

The following suggestions were made during the course of discussions:

- ◆ The NFHS-3 has not given the cross sectional data on prevalence HIV/AIDS. For example it gives information of agricultural unskilled labor and migrant population separately. It may be noted that the agricultural unskilled laborers are also migrant population and the very process of migration makes them susceptible HIV/AIDS.
- ◆ It is also important to link HIV / AIDS prevalence data to income. At present assumption about the income levels is made through the occupation.
- ◆ Housewives should not be identified as an occupation category particularly while collecting data in HIV/AIDS prevalence, as housewives are innocent victims.
- ◆ In some of the low prevalence states the education levels are also low while in the high prevalence states the education levels are higher. This does not mean that those who are more literate are most susceptible. It is more appropriate to assume that those who are more literate will go for testing.
- ◆ NFHS-3 has standards of living index as also HIV/AIDS prevalence data. These two should be linked and data should be analyzed on HIV/AIDS according to standards of living.
- ◆ While presenting occupational data categorization for every occupation should be done on the basis of gender.

Session II

Linkages Between Malnutrition and HIV/AIDS

Session II on “Linkages Between Malnutrition and HIV/AIDS” was chaired by **Dr B Sesikeran**, Director, National Institute of Nutrition, Hyderabad. In his introductory remarks Dr. Sesikeran underlined that malnutrition and HIV/AIDS are closely linked and nutrition support will help in boosting immune system so that the patient survives longer, the quality of life is improved, even if he has virus /disease.

II.1- Nutrition and Immunity

Prof. H. Krishna Prasad, Professor, Department of Biotechnology

All India Institute of Medical Sciences made a presentation on “Nutrition and Immunity”. Prof. Prasad mentioned that the World Health Organization (WHO) defines malnutrition as “the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions.” The inter-dependence between nutrition and resistance to infection has been substantiated by pertinent observations, epidemiological data and research. Macro and micronutrients are essential for maintenance of immune vigor. Malnutrition significantly influences Cell mediated immunity (CMI) and associated functions of phagocytic cells such as phagocytosis, intra-cellular killing and cytokine production. Besides CMI, malnutrition influences the function of the complement system. However it must be borne in mind that disease is the result of several predisposing factors in a malnourished individual.

Lymphoid tissues are sensitive to malnutrition. Characteristic atrophy of the thymus and the thymus dependent areas of the spleen and lymph nodes have been observed. Besides anatomical changes, sluggish lympho-proliferative response (LPR) and protein synthesis has been observed in malnourished subjects indicating protein synthesis and cell division essential for an immune response, requires abundant amounts of amino acids and energy. Protein–energy / calorie malnutrition (PEM) is the commonest cause of immuno-deficiency. PEM has been associated with lowered CMI as indicated by reduced number of CD4 T cells, lower CD4 : CD8 ratios, LPR to mitogens, , impairment of phagocytic functions and secretory IgA. Iron, zinc and vitamin A deficiencies and PEM are prevalent worldwide and are of public health importance in terms of sustaining immuno-competence in an individual. Several nutrients such as selenium, vitamin C and E modulate immune response. Recent advances have provided insights into the mechanisms responsible for the role of nutrients in specific immune function. Prof. Prasad spoke in detail about the role of zinc in immune functions. He explained that physiological functions of zinc includes Biochemical (cofactor for enzymes, activity of zinc finger proteins); *Cellular* (growth and cell development, cell membrane integrity, tissue growth and repair, wound healing); *Endocrinological*(reproduction: spermatogenesis and oogenesis, thyroid function, pancreatic function, prolactin secretion, thymopoetin synthesis); *Immunological*: function of neutrophils, T cells, B cells and NK cells; *Neurological function* (cognition, memory, taste acuity, vision); *Hematological* (coagulation factors); and *Skeletal* (Bone mineralization).

Causes of zinc deficiency are: malnutrition, alcoholism, malabsorption, burns, chronic debilitating disorders, chronic renal disease and acrodermatitis enteropathica. Immune cells

need zinc because it plays an important role in cellular replication:

- DNA polymerase that regulates DNA replication, & RNA polymerase are zinc dependant
- Zinc required for expression of multiple genes regulating mitosis: ornithine decarboxylase, thymidine kinase
- Transcription factors e.g. NF- κ B, metallothionein transcription factor-1 have zinc finger – like domains

Zinc deficiency leads to decline in bone marrow production, decline in chemotaxis and adhesion, impairment of phagocytosis and oxidative burst, decrease in NK cell lytic activity and IFN α production, decline in monocyte/macrophage activation, phagocytes, development of apoptosis, thymic atrophy and impaired T cell development and decreased counts. Decreased spleen, lymph nodes & peripheral blood, recruitment of naive T cells - CD4⁺ CD8⁺. Further because of zinc deficiency antibody responses get inhibited, T-dependant antibody responses are affected and there is reduced recall responses to T dependent and T independent antigen.

Talking about AIIMS experience on effect of serum zinc levels he said that:

- Serum zinc levels are higher in age matched controls compared to pediatric patients.
- T and B lymphocytes and monocytes were significantly lower in patients with sepsis compared to controls.
- CD4:CD8 ratios are lower in patients with sepsis compared to controls and correlated with serum zinc levels.

II.2 - Nutritional Status of People Living with HIV/AIDS

Dr. (Ms) Parmeet Kaur, Chief Dietician (Acting.), Department of Dietetics, All India Institute of Medical Sciences, New Delhi presented a paper on “Assessment of Nutritional Status of People Living with HIV/AIDS”. She explained that nutritional assessment is the initial step in the nutrition care process and the objectives of assessment are to obtain information regarding individual’s existing nutritional status and its adequacy. Assessment of nutritional status serves as basis for goal setting in view of formulating appropriate patient specific nutrition care plan and ultimately monitoring its efficacy. Comprehensive nutritional assessment includes anthropometric, bio-chemical, clinical and dietary assessment.

Dr. (Ms) Parmeet Kaur said that anthropometric evaluations provides estimates of body energy stores and protein mass by evaluating muscle and subcutaneous fat by using non-invasive and inexpensive external measurements. Anthropometry has a few limitations with HIV disease as total body fat measures reported in patients may be arbitrary due to increase in tissue fluid and decrease in cellular mass. Recording of serial weight history, percentage and usual weight and weight change is essential to detect wasting. An abrupt decline observed in Body Mass Index (BMI) also indicates progression of AIDS. Unintentional weight loss is sometimes the first symptom of HIV infection. Weight loss reflects the inability to meet nutritional needs and therefore may indicate nutritional risk. Weight loss of 3% within one month, 5% within 3 months or 10% within 6 months is an indicator of increased risk of morbidity and mortality. Body composition assessments are commonly done by skin fold measurements and Bioelectrical Impedance Analysis (BIA). Recently, combination therapy including HIV-1 protease inhibitors (PIs) has dramatically improved the long-term survival of HIV-infected patients. However, such

therapy is associated with a lipodystrophy syndrome characterized by selective loss of subcutaneous fat from the face and extremities and, in some patients, accumulation of fat

around the neck, dorsocervical region, abdomen, and trunk. However, BIA is not able to diagnose abnormalities arising due to fat redistribution as seen with lipodystrophy syndrome.

As regards biochemical assessment it includes laboratory measurement of serum proteins, micronutrient levels, lipid profile and immunological parameters. The laboratory values are to be interpreted with caution as malnutrition, medications and illness may cause metabolic alterations and the acute phase response to infection. Lipodystrophy in HIV-infected patients (LDHIV) is found to be associated with insulin resistance and its metabolic complications such as impaired glucose tolerance, diabetes, hypertriglyceridemia and low serum high density lipoprotein cholesterol levels. Clinical assessment is usually conducted by a physician; a review of the documentation in the medical record provides necessary information to facilitate nutrition assessment. Physical examination identifies physical signs of nutritional deficits and possible nutritional deficiencies. Medical history record showing occurrence of any opportunistic infections, concurrent disease, mental health problems and medication profile also needs to be taken into consideration. Dietary component of nutrition assessment determines macro and micronutrient adequacy of the diet and contributory factors affecting its intake by administering 24-hour dietary recall, food records and food frequency questionnaire checklist.

In addition to above components psychosocial history provides information about social and economic factors that influence the PLHA's ability to maintain adequate nutritional intake. Screening tools used internationally for assessment of nutritional risk of HIV –infected populations are (i) Scored Patient-Generated Subjective Global Assessment (ii) Revised Subjective Global Assessment of HIV –infected individuals (iii) Quick Nutrition Screen (iv) Nutrition Referral Criteria for Adults and for Pediatrics (v) Nutrition Screening Initiative (vi) HIV/AIDS Medical Nutrition Therapy Protocol. Out of above-mentioned tools only the Revised Subjective Global Assessment of HIV –infected individuals has been studied and validated.

Finally, for a low-income economy country like India it may be suggested that all HIV-positive individuals should undertake following minimal nutritional assessments; Premorbid weight, that is usual weight before infection, weight history since being infected with HIV, amount of regular exercise and/ or weight training, presence of opportunistic infections, fever and diarrhea, history of eating disorders, social and financial issues affecting food availability and accessibility, dietary history and current intake, use of alcohol or other drugs, weight, height and body mass index measurements and laboratory estimations of hemogram, electrolytes, serum albumin, fasting lipid profile if on ART therapy, fasting glucose followed by the collective interpretation of nutritional complications should be addressed in order to optimize overall nutritional status of the PLHA.

Guidelines for nutrition consultation of PLHA are given in Annexure II-2-1.

II.3 Measurement of Under Nutrition Immune Status Assessment

Dr. Rama Narayanan, Advisor Food Security Studies, M S Swaminathan Research Foundation, Chennai presented a paper on “*Measurement of Under Nutrition Through Height,*

Weight and Haemoglobin and Immune Status Assessment Through T Cells Test (CD4 and CD8)”. She said that the nutritional status of individuals is assessed through anthropometric,

biochemical and clinical methods. Heights and weights are the commonly used anthropometric indicators for assessing the nutritional status in both adults and children. While height is a

long-term indicator of malnutrition, weight is a short-term indicator. In children they are useful for monitoring growth. The heights and weights are compared with a standard to arrive at the nutritional status of the child. In children 'height for age' would indicate stunting, while 'weight for height' would indicate wasting (inadequate weight for height). Underweight defined as inadequate weight for age is a composite index that captures both stunting and wasting. In adults height and weight are used to calculate the Body Mass Index (weight in kg / height in m squared), which is a measure of adiposity. A value of less than 18.5 in adults indicates under nutrition.

Dr. Rama Narayanan explained that Haemoglobin (Hb) is an iron containing protein attached to red blood cells that supplies oxygen to all parts of the body. Deficiency of hemoglobin results in anemia. In India anemia due to iron deficiency is very high with nearly 70% of pregnant women and children being affected. In infections, especially with malaria and tuberculosis the red blood cell count goes down. This condition becomes acute in the case of HIV infection. Haemoglobin count measures the number of red cells and the amount of hemoglobin in the blood. Blood sample is drawn by a finger prick in adults and children or heel prick in newborn. The normal amount is 14gm / dl for men and 12gm / dl for women. While in the laboratory hemoglobin is assessed by the cyanmethaemoglobin method using the spectrophotometer, in field the colorimeter is commonly used, which estimates the optical density of the blood sample, from which hemoglobin is estimated.

Dr Narayan underlined that CD4 cells or T cells are lymphocytes and are responsible for the human immune system. Of these CD4 + are 'helper cells' which lead the attack in infections and CD8 + are 'suppressor cells' that end immune response. In HIV infection the CD4 and CD8 cell counts go down indicating immune damage. The CD4 count tells how strong the immune system is, how far the disease has advanced and helps predict the risk of complications and debilitating infections. The percentage of CD4 cells as well as the ratio of CD4 and CD8 cells are used as indicators to assess the extent of infection. The normal range for CD4 cells are between 20% and 40%. The ratio between CD4 and CD8 cells in healthy individuals is between 0.9 and 1.9. The CD4 count is used in combination with the viral load test, which measures the level of HIV in the blood, to determine the stage and outlook of the disease. Dr Narayan advised that periodic estimates of CD4 rather than a single count is more reliable and useful for understanding the impact of the disease.

Reference range for CD4 cells is given in **Annexure II-3-1**.

II.4 Nutrition and HIV / AIDS - Tamil Nadu Experience

Ms. Supriya Sahu, IAS, Project Director, Tamil Nadu State AIDS Control Society (TANSAC) presented a paper entitled "Integration of Nutrition Services with HIV Care-Tamil Nadu Experience" along with **Dr. Srinivas**, MD, Duke University sharing TANSAC's experience on nutrition and HIV / AIDS in Tamil Nadu. They made the following points:

- ***HIV Status in Tamil Nadu***
 - 1 Population: 62 million
 - 2 HIV Prevalence (2006): 0.38%
 - 3 PLHA registered with ART centres-68000
 - 4 26 ART centers
 - 5 Has 25% of the total patients on ART

- ***Nutrition has been integrated as part of HIV/AIDS care program in Tamil Nadu***

because evidence showed that maintaining optimal nutrition status delays disease progression and death. Further it was opportune moment for the state as Tamil Nadu had mature epidemic, good public health infrastructure; large number of PLHAs accessing health care and strong political and administrative will. Tamil Nadu piloted a comprehensive family centered model for provision of care and treatment services.

- **The Tamil Nadu Family Care Continuum Program** is supported by The Children's Investment Fund Foundation UK. It started in September 2005. It is implemented at 3 ART centers in partnership with 12 NGOs, covering 10 districts. The technical assistance is extended by Solidarity and Action Against the HIV Infection in India (SAATHII). The monitoring and evaluation is by Duke University. The Goals of Tamil Nadu Family Care Continuum (TNFCC) Program are:

- 1 Reduce HIV-related illness and death among children infected by HIV/AIDS and their families, and prevent children from being orphaned.
- 2 Enhance the quality of life of HIV-affected families.

Program Coverage Total Registration: **12179**

- 2 Number initiated on ART: **4011**
- 3 Number initiated on macronutrient supplements: **9413**
- 4 Number initiated on micronutrient supplements: **9860**

Components of Nutrition Services Comprehensive Nutritional assessment

- 2 Nutrition Counseling
- 3 Provision of Nutrition supplements
- 4 Macro & Micronutrient supplements to both pre ART & ART clients
- 5 Nutrition Demonstrations: Hospital and Field
- 6 Follow up of adherence and provision of nutrition & health education at home by ORWs
- 7 Guidelines & IEC Materials
- 8 Operational Guidelines for the Nutritionists
- 9 Nutrition Flip Chart

Provision of Macronutrient and Micronutrient Supplements Macro-nutrient supplements to meet additional calorie needs of HIV patients at different stages of HIV as per WHO guidelines

- 2 10% more calories for HIV a symptomatic patients
- 3 20% more calories for AIDS patients
- 4 50-100% more calories for children with growth failure

Supply Chain Management Key Components of TNFCC Program is given in **Annexure II-4-1**. The Graph on Supply chain Management is given in **Annexure II-4-2**

- **TNFCC Evaluation Mid Term Findings - Cohort Study**

Recruitment: October 3, '05 – May 31, '06

- 1 Clinical cohort (review of 2804 medical records)
- 2 Interview cohort (sub-sample of clinical cohort, n=1664)

Data collected at baseline and every 6 months

Data Triangulation

- 1 Case studies (n=30) repeated two times
- 2 Focus group discussions with 83 NGO staff (hospital and community)

- repeated twice
- 3 Review of home visit forms completed by ORW

Indicators among HIV+ Infected Adults (those on ART & Not on ART)

- 1 CD4 count
- 2 Major Opportunistic infections
- 3 QOL
- 4 Body Mass Index (BMI)
- 5 Micro nutrition adherence
- 6 Assessed by nutritionist
- 7 # pills consumed / #pills prescribed
- 8 Macro nutrition adherence
- 9 Assessed by nutritionist by examining empty packs
- 10 Macro consumed (grams) / Macro expected to be taken (grams)
- 11 Weight (kg)
- 12 Survival & BMI

Tables are given in **Annexure II-4-3**

Preliminary Results of Multiple Regression Analyses

- 1 Patients on ART, gained weight of 2.7 kg after controlling for macro adherence, micro adherence, number of nutritional counseling sessions and gender
- 2 Patients (on ART and not on ART) who are adherent to macro show 300 grams of weight gain for every 10% increase in macro adherence after adjusting for micro adherence, number of nutritional counseling sessions and ART

Survival among Adult Patients by Baseline BMI is given in Annexure II-4-4.

• **Challenges related to Macronutrient Supplements**

- 1 Maintaining un-interrupted supply of quality product
- 2 Storage and distribution at ART centers
- 3 Sharing of nutrition supplements with other family members at home
- 4 Storage at home

• **Lessons learnt**

Nutrition has a major role in improving the health of PLHAs as shown in the improvement of-BMI and weight gain, Nutrition component should be integral part of care continuum programs. Strengthening the Public Health System is critical for better delivery of services to PLHAs. Keeping these advantages in view the nutrition services program is being expanded to all patients on ART throughout Tamil Nadu with the support of UN-WFP (16 ART centers covering 12000 patients on ART).

Composition of micronutrient and macronutrient supplement composition and macronutrient supplement cost is given in **Annexure II-4-4.**

II.5 Nutrition and HIV/AIDS: Maharashtra Experience

Dr.A.M.Mehta, Joint Director, Maharashtra AIDS Control Society (MSACS), Mumbai shared the

experience of MSACS on “Nutrition and HIV/AIDS”. In his introductory remarks he agreed that there is a very well established link between infection control and good nutrition. Good nutrition helps in preserving health and provides protection from infection. However, good nutrition does not cure AIDS or prevent HIV infection. It helps to maintain and improve the nutritional status of HIV/AIDS persons; it strengthens immune system i.e. helps them stay healthy. Healthy and balanced diet Improves the quality of life of PLHA by:

- Maintaining body weight and strength
- Replacing lost vitamins and minerals
- Improving the function of immune system and body’s ability to fight infection
- Extending the period from infection to the development of AIDS disease
- Improving the response to treatment; reducing the time and money spent on health care
- Keeping HIV infected people active, allowing them to take care of themselves, their families and children
- Keeping HIV infected people productive and contribute to the income of their family

While talking on the importance of managing symptoms at all times, he observed that:

- 1 Rapid multiplication of the virus depletes the host of nutrients and increases vulnerability to infections.
- 2 Acting promptly and efficiently at the onset of symptoms is critical to strengthen the immune system and reduce the severity of infections.
- 3 Nutritional repercussions and responses vary as the disease progresses.

Dr Mehta informed about the pilot project on nutrition and HIV / AIDS in Maharashtra. He said that MSACS has selected 60 sex workers in Pune who have been suffering from HIV for the last 3-7 years, in the age group 20-45 years, and are not on ART treatment. Most of them are in second / third stages of HIV according to WHO classifications and have CD4 count of 350. They are being monitored for last 4 months. Their hemoglobin is tested every month. Weight is measured every month and BMI is measured every 3 months. They are being given 400 ml of milk, green leafy vegetables, seasonal fruits and high protein diet. Opportunistic infection is being treated. After 3 months it has been found that their weight increased by 10 - 15% except in two patients who were suffering from severe diarrhea.

Categories of States and Categories of Districts affected by HIV / AIDS. The information is given in **Annexure II-5-1**.

He also said that the various diet related problems in PLHA included: diarrhea, nausea and vomiting, sore mouth/ painful eating, and other digestive problems.

Discussions

- ◆ Studies show augmentations of immune function with zinc supplements.
- ◆ The meta-analysis of studies in India, Bangladesh and Nigeria has shown importance of zinc supplementation in children suffering from diarrhea. WHO/UNICEF have revised guidelines of management of diarrhea advising administration of zinc to all under five children with diarrhea, as there is zinc loss during diarrhea. 20Mg of zinc for period of two weeks makes absorption high, decline in recurrent diarrhea, decline in opportunistic infections, reduced mortality in persistent diarrhea, decline in hospitalization (reduces by 46%.) etc. There is improvement in CD4 and CD8 ratios. **Government of India will start**

zinc supplementation in 45 districts shortly.

- ◆ Severe zinc deficiency cases are rare in India. Most cases come in the range of mild to moderate. Even then they adversely affect the immune functions.
- ◆ There is no standards test for zinc deficiency and there is lack of clarity about optimum zinc levels. To understand whether someone is suffering from zinc deficiency, anti-body levels and overall malnutrition status can be looked at.
- ◆ Even though diet may have zinc there may be cases of zinc deficiency if the zinc intake is not bio-available or not distributed uniformly in the body. Zinc serum level is not an indicator of zinc deficiency.
- ◆ It has been observed that nutrition and nutrition counseling play an important role in improving immunity and over all health of PLHAs. There has been improvement in weight and CD4 counts in patients without ART. However, ART itself brings about improvement in weight and CD 4 counts, even here those on nutrition counseling and nutrition supplements gain more weight than those who are not on nutrition counseling. This has been proved in studies including study in the ART center of Maulana Azad Medical College.
- ◆ In any program of providing nutrition to PLHA it is important to maintain the supply chain, provide enough space for storage and maintain quality of products. TNSAC has solved this problem through better networking included interaction with the Deans of the medical colleges.
- ◆ Personal hygiene as also water safety is very important for maintaining good health.
- ◆ It needs to be studied whether adherence to ART also needs to better adherence nutrition counseling.
- ◆ There is need to motivate the patients for better adherence to ART and nutrition counseling. It needs to be studied as to what are the factors, which motivate the patients to be more compliant.
- ◆ Some patients do not require nutrition through ART centers however they do require intensive nutrition counseling for change in their behavior.
- ◆ Nutrition counseling is beneficial in improving weight and CD 4 counts.
- ◆ Without ART also nutrition supplements reduce opportunistic infection and improve weight marginally also. CD4 count also improves. However, it is not clear whether it is due to nutrition counseling or nutrition supplements.
- ◆ Lay counselor can be trained with clear-cut guidelines for giving nutrition counseling.

Session III

Evidence Based Nutrition Requirements of People Living with HIV/AIDS

Session III on “Evidence Based Nutrition Requirements of People Living with HIV/AIDS” was chaired by **Dr B K Tewari**, Nutrition Advisor, Ministry of Health, GOI.

III.1 - Review of Scientific Evidence: Nutrition and HIV/AIDS

Dr. Shariqua Yunus, National Consultant-Nutrition, WHO-India Country Office reviewed the scientific evidence: on nutrition and HIV/AIDS. She said that as there are complex interactions between nutrition and HIV/AIDS WHO TAG conducted a review of nutrition and HIV/AIDS for formulation of evidence based recommendations. The Review was limited to publications in peer-reviewed journals. No pooled data analysis was done. Methodological issues were pointed out wherever needed. The review summarized the existing knowledge base and identified gaps in available evidence. WHO commissioned reviews and examined key areas pertinent to the issue. Core questions addressed in the reviews were as follows:

- Impact of HIV/AIDS on the nutritional status of infected and affected children
- Potential impact of poor nutritional status on susceptibility to progression of and treatment of HIV/AIDS
- Impact of poor nutritional status on prevention, care and treatment of HIV associated opportunistic infections e.g. TB, diarrhea diseases etc.
- Nutritional needs of people infected with HIV over and above those required by uninfected people.

Major findings of the reviews are given below:

I - Macronutrients

Key Findings:

- Weight loss in adults and growth failure in children are common in HIV/AIDS infected children and adults.
- Resting energy expenditure is increased by around 10% in asymptomatic HIV infected adults and children
- An additional 20-50% increase in energy needs occurs during the convalescent catch-up period after a severe infection in both adults and children.
- These targets should be achieved through food-based approaches wherever possible.
- There is no evidence for increased protein requirement over and above that required in a balanced diet to satisfy the total energy requirements. (12-15% of the total energy intake)

Knowledge Gaps:

- Identification of locally appropriate, sustainable ways of increasing dietary intake to meet the additional energy needs of HIV infected adults and children.
- An urgent need to develop and evaluate macronutrient supplementation for the improvement of the nutritional status for infected HIV people and the potential impact of nutritional supplementation on delaying the initiation of ART.

- Evaluation of the impact of specific nutritional interventions for management of HIV-infected patients experiencing severe infectious complications.
- Identification of simple, practical ways to assess nutritional status and related outcomes in patients with HIV/AIDS before and during treatment with particular reference to resource limited settings.
- Understanding whether or how to modify established protocols for moderately and severely malnourished adults and children who are HIV infected

II Micronutrients

Key Findings:

- Screening for nutritional status and assessment of dietary intake should be included routinely in HIV treatment and care for children and adults.
- Consistent limitations in study design have limited our understanding on the exact nature of the HIV-MN relationship; any policy recommendation should be based on consensus statements derived from several trials.
- Current evidence is inconclusive about the effects of micronutrient supplementation on transmission and progression of HIV infection and as for all populations, the access to and intake of a diet that provides the full range of essential MN is a critical component of health for people infected and affected by HIV/AIDS.
- Evidence from randomized clinical trials in HIV-infected children concur with studies in non-HIV infected subjects that a large dose of vitamin A supplementation reduces diarrhea morbidity and mortality and all cause mortality in severely vitamin A deficient children younger than five years of age.
- Efforts to maintain adequate intakes (1 recommended nutrient intake) of all essential vitamins and minerals must remain a major emphasis of the public health programs irrespective of HIV status and particularly in areas where both malnutrition and HIV infection are endemic.
- In areas where specific MN deficiencies are endemic, efforts should be directed to make those nutrients available for all people irrespective of their HIV status by ensuring access to a diversified diet, fortified foods and micronutrient supplements as appropriate

Knowledge Gaps

- The safety and efficacy of specific micronutrient supplementation in HIV infected adults and children needs to be determined.
- Nutritional assessment methodologies are needed that can be effectively utilized and adapted to the various program and service delivery models found in resource limited settings in order to tailor micronutrient interventions related to the prevention, care and treatment of HIV/AIDS

III. Infant feeding and HIV Transmission

Key Findings:

- The overall risk of mother to child HIV transmission by a non-breast-feeding mother is 15-25% (without interventions to reduce transmission) and of a breastfeeding mother is 20-45%.
- The most effective intervention for reducing HIV transmission is through the use of ARV prophylaxis in a PMTCT program, which should include access to ART when indicated.
- Because human milk can transmit HIV at any time during lactation, the rate of HIV infection in breastfed infants is cumulative and increases with duration of breastfeeding.

- Clinical or sub-clinical mastitis is associated with HIV transmission risk.
- To reduce the risk of HIV transmission, HIV-positive mothers are advised to avoid all breastfeeding and use replacement feeding when it is acceptable, feasible, affordable, sustainable and safe to do so. Otherwise, exclusive breastfeeding is recommended during the first months of life and then should be discontinued as soon as it is feasible and replacement feeding can be provided safely.
- Early breastfeeding cessation is recommended for HIV infected mothers as soon as replacement feeding acceptable, accessible, feasible, affordable, sustainable and safe.
- Support is needed to ensure adequate nutrition and care during and after early breastfeeding cessation.
- When suitable replacement foods are hard to obtain, early cessation may increase malnutrition in infants and young children; malnutrition significantly increases the risk of child mortality from infectious diseases.
- New guidelines for feeding the non-breastfed child after six months are now available from WHO. The Global Strategy for IYCF adopted by WHO and UNICEF contains specific recommendations for children in exceptionally difficult circumstances, including those born to HIV positive women, and communities to be the best source of advice.
- In making the right choice women should receive counseling, including general information about the risks and benefits of the various infant-feeding options and specific guidance in selecting the option most likely to suit their circumstances. The mother's choice should always be respected and supported.
- The guidance also recommends that women have access to follow-up care and support, including family planning and nutritional support

Knowledge Gaps:

- Whether treatment of mastitis reduces the rate of transmission at the population level is still a subject of research.
- The specific role of maternal malnutrition in HIV transmission via human milk remains to be determined.
- Data are limited on the effect of early breastfeeding cessation on infant nutrition, health and HIV free survival.
- Finding effective means of preventing HIV transmission during breast-feeding with appropriate interventions is an urgent priority in resource limited settings.

IV. Growth Abnormalities in HIV-infected children

Key Findings:

- Poor growth, including intrauterine growth retardation, is common in children born to HIV-positive mothers.
- Although some evidence suggests that fetal HIV infection affects fetal growth, few data show differences in birth size between HIV-infected and un-infected newborns of infected mothers.
- Although estimates of growth failure vary by study population and according to the

criteria used, it is apparent that poor growth, particularly impaired statural growth, has a significant adverse effect on survival independent of the degree of immune deficiency in

HIV infected children.

- Disturbances in growth are detectable well before the onset of opportunistic infections or other manifestations of HIV disease progression.
- Studies conducted in Europe and the United States show that compromised statural growth is a better indicator of disease progression in HIV infected children than weight based criteria.
- Traditional risk factors in non-HIV infected children such as insufficient food intake and diarrhea also are major contributors to poor growth in HIV- infected children and may be especially important in resource-limited settings.
- Based on the currently available evidence in children not receiving ART, energy supplementation alone improves weight gain but does not reverse deficits in height.
- Prevention, early detection and treatment of diarrhea and other common illnesses may be effective approaches for enhancing growth and survival in HIV-infected children together with ART when clinically indicated.
- ART when clinically indicated improves weight, growth and development, but may not reverse abnormalities.
- Assessments of dietary intake, anthropometry (weight, height, regional adiposity) and biochemistry where available and feasible, need to be incorporated into care and management programs for children infected and affected by HIV.

Knowledge Gaps:

Although studies conducted in the developed world show that compromised statural growth is a better indicator of disease progression in HIV infected children than weight based criteria, research is needed to determine whether this is the case for children living in resource limited settings where food insecurity and malnutrition are highly prevalent.

The relative contribution of food and/ or MN supplementation to address growth problems in HIV infected children needs to be determined. Developmentally sensitive indices of nutritional assessment (both dietary intake and biochemical indices) need to be developed for resource limited settings.

V HIV and Nutrition: Pregnant and Lactating Women

Key Findings:

- Anthropometric measures were reported to decline with increasing viral load and decreasing CD4+ cell count in HIV infected pregnant women.
- The rates of weight gain reported in HIV positive mothers, however, are consistent with the weight gains in undernourished pregnant women in developing countries.
- Change in weight is appropriate for identifying women at nutritional risk and in need of intervention irrespective of HIV status.
- The few studies comparing HIV- positive and negative breastfeeding women observed no difference in body composition changes between groups.
- Although some evidence indicates a high proportion of HIV infected pregnant women have low or deficient levels of folic acid, albumin and vitamin A and that these are associated with increased viral loads and decreased CD4+ cell count, it is not clear whether these findings were the result of generalized malnutrition endemic to the areas where these women live or HIV specific findings.
- The standard recommendations for giving nutrition support to pregnant and lactating women needs to be followed, irrespective of HIV status.

Knowledge Gaps:

- The relative contribution of inadequate dietary intake (either from food insecurity or a metabolic complication of HIV infection and/or OI), lack of access to prenatal vitamin and mineral supplements, or an HIV specific anomaly that affects the processes of nutrition, to the short and long term health of pregnant and lactating HIV –infected women remains to be determined.
- The impact of HIV infection on metabolism including endocrine response during pregnancy and lactation and potential impact on body composition, nutrition and health needs to be further defined.
- Operational research is needed on the delivery of comprehensive nutrition and health services to HIV positive women to support maintenance and improvement of body composition and MN status.
- Dietary intake, body composition assessment need to be investigated and validated in HIV infected pregnant and lactating women in resource-limited settings.

VI. Nutritional Considerations in the Use of ART in Resource-limited Settings:

Key Findings:

- HIV-infected adults and children being considered for ART and while on ART need to be screened and assessed for nutritional problems: basic anthropometry and dietary assessment are appropriate.
- Documentation is needed of dietary supplement use including use of herbal and botanical therapies (that can potentially cause drug/ supplement interactions which in turn affect the efficacy, safety and/or compliance with ART) and participation in government sponsored food and/or micronutrient supplementation programs)
- ART can reverse but not rectify the loss of body mass (including muscle mass) that results from HIV infection.
- Metabolic complications of long term ART are documented in HIV infected adults; infants and children include lip dystrophy, dyslipidaemia, insulin resistance, derangements in glucose tolerance, lacticacidaemia and mitochondrial toxicity and problems with bone mineral metabolism.
- Risk estimates vary for lipodystrophy and the ART metabolic syndrome but there is a consensus that although nucleoside reverse transcriptase inhibitor drugs (NRTIs) such as stavudine have also been implicated, protease inhibitors (PI) are the class of drugs most commonly associated with these effects.
- These effects appear in men, women and children and present risks in terms of adherence with ART protocols, long-term health and quality of life issues and increased risk of chronic diseases including cardiovascular disease and diabetes.
- Bone problems have been associated with ART in HIV infected adults and children. However, the implication and importance of this is yet unknown and at present this does not effect the current recommendation for selection of first and second level therapies in resource limited settings.

Knowledge Gaps:

- Only limited data exist about the prevalence of metabolic complications on long term use of ART in resource limited settings and how best to manage them clinically; the impact of nutritional status upon these complications especially in those that are chronically undernourished needs to be established.
- Data are needed about the potential effect of ART on the nutritional needs of lactating women particularly in resource limited settings where breastfeeding is the predominant

mode of infant feeding.

- Evaluation of the potential impact of ART on growth and nutritional status of infected and uninfected infants born of HIV infected mothers in areas where malnutrition is common is a high priority.
- Data are needed on the interaction between poor nutritional status of bone related nutrients (calcium and vitamin D) and ART in resource limited settings.
- Because of the potential long-term health consequences of the metabolic complications of ART, appropriate research is needed on potential management for lipodystrophy and related conditions (e.g. diet or lifestyle changes) in adults and children, particularly those in resource limited settings.
- It is not yet clear whether nutritional supplementation can prevent or reduce the occurrence of long-term complications due to ART in adults and children.
- Evaluation of the impact of acute or chronic severe malnutrition in children on CD4 levels, response to ART or likelihood of ART side effects.

III.2 Nutrition for People Living with HIV (PLHIV)

Dr. Minnie Mathew, Senior Adviser, UN World Food Program, New Delhi
Made a presentation on Nutrition for People Living with HIV (PLHIV). She made the following points in the presentation:

- **Good Nutrition is important for PLHIV**

The immune system protects the body against bacteria, viruses, and other disease-causing organisms. Since HIV attacks the immune system, makes PLHIV very susceptible to disease, it is important to help build the body's immune system. Immune system maintenance requires a steady intake of all the necessary vitamins and minerals. This can be accomplished by eating a well-balanced diet including plenty of fruit and vegetables and yogurt products on a regular basis. By strengthening the immune system it is possible to protect the body from opportunistic infections and help in quick recovery from illness.

- **HIV affects Nutritional Status**

A common problem among HIV-infected people is the HIV wasting syndrome, accompanied by weakness, fever, nutritional deficiencies and diarrhea. The syndrome, can diminish the quality of life, exacerbate illness and increase the risk of death for people with HIV.

Wasting can occur as a result of HIV infection itself but also is commonly associated with HIV related opportunistic infections. HIV-related symptoms & medicines lead to reduced food intake, by decreasing appetite. HIV causes diarrhea and intestinal cell damage, which leads to poor absorption of nutrients, including high-energy substances such as fats.

- **Metabolic Changes in HIV**

HIV changes the way the body uses and stores nutrients, including fat and protein. When food is restricted, the body responds by altering insulin and glucagon production, which regulate the flow of sugar and other nutrients in the intestine, blood, liver, and other body tissues.

Over a period of time, the body uses up its carbohydrate stores from muscle and liver tissue and it begins to break down body protein to produce glucose. This process causes protein loss and muscle wasting.

Malabsorption of fats and carbohydrates is common at all stages of HIV infection. Fat malabsorption, affects the absorption and utilization of fat-soluble vitamins further compromising nutrition and immune status.

- **Nutritional Requirements for PLHIV**

The goal of a nutrition regimen is to maintain body weight of PLHIV

Energy requirements

- 1 Energy needs to be increased by 10% over the Recommended Daily allowances (RDA). During periods of symptomatic disease & opportunistic infection, energy intake should be increased by about 20% to 30%.
- 2 Intakes can be increased only to the extent possible, aiming for the maximum achievable up to 30% above normal intake during the acute phase.

Protein Requirements

- 3 An approximate rule of thumb is 100–150 g/day in HIV+ men and 80–100 g/day for HIV+ women.
- 4 Protein intake should not be greater than about 15–20% of total calories;
- 5 Extremely high protein diets can stress the kidneys.

Fat requirements

- 6 People with HIV may experience medication-related high cholesterol and triglycerides
- 7 Saturated fat content of the diet should be 7% or less of total calorie intake.
- 8 Monosaturated fats should be 10 % or greater of total calorie intake.
- 9 Polyunsaturated fat consumption should be 10% or less of total calorie intake

Micronutrients

- 10 HIV-infected adults and children should consume diets that ensure micronutrient intakes at RDA levels. WHO standards suggest 1RDA
- 11 Oxidative stress' occurs when there is an imbalance between the pro-oxidants and antioxidants, causing further damage to cells, proteins, and enzymes.

- **Diet in HIV**

Taste Changes

- 12 Use flavors and variety to improve taste
- 13 Eat preferred food
- 14 Eat food at room temperature

Nausea

- 15 Lower fat and sugar
- 16 An empty stomach increases feeling of nausea
- 17 Avoid skipping meals. Eat some salty snack before going to bed
- 18 Drink water between meals
- 19 Eat smaller more frequent meals
- 20 Try small amounts of food many times during the day.
- 21 Ginger tea lemon tea may help

Diarrhea/ Malabsorption

- 22 Avoid dairy products (except yogurt), oily food, high fiber food, too sweet, coffee, alcohol,

- nuts, seeds
- 23 Drink plenty of fluids, ORS
- 24 Include curd, bananas

Ulcers in mouth/swallowing problems

- 25 Take fluids, food at room temperature
- 26 Avoid acidic foods like citrus fruits & tomatoes
- 27 Eat soft bland foods like eggs, yogurt, rice
- 28 Sip water before each bite

- **Diet and ART**

- 29 There is no special diet for people on ART. Eat balanced diets (energy giving, body building & protective foods).
- 30 Consume 20- 30 % more energy than the RDA.
- 31 Limit the amount of fat & oil if experiencing medication related diarrhea.
- 32 Limit saturated and mono-saturated fat but consume fats with omega-3 if experiencing medication related high cholesterol.
- 33 It is not always possible to ensure adequate intake of essential vitamins & minerals through diet alone. Therefore micronutrient-fortified food may be necessary.

In summary, good nutrition helps HIV+ people maintain a good body weight and muscle mass. It delays progression of HIV infection to AIDS and help to stay healthy for a longer period. Maximizes the effectiveness of antiretroviral treatment.

Annexure III-2-1 gives the information on possible side effects of ARV and food drug interaction.

III.3 Special Nutritional Needs of Infected / Affected Children

Ms. Anuja Agarwala, Nutritionist, Department of Pediatrics, All India Institute of Medical Sciences, New Delhi presented a paper on **Special Nutritional Needs of Infected / Affected Children**. She underlined that malnutrition in AIDS is multifactorial. These symptoms do not differ from HIV-negative children but the symptoms are more prolonged and infection clearance is slow. In fact, HIV infected children will have several additional symptom less opportunistic infections and increased antibiotic resistance as well. In 90% of cases children get infected with HIV through mothers and in 10% of cases it is through other factors like contaminated medical equipment.

According to Dr Aggarwal complex presentation of HIV/ AIDS with pathologic lesions affecting oral cavity (oral thrush), pharynx, esophagus and neurological problems along with malabsorptive diseases and systemic infections lead to nausea, dysphagia and inhibit appetitive behavior at CNS. As a result, there are alterations in food intake leading to malnutrition.

As regards HIV infected children they have increased calorific needs from early in the disease even before they become symptomatic. Early aggressive nutritional intervention even before the child becomes wasted with very low CD4 counts will reduce the risk of opportunistic infections, mortality and may delay HIV disease progression. Malnutrition in HIV/AIDS is reversible by tackling the quality of life and starting the feeding programs much before the child is in terminal state (Guarino et al 2002).

Dr Aggarwal suggested the following as the “nutritional goals” to be achieved:

- (1) Provide adequate nutrients for proper bodily functions – diverse and healthy dietary principles
- (2) Minimize symptom of intestinal malabsorption
- (3) Reverse malnutrition
- (4) Maintain normal growth (Monitor weight for age, weight for height, height for age)

She also made the following observations relating to nutrients:

Macronutrients

Energy – 50 % more than the Recommended Dietary Allowances is required due to Progressive wasting due to body weight loss 1/3rd below ideal

Body cell mass depletion is associated with both lean mass and fat tissues Low BMI (16-18) often associated with death.

Increased REE due to increased plasma viral load, fever, night sweats and medications.

Proteins – There is total body nitrogen depletion, which is correlated with total body potassium (TBK) depletion and increased mortality in advanced HIV.

15% of the total calories should be provided in the form of proteins. A very high protein intake increased calcium excretion and therefore, not recommended.

HIV infected children have high demands of essential proteins particularly cystein. Dietary cystein supplementation has demonstrated better survival rates, improved immunological functions (in randomized controlled trial by Kalebic et al 1991, Herzenberg et al 1997).

Carbohydrates and Fats

Total fat intake can go up to 35 – 40 % in case of children in order to provide calorie intake in small quantity of food or feed. Good quality of fat can be ensured by advocating fat low in saturates (approximately. 7%), polyunsaturates (10%) and rest monounsaturates. Lactose intolerance is common and therefore, diet low in lactose content may be prescribed.

Annexure III-3-1 gives calorie and protein requirements of infants and children.

Micronutrients and Vitamins

HIV infected children have low levels of all micronutrients and vitamins. These deficiencies badly affect the immune responses. Recommendation is to provide 2 – 4 times the RDA of vitamins and minerals depending on the specific clinical scenario and dietary intake.

Micronutrient deficiency is reported to lead to immune dysfunction (decreased lymphocyte stimulation response, lower thymic function, depressed neutrophil function etc), increased infections, morbidity, disease progression but no randomized controlled trials have been done to confirm this hypothesis. Most of the guidelines are for adults and specific recommendations for children are not developed.

Dr Aggarwal pointed out that vitamin A, vitamin B-complex, folic acid, vitamin B12, vitamin E, •zinc, and •selenium are quite important.

Vitamin A

- 70% HIV infected children – Vitamin A deficient

- Decreased Serum levels - disease progression and mortality risk (increase by 3 fold)
- 27% infected children – low retinol levels in spite of adequate dietary intake
- Dietary and supplemental intake of 9,000 – 20,000 IU delays progression to AIDS (reduces RR by 50%)
- Maternal Vitamin A deficiency – a risk factor for transmission of HIV (3.69 times chance) Reduced all-cause mortality
- Improved growth
- Reduced diarrhea associated morbidity (28%)
- Hospitalization (77%)
- WHO recommendation (2003)

WHO recommendation for Vitamin A in children

Category	Age group	RDA	Duration
Infants	6 -12 months	1,00,000 IU	Every 4 – 6 months
Children	12 – 59 months	2,00,000 IU	Every 6 months

Beta Carotene and other Carotenoids

- HIV + showed 6.5 times lower levels of serum beta carotene levels
- Deficiency indicative of fat malabsorption and diarrhea
- Deficiency increased free radical load, CD4 lymphocytes, CD4/CD8 ratios, CD4 counts
- Antioxidant supplements beneficial

Vitamin B –Complex

- Vitamin B12 deficiency – 8 fold increase in the risk of dying from an opportunistic infection
- Highest intake of the full range of B complex vitamins - significantly improves survival rates over 8 period
- Folic acid – 2 to 4 RDA
- Dietary sources - dried beans, whole grains (whole-wheat bread, oats, coarse maize meal, sorghum), chicken, fish, meat, liver, eggs, dairy products (milk, cheese, yogurt, sour milk), nuts, bananas

Zinc deficiency – well documented

- Anti-oxidant, immune-modulator, anti-viral agent
- Low plasma levels in 50% healthy asymptomatic HIV +
- Deficiency increases in mortality risk (2 folds)
- Oral zinc supplementation in HIV infected children @ 1.8 – 2.2 mg/kg/day for 3-4 weeks, improved Zn levels, CD4 counts and clinical scores (2 trials)
- Dietary sources - meat, eggs, leafy green vegetables, nuts, seeds and whole grains.

Vitamin E and Vitamin C HIV-positive people with the highest blood levels of vitamin E show a decreased risk of disease progression compared with those patients with the lowest vitamin E levels

- Adult dose – 400-800 IU of Vitamin E 500-2000 mg /day of Vitamin C
- Dietary sources - whole grains (especially wheat and oats), nuts and seeds (including peanuts, vegetable oils (olive and canola oils) and leafy green vegetables

Selenium and Copper - Most important nutrient in HIV disease

- Selenium-deficient infected person has 20 times more probability to die from opportunistic infections compared with an HIV-positive person who has a good selenium

status

- Selenium-deficient HIV-positive people progress much faster to AIDS
- Reduction of serum copper levels by 40% in infected subjects
- The best food sources of Selenium are offal (kidneys, liver), fish and Brazil nuts (3-4 nuts per day will provide a person's daily requirements)
- It is recommended that selenium intake should be around 200mcg/day for people with HIV disease. It should not exceed 400mcg/day

Carnitine

It prevents the destruction of CD4 and CD8 T cells and supplementation in the dosage of 2,000 mg /day is recommended.

Dr Aggarwal recommended that multivitamin and minerals supplement should be given daily. Following could be the composition:

- Folic acid 1 mg/d (give 5 mg on Day 1)
- Zinc 2 mg/kg/d
- Copper 0.2 mg/kg/d
- Start iron once the child has a good appetite and starts gaining weight

Single multivitamin and mineral supplement daily delays progression of HIV infection to AIDS.

Dr Aggarwal said that high-energy, high-protein, nutrient-dense diet with micronutrient supplementation should be given. Dietary manipulation should be advised as follows: offer variety for main meals, give meal accompaniments, and in between snacks. Further, counsel on food choices, frequency of meals and snacks, and methods of increasing caloric density. Often, commercial nutritional formulas used as supplements are useful, well-accepted, and have high-nutrient content. Appetite stimulant – megastrol acetate @ 20-40mg/day could be given. Steroids – reverse wasting in children with calorically adequate diet (Clinical trials at Children's Hospital, Los Angeles).

As regards type of feeds it should be noted that nutritional needs are great and early aggressive nutritional support is needed. Oral enteral route is the best if adequate calories can be achieved because of its decreased tendency for infection and cost. Children with oral thrush, swallowing difficulties and neurological problems may not be able to feed orally and naso-gastric tube feeding may be started to provide complete nutrition. Partial parenteral nutrition can be used for short periods (<2 weeks) to bridge a period when negative energy balance is expected. Total PN is indicated only in presence of severe malnutrition.

Antiretroviral drugs and other medications hinder the absorption of food, nutrients and supplements. Better understanding of impact of ARVs on nutrients and nutritional status,

efficacy and side effects are required. Multivitamins can be safely taken in larger quantities but under supervision. Mineral values should be approximate RDA values as excess may be harmful.

Recommendations

- For not infected mothers and whose infection status is unknown exclusive breast-feeding is recommended for 6 months.

- HIV infected mothers should be advised to avoid all breast-feeding when replacement feeding is acceptable, feasible, affordable, sustainable and safe. Otherwise exclusive breast-feeding is recommended during first month of life and should be discontinued as soon as it is feasible. Key role of Nutrition and Health sector is well recognized
- Nutrition indicators should be incorporated into HIV/AIDS monitoring and evaluation plans
- Systemic operational and clinical research should be conducted to support evidence based interventions and strategies.
- Practical tools should be developed for nutritional assessment. Control of AIDS calls for multi sectoral action –existing interventions should be expanded for improving nutrition.
- Strong Political support and political commitment are essential. It is necessary to develop and protect human capacity and skills for effective community participation

Discussions

- ◆ Children should be given calorie dense foods. Any food can be made calorie dense by simple methods such as addition of Ghee (clarified butter) or edible oil.
- ◆ WFP is developing soya based energy dense foods.
- ◆ The Nutri Plus developed by WFP combines wheat and soya in 75:25 ratio. This is fortified with vitamins and minerals with 1 RDA. This has been launched in Tamil Nadu. Compliance is quite good.
- ◆ All PLHAs require both micronutrients and macronutrients in approximate amounts depending on status of patients.

Session IV

Nutrition Counseling and Awareness

Session IV on “Nutrition Counseling and Awareness” was chaired by **Dr Ashok M Mehendale**, Professor of Community Medicine, Mahatma Gandhi Institute of Medical Sciences, Nagpur.

IV.1 - Review of Materials Available for Nutrition Counseling

Dr. Po-Lin Chan, Country Officer HIV/AIDS, Office of the WHO Representative to India, New Delhi- reviewed the materials available for nutrition counseling. She informed that materials for nutritional counseling are widely available globally and locally.

While talking about the effectiveness of nutrition counseling materials she mentioned that nutritional counseling in HIV has demonstrated effectiveness as it is more sustainable, and is associated with behavior change. There are evidences from other chronic diseases to prove this. She cited some of the studies in this regards, viz.:

- Ravasco et al (2005): GI cancer patients
- Arcand et al (2005): Heart failure and dietary salt intake
- Sartorelli (2005): changing lifestyles of non-DM adults (weight control, LDL, Cholesterol)
- Dalziel et al 2007, economic model: cost effective

Dr Chan was of the view that while preparing the nutrition care and support interventions programs, the following aspects need to be kept in view:

- 1 Counseling (clinic-based, home-based, community-based)
- 2 Awareness generation, IEC, mass media
- 3 Provision of food aid or other resources
- 4 Nutrition assessments
- 5 BCC interventions

Objectives of Nutritional Counseling and Support programs should be to

- ◆ Maintain adequate diet and nutritional care practices to meet special nutritional needs eg children, HIV- exposed infants, pregnant women
- ◆ Manage effects of opportunistic infections and symptoms
- ◆ Manage interactions between drugs and food and nutrition

As regards Program Entry Points for general nutritional counselling and support they could include the following:

- Non-HIV Programs
 - RCH program
 - ICDS
 - TB program)
- PLHA Networks
- ICTCs
- OVC Programs; School-Based Services

- ART Services
 - During medicine provision
 - During follow-up (clinic- and home-based)
 - Counseling, IEC, simple aids (meal planner)
 - Time and capacity issues (doctors, nurses)
- Non-ART services
 - Home-based care (follow-up)
 - Counseling services by NGOs
 - PLHA networks
 - Links to food aid and nutrition programs (e.g. -TNFCC and WFP)

Dr Chan stressed that it is necessary to undertake capacity building of all involved in nutrition support. Many countries including Rwanda, Kenya, Uganda, Bolivia have developed national guidelines and policies, handbook (adaptation from regional work), training course (adapted from regional course FANTA/ WHO/ FAO), counselling job aids: flipcharts and patient self management materials: leaflets, recipes etc. Ethiopia has developed counselling card for fathers to encourage their role in infant and maternal nutrition

For developing the national guidelines and policies for nutrition counseling, the materials developed by WHO/FAO/WFP/UNICEF and from regional/country experiences (mainly Africa) can be referred to. These will be useful for program managers in integrating nutrition into the various programs

Tools for nutritional counseling are nutritionist/dietician, non-professional counselors in nutrition (counselors and peer educators), etc. As regards training materials WHO/FAO, FANTA/USAID (Africa) have developed manuals for training courses for nutritionists, doctors, counselors/ nurses and preservice and could be useful in providing training. Further self-management material should be developed for easy reference by PLHA.

In India also nutrition-counseling materials have been developed. It may be useful to look into all the nutrition-counseling materials both national and international and develop guidelines for different regions in India based on best practices and what works and what does not work in Indian settings. Due to differences in dietary habits it may be important to develop regional guidelines in India. Recopies and servings should be included in the nutrition counseling materials. While developing the guidelines it will be important to translate issues like RDA in a commonly understandable language.

IV.2 - Nutrition Counselling for PLHIV – Broad Areas

Dr Minnie Mathew, Senior Adviser (Programme), World Food Programme
New Delhi broad areas requiring attention in nutrition counselling for PLHIV.

She said that in view of the paucity of nutrition counseling materials for People living with HIV (PLHIV). WFP developed a flipbook to be used in counseling. The book comprehensively covers PLHIV of various age groups and various conditions. To cater to this requirement, the flipbook is divided into separate sections. Since information provided in the flipbook cannot be exhaustive, the counselor is provided with a Guide, which provides more technical information, which would facilitate the counselor to answer questions raised by the PLHIV client.

Identifying Topics for Counseling

Formative Research was the first phase of the project, which was to understand the common problems experienced by PLHIV in India. There is very little knowledge of nutrition and its importance as part of care and treatment of HIV. There was considerable interest among clients to have more information on nutrition so that the immunity level is kept at an optimal level and the drug regimen can be delayed. Providing early and adequate nutritional support and counseling and care emerged as one of the most important interventions for patients with HIV/AIDS.

The important messages were based on existing secondary data and the primary research conducted by WFP. Besides, visits to the clinics, talking to PLHIV and doctors provided a good understanding on the common problems experienced by PLHIV on which they wanted to have information.

IV.3 - Operational Lessons on Nutritional Counseling

Prof. Richa Dewan, Head, Department of Medicine, Maulana Azad Medical College, Lok Nayak Hospital, New Delhi made a presentation on “Operational Lessons on Nutritional Counseling” . She mentioned that PLHA are vulnerable to poor nutritional state. The effect of HIV infection on nutrition begins early in the course of the disease, even while the patient is asymptomatic. HIV infection enhances the energy requirement by increasing the resting energy expenditure, reducing dietary intake, causing nutrient mal-absorption and loss, opportunistic infections and due to various side effects of the Anti Retroviral Drugs.

Nutrition and immune functions are closely related. Maintenance of optimal nutritional status is essential for preserving the body stores as well as to support therapy. Nutritional counseling and therapy is known to delay the progression of infection and improve the immune status, prevent wasting effects of HIV infection, prevent the opportunistic infections and improve the quality of life.

With the help of a dedicated dietician, nutritional counseling services have been started in ART clinic of Lok Nayak Hospital since January 2006. These services for PLHAs mainly incorporate assessment of nutritional status and its clinical correlates; nutritional intervention in the form of individualizing meal plan for increasing the calorie and protein intake; modifying the diet plan in situations like anorexia, oral ulcers, diarrhea, tuberculosis anemia etc; counseling for food safety and hygiene; and nutrition related research.

Based on two studies, carried out in the Center on the assessment of nutritional status and its clinical co-relates in patients of HIV/AIDS, the following observations were made.

- Prevalence of malnutrition, based on Body Mass Index (BMI) and Skin Fold Thickness (triceps) in treatment naïve patients was found to be 46% and 30% among those receiving Anti Retroviral Therapy. It also co-related significantly with the CD4 counts. The associated co-morbidities were mainly diarrhea and tuberculosis.
- Dietary analysis has shown that the diet of the majority of patients is lacking in adequate calorie and proteins. 80% of the patients have been found to be consuming less than 1800 Kcal/day, mostly due to anorexia or lack of information regarding appropriate dietary intake and / or poor socio-economic status of the patient.

Prof. Dewan informed that counseling is carried out at monthly intervals when patients come to collect their Anti Retroviral drugs. Dietary counseling is accepted and adhered to by nearly 80% of the patients. Analysis of 200 patients who were followed up for one year has shown that among the compliant patients weight gain was seen in almost all and a significant weight gain was seen in 35% of patients. Among the non-compliant patients there was either fall in weight or no gain. The reasons for non-compliance were either financial constraints, the nature of job and distribution of food among the family members with children getting priority over parents, and husband over wife and addiction to alcohol. Women overall had lesser weight gain as compared to men. Other observations have been a significant weight gain in compliant patients with or without corresponding increase in their CD4 counts; patients consuming high fat diets or alcohol showed a fall in CD4 counts in spite of continued Anti Retro-Viral therapy; in small number of patient's consumption of non-vegetarian food products and nuts was associated with better CD4 response.

Diarrhea contributes significantly to the state of malnutrition in HIV positive. As most of the diarrhea episodes are due to food and water borne infection it is important to counsel these patients regarding food safety and hygiene.

Prof. Dewan mentioned that goals of nutrition counseling should be to:

- Improve nutritional status
- Maintain Improve nutritional status
- Maintain weight and prevent weight loss
- Preserve muscle mass
- Ensure adequate nutrient intake
- Improve eating habits and diet
- Replenish stores of essential nutrients
- Prevent food-borne illnesses and prevent weight loss
- Preserve muscle mass

Following should be the components of nutritional counseling:

- Nutritional assessment
- Intervention
- Follow up
- Research

Highlighting the importance of clinical assessment Prof. Dewan mentioned that the following symptoms of opportunistic infections should be looked at::

- Diarrhea and vomiting
- Fever
- Anorexia
- Weight loss
- Odynophagia
- Aphthous ulcers
- Oral thrush

Prof. Dewan concluded that:

- The results of dietary counseling at the ART center has been very encouraging
- The dietary interventions in the form of increased calories and protein intake using locally available food items have shown a definite improvement in the nutritional and immunological status of HIV+ patients.
- Dietary counselors should be an integral part of ART centers.

Discussions

- ◆ In Clinical setting nutrition counseling does well however it does not work in community settings.
- ◆ When nutrition supplements were given to a patient suffering from HIV in Manipur his weight and immunity status improved and he became Mr. Manipur. He is a quoted as good example of success of nutrition therapy. His CD 4 improved from 184 to 365 and in 7 year he gained 12kg weight. Imphal ART center launched a research project of HIV and nutrition and after to 2 years it will have scientific evidence on role of nutrition and HIV.
- ◆ Doctors. may not be able to give adequate nutrition advice and hence it is essential to employ nutritionists in all the ART centers. Every Art center should have trained nutritionist, proper infrastructure, and space for patients and counselor.
- ◆ Even in large ART center like Maulana Azad Medical College the patient's load of 50 to 60 patients can be handled adequately by the nutritionist.
- ◆ The message that food safety and hygiene are very important and simple behavioral change like washing hand before meals can bring down episodes of diarrhea significantly should be spread across the country.
- ◆ As regards cost of hiring nutritionist in the ART centers if cost benefits analysis is done in terms of reduction in medical cost, hospitalization, medications and better immunity for patients then it will be found that the benefits far outweigh the cost the hiring nutritionist.
- ◆ Ration cards should be given to all the HIV patients coming from low socio economic status to enable them to get adequate food from the public distribution system. The cards should be such that patients are not identified as PLHA. This will solve problem of storing food in the ART centers.
- ◆ Maharashtra has solved the problem by giving yellow card to PLHA in Nasik district. PLHAs get registered at NGOs working with HIV/AIDS patients. NGO representatives visit home and give their recommendations on issuing yellow ration cards.
- ◆ Nutrition should be a integral part of the over all health as in all hospitals as it's increasingly being seen that many diseases including communicable and non-communicable diseases can be managed effectively with nutrition.
- ◆ HIV Bill should be made into an Act of Parliament at the earliest so that accessibility problem is solved.
- ◆ As in the case of appointment of labor officer, it should be made mandatory that on specific numbers patient's nutritionist should be appointed in the hospitals.

Session V

Operational Issues: Nutrition Delivery System

Session V on “Operational Issues: Nutrition Delivery System” was chaired by **Dr Rajan Sankar**, Regional Representative, Global Alliance for Improved Nutrition (GAIN), New Delhi. In his opening remarks Dr. Sankar emphasized PLHA needs extra nutritional care and their nutritional requirements are much higher. The risks of malnutrition increase during the course of infection. Good nutrition cannot prevent HIV or check AIDS but it will help other efforts to delay the progression of HIV to AIDS related diseases. Nutrition support should be provided in a holistic manner.

He addressed the issue of bridging the knowledge-application gap. He said that public private partnership is important to address issues related to HIV/AIDS and different sector should not work in isolation. HIV research is the first to bring new models of partnership i.e. community consultation has become important part of the research endeavor. Dr. Sankar was of the view that few crisis has effected human health and threatened national, social and economic progress in a way in which HIV/AIDS has affected and therefore, there is a need to look at new ways of addressing them. In the area of international health and nutrition programs there is a paradigm shift in deploying private sector participation and funds. Public private resources should be directed to improve health and nutrition. While private sector can look at opportunities to expand business at the same time it should develop low priced commodities and goods. Deeper pocket outside government sector may be opened for public goods.

V.1 - Strategy and Action Plan for Integrating Nutrition Services As Part of HIV/AIDS Control Programs

Dr. Sai Subhasree Raghavan, President, SAATHII, (www.saathii.org) made a presentation on “Strategy and Action Plan for Integrating Nutrition Services as Part of HIV/AIDS Control Programs”. She emphasized the importance of advocacy (not activism) for universal access to nutrition services to all those who are identified as HIV Positive. She highlighted the following:

Universal Access

- 1 To Reach Millennium Development Goal on HIV/AIDS – to halt and reverse the spread of the epidemic by 2015
 - Requires far greater access to HIV prevention and treatment, care and support than is currently available.
 - The current pace of most national responses is far too slow in reaching all in need of HIV information and services.
- 2 At the 2005 World Summit, UN member states agreed to
 - Developing and implementing a package for HIV prevention, treatment and care with the goal of universal access to treatment by 2010.
- 3 At the 2006 UNGASS Meeting Member States including India Signed a Declaration.

Universal Access in India

- Estimated Cases: 2.6-3.1 Million
- Identified Cases: More than four lakhs

Involving all identified case in nutrition care

Opportune Moment

India has begun to implement phase III of National Program (NACP III). This is a *well-developed resourced plan, which was developed over two years in consultation with all stakeholders*. There is Large-funding support for Family Care Programs. NACP III makes mention of nutrition support as one of the activity but there is no blue print or operational plan. The Tamil Nadu pilot projects should be scaled up at the National Level.

Strategies for Way Forward

- Multi-Sectoral Collaboration
- Identification of Technical Assistance Agencies That can Assist
 - NACO in leading the effort
- Establishment of Technical and Operational Working Groups to
- Advise NACO in
- Formulating India Specific Guidelines
- Develop, Implement and Monitor a Comprehensive Resourced National Plan
- Capacity Building
- Program Implementation (Short and long term plans)
- Mainstreaming
- Development of Provider and Patient Education Tools
- Build Evidence
- Coordinated Advocacy Strategy

Multi-Sectoral Collaboration

(Key to Success)

- Real Power lies in collective knowledge and partnership.
- Process
- Academia (Training, Technical Assistance, Research and Advocacy)
- National Institutions (Research, Policy and Advocacy)
- National and State Governments (Policy and Implementation)
- UN and Bi-Lateral Agencies (Funding, Policy, Advocacy and Technical Assistance)
- NGOs (Technical Assistance, Implementation and Monitoring)
- People Living with HIV (Policy, Advocacy, Implementation and Monitoring).

Identification of Technical Assistance Agencies That can assist NACO in leading the effort

- Agencies with interest in Universal Access to Nutrition
- Agencies with expertise in Designing and
- Implementing Large Nutrition Programs
- Agencies with Dedicated Resources for Provision of technical and coordinating Assistance e.g. UNICEF (PMTCT), WHO (ART), Clinton Foundation

(Pediatric Initiative), SAATHII (State Level Technical Assistance on Care, Support and

Treatment, Nutrition and PMTCT)

Representation of Technical Working Group

- NACO (Policy and Implementation)
- UN and Bi-lateral Partners
- Technical Assistance agencies
- Academic Institutions
- SACS
- People living with HIV
- National Food and Nutrition Institutions
- ICMR
- Potential Donors

Representation of Operational Working Group

- NACO
- UN and Bi-lateral Agencies
- State and District Level Administration
- Technical Assistance Agencies
- NGOs that have implemented nutrition programs
- People living with HIV
- Women and Child Welfare Department (Convergence and Sustainability)
- NHRM
- Academic Institutions (Training, and Research)
- ICMR

Formulating India Specific Guidelines

- Adapt WHO Guidelines and consider state specific modifications)
- Experiences from other Countries (Kenya, Rwanda, South Africa)
- Process
 - Draft the Guidelines
 - Review, pre-test and endorse the guidelines
 - Make the guidelines available to the target audience
 - Advocate and Create an enabling environment for use of guidelines
 - Support services and delivery points that will use the guidelines
 - Monitoring and Evaluation of use of guidelines

Note: Excellent Tool Available on Developing National Level Guidelines from Regional Center for Quality Health Care (RCQHC)

Develop, Implementing and Monitoring a Comprehensive Resources National Plan

- Goal is to reach all patients with minimum services
- Basic nutrition counseling, assessment and access to food or Supplements.

Entry Points

- Need to develop implementation plans for various entry points

- ART Clinics: More than 200 by 2011 (300,000 Patients)
- Employ Nutritionists
- ICTC Clinics: Close to 5000 by 2011
- Train the counselors
- Home Based Care Programs
- Train the counselors and out reach workers
- Targeted Interventions
- Train the counselors and out reach workers
- TB Programs
- Hospitals

Capacity Building

- Integration of nutrition training within current curriculum for doctors, Counselors and out reach workers.
- Refresher courses
- Onsite training and supportive monitoring
- Specialized long term training for nutritionists and counselors
- Integration of nutrition as part of training of social workers and other

Demystifying Distribution

- Operational research
- Feasibility studies
- Short and Long term solutions
- Mainstreaming?

Development of Provider and Patient Education Tools

- Tools as per core competency
- Tools in local languages
- Training on tools
- Innovative tools
- Tools for children and special populations

Build Evidence

- India specific research is critical for formulating guidelines and for Evaluating the impact of the programs.
- India has tremendous research capacity through ICMR Labs, National Institutions, Academic Institutions, Medical Colleges and NGOs.
- Process

- Develop Research Working Group
- Develop National Priorities
- Raise Funds
- Build Capacity and Intersectional Collaboration
- Implement Research
- Disseminate Results for Informing Policies and Programs
- Monitor

Coordinated Advocacy Strategy

Include Activism (?)

- Reasons for more than three million people receiving ART in the world is due
- to advocacy at various levels
- *Pressure to invest in drug discovery*
- *Pressure to fast track approvals of drugs*
- *Advocacy for expanded access in developing countries.*
- Process
 - *-Set Ambitious goals*
 - *-Develop intelligent strategy and operational plan.*
 - *-Work together*
 - *-Persevere*
 - *-Monitor*

Note: Need advocacy agencies that can dedicate manpower and time

V.2 - Nutrition within the HIV/ AIDS Care and Support Setting from NGO's Perspective

Dr. Nirmala Rajagopalan, Project Manager, Freedom Foundation, Bangalore forwarded a paper on "Nutrition within the HIV/ AIDS Care and Support Setting" from NGO's perspective. She expressed the view that any resource poor country would naturally find dealing with nutrition related issues an uphill task. Within a country like India, resource deficit combined with a chronic infection like HIV can make this issue even more daunting.

Nutrition with respect to HIV needs to be looked at from two dimensions. One, social and the other disease related. Social factors would be poverty, myths regarding food, migratory occupations and also gender (women in India generally play the role of nurturer and tend to neglect themselves) and illiteracy. Disease related factors would include the chronic nature and progression of AIDS leading to malabsorption, oral manifestations in AIDS like candidiasis that cause inability to eat and pill burden that could also be associated with dietary restrictions.

Explaining the work of Freedom Foundation, an NGO working in the areas of HIV/AIDS and chemical dependency she informed that it has medical care & support centers for HIV/AIDS and mainly cater to people from the lower socio-economic strata. In addition, there are also two residential facilities for orphaned children infected with HIV. The center provides free opportunistic infection management and highly active anti-retro-viral treatment (HAART) at concession. Dealing with nutrition related issues among our patients has always been a

concern.

The Foundation's settings have demonstrated that nearly 40% of people living with HIV are infected with tuberculosis (TB). There is adequate data that substantiates the need for a balanced diet when a person has TB. The more contemporary issue is that of nutrition in the era of HAART, which is provided in order to control the viral replication, thereby improving the immunity of the person. Naturally as the person's immunity starts to improve, there is going to be an increase in appetite. In-addition the body will also require additional supplements in order to repair the wear and tear that has occurred with disease progression.

PLHA from economically poor background today have the option of availing of free HAART medication through the government hospitals. However, the dietary needs of the individual still remain unanswered. This is truer for widowed women or women whose husbands are debilitated. With no other form of social support, women on HAART often have to deal with starvation.

At Freedom Foundation, the dietary needs of the person are catered to at three levels. The first step is to educate the PLHA regarding nutrition through both individual and group sessions. The second is to directly meet the nutritional requirements of the patients while they are admitted at the care & support facility. During this time, they are provided with balanced meals that are designed to be simple and replicate the diet that they may have once they return home. During their in-patient stay they are also introduced to a nutrition powder that is prepared in-house. Finally, for single mothers or couples who are very poor, monthly rations are provided. The rations are meant to complement and not supplement their nutritional intake. The nutrition powder is also provided along with the rations. The PLHA are also provided with multi-vitamin and iron supplements until their HAART medication have taken effect and the immune system has been re-constituted.

There is a tendency among medical practitioners to go on overdrive when it comes to prescribing multivitamins and other nutrition supplements. However, there are studies that advocate prudent use of iron & folate supplements especially in HIV infected children. In India, there are not many studies that have focused on nutrition in HIV/AIDS. Such studies if undertaken would be extremely helpful in understanding the indigenous dietary factors that affect or control disease. Progression rather than depending on studies from affluent settings that are culturally and genetically different from India.

Freedom Foundation has in its own way begun to acknowledge and act upon the importance of proper nutrition in HIV/AIDS. However, there is a need for increased understanding regarding diet and nutrition and instituting better systems of ensuring that people with chronic illness receive assistance with their nutritional requirements.

V.3 - Government Programs Concerning Nutrition

Dr. B.K. Tiwari, Adviser (Nutrition), Directorate. General of Health Services, Ministry Of Health and Family welfare, Government of India made a presentation on Government Program Concerning Nutrition. Dr Tewari observed that India is surplus in food grain production. However, in spite of excess food production the problem of malnutrition/ under nutrition is prevalent in the entire country. The food and nutrition security at the household level and that of individual *per se* is inadequate. . He talked about India's position in world In respect of food production. This is given in **Annexure V-3-1**

Dr Tewari said that India has double burden of disease i.e. both under nutrition and over nutrition. There is problem of affluence/diet related chronic non-communicable disorders.

The major causes of malnutrition/under nutrition are: inadequate food, poverty, low purchasing power, poor socio-economic status of women, female illiteracy and high rate of population growth. Further, low access of population to: health, education, safe drinking water, sanitation, hygiene and other social services add to the woes.

Vulnerable groups for under-nutrition includes infants, pre-school children, pregnant and lactating mothers, and elderly.

He said that Government has taken a number of steps to improve the nutrition status. National Nutrition Policy was adopted in (1993), National Plan of Action on Nutrition was adopted in (1995) and National Nutrition Mission was launched in (2006). He highlighted the following:

Micronutrients of Public Health Importance

Micronutrients of public health significance are: iron, iodine, and vitamin ‘A’. Effective strategies for prevention and control of micronutrient deficiencies include supplementation, food fortification and dietary diversification.

Specific Programs on Nutrition

1- Food Fortification

Following is the current status of micronutrient food fortification:

<u>Food Article</u>	<u>Fortificant</u>	<u>Level</u>	<u>Remarks</u>
▪ Vanaspati	Vitamin ‘A’	25 I.U./gm	Positive Test for Vitamin ‘A’
▪ Common Salt Level	Iodine	30PPM 15PPM	Production Level Consumption
▪ Common Salt	Iron	850-1100PPM	--
▪ Fortified Atta	Iron, Thiamin, Riboflavin & Niacin	--	No Limit specified
▪ Fortified Specified Maida	Iron, Thiamin, Riboflavin & Niacin	--	No limit
▪ Fortified Mineral Water	Copper, Iron		1 PPM 0.3 PPM

Micronutrient Fortification Under Consideration

- Sugar With Vitamin 'A'
- Common Salt With Iron & Iodine
- Wheat Flour With Iron, Zinc & Vitamin 'B' Complex.

2. Integrated Child Development Services (ICDS) Scheme

- Supplementary nutrition
- Growth monitoring
- Immunization
- Health check-up and referral services
- Preschool/non-formal education
- Nutrition and health education.

Following guidelines are followed in the nutrition programs under ICDS:

	Calories	Proteins
Children upto 6 yrs	300	8-10 g
Severely malnourished children	Double of above	
Pregnant & lactating mothers	500	20-25 g

3-National Program of Nutritional Support to Primary Education (Mid- Day Meal Program)

4-Kishori Shakti Yojana (KSY)

5-National Rural Health Mission

6-Prevention and Control Anemia

7-Prevention and Control Vitamin A Deficiency

8-Janani Suraksha Yojana

9-National Iodine Deficiency Disorders Control Program

10-Pilot Program for Control of Micronutrient Malnutrition

- Important micronutrient covered are iron, folic acid, vitamin 'a', fluorine & zinc.
- Population covered are school going children, adolescents, non-pregnant women, adult male & elderly.
-

11-Public Distribution System (PDS)

- Revamped (PDS)
- PDS for BPL

Dr Tewari was of the view that following factors greatly influence success of strategies to eliminate micronutrient malnutrition:

1. Assessment (Situation Analysis)
2. Communication (Disseminating Findings)
3. Planning (Developing A Plan Of Action)
4. Political Decision
5. Implementation
6. Monitoring & Evaluation

V.4 - Nutrition Strategies In A.P State AIDS Control Program.

Dr. A. Ashok, Managing Director, A.P. Foods presented the case study on - “Role Of A.P.Foods In The Implementation of Nutrition Strategies In A.P State AIDS Control Program”. Talking about the importance of nutrition for PLHA he said that It is necessary to attach utmost importance to nutrition in PLHA because studies and experience have shown that nutritional status is strongly predictive of survival and functional status among people living with HIV/AIDS (PLH/A). It should be noted that nutritional problems might occur at any stage of disease and can contribute to impaired immune response, accelerate disease progression, increase the frequency and severity of opportunistic infections, and impede the effectiveness of medications. Fortunately, many nutritional disturbances are preventable and manageable. HIV infection can frequently result in nutritional deficiencies and growth failure. Malnutrition associated with HIV/AIDS can severely affect an already compromised immune system, leading to increases in rates of opportunistic infections and a decreased survival rate. It is important to monitor and maintain adequate nutritional status in HIV-infected children and adults.

Dr Ashok further added that the relationship between immunity and nutrition has been well established and underscores the important role of nutrition in HIV/AIDS. Nutritional interventions—including nutrition assessments, counseling, therapy, and access to food—can have a positive impact on morbidity, mortality, and quality of life. It can also decrease or delay hospitalizations, emergency room visits, and costly and invasive treatments. If initiated soon after diagnosis of HIV or AIDS, medical nutrition therapy may help prevent malnutrition, lipodystrophy, and the loss of lean body mass. All HIV-positive clients should receive basic education regarding nutritional issues. Regular resistance exercises have also been shown to restore lean body mass and strength in PLWH/A. All PLHAs should therefore be monitored regularly, and the nutrition care plan should be revisited and modified as the patient’s needs and goals. Nutrition interventions should address challenges associated with new, complex antiretroviral regimens, which involve many pills; have complicated dosing schedules; and may cause symptoms that negatively affect food intake, absorption, and nutrition status. In view of this there is an urgent need for low cost interventions, to reduce the morbidity and mortality related to HIV infection, in developing countries.

Dr Ashok said that all health providers now have a window of opportunity to address nutrition-related problems. It is vital that all providers understand the need for basic nutrition assessment and intervention and the role of nutrition in PLHAs health status.

Energy- and micronutrient-providing nutritional supplements can make a significant contribution to the care of PLHA by preventing/decelerating weight loss. Nutritional supplements containing individual immune-enhancing components, such as L-glutamine and arginine, have shown to promote weight gain and improve immunity in PLWHA, whilst others have failed to show an improvement in immunity outcomes.

Patients with HIV/AIDS often lack vitamins and minerals because of inadequate dietary intake, infection, and mal-absorption. Micronutrient deficiencies are frequently present in HIV-infected adults and children. Micronutrient intakes at daily-recommended levels need to be assured in HIV-infected adults and children through consumption of diversified diets, fortified foods, and micronutrient supplementation as needed. WHO recommendations on vitamin A, zinc, iron, folate and multiple micronutrient supplements remain the same. Micronutrient supplements are not an alternative to comprehensive HIV treatment including ARV therapy. Studies have shown

that some micronutrient supplements may prevent HIV disease progression and adverse pregnancy outcomes. Additional research is urgently required.

It is also important to provide a high-calorie, high protein diet high in vitamins and minerals. HIV-infected adults and children have increased energy needs compared with uninfected adults and children. Energy needs increase by 10 percent in asymptomatic HIV-infected adults and children. Energy needs for adults suffering from more advanced disease is increased by

20 to 30%. In HIV-infected children experiencing weight loss, energy needs are increased by 50 to 100%. A daily multiple vitamin/mineral supplement is of benefit to HIV-positive patients, whether they are symptomatic or asymptomatic.

- Vitamin A: reduced diarrhea, improved several indicators of immune status in children, reduced pre-term deliveries.
- Vitamin B12: improved CD4 cell counts.
- Vitamin E, C: reduced oxidative stress and HIV viral load
- Reversing anemia: improved survival
- N-3 fatty acids: weight gain
- High energy/protein drink: weight gain
- Glutamine+antioxidants: weight gain, improved body cell mass
- Selenium and beta-carotene: increased anti-oxidant enzyme functions
- Zinc: reduced infectious disease morbidity (though conflicting findings)
- Multivitamins (A, B, C, E, folic acid)
- Improved pregnancy-related outcomes and immune status

Dr Ashok identified Soy as of particular benefit in HIV According to the Food and Nutrition Technical Assistance (FANTA) while protein requirements of HIV-infected persons jump to 50-100% higher than for uninfected persons. The vast majority of recommended calorie-containing nutritional supplement products contain soy ingredients for optimum nutrition: Soy protein and adequate calories can help to prevent body from wasting, which is often associated with HIV/AIDS. Soy plays a role in nutritional maintenance, an essential feature of optimal effectiveness of medicine while helping to minimize nutrition-related side effects. Proper nutrition keeps the body fortified to support the best possible immune function, prevent nutrition-related immune deficits, and help to ward off opportunistic and other infections. Soy protein quality at par with milk and egg protein and the protein quality for optimal utilization. Desired health benefits in chronic HIV infection include:

- Reduce effects of glucose intolerance and diabetes
- Reduce effects of cardiovascular disease
- Reduce bone mineral losses
- Reduces the risk of cancers

Dr Ashok gave an overview of Hyderabad-based AP Foods, A.P. Foods is a Government of A.P. Enterprise functioning under the auspices of A.P. Nutrition Council, a Society which was set up in the year 1976 with the assistance of CARE & UNICEF and GOI for producing and supply of Nutritious Foods to Malnourished School going, pre school children, Pregnant women and Lactating mothers. It produces a variety of food products. Product formulations are based on the guidelines/ suggestions from the NIN, CFTRI, Mysore and Food & Nutrition Board, Government. of India.

AP Foods is supplying Nutritious food to A.P.AIDS Control Society to cover 2000 adults and 500 children. These products are based on wheat and soy. Following is the result of consumption of these foods in HIV patients on ART with CD4 counts of less than 200:

- Health and energy levels improved
- Gain in strength and stamina
- Frequency of diarrhea reduced
- Decreased weight loss

- Resistance power increased
- Prevalence rate of sickness decreased
- Improved absorption of ART drugs
- Better nutritional status
- Good Acceptability in patients. Patients liked the taste and requested this supplement.
- No side effects

Keeping in view the success of the program Dr Ashok stressed the need for the State Governments to take up steps to implement such programs on nutrition as part of efforts towards control of HIV / AIDS in their States.

V.5 - Defence Against HIV / AIDS: Role of Micronutrients

Mr Arun Kelkar , Managing Director, Hexagon Nutrition Pvt. Ltd., talked about how corporate sector can get involved in the move to assure better quality of life to HIV / AIDS patients.

He emphasized that addition of specific micronutrients to the daily diet can improve immunity and, hence, promote the defense against AIDS. He cited the study done in Khayelitsha, a township of Cape Town, South Africa. This was a clinical pilot study in HIV-positive patients with advanced AIDS who had never taken any ARV drugs. The goal of the study was to show that a combination of micronutrients could reverse the course of AIDS, even in its advanced stage. The study was done by Dr. Rath's Research Institute, USA. Dr. Rath, Health Foundation, South Africa and Medical University of South Africa. This nutrient combination consisted of specific vitamins, amino acids, minerals and polyphenol extracts from green tea. The list of micronutrients in this program and details of the study are available on the web site. Blood tests and clinical evaluations were performed at the start and after 4 weeks on the nutrient program. Already after the first month of this study, the clinical and blood test results were astounding. Patients with the most severe stages of AIDS had the highest improvements of immune function. Key findings of this study were published. In July 2004, More details can be found at www.dr-rath-research.org The *New York Times* had already reported about a study of pregnant women in Tanzania with AIDS, originally published in the July 1 issue of the *New England Journal of Medicine*. This 6-year study documented that multivitamins can slow the progress of AIDS by 50%. No previously tested vitamins or ARV drugs have been able to show the reversal of clinical symptoms of AIDS as documented here. Moreover, in this study all known immune system markers - not only CD4 counts - significantly improved within the short period of only 4 weeks! Results of study on Improvements in Immune Functions Markers are given in **Annexure V-5-1**.

Mr Kelkar also gave specific examples of immune deficiency-related skin ulcer reversals in HIV / AIDS patient when along with ART the patient was put on a specially designed nutrition therapy. He enumerated multiple benefits of micronutrients in HIV / AIDS patients, which included the following: reduces medication side effects; enhance immunity, slow down disease progression and increase in life expectancy/longevity. Further, research studies in US with supplementation of vitamin A alone did not have much effect. Recent research has shown that ideal combination should have: amino acids, vitamins, and trace minerals. **Annexure V-5-2** gives information on *Role of Micronutrients in Chronic Infections and Malignancies*.

He introduced a new concept for administration of micronutrients i.e. in powder form through "sprinkle sachet". He said that it is specially useful since HIV/AIDS affected population are already consuming many tablets/capsules every day as part of medical treatment. The "sprinkle

sachet has Well balanced combination of amino acids, vitamins and trace minerals Supplement formula for HIV/AIDS. It does not affect taste, smell or color of food, compatible

with different forms of food. It does not require special measuring utensils or handling and can be given at meal time twice daily. People do not need to be literate to learn how to use them. It is easy to store, transport and distribute and has shelf life of one year.

Mr Kelkar suggested integration of nutrition including micronutrients into the essential package of care, treatment and support for people living with HIV/AIDS.

Discussions

- ◆ Both macronutrients and micronutrients are important for improving health and boosting immunity of PLHA since majority of them come are from low socio economic background.
- ◆ Community care center should be included in the entry points
- ◆ Budget for public distribution system should be increased to take care of the needs and requirements of PLHAs.
- ◆ Majority of research results are not in the public domain. Research results should be widely disseminated.
- ◆ State Governments should properly identify those living below poverty line (BPL) and what they should be given through the public distribution system. Since public distribution system is a state subject. Central Government gives subsidy of to Food Corporation of India (FCI)
- ◆ In Andhra Pradesh the public distribution system is a success story in reaching food to those below poverty line since there is proper monitoring.
- ◆ Nutrition issues have not been effectively addressed in the country due to multiplicity (14) of ministries handling the subject. It is important that an independent council is set up to look at nutrition issues in view of large section of Indian population suffering from malnutrition and related diseases. The council should also set up standards for nutrition education.
- ◆ Technical Committee should be set up to follow up implementation of the recommendations of the Conference.

Session VI

The Next Steps for Management and Prevention of HIV/AIDS through Nutrition Strategies

Mr D H Pai Panandiker, Chairman, and ILSI-India chaired this Session. Dr B Sesikeran, Director, NIN presented the Draft Framework for India – recommendations of the Conference. The participants discussed these recommendations in-depth and the Framework for Action was revised on the basis of suggestions made. The final Framework for Action is given on Pages 4-6.

Mr Panandiker mentioned that meeting of Technical Advisory Committee would be called shortly to discuss how the recommendations should be implemented.

Discussions

- ◆ While allocating funds for community health care programs Government should follow simple procedures to ensure timely deployment of resources for public good.
- ◆ In case of flexi-funds of GOI no stringent cumbersome procedures are used. The funds are allocated to health sanitation societies and administered through the village panchayats.
- ◆ For AIDS patients Andhra Pradesh Foods can supply sachets at Rs. 1.25. The prices can go down if large quantities are producer.
- ◆ High Priority should be given to research in nutrition for HIV/AIDS
- ◆ Anganwadies can be used as entry points for nutrition counseling.
- ◆ Along with NACO other ministries like Ministry of Women and Child Development and Health Ministry should be involved in implementation of the Conference recommendations since it may not be practical for NACO to fund the programs with cost implications. Inter-Ministerial coordination is important because along with others issues of livelihood and education are also involved.
- ◆ In order to ensure that the research projects provide full information on nutrition of HIV/AIDS, Government of India through its research institution should get involved in the planning of research projects. Indian Council of Medical Research (ICMR) can play an important role in ensuring that research is properly designed. ICMR should also involve hospitals and academic community in the clinical trials.
- ◆ Government funds through Ministry of Health, Department of Biotechnology, Department of Science and Technology, and Indian Counsel of Medical Research etc are available for well conceived research programs. The basic requirement is that the organization applying for research should be registered with Department of Scientific in Industrial Research.
- ◆ Mass media should be used for creating awareness on nutrition and HIV/AIDS and addressing issues of hygiene and food and water safety.
- ◆ Strong political will is important for success of any program
- ◆ Coordination with Education Department is important for creating awareness of nutrition and hygiene.
- ◆ More programs should be organized on Nutrition and HIV/AIDS in different parts of the country.

Ms Rekha Sinha, Executive Director, ILSI-India proposed vote of thanks to the co-sponsors, members of Technical Advisory Committee, speakers and participants for their invaluable inputs.

Annexure - 1
HIV/AIDS Burden in South East Asia Region 2005

Country	Adult HIV Prevalence %
Bangladesh	<0.1
Indonesia	0.2
India	0.36
Myanmar	1.3
Nepal	0.5
Thailand	1.4
Sri Lanka	<0.1

Annexure - 2

Effect of Nutrition on HIV/AIDS – I

- High Energy, high protein drink (1996 Stack et al) led to weight gain
- Omega 3 fatty acid in fish (Hollerstein 1999) led to weight gain in some AIDS patients
- Glutamin + antioxidants (Shabert et al) led to weight gain

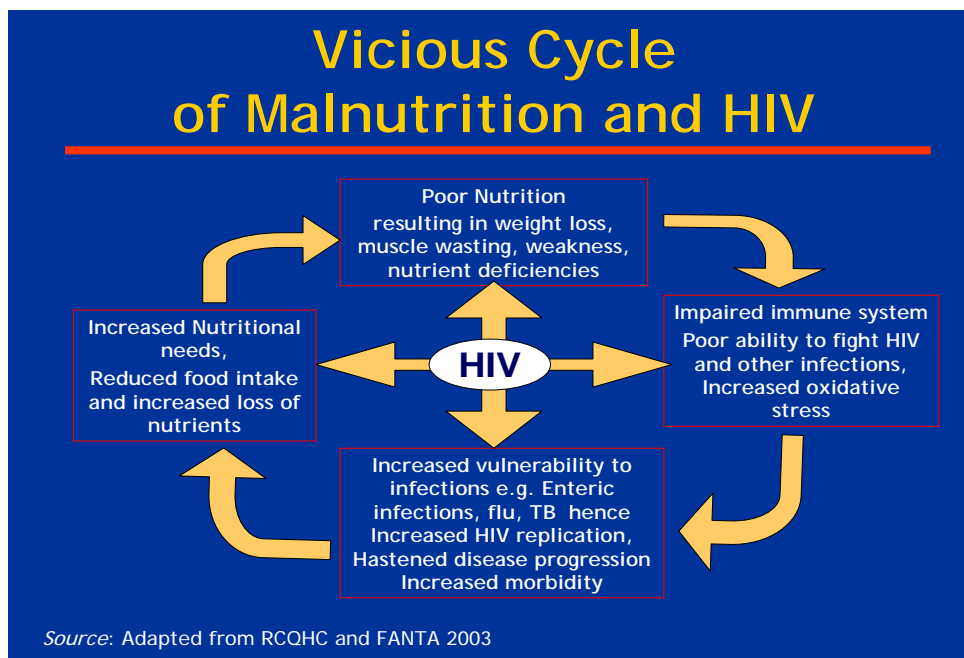
Effect of Micronutrients Intake on HIV/AIDS - II

- Vit A (Tanzania, South Africa) improved immune status
- Vit B12 (USA) improved CD 4 count
- Vit E + C (Canada) reduced oxidation stress & HIV viral load
- Multivitamins (A, B, C, E, folic acid) improved pregnancy related outcomes

Effects of Mineral Intake on HIV/AIDS - III

- Selenium + Beta carotene (France) increased antioxidant enzyme function
- Zinc (Italy) reduced incidence of opportunistic infections
- Iron (USA) slowed HIV progression and improved survival

Vicious Cycle Of Malnutrition And HIV



Annexure I:1:1

Table 1-SES Of STD Patients

Occupation	High Prevalence States	Low-moderate States
Agri./Unskilled Worker	36%	19%
Housewife	28%	40%
Driver/Cleaners	8%	5%
Industry/Factory Workers	8%	6%
Service	6%	10%
Business	5%	8%
Student	4%	6%
Hotel Staff	3%	2%
Unemployed	3%	4%

Education:

- 10% were graduates & above
- Around 40% had secondary level education
- 25% Illiterate
- 25% Primary

Table 2-SES Of ANC Women

Occupation	High Prevalence States	Low-moderate States
Agri./Unskilled Worker	53%	40%
Driver/Cleaners	11%	9%
Industry/Factory Workers	9%	10%
Service	10%	15%
Business	10%	18%
Student	1%	1%
Hotel Staff	2%	1%
Unemployed	3%	4%

Education:

- 6% were graduates & above
- Around 40% had secondary level education
- 28% Illiterate
- 26% Primary

**Table-3-HIV Prevalence among different
Occupational Group STD Patients**

Occupation	High Prevalence States	Low-moderate States
Agri./Unskilled Worker	16-18%	2-3%
Housewife	10-13%	1-2%
Driver/Cleaners	19-22%	3-5%
Industry/Factory Workers	11-19%	3-4%
Service	10-13%	2-3%
Business	15-19%	2-3%
Student	4-7%	1-2%
Hotel Staff	15-21%	3-5%
Unemployed	12-15%	2-4%

* The ranges are the variation over the year 2002-2005

HIV Prevalence Among Different Occupational Group
ANC Women

HIV prevalence in all occupational groups in high prevalence states varied between 1% and 2% over past five years and in low prevalence states it was less than 1% in all groups

Guidelines For Nutritional Consultation Of PLHA

Patients Profile	Referral Guidelines
New Asymptomatic	Within 6 months
New Symptomatic	Within 1 month
Asymptomatic	Every 6-12 months
Symptomatic	Every 2-6 months
Initiation of HAART with food interactions	At time of HAART initiation
Pregnant	Every 2-4 weeks
↑lipidemia, ↑ glycaemia, osteopenia	Within 1 month

Annexure II:3:1**Reference Range (CD 4)**

	count / microlt	%
Males *	383 – 1347	24 – 52
Females*	448 – 1593	28 – 59
Birth**	2800 – 3900	50 – 57
Till 6 yrs**	560 – 2700	27 - 57
6 – 12 yrs**	560 - 2700	27 – 57

* Source: Pub Med ID 18206601

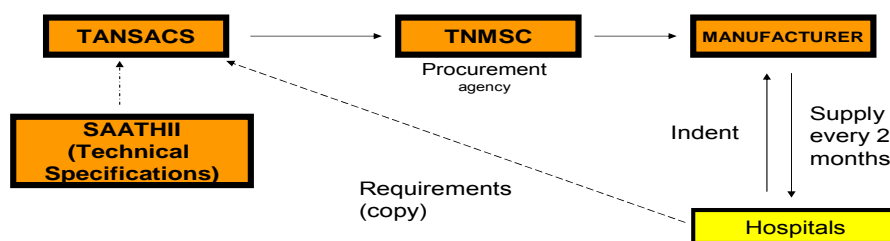
** ibid

Key Components Of TNFCC Program

Program Component	Setting	Core Services
Clinical	Hospital	Medical assessment Laboratory assessment Psychosocial counseling Referral to other services (e.g., TB)
Nutrition	Hospital	Nutrition assessment & counseling Micro nutrient supplementation Macro nutrient supplementation
Home/Community based care	Home Community	Adherence counseling & follow up, Nutrition counseling & food demo, family & child counseling, linkages for support services, hospital follow-up, support group & children forum meetings

Supply Chain Management

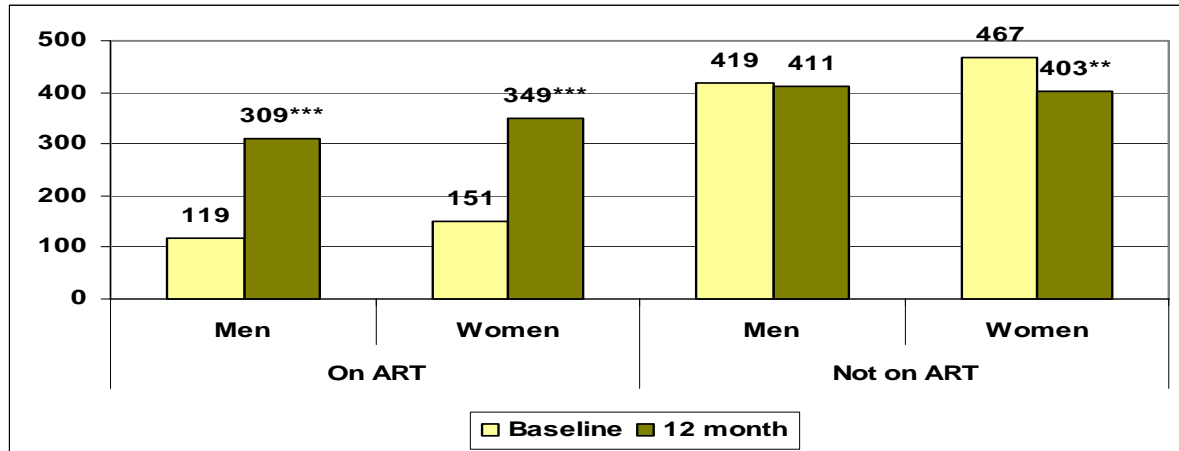
Supply chain Management



Every batch nutrient supplements are tested for quality both before and after supply

A

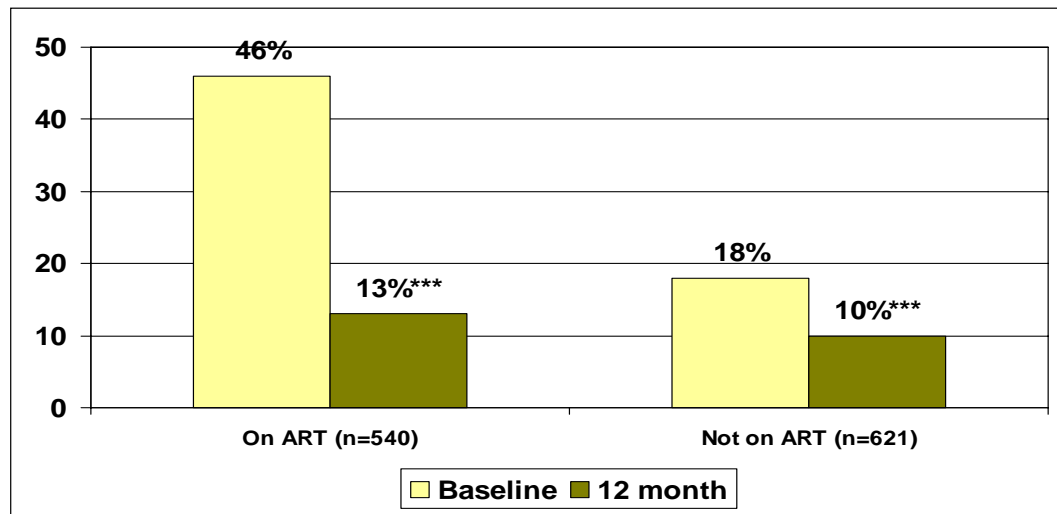
Change in CD4 cell count



** Statistically different from baseline $p < 0.01$, *** $p < 0.001$

B

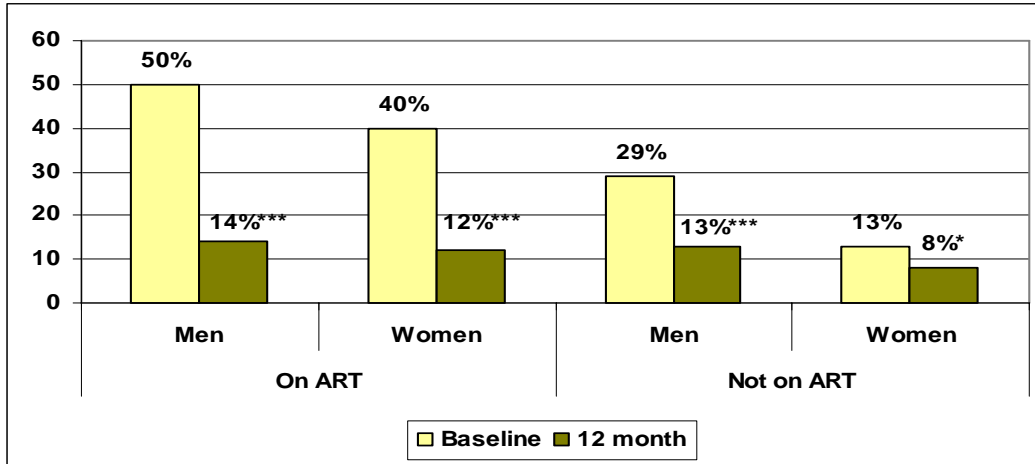
Opportunistic Infections (Candidiasis, Diarrhea)



*** Statistically different from baseline $p < 0.001$

C

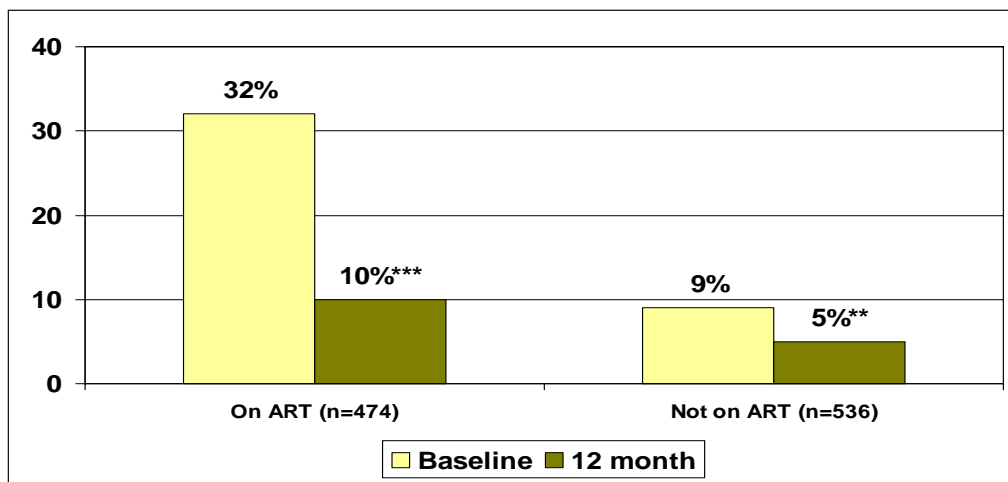
Opportunistic Infections (Candidiasis, Diarrhea)



** Statistically different from baseline $p < 0.01$, *** $p < 0.001$

D

Opportunistic Infection (Active TB)



** Statistically different from baseline $p < 0.01$, *** $p < 0.001$

E

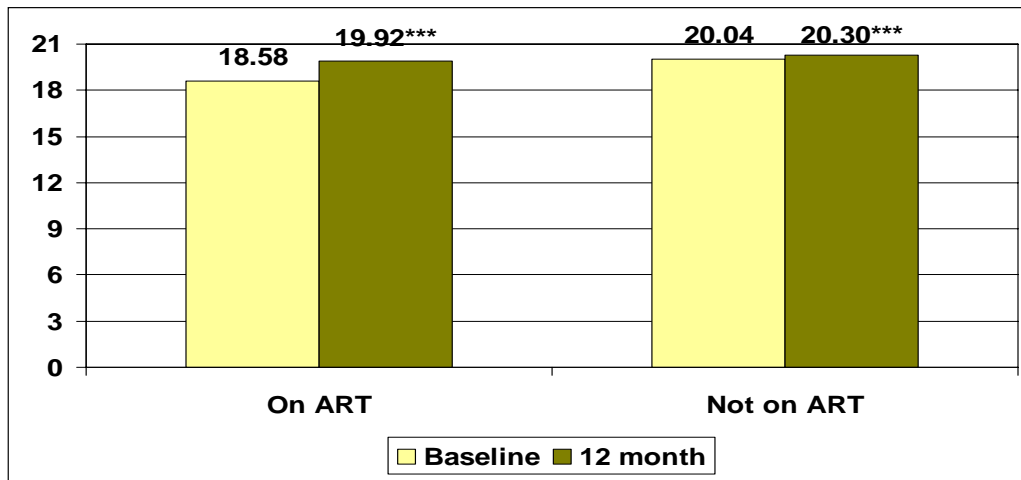
WHO – Quality Of Life

	Baseline	12-month
Physical QOL		
On ART (n=393)	11.07	13.73***
Not on ART (n=441)	12.88	13.99***
Psychological QOL		
On ART (n=393)	11.62	13.51***
Not on ART (n=441)	12.55	13.29***
Social QOL		
On ART (n=390)	12.41	13.67***
Not on ART (n=440)	12.83	13.86***
Environmental QOL		
On ART (n=393)	11.98	13.15***
Not on ART (n=441)	12.10	12.97***

* Statistically different from baseline p<0.05, **p<0.01, ***p<0.001

F

Change in BMI



*** Statistically different from baseline p<0.001

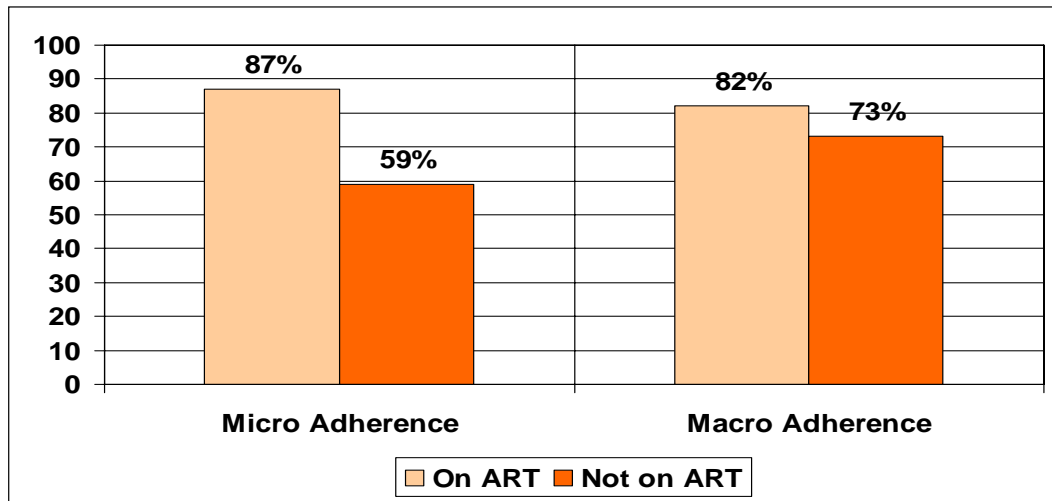
G

Body Mass Index (BMI)

	Baseline (528)	12-month (528)	95%CL	P Value
On ART				
Severe MN (<18.5)	55%	35%	(14%, 26%)	<.001
Normal (18.5 – 23)	38%	51%	(9%, 20%)	<.001
Obese (23+)	7%	14%	(3%, 10%)	<.001
Not on ART				
	Baseline (589)	12-month (589)	95%CI	P value
Severe MN (<18.5)	40%	36%	(-2%, 9%)	=.19
Normal (18.5 – 23)	41%	43%	(-7%, 4%)	= .60
Obese (23+)	18%	21%	(-7%, 2%)	=.32

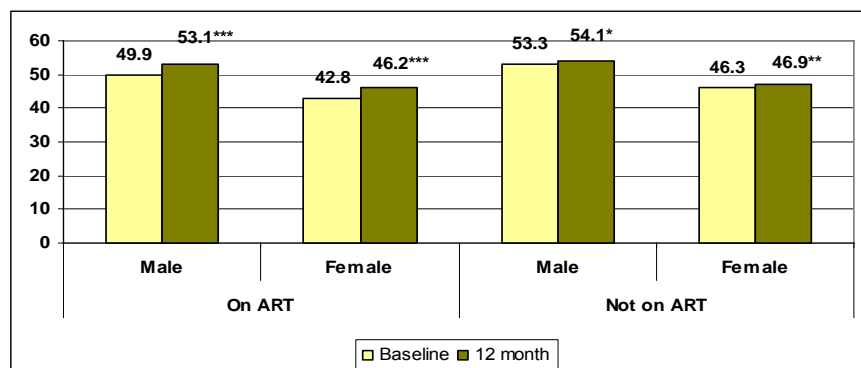
H

Micro Adherence & Macro Adherence



I

Change in Weight



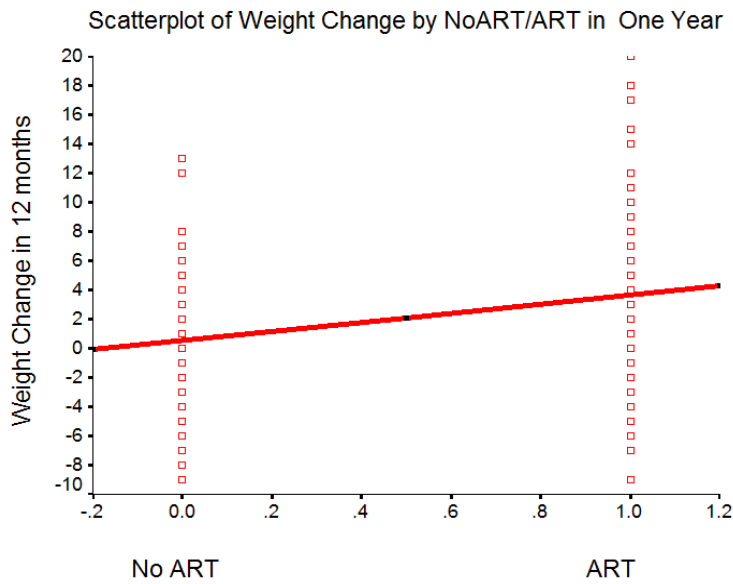
* Statistically different from baseline $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

J

Mean, SD of Weight Change in One Year

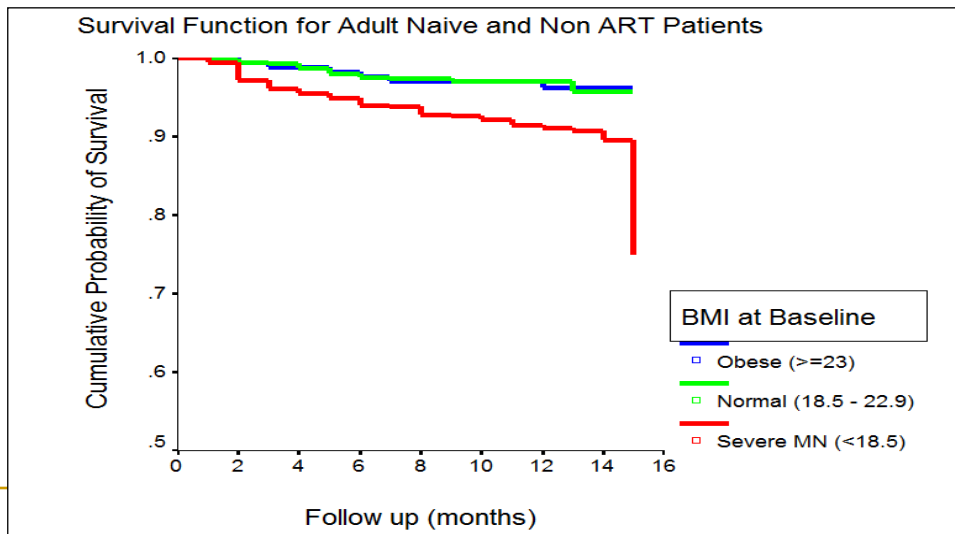
Group	Weight Change in One Year (kg)		
	Mean	SD	n
No ART	0.52	3.9	176
ART	3.76	5.3	164
Difference 3.15			$p < .001$

K



L

Survival among Adult Patients by Baseline BMI



Micro-Nutrient Supplement Composition

- 1 Vitamin A - 2500 IU
- 2 Vitamin D3 -200 I.U.
- 3 Vitamin B1 -2 mg
- 4 Vitamin B2 - 2 mg
- 5 Vitamin B6 -0.5 mg
- 6 Calcium pantothenate - 1 mg
- 7 Folic acid -0.2mg
- 8 Niacinamide -25 mg
- 9 Vitamin C -50 mg
- 10 Multi-vitamin is given in drop form for children.
- 11 Additional Iron and Folic acid tablets and syrup
- 12 Available through State Funding (Tamil Nadu Govt. has approved distribution for all HIV patients)

Macro- Nutrient Supplement Composition

- 1 Calories / 100 g: 400 K cal
- 2 Protein: 15 % (15 – 20 %)
- 3 Carbohydrate: 55 – 75 %
- 4 Fat: 15.00 %
- 5 Crude fiber: 3.50 %

Cost of Macro- Nutrient Supplements

- 1 Pack Size: 500 grams
- 2 Per Packet Cost: Rs 15
- 3 AIDS patients: 8- 9 Packets per month (20% additional calories)
- 4 Rs 120- 135/month
- 5 HIV patients: 3- 4 Packets per month (10% additional calories)
- 6 Rs 45-60/month

Categories of States

High Prevalence	Moderate Prevalence	Low Prevalence	
		Highly vulnerable	Vulnerable
Tamil nadu Andhra Pradesh Maharashtra Karnataka Nagaland Manipur	Gujarat Goa Pondicherry	Assam,Bihar Delhi,Himachal Pradesh,Kerala, Madhya Pradesh Punjab, Rajasthan Uttar Pradesh West Bengal Chhattisgarh Jharkhand Orissa Uttaranchal	Arunachal Pradesh Haryana, J & K Meghalaya, Mizoram,Sikkim, Tripura A & N Islands, Chandigarh D & N Haveli Daman & Diu Lakshwadeep

Categories of Districts

> 1% ANC/PPTCT prevalence in district in anytime in any of the sites in the last 3 years	A
< 1% ANC/PPTCT prevalence in all the sites during last 3 years associated with more than 5% prevalence in any HRG group (STD/CSW/MSM/IDU)	B
<1% in ANC prevalence in all sites during the last 3 years with less than 5% in all STD clinic attendees or any HRG with known hot spots (Migrants, truckers, factory workers, tourists, etc)	C
< 1% in ANC prevalence in all sites during last 3 years with less than 5% in all STD clinic attendees or any HRG or No / Poor HIV data with no known hot spots / unknown	D

Possible Side Effects Of ARV

Drug	Side effects
Stavudine	Nausea, vomiting, peripheral neuropathy, chills & fever, anorexia, stomatitis, anaemia, headaches, rash, bone marrow suppression, pancreatitis
Lamivudine	All above +dizziness, abdominal pain, fatigue, insomnia, abdominal pain, muscle pain
Nevrapine	similar
Zidovudine	similar

Food-Drug Interactions

ARV	Dietary Recommendation
Stavudine	No food interactions. Limit alcohol intake
Lamivudine	No food interactions. Avoid alcohol
Nevrapine	No food interactions.
Zidovudine	Take 30-60 mts before meals. If this causes nausea, take with low fat meal. Avoid alcohol

WHO Stage Calorie (RDA) Protein

- Stage 1 ↑10-15% 1gm/kg b.w.
 - Stage 2
 - Stage 3 ↑20-30% 1gm/kg b.w.
 - Stage 4
-
- Protein intake is increased to 1.5 gm/kg b.w. in patients with hyper catabolic state, under-nutrition and tuberculosis

 - Gradual step up approach is advised

Sample Diet

- **1800 Kcal/day**
 - Toned milk: 500gms
 - Curd : 125gms
 - Cottage cheese(paneer) : 25gms (or 100gms chicken/100gms fish/ 75gms red meat/1 egg)
 - Chapatti/Dalia/Bread: 2/ 1katori/ 2
 - Rice: 200gms
 - Vegetable: 2 katori
 - Pulses: 1katori + roasted channa(50gms)
 - Oil: 20gms
 - Sugar: 3tsp
 - Fruit: 200gms(seasonal)

Food Articles For Step-Up Diet

- Toned Milk + Supplements(Skimmed milk) + 25g of cottage cheese
- Roasted/Boiled/Sprouted black gram

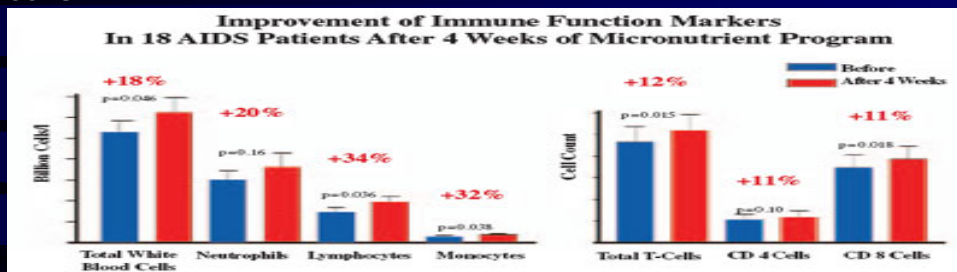
- Wheat flour + Gram flour
- Soya bean chunks(Nutrela) added in any vegetable preparation
- Curd/buttermilk + Sugar
- Seasonal fruit juice(home-made) + Sugar
- Peanuts/Nuts
- Pulses/lentils
- One serving of salad(seasonal) + Amla(Indian gooseberry)
- Liquid diet(in case of diarrhea)
 - Lemon water/Coconut water/Lentil Soup

India's Position In World In Respect Of Food Production

ITEMS	STATUS	PRODUCTION (2003-04)
CEREALS	3RD	212 Million Tonnes
FRUIT & VEGETABLES	2ND	
MILK	1ST	91 Million Tonnes
PULSES	1ST	13.67 Million Tonnes

Improvements In Immune Function Markers

No previously tested vitamins or ARV drugs have been able to show the reversal of clinical symptoms of AIDS as documented here. Moreover, in this study all known immune system markers - not only CD4 counts - significantly improved within the short period of only 4 weeks!



The scientific responsibility of these results is shared by [Alexandra Niedzwiecki, Ph.D.](#) (Dr. Rath Research Institute, USA), [David Rasnick, Ph.D.](#) (Dr. Rath Health Foundation, South Africa), [Sam Mhlongo, M.D.](#) (Head of Family Medicine, Medical University of Southern Africa, MEDUNSA, South Africa) and Matthias Rath, M.D.

Role of Micronutrients In Chronic Infections & Malignancies

Amino Acids

Physiological Functions

N-Acetyl Cysteine	Helps to resist the immune suppression associated with HIV
L- Carnitine	Conditionally essential nutrient
L-Arginine	Wound healing, stimulates immune function and promotes secretion of several hormones
L-Glutamine	Antioxidant that is protective in people with HIV infection
L-Isoleucine	Prevents cell duplication of lymphoblastic tissues
L- Methionine	Supplies sulphur for metabolism and growth also helps in preventing deterioration occurring nervous system.

Vitamins

Physiological Functions

Vitamin B1	Major deficiency in HIV/AIDS leads to neurological abnormalities
Vitamin B2	Well known for red blood cell formation and antibody production
Vitamin B3	Regulates blood cholesterol leading to decrease risk of progression of disease related to AIDS
Vitamin B5	Helps in proper functioning of GI tract
Vitamin B6	Major deficiency in HIV/AIDS leading to impaired immunity, skin lesions and mental confusion
Vitamin B12	Helps in Replenishment of low blood levels
Folic Acid	Essential as it helps to keep homocysteine levels in blood from rising
Vitamin C	Well known Antioxidant
Vitamin E	Well known Antioxidant combined with Selenium

Trace Minerals

Physiological Functions

Magnesium

Helps formation of new cells, relaxing muscles, clotting blood and forming ATP

Copper

Essential for the formation of ATP (Adenosine tri phosphate)

Chromium

Added as "picolinate" helps to maintain normal blood sugar levels and improves glucose tolerance

Selenium

Helps in combating infection, improves intestinal function thus improves appetite and heart function. Its deficiency is associated with high mortality among HIV infected people

Zinc

Helps in synthesizing proteins, maintains fertility and protects against free radicals. N-Acetyl Cysteine may increase urinary excretion of zinc and hence additional supplementation of zinc is essential.

Abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Clinics
APL	Above Poverty Line
ART	Antiretroviral Treatment
ARV	Anti Retroviral
BMI	Body Mass Index
CMI	Cell Mediated Immunity
FANTA	Food and Nutrition Technical Assistance
GAIN	Global Alliance for Improved Nutrition
HAART	Highly Active Antiretroviral Therapy
HIV	Human Immunodeficiency Virus
ICDS	Integrated Child Development Services
ICTC	Integrated Counseling and Testing Centre
ICMR	Indian Council of Medical Research
IEC	Information Education and Communication
ILSI - India	International Life Sciences Institute - India
IYCF	Infant and Young Child Feeding
MSACS	Maharashtra AIDS Control Society
MN	Micronutrients
NACO	National AIDS Control Organization
NACP	National AIDS Control Program
NARI	National AIDS Research Institute
NIN	National Institute of Nutrition
NGO	Non-governmental Organization
OPD	Out-patients Department
OVC	Orphans and Vulnerable Children
PEP	Post-exposure Prophylaxis
PHC	Primary Health Centre
PID	Patient Identification Digit
PLHA	People Living with HIV/AIDS
PMTCT	Prevention of Mother-to-Child Transmission
PPTCT	Prevention of Parent-to-Child Transmission
RCH	Reproductive for Children Health
RDA	Recommended Daily Allowances
SACS	State AIDS Control Societies
SES	Socio Economic Status
STD	Sexually Transmitted Disease
SAATHI	Solidarity and Action Against the HIV Infection in India
TANSAC	Tamil Nadu AIDS Control Society
TI	Targeted Intervention
TNFCC	Tamil Nadu Family Care Continuum Program
USAID	United States Agency for International Development
USP	Universal Safety Precautions
VCTC	Voluntary Council and Testing Center
WFP	World Food Program
WHO	World Health Organization

