Communicating Nutrition Information: A Critical Examination of Various Approaches in Practice

A Thesis Submitted to the University of Hyderabad
for the Degree of
Doctor of Philosophy in Communication
by

G. M. SUBBA RAO

Department of Communication
Sarojini Naidu School of Arts and Communication
University of Hyderabad
Hyderabad. A.P. 500046.
India.

December 2009

CERTIFICATE

This is to certify that the thesis, "**Communicating Nutrition Information: A Critical Examination of Various Approaches in Practice**" submitted by **Mr. G.M. Subba Rao** for the award of the degree of Doctor of Philosophy in Communication is bona fide research carried out under my supervision in the Department of Communication, Sarojini Naidu School of Performing Arts, Fine Arts & Communication, University of Hyderabad.

The thesis or a part thereof has not been submitted for any other degree at this or any other University. The thesis as a whole, in its approach to the subject, in its organization and treatment of the material, and its critical analysis represents the independent work on part of the candidate.

Dean
Sarojni Naidu School of Performing Arts,
Fine arts and Communication,
University of Hyderabad.

Prof. Vinod Pavarala
Thesis supervisor

Hyderabad
Date:

DECLARATION

I hereby declare that this thesis titled "**Communicating Nutrition Information: A Critical Examination of Various Approaches in Practice"** submitted by me for the award of the degree of Doctor of Philosophy in Communication is the result of original research carried out by me under the supervision of **Prof. Vinod Pavarala, Department of Communication, Sarojini Naidu School of Arts and Communication, University of Hyderabad, Hyderabad**. This work has not been submitted either in part or in full for any other degree or diploma to this or any other University.

G.M. SUBBA RAO

Hyderabad
Date:

To

Amma & *Naanna*…

…and for all those who are seriously engaged in nutrition communication

ACKNOWLEDGEMENTS

I am heartily thankful to my supervisor, Prof. Vinod Pavarala, whose encouragement, guidance and support from the initial to the final level enabled me to develop, chart the course of my work and present the same in the current form.

I am thankful to the successive directors of the National Institute of Nutrition (NIN), Dr. Kamala Krishnaswamy, Dr. B. Sivakumar and Dr. B. Sesikeran for their constant encouragement.

The case studies presented in this thesis were carried out as different projects, which were supported by the National Institute of Nutrition (NIN), Hyderabad. I thank NIN, who kept me going without worrying about money or manpower.

I cannot thank enough, Dr. Purendra Prasad, Associate Professor, Sociology, University of Hyderabad, for his critical comments and timely inputs to strengthen the thesis. Thanks are also due to Prof. Anandhakrishnan of Theatre Arts Department for his few but thought provoking comments during the Doctoral Committee meetings.

I owe a great deal to Dr. T. Vijayapushpam, my colleague at NIN and a good friend, who has been kind enough to let me experiment in her projects dealing with nutrition education for adolescents.

The studies carried out with school children and on school curricula could not have been completed with out the support and inputs from all the co-investigators, Dr. T Viajayapushpam, Dr. D. Raghunatha Rao, Mr. Anil Dube, Dr. Sarma, Dr. Grace Maria Anthony and Mr. Venkaiah.

Ajay Kumar of COVA has been very supportive in reaching the schools of the old city of Hyderabad for the study. He has exemplary dedication for the 'field work' and has been very inspirational.

I am deeply indebted to all the educational institutions, managements, teachers and most importantly the students for taking time off for me and nutrition education.

I express my sincere thanks to Mr. Sundararajulu and Mr. Laksmi Narayana of Food and Nutrition Board, Hyderabad for their time and patience. Mr. Sundara Rajulu's 'never-say-no' spirit and dedication for nutrition education /communication was awe-inspiring.

It was indeed a very pleasant and memorable experience to interact with Mr. P.V. Satheesh at the Deccan Development Society (DDS), Pasthapur. I thank him for his time and patience. I am grateful to Dr. Salomeyesudas who gave me insights into the incredible work of DDS and shared quite a lot of literature. Her cheer and thoughtful comments lightened up our interactions.

My deepest regard to my senior colleagues at NIN for sharing their views on the nutrition education and communication activities of the Institute carried out in the last couple of decades and helping me draw objective inferences.

My special gratitude goes to Dr. T.C. Raghuram and Dr. K.V.R. Sarma, the past Heads of the Extension and Training Division, NIN as well as to Dr. G.N.V. Brahmam, the current HoD, for their encouragement.

The critical comments given by my colleague and friend Dr. Sudershan Rao were very helpful at various stages of writing the thesis. My thanks to him.

The invaluable support and help rendered by Mr. Rama Rao and other colleagues at NIN at various stages of my work, is gratefully acknowledged. I am also thankful to the staff in the Dean's office at SN School for their help. Mr. Raghavan especially was very helpful in guiding me through the administrative formalities.

My wife Vijaya needs a great deal of appreciation for putting up with me during these maddening years and for constantly pepping me up and telling me that I have it in me to complete this herculean task.

My love to my son Advait for being a good boy.

I owe everything to my parents without whose love, affection and blessings, I wouldn't have even dreamt of attempting anything of this magnitude. A big 'thanks' to my father for chasing me to finish.

CONTENTS

S.No.	Title	Page No.
1.	Acknowledgements	ix
2.	List of Acronyms	v
3.	List of Tables	xii
4.	List of Figures	xiii
5.	Abstract	xiv
6.	**Chapter 1 : Introduction**	1
7.	**Chapter 2: Development Communication – A Historical Overview**	13
8.	**Chapter 3: Historical Perspective**	
	3.1 History and Evolution of Nutrition Research in India	40
	3.2 Nutrition in Public Health Discourse in Colonial and Post-colonial India	51
	3.3 Trends in Nutrition Education and Communication Research and Practice	74
9.	**Chapter 4: Communicating Nutrition in Pedagogical Settings**	
	4.1 Communicating Nutrition in Classroom Settings - Different approaches and lessons learnt	99
	Study 1: Nutrition education for school-going adolescents using FAO's learning material - "Feeding Minds, Fighting Hunger Programme (FMFH)	101
	Study 2: Effect of two different educational tools on Nutrition knowledge of school- going adolescent girls.	110
	Study 3: Nutrition education for student community volunteers – A comparative study of two different communication methods	114
	4.2 Content Analysis of Nutrition Component in School Science Textbooks	126
10.	**Chapter 5: Communicating Nutrition in Community Settings – Some Approaches in Practice**	
	Institutional Approaches to Nutrition Communication	153
	Study 1: Food and Nutrition Board, Government of India	158
	Study2: Deccan Development Society (DDS) - A voluntary organisation	174
	Study 3: National Institute of Nutrition (NIN)	194
11.	**Summary & Conclusions**	217
12.	**Bibliography**	230
13.	**Appendices**	267

LIST OF ACRONYMS

ACDPO	-	Assistant Child Development Project Officers
ANOVA	-	Analysis of Variance
APDS	-	Alternative Public Distribution System
APSCERT	-	Andhra Pradesh State Council of Educational Research and Training
BIS	-	Bureau of Indian Standards
CBSE	-	Central Board of Secondary Education
CD	-	Compact Disc
CDPO	-	Child Development Project Officers
CFNEU	-	Community Food and Nutrition Extension Units
CGAIR	-	Consultative Group on International Agricultural Research
COVA	-	Confederation of Voluntary Associations
DDS	-	Deccan Development Society
FAO	-	Food and Nutrition Organization
FASEB	-	Federation of American Societies for Experimental Biology
FDTRC	-	Food and Drug Toxicology Research Centre
FMFH	-	Feeding Minds, Fighting Hunger Programme
FNB	-	Food and Nutrition Board
GoI	-	Government of India
IARI	-	Imperial Agriculture Research Institute
ICAR	-	Indian Council of Agriculture Research

ICCIDD	-	International Council for Control of Iodine Deficiency Disorders
ICDS	-	Integrated Child Development Services
ICMR	-	Indian Council of Medical Research
ICN	-	International Conference on Nutrition
ICSE	-	Indian Council of Secondary Education
ICT	-	Information and Communication Technologies
IDD	-	Iodine Deficiency Disorders
IEC	-	Information, Education and Communication
IRFA	-	Indian Research Fund Association
IYCF	-	Infant and Young Child Feeding
KAQ	-	Knowledge Assessment Questionnaire
LBW	-	Low Birth Weight
MoHFW	-	Ministry of Health and Family Welfare, Government of India
NCDs	-	Non-communicable Diseases
NCERT	-	National Council of Educational Research and Training
NCLAS	-	National Centre for Laboratory Animal Sciences
NFHS	-	National Family Health Survey
NGO	-	Non-Government Organization
NIN	-	National Institute of Nutrition
NIPCCD	-	National Institute of Public Co-operation and Child Development
NNMB	-	National Nutrition Monitoring Bureau

NNP	-	National Nutrition Policy
NPAN	-	National Plan of Action on Nutrition
NRL	-	Nutrition Research Laboratories
NSS	-	National Service Scheme
OTC	-	Orientation Training Course
PAR	-	Participatory Action Research
PDS	-	Public Distribution System
PEM	-	Protein energy Malnutrition
PUCL	-	People's Union of Civil Liberties
QCL	-	Quality Control Laboratories
SAC	-	Scientific Advisory Committee of NIN
SD	-	Standard Deviation
SE	-	Standard Error
TINP	-	Tamil Nadu Integrated Nutrition Programme
ToT	-	Training of Trainers
UNDP	-	United Nations Development Programme
UNESCO	-	United Nations Economic, Social and Cultural Organization
UNICEF	-	United Nations International Children's Emergency Fund
USDA	-	United States Department of Agriculture
WCD	-	Ministry of Women and Child Development, Government of India
WHO	-	World Health Organization

LIST OF TABLES

Table No.	Title	Page No.
1.	Impact of nutrition education on adolescent girls in Hyderabad	114
2.	Background characteristics of the respondents	121
3.	Comparison of positive increments in nutrition knowledge after intervention	122
4.	Operational Definitions of terms	132
5.	Distribution of number of chapters in NCERT Textbooks	133
6.	Distribution of number of chapters in AP State Board Textbooks	134
7.	Subject-wise distribution of number of illustrations in NCERT Textbooks	136
8.	Subject-wise distribution of number of illustrations in AP State Board Textbooks	136
9.	Nutrition topics covered in NCERT and AP State Board textbooks	139
10.	Food Safety topics covered in NCERT and AP State Board textbooks	143
11.	Communication activities employed by DDS to popularise millet based foods	185

LIST OF FIGURES

Figure No.	Title	Page No.
1.	Comparison of mean scores of control and experimental groups at baseline and after intervention	108
2.	Improvement in the mean scores of the school children after intervention	109
3.	Folders developed to educate NSS	118
4.	Video film with folk dance and songs on nutrition	119
5.	Nutrition knowledge with different communication tools	122
6.	Subject-wise allocation of space (%) in Biology component of NCERT textbooks	137
7.	Subject-wise allocation of space (%) in Biology component of AP State Board textbooks	137
8.	Depiction of food items in NCERT textbook (IV Std.) Vs. Depiction of cereals, pulses, nuts, roots etc. in AP State Board books	146
9.	Colourful pictures in an NCERT textbook (left) Vs. single colour line drawn depictions of food groups in AP State Board Textbook (right)	146
10.	Urban bias in illustrations in NCERT textbooks?	147
11.	Infrastructure of Food and Nutrition Board	159
12.	Training of Trainers	161
13.	Cooking Demonstration during an awareness programme in Orissa	162
14.	Flow of Nutrition Information from FNB to the target groups	173
15.	Alternative Public Distribution System	176
16.	Figure 16. Local women displaying Community Gene Bank	177
17.	Research areas and activities of National Institute of Nutrition	198
18.	A Collage of Nutrition Education Activities of Extension and Training Division, NIN	202

ABSTRACT

India today is confronting a strange paradox of being home to millions of undernourished as well as to a growing number of overweight /obese people. The search for solutions to tackle these problems had often pointed at nutrition communication as one of the necessary conditions. Given the labyrinth of nutritional problems, diverse approaches are in use and they are expected to serve varied purposes, including awareness creation, capacity building, policy advocacy, behaviour and social change. Nutritional concerns are now being integrated into various developmental policies at different levels of governance. Non-Governmental Organisations (NGOs) and international organisations are also putting in considerable efforts in taking the message of nutrition to the community. This thesis attempts a critical examination of various nutrition communication approaches in two broad contexts – among adolescents in the pedagogical settings of educational institutions, and in the larger 'community' setting.

The methodological innovation attempted in the thesis by bringing together a number of case studies helped explore how content is determined by approach and how the approach is in turn influenced by the context.

It concludes that no single approach will be continuously effective or suitable for resolving all problems of malnutrition. Hardly any approach is adequately positioned to capture the complexities of the context as the choice of

approach is often determined not by its normative value but by various internal and external institutional factors.

For nutrition communication to be successful, multiple levels of communication from diverse perspectives need to be simultaneously activated, with a dialogical engagement among the scholars and practitioners operating at the different communicative levels. Communication should be a fundamental component of all nutrition programmes with adequate budget and appropriate evaluation mechanism incorporated right at the planning stage. Communicators should go beyond their institutional factors as well as individual beliefs to choose approaches from a synthesis of models and practices in order to harness from varied communication theories and experiences from practice.

Chapter 1

INTRODUCTION

The scourge of malnutrition affects the developmental process in India like a double-edged sword. While on one hand, malnutrition in the form of under-nutrition or deficiencies of essential vitamins and minerals continues to cause severe illness or morbidity among millions of people, on the other hand, the problems related to dietary excesses, overweight and obesity have been affecting a substantial proportion of the population.

India is home to over 200 million undernourished people (FAO, 2001). It is estimated, more than 56% of women in the age group of 15-49 years, a greater number (58%) of pregnant women and pre-school children (under 5 years age) (79.2%) are affected by Iron Deficiency Anaemia (NFHS-III). Data from rural areas of nine states surveyed by the National Nutrition Monitoring Bureau (NNMB) during 2005-06 depicted a grave picture with 55% of adult men and as many as 75% of non-pregnant / non-lactating women as anaemic. The data also indicated that underweight, stunting (less height for age) and wasting (less weight for height) are prevalent among 40%, 45% and 20% of children (under 5 years) respectively. On the whole, the survey concluded that over 33% of all males and females were suffering from chronic energy deficiency (NNMB, 2006). Apart from these, a host of micronutrient deficiency disorders like Iodine Deficiency Disorders (IDD) and Vitamin A deficiencies are prevalent among the population in India. These nutritional deficiencies make the population less productive and thus they get stuck in the vicious cycle of poverty and malnutrition. On the other side of the spectrum is the

alarming rate at which overweight, obesity and related non-communicable diseases (NCDs) are growing. NFHS-III data shows that as many as 15% of women and 12% of men are overweight or obese. Though the proportion may appear small, the seriousness of the problem is much higher owing to the sheer size of the population of the country.

In this scenario, the present thesis attempts to explore the role that development communication research and practice has been playing traditionally, in public health nutrition and examines the current models of nutrition communication in practice.

Lack of effective communication – a bottleneck

The need for alleviating nutritional problems was recognized in India long ago. Article 47 of the Indian Constitution says, "State shall regard raising the level of nutrition and standard of living of the people and the improvement of public health among its primary duties." Though there has been unequivocal commitment to the cause of nutrition through constitutional provisions, the primary focus was always on providing food to the needy. Policy makers have often equated lack of adequate food to lack of nutritious food. It is only lately that we realised that excessive food stocks in the country, if properly distributed, can only tackle the problem of hunger, while prevention and control of undernutrition is all together a different task. Researchers have been pointing out that the problem of 'hidden hunger' is

widespread. Most families make do with food that may be deficient in micronutrients owing to their inability to afford fruit, vegetables and animal foods needed to provide balanced diets. Today, refined wheat and rice have virtually displaced coarse grains and millets as the staple cereal among the population. This in a way has resulted in substantial reduction in fibre content in the diet and possibly, also the content of micronutrients such as vitamin B-complex, zinc and chromium (Rajagopalan, 2003a). Hunger today refers not to the overt and obvious hunger of poor people who are unable to afford at least one square meal a day, but to a more insidious hunger that is caused by eating food that is filling but deficient in essential vitamins and micronutrients (Subba Rao, 2004).

A surfeit of nutrition and health programmes was developed to cover all aspects of lifecycle. The three most important nutrition programmes viz., National Nutrition Anaemia Control Programme, National Prophylaxis Programme for Prevention of Blindness due to Vitamin A Deficiency, and National Iodine Deficiency Disorders Control Programme – are aimed at combating micronutrient deficiency problems of anaemia, blindness and iodine deficiency disorders respectively. Despite implementation of these programmes for quite a long time, impact evaluations at different points of time showed poor coverage. Among the main bottlenecks identified were: lack of proper orientation of health functionaries and poor beneficiary compliance due to low-awareness among beneficiaries as well as the general

public due to weak IEC (Information, Education and Communication) component or its inadequate usage to create awareness (Vijayaraghavan and Rao, 1982).

Integrated Child Development Services (ICDS) scheme was launched in 1975. ICDS integrates nutritional services with primary health care, education and development programmes for children. The main beneficiaries under this scheme are pregnant and lactating women and pre-school children. Despite all these measures, both NFHS (2006) and NNMB (2006) depict a gloomy picture of prevalence of anaemia and other nutritional deficiencies among these women. This profile is the result of reproductive behaviour of earlier cohort of undernourished mothers resulting in 33 per cent of children with low birth weight (LBW). These LBW children are likely to grow up to be malnourished adults who are vulnerable to the incidence of chronic diseases thus making themselves susceptible to double burden. Proper communication and creation of awareness about these programmes to ensure compliance and participation is again the weakest link (ICMR, 1989; Sarma et al., 1992; NIPCCD, 1992).

Nutrition education, communication and participation

The prevalence of malnutrition is often attributed to poor nutrient intake, lack of resources, illiteracy, ignorance and to a large extent to lack of proper awareness. There was always a need felt for nutrition and health

education and awareness programmes to achieve the goals through appropriate interpersonal and media. One fundamental feature of nutrition education often has been its implicit emphasis on dietary behavioural change brought about by educational intervention (Contento et al., 1995). Many a nutrition education effort has been directed more towards the purpose of disseminating nutrition information than toward the purpose of improving dietary habits (Whitehead, 1973). Such an approach was effective in increasing knowledge, but was not very effective in changing dietary behaviour or practices. Exposure to new information or services, which is thought to induce knowledge acquisition, may not result in change in attitudes and/or dietary behaviour. Ignorance, largely, is a result of illiteracy, socio-economic factors and food belief systems that may interfere with behaviour change, even though awareness has increased among the people. Illiterate families will not be able to benefit from any available information on health and good nutrition. A paradoxical situation that is often observed in the developing countries is that people do not consume some nutritious foods even when available because of several food beliefs and socio-cultural practices resulting in food taboos (Nayak, 1999).

Everett Rogers (1995) suggested that some kinds of knowledge are more motivating than others – 'Awareness' knowledge as the kind that captures people's attention, increases awareness and enhances motivation, whereas 'how-to' knowledge is the kind needed when they are already

motivated. However, dissemination of 'how-to' type of knowledge would just remain 'information' when people are not motivated to understand the potential positive and negative consequences of behaviour. Therefore, both motivational and instrumental (i.e., 'how-to' knowledge) are needed for effective nutrition education designed to foster behavioural change.

Suttilak Smitasiri (1994) suggested that traditional nutrition education efforts in less developed countries is based on the assumption that people lack nutritional knowledge leading to nutritional problems, and that when people correctly learn about nutrition, they will act appropriately according to their knowledge. Lack of a coherent and well articulated theoretical framework has been considered one of the weaknesses in communication programmes.

Other researchers have taken a different perspective when they reiterated that 'good' health and nutrition communication is one that is continuous and iterative. As in other fields, communication and awareness campaigns should be based on multi-media approach and should be continuous while being culture-specific. IEC strategies and campaigns should be phased over a period of time, as people move through different steps of behavioural change (un-aware, aware, concerned, knowledgeable, skilled, motivated to change, trial and sustained behaviour change) (Saibaba, 2003).

Many communication researchers are of the opinion that most of the nutrition communication carried out in India is based on modernization and dependency paradigms. These are essentially one-way horizontal communication models of information transmission from source to receiver (e.g. development project to development recipient) (Hornik, 1985; Nayak, 1999). As an alternative to both the modernisation and development communication paradigms, the emerging participatory communication paradigm (for development) emphasises the importance of people's participation in the process of communication design, implementation, and evaluation (Bordenave, 1994). The rationale behind participatory communication is that it eliminates a one-way, prescriptive, and non-participatory approach to development. Thus, it involves people (development recipients) in two-way dialogical interactions in the design, development, implementation, and evaluation of development projects. Similarly, the involvement of people in a development communication process is very important, as they are the ultimate beneficiaries of development communication policies and planning.

Linking this to development communication paradigms, participatory actions rest on two-way communication, which helps eliminate the pitfalls of a top-down, non-participatory communication approach that inherently does not fully involve people in all phases of a development project (design, development, implementation and evaluation). Unlike top-down approaches,

participatory communication is usually based on local conditions and constraints. Experience has shown that when a community is fully involved in the design, implementation, monitoring and evaluation of nutrition and other development projects, these are likely to be more effective and sustainable. Such participatory efforts more often meet the real needs of the people in the community and achieve results that can be continued with minimal external inputs (Achterberg, 1993).

In view of the growing importance of the involvement of people in a development project, it appears that some of the nutrition-related projects in various parts of the world have already successfully applied participatory communication approach to their projects (Khadka, 2003).

Today nutritional concerns are being integrated into various developmental policies and programmes being taken up at various levels of governance. Non-Governmental Organisations (NGOs) and international organisations like UNICEF and FAO are also putting in considerable efforts in taking the message of nutrition to the community. In some cases all the three sectors (Government, Voluntary and International Organisations) are working together. All these organizations are emphasizing the need to involve the beneficiaries in the process of evolving programmes and/or implementation of the same. Community participation is the key word. The euphoric word 'participation' has become a part of development jargon. People's

participation in development in which the control of the project and decision–making power rests with planners, administrators and the community's elite is 'pseudo-participation'. When the development bureaucracy, the local elite, and the people are working cooperatively throughout the decision-making process and when the people are empowered to control the actions to be taken, only then there can be 'genuine participation' (White, 1994). Similarly, in different nutrition communication programmes too the extent of participation varies and accordingly the approaches to communicating nutrition information are also likely to differ.

In this scenario, it is extremely difficult to determine what exactly works and what does not. There is a need to carry out a critical analysis of various approaches to communication and to understand the perceptions of the key people who devise and implement nutrition communication strategies. At the same time various approaches in use, their successes and failures need to be understood. Given the plethora of nutritional problems, the diversity of cultures, populations and the stakeholders in nutrition communication, it is difficult to critically examine all the nutrition communication endeavours in vogue.

Given this milieu, the present thesis attempts to fulfil two broad objectives – to explore the evolution as well as trends in development communication vis-à-vis nutrition communication; and to take a critical look

at various nutrition communication approaches in different contexts – firstly among adolescents in the confines of educational institutions and the other among the larger contexts of 'community' setting.

Overview of the thesis

While critically examining the evolution of development communication globally, the chapters dealing with the history of nutrition communication would examine the concept of nutrition in the public health discourse in colonial and post-colonial eras, document the history of nutrition research in India and then critically examine the trends in nutrition communication research globally.

The subsequent chapters deal with various approaches to communicate nutrition information to the adolescents and young adults in educational institutions. This chapter includes three different research studies and attempts to critically examine their strengths and weaknesses and culminates in examining the extent of food and nutrition component in the school science curricula.

The later part of the thesis takes a macro view and critically examines the institutional perspectives to nutrition communication by examining the approaches being adopted by three different organizations from three different sectors viz., Government, Voluntary Sector and Research and Development.

Methodology

As mentioned above, the thesis deals with a wide array of issues including the historical aspects, trends and evolution of development communication with specific emphasis on nutrition education and communication vis-à-vis the Indian context. In order to compile these chapters, literature from historical sources such as books and government policy documents, from published literature such as articles from peer-reviewed / indexed journals, newspapers etc. were used.

Subsequent chapters dealing with approaches to communicate nutrition information to adolescents / young adults in educational institutions as well as the chapter on institutional approaches to nutrition communication include four different studies and three case-studies respectively. The specific materials and methods used for each of these studies have been elaborated in the respective chapters.

Therefore, before proceeding with the chapters related to the history of nutrition and nutrition communication in India, a description of various theories and models of development communication will be succinctly presented.

Chapter 2

DEVELOPMENT COMMUNICATION –

A HISTORICAL OVERVIEW

Development communication originated in post-war (World War II) international aid programs to Third World countries (in Latin America, Asia and Africa), where poverty, illiteracy, poor health and a lack of economic, political and social infrastructures were rampant (Melkote and Steeves, 2001, Waisbord, 2000). At that time, these countries were in a hurry to find solutions to these most urgent needs of their people (Kumar, 1994). Development theories have their roots in the mid-twentieth century optimism that the post-colonial world could eventually 'catch-up' with the industrialised Western countries. As many African and Asian countries got freedom from the European empires in 1960s, the most important issue was to address the large disparities between the so-called 'developed' and 'underdeveloped' countries. Development perhaps meant the process by which these countries could become more like the Western 'developed' societies in terms of political system, economic growth, life expectancy, education etc. (Inkeles and Smith, 1974). The implicit assumption was that there was one form of development as visible in the developed world that underdeveloped societies needed to replicate.

Since then, different definitions of development communication were provided in numerous studies. However, development communication commonly refers to the application of communication strategies and principles in the developing world. Melkote (1991: 229) states that the goal of 'development communication' is to improve the quality of life of populations

and also increasing income levels, promoting well-being, eradicating social injustice, promoting land reform and freedom of speech, and establishing community centres for leisure and entertainment. Today, development communication encompasses a bigger role by facilitating removal of constraints for a more equal and participatory society.

MODERNIZATION THEORY AND THE DOMINANT PARADIGM

Research and projects addressing development communication flourished during the First 'development decade' in the 1960s. Different theories and strategies that emerged during this period, shared the premise that problems of development were basically rooted in lack of knowledge. Consequently, it was considered that interventions were needed to provide people with information to change behaviour.

The early studies in development communication were dominated by 'modernization theory', which suggested that cultural and information deficits were the root causes for development problems, and therefore could not be resolved only through economic assistance (a la Marshall Plan to resuscitate Europe in the post-war period) (Melkote and Steeves, 2001: 54). Existence of a 'traditional culture' in the Third World countries was looked at as a major factor that inhibited development. In other words, culture was viewed as the bottleneck that prevented the adoption of modern attitudes and behaviour. Based on this diagnosis, development communication proposed

that changes in ideas would result in transformations in behaviour. The low rate of agricultural output, prevalence of malnutrition, high rate of fertility and mortality, or the low rates of literacy found in the underdeveloped countries were attributed to the persistence of traditional values and attitudes that prevented modernization. Hence the goal to instil modern values and information through the transfer of media technology and the adoption of innovations and culture originated. Thus, the problem of underdeveloped regions was believed to be an information problem and communication was presented as the instrument that would solve it. Exposure to mass media was viewed as an important factor that could bring about modern attitudes. As theorized by Daniel Lerner (1958) and Wilbur Schramm (1964), communication basically meant transmission of information. And this knowledge-transfer model dominated the arena of communication for years. Emphasis was laid on media-centred persuasion activities that could improve literacy, which would, in turn, allow the populations to come out of traditionalism. The Shannon- Weaver model that set out to explain the transmission of information became extremely influential in communication studies. The other was the propaganda model developed during World War II which was termed as the 'bullet theory' by Schramm (1971) and 'hypodermic needle theory' by Berlo (1960). This model posited that the mass media had bullet-like effects in reaching the information to the communities and changing their attitudes and behaviour. The 'stimulus-response' model also explained the same (McQuail and Windhal, 1981). In these perspectives,

communication was portrayed as a linear and one-way process in which senders send information through media channels to receivers. Consequently, development communication was equated with the massive introduction of media technologies to promote modernization and to serve as agents of diffusion of modern culture. This obviously meant that the diffusion of media technologies meant that modernization could be measured and quantified in terms of media penetration (Lerner 1958, Inkeles and Smith 1974). Even the statistics produced by the United Nations Organisation regarded the penetration of newspapers, radio and television sets as proxies of development. National governments soon looked at media as instruments for the dissemination of modern ideas that would improve agriculture, health/nutrition, education, and politics. So-called "small" media such as publications, posters and leaflets were also recommended as crucial to the success of what became known as Development Support Communication, that is, the creation of the human environment necessary for a development program to succeed (Agunga 1997).

Diffusion of Innovations

Among the modernization theories, Everett Rogers's (1962, 1983) "diffusion of innovations" theory became one of the most influential ones. Having reviewed over 500 empirical studies, he proposed that there are five stages through which an individual passes before an innovation is adapted, viz., awareness, knowledge and interest, decision, trial, and adoption/rejection. Rogers' premise was that innovations diffuse over time

according to individuals' stages of adoption of an innovation. He divided populations in different groups according to their propensity to incorporate innovations and adopting them – innovators, early adopters, early majority, late majority and laggards. According to him, the early adopters act as models to emulate and create a favourable climate for acceptance and change. The slow adopters were called laggards (Rogers, 1969). This latter category was used to describe a majority of the population in the Third World.

According to Rogers (1962), development communication entailed a process by which an idea is transferred from a source to a receiver with the intent to change his/her behaviour. He theorized that the source usually wants to alter the receiver's knowledge of some idea, thereby changing his/her attitude toward the same and thus, finally persuading the receiver to adopt the idea as part of the regular behaviour.

Moving away from media-centrism that was reflected in earlier theories, the "diffusion" studies emphasized that although media had a great importance in increasing awareness, interpersonal communication and personal sources were also vital in making people adopt innovations. In a way, the 'opinion leader theory' put forth by Katz and Lazarsfeld (1955) contributed significant insights to this new outlook. They found that interpersonal relations were crucial in channelling and shaping opinion. According to the 'opinion leader' theory, there are two steps in information flow viz., from the media to opinion leaders, and from leaders to the masses

indicating that the audiences rely on the opinions of members of their social groups rather than solely on the mass media. This insight was incorporated in diffusion studies. Scholars like Hornik (1998) established the effectiveness of extension workers in agricultural development projects highlighting the importance of interpersonal networks in disseminating innovations (Hornik 1988). As a result of these, the role of change agents and beneficiaries was also seen as crucial along with that of communicators.

In the mid-1970s, the need to review some basic premises of modernization theories was felt. In a widely quoted article, Rogers (1976) admitted “the passing of the dominant paradigm.” He concluded that it was necessary to be sensitive to the specific socio-cultural environment in which communication took place. Consequently, Rogers’s definition of communication showed important changes. Development was looked at as a participatory process of social change. Communication was no longer focussed on persuasion or transmission of information between individuals / groups, but was understood as a process by which participants create and share information with one another in order to reach a mutual understanding (Rogers 1976).

OTHER THEORIES IN THE TRADITION OF DOMINANT PARADIGM

Social marketing

Social marketing has been one of the approaches that have carried forward the premises of diffusion of innovation and behaviour change models. Since the 1970s, social marketing has been one of the most influential strategies in the field of development communication.

The concept of social marketing was first introduced by Kotler and Zaltman (1971: 5) and was defined as “the design, implementation and control of programmes calculated to influence the acceptability of social ideas and involving considerations of product, planning, pricing, communication, distribution and marketing research”. It was clearly a product of specific political and academic developments in the United States that were later incorporated into development projects. Among various reasons, the emergence of social marketing responded to two main developments: the political climate in the late 1960s that put pressure on various disciplines to attend to social issues, and the emergence of non-profit organizations that found marketing to be a useful tool (Elliott, 1991). Social marketing consisted of putting into practice standard techniques in commercial marketing to promote pro-social behaviour. It imported theories of consumer behaviour from marketing and advertising into the field of development communication. The analysis of consumer behaviour required an understanding of the influences that create consumer needs and how those

needs can be met (Novelli 1990). Influences include environmental, individual, and information-processing and decision making. At the core of social marketing theory is the exchange model according to which individuals, groups and organizations exchange resources for perceived benefits of purchasing products. The aim of interventions is to create voluntary exchanges. What social marketing brought was a focus on using marketing techniques such as market segmentation and formative research to maximize the effectiveness of interventions. More recently, Andreasen (1994: 110) has defined it as "the adaptation of commercial marketing technologies to programs designed to influence the voluntary behaviour of target audiences to improve their personal welfare and that of the society of which they are a part."

Social marketing suggested that the emphasis should be put not so much on getting ideas out or transforming attitudes but influencing behaviour. For some of its best-known proponents, behaviour change is social marketing's bottom line. Unlike commercial marketing, which is not concerned with the social consequences of its actions, the social marketing model centres on communication campaigns designed to promote socially beneficial practices or products in a target group. Social marketing's goal is to position a product by giving information that could help fulfil, rather than create, uncovered demand. It intends to "reduce the psychological, social, economic and practical distance between the consumer and the behaviour"

(Wallack et. al., 1993: 21). In the United States, social marketing has been extensively applied in public information campaigns that targeted a diversity of problems such as smoking and alcoholism.

Social marketing's focus on behaviour change, understanding of communication as persuasion (transmission of information), and top-down approach to bring about change suggested an affinity with modernization and diffusion of innovation theories (Waisbord, 2000).

Critics of social marketing have pointed out that social marketing often manipulates populations as it is solely concerned with goals without regard for means. In the name of achieving certain goals, social marketing justifies any methods (Buchanan, et. al., 1994). Others argued that social marketing is a non-participatory strategy because it treats most people as mere consumers. Because it borrows techniques from Western advertising, it shares its premises, namely, a concern with selling products rather than participation. Social marketers have brushed aside these criticisms, emphasizing that social marketing is a two-way process and that it is genuinely concerned about community participation (McKee, 1994). As Novelli (1990) puts it, "the marketing process is circular." This is why input from targeted communities, gathered through qualitative methods such as focus groups and in-depth interviews, is fundamental to design campaign activities and content.

Health promotion and health education

The concept of health promotion was also originally founded in the United States and was later applied for interventions in developing countries. The same approaches that were used to battle chronic diseases, high-fat diets, and smoking in the United States in the 1970s and 80s, were adopted in development interventions such as child survival and other programs that aimed to remedy health problems in the Third World (Waisbord, 2000). Health promotion was dominated by the view that individual behaviour was largely responsible for health problems and, consequently, interventions should focus on changing behaviour (Terris, 1992).

The prevalent view was that changes in personal behaviours were needed to have a healthier population. Although the imperative of institutional changes gained some ground, a good number of studies were offered as conclusive evidence that personal choices determined changes in health behaviour.

This highly individualistic perspective was initially criticized in the context of developed countries for 'blaming the victim' and ignoring social conditions that facilitated and encouraged unhealthy behaviours (Waisbord, 2000). To its critics, individual-centred health promotion ignores the surrounding social context within which individual health behaviours take place (Minkler and Wallerstein, 1997). They pointed out that the overall context needed to be considered both as responsible and as the possible target

of change. Today, international organisations such as the World Health Organization seem to be moving away from the individualistic views and they stress that the goal of health promotion is to provide and maintain conditions that make it possible for people to make healthy choices.

'Health education' is an important component of health promotion. It refers to learning experiences to facilitate individual adoption of healthy behaviours (Glanz et.al., 1990). The evolution of health education was also more like that of health promotion. Initially dominated by conventional educational approaches that emphasized knowledge transmission and acquisition as well as changes in knowledge, attitudes and beliefs, theories and strategies that stressed the importance of social and environmental changes gradually gained relevance. This meant that both health education and health promotion became more broadly understood. More recently, health education has come to encompass a variety of interventions, including conventional education, social marketing, health communication, and empowerment actions (Steston and Davis, 1999). Today health promotion includes the promotion of public policies that are responsible for shaping a healthy environment. The goal of health promotion is to facilitate the environmental conditions to support healthy behaviours (WHO, 1986).

Entertainment-education

Entertainment-education is a communication strategy to disseminate information through the media. As applied in development communication, it

was originally developed in Mexico in the mid-1970s and has been used in 75 countries, including India, Nigeria, the Philippines, Turkey, Gambia, and Pakistan. Paradigmatic examples of this approach have been soap operas in Latin America (telenovelas) that were intended to provide information about family planning, sexual behaviour, and health issues. In India, television broadcasts of the soap opera *Hum Log* (We People) had positive results in promoting certain socially desirable behaviour -- women's equality and smaller family size. Developed by Doordarshan, India's government television system, *Hum Log* was telecast in Hindi consisted of 156 episodes of 22 minutes each, and ran for 17 months during 1984-85. At the end of each program, an epilogue lasting 30-50 seconds summarized the social concepts and provided guides to action (Singhal and Rogers, 1989). Literacy and agricultural development have also been central themes of several entertainment education efforts in some countries.

Entertainment-education is not a theory but a strategy to maximize the reach and effectiveness of health messages through the combination of entertainment and education. It subscribes to the Shannon-Weaver model of communication of sender-channel-message-receiver. Like diffusion theory, it is concerned with behaviour change through the dissemination of information. It is based on Albert Bandura’s (1977) social learning theory, a framework currently dominant in health promotion. Entertainment-education is premised on the idea that individuals learn behaviour by observing role models, particularly in the mass media.

Entertainment-education refers to “the process of purposely designing and implementing a media message to both entertain and educate, in order to increase audience knowledge about an educational issue, create favourable attitudes, and change overt behaviour” (Singhal and Rogers, 1999: xii).

CRITIQUES OF THE DOMINANT PARADIGM

Dependency theory

One of the most powerful critiques of modernization / diffusion theories came from the dependency paradigm. Contrary to the modernization theories, the dependency theorists argued that the problems of underdevelopment were not internal to Third World countries but were determined by external factors and the way they were being attempted to be integrated into the world economy. For instance, Andre Gunder Frank (1969) based on his studies in Chile and Brazil chose to view ‘development’ from a structuralist and socioeconomic perspective and suggested that imperialism and development were tied to the unfolding of capitalism. In one of his essays he wrote, “for all regimes, democratic and non-democratic alike, it is dependence within the global system which establishes the framework for policy and political practice. Even the ‘choice of people’ is determined by economics” (Frank, 1991:21). In fact, it was argued that the developed countries attempted to control economic power and political decisions in all the countries around the world. The social and economic consequences of such attempts kept the Third World countries underdeveloped and

maintained their dependency. Thus, the Third World countries were politically and culturally dependent on the West. While these represented the external problems, the internal socio-economic and political scenarios were also partially responsible for the problems of underdevelopment (Kapoor, 2002). It was argued that the development programs failed to address structures of inequality and targeted individual rather than social factors and that the problems of the underdeveloped world were more political rather than the result of the lack of information (Hornik, 1988). Unequal land distribution, lack of credit for peasants, and poor health care services were some of the limiting factors. Consequently, interventions were doomed due to lack of basic conditions that could make it possible for people to adopt new attitudes and behaviours.

Experts also argued that in singling out the mass media as having a central role in introducing innovations, modernization theorists ignored the issue of media ownership and control. Some of them felt that powerful interests controlled the media that was supposed to promote development. A few others opined that the media were not interested in championing social goals or helping underprivileged populations but in transmitting entertainment and trivial information (Shore, 1980). Thus the dependency theorists brought forward the role of interrelationship between the media structure, content and the context in the Third World countries which were in a way ignored in modernization theories (Melkote and Steeves, 2001). They

believed that solution to underdevelopment problems was essentially political, rather than merely informational. It can be said that the Dependency Theory has not yet provided a plausible theory of successful approach to underdevelopment. However, a moral critique on the resultant problems of the development dominance was brought forward by the thinkers who subscribed to the dependency paradigm. They have also expedited the exploration for alternative models for mass human welfare (Nair and White, 1994).

Participatory theories

Modernization paradigm was criticized on the grounds that it promoted a top-down, ethnocentric and paternalistic view of development. The participatory theorists argued that the diffusion model proposed a conception of development associated with a Western vision of progress. They have also criticized traditional approaches for not involving local people in preparing and implementing development interventions. For instance, Governments often decided what was best for agricultural populations, without giving them a sense of ownership in the systems that were introduced (Mody, 1991; Servaes, 1989; White 1994). In a way these approaches were 'top-down' in nature, which implicitly assumed that the knowledge of governments and agencies was correct, and that indigenous populations either did not know or had incorrect beliefs. For participatory theorists and practitioners, development communication required sensitivity

to cultural diversity and specific context that were ignored by modernization theories. The lack of such sensitivity accounted for the problems and failures of many projects.

As an alternative to both the modernization and dependency paradigms of development communication, the participatory development communication approach emphasizes the importance of people's participation in the process of communication design, implementation and evaluation. Many communication scholars (Bordenave, 1994; Moemeka, 1994; Servaes 1996) believe that involvement of people would stimulate two-way communication and enhance the likelihood of success of the programme. The rationale behind participatory communication is that it eliminates a one-way, prescriptive, and expert-centred approach to development. It involves the development recipients in two-way dialogical interactions in the design, development, implementation and evaluation of development projects (Khadka, 2000).

In short, participatory theories considered necessary a redefinition of development communication. One set of definitions stated that it meant the systematic utilization of communication channels and techniques to increase people's participation in development and to inform, motivate, and train rural populations mainly at the grassroots. Bordanave (1994) defines 'participatory communication' as that type of communication in which all the interlocutors

are free and have equal access to means to express their viewpoints, feelings and experiences. Collective action aimed at promoting their interests, solving their problems and transforming their society is the objective.

For others, development communication needed to be human rather than media-centered. This implied abandonment of the persuasion bias that development communication had inherited from the theories of dominant paradigm.

At this juncture, it is necessary to discuss the work of Brazilian educator Paulo Freire (1970) in the 1960s and early 1970s, particularly in relation to literacy training, which challenged the conceptions of development communication. He argued that development programmes had failed to educate small farmers because they were interested in persuading them about the benefits of adopting certain innovations. Development programmes tried to domesticate foreign concepts, to feed information, to force local populations to accept Western ideas and practices without asking how such practices fit existing cultures. Freire felt that the goal of communication should be 'conscientization', which Freire defined as free dialogue that prioritized cultural identity, trust and commitment. His approach has been called "dialogical pedagogy" which defined equity in distribution and active grassroots participation as central principles. Freire's ideas ran against fundamental principles in the diffusion model - the sender-focus and

behaviour bias. He diagnosed the problems in the Third World as problems of communication, not information as persuasion theories proposed.

Studies in a variety of Third World rural settings found that marginal and illiterate groups preferred to communicate face-to-face rather than through mass media or other one-way sources of communication (Okunna, 1995). The recommendation was that development workers should rely more on interpersonal methods of communication rather than national media and technologies, and that they should act as facilitators of dialogue. People, not change agents, were central to community participation. It stressed on indigenous knowledge and aspirations in development and downplayed the role of expert and external knowledge. Communication was viewed as a horizontal process and not as a vertical model that placed knowledge in the domain of a few experts.

Participatory communication encourages community participation in decision-making, implementation, and evaluation of projects. This, researchers said, would give a sense of involvement and ownership and skills that they can use beyond the timetable of development projects (Kavinya, et.al., 1994).

Community empowerment has become one of the main contributions of participatory theories to development communication. Empowerment is

possible only if community members critically reflect on their experiences and understand the reasons for failure and success of interventions (Bradford and Gwynne, 1995).

Even participatory communication was criticized on many counts. One problem in participatory models was that it was not clear that communities needed to be involved for certain results to be achieved. In some cases such as epidemics and other public health crises, quick and top-down solutions could achieve positive results. Participatory communication ignores that expediency may also positively contribute to development. Shirley White (1994:18) says, “approaching through grassroots decision-making process could often be a slower process than centralized decisions, rendering participation unviable method in cases that require prompt resolutions”. Another problem was that participation in all stages does not have similar relevance. If decisions were made outside of the community and the latter was assigned the role of implementing and evaluating results, participation was limited to instances that depended on decisions previously made (White 1994; McKee 1994).

The focus on interpersonal relations in the participatory approach also underplayed the potential of the mass media in promoting development. Little attention was paid to the uses of mass media in participatory settings, an issue that is particularly relevant considering that populations, even in remote areas, are constantly exposed to commercial media messages that

stand in opposition to the goals set by programs. This lack was particularly evident in Freire's theory of dialogical communication that is based on group interactions, setting aside the role of the mass media (Waisbord, 2000).

Moreover, people can be manipulated into participating. This would violate local autonomy and the possibility that members might not be interested in taking an active role. Critics argued that participatory communication, could be seen as foreign, pushing for certain goals and actions that have not resulted from inside communities.

Servaes (1996:23) admits that "participation does not always entail cooperation nor consensus. It can often mean conflict and usually poses a threat to extant structures...Rigid and general strategies for participation are neither possible nor desirable."

Media advocacy

Media advocacy is another approach that questions central premises of the traditional paradigms. Media advocacy is the strategic use of mass media to advance social or public policy initiatives (Wallack, et.al., 1993). Its goals are to stimulate debate and promote responsible portrayals and coverage of development issues. Advocacy requires mobilization of resources and groups in support of certain issues and policies to change public opinion and decisions. It consists of the organization of information for dissemination

through various interpersonal and media channels towards gaining political and social acceptance of certain issues (Stuart and Achterberg, 1997).

Like education-entertainment strategies, media advocacy rejects the idea that the media can be a source of only anti-social messages, and instead, proposes to include socially relevant themes in entertainment. Unlike education-entertainment, which has been mostly concerned with directly influencing audiences, media advocacy centres on shaping the public debate on various issues.

According to media advocacy theory, campaigns are not the panacea not only because their effectiveness is questionable, but also because they ignore the social causes of behaviour. Media advocacy adopts a participatory approach that emphasizes the need of communities to gain control and power to transform their environments. It assigns the media a pivotal role in raising issues that need to be discussed and putting pressure on decision-makers. However, advocacy is not solely concerned with media actions.

In summary, advocacy consists of a large number of information activities, such as lobbying with decision makers through personal contacts and direct mail; holding seminars, rallies and news making events; ensuring regular newspaper, magazine, television and radio coverage and obtaining endorsements from known people (Wiasbord, 2000).

Social mobilization

Social mobilization is a term used by the United Nations International Children's Emergency Fund (UNICEF) to describe a comprehensive planning approach that emphasizes political coalition building and community action (UNICEF, 1993). It is the process of bringing together all feasible and practical inter-sectoral social allies to raise people's awareness of and demand for a particular development programme and to strengthen community participation for sustainability and self-reliance.

Mobilization is a process through which community members become aware of a problem, identify the problem as a high priority for community action, and decide steps to take action (Thompson and Pertschuk, 1992). It starts with problem assessment and analysis at the community level and moves to action on chosen courses, involving many strategic allies at all levels in a wide range of support activities. Central to social mobilization interventions is empowerment or the process through which individuals or communities take direct control over their lives and environment (Minkler and Wallerstein, 1997).

Social mobilization suggests that wide community participation is necessary for members to gain ownership so innovations would not be seen as externally imposed. McKee (1999) says that social mobilization is the glue that binds advocacy activities to more planned and researched program

communication activities. At the same, he time reiterates that social mobilization programs require that government agencies, NGOs and donor agencies need to meet and review the objectives and methodology of the research, follow its progress through periodic briefings and give feedback on the final report.

Development Support Communication

Emphasis on greater participation of beneficiaries in the process of development in general and message development in particular, has prompted a relook into the role of communication in development. There is a shift from 'the concept of 'development communication' with its emphasis on top-down, media-centred communication to 'development support communication' focused on co-equal, little-media-centred government-with-people communication' (Ascroft and Masilela, 1989). In the context of absence of common language of communication between the administrators, technical experts on the one hand and receivers on the other, scholars of development support communication are focusing on constructing communication models, which would make development communication messages comprehensible and relevant to the user-receivers (Melkote, 1991: 262). Although some scholars have written an obituary for Development Support Communication (Hornik, 1988), Melkote and Steeves (2001) argue that the very concept of 'development' if re-conceptualised to mean 'empowerment', entails a new role for specialists in development support communication.

ESSENTIALS FOR SUCCESS OF DEVELOPMENT COMMUNICATION

In conclusion, it can be said that whatever be the differences among theories and approaches, one point of convergence is that political will is necessary in order to bring about change (Hornik, 1988). Development communication should not only be concerned with working for specific outcomes but also aim at community empowerment. This requires coming up with a set of indicators that measure the impact of interventions in terms of empowerment. While empowerment lacks a single, conclusive definition, it may refer to communities making decisions for themselves and acquiring knowledge (e.g. about health issues). Whereas for participatory/advocacy approaches empowerment may mean changes in power distribution, advocates of social marketing suggest that marketing empowers people by providing information and having constant feedback from consumers.

Practitioners seem to have realized that a multi-pronged approach with diverse strategies is needed to improve the quality of life of communities in developing countries. Rather than promoting specific theories and methodologies regardless of the problem at stake, there has been an emerging consensus that different techniques are appropriate in different contexts in order to deal with different problems and priorities.

It would be interesting to understand how the trends in theory and practice of development communication have impacted nutrition education

and communication. However, before venturing into the historical aspects of nutrition communication research and practice, it would be pertinent to understand how nutrition research evolved in India.

Chapter 3

HISTORICAL PERSPECTIVE

3.1 HISTORY AND EVOLUTION OF NUTRITION RESEARCH IN INDIA

Food and Nutrition in Ancient India

Evidence indicates that several of the foods we eat today were consumed even during the Indus Valley Civilization, dating back to 3000-5000 BC (Achaya, 1994). Later when Ayurveda evolved, systematic concepts concerning foods, their quality, their role in daily diet in relation to health of an individual and their use in management of diseases came to the fore. Foods were divided according to their 'cooling' or 'heating' effects. In the treatment of diseases, observance of diet regime forms a very essential part of the treatment (Rao, 1968). Even the modern scientific knowledge has established that several of these concepts were indeed rational, scientific and are relevant even today (Majumdar, 1971).

Ayurveda taught '*aharatattva*' and '*dinacarya*' as the processes that play important role maintenance of health. The '*aharatattva*' points out that though satisfaction of hunger is usually the primary criteria for food intake, diets should be planned on sound nutritional principles in order to ensure healthy and active life. The concept of *dinacarya* discusses the need to be physically active for maintaining ones health. Long before vitamins and minerals were discovered, ancient Indian through trial and error methods developed food habits that used to provide various nutrients. With the advent of many a culture, the Indians changed their lifestyles and food habits; the teachings of

aharatattva and *dinacarya* went into oblivion with passage of time (Sen, 2005). Ayurveda along with other Indian sciences in mathematics, astronomy and medicine which reached other countries as well remained almost stagnant after the 12th century AD (Majumdar, 1971). While it is difficult to understand how such a widely accepted system of medicine and treatment faded away into such baser forms, some researchers feel that Brahminical rituals, religious prejudices and continuous political turmoil have led to this (Rao, 1968; Jain, 1983). In the later years after the British established their hegemony in India, they desired to teach the 'natives' that western science and medicine was universal and instructed them (natives) to apply the new order of 'universal knowledge' in their objects and practices, thus instituting the western form of science as a general form of knowledge (Prakash, 1999). Promoting health, 'modern' science and medicine occupied the colonial rhetoric and it was projected to be the larger imperial purpose in India, just as they were integral to the colonial denunciation of India as a primitive and backward society (Arnold, 1994a). Hence, 'modern' science and scientific research related to health and disease in India actually began in the first decade of the 20th century. Nutrition research related to dietary deficiency diseases and to the study of the role of habitual diets of the sub-continent in health and prevailing diseases in the country was also initiated just about the same time (Narsinga Rao, 2005, Arnold, 1994b).

Development of science during the British rule

The intellectual stagnation and obscurantism which had developed in the Indian society continued to dominate Indian health science. The British policy was not in favour of developing science in India, but they were only interested in exploiting the natural resources for their industry back home. There were some British medical scientists who were interested in tropical diseases. Several of them have even carried out pioneering work in bringing to light and to the world at large, the ancient Indian contributions in the field of sciences and art (Majumdar, 1971).

Before the British actually established their empire, the East India Company was in-charge of administration of the country. East India Company representing the British commercial interests was more interested in exploiting the natural resources of India. With this motive, between 16th and 19th centuries, they established scientific bodies to carry out Geographical Survey, Meteorological Survey, Botanical Survey and later Zoological Survey of India (Subbarayappa, 1971). However, there were hardly any efforts to promote modern scientific work in India, while these scientific survey organizations were concerned only with the application of the science developed in the West for survey and compiling the data on resources like minerals, plants and other natural resources by 'experts' recruited in Britain. Indians served only as subordinates under the British 'scientists'. There was hardly any attempt till the later half of the 19th century to give these

responsibilities to Indians. Some of the experts associated with these survey activities were scientists who did carry out some research along with their regular survey work. Added to this English education too more or less became a pre-requisite for the Indians to take up scientific study or research. After the introduction of English education by Lord William Bentinck in 1835, many Indians got trained in the areas of scientific activity (Narsinga Rao, 2005).

Development of Scientific Work during the last two centuries

The study of science in India during the last two centuries was mainly due to two important developments – starting of scientific societies and appointment of scientific officers in various services and survey departments and in the corresponding provincial departments.

The first scientific society to be established in India for promotion of science was the Asiatic Society of Bengal founded in 1784 by Sir William Jones and a group of about thirty European scholars, who met under the Chairmanship of Robert Charles, the second judge of the Supreme Court. This Society started publishing papers from the middle of the 19th century in physics, chemistry, biology and medical sciences. From 1884 to 1900 was a period of intense scientific activity in the history of the Asiatic Society so far as biological sciences were concerned. This society changed its name to Royal Asiatic Society of Bengal in 1936 (Randhawa, 1980)**.** Subsequently, it was the

'Indian Association of Cultivation of Science' which was started by an Indian in Calcutta in 1876. It was at this Institute that Sir C V Raman carried out his earlier work.

Agriculture Research in India

The work of Botanical Survey and of earlier botanists may be of relevance to Nutrition in India as the details of botanical work in identification and classification of edible plants perhaps helped subsequent nutrition research related to food analysis. Development in agricultural research during the 19th and 20th centuries is of much relevance to nutrition, with special reference to food crops. The research with respect to increased productivity of traditional food crops and introduction of newer varieties was stepped up for improving yield and quality (mainly nutritional quality).

Recurrent famines have prompted setting up of agriculture departments in the country and emphasis on agricultural research. After famine in Bengal and Orissa in 1866, the famine commission mooted the policy of having a special development of agriculture to watch over the interest of agriculture. Lord Lawrence, the then Governor General thought that it was rather too premature to take such a step. Subsequently, Lord Mayo, the fourth viceroy of India and his adviser, Lord Hume were responsible for starting the Department of Agriculture in 1878. Departments of Agriculture were set up in various provinces also (Randhawa, 1980). The

setting up of these departments was triggered by the pressure from the British Textile Industry which was facing a crisis due to the stoppage of cotton supply from USA on account of civil war in that country. The Department of Agriculture was started by the British Government with an idea to improve a commercial crop like cotton and not food crops. But the railways and telegraph facilities developed almost during the same period have immensely facilitated the transfer of food and food crops from place to place.

Following yet another major famine in 1876-78, which affected over 60 million people, another famine commission was appointed in 1880, whose report revived government's interest in agriculture. Several steps were taken to improve and strengthen the Agriculture Departments at the Centre as well as in the provinces. Soon after this, during 1899-1900, there was a famine that was recorded as one the severest. During this famine, most parts across the country were affected. One of the most important recommendations of the Famine Commission (1901) that year was to foster research in agriculture in order to improve the agricultural situation of India. Acting on this recommendation, Government of India, under the leadership of the then Viceroy, Lord Curzon founded the Imperial Agriculture Research Institute (IARI) in 1905 at Pusa in Bihar. Apart from the many Survey Departments, this was perhaps the first research institute established in India. Almost during the same time, Agricultural Colleges and Research Stations were established in all the important provinces (Narsinga Rao, 2005).

Subsequently, the government of India appointed a Royal Commission of Agriculture in 1926 to examine the conditions of Agriculture and rural economy in India. The commission pointed out the lack of coordination between agriculture research activities at the Centre and Provinces. The Commission also recognized the importance of experimentation to fuel the agriculture research and thereby the progress of the same. The Commission also felt that all agriculture extension work, demonstration and propaganda should be based on research. Hence the commission proposed the setting up of the Imperial Council of Agricultural Research (ICAR) to promote, guide, co-ordinate and integrate agricultural research in India. ICAR came to being in 1929 and was later renamed as the Indian Council of Agricultural Research (ICAR) after India attained freedom (Randhawa, 1980). In the later years ICAR has made a signal contribution to the over all growth and development of agricultural sciences in India. Research on agricultural sciences under the aegis of ICAR as well as by the food science and nutrition departments of agricultural universities looked at ways and means to maximize yield. As far as education and communication aspect is concerned, agriculture extension works and research activities of ICAR and Agriculture Universities have been active in taking the fruits of this research to the cultivators, but nutrition education and communication did not figure in their agenda.

Medical Research in India and evolution of Nutrition Research

Just as famines were of periodic occurrence in India epidemics of tropical diseases were also occurring periodically. Tropical diseases that attracted the interest of the medical fraternity in the 18th and 19th centuries were Plague, Cholera, Malaria, Kala Azar. The British Colonial Government had to deal with diseases as a public health issue for their prevention, control and management. From 1763 onwards, Medical Services in the three provinces – Bengal, Madras and Bombay started functioning; however, initiation of Medical Research Organisation in India has been established in 1869. The early studies have concentrated mainly on diseases like Cholera, Malaria, Beriberi, Kala Azar etc. Most of these researches primarily looked into the sanitary aspects of health than the public health aspects (Gangulee, 1938). During this period, Edward Hare successfully introduced the practice of administering quinine in fever. Henry Vandyke Carter investigated the origin and development of famine fever, leprosy, encephalitis and mycetoma. Ronald Ross worked on the origin of malarial fever and proved beyond doubt that mosquitoes were responsible for the spread of Malaria, which can be considered a signal contribution from India (Basu, 1982).

Attempts to organize medical research have taken a definite shape in 1894 with the Indian Medical Congress submitting a resolution to the Government of India urging the establishment of a research institute. Consideration given to this by Government and repeated occurrence of

epidemics led to the establishment of central and provincial laboratories which later developed into centres of medical research. Several laboratories and institutes were started in the country – Bacteriological Laboratories at Agra (1900), Hafkines Institute in Bombay, Pasteur Institute at Kasauli (1900), King Institute, Guindy (1906), Pasteur Institute, Coonoor (1907). It can be said that Medical Research Organisation in India was placed on a firm footing, with the creation of Bacteriological Department of India which was sanctioned in 1900 but started functioning only in 1906 (Basu, 1982).

In order to overcome the bureaucratic delays in executing urgent medical work related to epidemics and their control, there was a need for an autonomous set up, which could take quick decisions, the Indian Research Fund Association (IRFA) was founded in 1911. IRFA and its successor, the Indian Council of Medical Research have been at the forefront of research in various fields of medicine and health including nutrition in the country over the last nine decades (Pandit and Rao, 1961). In 1918, IRFA established an enquiry unit in one room at the Pasteur Institute in Coonoor under Sir Robert McCarison. Thus, in a way IRFA sowed seeds for nutrition research on modern scientific lines in India. Since then, nutrition research in India has been promoted primarily under medical research, unlike in some of the Western countries like UK and USA, where it flourished mainly as part of Agriculture Research. It is indeed relevant here to state that there have been some efforts by individual medical scientists, for example, studies by Giles on

Beri Beri and famine fever by Carter from 1869 (Patwardhan, 1961). Dr. B Narsinga Rao in his book, *Development of Nutrition Science in India* (2005) points out that there might have been some studies on the effect of starvation during recurrent famines, but also states that no records of such studies are available.

The first recorded study on nutrition was on the observations by Lewis in 1881 and later by McCay 1910 on diets of Indians, prisoners and army personnel, in which he reported that protein intake was low among Indians. Lewis drew attention to the need for determining the food requirements of persons in the army undergoing physical exertion (Patwardhan, 1961). Despite all these studies, Sir Robert McCarrison is credited to be the initiator of nutritional studies in India. He suggested that the faulty diet consumed by Indians at that time was the main cause of various deficiency diseases. Later he became the Director of the Nutrition Research laboratories (NRL) established in 1928. Dr. Aykryod, who succeeded Sir McCarrison, initiated diet and nutrition surveys in the country and also studies on the composition of Indian diets. Such surveys coupled with dietary surveys were carried out in different parts of the country by the Provincial Health Services and other institutes, but they were all isolated and not based on statistically selected samples of population. During this period, there were hardly any efforts to develop strategies to combat then prevalent nutritional disorders except for some isolated studies on impact of feeding supplements to schoolchildren and

supplementing vitamins in cases of vitamin deficiencies (Narsinga Rao, 2005: 676-677). Nutrition deficiency diseases, which were identified to be prevalent among the poor income groups before the country's independence, continued to receive attention even after independence with an emphasis on seeking solutions to some of these problems. Besides these problems, protein energy malnutrition (PEM) was determined to be an important problem among pre-school age children manifesting in their clinical form as kwashiorkor and marasmus.

After independence, nutrition research also placed emphasis on hitherto ignored nutrition problems. However, the family diet and nutrition surveys in different states were still being carried out by the state nutrition departments till the end of 1970 and later by the National Nutrition Monitoring Bureau (NNMB) set up by ICMR in the National Institute of Nutrition (NIN). NNMB made it possible to carry out systematic diet and nutrition surveys at periodic intervals and obtain a quantitative assessment of nutritional status of the population and prevalence of nutritional deficiency disorders across many states in the country. Between 1960s and 70s, considerable efforts were initiated towards development of appropriate intervention strategies and some such programmes have subsequently evolved into National Nutrition Programmes. These efforts formed an integral part of the National Nutrition Policy in later years.

3.2 NUTRITION IN PUBLIC HEALTH DISCOURSE IN COLONIAL AND POST-COLONIAL INDIA

The Indian constitution recognizes the right of Indian citizen to health. But since independence, the Indian state has spent smaller proportion of its resources on public health than many other countries in the world (UNDP, 2005). No wonder, public health is considered to be 'one of the most neglected aspects of development in India' (Dreze and Sen, 2002). Freedom from hunger and access to adequate food and nutrition is perceived to be a constitutional right in India. It is mandated by an extended interpretation of the 'Right to Life', guaranteed by Article 21 of the Indian Constitution. In fact, Article 21 imposes upon the state to protect this right. Further Constitutional commitments are articulated in Article 47, which mandates that, "The State shall regard raising the level of nutrition and standard of living of its people, and improvement in public health among its primary duties", (Government of India, 1960). Unfortunately nutrition security has often been ignored historically and India today faces a strange paradox of being a home to teeming millions of undernourished people and an emerging hub for the obesity and associated chronic diseases (CARE, 2003). While accepting that the state-directed and internationally supported public health and nutrition programmes have contributed to the health and well-being of Indians, experts say that deep-rooted, systematic and holistic weaknesses of India's public health system have acted as significant limiting factors (Amrith, 2009). In this scenario, this chapter attempts to explore the inherent paradoxes in dealing

with nutrition in the Indian public health discourse in the colonial and post colonial era.

Public Health in Public Sphere

Initially, public health entered the public sphere from the elite circles of India's emergent colonial middle class. A new level of discussion on health and health practices formed the engagement of Indian elites, who on exposure to sanitary science, even questioned the accepted customs and practices that they considered detrimental to family health (Amrith, 2007). Certain hygienic practices were associated with being modern.

With evolution of the printing technology, there was an increase in the popular writing on health and illness, which was targeted to the middle-class reading public. These disseminated the western ideas about the body, wellness and treatment of diseases. A range of topics like vegetarianism, vital health care tips, nutrition, care and feeding of infants, healthful beauty and vital statistics occupied many column inches. Even the vernacular literature was replete with articles on health especially targeted at women offering them advice on taking care of their bodies, managing their homes and child rearing (Lal, 2003). Thus, health and nutrition debates in the public sphere remained only among the elites. As regards the public health discussions about the poor, the elite seemed to be caught in the colonial Malthusian discourse of 'over-population' being responsible for recurrent famines and defective sanitation (Amrith, 2007).

Many seeds of hope for health were generated during India's struggle against colonial rule (Banerji, 2004). With *Swadeshi* movement of 1904, there was an increasing interest to alleviate the 'problems of poverty' while harnessing the indigenous products, culture and economy (Visvanathan, 1998). This discourse of poverty brought to the fore a number of elite discussions on health and hygiene. On one hand, this prompted the experimental engagement of elites in western medical ideas as the means to resolve public health problems of the poor, while on the other, the activist and the experimental had extended the discussions on public health into critique of the colonial rule (Arnold, 1993). This period saw the birth of nutrition research in India. Sir Robert McCarrison, who with his exposure to the advances in nutrition science in the western countries, formed the opinion that in certain Indian diets, there were multiple defects and these defects were the cause of poor physical development, low resistance to disease and widespread ill-health in India (Patwardhan, 1961).

On the policy front, the foundations for a public health service in India were laid in 1864 with the appointment of Sanitary Commissioners for the three provinces of Bengal, Bombay and Madras, but organized public health activity was halting in its progress for over the two decades that followed (Gangulee, 1938; Government of India, 1941). The report of the Plague Commission submitted in 1904 on the epidemic of plague which swept the country at that time, awoke the people and stirred the Government to

strengthen the then existing public health administration. Since then, for a few decades to come, the State Public Health Services have been concerned with improving hygiene and sanitation and fighting the epidemics of communicable diseases (Patwardhan, 1961). Despite concerted efforts on scientific enquiry of 'deficiencies' of Indian diets (by McCarrsion and others) and discussions on nutrition and well being in the elitist domain, nutrition did not enter the arena of public health administration. Surprisingly, it is during this time that British India witnessed decline in mortality. This in no way is attributable to improved nutritional improvement or public health policies. Klein (1990) attributed this to 'biological immunization' (reduced lethality of communicable diseases after a generation of exposure) and Guha (2001: 86) wrote, "weather gods enabled to maintain a stable level of moderate malnutrition rather than alternatively plunge between adequate nutrition and severe malnutrition".

The Nationalist Movement and Public Health

Gandhi's nationalist movement mobilized the Indian peasantry against the colonial rule and socialists, conservatives and communitarians turned their attention to the problems of the poor. There were small scale experiments to mobilize new ideas of public health. For instance, in the famine affected Bengal, where millions were starving, India's poet-reformist Rabindra Nath Tagore initiated the Sriniketan Rural Reconstruction Project, which promoted holistic approach to rural development with focus on public

health, sanitation and agriculture (Amrith, 2007). Soon, the then leaders saw ill-health and starvation as some of the responsible factors for the prevailing economic scene quashing the markers like national income statistics and industrial development that have pre-occupied the pioneering works of Dadabhai Naoroji and others. Amrith (2006: 9) argues, "the science of nutrition played an important role in lending new language to the discussion of economic change…. Discussions of India's poverty, had, hitherto focused on absence of industry on one hand and the incidence of famine, on the other. As the era of terrible famines seemed to have passed, by the 1920s, the language of nutrition provided for a more fine-grained analysis of deprivation and a new way of talking about well being." He also cites Gandhi's writings on nutrition in *Harijan* and *Young India* drawing from the most advanced nutritional knowledge of that time.

Parallel to this, on the policy front, as Patwardhan (1961: 459) says, the observations of the Royal Commission of Agriculture (1926) on the researches of McCarrison and their significance made the then British Government 'nutrition-conscious' for the first time. This led to recognizing Dr. McCarrison's Deficiency Disorders Enquiry Unit into a full-fledged Nutrition Research Lab.

In 1936, the League of Nations' Health Committee released 'Physiological Bases of Human Nutrition'. A summary of the report appeared

in Gandhi's publication *Harijan* (as cited by Amrith, 2006). Gandhi, who declared that he was not an opponent or foe of science (Kumar, 2000a) turned to scientific knowledge in search of the diet that could build the vigour and vitality of an impoverished nation. His ashrams were a combination of hermitage and laboratory and were locations of scientific experiments (Visvanathan, 1998). His experiments with food and hygiene were a critique of the public health commitment of colonial India. Gandhi seems to have referred to Robert McCarrison's experiments feeding 'typical Indian diets' to rats, textbooks on nutrition and 'Balanced diets' by H.V. Tilak. Apart from these, Gandhi's public correspondence with both McCarrison and Aykroyd, successive directors of Nutrition Research Labs has also been documented by Amrith (2006). Gandhi wrote elaborately on polished rice weakening the vitality of Indian race (*Harijan* 26th Oct 1936) as well as on green leaves and other cheap foods for the health of villagers and economic reorganization of villages. The modernist nationalists in the country have identified public health and alleviation of hunger as important steps in building a healthy 'new nation'. The Far Eastern Conference on Rural Hygiene met at Bandung, Indonesia managed to impress upon the participating Governments that malnutrition was a public health problem and hence there was an immediate need to take steps to tackle the problem. This prompted the Government to send personnel to get trained in nutrition at Nutrition Research Lab in Coonoor, with an intention to appoint trained nutrition personnel as nutrition officers in charge of public health nutrition in the provinces. The nutrition

sections that started during this period were only confined to the three provincial states and took nearly two decades to expand to about a dozen centres. By late 1950s some of them were making scattered efforts to carry out nutrition surveys and didactic nutrition education programmes (Patwardhan, 1961).

Subsequent to the victory of Indian National Congress in 1937 elections, the National Planning Committee (established by the Congress) in its reports on 'problem of population' identified the connection between poverty, under-nutrition and ill health. Wrote the Planning Committee in its report on national health (1938-40) (as cited in Amrith, 2006):

> …something like 75 per cent or even more, of the incidence of physical disabilities other than those due to infectious diseases can be prevented by the provision of suitable food, adequate both in quantity and quality.

Although the Planning Committee in some of their observations have cited nutrition and sanitation as necessary elements in building 'new' India, they emphasized the combination of legislation and latest technologies (for birth control, eugenics etc.) that would 'relieve India from terrible waste of life and make India economically efficient'. Perhaps this was reiterative of the Malthusian discourse in which they were caught. Many termed the decade that followed as 'phase of transition' in science and technology as ever increasing attention was being paid to development with science and technology as catalytic agents (Kumar, 2000a). In 1944, AV Hill, the then

Biological Secretary, Royal Society was invited to report on the state of scientific research in India (Kumar, 2000, a, b). He talked of quadrilateral dilemma involving population, health, food and natural resources. According to him, the complex problems of India were 'not physical, chemical or technological but a complex of biological ones involving, population, health, nutrition and agriculture' (Hill, 1960; Kumar, 2000b). The then British Governance soon turned to plans for post-war reconstruction to make a display of their 'concern' for the national welfare, and to assuage key sections of the Indian elite. The circumstances of the war brought together, within the first Health Survey and Development Committee (popularly known as the Bhore Committee), a combination of conservative bureaucrats and international medical consultants, who had discussions with the visiting international consultants like A.V. Hill. The Bhore report, finally published in 1946, associated public health with plans for economic development, suggesting that 'unemployment and poverty produce their adverse effect on health through the operation of such factors as inadequate nutrition, unsatisfactory housing and clothing and lack of proper medical care during periods of illness.' The committee also recommended setting up of a national health service and a modern health administration, in which the *State makes itself responsible* for providing the community with health protection. Although the recommendation of creating modern health administration did not materialize owing to conflicting priorities, the terms set by the Bhore Committee left a lasting legacy.

Changing Priorities in the Post-colonial Era

At the time of political independence in 1947, in the Post-colonial India, public health was well established in the political culture and with in the thinking of the planners, health was at once a human right, but the voices were a relative minority and could not compete with the State preferences at that time for industrialization and strengthening defence. There was, in the end, relative consensus that, in the Constitution, public health ought to be a directive 'principle of governance' rather than a fundamental right. In the Nehruvian India which believed in 'planned' state intervention to tackle all kinds of social problems using modern technology (Visvanathan, 1998), even public health, like agriculture and industry was amenable to technological transformation (Prasad, 2007). At the same time the public health discourse in India was probably shaped by international climate especially after the establishment of the World Health Organisation (WHO) of the United Nations in 1945. WHO gave a symbolic legitimacy to public health with its founding declaration depicting health as a 'fundamental human right' (Siddiqui, 1995). WHO also played a crucial role in global circulation of standard set of public health policies and technologies for implementing them. India, as a sovereign nation, was entitled by right to the latest international technologies of health; DDT, antibiotics, x-ray machines. In its quest to provide public health, India deployed external resources (Amrith, 2007). In the two decades that followed, India along with a number of Southeast Asian Countries used globally circulated new medial technologies

to fight a number of infectious diseases, especially malaria (Jeffery, 1988). Since then, nutrition did not explicitly figure in many health policy statements for years to come.

At that time, India faced a multitude of nutritional problems like chronic energy deficiency due to low dietary intake and high prevalence of infection because of poor access to safe drinking water and poor sanitation. The threats of repeated famines and acute starvation due to low agriculture production and lack of an appropriate public distribution system compounded the problem (Rajagopalan, 2003a, 2003b). The Indian policy makers saw malnutrition as a welfare problem and addressed it accordingly (Berg, 1970). Naturally, the focus was on producing enough food at the national level to potentially feed all people. Nutrition naturally was considered to be primarily an issue of insufficient food quantity. The focus was on expanding agricultural output by bringing more land into cultivation and using modern technologies and techniques of farming (Haddad and Geissler, 2005). No wonder, the first three five-year plans assumed that economic growth and food production would themselves solve the problems of poverty and undernutrition (Planning Commission, 2008). With the focus still on food production, by 1960s, the emphasis shifted to crop yield or output and India embarked on “Green Revolution” led by the newly formed Consultative Group on International Agricultural Research (CGIAR). The Green Revolution helped the country to move from chronic shortages of food

to an era of surplus. But the benefits did not seem to have percolated to the grassroots level (Rajagopalan, 2003b).

Around the same time, researchers around the world have pointed out that ill health in India, as elsewhere, was due as much to non-specific diseases due to lack of proper nutrition or sanitation as to the 'specific' diseases against which concerted internationally attention was being paid (Scrimshaw et al., 1968; McDermott, 1966). Soon, internationally, there was increased recognition that an integrated approach to improving nutrition was required and 'Applied Nutrition Programmes' were promoted by international agencies. Like in many countries in the south-east Asian region, there were 'broad-based' community development programmes designed to improve the quantity and quality of local food production and to improve incomes to make such foods affordable and used (Geissler, 1993). However, in the Indian context, in the early 1960s, the public health policy experienced a striking shift prioritizing population control as a panacea for all ills. Mohan Rao (1999) argued that the agenda of population control in India determined the directions of health policy.

Perhaps, the 1966-67 Bihar famine dramatized the magnitude of malnutrition with about 90 million people being affected by it. Policy makers have begun to realize that national development cannot take place unless hundred of millions of the 'poor' experience some betterment and participate

in the national development (Berg, 1970). A Home Ministry report published in 1969 December, cited by Berg (1970) warned,

> … failure to improve the lot of India's masses may lead to a situation where the discontented elements are compelled to organize themselves and extreme tensions building up with in a 'complex molecule' that is the Indian village…

The government accelerated efforts to produce more grain. Introduction of high yielding seed varieties, fertilizers, technological inputs were possible in the green revolution days.

Although, the Mid-day Meal Programme which was operational since 1961 aimed to attract more children for admission to school (Park, 2000), a sizeable numbers of children were reached during the Bihar famine (Berg, 1970). The findings around the same period suggested a link between malnutrition and mental development, physical growth and their relationship with the potential productivity of individuals (Gopalan, 1974). In 1967, a Comprehensive Nutrition Plan was rolled out by the Ministry of Health (Government of India, 1967). Berg (1970: 1408) wrote,

> …serious thought process for the first time is given to the developmental ramifications of malnutrition, to the economic dimensions of the problem, to vote getting appeal of nutrition in a democracy to national planning implications, and to evaluating alternate cost solutions. A first attempt to the latter was the Comprehensive Nutrition Plan….it was to my knowledge the first attempt at an analytical systems approach to meeting the nutritional needs.

The same period also saw India's first venture into fortification of cereal foods with introduction of Modern Bread in 1968, through Government Modern Bakery plants that were set up with the help of Canada and Australia. During the drought years the food ministry made an attempt to promote wheat consumption, as wheat unlike other cereals was available in large quantities from abroad (Berg, 1970). Although a significant proportion of health budget was being utilized for malaria control and promoting family planning in the 1960s (Amrith, 2007), these were the years during which the 'Community Development' phase prevailed on the nutrition scene. The positive outcome of this phase however is the increased realization that combating the problems of nutrition needed community involvement and that at the Government level there was a need for co-ordinated approach (FNB, 1995b).

In the fourth five-year plan in 1970, specific nutrition intervention programmes for improving nutrient status of vulnerable mothers and children were developed (Planning Commission, 2008). For the first time a section on the subject was introduced in the plan documents. The shift was obvious in the Prime Minister's message in the parliament during the presentation of budget for 1970-71 (as cited in Berg, 1970: 1396),

> The Government of India, have therefore, decided to give high priority to the problem of nutrition among children in the Fourth Plan.

India's political and economic scenario became volatile in the early 1970s. 'Unplanned' population growth was being seen as the major cause for India's poverty. Between 1971 and 1976, population management became a political issue because of its proposed relationship to poverty, economy, widespread ill-health and malnutrition. Campaigning on a platform of '*garibi hatao*' (end poverty), Indira Gandhi of the Indian National Congress party became the Prime Minister of India (Turay, 2007). These efforts to reduce poverty did not yield great results as India at that time was facing the Bangladesh War, poor harvests, and an oil crisis. By 1974, inflation was rising. On June 26, 1975 Indira Gandhi, the then prime minister, declared a state of political Emergency on the premise of preventing economic deterioration, political disruption, social disturbance, and general chaos in the country (Palmer, 1977). Shortly after declaring the Emergency, an anti-poverty Twenty Point Program was announced by the caretaker Government (Turay, 2007). Sanjay Gandhi, Indira Gandhi's son and a youth leader was afforded political privileges including permission to develop national policies. He proposed that unplanned population growth would pose a threat to the Twenty Point Program (Panandiker and Umashankar, 1994), using Malthusian reasoning, Sanjay spearheaded the India's most controversial sterilization drive.

In 1976, with India's population growing rapidly and the Emergency extended for another year, National Population Policy was announced. The Policy hoped to help placate the nation's economic hardships, established

how incentives would be allocated to those who participated in population management efforts. The sterilization drive lacked sustainability and was counterproductive to improving and protecting the nation's health. On one hand, it concentrated resources in one place when the country's health professionals were being used to reach sterilization goals rather than provide other services (Turay, 2007) and on the other, the compensations and incentives for sterilization operations rose to almost ten percent of the total health budget (Jeffery, 1988). These were some of the factors that led to the defeat of the Congress Party in the general elections that followed.

While continuing the spirit of *'garibi hatao'* the policy makers were forced to look beyond population control. They turned to issues of social and structural transformation that would ensure food security to the populations. Schemes for poverty eradication also took shape and the fifth Five year plan implemented cohesive minimum needs programme, tying up health to education, water supply, sanitation and food. A string of nutrition programmes directed towards specific nutritional deficiencies were initiated such as Crash Feeding Programme, Supplementary Nutrition Programme for pre-school children, Prophylaxis Programme on Nutritional Anaemia in Women and Prophylaxis Programme of Vitamin A to combat nutritional blindness among children (Park, 2000; FNB, 1995a). Launched on 2nd October 1975 in 33 Community Development Blocks, Integrated Child Development Scheme (ICDS) today represents one of the world's largest programmes for

early childhood development. ICDS aims at breaking the vicious cycle of malnutrition, morbidity, reduced learning capacity and mortality. It is an inter-sectoral programme which seeks to directly reach out to children, below six years, especially from vulnerable and remote areas and give them a head-start by providing an integrated programme of early childhood education, health and nutrition. The programme also is being implemented with an idea that Early Childhood Care and Education can succeed unless mothers are also brought within its ambit (MoWCD, 2008). These direct nutrition interventions differ in their immediate direct impact and their indirect outcomes. Some are more sharply focussed than others. While the so called 'vulnerable groups' have been reported to benefit most from these nutrition programmes, better area and population focus still seems to be lacking (Bajaj, 1990).

Despite all these efforts in the 1970s, population control still assumed greater policy attention and larger chunk of the health care budget. Therefore even in public health debates and media space many issues such as malnutrition or chronic hunger received next to no attention (Sainath, 1996).

By 1980s, public health achievements of India were being touted as elimination of smallpox; plague; decreased mortality from cholera and related diseases and 'successful' malaria control efforts. Despite all these efforts, the 'ever-growing' population continued to be the reason for the serious and urgent concern for the prevailing health picture. However, there was a

realisation that wholesale adoption of health policies and establishment of curative centres based on the Western models was not working in the Indian scenario. The National Health Policy formulated in 1983 (MoHFW, 1983) in its introduction said,

> In spite of such impressive progress, the demographic and health picture of the country still constitutes a cause for serious and urgent concern. The high rate of population growth continues to have an adverse effect on the health of our people and the quality of their lives… The existing situation has been largely engendered by the almost wholesale adoption of health manpower development policies and the establishment of curative centres based on the Western models, which are inappropriate and irrelevant to the real needs of our people and the socio-economic conditions obtaining in the country."

The first National Health Policy in 1983 aimed to achieve the goal of 'Health for All' by 2000 AD, through the provision of comprehensive primary healthcare services. It stressed the creation of an infrastructure for primary healthcare; close co-ordination with health-related services and activities. Nutrition along with drinking water supply and sanitation figured in the problems needing urgent attention (WHO, 2008). But the assumption again seemed to be increasing incomes would lead to increased consumption of nutritious food when the policy stated,

> National and regional strategies should be evolved and implemented, on a time-bound basis, to ensure adequate nutrition for all segments of the population through a well developed distribution system, specially in the rural areas and urban slums. Food of acceptable quality must be available to every person in accordance with his physical needs.... The over-all strategy would necessarily involve organized efforts at improving the purchasing power of the poorer sections of

> the society. Schemes like employment guarantee scheme, to which the government is committed, could yield optimal results if these are suitably linked to the objective of providing adequate nutrition and health cover to the rural and the urban poor. (MoHFW, 1983)

Simultaneously, an inter-sectoral planning approach, which the international development agencies implemented in the developed countries after the World Food Conference in Rome in 1974 was being promoted in developing countries also. The international agencies even offered technical support for this activity (Haddard and Geissler, 2005). Nutrition, as a separate chapter started appearing from the Sixth Five Year Plan (1980-85) document. Needless to say, in subsequent documents, nutrition promotion has been described as an important objective in several sectoral plans and policies, introducing 'multi-sectorality' in India's nutrition scene. Nutrition was sought to be promoted through developments in various sectors like agriculture, food production, health literacy, poverty alleviation and so on (FNB, 1995a).

As regards the National Health Policy, the period after 1983 witnessed several major developments in the polices impacting the health sector - adoption of National Health Policy in 1983, 73rd and 74th Constitutional Amendments in 1992 (the local bodies (Municipalities and *Panchayat*) have been assigned 29 development activities, which have a direct and indirect bearing on health), National Policy on Indian System of Medicine and Homeopathy in 2002, Drug Policy in 2002, introduction of Universal Health

Insurance schemes for the poor in 2003, and inclusion of health in the agendas of the political parties (WHO, 2008). On the nutrition front, adoption of the National Nutrition Policy (NNP) in 1993 and the International Conference on Nutrition (ICN), held in Rome in 1992 are landmarks. In the view of the Government, malnutrition was gradually being viewed as a national problem and not merely a sectoral problem and it argued that the control of malnutrition was only possible through the formulation of a National Policy. With inputs, technical advice and framework from the international agencies, the National Plan of Action on Nutrition (NPAN) was developed as a sequel to the Nutrition Policy. The objective was to operationalize the multi-sectoral strategy enshrined in the Policy (FNB, 1995a,b).

In 2001, the Peoples Union of Civil Liberties (PUCL) filed a writ petition in the Supreme Court of India, demanding that the right to food be recognized as a *legal* right for every citizen in the country. The filing of the petition resulted in greater attention to the implementation of food safety net policies and programmes, by the Government. The Supreme Court passed significant interim orders to strengthen the country's food entitlement programmes and schemes. The Right to Food is now very much in public gaze. The government has taken specific steps in keeping with the interim orders of the court, to safeguard the right to food in India. The court has mandated that constraints, such as insufficient resources for example, cannot be cited as a reason for not safeguarding rights, stating that the problem

should be addressed by reallocating budgets. As a result, recent budgets have seen significantly increased allocations in resources for food entitlement and social security schemes, even though there have been reductions in overall sector allocations (CARE India, 2003).

The National Health Policy was revised in 2002 and encompassed strategies to achieve an acceptable standard of good health among the general population of the country and has set goals to be achieved by the year 2015. But in the public health scenario, HIV/AIDS, TB and Malaria prevention/eradication assumed great importance both due to growing international attention as well as support. Nutrition, despite repeated measures from the Government and adoption of a Policy, was perhaps still being viewed as a 'welfare' measure than a health 'priority'. The 'multi-sectorality' of addressing the problem as envisioned in NNP and NPAN were being relegated in the comparative priorities of each sector. There are constraints in implementation of the policy such as lack of awareness at all levels, poor inter-sectoral involvement, poor coordination and low priority for nutrition in various sectors (WHO, 2005). The relegation of 'Nutritional Priorities' in the gamut of public health issues is also obvious in the fact that the National Nutrition Mission, which was formed under the chairmanship of the Prime Minister, way back in 2001 could not meet even once till date.

In recent years, nutrition and development transition has been occurring in India, due largely to demographic and epidemiological

transition, the forces of internal migration, urbanisation, the changes in food consumption patterns and physical activity patterns. These are contributing to increased prevalence of overweight, obesity and associated debilitating health conditions. India today is facing a strange paradox of severe hunger and undernutrition on one side and increasing prevalence of obesity on the other. The diet related non-communicable diseases are emerging as a disturbing trend even among the less affluent communities (Shetty, 2002). In this scenario, it becomes all the more important to recast focus on combating the double-edged problem of malnutrition (undernutrition and over-weight/obesity).

Conclusion

Emerging from the elite circles of India's middle class, as a public discussion on health, the public health discourse in the colonial times took shape as an important issue during the nationalist movement for building a new India. With underpinnings on poverty alleviation and rural upliftment the idea of public health under the nationalist agenda laid emphasis on sanitation and nutrition. For the country that was hit by terrible famines, the language of nutrition provided for a more fine-grained analysis of deprivation and a new way of talking about well being. However, in the post-colonial era with the planners using globally circulated new medical technologies to fight a number of infectious diseases (like malaria) and subsequently to mitigate the population growth, nutrition got relegated in the

public health discourse. With the assumption that improving some social and economic determinants and increasing agriculture production the nutrition of the people could be taken care of, India embarked on the green revolution and a string of welfare measures. Hence, programmes for nutrition improvement have generally been looked upon as welfare relief operations, rather than as aspects of the fulfilment of an essential pre-condition for social and economic development (Gopalan, 1992). The Indian experience has belied the facile assumption that improved nutrition will automatically result as a spin-off effect of improved food production, increased per-capita income or of extended child-survival promotion operations.

As Peters *et. al.* (2003) suggest, the public health transition in the past five decades or so has not been smooth. Avoidable losses due to communicable and preventable diseases and more importantly due to malnutrition have been exceptionally high. In recent years, there has been increasing recognition of the importance of the nutrition factor in development, and several large-scale nutrition intervention programmes have been attempted. Although, a coherent, well-conceived national nutrition policy was in place for a long time, bringing about inter-sectoral involvement to tackle the problems of inadequate or over nutrition have not percolated to all the sectors owing to low awareness, poor coordination and low priority for nutrition in various sectors. Nutrition programmes, therefore, do not enjoy high priority or adequate resource allocation in the development

agenda. Nutrition improvement was, at best, perceived as a derived rather than a direct objective of the development process. As a result, there were hardly any attempts to ensure nutritional orientation of national food policies and to lay adequate focus on nutrition in primary health care.

3.3 TRENDS IN NUTRITION EDUCATION AND COMMUNICATION RESEARCH AND PRACTICE

Nutrition education

> "Oh, God, give us food which does not cause any disease and also gives us strength."
>
> - **Yajurveda**

> "He, who takes food in proper measure lives long life and lives without disease, gets strength and alertness of mind. However, his children are born healthy and without any deformity or disease."
>
> - **Mahabharata**

Yet another ancient Indian dictum says, "*Annam Brahma*" (Food is divine). More than 2000 years ago Hippocrates wrote: 'let food be your medicine, and let medicine be your food'. The statement, made by the founder of physic, is often used by nutrition scientists as an advertisement to emphasize the need for knowledge and proper understanding of nutrition. Almost 200 years ago Anthelme Brillat-Savarin, a French lawyer and politician who gained fame as an epicure, gastronome and the pioneer of the genre of the gastronomic essay said, 'the destiny of nations is determined by what and how they eat' (Cannon, 2002). These draw people's attention to the need to educate themselves about the importance of food and right nutrition. In fact, the practice of nutrition education is about as old as any of the so-called 'helping professions' such as nursing and counselling. While there are many definitions of nutrition education, one striking characteristic is that it is viewed as a form of planned change that involves a deliberate effort to

improve nutritional well-being by providing information or other types of educational/behavioural interventions (Sims, 1987). Following are some of the important definitions found scholarship on nutrition education:

> Nutrition Education is a means of translating nutritional requirements of food, and adjusting the food choices to satisfy nutritional, cultural, psychological and economic needs (Albasena, 1971).

> The process by which beliefs, attitudes, environmental influences and understandings about food are converted into practices, which are nutritionally sound and consistent with individual's needs, purchasing power, available food sources and socio-cultural background (Devadas, 1977).

> Nutrition education is that group of communication activities aimed at achieving a voluntary change in nutrition related behaviour to improve the nutritional status of the population. (Andrien , 1994)

> A set of learning experiences designed to facilitate voluntary adoption of eating and other nutrition-related behaviours, conducive to health and well-being (Contento et al., 1995).

Activities to inform the public about advisable food choices (based on scientific evidence) had started soon after the turn of the previous century (Sims, 1987). In the American context, W.O. Atwater, the first Director of United States Department of Agriculture's (USDA) Office of Experiment Station is credited with charting a new course for nutrition education at USDA, by using the scientific process to develop dietary guidance to improve the health and well-being of the population. In a Farmers' Bulletin published in 1902, Atwater emphasized the importance of variety, proportionality and moderation in healthful eating (Welsh, 1994). Although nutritionists have

been engaged in nutrition education for many years, few have questioned its efficacy. It was perhaps assumed that nutrition education research would result in positive outcomes. Even the very few evaluations that were conducted during the early part of the 20th century, were subjective and were more focused on finding out how well the audience liked a specific programme (Gillespie, 1981).

Nutrition education programmes – Awareness creation or behaviour change?

A review of nutrition programme evaluations for three decades between 1930s and 1960s conducted by McKenzie and Mumford (1965) concluded that only a few were objectively conducted. Whitehead's (1973) review of the studies spanning 70 years found that nutrition education has been directed more towards the purpose of disseminating nutrition information than toward the purpose of improving dietary habits. Such an approach was effective in increasing knowledge, but was not very effective in changing dietary behaviour or practices. The assumption was perhaps that people were given information; they would change their attitudes and in turn change their behaviour to be consistent with their newly acquired knowledge. Realising that effectiveness of programmes should not be assumed but measured, soon nutrition educators began to apply nutrition knowledge tests. These tests measured changes in the cognitive domain. A review of studies conducted in the 1960s and early 1970s showed that many of these tests only

evaluated nutrition knowledge, but few attempted to measure attitudes and practices (Gillespie, 1981). Later, more studies were developed to measure affective and behavioural outcomes as well as cognitive ones. This gave greater insights into the degrees of success and failure of the programmes. Many studies still focus on developing a programme and testing it with a sample audience, while effective nutrition education should result not only end in the acquisition of knowledge and skills, but also bring out desirable changes in the eating habits of the learners.

A meta-analysis conducted by Johnson and Johnson (1985) reviewed all the available research in nutrition education till the mid-1980s in order to assess effectiveness of nutrition education and to delineate new directions for future research. They reported their observations on impact of nutrition education in terms of knowledge, attitudes and behaviour, since these were the most commonly measured variables. Their meta-analysis of 303 studies found that nutrition education resulted in an overall improvement of 33% in knowledge, 14% in attitude and 19% in dietary practices. Elucidating the general characteristics of nutrition education research, they concluded that as many as 87% of studies from North America and about 60% of all the studies were conducted in schools. They also indicated that a wide variety of instructional procedures were used in the studies and many of the studies involved participants not in designing communication methods but in planning menus, preparing and tasting foods. Finally the study concluded

that as many as 80% of the studies used more than one educational method creating interactions among instructional strategies, thus, making it difficult to determine the relative effectiveness of each.

Influences on nutrition related behaviour

Exposure to new information or services, which is thought to induce knowledge acquisition, may not result in change in attitudes and/or dietary behaviour. Ignorance largely is a result of illiteracy, socio-economic factors and food belief systems that may interfere with behaviour change, even though the awareness is increased among the people (Nayak, 1999). Cultural pattern, socio-economic status, concept of health and illness are key factors in determining the dietary pattern of the community (Rau, 1968). The approach that is used most often in health and nutrition education programmes is 'top-down' with the planners designing the media material to provide information to the community, from a central point without taking into consideration the regional and socio-cultural differences that exist within the populations (Nayak, 1999). Smitasiri (1994) suggested that traditional nutrition education efforts in less developed countries are based on the assumption that people lack nutritional knowledge leading to nutritional problems, and that when people correctly learn about nutrition, they will act appropriately according to their knowledge. Lack of theoretical framework has been considered one of the weaknesses in communication programmes. Messages were usually medically oriented and mainly addressed nutritional diseases and how to avoid them. The information provided was what the planners perceived as

important for the community to know. In most of the less developed countries, inter-personal communication was expected to be the main channel for traditional nutrition education. The volunteers in the existing health set-up, trained in basic nutrition without proper media materials, are identified as key communicators. These could be stated as some of the reasons for the failure of intervention programmes to make a measurable impact (Nayak, 1999).

Nutrition Education, Communication and Promotion

A distinction is often made between the terms *nutrition education, nutrition communication, nutrition promotion* and *information, education and communication* (*IEC*) (Graeff et. al., 1994). There is a great deal of overlap in actual practice. In the last couple of decades, a dramatic change has occurred in the definition as well as in methods of nutrition education. The traditional definition of nutrition education is a process of giving the wisdom of how to acquire, prepare and consume foods that are good to eat (Gussow, 1984). While the focus of education activities is on changing individual behaviour, there has been a growing recognition that the health of individuals and their health-related behaviour are products of that individual's continuous interaction with his or her environment. This includes the family, community, culture, social structure, and physical environment (Smith, 1997).

Currently, the concept of communicating nutrition has been introduced into the field of nutrition education. Education activities can

include *information* processes, which are generally designed to inform unilaterally, whereas *communication* is a two-way process. To communicate, based on its roots from Latin, means to have a common understanding. It is believed that this concept is broader and allows for consideration of 'people' as individuals in communities and not 'students' in a classroom (Smitasiri, 1994).

One of the pre-requisites of good communication is that it should be continuous and reiterative. Communication research findings suggest that behaviour is a difficult and slow process that requires many messages and over a long period of time (Yarbourgh, 1981). Campaigns should be based on multi-media approach and should be continuous while being culture-specific. Nutrition communication should be phased over a period of time, as people move through different steps of behavioural change (un-aware, aware, concerned, knowledgeable, skilled, motivated-to-change, trial and sustained behaviour change).

One of the major factors in bringing about positive behaviour change is creating an enabling environment. Recognizing this, the Ottawa Charter for Health Promotion (WHO, 1986) developed by 38 countries identifies five interdependent domains for action in promoting the health (including the diet related health) of individuals, groups and populations. They are (i) building healthy public policy; (ii) creating supportive environment (iii) Strengthening community action (iv) developing personal skills (*education*) and (v)

reorienting health services (*to promote health as well as treating illness*). In this way, educational strategies to bring about behaviour change in individuals are given structural and environmental support. This has led to definitions of *health (nutrition) promotion*, which still have *education* as a central activity. One such definition describes health (nutrition) promotion as a combination of health (nutrition) education and related organisational, economic and environmental supports for enabling behaviour change of individuals to promote (nutritional) health (Green and Anderson, 1986).

Developing nations have a wide array of nutritional problems, and some countries have a mixture depending on their stages of development. Directing nutrition communication interventions precisely at such specific target groups is thus a real challenge. Experiments from different parts of the world have been directed at implementation of various media-based nutrition education strategies with positive results (Valyasevi and Attig, 1994). Much of the present work in nutrition education and communication is now viewed from a broader framework as a process (ie., a mechanism for interaction among participants) and as a resource (applying a co-ordinated, multi-sectoral and interdisciplinary effort) toward improving and sustaining the nutritional status of the most vulnerable groups. Several approaches to nutrition education have been developed and effectively applied over the years. These include: *social marketing, social mobilisation, and development-support communication.* These approaches have some basic commonalties: (i) the ultimate goal is to improve the quality of life of people through a

participatory process of communication, (ii) there is a demand to establish a dynamic relationship among the participants of the programme: the subjects of the nutrition education intervention, the policy makers, the planners, and the implementers, as well as the evaluators, (iii) information, education and communication (IEC) strategies are built into the process, and (iv) the core elements of the process are: formative research, assessment and analysis; capacity building; development of a multi-channel communication strategy; community organising; networking, alliance-building, and co-ordination with linkage and support systems; design, pre-testing, and development of messages and materials; and monitoring and evaluation (Stuart & Achterberg, 1995).

While nutrition communication has been relying largely on inter-personal communication, a multi-pronged approach to educate the opinion makers, policy framers and implementers is being looked at as the need of the hour. After all, positive change in behaviour needs an enabling environment.

Participation and Nutrition Communication

Many communication scholars believe that involvement of people in the communication process may enhance the likelihood of program success by stimulating two-way communication. Bordenave (1994:43) defines participatory communication, “as that type of communication in which all the interlocutors are free and have equal access to access to the means to express their viewpoints, feelings and experiences. Collective action aimed at

promoting their interests, solving their problems, and transforming their society, is the means end."

The rationale behind participatory communication is that it eliminates a one-way, prescriptive, and non-participatory approach to development. Thus, it involves people (development recipients) in two-way dialogical interactions in the design, development, implementation, and evaluation of development projects. Similarly, the involvement of people in a development communication process is very important, as they are the ultimate beneficiaries of development communication policies and planning.

Participatory actions rest on two-way communication and development. Two-way communication helps eliminate the lacunae of a top-down approach, which usually neither involve people in different phases of a development project, nor consider local conditions and constraints. Experience has shown that when a community is fully involved in the design, implementation, monitoring and evaluation of nutrition and other development projects, these are likely to be more effective and sustainable. Such participatory efforts more often meet the real needs of the people in the community and achieve results that can be continued with minimal external inputs (FAO, 1994).

In view of the growing importance of the involvement of people in a development project, it appears that some of the nutrition-related projects in

various parts of the world have already successfully applied participatory communication approach in their projects (Khadka, 2003).

Some Participatory Nutrition Communication Approaches

In their commentary, Valyasevi and Attig (1994) have listed four most common strategies being used today based on the experiences and reports given by 10 South and East Asian countries at the FAO-sponsored Inter-Country Workshop on Nutrition Education for South and East Asian Countries (held at Salaya, Thailand, in February 1993). They are, Information Dissemination, Educational Communication, Participatory Action, Participatory Communication approaches. Each of them has been explained as below:

Information dissemination: Countries using the "information dissemination" model usually (but not always) include the least developed and developing nations, which have limited communication capabilities. This approach parallels the "knowledge dissemination" model. According to this model, if people receive the knowledge they need to change, then change will automatically follow. However, "knowledge" is here extended to "information" in general, since not all of what is transmitted can be considered knowledge, at least in terms of how the receiver interprets it. Nonetheless, this approach is centred on the belief that providing people with information is enough to get them to change their behaviours. The mechanisms for providing information range from posters to radio and

television spots to non-participatory group counselling sessions where a "teacher" provides knowledge to target group members. Most of these efforts are founded on the KAB (knowledge, attitude, behaviour) or KAP (knowledge, attitude, practice) model, which postulates that such mechanisms lead to, improved knowledge, followed by changes in attitudes and behaviours or practices.

Educational communication: This approach is often characterized by one of two strategies. First, a strictly mass media approach may be used to persuade people to adopt a new product, service and/or behaviour. This method is close to the information dissemination approach, but often goes beyond information dumping to apply a social advertising strategy to encourage people to try something new. However, people are not always told how to use the product properly, and countless experiences have shown that use of mass media alone is not effective in leading to behaviour change (Achterberg, 1993).

At the other extreme, education can occur primarily through face-to-face instruction in non-formal health care clinics, such as village or district health stations. Some pamphlets, brochures or posters may be used, but the assumption is that a person can be convinced to adopt a new behaviour by using traditional teaching and educational approaches. This method was common in the 1950s and 1960s, and to some extent it did lead to behaviour change.

The educational communication approach rests largely on a top-down model of communication where information is passed down the hierarchy from official or doctor to patient.

Participatory action: Many non-governmental organizations, claim that their primary focus is on participatory action and empowering people to identify their problems, determine viable solutions and implement and evaluate interventions using their own resources. It is premised on the practical reality that nutrition-oriented development projects cannot be sustained at the grassroots level if these are planned from the top, focused on individual components and isolated from a total development process. This strategy relies heavily on a participatory action research (PAR) framework and a bottom-up development approach. The participatory strategy is very effective on a small scale and has the potential to be so, on a large scale as long as the momentum continues and people remain involved.

Participatory communication: Today, the communication component and the participatory action component are being joined into a combined top-down/bottom-up participatory communication process (Smitasiri, Attig and Dhanamitta, 1992). Efforts in Thailand provide a good example of this strategy, where borrowing from approaches such as social marketing, planners have combined the traditional creative media and interpersonal education strategies of communications with the learning-by-doing programmes of concrete participatory action.

Participatory communication has two very important characteristics. First, it focuses on people's felt needs through the use of formative research which entails the collection of data and information to identify important factors that may affect a programme's acceptance; these considerations are then incorporated into a communication programme's design. The intent is not to confront people with their inappropriate beliefs or resource constraints, but to use these beliefs to build nutrition communication programmes.

The second important aspect of participatory communication is that it focuses primarily on changing the environment in which people see themselves. People are a product of their environment, and the latter must be conducive to change before people can be asked to change. Social mobilization is based upon creating a local need and demand for change by initially focusing on how people view their environment, rather than how they view themselves. Once again, this need and demand rests on formative research into the needs of the people themselves. In this context, the term "people" does not mean vulnerable target groups only, but target audiences. The general public is not a uniform mass and should not be treated as such. Rather, it should be separated into specific groups according to their characteristics, needs, wants and predispositions. Media and interpersonal action programmes can then take these characteristics into account and become more effective behaviour-change mechanisms (Achterberg, 1993).

Trends in nutrition education and communication research in India

In the Indian context, in proposing his plan on nutrition research in India way back in the 1900s, McCarrison (the first Director of NIN) had included community nutrition education as one of the activities. Towards this end, popular books and pamphlets were prepared by him, which were continued later by his successor, Aykroyd. Although there were many such scattered efforts there was hardly any concerted strategy for education. It was in the late 1960s that there is evidence of individual nutrition scientists to develop 'appropriate' methods of nutrition education consistent with the socio-economic and cultural background of our population (Narsinga Rao, 2005). In the early 60s many studies carried out by the scientists of NIN, have emphasized on nutrition education for schoolchildren. Studies examined various aspects like nutrition component in school syllabi and teaching nutrition in schools (Chapakam & Balasubramanian, 1967a,b,c). In 1970s, studies looked into finding effective media in given settings to carry the message of nutrition to various groups of people (Devadas, 1977); nutrition counselling as tool to disseminate nutrition information (Dastur et al., 1976) etc. Berg (1970) wrote that the Indian preference was to approach nutrition education as not so much a nutrition problem but as a communication problem. Earnest efforts were made through the mass media and by commercial advertising agencies to go beyond the 'four food groups' clichés of the standard nutrition posters. There are hardly any studies evaluating this communication drive. In the 1980s, some studies looked into the use of mass

media for dissemination of nutrition messages and their relative effectiveness in doing so (Kaliperumal, 1986; Mathur and Joseph, 1986). Around the same time, studies conducted by Parvati Rau (1991, 1994) proved that folk art forms could also be used as effective media for nutrition education. In 1980s ICMR funded a string of projects on nutrition education to various groups (Narsinga Rao, 2005), most of them aimed at providing nutrition education interventions and assessing knowledge increment. However, the studies concluded that due to economic factors people were unable to put knowledge to practice. In this connection there are lessons to be learnt from the Tamil Nadu Integrated Nutrition Programme (TINP), implemented since the 1980s. TINP had integrated health and nutrition interventions with a major communication component. There were some lessons to be learnt from this project. The communication strategy segmented the audience into primary and secondary targets and strategies were carefully planned for both. Two-pronged communication was used for the primary target group and one-way communication for the secondary audience. The primary target group was mothers, mothers-in-law, and fathers. Counselling was used and was supported by flip charts and flash cards. The secondary target group was the rest of the population. The methods used were films - incorporating popular film tunes, filmstrips, and slides. Pamphlets were available for the literate and the popular folk medium "villupattu" was also used. Although no separate evaluation of the communication strategy was conducted, it was well accepted that a major contribution of the communication strategy was to

increase the community's use of services and it was emphasized that communication activities should be supported by other services/strategies which make it possible to act on the messages (Vijayaraghavan, 1997). Studies by NIN have also used social marketing techniques for imparting nutrition education (Nayak, 1999). In studies conducted over the past decade, internationally accepted school-based education modules and computer-based education tools have also been used for nutrition education (Subba Rao et al., 2006; Vijayapushpam et al., 2003 and Raghunatha Rao et al., 2007).

Nutrition Education/Communication - A Multi-Pronged Approach

Today, nutrition education and communication is viewed from a broader framework as a mechanism for interaction among participants, and as a resource, applying a co-ordinated, multi-sectoral and interdisciplinary effort (Stuart and Achterberg, 1995). Nutrition communication is now an umbrella term for a wide range of education and other approaches that aim to influence nutritional status (Smitasiri et.al., 1993). Some of the following have been experimented with:

Social Marketing: One reason why social marketing has become popular in recent years is that nutrition communication's goal is to facilitate change in nutrition-related practices and status. This usually requires increasing the demand for specific foods and practices (Smitasiri et. al., 1993). Social marketing uses business marketing principles to advance a social cause or idea (Kotler and Zaltman, 1971). It is described as a social change

management technology that involves the design, implementation and control of programmes aimed at increasing the acceptability of a social idea or practice in one or more groups of target adopters (Kotler and Roberto, 1989). The strategy adopts the four Ps of marketing, namely product, price, place, and promotion. In the 1990s, this strategy was successfully used in Thailand for promoting Vitamin A rich foods (Smitasiri et.al., 1993). Elsewhere in the world, a great deal of experience has been documented in the social marketing of breast-feeding, weaning foods, oral rehydration salts, and immunisation (McKee, 1992). In India too this strategy was successfully used to promote nutrition education in Anantapur District of Andhra Pradesh (Nayak, 1999)

Advocacy: Advocacy is a planned communication effort to persuade decision makers at policy, planning, and management levels to adopt necessary policies and allocate resources for a cause (Stuart and Achterberg, 1997). In the Indian context, international organizations like WHO and UNICEF have been using this strategy to encourage various stakeholders from different sectors of government realize the role envisaged for them in implementing the country's food and nutrition plans and policies. A workshop was organized in April 2005 in India for representatives from seven Southeast Asian countries and many such workshops are being planned (WHO, 2005). Other efforts involve depicting the effects of malnutrition as functional and economic consequences for mobilising support for policy makers. International organizations like CARE-India with the support of WHO

prepared advocacy material based on PROFILES programme developed by Academy for Education Development, USA. These material clearly elucidate the cost-benefit ratio of investments needed today to save the impending economic losses to the country due to less productive malnourished manpower (Subba Rao, et.al., 2005).

Participatory Communication: Bordenave (1994) defines participatory communication as that type of communication in which all the interlocutors are free and have equal access to access to the means to express their view points, feelings and experiences. It is believed that participatory communication may enhance the likelihood of program success by stimulating two-way communication in the program. The rationale behind participatory communication is that it involves audiences (people/communities) in dialogue, collaboration, and decision making while considering them as the ultimate and perhaps the most important beneficiary of development process. As a result, such communications process can address a whole range of social, cultural, political, economic, and environmental issues affecting people's nutrition and health (Khadka, 2003). Experience has shown that when a community is involved in the design, implementation, monitoring and evaluation of nutrition and other development projects, these are likely to be more effective and sustainable. Such participatory efforts more often meet the real needs of the people in the community and achieve results that can be continued with minimal external inputs (FAO, 1994).

Edutainment using Information and Communication Technology: While the multimedia CD-ROM market is exploding with programmes for children, there are only a few nutrition education programmes. Although the ability of multimedia programmes to capture children's attention, increase their knowledge and change behaviour is widely documented in the developed world, there are very few studies that compared the efficacy of teaching tools in experimental designs. A study carried out by Turnin et.al. (2001) concluded that using computer-based nutritional teaching method at school provides an additional and modern support to conventional teaching. In the Indian context, Vijayapushpam et. al. (2003), documented that CD-Rom based intervention brought about significant improvement in the knowledge of the school children. Contrary to this observation, a study by Ragunatha Rao et.al. (2007) proved that the CD-Rom intervention was not of any additional value over the classroom-based intervention. It has also been observed that a majority of the adolescent girls paid attention to the classroom lecture given by the science teacher using folders, slides and charts and they interacted more with the teacher. During the intervention with audio-visual CD, the attention of the adolescent girls was very low indicating the effectiveness of the traditional classroom teaching method. The authors indicated that this could be due to the reason that most of the girls viewed computers as entertainment devices than educational devices.

Food labels as modes of nutrition communication: In the west now food labels are being viewed as important modes of communication. This is one potentially powerful tool of communication not often considered when traditional channels are discussed (Goldberg, 1992). In addition to the ingredients list, the nutrition-labelling panel gives important information about nutrient content, thus enabling the consumers to make healthy choices. This becomes all the more important in the Indian context too as over 59% households buy packed foods sometime or the other (Polasa et. al., 2006). Though studies in other parts of the world reported that about 40% of the consumers do not check the food labels (Surujlal and Badrie, 2004; Yang et al., 2000), it was observed that women, especially those with higher educational levels, were more likely to check food labels than men (Yang *et.al.*, 2000). In a study conducted in the south Indian states, Subba Rao et.al., (2007) too observed that the literate women were more likely to check label information and concluded that efforts can be intensified to familiarise quality symbols on food labels, which can be identified even by the illiterates.

The way forward

As the National Nutrition Policy of the Government of India recognizes that "…nutrition affects development as much as development affects nutrition…" (FNB, 1993:2), nutritional concerns are being integrated into various developmental policies and programmes being taken up at various levels by the Government. Non-Governmental Organisations (NGOs) and international organisations like WHO, UNICEF and FAO are also putting

in considerable efforts in taking the message of nutrition to the community. In some cases all the three sectors (Government, Voluntary, and International Organisations) are working together. All these organizations are emphasizing the need to involve the beneficiaries in the process of evolving programmes and / or in implementing the same. But in many of these endeavours, there has hardly been any evidence of separate evaluation of the nutrition education / communication components. There is a dearth of published literature even of the scattered studies and smaller experiments conducted in different parts of the country by NGOs, University Departments and students. This underlines the need for systematic documentation of all nutrition education and communication programmes.

This review indicates that nutrition education is a necessary but not a sufficient condition for bringing about the desired behaviour change. Hence emphasis should be laid on creating an enabling environment for adapting and maintaining positive behaviour change. The following conclusions arrived at by an earlier review done by Stuart and Achterberg (1997) also hold good in this scenario: (i) nutrition education and communication should be thought of as an integral part of a country's development plan; (ii) changing food and nutrition behaviours to improve nutritional status at a country level is a long process comprising many steps, in many sectors, at many levels; (iii) nutrition education and communication programmes need to be comprehensive and co-ordinated for effectiveness; and (iv) nutrition education and communication problems need to be participatory in nature for

effectiveness. More studies are needed to document and evaluate advocacy as an approach to muster support from the policy makers for nutrition programmes.

Participation has become a part of development jargon. When the development bureaucracy, the local elite, and the people are working cooperatively throughout the decision-making process and when the people are empowered to control the action to be taken, only then there can be genuine participation (White, 1994). In real life situations, in different nutrition communication programmes too the extent of participation varies and accordingly the model adopted is likely to differ. In a country like India, which is in the phase of transition, more studies are needed to evaluate the efficacy of participatory communication strategies in raising the nutritional status of the people. More studies are also needed to evaluate the effectiveness of ICT and food labels as media of nutrition communication.

The above review has clearly indicated that integrated, multiple strategies seem to work, ie., a combination of different actions is widely seen as responsible for the success of a holistic communication strategy. Although, communication strategies used interpersonal and mass communication interventions, in many a successful project, several stakeholders and organizations worked in many ways towards a common objective. The need for increased sensitivity to the problems of applying strategies that have been successful in specific contexts to the others is also brought out. This means

that the communication strategies that aim to mobilize communities for the cause of nutrition need to adopt different characteristics in different circumstances and the multiplicity of approaches is based on the context and 'felt' needs.

Moving away from top-down models of communication that concentrated on effects and effectiveness of an 'intervention', the focus of different approaches now seems to be on various aspects like beneficiaries, the consideration of various stakeholders, participation, outcomes, data gathering, analysis, and a multi-channel versatility. However, the strategies or approaches decide the content while the content is largely decided by the context.

Hence there is a need to critically examine different models, approaches and content for communicating nutrition in different contexts both at micro and macro levels. While attempting to do so, it is also pertinent to critically examine the context in which key actors in nutrition communication work and their considerations for choice of a model or approach for nutrition communication. In order to do so, first, it is proposed to examine different approaches to nutrition communication, keeping the context similar ie., in the pedagogical settings of educational institutions. Secondly, at a macro level it is proposed to examine the approaches and models adopted by organisations from diverse sectors (such as Government, NGO and Research), each of them working in different contextual settings.

Chapter 4

COMMUNICATING NUTRITION

IN PEDAGOGICAL SETTINGS

4.1 COMMUNICATING NUTRITION IN CLASSROOM SETTINGS - DIFFERENT APPROACHES AND LESSONS LEARNT

Nutrition education is a key element in promoting sustainable healthy eating behaviours and should start from early stages of life (Foerester *et al*, 1997). The importance of early learning of nutrition-related knowledge, attitudes and behaviours for future health is widely recognized (Tones et.al., 1994). The prevalence of malnutrition around the world, in the form of both undernutrition and overnutrition due to dietary excesses, is partly being attributed to low awareness. In India alone, there are about 204 million undernourished people and more than 50% of children are suffering from undernutrition (Krishnaswami, 1998 and FAO, 2001). Adolescents constitute one-fifth of the total population and about 84% of this population lives in developing countries. According to WHO, children in the age group of 10 –19 years are referred to as adolescents, Adolescence is the transitional phase of life from childhood to adulthood, during which period, growth spurt with rapid increase in height and weight, psychological and sexual maturity with cognitive development are observed among adolescents (NIN, 1998).

This chapter seeks to examine the impact of different methods for communicating nutrition information on nutrition knowledge of adolescents and young adults in pedagogical settings, employing various communication methods like lecture, CD Roms and Folk dance in the classroom settings.

Adolescence is a particularly unique period in life because it is a time of intense physical, psychosocial and cognitive development and therefore the caloric and protein requirements increase. The nutritional requirements such as macronutrients such as proteins and micronutrients including vitamins and minerals are high during the puberty of adolescents to meet the demand of increased nutritional needs as the adolescents gain up to 50% of their adult weight and skeletal mass, more than 20% of their adult height during this period (Spear, 2002). Undernutrition in these early stages of life can result in growth retardation, mental impairment and low immunity to disease in later life. On the other hand, overweight and obesity – especially in childhood and adolescence – are related to the burden of associated chronic diseases in adulthood (Narayan, et.al., 2001). With almost 20% of Southeast Asia's population being constituted by adolescents (Griffiths and Bentley, 2001), there is an urgent need to focus on adolescent nutrition in India too. Community trials suggest that nutrition education is an accessible and effective tool in developing healthy nutrition-related practices (Kelder et. al., 1995). But, NNMB Report (2003) points out that only 14% of adolescent population was exposed to nutrition education.

Schools provide the most effective and efficient way to reach a large segment of the population, including young people, their families and the community in general (Perez-Rodrigo and Javier, 2001). The beneficiaries can act as change agents by spreading the messages to a large segment of population (Lionis et. al., 1991; Green and Iverson, 1982). Given this

background, various studies were conducted among school/college-going children, and adolescents using different approaches to communicate nutrition information. The present chapter is based on three different studies:

STUDY -1

Nutrition Education for school-going adolescents using FAO's learning material - "Feeding Minds, Fighting Hunger Programme (FMFH)

About FMFH

Food and Agriculture Organization of the United Nations (FAO) along with a group of international and non-governmental organizations has launched a global education initiative called 'Feeding Minds, Fighting Hunger' (FMFH) with the aim of educating and motivating schoolchildren to get actively involved in creating a world free from hunger and malnutrition. Three different lesson plans of FMFH are suggested for Primary, Intermediate and Secondary school levels. Each lesson contains background information for the teacher, objectives, concepts and contents to be covered in the classroom during implementation. Three common lesson plans for all school levels deal with three different topics: (1) What are hunger and malnutrition and who are hungry? (2) Why are people hungry and malnourished? (3) What can we do to help end hunger? Apart from these guidelines, a variety of classroom activities including teaching aids and discussion points are also provided.

We carried out a study in Hyderabad to assess the efficacy of FMFH lesson plans in improving the knowledge levels of school children. For the purpose of the study, only the intermediate level lesson plan was used to educate the school students.

Objectives

1. To assess the current knowledge levels of middle-level schoolchildren and their science teachers on topics related to FMFH lessons
2. To orient teachers on the concepts of FMFH and to educate middle-level schoolchildren through them; and
3. To evaluate the impact of school-based teaching of FMFH lessons on the improvement of nutrition-related knowledge levels of school children.

Materials and methods

The study was conducted in schools of the old city of Hyderabad in association with a non-governmental organisation, the Confederation of Voluntary Associations (COVA). The prime focus of COVA is on citizenship rights and on perspective building for harmony and peace between the diverse communities in the country. Through direct programmes and by networking with other NGOs, COVA organises perspective building activities, carries out campaigns, and conducts research for influencing diverse sections of civil society and the state apparatus to adopt inclusive and secular outlook. It also seeks to promote policies that would foster rights and

secure justice and peace for all. In the old city of Hyderabad, COVA not only works with women, slum communities, professional and educated sections but also with children, students and youth. For carrying out various capacity building programmes and awareness, COVA directly works with a number of schools in Hyderabad, especially in the old city (COVA, 2009). Out of 83 such member schools of COVA, 49 schools whose medium of instruction was English were considered for the study. Informed consent was obtained from the heads of the participating schools and pupils.

Sample size: In the pilot study, a pre-tested knowledge assessment questionnaire (KAQ) consisting of 20 multiple-choice (closed-ended) questions was administered to 75 schoolchildren selected randomly from five schools. The 20 questions were related to hunger, food insecurity, nutrition, nutrition deficiency disorders and FAO; two additional questions related to their preferences in methods of learning were also included (Appendix -1).

For the main study, the cluster randomisation procedure was used to determine the number of schools. The sample size was calculated from an expected improvement of 4 points (on a scale of 20) in mean scores after the intervention, with 95% level of significance and 80% power. From the total number of schools available, 10 schools were selected randomly and each school was again randomly allocated to either the control or the experimental group. Thus, five schools were treated as control group and the remaining

five as experimental group. All children from grades VIII and IX, and the biological science teachers of these classes, were included in the study.

Statistical analyses: Data from the KAQ were analysed using the SPSS package version 11.5 (SPSS Inc., Chicago, IL, USA). Effect size was also assessed to determine the extent of the intervention's effect in improving knowledge levels among children and teachers in schools in the experimental group over those in the control group.

Nutrition Education

Teacher training workshops: A teacher-training workshop was organised in March 2003 for the biological science teachers of grades VIII and IX of the experimental schools. The teachers were trained in the concepts of FMFH and different strategies of communication, in order to modify the FMFH lesson plans to suit the local needs of their schoolchildren. A follow-up workshop was conducted in July 2003 to reinforce the knowledge acquired in the previous workshop before the teachers implemented the FMFH lesson plans in their respective schools.

Development of communication materials: The following communication materials were developed based on the preferences indicated by the students in the pilot study, in consultation with the teachers:

Posters: One poster on functions of foods and three posters on micronutrient deficiency disorders – anaemia, vitamin A and iodine deficiency disorders – were identified from existing posters of the NIN and modified. In addition, posters relating a Hunger Map of Asia, a Hunger Map of the World, vulnerable groups, food systems and what can children do to help end hunger and malnutrition were adapted from the FMFH lesson plans. These topics were identified with the help of teachers during the first teacher training workshop. Each school was given a complete set of 10 posters.

Some posters developed based on FMFH lesson plans

Skit: A skit covering all the concepts mentioned in FMFH lesson plans was developed involving the children's theatre group of COVA to reinforce classroom education. For the purpose of development of the Skit, the FMFH booklet was initially given to the script writer and the director, who interacted with the scientists of the National institute of Nutrition for certain clarifications. In order to ensure that the script was in concurrence with the lesson plans, the script was finalized in consultation with the investigators. Considering the limitations of space, infrastructure like well-equipped

auditoria in many of the study schools, child artistes of the theatre group were trained to perform in the 'street play' format. Once the skit was ready, it was performed before a panel of nutrition scientists who ensured that the scientific information is not jeopardized. Then the play was performed in each of the schools in the experimental group. Each performance was followed by a discussion with the respective school teacher.

Skit performance in progress in a study school

Implementation of FMFH lesson plans

In the experimental schools, teachers implemented FMFH lesson plans using the communication materials along with various classroom activities.

Post-intervention knowledge assessment

The post-intervention knowledge assessment was carried out by administering the same KAQ that was used at baseline to 254 students in the control group and 216 students in the experimental schools. The children were instructed not to discuss among themselves while answering the questionnaire. One school opted out of the study and some children were not

present at the time of administration of the post-intervention questionnaire. As there was no significant difference in mean scores between experimental schools at baseline, the dropout did not affect the overall outcome.

Furthermore, retention of the concepts of FMFH lesson plans was also studied by administering the same questionnaire after a gap of 2 months for the experimental group. For the purpose of analysis, each right answer was assigned a score of one and the wrong answer was scored zero.

Results

Pilot study: The mean score (± standard error) of 75 children of all five schools was 8.36 ± 0.36. About 80% of the schoolchildren preferred to learn through classroom lectures, followed by teaching aids (such as charts and posters) and role-play.

Main study: Mean score (±SE) on the concepts of FMFH lesson plans of biological science teachers was 14.20 ± 0.66 in the control schools and 13.00 ± 1.29 in the experimental schools at baseline. However, an increase in knowledge levels among the biological science teachers of the experimental schools (17.50 ±0.64) was observed after the intervention.

Baseline scores of schoolchildren in the control and experimental schools showed that there was no significant difference ($t = 1.43$; $P = 0.2$) between the groups, indicating homogeneity in the groups. Post-intervention

results indicated a significant improvement (t =12.72; P = 0.000) in the knowledge levels of the experimental group (Fig. 1). Significant improvement (t = 7.95; P = 0.000) was also observed in the knowledge levels of the control group (Fig. 1).

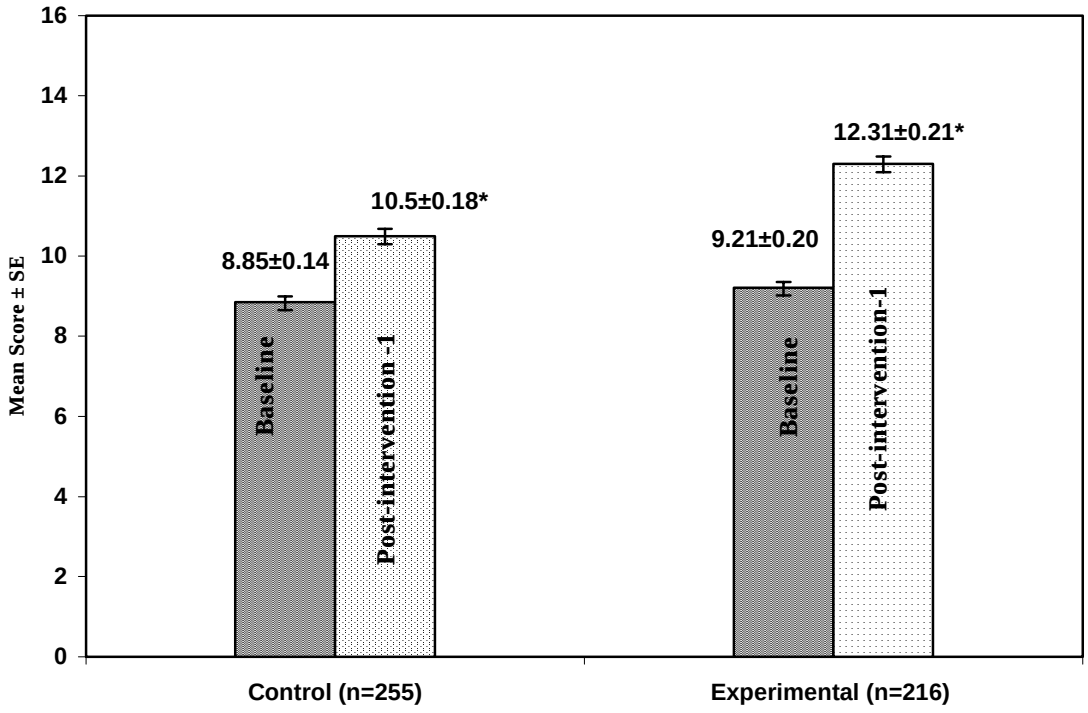

Figure 1. Comparison of mean scores of control and experimental groups at baseline and after intervention

However, comparisons between the mean improvement in knowledge levels of the control (1.65 $\pm$ 0.21) and experimental groups (3.09 $\pm$ 0.19) revealed a significant increment (t = 4.54; P = 0.000) in the experimental group versus the control group, indicating the efficacy of the intervention (Fig. 2). Regarding the retention of knowledge gained during the intervention, comparison of post-intervention-1 and post-intervention-2 mean scores of schoolchildren in the experimental group showed no significant difference (t = 1.7; P = 0.09) (Fig.1), indicating that there was retention of knowledge.

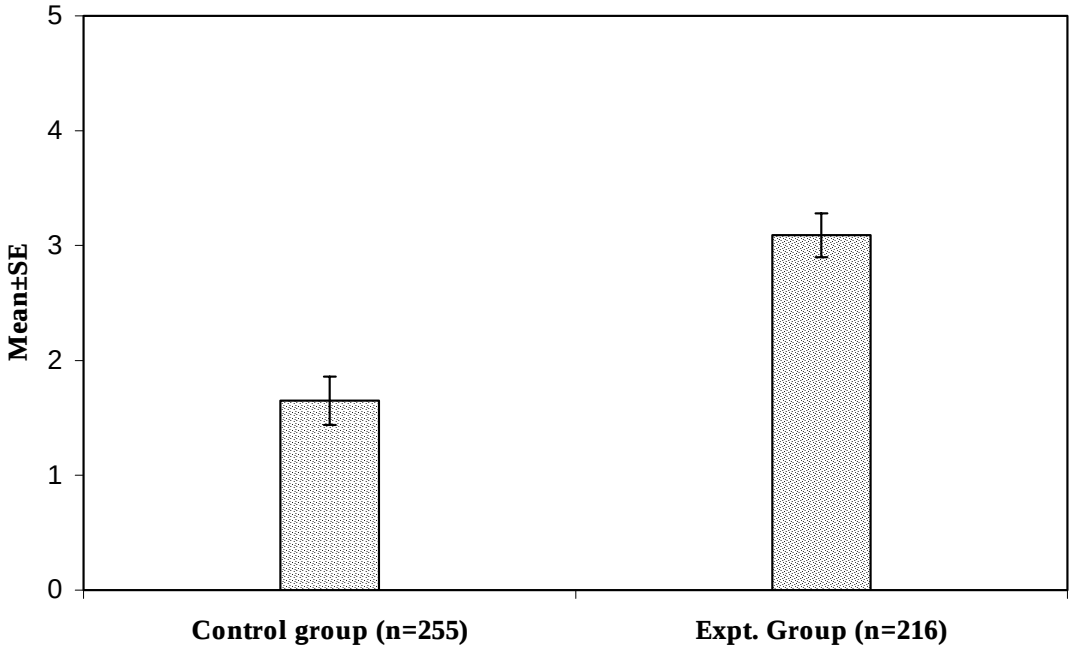

Figure 2. Improvement in the mean scores of the school children after intervention

Effect size: The effect size is the average percentile standing of the average treated (or experimental) group relative to the average untreated (or control) group. In the present study, the effect size of the difference in improvement in nutrition knowledge after the intervention between experimental and control groups was d = 0.40, indicating that the mean of the treated group is at the 66th percentile of the untreated group. Effect size can also be interpreted in terms of the percentage of non-overlap of the treated group's scores with those of the untreated group. In the present study, the effect size of 0.40 indicated a non-overlap of 27.4% in the two distributions, establishing that the intervention's effect was of medium magnitude as per Cohen's standard.

STUDY – 2

Effect of two different educational tools on Nutrition knowledge of school-going adolescent girls.

Why adolescent girls?

In India, the nutritional needs of adolescent girls in particular are often neglected (Basu et.al., 1986). Increased physical activity combined with poor eating habits, menstruation and adolescent pregnancy contribute to poor nutritional status of the population. According to the National Nutrition Monitoring Bureau (NNMB) Report 2003, the prevalence of anaemia is 69% among adolescent girls. Micronutrient deficiency disorders in the adolescent phase result in growth retardation, low immunity to disease, and impaired reproductive functions that contribute to some pregnancy-related deaths or result in delivering low birth weight (LBW) babies, thus perpetuating the transgenerational cycle of malnutrition (Bhaskaram, 2001).

Objectives

To assess the nutrition knowledge of the adolescent girls from different schools of Hyderabad and to study the efficacy of two different nutrition education tools (traditional (lecture-based) and CD Rom-based) in improving the nutrition knowledge levels among the adolescent girls in the classroom setting.

Materials and Methods

Selection of schools: The list of schools was obtained from the District Educational Officer, Hyderabad. There were 48 Government-aided Higher Secondary Schools in the new city of Hyderabad. Among these schools, 20 schools were contacted at random and the principals of these schools were explained about the objectives of the study. Out of these schools, the principals of four schools agreed to participate in the study. Informed consent was obtained from both principals and students of the participating schools.

Study design and subjects: Purposive sampling method was adopted to select adolescent girls studying 8^{th} class for the study. A total number of 164 adolescent girls were recruited for the study.

Baseline data: A structured interview schedule was administered to find out the socio-demographic details of the study subjects. A pre-tested knowledge assessment questionnaire (KAQ) consisting of multiple-choice questions on various aspects of health and nutrition was administered to children (Appendix -2). All answers were coded for data analysis.

Nutrition education: After obtaining the baseline data, two schools were considered as control group while the other two were experimental group. The experimental group was given two nutrition education interventions while no intervention was given to the control group. In intervention-1, the experimental group was given nutrition education by the science teachers in

the classroom setting in the traditional method using slides, charts and folders, which were developed based on the knowledge levels at baseline and also science curriculum up to 8th grade. The post intervention data were obtained at two different points of time – one immediately after the intervention and the second with a gap of three months from the experimental group to assess the knowledge improvement and retention after classroom intervention. For intervention-2, a Compact Disc (CD) with animated messages on Nutrition and Health was developed and pre-tested by the investigators. The impact of this new technology tool in improving knowledge over and above the first intervention was assessed separately by re-administering the same questionnaire.

Data Analysis: Data collected from these girls (n=164) using KAQ were analyzed separately using SPSS Package (version 11.5). ANOVA test was performed (at 5% significance level) to determine differences in the nutrition knowledge levels between the control and experimental groups at baseline as well as after intervention-1 and intervention-2. In order to determine the significance of difference in the increments of knowledge between the interventions, paired t-test was performed.

Results

Socio-demographic characteristics: The average monthly family income of 50% of the subjects was less than Rs.6000/-, while it ranged from Rs.6,000/- Rs.17,000/- for the rest. The education of fathers of 59% of the subjects was

below 10th class. However, about three-fourth of the mothers had education up to 10th class.

Impact of nutrition education: At the baseline, the average nutritional knowledge levels were not significantly different between the control and experimental groups ($p>0.05$) indicating the homogeneity of the groups with regard to the awareness on nutrition and health ($p>0.05$). Post intervention data analysis by ANOVA test indicated that there was a significant improvement ($p<0.001$) in the knowledge levels of the experimental group after intervention-1 using folders, charts and slide show. An improvement in the mean scores from 46.7% to 58.8% in KAQ test was observed in the experimental group with an increment of 12.27% as against the increase from 46.8% to 49.7% in control group with an increment of 2.9%, which was not significant ($p>0.05$). After a gap of three months, the same KAQ was re-administered to the experimental group and no significant ($p>0.05$) difference was observed in the mean scores showing that there was retention of the knowledge gained through intervention-1. Then, intervention-2 was given with CD-Rom. After the intervention-2, the increase in the nutrition knowledge was observed from 46.7 to 56.9% in the experimental schools with an increment of 10.5%. Similar increase in the nutrition knowledge from 46.6 to 53.1% in the control schools with an increment of 6.4% was observed. However, the intervention-2 (using CD Rom) did not show any significant

improvement in the nutrition knowledge in the experimental group over and above the knowledge gained and retained after intervention-1.

Table 1. Impact of nutrition education on adolescent girls in Hyderabad

Group	No.of adoles-cent girls	Mean ± SD				
		Before (Base line)	Intervention-1		Intervention-2	
			% of marks	Incre ment-1	% of marks	Incre ment-2
Experimental	87	46.73± 15.14	58.86± 16.13	12.27± 12.7	56.92± 14.37^{NS}	10.5± 12.1
Control	77	46.69± 12.4	49.75± 12.3	2.9± 8.5	53.19± 14.36	6.4± 11.5
F value		13.88 *		25.58**	2.26 ^{NS}	4.14*
** P<0.001			* P<0.05		NS – Not Significant	
Note: Paired t-test indicated that no significant (p>0.05) difference was observed in the knowledge increments between intervention-1 and intervention-2 improvement of knowledge levels						

STUDY-3

Nutrition education for student community volunteers – A comparative study of two different communication methods

Studies show that educational institutes provide the most effective and efficient ways to reach a large segment of the population, including young people, their families and the community in general (Perez-Rodrigo, 2001). The beneficiaries can act as change agents by spreading the messages to a large segment of population (Lionis et.al., 1991). If such change agents are community service volunteers, the benefits are likely to be more. The National Service Scheme (NSS), a student youth service programme that has been in operation in colleges of India for over three decades, aims at creating social consciousness among the youth with an overall objective of personality

development (holistic development through experiential exposure) of the students through community service (Green and Iverson, 1982). Their community service programmes usually include adapting a particular village or a slum and conducting community awareness programmes on various issues including health and nutrition, mobilizing opinion leaders through stakeholder meetings and rendering voluntary service for improving hygiene and sanitation of the locality in which they work. The student volunteers who opt for this scheme, if given nutrition knowledge using reproducible communication method, may help to spread nutrition awareness to the community.

As Rau (1994) states, folk dance forms are a measure of communication, which is 'made-to-order' for a community, using local dialects and cultural concepts to convey messages. However, their potential has not been exploited fully for conveying health and nutrition messages.

A number of studies have been carried out among school children but there are hardly any studies among college-age young adults and little is known of the most effective communication strategy to provide nutrition education to them. Given this background, the present study was with the following objectives:

a) to assess the current nutrition knowledge levels of undergraduate students (who are volunteers under the National Service Scheme)

b) to provide nutrition education using two different communication methods - the first, using traditional techniques (lectures in the classroom setting aided by print material) and the second using a televised version of a local folk art form, and

c) to study the comparative effectiveness of these methods in improving the knowledge levels.

Materials and Methods

Study Design: Repeated measures of knowledge scores were carried out at two points in time (pre- and post-intervention) for the students participating in two mega camps (where NSS volunteers from various colleges of the University area congregate for a week long skill building programme).

Sample and Study Setting: The study was conducted among the undergraduate students of Osmania University (N=207). The students were community volunteers under the National Service Scheme (NSS). Adopting the purposive sampling method, this study was conducted during two mega camps involving youth volunteers belonging to different affiliated colleges of the University from various districts. In Camp-1, 70 students participated, while in Camp-2 there were 137 students. The study was conducted after seeking the permission of the NSS Programme Officer of the University and obtaining informed oral consent of the students.

Nutrition Knowledge Assessment: Baseline information on socio-economic status and nutrition and health-related knowledge levels was collected using a pre-tested knowledge assessment questionnaire (KAQ) consisting of 31 closed-ended questions on energy , fats, protein, obesity, vitamins & minerals, micronutrients, nutrition during adolescence, nutrition during pregnancy and communicable and non-communicable diseases (Appendix-3). Every correct answer was assigned a score of two and the wrong answer was given a zero. Scores obtained for individual questions were added to get the total score of each student.

Development of Communication Material for Nutrition Education: The communication materials were developed after discussions with the NSS Programme Officers, Nutrition Researchers and Social Scientists who were present at a Workshop Organised at the National Institute of Nutrition (NIN), Hyderabad. These materials were pre-tested in a pilot study.

The nutrition education material for Camp-1 comprised of charts, colour folders, slides and transparencies. Charts contained basic nutrition and health related information. Seven multi-colour folders (Figure-3) were developed in Telugu (the local language) on different themes like energy, proteins, fats, micronutrients (iron, iodine and vitamin A), obesity, nutrition during adolescence, nutrition during pregnancy and communicable diseases.

Another communication tool, a televised version of *Golla Suddulu* [*], a local folk song and dance form in Telugu was developed for Camp-2 (Figure-4). The subject matter was given to a professional folk dance troupe that developed the programme. Before finalization, the programme was presented in front of an expert group at the National Institute of Nutrition (NIN) in order to ensure that the scientific facts were not jeopardized. The film lasted approximately 42 minutes with five major segments viz., carbohydrates and proteins (7min. 4sec.), fats and oils (7min. 45sec.), micro-nutrients (11min. 57sec.), nutritional requirements during adolescence and obesity, non-communicable and communicable diseases (7min. 55 sec.) and nutrition for pregnant women (5min. 45 sec.).

Figure 3. Folders developed to educate NSS volunteers

[*] *It is a popular form of entertainment, by a group of dancers dressed as shepherds teaching morals through songs (in local dialect) and dance with the aid of percussion instruments.*

Figure 4. Video film with folk dance and songs on nutrition

As Mukherji et al. (1997) observed, there are some difficulties involved in the use of folk media as they require careful planning and preparation with appropriate scripts that balance standardized messages and local needs. They also call for input and training to standardize performance quality every time. In order to overcome this problem, a standardized performance was televised and the film was used for intervention. Since the students were already employing folk dance form for community education on personal hygiene and sanitation, the present film could be used as a guide by them to reproduce all or any of the segments for community education on nutrition.

Intervention: Communication materials such as charts, colour folders, slides and transparencies coupled with lectures by nutrition scientists were used for nutrition education intervention for Camp-1 (n=70) at the first mega camp.

The sessions were interactive and allowed for ample discussion with the expert. While the televised version of folk dance form was used as educational intervention tool for Camp-2 (n=137) at the second mega camp. In this intervention too discussion followed after each segment was screened.

Post-intervention Knowledge Assessment: The same questionnaire that was used to obtain the baseline data was administered to assess the knowledge improvement of the students after the interventions in both the Camps.

Results

The age of the respondents ranged between 19 and 21 years. About 67% of them were pursuing science courses. Nearly half of the students were pursuing second year of their under graduate course while very few were in the final year (Table-2). The Chi-square test showed that there was no significant ($p>0.05$) difference between the nutrition knowledge of the students pursuing Sciences and Arts subjects. Baseline knowledge scores of Camp-1 and Camp-2 were not students significantly ($t = -0.745$, $p > 0.05$) different showing that the Camps were homogenous in terms of their nutrition knowledge.

Table 2. Background characteristics of the respondents (n=207)

Variables	Camp–1 (%) (n=70)	Camp-2(%) (n=137)	Total %
Subject			
Arts & Humanities	21.5	40.1	**33.3**
Science	78.6	59.9	**66.7**
Year of Undergraduate Course			
1st year	-	12.4	**8.7**
2nd year	40	55.5	**49.8**
3rd year	60	32.1	**41.5**
Gender			
Male	45.7	75.2	**65.2**
Female	54.3	24.8	**34.8**

Post-intervention data showed that the there was a significant ($t= 0.745$, $p< 0.05$) improvement in the knowledge levels of the students in Camp–1 where classroom lectures with aids like posters, charts and folders were used as the nutrition education method. Significant ($t=0.219$, $p<0.05$) knowledge improvement was also observed among the students of Camp-2, where the televised version of folk art from was used as the educational tool. Comparison between the mean improvement in knowledge levels of Camp-1 and Camp-2 revealed that there was no significant ($p>0.05$) difference in the knowledge gained by the students by two different communication methods, indicating that both the methods were equally effective (Fig.5). However, analysis of only those subjects who showed positive increments after interventions showed that Camp-2 had a significant nutrition knowledge increment ($t= 2.578$, $p<0.05$) compared with Camp-1 (Table-3), indicating that the educational intervention using the televised version of folk art form was better in bringing about positive increment.

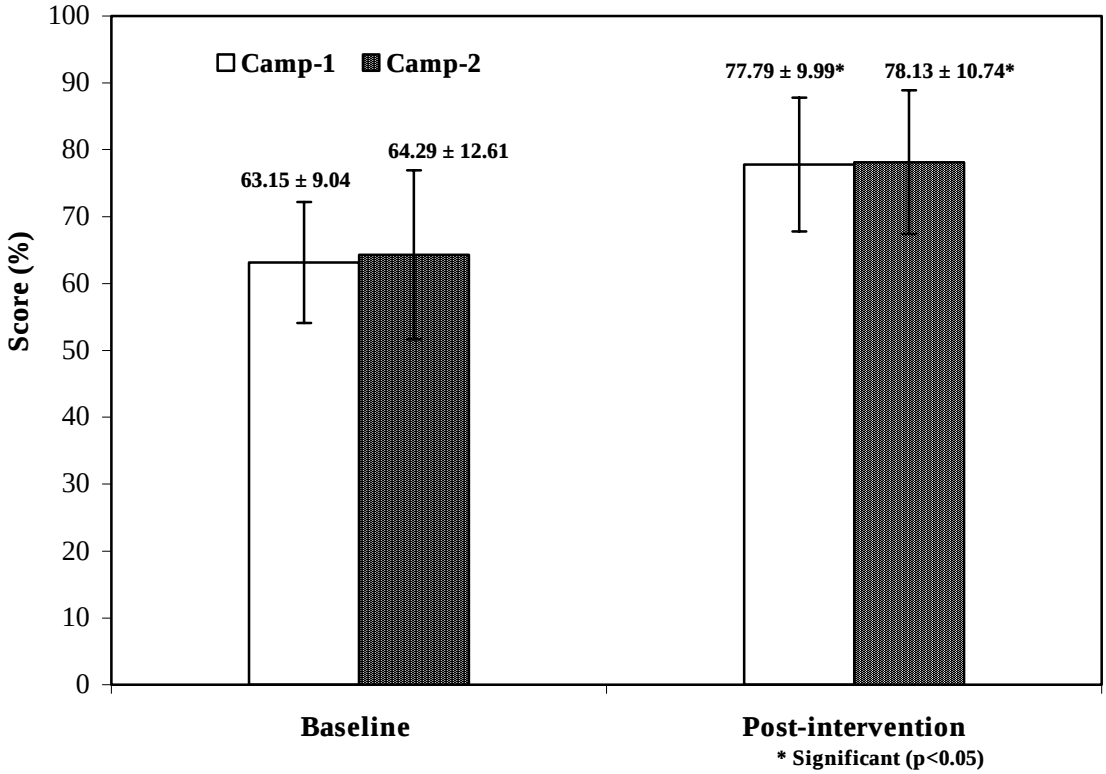

Figure 5. Nutrition knowledge with different communication tools

Table 3. Comparison of positive increments in nutrition knowledge after intervention

Group	Mean ± SD	t- value	p-value
Camp –1 (Lecture + Print Material) (n=63)	15.21 ± 8.48	2.578	$p < 0.05$*
Camp–2 (Video film with folk dance) (n=114)	18.76 ± 9.29		

* Significant

Some inferences from the studies and lessons learnt

1. These studies prove that providing nutrition education to the adolescents in the classroom setting in the schools is an effective and efficacious way of imparting nutrition knowledge. Effective nutrition education should result not only in the acquisition of knowledge and skills, but also induce

desirable changes in the eating habits of the learners (Smith, 1997). However, all these studies stop only at information dissemination and measuring knowledge improvement, which may need not necessarily lead to change in dietary practices.

2. In Studies 1 & 2, it was observed that there was a significant knowledge increment in the control groups also even without providing nutrition education. The knowledge gained by the experimental groups, however, was significantly higher. This significant post-intervention improvement in knowledge levels of the students in control groups could be attributed to other factors such as the nutrition lessons in their curriculum, exposure to various media and the influence of parents, teachers and peer groups (Clancy–Hepburn et al., 1974). Or it could be a form of reactivity whereby the students' knowledge has improved simply in response to the fact that they are being studied and not in response to any particular experimental 'intervention' sometimes referred to as the 'Hawthorne Effect' (McCarney et. al., 2007).

3. All the three studies rely heavily on interpersonal communication and suggest that person-to-person communication is an effective means of providing nutrition education. But they do demonstrate the effectiveness of multi-media approach to complement inter-personal communication. Even though the benefits of using computer-based nutrition education tools in schools is widely documented, only a few studies have compared

the efficacy of teaching tools in experimental designs. A study carried out by Turnin et.al. (2001) concluded that using computer-based nutritional teaching method at school provides additional support to conventional teaching. Contrary to this observation, Study-2 proved that the CD-Rom intervention did not result in any further improvement in nutrition over the traditional classroom teaching. It has also been observed that during intervention-1, a majority of the adolescent girls paid attention to the classroom lecture given by the science teacher using folders, slides and charts and interacted with the teacher, whereas, while using audio visual CD, the attention of the adolescent girls was very low indicating the effectiveness of the conventional method. This could be due to the reason that most of the girls viewed computers as entertainment devices than educational devices. While, in Study-3, the significant 'positive' increment observed with folk-dance based intervention as compared to the traditional teaching, indicates that the visual impact coupled with folk music helped in retaining attention of the volunteers. Raghavan (1979) and Ranganath (1982) suggested that folk media are culturally contextual, particularly in rural areas. Their flexible format can be adapted easily to program needs and local situations (Mukherji et.al., 2005). In the present study too it was observed that the volunteers were already using similar folk-dance based programmes to educate the community on issues like sanitation and personal hygiene and they found the present folk dance based nutrition education method replicable. Hussain et. al., (1997) who

have also studied relative efficacy of folk media in promoting Vitamin A rich foods in Bangladesh concluded that interpersonal communication approaches are still effective in disseminating messages in the developing world, while entertainment education using folk media could deliver messages to a wider audience. In the present study too inter-personal communication appears to have played an important role because even though both the interventions were followed by discussion with the investigators, the folk dance based intervention generated more discussion. This indicates that folk media can be used to complement interpersonal communication as they have the potential to generate interest in nutrition related topics thus enlarging the scope and effect of the interpersonal communication for nutrition education.

4. The participation of teachers in nutrition communication to adolescents is reiterated. But it is often very difficult to get teachers to cover these 'extra' topics outside the curriculum. In all the studies getting the commitment from managements of the educational institutes was not so easy. The reluctance of the educational institutions to take up activities outside the regular curriculum was indeed a problem that was encountered in all the three studies. For instance, in Study-1 one school in the experimental group dropped out mid-way, whereas, in Study-2, of the 20 schools contacted, only five agreed for the study. This emphasizes the need to make nutrition education part of the school curriculum.

4.2 CONTENT ANALYSIS OF NUTRITION COMPONENT IN SCHOOL SCIENCE TEXTBOOKS

Although, in our studies, we observed that school children prefer to learn in the classroom setting through the teacher, choosing to teach nutrition education is not a clear-cut choice for teachers or schools, as nutrition has to compete with other subjects (Lytle, 1994). As already pointed out, providing nutrition education as an external knowledge intervention may not always meet with success because it is difficult to get teachers to cover these 'extra' tasks outside the regular curriculum (Subba Rao et.al., 2007). Nutrition education needs to be complemented with proper food safety education (Subba Rao and Sudershan, 2007) because it includes procurement of safe foods in sufficient amounts to cover the nutritional requirements of individuals (Aranceta, 2003). Education about these aspects at a young age to school children enhances their knowledge and skills required to understand contemporary food and nutrition issues (FAO, 2001). Nutrition education curriculum programmes are unlikely to work well if they are not part of the 'core' school curriculum (Stuart and Achterberg, 1995). As Lytle (1994), suggests integrating nutrition education into curricular areas helps to resolve the problem of not having time to teach nutrition. Development of innovative nutrition education component that can be effectively blended along with other health related issues usually included in the science curricula is a continuous and demanding process. Before developing such content, the first step would be to evaluate the nutrition component in the existing school

science textbooks. Content analysis of curricula and textbooks can thus be the basis for improving school-based nutrition education (Kondracki et.al., 2002). In the Indian context, there are three different streams of school education – (1) Through the schools affiliated to Central Board of Secondary Education (CBSE) (2) Through the schools affiliated to the Council for the Indian School Certificate Examination that gives Indian Certificate of Secondary Education (ICSE) certification on completion of Class X; and (3) Through the schools that follow the education patterns guided by the respective State School Education Boards.

As on today, there are 9689 schools across the country that are affiliated to CBSE (CBSE, 2008). For the CBSE schools, the syllabus is prescribed by the Board and the schools usually follow the textbooks published by the National Council for Educational Research and Training (NCERT) or by private publishers. There are several thousands of schools affiliated to the respective State Education Boards. These schools follow the syllabi prescribed by the respective Boards. In case of Andhra Pradesh, the textbooks are published by the AP State Council for Education Research and Training (APSCERT).

Content Analysis of curricula and textbooks can be the basis for improving nutrition education (Kondracki et.al., 2002; FASEB, 1995). Krippendorf (1980:21) defines Content Analysis as “a systematic, replicable technique for compressing many words of text into fewer content categories

based on explicit rules of coding". He also suggests that it is a technique for making replicable and valid inferences from the text/data to their context (Krippendroff, 1986). It is a technique that is used to develop objective inferences about a subject of interest in any type of communication (Berg, 1998). Neuendorf (2002:10) offers a six-part definition of content analysis, "Content analysis is an in-depth analysis using quantitative or qualitative techniques of messages using a scientific method (including attention to objectivity-inter subjectivity, a priori design, reliability, validity, generalizability, replicability, and hypothesis testing) and is not limited as to the types of variables that may be measured or the context in which the messages are created or presented."

For the present study, the CBSE and AP State Board textbooks were selected with the following objectives:

Objectives

1. To analyse the biological science content in relation to the over all general science component of the textbooks of all classes from primary to high school (I - X classes).
2. To do quantitative content analysis for finding out the proportion of space allocated for the nutrition component in relation to the other topics in the biology textbooks.

3. To conduct qualitative analysis of the nutrition component for finding out the topics dealt with, importance assigned to them, continuity of the topics from one class to the other.

Materials and Methods

Sample: All science text books from Classes I-X of two streams - NCERT and AP State Board were selected for the study. ICSE textbooks were not considered for the study as they are not printed by the Council (which only prescribes the syllabus) and the schools rely on books from private publishers, but the books used by each school differ greatly from the others.

As regards the NCERT and AP State Board textbooks, most schools in Hyderabad use books published by private publishers for classes I-V, for class above VI, the schools use either NCERT or APSCERT books based on their school affiliations. For primary classes (I to V), books published by Navneet publishers were selected for CBSE syllabus and textbooks by Holy Faith Publishers were selected for AP State Board as they are commonly used.

Methodology and Analyses: The process of content analysis consists of coding raw messages according to a classification scheme that allows for easy identification, indexing and retrieval of content relevant to research questions (Berg, 1998). For the purpose of the study all the content related to physics, chemistry and environment (excluding sanitation, cleanliness and safety of water) were categorized under 'Physical and Environmental Sciences' and

content related to life sciences were categorized as 'Biology'. Under biology, the terms 'nutrition', 'food safety', 'health' and 'others' were operationally defined before carrying out the study. The operational definitions in terms of inclusion and exclusion criteria have been listed in Table-4.

Quantitative Content Analysis: In the present study quantitative and qualitative content analysis methods were used. Physical measurement of space (in terms of pages) allocated, number of illustrations and exercise questions were measured as part of the quantitative analysis (Shepherd and Achterberg, 1992).

Degree and emphasis for quantitative analysis:

Chapters: While counting the total number of chapters, only those lessons which were completely dedicated to the subjects of interest (nutrition, food safety or health) were considered. Those chapters with one or two units or sub-units dedicated to the topics were not considered.

Space allocated (no.of pages): While counting the number of pages allocated for each subject, irrespective of the theme of the chapter, if the topic dealt with fell into the categories of interest (as per the operational definitions / inclusion and exclusion criteria) and was covered in more than a quarter page, then it was counted under the respective subject area.

Illustrations: All illustrations in the science textbooks were categorized into physical and environmental science according to the chapters in which they were placed. Of the illustrations in the biology segment, those occurring in the lessons categorized as Nutrition, food safety and health and hygiene were counted under the respective themes. Of these, all those pictures which showed fruits, vegetables, grains, pulses, eatables or activity of eating were considered under nutrition whereas the visuals related to hand washing, cleanliness, hygiene, street foods, food vending, food in covered containers etc were considered under food safety.

Qualitative analysis of topics was carried out to understand the latent meanings of the content by analyzing quality of narration, illustrations and other general elements like font, print, etc. The latent meanings were first interpreted by the investigator and were later independently reviewed by a sociologist and an expert committee comprising of nutritionists and communication professionals. Only those interpretations that were commonly agreed by all have been included in the results.

Table 4. Operational Definitions of terms

Theme	Inclusion	Exclusion
Nutrition	All topics that pertain to food, food intake, its functions, nutrients, their role in human health Nutrient deficiencies and diseases or disorders arising there of Food consumption, Unhealthy foods, over nutrition / obesity and lifestyle diseases	Food borne diseases. All human, plant and animal processes like respiration, digestion, reproduction, excretion etc fall under this category. Topics related to food / water handling, storage, preservation and cooking. Food borne illnesses. Food additives and impact on health Disease prevention and cure
Food Safety	Topics related to food / water handling, storage, preservation and cooking. Food borne illnesses. Food additives and impact on health	Nutrition, nutrition deficiency disorders and related topics mentioned above Disease prevention and cure
Health	Wellbeing of individual. Disease prevention and cure.	Nutrition, nutrition deficiency disorders and NCDs due to overweight and obesity food borne diseases Food Safety (as mentioned above)
Others	All human, plant and animal processes like respiration, digestion, reproduction, excretion etc fall under this category	Health, Nutrition and food safety

Results

Quantitative content analysis showed that the biology component occupied relatively less space in relation to physical and environmental science in the NCERT textbooks in the higher classes, while at least one chapter in them was dedicated to nutrition from I to VII classes, there is no special chapter on nutrition in the high school science textbooks (from VIII to X classes) (Table-5). Similarly, the number of chapters allocated for biology is relatively less when compared to physical and environmental science in classes VI to X even in the AP State Board textbooks. Special chapters on nutrition appear only in classes IV and V. Although nutrition topics are dealt with in the IX and X classes they appear as sub-units in other chapters related to health (Table-6). As regards food safety, there are hardly any dedicated chapters for the subject in the science textbooks of both NCERT and AP Board.

Table 5. Distribution of number of chapters in NCERT Textbooks

Class	Total	Physical & Environmental Science	Biology	Nutrition	Health & Hygiene	Food Safety
I	18	7	11	1	3	0
II	19	9	10	1	1	0
III	18	5	13	1	4	0
IV	14	7	7	1	1	0
V	17	7	10	1	2	0
VI	16	11	5	2	0	0
VII	15	9	6	1	1	0
VIII	14	11	3	0	1	0
IX	15	11	4	0	1	0
X	17	12	5	0	0	0

Table 6. Distribution of number of chapters in AP State Board Textbooks

Class	Total	Physical & Environmental Science	Biology	Nutrition	Health & Hygiene	Food Safety
I	7	3	4	1	1	0
II	9	4	5	1 unit	1	0
III	10	6	4	0	0	0
IV	11	7	4	1	1	2
V	11	7	4	1	0	0
VI	11	8	3	0	1	0
VII	11	9	2	0	0	0
VIII	14	9	5	0	3 units	1 unit
IX	19	13	6	1 unit	1 unit	1 unit
X	15	11	4	2 units	4 units	0

As regards the space allocation for each of the topics of interest, within the biology component in the school textbooks, nutrition has been provided over 10% of the space in all classes up to VII in the NCERT curriculum. However, it is not the same in the AP State Board syllabus. Food safety got about 1% of all space allocated for biology in primary classes in NCERT (Figure-6). In AP State Board Science syllabus, it was observed that although there were no dedicated chapters for nutrition, 10-23% of the space was allocated for nutrition component in the biology content in the primary classes. About 10% of the biology content was allocated for nutrition in Class –X. However there was almost no allocation of specific space for food safety in AP Textbooks at all, except in V and VII classes where 15% and 5% of space in biology component was allocated respectively (Figure-7).

Physical counting of the illustrations revealed that in the primary classes (I-V), the number of illustrations allocated for biology were more than half of all the illustrations in both NCERT as well as AP State Board science textbooks. However, the number of illustrations related to nutrition was more than 25% of all biology illustrations only in the first two classes. However, the number of illustrations pertaining to biology vis-à-vis nutrition and food safety, decrease in the textbooks of classes of subsequent classes. In the high school text books (VIII-X) there were no illustrations pertaining to nutrition at all, quite obviously because there is no reference to this topic anywhere. Similarly in the AP state textbooks, more than a quarter of all biology illustrations in classes I-IV relate to nutrition while it is almost nil in classes V-X. Food safety related illustrations are almost nil in NCERT textbooks of I through X classes, with the highest of 6% of all biology illustrations only in class IV (Table-7). In the AP State Board textbooks, illustrations related to food safety occupied relatively higher proportion of the biology illustrations. At least one percent of all biology illustrations from classes I–V depicted food safety, with least (1%) in Class-I and highest (15%) in class-V. Thereafter, in higher classes the food safety illustrations were not found except in class-IX, where it was 9% (Table -8).

Table 7. Subject-wise distribution of number of illustrations in NCERT Textbooks

Class	Total No.	Physical and envmnt. science	Biology				
			Nutrition (% of biology)	Health & Hygiene (% of biology)	Food Safety (% of biology)	Others	Total Biology
I	226	36	52 (27.6)	27 (14.3)	0 (0)	111 (58.1)	190
II	264	85	46 (25.8)	21 (11.7)	1 (0.6)	111 (62)	179
III	169	45	6 (4.9)	35 (28.4)	0 (0)	83 (66.9)	179
IV	155	80	11 (16.2)	6 (8.8)	4 (5.9)	47 (69.1)	68
V	150	78	3 (4.2)	7 (9.7)	1 (1.4)	61 (84.7)	72
VI	237	146	25 (27.5)	0 (0)	0 (0)	66 (72.5)	91
VII	191	116	3 (4)	2 (2.7)	0 (0)	70 (93.3)	75
VIII	160	113	0 (0)	6 (12.8)	0 (0)	41 (87.2)	47
IX	170	113	0 (0)	8 (14)	0 (0)	49 (86)	57
X	196	138	0 (0)	0 (0)	0 (0)	58 (100)	58

Table 8. Subject-wise distribution of number of illustrations in AP State Board Textbooks

Class	Total No.	Physical and envmnt. science	Biology				
			Nutrition (% of biology)	Health & Hygiene (% of biology	Food Safety (%of biology)	Others	Total Biology
I	316	55	67 (26.1)	8 (3.1)	2 (0.8)	184 (70)	261
II	222	58	71 (43.3)	20 (12.2)	5 (3.1)	68 (41.4)	164
III	176	56	29 (24)	11 (9.1)	2 (1.7)	78 (64.8)	120
IV	105	46	25 (42.5)	7 (11.9)	5 (8.5)	22 (37.2)	59
V	127	58	0 (0)	7 (10.1)	10 (14.5)	52 (75.4)	69
VI	184	42	0 (0)	4 (2.8)	0 (0)	138 (97.2)	142
VII	143	88	0 (0)	0 (0)	0 (0)	55 (100)	55
VIII	187	123	0 (0)	3 (4.7)	0 (0)	61 (95.3)	64
IX	181	113	0 (0)	0 (0)	6 (8.8)	62 (91.2)	68
X	285	156	7 (5.5)	13 (10.1)	0 (0)	109 (84.4)	129

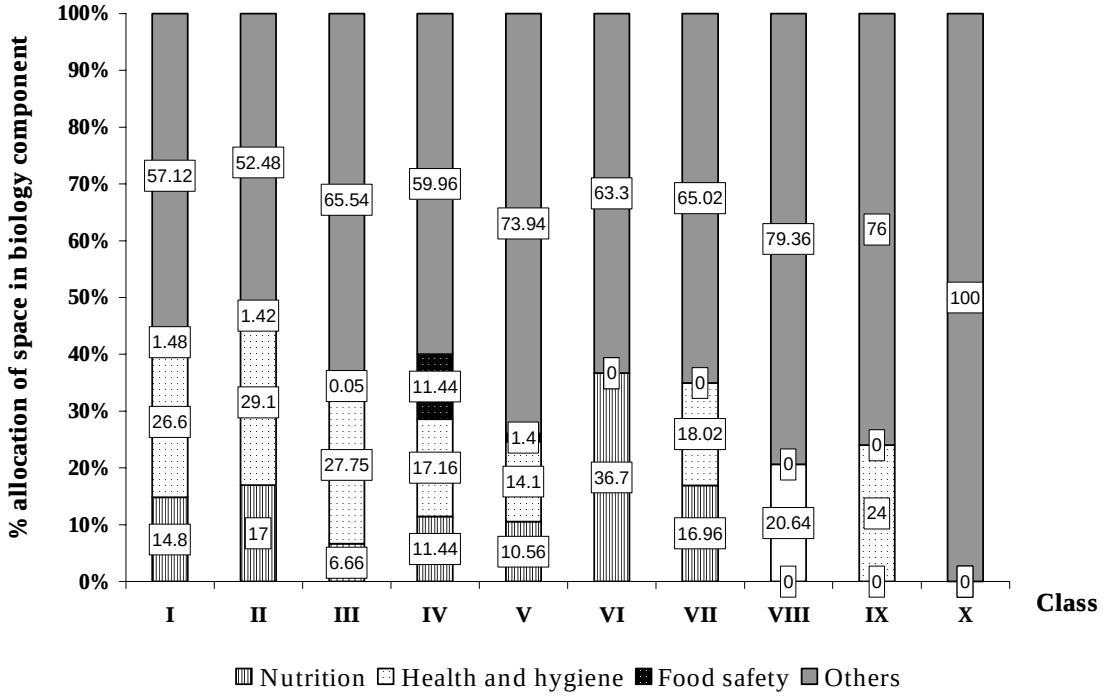

Figure 6. Subject-wise allocation of space (%) in Biology component of NCERT textbooks

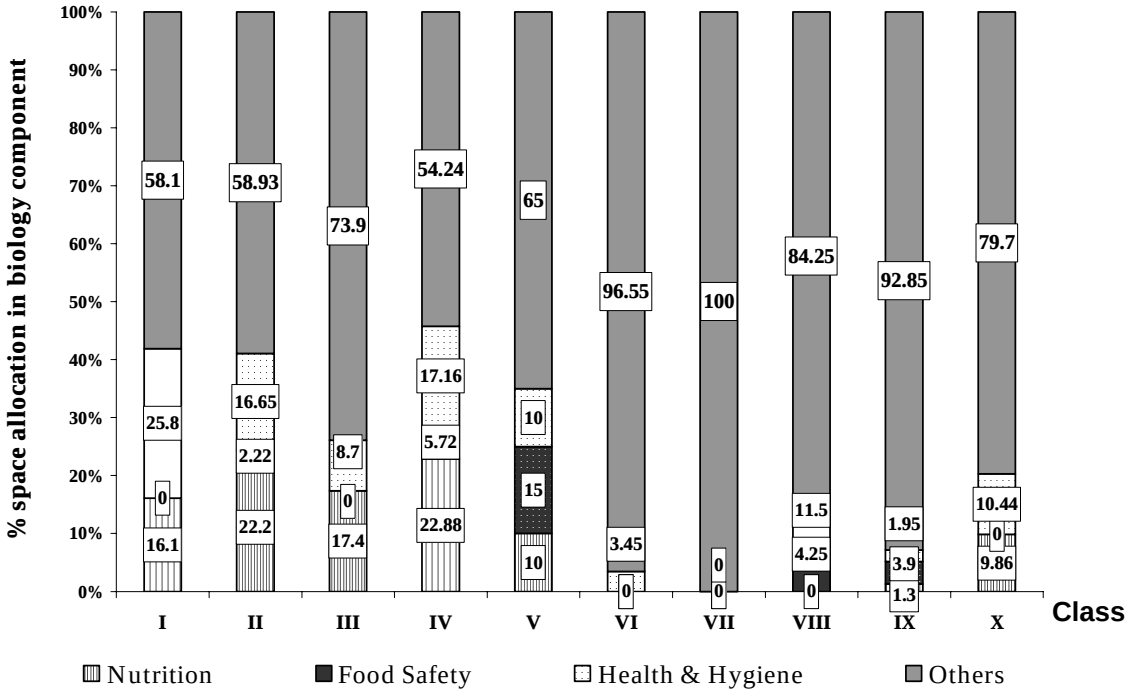

Figure 7. Subject-wise allocation of space (%) in Biology component of AP State Board textbooks

Qualitative content analysis revealed that in both NCERT and AP State Board syllabi, the first nutrition related content in the first three classes was devoted to recognizing various foods, creating awareness about the foods that are derived from plant and animal sources. Thereafter in higher classes wherever nutrition topics are covered, topics like food groups, functions of foods and nutrition deficiency disorders are dealt with in greater or lesser detail (Tables-9 and Table-10). The data also indicated that the colour visuals and tables have been interspersed in the NCERT textbooks both for visual relief and easy understanding. However, in AP State textbooks, text dominates and visuals are simple black and white line drawings which sometimes are not easily comprehensible (Fig-8 & 9). In both the syllabi in all classes except in Classes I and II, the nutrition lessons appear in the back pages of the books. The illustrations depicting good food habits, eating habits, cooking etc., in the NCERT science textbooks of the primary classes seem to have an urban bias with pictures of children consuming foods on a ‘dining table’ using modern cutlery and crockery (Fig-10).

Table 9. Nutrition topics covered in NCERT and AP State Board textbooks

Class	NCERT	AP State Board
I	'Plants around us' illustrations of fruits and veg. are given 'Food from Plants' – cereals, pulses, nuts, fruits (illustrations) 'Good Habits' – Eat at regular intervals, take just enough, Don't waste / over eat, chew	Plants give us food - Grains, vegetables, fruits, oils pulses and spices (illustrations for easy identification)
II	"Uses of Plants" - 'Plants give us food' – cereals, pulses, oilseeds, tubers, roots leaves, veg (colour illustrations) Lesson 'Our food' – functions of foods Energy yielding, body building and protective. ***Eat food four times a day***	Small unit in Chapter on 'Plant Life" deals with plants as sources of foods A Unit on 'Animal Life' - Milk, poultry and meat shown as foods from animals Under the chapter on Human body, a unit on "food for health' deals with kinds of food
III	o One complete chapter on nutrition 'Food for body' o Food groups o Milk highlighted as 'complete Food' o Foods – raw and cooked o Advantages of cooking – kills germs, easy to digest, made soft & tasty	o One complete chapter on 'Food' o What is food? Functions of food, why do we eat food o Food sources o Food groups o Carbohydrates -rich foods o Fats –rich foods o Protein –rich foods o Vitamins and minerals – foods rich in these o In a brief running text towards the end of the page "The food which contains <u>all the nutrients</u> in <u>required quantities</u> needed by the body is called balanced diet" (not even highlighted) o "Population and food shortage"

Class	NCERT	AP State Board
IV	In a lesson on 'Uses of plants and animals', Under uses of plants, "Plants give us food is discussed with illustrations – roots, tubers, cereals, fruits, nuts etc. Similarly in half a page, foods from animals also discussed – egg, chicken, meat	o One Complete chapter on Nutrition under the title "Food we eat" - o Raw foods - Why fruits and vegetables salads / sprouts o Care in selecting raw foods o Why should we cook food and methods of cooking o protecting foods from flies and insects o "population and shortage of food" discussed with illustration
V	o Under "Our body, diseases and sanitation" , a unit on 'Deficiency diseases', which discusses 'Balanced diet' o Recommended intakes of cereals, pulses GLVs etc. given in a table o Discussion on Deficiency disorders – protein def., energy def. Vit A, B, C, D Def, Mineral Def. (iron and iodine) o Causes for deficiencies – diarrhoea and hookworm infestation o Culminates in importance of washing vegetables o Do not over wash and do not overcook	No Chapter on Nutrition

Class	NCERT	AP State Board
VI	"Components of food" – Elaborate discussion on meal. Some common meals of different states. Small experiments to measure carbohydrate, protein or fat in foods What's the function of various nutrients – Carbohydrates, proteins, vitamins minerals (vit A, B, C, D and iron, calcium, iodine, phosphorous) Balanced diet Deficiency disorders Elaborate with colour illustrations	No Chapter on Nutrition
VII	Chapter 'Our food" What is food Why do we need food, Foods we consume Nutrition, Need for variety of foods What are nutrients – Chart on balanced diet Components of foods Box item on Saturated fatty acids (SFAs), Hydrogenated oils and ill-effects on heart Vegetable oils – Unsaturated fats food for health Combination of Saturated fatty acids (SFAs) and Unsaturated fats Food substitution with low cost nutritious food… Examples given in a table A table on cutting energy consumption by food replacement a list of 21 items given	No Chapter on Nutrition

Class	NCERT	AP State Board
VIII	No chapter	No Chapter on Nutrition
IX	No chapter	None on human nutrition Nutrition in Animals as a unit in 'Life processes" - Nutrition in various animals, Need for digestion and digestive enzymes,
X	No Chapter	One complete chapter titled 'Nutrition' Nutritional requirements – Macro and Micro nutrients and their importance for body Carbohydrate, protein and fat, vitamins and minerals and Balanced diet Deficiency diseases - Calorie Malnutrition, Protein Malnutrition, PEM, Kwashiorkar, Marasmus, Obesity. Vit Deficiency Diseases - Vit A, Vit D, Vit E, Vit K (Vit B with pellagra illustration Vit D Deficiency with line drawings) Table showing vitamins - deficiency disorders - rich foods

Table 10. Food Safety topics covered in NCERT and AP State Board textbooks

Class	NCERT	AP State Board
I	"Our needs and House" half a page on 'Good food' – defined as fresh and nourishing, helps in growth and health. Clean food	▪ Need for safe food and safe water is briefly discussed in a lesson on 'Human Body, Health and Hygiene' ▪ Main messages - clean water, its need, need to boil; if water is impure it may cause some disease ▪ Clean food, fresh food, dirt and germ-free food, food from covered containers
II	"Our food" – Clean, covered food is good Do not buy from street vendors Washing hands, rinsing mouth	"Air, water and weather" a Unit deals with 'Clean water for drinking". With illustrations, discusses about why water should be clean for drinking. Discusses filtering and boiling
III	"Food for healthy body" deals with nutrition o How can we take care of our food o Washing fruits and veg o Fruits and salads to be consumed fresh o Cover the food o Don't over cook o Washing fruit and veg in salt water	o Types of diseases' o Dysentery as food borne disease o Messages – Cover the food, wash vegetables and foods before cooking, boil and cool the drinking water
IV	"our body and food" – Food nutrients and microbes boiling, steaming, frying, fermented. Microbes, Useful and harmful microbes	o Under "Food we eat" food selection, protection from insects and flies, ways of preserving food and methods of cooking food, storage of foods

Class	NCERT	AP State Board
V	o In "Communicable diseases" there is a passing reference to food and water borne diseases like cholera, typhoid, jaundice, dysentery Causes for deficiencies – diarrhoea and hookworm infestation Culminates in importance of washing vegetables Do not over wash and do not overcook	Preservation of fruits and vegetables' Need for preservation Methods of preserving fruits and vegetables – freezing, storing in plastic bags, preservation in dried form, pickling fruit jams and juices (Only one illustration of a refrigerator with some foods) Under 'Health education', food borne diseases are discussed – cholera, typhoid and itch are given as food borne diseases two illustrations one on fly swarming foods and the other depicting itch
VI	None	None
VII	"our food" – Nutrition and Perishable, non-perishable, storing at room temperature, refrigeration, cold-storage, deep freezing Food sanitation – personal hygiene of food handlers, cleanliness of surroundings, utensils etc., half cooked or uncooked animal foods may cause disease Food poisoning- by microbes, salmonella, clostridium is mentioned "Health and diseases" quality of food, hygiene, unwashed fruits, roadside eateries	None

Class	NCERT	AP State Board
VIII	None	One unit on 'Storage and preservation of food' o What is food poisoning o Importance of storage of cooked uncooked foods o Methods to prevent spoilage of food o Different methods of food preservation (Drying, smoking, mechanical drying, salting, freezing, pasteurisation, use of high temp., canning, pest control discussed elaborately. o **NO illustration at all**
IX	None	None
X	None	None

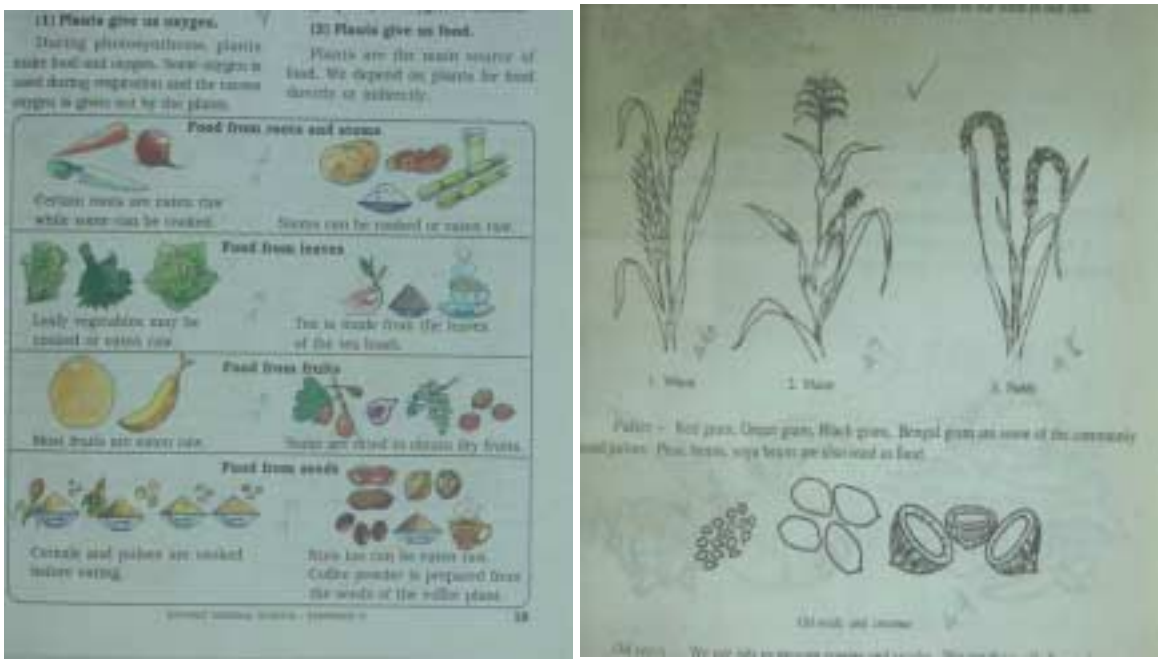

Figure 8. Depiction of food items in NCERT textbook (IV Std.) Vs. Depiction of cereals, pulses, nuts, roots etc. in AP State Board books

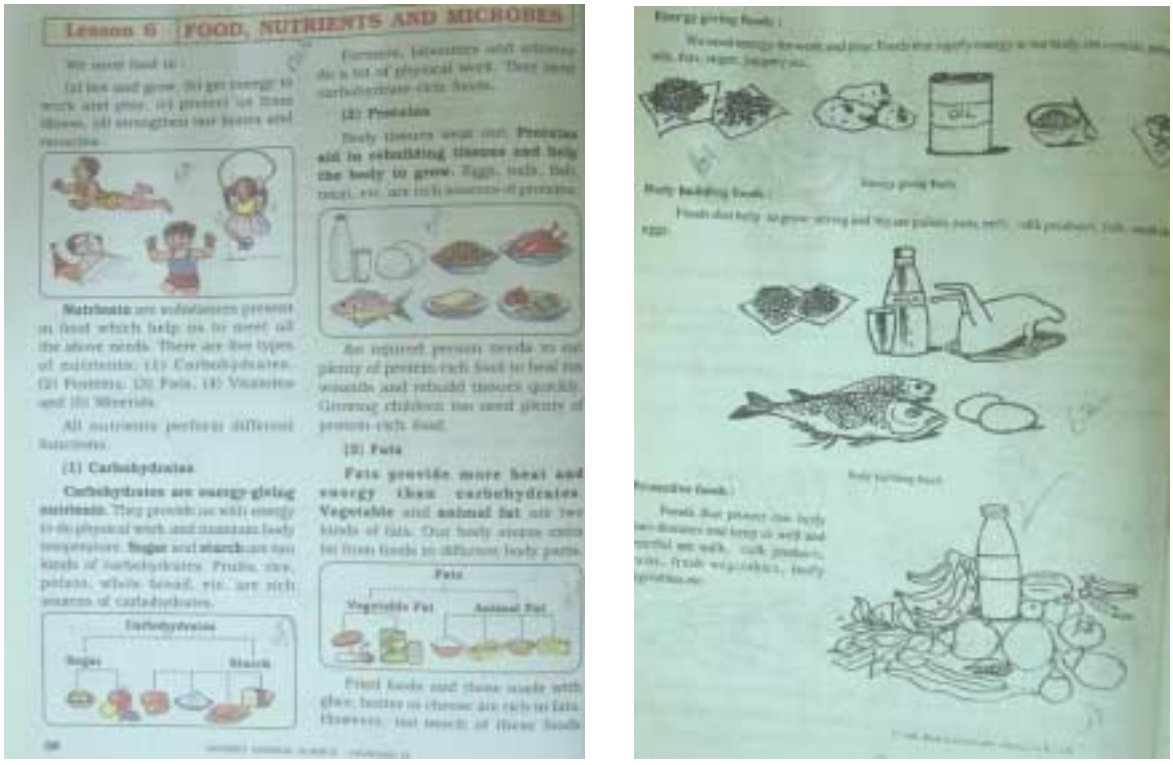

Figure 9. Colourful pictures in an NCERT textbook (left) Vs. single colour line drawn depictions of food groups in AP State Board Textbook (right)

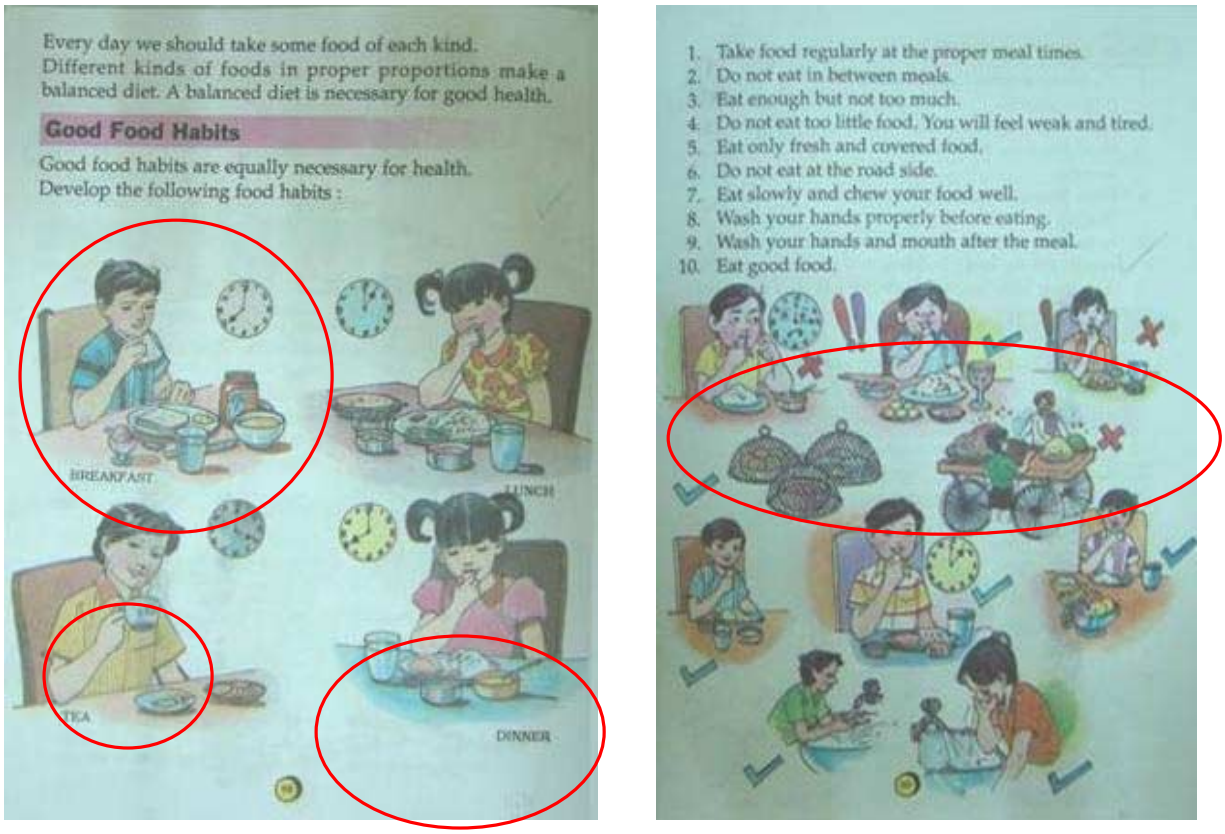

Figure 10. Urban bias in illustrations in NCERT textbooks?

Discussion

In various national plans and policies, the government has time and again reiterated its unequivocal commitment to incorporate nutrition into the school curriculum. For instance the National Nutrition Policy 1993 and the National Plan of Action on Nutrition (NPAN), 1995 in its indirect policy measure through the Ministry of Education, clearly emphasizes the need for incorporating 'nutrition' in school text books (FNB, 1995a). The National Policy of Education (1986 – modified in 1992) and National Curricular Frame Work (2005) also highlight the need and importance of nutrition and physical activity as part of health education in schools (WHO-India, 2008). The

analysis of nutrition component in school curricula reveals that despite all the above policy measures, nutrition seems to have not got its due in the school curricula. This observation is in concurrence with an earlier review of school health programmes in 10 Indian states, which observed that there is no priority for health promotion in actual practice due to lack of commitment from education departments (WHO-India, 2008). The present analysis of curricula also indicated that there are too many inconsistencies in presentation of topics related to nutrition. This observation is in concurrence with an earlier study carried out in Delhi in 1996 to assess the micronutrient nutrition related content in the school curricula, which also observed inconsistencies in presentation of topics related to micronutrients (ICCIDD, 1996).

In their analysis of the nature of science and technology presentation in NCERT science textbooks for classes IV through X, the development of conceptions on some physical science topics (like force, work, and energy); Koul and Dana (1997) found that there was ‘excessive’ physical science content with prime emphasis on established concepts, laws, and theories. Similar observation was also made earlier by Ramanathan and Siddiqi (1994). In the current study too we found that the emphasis on physical sciences was increasing in classes VI through X allocating lesser proportion of space for the biology component, thereby, limiting the scope for coverage of nutrition and food safety. Some researchers have suggested integration of nutrition into diverse curricular areas (Lytle, 1994), but in the present study, we found that

integrating nutrition and food safety related topics in subjects other than science, say in physical and environmental sciences actually dilutes the importance of nutrition and food safety education because it gets masked under other related topics. For instance, although nutrition (more precisely, importance of regular but small meals) and food safety (importance of washing hands before eating) were covered in some primary classes in the lessons pertaining to 'good habits' along with aspects like 'sitting in good posture', 'wearing washed clothes', 'combing hair' etc., understandably this does not give adequate scope for the child to comprehend the scientific rationale or importance of inculcating the above nutritional or food safety habits.

Considering that India's adolescents are confronted with the problems of undernutrition (NNMB, 2006) on the one hand and overweight and obesity on the other (Laxmaiah et.al., 2007; Krishnaswamy, 1999), the school system can be effectively used to educate the school-going children. The science textbooks of all classes after class III in both NCERT and AP syllabi, however, only deal with food groups or nutrient deficiency disorders. There is hardly any mention of important deficiency disorders like anaemia and iodine deficiency disorders and steps to be taken to control them. Similarly, there is hardly any information on contributing factors to overweight and obesity like consumption of unhealthy / junk foods, lifestyle factors etc. Similarly there is no mention of obesity and resultant chronic diseases like diabetes, hypertension and cardiovascular diseases.

The need to take food safety related education beyond safe handling, consumption and preservation of foods is time and again stressed. In the present scenario, when there are shifts away from *meals* to *snacks* and from *at-home* to *away-from-home* meals, children should be made aware of food additives and contaminants and they should also be taught to read and understand the food labels in order to help them make healthy food choices (Subba Rao and Sudershan, 2007). However, the present study indicates that food safety in whichever class it appears, deals mostly with cleanliness of surroundings and not consuming fly swarming or insect infested foods and sometimes with techniques of preservation.

Conclusions

The present study revealed that the space allocation for biology in relation to physical sciences is lesser in higher classes. Nutrition component is dealt at primary school level but very little at high school level. Nutrition when covered after class III in both NCERT and AP syllabi, only deals with food groups or nutrient deficiency disorders. Similarly, food safety deals only with cleanliness of surroundings, not consuming fly swarming or insect infested foods**.**

Our study clearly brings out the lacunae in the nutrition component covered in the school curricula. It could be recommended that many important topics such as nutrition and growth, link between childhood malnutrition and non-communicable diseases in adulthood, adolescent

nutrition, nutrition for girl child, hidden hunger, lifestyle factors and obesity, nutrition during pregnancy and lactation, importance of breast feeding, unhealthy foods, fortification etc. be covered in the curricula. Considering that many of our earlier studies indicated that school based nutrition education is preferred mode of learning and effective way of education, the results of this study will be useful during future revisions of the textbooks for strengthening the nutrition and food safety components.

Chapter 5

COMMUNICATING NUTRITION IN COMMUNITY SETTINGS – SOME APPROACHES IN PRACTICE

INSTITUTIONAL APPROACHES TO NUTRITION COMMUNICATION

Nutrition Communication and positive results, if any from it, are difficult to reproduce routinely on a large scale. Given the limited resources available in most settings, nutrition communication efforts are usually designed to have an impact on large sections of the population in a cost-effective way. From a review of literature, Smith (1997) identified the following factors as important for affordability, effectiveness, and reach, particularly for large-scale programmes.

Programme design: A plan for building commitment at all levels, planning for monitoring and evaluation are crucial in the programme design. Clear and achievable goals, objectives and strategies should ideally be based on an analysis of the factors affecting the target groups. Planning should be done for training and capacity building.

Targeting: Involves group customization of communication (Kreuter and Skinner, 2000). Targeting involves development of single communication approach for a defined population sub-group that takes into consideration the common characters commonly shared by the sub-group's members. Appropriate group targeting can substantially reduce costs (Berg, 1987).

Duration: If demonstrated improvements in the nutritional status of large population groups are being aimed for, the programmes have to be sustainable. As communication has to deal with groups of audience who are at different stages of behaviour adoption, it has to be considerably long drawn, reinforcing and reiterative. New programmes must have sufficient lead in time to allow for detailed planning, consultation and field testing of education resources (Parlato et. al., 1992).

Community participation: Participation of the community and community leaders to promote solutions to nutrition problems is widely recognized. (Parlato et al, 1992; Cerqueira and Oslem, 1995; Whitehead, 1993). participatory approaches see people as the nucleus and necessitates listening, and trust thus reducing the social distance between communicators and receivers, between teachers and learners, between leaders and followers as well as facilitate an exchange of ideas, knowledge and experiences (Servaes and Malikhao, 2005). Participation also stresses the importance of cultural identity of local communities and of democratisation and participation at all levels. It points to a strategy, not merely inclusive of, but largely emanating from, the traditional 'receivers' (Freire, 1983). Such participatory efforts are likely to address the needs of the people and achieve results that can be continued with minimal external inputs.

Strategies: They are usually descriptive of the audiences' patterns of use and what they know as they have an interactional function of enabling a joint

negotiation of meaning between the sender and the receiver in order to achieve objectives of a set communication process (Tarone, 1981). Strategies usually try to define the suitable means, media and approaches to communication. Strategies are to be designed to create supportive environments to strengthen local ownership and to develop structural and institutional support.

There are many players in the field of nutrition communication, with a variety of programmes aimed at larger audiences. Today nutrition communication is part of many development and health programmes across sectors. As the National Nutrition Policy, 1993 recognizes that "…nutrition affects development as much as development affects nutrition…", nutritional concerns are being integrated into various developmental policies and programmes being taken up at various levels by the Government. Non-Governmental Organisations (NGOs), international organisations and research institutes are also putting in considerable efforts in taking the message of nutrition to the community. Government Organisations engaged in nutrition education and communication activities would subscribe to the larger 'national priorities' laid down in the government policy documents, which in turn could have been aligned with the global priorities identified by the international organisations and/or UN agencies. The research organisations and civil society can play a very important role in the formation of public opinion through independent groups or associations. Successful

experiments in community settings carried out by research sector and public opinion through civil society groups can reach the government and have an impact on its policies and priorities, other than contributing to a change in the overall nutrition scenario of the public. These organizations are significant groups as the public often considers them as independent groups and holds their opinions as credible. Thus they remain to be powerful opinion leaders, educators and communicators for the public (Meshesha, 2008). It is a common understanding that in different nutrition communication programmes by different organizations, the extent of participation varies and accordingly the model adopted is likely to differ. A study was conducted with the following aims:

1. To document nutrition communication approaches being adapted by four different organizations in four different sectors (one each from a Government Department, a Research Institute and an organization in the Voluntary Sector).
2. to understand the notion of nutrition communication as perceived by these organizations (or the implementers in the organizations)

Methodology

'Case study method' was employed for the study. The 'case study' is a research strategy which focuses on understanding the dynamics present with in a single setting while studying the particularity and complexity of a single case covering its activity within important circumstances (Eisenhardt, 2002; Stake, 1995).

For the present study, four different organizations from four different sectors were purposively selected for 'case studies'. The Food and Nutrition Board of Government of India was selected from the Government Sector, National Institute of Nutrition (NIN) from Research and Development Sector, and the Deccan Development Society (DDS) from the Voluntary Sector.

As suggested by Eisenhardt (2002), the case studies combined data collection methods such as information gathering from archives, in-depth interviews with the key people involved in nutrition communication in each organization and observations (wherever possible). Semi-structured in-depth interviews were also conducted with the food inspectors. These interviews are ''speech events'' closer to friendly conversation than the stimulus-response model found in a survey research interview. They involve asking questions, listening, expressing interest and recording what was said. Questions are open-ended with frequent probes and do not follow a specific order (Newman, 1994).

In preparation for the semi-structured in-depth interviews, a theme guide was prepared (Appendix-4). The theme guide listed the following topics around which the interviews would focus:

a. Various nutrition communication activities of the particular organization and its target audience
b. Whether nutrition communication was a planned effort with a monitoring and evaluation component, budget and specific objectives.

c. Indicators for success of the nutrition communication efforts – laid out in the programme and/or perception

d. Community participation

In summarizing each of the organizational case studies, a standardized format (Smith, 1997) of highlighting key aspects of the nutrition communication programmes was followed, by documenting the nutrition issues being addressed, objectives, target groups, sectors and/or settings involved, strategies used, duration of the project, results from evaluations (if available), and finally the conclusions of the case study from observations and inferences. Efforts were also made to identify funding resources in order to assess the possible effect of resource constraints. Each case study summary is followed by a brief discussion, which provides conclusions regarding the trends which emerge overall, how these compare with past reviews and what examples of best practices are provided by these studies to better inform similar projects in the future.

CASE STUDY-1:

FOOD AND NUTRITION BOARD, GOVERNMENT OF INDIA

The Food and Nutrition Board (FNB) was established in the Department of Food, Ministry of Agriculture in 1964 as a non-statutory ministerial wing with the objective of diversifying Indian diet for improving the nutritional status of the people. The functions of the Board included development and popularization of subsidiary and protective foods; nutrition

education; extension and food management; conservation and efficient utilization of food resources; and food preservation and processing (MoWCD, 2004).

After the Government of India adopted the National Nutrition Policy in 1993, FNB was transferred to the Department of Women and Child Development. The infrastructure of the FNB (Fig-11) comprises of a technical wing at the Centre, four regional offices and quality control laboratories at Delhi, Mumbai, Kolkatta and Chennai and 43 Community Food Nutrition and Extension Units (CFNEUs) located in 29 States and UTs (FNB, 2008).

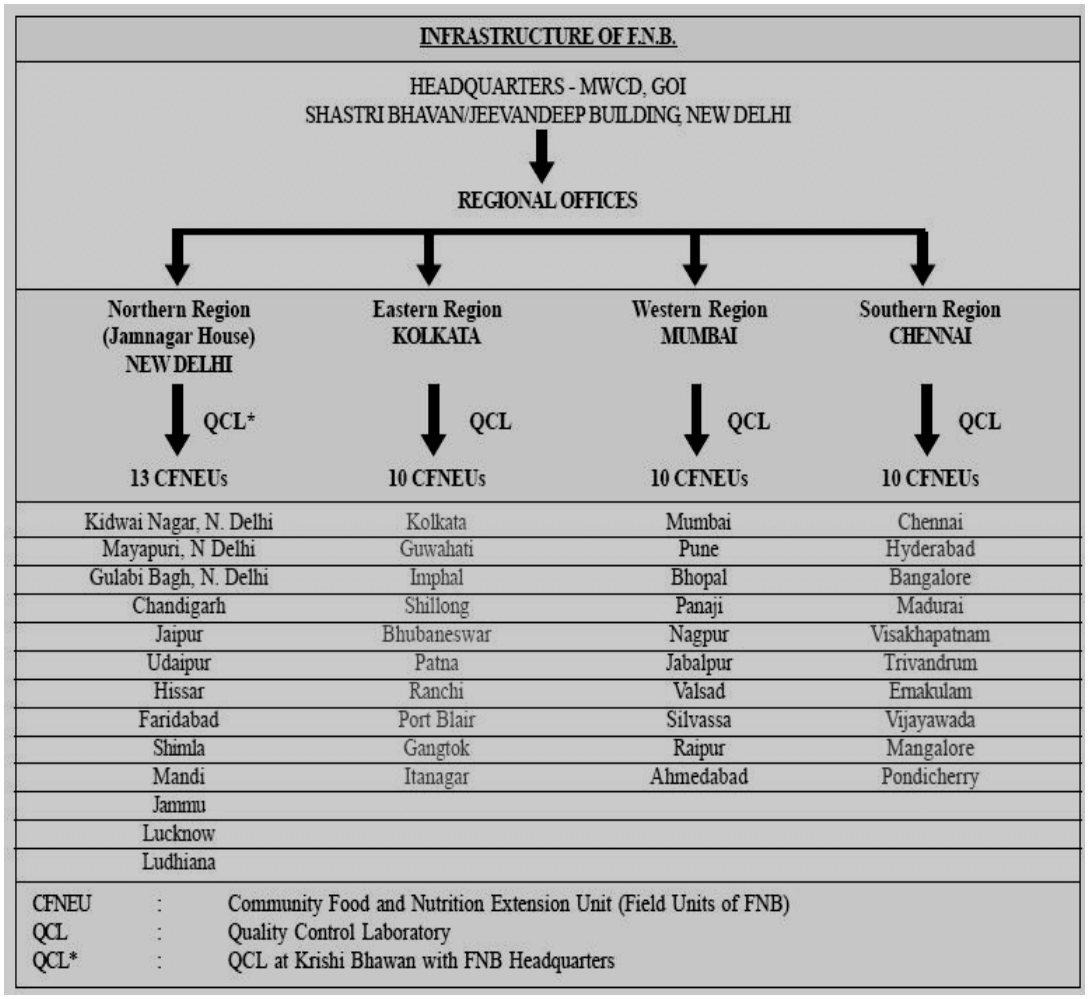

Figure 11. Infrastructure of Food and Nutrition Board

Source: http://wcd.nic.in/ar0304/chapter5.pdf

The major activities of the Food and Nutrition board are as follows (DWCD Annual Reports, 2002-03 to 2007-08):

Nutrition Education and Training: Nutrition education of the people in rural, urban and tribal areas is carried out through its 43 Community Food and Nutrition Extension Units (CFNEUs) in different States / UTs in collaboration with State Governments, National Institutes and Social Organizations. Each

CFNEU is equipped with a mobile van, audio-visual equipment and is manned by 'technically trained' personnel. FNB Headquarters, through its four Regional Offices, provides the logistic support for the functioning of these units (MoWCD, 2004).

In order to disseminate information regarding nutrition at community level, each CFNEU organizes five-day training programmes for Master Trainers comprising Child Development Project Officers (CDPOs), Assistant Child Development Project Officers (ACDPOs), Medical Officers, Lady Health Visitors, Senior Supervisors of ICDS / Instructors who in turn act as trainers for the grassroots-level ICDS functionaries such as Anganwadi Workers and the community at large. The five-day training programme usually covers various issues relating to nutrition of infants, young children, adolescent girls, pregnant and lactating women, and various forms of malnutrition, like under-nutrition and deficiency of micro nutrients such as iron, folic acid, vitamin A and iodine. The programme lays adequate emphasis on community based

mechanism for monitoring and reviewing nutrition levels and communicating nutrition information utilizing all available channels (FNB, 2008).

Each CFNEU organizes a Training of Trainers (ToTs) Course for 15 master trainers in each quarter of the year (Fig-12). Each of these master trainers in turn organizes four Orientation Training Courses (OTCs) of two day duration for 30 participants comprising grass-root level functionaries and volunteers from community under the supervision of FNB staff.

Figure 12. Training of Trainers

Source: Annual Report of Department of Women and Child Development 2007-08

In addition, live demonstrations on various aspects of nutrition are organised by CFNEUs in rural and tribal areas, and urban slums to create nutritional awareness among the people. Cooking demonstrations of some low cost nutritious recipes is also a part of this (Fig-13).

Figure 13. Cooking Demonstration during an awareness programme in Orissa

Source: Annual Report of Department of Women and Child Development 2005-06

Training of home scale preservation of fruits and vegetables and Nutrition: This is a five-day training programme that is aimed at women (usually housewives) and adolescent girls. These programmes are organized by CFNEUs with a view to promote consumption of fruits and vegetables which are rich sources of micronutrients, fibre and antioxidants, and also to strengthen their skills in fruit and vegetable preservation so that it can serve as an income generation activity for the participants.

A Ready Recokner on Home Scale Preservation of Fruits and Vegetables printed by FNB in 12 regional languages is provided to each of the trainees. Apart from this, the processing facilities put up at various CFNEUs can be used by the community at nominal charges for preserving fruits and vegetables when available in plenty for glut season.

Monitoring of 'Supplementary Feeding' and 'Nutrition and Health Education' components of ICDS: The CFNEUs are also responsible for monitoring the 'supplementary nutrition' and 'nutrition and health education' components of ICDS in their respective areas of location. The staff of CFNEU generally spend a day, at the time of inspection at various anganwadi centres, and conducts nutrition education demonstration for the benefit of anganwadi workers as well as the community. The observations of the staff during the inspections are periodically reviewed at the headquarters and the States are requested to take appropriate corrective measures (NIPPCCD, 1992; Sarma et. al., 1992).

Mass Awareness Campaigns: Events like National Nutrition Week (1-7th September), World Breast Feeding Week (1-7th August), World Food Day (16th October), Global Iodine Deficiency Disorder (IDD) Day (21st October), International Women's Day (8th March), Universal Children's Day (14 November) etc, are organized by all the CFNEUs on a large scale in association with the State Governments, educational institutions, NGOs and the media (NIN, 2007). These events were marked by the organization of workshops, special nutrition education programmes, exhibitions and coverage through radio, TV channels (usually government owned) and the Press.

Mass Media: Video spots on various topics like 'Infant and Young Child Feeding', 'Preparation of Instant Foods for infants at home' and 'Nutrition of

the Girl Child' etc are telecast through Doordarshan. Audio jingles on a variety of nutrition related topics aimed at women are broadcast through All India Radio.

These mass media based education material are used by some state Governments for education of the functionaries and Self-Help Women Groups (SHGs) in training courses.

Development, production and distribution of educational/training material: Popularization of low cost nutritious foods from locally available raw material is one of the mandates to the Board under the National Nutrition Policy 1993 (FNB, 1993; 1995a). The field units of FNB have been developing low cost nutritious recipes from locally available foods keeping in view the requirements of infants and pre-school children, and propagating the same through training courses and nutrition education programmes.

The preparation of 'sattu', '*ragi* and ground nut *laddu*', like instant foods using locally available food grains and nuts/ oil seeds and other nutritious preparations for children standardized by CFNEUs have been adopted by some State Governments in their nutrition programmes.

Food analysis and standardization: There are four Quality Control Laboratories (QCL) of FNB located at Delhi, Mumbai, Kolkata and Chennai. These QCLs analyze processed Fruit and Vegetable Products as well as

various supplementary foods used in ICDS and Mid-day Meal scheme. The samples of the supplementary foods used in ICDS and Mid-day Meal Programme are received from the State Departments of Social Welfare and Women & Child Development for analysis.

Apart from these, FNB also renders technical advice on food quality and standardization to various committees of Department of Health, including Codex, Bureau of Indian Standards (BIS) etc. (FNB, 2008).

One of the terms of reference of the National Nutrition Mission constituted under the chairmanship of the Prime Minister is to review the National Nutrition Policy (1993) and National Plan of Action on Nutrition (1995) with a view to facilitate setting nutrition goals for the next decade and effective policy direction and inter-sectoral collaboration. A Working Group for Review of National Nutrition Policy and National Plan of Action on Nutrition was constituted under the chairpersonship of the Secretary (WCD). A draft review document on National Nutrition Policy highlighting the mandate of the policy, achievements during the last one decade, constraints in fully operationalizing the policy, vision for the next decade and some macro and micro level strategies for achieving the national nutrition goals, was prepared for consideration by the Working Group. The first meeting of the Working Group was held on 17th February, 2004 under the chairpersonship of Secretary, WCD (FNB, 1993; 1995a, b; MoWCD, 2004, DWCW, 2006).

Inferences from in-depth interviews

Two in-depth interviews were conducted with the key communicators in Food and Nutrition Board. The first interview was conducted with the Assistant Technical Advisor, who was aged 60 years and a post-graduate in Sciences. He has been with FNB ever since its inception and served in different CFNEUS in north, east and south India before assuming office in Hyderabad. He is fluent in Hindi, English Tamil and his mother tongue is Telugu (the language spoken in Andhra Pradesh). The second interview was conducted with a 47-year-old Demonstration Officer, who was also a Post Graduate in Science and worked in Tamil Nadu before assuming office in Hyderabad about four years ago. He is fluent in Tamil and English and learnt Telugu after coming to Hyderabad. Now he is fluent in the language and carries out nutrition education programmes of the Board even in rural areas. The inferences from these two in-depth interviews have been categorized under the following topics interspersing relevant quotes from the interviews.

Nutrition Communication activities and targeting

When asked how the limited staff available in each unit would deal with training programmes for the middle level health functionaries, the Assistant Technical Advisor of Andhra Pradesh said,

> We have a standardized training programme on nutrition and health. Since we ourselves cannot engage them through the training programme, we also source guest faculty from reputed home science colleges, social and preventive medicine departments of medical colleges or research institutes.

Nutrition education being the focus of these training programmes, the emphasis is more on Infant and Young Child Feeding Practices (IYCF), Nutrition for pregnant and lactating mothers as well as nutrition during adolescence. When asked how they address changing context of food and nutrition in their training programmes, the Demonstration Officer said,

> While undernutrition and related programmes and strategies are our focus in training programmes, we are now covering topics like growing obesity and non-communicable diseases in our training programmes.

As mentioned above, the middle-level health functionaries are expected to act as master trainers and they are in turn expected to train the grassroots level health functionaries ie., Anganwadi Workers. Of late, the mothers' committee members, who have been helping running the Anganwadi Centres in various villages, are also being 'trained' as master trainers. There are a variety of reasons why a new group is being explored or experimented to act as master trainers. While the Demonstration Officer felt that the mothers are the 'nodal agents' to communicate to the others, the Assistant Technical Advisor had a different story to narrate. He said,

> Earlier, say about 5 years back, FNB was funding the master trainers to organize second level training programmes for Anganwadi Workers, Mothers' Committees and also Adolescent Girls. But there were instances of misappropriation of finances and hence we have started training the Mothers' Committees and adolescent girls or the second-level.

As regards the direct-to-community programmes, which are aimed at three different groups of audience, viz., mothers of infants, pregnant and

lactating women, adolescent girls, the content usually cover locally relevant themes. They include ‘food fads and fallacies’, ‘nutritious food need not be costly food’, ‘benefits of traditional foods’ and other relevant topics based on the group.

When asked how the target audience for these direct-to-community programmes are reached, it was indicated in the in-depth interviews that the women and children are mobilized through Andganwadi Workers. The Assistant Technical Advisor indicated that there were often many problems at household level which hinder the participation of women in the rural areas and urban slums. He said,

> There is often a problem of men discouraging women from taking part in our community awareness programmes as they (women) would have to forego their daily wages to attend such a programme.

Programme Design and Monitoring & Evaluation:

The programme design is uniform for all the CFNEUs. They work against a given target of conducting at least one Training of Trainers Programme per quarter, three orientation training courses per quarter, 10 Direct to the Community Programmes per month, 11 inspections of Anganwadi Centres and their training if needed. Each Centre is expected to meet this target.

When asked about the monitoring and evaluation of the programmes, it was informed that there is no inherent mechanism for monitoring or

evaluation. The Assistant Technical Advisor said that they have to send reports of the completed programmes along with documentary evidence like photographs etc to the headquarters in New Delhi. Sending Annual Report of Activities is also mandatory.

As regards evaluation of the programmes by an outside agency, he could hardly recollect any such effort except studies by the National Institute of Public Cooperation and Child Development (NIPCCD) in 1992-93 and 2000.

Budget for Nutrition Communication

Informing about the budget the Assistant Technical Advisor felt that it was too meagre to meet the set targets. There appears to be no separate budget for communication activities. The amount that is allotted to the centre has to be spent for all the activities that it has to carry out. To report in the words of the FNB official,

> … the annual budget of entire Food and Nutrition Board was a little over 3 crore rupees in 2007-08. Now, can you imagine what will come to each unit, which is expected to organize about 4 trainings of trainers, 12 programmes for Anganwadi Workers and 120 direct-to-community programmes and almost the same number of inspections of Anganwadis. But we have to make do with what we get.

Indicators of success of training programmes

Answering a probe on how they usually find out whether their training programmes have had any impact on the target groups, he said that they

would informally talk to the participants of the training programmes and find out from them. According to him there is no other mechanism.

> We informally find out from the Anganwadi Workers during the courses if they consider our programmes relevant to them. Since they have to undergo training once in six months or at least once a year, we get to interact with them. At that time we try to follow up with them and the response is usually good… I can say at least half of them seem to practice (what they learn).

However, even this kind of an informal follow-up is rarely possible in case of Direct-to-community programmes owing to the geographical area each unit has to cover.

> Due to staff constraints, we cannot even go back to the same village once in many years. For instance, we are just five of us (technical staff), supported by five others. Our area of operation includes Telangana districts and Kurnool and Anantapur Districts in Rayalaseema of AP. With all the targets that we are expected to meet, we can hardly revisit less than 10% of all villages that we ever went to.

Yet another informal mechanism that the Demonstration Officer explained was as follows,

> After conducting the training programmes for adolescent girls or the Mothers' Committees, we usually ask them to get back to us the next day with a low-cost nutritious food preparation that we would demonstrate to them. But this may not be possible in all the centres.

Community participation

The approach in almost all the communication activities is didactic. When we asked the officials whether they took into consideration what their audience already know or how (through which media) they prefer to learn, the officials said that they 'often' undertake pre- and post-course evaluation

of knowledge by employing questionnaires during the training programmes for middle-level health functionaries.

As regards the media preferences it was reported that they do not have any such information, but the Technical Advisor explained saying, “from my experience, I think they prefer discussions where they can share ideas. But we are hard pressed for time and work with limited staff and shoe-string budgets.”

Community participation and community ownership of the programmes are almost unheard of for the Department. The level of participation is only limited to passing on the ‘nutrition knowledge’ to the others (middle-level functionaries to anganwadi workers and through them to the community). The only area where community participation is involved is in training programmes pertaining to fruit and vegetable processing. The women after they are trained are encouraged to practice them to build finances of the family or use the fruits and vegetables in ‘unseason’. The technical Advisor informed that,

> We have some facilities at our CFNEU’s, where we have modest food processing equipment to make juices, pickles etc. We strongly encourage women to make use of the facilities free of cost. Women can make the fruit juices etc for their household use or for commercial use. We charge a nominal processing fee of Rs.2/- per bottle.

Comments

The nutrition education / communication approach adopted by FNB can be summarized as below (Fig-14). Whether it is training of the functionaries or training of the community itself or reaching the message of nutrition to the 'beneficiaries' through them, the organization's approach seems to be didactic and hence can be summarized as 'top-down' approach with some emphasis on multiple-step flow of nutrition communication.

This model appears to be largely framed in the 'opinion leader theory' (Katz and Lazarsfeld, 1955), which postulated that interpersonal communication plays a crucial role in channelling and shaping the opinion. There are two or more steps in information flow viz., from the source to the opinion leaders, and from leaders to the 'masses'.

Considering that the approach(es) chosen by FNB for communication of nutrition information is dominated by conventional educational approaches that emphasize knowledge transmission and acquisition with an inherent assumption that these would ultimately lead to change in attitudes or behaviours, it can even be categorized under the 'Information dissemination' approach of nutrition communication indicated by Valyasevi and Attig (1994). As there is intermittent use of mass media and additional educational material like posters, mass media etc., it partly adheres to the 'Education Communication' model as well.

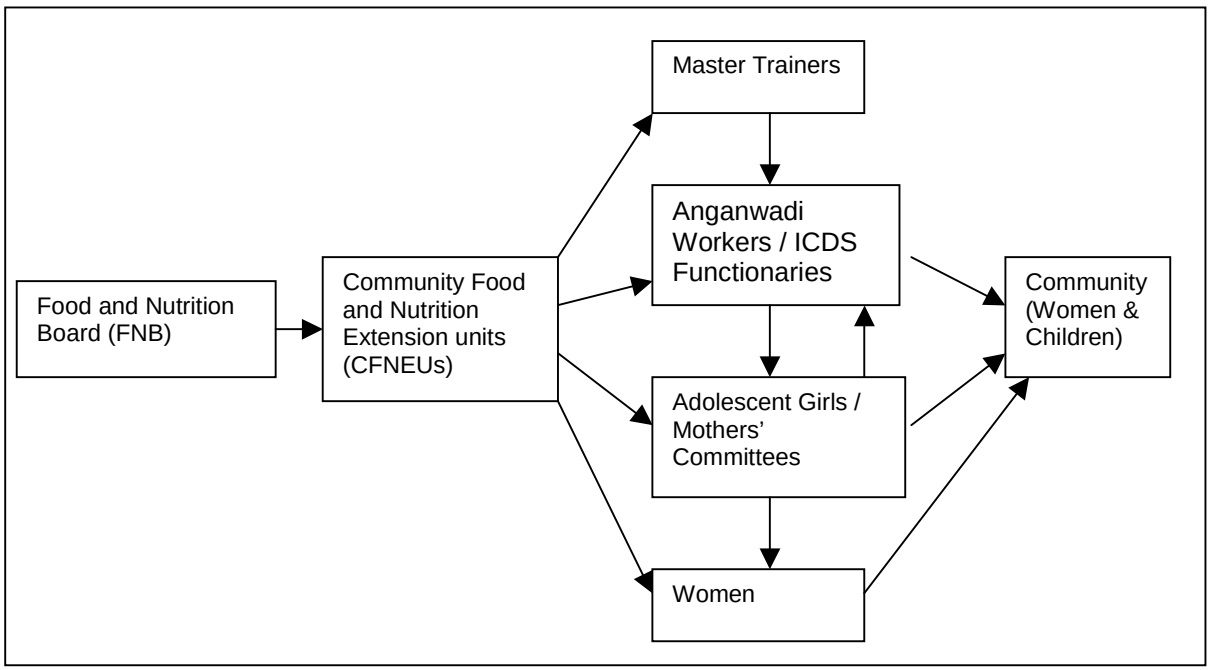

Figure 14. Flow of Nutrition Information from FNB to the target groups

Over all, the case study brings to the fore a number of issues like lack of systematic evaluation of the programme on the whole and the communication (rather education) component in specific, complete lack of planned communication effort and an almost elusive feedback mechanism. These make it impossible to assess the role of FNB in nutrition communication and thereby achieving nutritional improvements on a national scale. Furthermore, lack of knowledge of the staff on the importance of 'learning from the community' before 'making the community learn' coupled with large number of target programmes that they have to conduct and limited resource (both financial and infrastructure) allocation underline the need for a thorough re-look at the approaches employed for nutrition communication.

CASE STUDY -2

DECCAN DEVELOPMENT SOCIETY (DDS) - A VOLUNTARY ORGANISATION

About DDS

The Deccan Development Society (DDS) is a Non-Government Organisation (NGO) based in Zaheerabad area of Medak district in the southern state of Andhra Pradesh, India. Incorporated in 1983, this grassroots organisation is working in over 75 villages with women's societies. With over 5000 registered members, the Society aims to bring the village groups (*Sanghams*) together into a strong pressure group for women, *dalits* (socially marginalized) and the poor, and to facilitate debate, discussion and educational activities that will encourage local governance and autonomy over local resources.

The organization's goal is to convert the *Sanghams* into self-sufficient, self-reliant and self-provisioning in their regional areas. For more than 20 years, DDS' work has focused on regenerating rural livelihoods by combining indigenous farming knowledge, eco-friendly technology and gender justice.

The society claims to be promoting people oriented participative development in the areas of food security, ecological agriculture and alternate education. It is also trying to reverse the historical process of shift in food habits, degradation of environment and people's livelihood system in this

region through a string of land related activities such as perma-culture, community grain bank, community gene fund, community green fund and collective cultivation amongst others (Deccan Development Society, 2009). Listed below are the various initiates the NGO is working on –

Autonomous Communities

The women of the DDS *Sanghams* have been actively working towards autonomy over food production, autonomy over seeds, autonomy over natural resources autonomous market and autonomous media. They successfully got control over their own food production, seeds, natural resources, healthcare systems, markets and media.

Since 1995, DDS *Sanghams* have been running what they call an 'alternative public distribution system' in over 50 villages (Fig-15). This is a self-provisioning food system based on the principles of local production of local foods, local storage and local distribution. By bringing cultivable fallow land under production, the women have been producing a basket of crops through a biodiversity-based, ecological food-production system. The focus was on knowledge-based farming, which underlines the importance of mixed cropping, cultivation of native varieties of grains and millets, soil and water conservation, organic agriculture and afforestation.

Figure 15. Alternative Public Distribution System

Source: www.ddsindia.com

Community Gene Banks

Promoting food sovereignty being one of the important efforts of DDS, the local population has been working towards taking control over their food sovereignty by promoting village-level Community Gene Funds (Fig-16). Over 1500 women farmers of DDS *Sanghams* are engaged in growing diverse crops on their marginalized lands. They have established village level Community Gene Funds in 60 villages and have retrieved over 80 land races, which had been obliterated by so-called modern agricultural practices. The community gene bank is very dynamic. The seeds go back yearly to the fields and are offered back to the villages. The women consider seeds their "knowledge" and each farmer works typically with over 15 varieties of seed maintaining strong local biodiversity and promoting diverse, rain-fed, "ecological farming" with no external input.

Figure 16. Local women displaying Community Gene Bank

Source: www.ddsindia.com

The women map the surrounding villages to gauge families' entitlements depending on their levels of poverty. Instead of queuing up to plead with the government officials for their ration entitlements, the villagers have almost reached a position to control grain and its distribution. Since 1996, more than 3,000 women in 60 villages have increased productivity on their land; the extra food grain produced about 1,000 extra meals for each participating family per year.

Noteworthy in these efforts is the practice of "hunger mapping", which involves the Society in identifying marginalized sections and run community

contributed food kitchens for them using resources from Community Grain Funds formed by women in these villages.

Autonomy over Natural Resources

The DDS women's *Sanghams* have worked on the improvement of their natural resources in multiple ways. Since 1990, they have regenerated over 1000 acres of common land in and around their villages by raising neighbourhood forests. In 28 villages, they have planted over a million trees on the degraded village commons.

The DDS women have also created about 30 Village Medicinal Commons growing over 60 different species of medicinal plants on patches of village common lands.

Autonomy over market

Since 1999, the women of DDS have worked on creating a market with about 2,000 members, comprising ecological, self-produced food crops. The sales of their agricultural and other produce yielded profits as well as dividends for the women. A mobile van selling the locally grown food grains was introduced in 2001 to provide people easier access to the produce (Mazhar et. al, 2007). The Zaheerabad Consumers Action Group was also formed which brought out films on local cuisine and a cookbook using ingredients based on the crops that the women produce. It even runs Cafe Ethnic- a millet restaurant.

Cafe Ethnic is a restaurant in Zaheerabad run by a cooperative facilitated by DDS. The restaurant serves healthy, tasty food made with millets - indigenous grains - rather than rice or wheat.

Household Food Security

Through many of the above mentioned initiatives, DDS has been working towards ensuring household food security of the poor and the marginalized by encouraging them to work collectively on their marginalised lands towards its incremental upgradation. Through this programme, over 4000 members of the DDS women's *Sanghams* have improved their own patches of over 10,000 acres of degraded lands allotted to them by the government of Andhra Pradesh as a part of its land reforms programmes through efforts like bunding, trenching, top-soil addition etc. This has made them improve their crop production by over 300 per cent. Lands which hardly grew 20-30 kg of sorghum / acre sometime back, grow about 100-120 kg of the produce today. This indeed is a remarkable way in improving food grain security for the households in the region.

Food Security for the Community of the Dispossessed

Under this programme, the *Sangham* women work as collective cultivators and take charge of large pieces of land on lease from the land owners who were unable to utilise their land for food production. On an average, each *Sangham* woman member of the land lease group works on the

leased land for four to five days a season and in return earns enough food crop as remuneration. This food would last for their families for over a one month.

Autonomous media - The Community Media Centre

This is a significant communication effort of DDS that needs a special mention. The Society has conducted four-day video training workshops over a 10-month period starting in 1998 for about 10 dalit women in the age group of 16-35 years. Their motivation was varied. The seven women who completed all the workshops learnt about the different parts of a video camcorder, how to use a tripod and shoot, the principles of composing a picture, aspects like camera distance, angle and movement, sound recording and editing on a simple home video system.

Narsamma, one of the first batch graduates, did a dramatic report on the damage to crops caused by heavy rain. She told her story standing in ankle-deep water, surrounded by blackened, soggy crops and spoke eloquently about the destruction of "bajra" and "jowar." Her report was aired on the regional channel of the state-owned Doordarshan television network, as well as on the privately-owned ETV channel. Since then, the women have made more than 100 films on issues ranging from food and seed sovereignty to water and urban displacement.

The community FM radio: The community FM radio centre is yet another step in this endeavour. The operations of this centre began in 1996 with a 100-watt transmitter, which had a 30-km radius and can cover up to 100 villages. A community produced audio was narrowcast through tapes earlier (Pavarala and Malik, 2007). From 15th October 2008, the "Sangham Radio" went on air becoming the first community radio station in India (The Communication Initiative Network, 2009). This radio station broadcasts programmes on health, local foods, education, agriculture, health, tips for weeding and cropping.

All the initiatives of the society are run through Participatory Rural Appraisal [PRA]. This methodology ensures, all the programs will have total participation of the community, especially the women. The society only acts as a catalyst to guide the community into those activities that the community decides to pursue (Satheesh, 2002).

Inferences from the in-depth interviews

In-depth interviews were conducted with the Director and an Agriculture and Nutrition Scientist of DDS. The Director is aged about 55 years and has been one of the founder members of the Society. Basically trained in Journalism and Mass Communication, he has pioneered the participatory approach that the Society adopts in all its programmes. The Agriculture and Nutrition Scientist is aged about 45 and holds a doctorate

degree in Nutrition, was actively involved in the programmes related to restoring the traditional food and farming practices and creation of the alternative PDS.

The inferences from the in-depth interviews with them are listed under the following themes:

Nutrition Communication activities and targeting

When asked about the nutrition communication activities of the Society, the Director said that the approach of the organization is purely participatory and aims at learning from people and helping them spread the knowledge among themselves. Citing the example of their activities related to popularising the locally grown grains, he cited how they learnt from the community about their perceptions of the nutritional values of the local foods from the locally grown crops. He said,

> The local classification of the nutritional status of crop was based on 'heat' and 'cold' elements. Based on these the local people recommend different kinds of foods for different human body types and for different seasons. For instance, finger millet is suggested for winter because it is considered a 'hot' food and similarly little millet is suggested during summers. Similarly, we learnt from them about 200 odd Green Leafy Vegetables that the local villagers use and most of them are unknown to us. We collected people's views on how each one of these GLVs is good for health and our agriculture scientists have gotten them analysed for their nutritive values and they surprisingly matched with the virtues of the same listed by the women. For instance, if they said that by consuming 'x' variety of GLV, 'raktam padtadi' (increase the content of blood) we found that the particular GLV was indeed rich in dietary iron.

Several research papers reiterate these observations (Schmid, 2005; Schmid, et. al., 2006a,b; Salomeyesudas, 2004; Satheesh and Reddy, 2003). For instance, Salomeyesudas's (2004: 18) article on the uncultivated greens, which the local populations consume in their daily diet, suggests:

> To understand the contribution of these green vegetables towards the health of the poor, the uncultivated green leafy vegetables were subjected to scientific analysis… at the National Institute of Nutrition, Hyderabad, for the nutrient composition. The results revealed that *Jonnachemcheli*, one of the most common uncultivated green contains 3237 mg of calcium per 100g of edible portion and 111.3 mg of iron; *Adavi Pullakura*, which is available through out the year, is also rich in iron and calcium, containing 139 mg and 331 mg respectively; and *Tummikura*, which is highly auspicious and consumed by every family, is rich in iron with 81.6 mg per 100 g of leaf. The results once again proved the knowledge and wisdom of our women is far superior.

When asked how they took back this kind of traditional nutrition knowledge to the others in the community, he said,

> It was never done in an organized manner, but in an unorganized manner. Of course discussion and exchange of views and information is an important method of communication. Health workers also meet the women at least once in a month and food and nutrition covers a considerable part of the discussions.

The Nutrition and Agriculture Scientist informed, "Food festivals showcasing recipes with these millets and forgotten Greens went a long way in popularizing the local nutrition knowledge"

When asked how they targeted the communication related to food and nutrition, the Director said,

> As you know, the community radio and film making are important sources of exchange of information. The issues related to food and nutrition and the forgotten millets and the less known

greens are also presented in their films and radio. 'Patapantala Parichayam' (An introduction to the forgotten crops) is an important film.

The Café Ethnic initiative in itself is a method of communicating the nutritional richness of the ethnic food preparations. A typical menu card at the restaurant clearly indicates the ingredients, method of preparation and the nutritive values.

The Agriculture and Nutrition Scientist showing a number of publications, photographs and other documentary evidence explained that a wide range of nutrition communication activities were carried out among diverse audience. She listed a number of nutrition communication activities especially to popularize the traditional foods and millet based preparations. The following are some such activities (Table-11):

Table 11. Communication activities employed by DDS to popularise millet based foods

Communication Activity	Media Used	Target Group	Key messages
Education on nutritional values of traditional food preparations of the region	Comparative charts depicting the nutritional values of traditional food preparations using local millets against the nutritional values of rice, wheat and refined wheat preparations were displayed in schools in villages	School Children	Traditional foods of the region (prepared with locally grown coarse millets, grains) are nutritionally superior to the ones prepared from rice or wheat
Education on uncultivated greens of the region	Specimens of the green leafy vegetables were displayed in the schools and colleges along with their nutritional benefits. Often these were accompanied by a talk by the scientist	School and College students	The uncultivated greens that are consumed in the region are rich in many nutrients as proven by scientific tests. Need to include them in day-to-day diet
Films shows on the traditional foods and their nutritional importance	Video Films made by the *Sangham* women made in Telugu (the local language): - *Mana vantalu Mana pantalu* (Our Recipes and our Crops) - *AAku Kuralu* (Leafy vegetables) – 4 versions	School children, college students and rural women	Traditional foods of the region (prepared with locally grown coarse millets, grains) – their preparation and nutritional advantages The uncultivated greens that are consumed in the region are rich in many nutrients as proven by scientific tests. Need to include them in day-to-day diet

Communication Activity	**Media Used**	**Target Group**	**Key messages**
Programmes on community radio	Radio talks and discussion programme	Rural women	All the above points along side promoting bio diversity and cultivation of traditional food crops
School visits	- Inter-personal communication and group discussions, by the rural women, who go round the village and collect the uncultivated greens and explain their medicinal values and nutritive values - Distribution of Menu cards - Quiz programmes with traditional food systems as a theme	School children and rural women Parents through School children	Less known green leafy vegetables and uncultivated greens which were being used in these areas earlier have medicinal values and nutrients Recipes with millets and greens
Scientific publications and position papers	Dissemination through publications and presentations in conferences, seminars and other for a by the Board members or the scientists of DDS	Scientific community, policy makers and to the development agencies / partners	All the above and related activities of the Society

Communication Activity	Media Used	Target Group	Key messages
Jatras and community festivals (*Pata Pantala Panduga* – Traditional Crops Festival)	An exhibition and village celebration where biodiversity, traditional food festivals, local crops and medicinal plants and their uses are all exhibited at village sites. Discussions and inter-personal and inter-group interactions among the people of different villages in the area	All the villagers	All the above Information sharing, exchange views and discussion/ interactions on various issues like crop biodiversity, knowledge about traditional foods, recipes and their health benefits

Programme Design and Monitoring & Evaluation

One of the main aims of the *Sanghams* as well as DDS being achievement of food security through food sovereignty, the programmes are all aimed at establishing autonomy in local production, local storage and local distribution of foods. The programme design used is participatory in nature. 'Learning from the community' forms the basis for any programme. Perceptions of the local people on the nutritional values of the foods and traditional cooking practices have formed the basis for many an activity aimed at promoting food security through bio diversity and restoration of traditional food crops. The agriculture scientist quoting her/their studies (Satheesh and Salomeyesudas, 2003; Schmid et al, 2006a; Salomeyesudas and Satheesh, 2009) using participatory rural appraisal techniques carried out in late 1990s and early part of this decades claims,

> We were surprised to note that when the farmer women of this region spoke about the nutritional qualities of the uncultivated greens or of the millets, there seemed to emerge a regular consensus among groups. For instance the feeling of strength in the body provided by consuming certain greens was associated by many women with the process of blood formation. To our surprise many of the greens that they were referring to proved to be rich in iron. Do they need any external 'intervention', we just tried to help them spread their 'traditional' knowledge to the others.

With autonomy over the media, the community identifies issues of importance and programmes are aired on the same. The communication process is participatory, involving documentation of the nutritional perceptions of the women and information on traditional foods; identification of the issues for action and dissemination of knowledge through group

interactions and autonomous media. The organisational involvement on behalf of the Society is limited to the extent of facilitating the activities related to media autonomy, food autonomy and sovereignty and promoting biodiversity. The society also helps the local women and *sanghams* in documenting their experiences and in identifying opportunities and avenues to voice their views and showcase their achievements. However, the discussions revealed that specific programmes are not planned out exclusively for food and nutrition communication. Food and nutrition forms an integral part of many broader issues. For instance, food festivals, screening of films on local foods and discussions about nutritional values of the local foods are all important part of the biodiversity festivals (*Jatras)* organised by the *sanghams.* The processions of the mobile biodiversity festivals typically involve collections and display of local seeds; the singers, dancers and drummers join in with their novel and creative compositions covering all these aspects; evenings are marked with food festivals and screening of films made by local women (Mazhar et al., 2007). These festivals, as the Secretary of DDS says, “attract unprecedented participation from the people engaging tens of thousands of villagers from over 60 villages”.

Referring to the specific activities carried out in villages, local schools and colleges, the agriculture and nutrition scientist felt that they were all planned communication activities involving inputs from her and other staff of DDS. Posters indicating comparative charts of nutritive values of traditional foods against rice or wheat preparations were prepared.

When asked whether there was any inbuilt mechanism as part of planning to monitor and evaluate the effectiveness, effects or impact of the food and nutrition communication activities, the Secretary of the Society said,

> Never in an organised manner! From the way the traditional crops are grown, foods are consumed and the alternative PDS that has been developed by women, the failure of intellectual, 'tablet' kind of communication and the success of participatory approach is reiterated.

When asked whether there were any organised efforts to evaluate the success of specific communication efforts in the projects dealing with school/college students, the agriculture and nutrition scientist, who spearheaded the programme confessed, "No! we have never carried out any evaluation."

Budget for Nutrition Communication

When asked about the budget for communication activities, the discussions revolved more around the efforts of the organisation towards financial empowerment of women. To quote the Secretary,

> The *Sangham* women identify the uncultivated lands in their respective villages, and their *sangham*s provide loans after wealth ranking is done by the women. The women grow millets and repay the loan. Jowar ration cars are also issued and that promotes consumption of the millets grown.

When probed about specific budget allocation for the food and nutrition communication activities, he said that there is hardly any separate budget for nutrition communication activities. The scientist was also equally

unsure when she said, “Cannot tell! It could be about 5% of the total budget depending on the project”.

The autonomous media initiatives of the organisation have been funded by a number of agencies, including UNESCO, but the funding remains limited to providing equipment and training to the women. The issues on which programmes are made would be decided by the women.

Indicators of success of food and nutrition communication efforts

Answering a question related to impact assessment, both the respondents indicated that a number of qualitative changes in the community’s food habits were brought about by efforts of the Organisation and those of the *Sanghams*. They said that a large chunk of this success is attributable to communication.

> The very initiative of the alternative PDS and the growing demand for the millets and traditional recipes in the DDS villages is an indication that the village women have articulated their concern on Nutrition and said emphatically that rice had destroyed their traditional food habits.
>
> The *sangham* shops where the sales of millets have gone up can be seen as proxies to indicate that the consumption patterns and food preferences have changed.

Participation in Communication

As documented earlier, community participation is the basis of all efforts of the DDS activities. Women play an invaluable role in conserving traditional foods and transmitting knowledge about nutritional values of

these foods. This knowledge, passed on to them for generations, is being steadily relegated, marginalised and sometimes undermined by the popular media as well as the Government 'welfare' schemes (Salomeyesudas and Satheesh, 2009). The participatory approaches employed by the DDS women in documenting this traditional knowledge and spreading it through a string of related activities seem to have established that food and nutrition issues are intertwined with a number of other aspects that relate to ensuring availability, accessibility and use of the foods.

Comments

Servaes (2002: 17) emphasises that the process of 'participation' in development or in communication involves considering the viewpoint of the local groups of the public. He goes on to observe, "in recognizing that rural people are at the heart of development, by seeking their views and involving them from the start, participatory communication has become what many consider to be the key link between farmers, extension, and research for planning and implementing consensus-based development initiatives". The model being adopted by DDS falls very much into this category. The two very important characteristics which were observed in the current case study can be summarised as follows: firstly, it focuses on 'learning from the people' through a wide range of activities and incorporating these considerations into the programme design, be it to achieve food sovereignty, media autonomy or market autonomy. The intent obviously is not to confront the people (more

so, women) with their inappropriate beliefs, perceptions or resource constraints, but to use these beliefs to build food and nutrition (communication) programmes that engage them. The model also focuses on changing the environment in which people see themselves. Social mobilization is being achieved through creating a local need and demand for change. While doing so the model also seems to underline the understanding that "people" (for the process of food and nutrition communication) does not only mean vulnerable target groups as in most nutrition communication programmes, but involves a cross section of groups and villages. The role of *Sanghams* in engaging women, empowering them and making them autonomous by building a sense of belief and confidence in their traditional food systems, foods and recipes as against the 'elite' or 'Government' ones is significant. The alternative PDS (APDS) and the community media initiatives are very much helpful in facilitating the shift from the non-nutritious 'elite' foods or 'Government' foods to the more traditional millets and greens. The role of the NGO here is of mere facilitation. The role of the Society in substantiating the traditional nutritional perceptions of the local foods with validated scientific information on the nutritional values of these foods would have definitely gone a long way in building the confidence of the people in their traditional knowledge. While doing this, the NGO also helps effect a wider policy change as well as in mobilizing favourable opinions from various quarters (scientific community, donors, government etc).

Yet another observation that this case study brings to the fore is that the nutrition communication per se is not a planned effort by the NGO or by *Sanghams*, but it forms an integral part of the efforts to promote local agricultural practices and cropping patterns. A wider programmatic agenda is to encourage the biodiversity, which DDS says, was affected by the state agriculture and food policies over a period of time. In promoting the traditional food systems through concerted efforts like APDS, the *Sanghams* of the society are perhaps over emphasising their virtues, which may build animosity against or resistance to the so-called elite or government foods.

While the participatory approach allows for involvement of the people in programme planning and implementation, the mechanism for evaluation of the impact, effect or effectiveness of the food and nutrition communication programmes appears to be weak or almost non-existent. A mechanism for evaluation may help in understanding or analysing the extent of change the communication activities have prompted.

CASE STUDY -3:

NATIONAL INSTITUTE OF NUTRITION (NIN)

The National Institute of Nutrition (NIN) is India's premier nutrition research institute, working under the aegis of the Indian Council of Medical Research (ICMR), Department of Health Research in the Ministry of Health and Family Welfare, Government of India. The Institute was founded by Sir

Robert McCarrison in the year 1918 as 'Beri-Beri' Enquiry Unit in a single room laboratory at the Pasteur Institute, Coonoor, Tamil Nadu. Within a short span of seven years, this unit became a Deficiency Disease Enquiry, and later in 1928, emerged as Nutrition Research Laboratories (NRL). It was shifted to Hyderabad in 1958. At the time of its golden jubilee in 1969, NRL was renamed as National Institute of Nutrition (NIN).

The following centres also started functioning at NIN in later years:

- Food And Drug Toxicology Research Centre (FDTRC) in 1971
- National Nutrition Monitoring Bureau (NNMB) in 1972 and
- National Centre for Laboratory Animal Sciences (NCLAS) in 1976

The emphasis of NIN's research work is on problem-oriented research, with a view to discovering practical solutions to nutrition problems that can be applied within the existing socio-economic framework of the country (Narasinga Rao, 2005; Dube, 1993).

The vision of NIN is "to achieve optimal nutrition of vulnerable segments of population such as women of reproductive age, children, adolescent girls and elderly by 2020." And the mission is "to enable food and nutrition security conducive to good health, growth & development and increase productivity through dedicated research, so as to achieve the

national nutrition goals set by the government of India in the national nutrition policy." (NIN, 2009)

In order to achieve these, the Institute has set for itself the following objectives (NIN, 2009):

1. To identify various dietary and nutrition problems prevalent among different segments of the population in the country.
2. To continuously monitor diet and nutrition situation of the country.
3. To evolve effective methods of management and prevention of nutritional problems.
4. To conduct operational research connected with planning and implementation of national nutrition programmes.
5. To dovetail nutrition research with other health programmes of the Government.
6. Human resource development in the field of nutrition.
7. To disseminate nutrition information.
8. To advise governments and other organizations on issues relating to nutrition

The activities of NIN can broadly be categorized in to laboratory research, clinical research, community-based research, nutrition education and communication. NIN's approach to nutrition research is multi-pronged encompassing diverse disciplines. For instance, lab-based research covers a

wide spectrum of areas like bio-chemistry, biophysics, molecular biology, endocrinology, food chemistry etc. Similarly, clinical research covers areas like maternal and child nutrition, microbiological studies and a range of pathology services alongside rendering nutritional rehabilitation services to malnourished children and pregnant women by providing in-patient treatment at the two major hospitals in Hyderabad meant for women and children. The Community-based studies include studies on prevalence of various nutritional deficiencies, operational research, programme evaluations and others. The other three centres on NIN campus – NNMB, NCLAS and FDTRC look into activities involving nutritional monitoring (NNMB, 2009), providing animal models for experimental purposes and food and drug toxicology studies respectively. The following figure gives a bird's eye view of the Institute's research areas and activities (Fig-17).

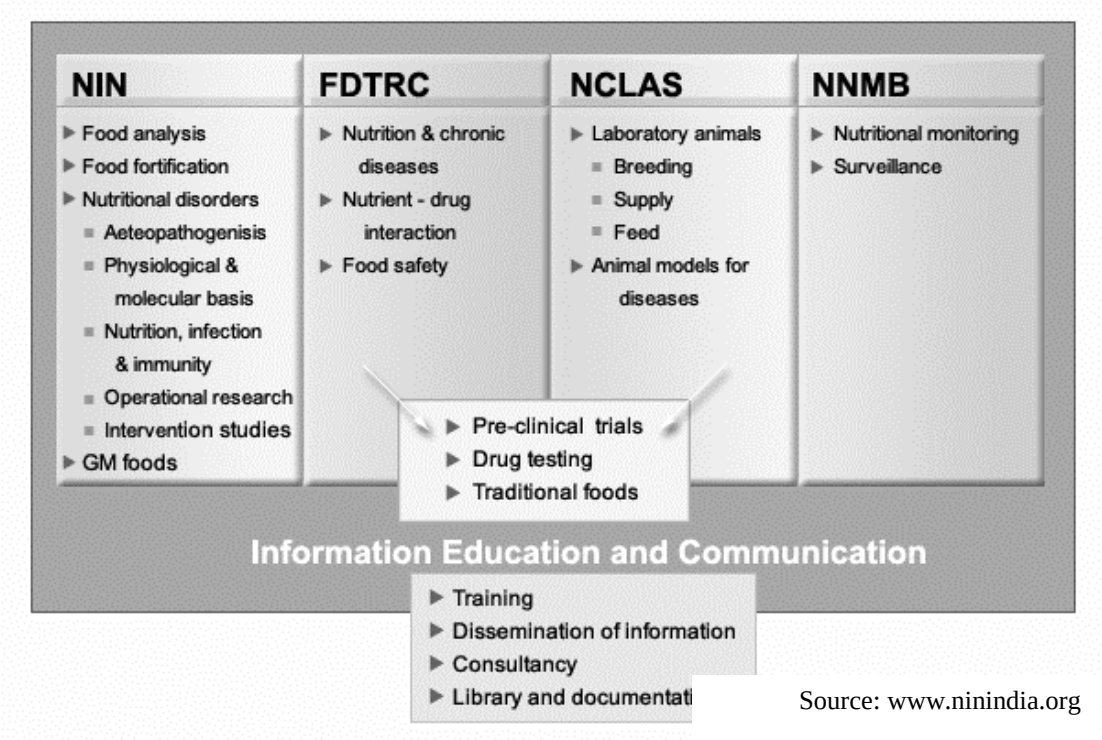

Figure 17. Research areas and activities of National Institute of Nutrition

As can be seen from the above figure, information, education and communication, capacity building through training activities are among the most important activities of the Institute. The main aim of these activities is to take the "fruits of nutrition research to the community" (Dube 1993:6). The Department of the Institute that spearheads this activity is the 'Extension and Training Division' (Fig-18). The Division's activities are multi-pronged encompassing the following:

- **Nutrition communication research**
  - community–based research involving both quantitative and qualitative research techniques.
  - media research including target audience segmentation, content analysis, message designing, monitoring and evaluation.
  - use of social marketing strategy
  - networking with international organizations and other NGOs.

- **Human resource development through training programmes**
  - ***M.Sc (Applied Nutrition):*** The course is currently being revamped to a two-year programme. This was earlier a 9 month specialization programme in nutrition affiliated to the Andhra Pradesh University of Health Sciences for graduates in medicine or postgraduates in Biochemistry / Food Science & Nutrition / Home Science etc. The course drew a number of health professionals, practitioners and academics from Government

Departments, Hospitals, Universities and Institutes as well as self-funded private individuals. The Course combined classroom training with clinic, community and lab-based training. The MSc Programme also had problem-based learning in real-life community settings, task-based learning and seminars. At the end of two years, the students were to come up with a dissertation on a topic of their choice (Mohanram, 2003).

- ***PG Certificate Course in Nutrition***: The Post-Graduate Certificate Course in nutrition is one of the short-term intensive training programmes in nutrition offered by the National Institute of Nutrition, Hyderabad, India, for persons involved in medical education and public health. The course aims to provide the participants an exposure to the latest developments in nutrition science with particular reference to nutritional disorders and strategies for their prevention and control, including allied aspects which are relevant to developing countries; to enable them to develop the necessary skills to plan, implement and evaluate nutrition programmes; and to provide necessary background to help strengthen the nutrition component in teaching in medical colleges and enhance the capabilities of personnel involved in nutrition and health intervention and training programmes. The course extends over a period of 10 weeks, from January to March every year.

- ***Annual Training Course on Endocrinological Techniques and their Application***: This 45-day training programme is meant for medical graduates and post-graduates in Biochemistry employed in Universities and Research Institutes.

- ***Training Course on Assessment of Nutritional Anaemias***: This is a 10-day long capacity-building programme aimed at medical graduates and Post-graduates in Biochemistry who teach in Universities and Research Institutes.

- ***Other Adhoc programmes***: These are the training programmes on any related subject tailor-made for in-service candidates on request from various national, international and voluntary organizations.

- **Information dissemination by**
  - publishing periodicals and books
  - conducting integrated nutrition education camps in villages, slums, industrial organizations and other community settings
  - producing educational aids (multicoloured posters/ charts), Instructional CDs, TV films and regular updating of Nutrition Museum.
  - using print, radio and TV as channels of nutritional communication.

- optimal utilization of traditional folk forms (Street play, Burrakatha etc.) for nutrition education
- commemoration of special events like National Science Day, World Food Day, National Nutrition Week, Breast Feeding Week and National Technology Day.
- information posters and lectures in the modestly stocked nutrition museum on NIN campus (NIN, 2001a; 2009).

Figure 18. A Collage of Nutrition Education Activities of Extension and Training Division, NIN

Inferences from In-depth interviews

In-depth interviews were conducted with two staff members of the Extension & Training Division – one is a Scientist 'D' and the other was 'Communicationist'. The Scientist is a PhD in Sociology and has been actively working in the area of nutrition communication research for over a decade. Her research studies in the recent past have involved communicating nutrition information to school children (Vijayapushpam *et.al.* 2003, 2008; Raghunatha Rao, 2007; NIN, 2002) and to rural women as well as using the Student Volunteers from Universities as agents of change. She is aged about 50 years and the interview with her was conducted in English.

The Communicationist is aged about 51 and holds dual Masters Degree in English as well as Journalism and Mass Communication. He has been with NIN for over 25 years and is actively involved in many activities like delivering nutrition talks, conducting awareness programmes and exhibitions. He also edits NIN's popular quarterly periodical 'Nutrition' (in English) and *Poshan* (Hindi) and several other communication materials like brochures, leaflets and films. In-depth interview with him was also conducted in English.

Inferences from these two interviews have been coded and categorized under the following themes;

Nutrition Communication activities and targeting

Speaking about the nutrition communication activities, the Scientist said that her activities are multi-pronged involving simple information dissemination on dietary guidelines, cooking tips and nutrition to various groups of people in community settings like educational institutions, villages, women's groups, urban slums etc.

> I can divide the nutrition education and communication activities that I undertake into two categories - structured and unstructured. Structured Communication activities are those done as part of our research projects, which involve planning, collecting baseline data, communication material preparation, pre-testing and communicating etc., the unstructured ones are like the community awareness programmes, lectures, radio talks, conducting exhibitions etc. in different community settings.

The Communicationist too listed all the above nutrition activities and added,

> … we also bring out a string of informative and low-priced books and journals in English as well as in some regional languages. These publications contain the essence of Institute's research over the years. And, we also bring out quarterly periodicals called 'Nutrition' (in English), Poshan (in Hindi) and Poshana (in Telugu) which contain simple articles and easy tips on a wide range of nutrition topics.

When asked about the audience to whom these activities are targeted, both of them said that the unstructured nutrition education / communication activities are meant for diverse groups.

> For instance, when community awareness lectures are carried out say in villages or slums, there is likelihood that men, women and children from different sections are there. If these activities are organised in co-ordination with NGOs or Universities or government departments, then the audience are from particular groups like, women, students, health workers etc.

Speaking about the nutrition education and communication activities in the research projects, the Scientist said,

> This communication is usually structured and targeted. For instance my earlier research projects dealt with school children, then, obviously their teachers and school children themselves were our target audience. When I dealt with the University student-volunteers, though our focus was to reach the rural and slum dwelling-women, our primary target was student volunteers who in turn were expected to take the message of nutrition to the women. So it varies from project to project.

When probed about the messages for different target audience and the media, the Scientist said,

> My emphasis in all IEC programmes is on the need to eat a variety of foods to get all nutrients. Then I also cover the food groups, functions of food and the need for balanced diet as well as the foods that are rich in micronutrients. If the target group is women of reproductive age, then I emphasise on iron deficiency anaemia.

Adding about the media she often chooses to 'convey' the messages to different target groups, she said,

> I try to use suitable media to different target groups. It usually depends on the education level of the target groups. For example, for school children I have been using CDRoms, slides and charts coupled with lectures. For student volunteers I used, folk art form in a recent project, otherwise I use folders, charts and flip charts. When dealing with women I use flex sheet charts and flip charts as support to the interactive discussion method of information sharing.

Alongside the above mentioned nutrition communication research and extension programmes, both the respondents indicated that human resource development through nutrition education in structured training programmes as one of the important activities of their Division.

> Our training programmes, be it the PG Certificate Course or other short-term courses are aimed at capacity building in nutrition sciences. Ours being a research Institute, the participants of these programmes get to interact with the scientists working in the field in the classroom sessions which promote interactive learning. Apart from these a number of seminars, field visits, lab work and task analyses give them a practical understanding of 'applied' nutrition.

Speaking about the MSc (Applied Nutrition) Programme that is being revamped, he said "…our MSc (Applied Nutrition) programme is being revamped now to build young force in nutrition. We are now targeting the programme at fresh graduates also. It will be a two-year programme with affiliation from NTR University of Health Sciences, Vijayawada, AP."

He also spoke about a variety of other communication strategies that they adopt to disseminate the nutrition messages, like writing articles in health columns of popular dailies where readers from a cross section of the society become their target audience. He added,

> Similarly, our quarterly bulletin 'Nutrition' has wide readership ranging from like students, faculty from Universities, women, senior citizens and general audience. 'Nutrition News', yet another periodical from the Institute, lucidly summarizes recent research studies and is aimed mainly at students of Nutrition, University faculty and researchers.

Programme Design, Monitoring and Evaluation

Commenting about the programme design both the participants of in-depth interviews indicated that there was no specific programme design for the Institute's 'routine extension activities', which involve community awareness programme, radio talks, extension talks, exhibitions etc. The

celebration of special events like the National Nutrition Week, World Food Day, National Science Day, Breast Feeding Week etc involve some planning.

However, nutrition communication research studies have a specific programme planning and they differ from project to project. The study protocols are usually approved by a group of experts in the Scientific Advisory Committee (SAC), which meets every year and reviews the future, on-going and completed research studies. The committee usually analyses all the projects at all stages very critically from various points of view such as study design, rationale, methods, proposed statistical analyses and expected outcome. The research studies can be carried out only when they are cleared by the SAC.

When probed about specific programme planning in her recent studies, the scientist said,

> The study design was in a way similar in some of my recent studies. They all involved baseline data collection, (usually) based on knowledge about the nutrition topic of interest, identifying lacunae in knowledge, development of communication material, using it as an intervention and assessing its impact in terms of knowledge improvement.

She admitted that all her recent studies have more or less dealt with knowledge dissemination using different media and assessing the impact of such nutrition education/communication on knowledge levels of the 'study subjects'. As regards monitoring and evaluation components, she said that

they are built-in components of any research study that they take up. While speaking about the evaluation process by SAC she rued,

> There is hardly any expert from Social Sciences in the SAC. Having some social scientists in the Committee I think will further enhance the external evaluation of our projects.

Talking about the nutrition education (training) programmes of the Institute, the Communicationist said that they have an in-built mechanism for periodic evaluation of course structure, content, utility, perceived benefits etc. It is usually carried out using 'appropriate' instruments like questionnaires, which are administered to the participants at entry and at immediate post-training period. He said the faculty evaluation forms filled up by the trainees help them assess the quality of teaching. He also referred to some earlier follow-up evaluation studies (by Mohanram et al., 1997) that looked into the perceptions of the trainees on relevance of the course in their day-to-day functioning after joining their official positions. He, however, said,

> Such follow-up evaluation has not been done for a long time now. However, the pre and post-training evaluations are still on. We make use of them for improving or altering our programmes.

Budget for Nutrition Communication

Funding for the research projects is either from "intramural (from ICMR or NIN sources) or extramural sources (other external funding agencies)". The scientist said,

> So far all my research projects, for that matter almost all the research work done in the last decade was funded from intramural sources. Ones the SAC approves a study protocol; it will get some sanction from the Institute's funds. However, if the amount is

> really high, then they (SAC members) suggest that we should try out elsewhere. For my studies, although I faced some problems of inadequate funding I resolved them with the help of my superiors.

She added saying that for projects that have duration of more than a year, the inflow of funds is based on the SAC's recommendations after assessing its progress every year.

When asked about funding for their extension activities, the Communicationist said that the printing of many communication materials such as the journals, periodicals and other popular publications is done at the Institute using the 'modest' printing facility. For the celebration of special events, the Institute provides funds. The communication material prepared under various research projects is also used during extension activities. He added,

> There was a proposal to revamp the nutrition museum at the Institute and a budget of about 16 lakh rupees was drawn up quite sometime back, but we never got the sanction so far.

Indicators of success

When asked how they measured the success of their extension programmes, the responses were varied.

> It's often difficult to estimate success of an extension activity like a lecture or an exhibition or community awareness programme. If such programme can result in a positive change in their behaviour or lifestyle, then I consider it successful… when we seldom get an opportunity to visit the same place or meet the same group, it would be extremely difficult to estimate what impact such knowledge dissemination has made.

> When I happen to back to the same village or the slum, people recognize me and some and tell me that they are following my advice, then I consider nutrition education had been successful. I think interactive discussions coupled with visuals will have a great impact among women.

Speaking about the structured communication research projects, she said, “each study has a set of indicators, which help us assess the success of our communication efforts. Usually it is the knowledge improvement. We usually analyse using knowledge scores and if there is statistically significant improvement (in scores) after the education/ communication intervention, we conclude that it has been successful.”

When probed if behaviour change or shift in dietary habits were ever considered as indicators of success, she said that their research studies in the recent past have only measured knowledge improvement, but not change in dietary habits or behaviours.

Community Participation

It was obvious from the discussion that the scope for community participation was limited or non-existent. Since most of the extension activities are meant for information dissemination, there is extremely limited scope for community participation. Both the respondents informed the interviewer that they would try to make even these sessions interactive, thus encouraging at least minimal participation from the audience. Citing some examples of how she tried to make the education programmes interactive and relevant to the audience that she was addressing,

> For instance, while going for an extension programme at Rajapalyam (in Tamil Nadu), I saw vast fields of Bajra around the highway. Before starting my talk in a nearby village, I started by asking them whether they eat Bajra, which is so widely grown around their village, I was surprised to learn from the people that they do not consume what they grow, but sell it in the market. Then my talk revolved around the importance of traditional foods, how millets are superior to rice or refined wheat flour etc. It was very well received.

After citing a few similar examples she said,

> In fact community participation is limited to interacting with them. From my side, I try to do need based communication. Most of them (audience) are illiterate, they hardly have any knowledge of nutrition, how can we involve them?

When asked about the extent of community participation in the research projects, she said it was limited to participating in pre and post-intervention assessments. To a question on whether they ever tried to at least understand the media preferences of their audience, she replied in the negative but said,

> In the current project dealing with student-volunteers and rural women, we made efforts to understand their media preferences and design the communication material accordingly.

Referring to the other research studies carried out by some of his colleagues in the Division, the Communicationist said,

> In some school-based nutrition education studies, we involved teachers right from the beginning, teachers were trained in the media they preferred, they were involved in preparation of educational material and they were actually asked to adopt the same material to the school children.

Comments

From the in-depth interviews conducted at NIN, the point that came up front was that the Institute's research projects are only directed at understanding the uses of different media/approaches to disseminate nutrition messages to the community. There is hardly any scope for repeating these experiments in many social settings or for making them self-sustaining. The successes or failures of employing certain approaches, methods or communication material documented by the researchers of the Institute were being disseminated to various organisations, policy makers, media etc from time to time, with the hope that this research is put into action by the other stakeholders. Although effective approaches and media and communication tools identified through the research projects carried out at NIN are being disseminated through various in-house journals, conferences etc., these are still scattered efforts.

Over all analysis of the nutrition communication or education efforts of NIN appear to in the 'communication–effects' perspective predominantly with an implicit assumption that isolated individuals are relevant behavioural units. Many communication efforts of NIN seem to be viewing the effects (in terms of knowledge gain or behaviour adoption) from the 'Sender's' perspective and do not seem to have examined the unintended consequences of communication especially given the fact that the individuals are not atomized units unconnected and uninfluenced by the context. On the other hand, it can be argued that this perhaps is a valid approach given the fact that

most studies by NIN have aimed to look at short-term effects of communication and education activities. In fact, Yarbrough (1981) in his review of 'Communication Theory and Nutrition Education Research ' argues, "despite the limits of communication effects approach, it is probably unexcelled for evaluation of relatively short-term communication and education campaigns. This approach provides a relatively simple way to determine what type of people have responded in what way to our efforts".

The other term that repeatedly occurred during in-depth interviews, and was not documented in the inferences earlier was the Information, Education and Communication (IEC) approach. There are three underlying components that seem to be promoting awareness and understanding of nutrition issues among the 'common people'. Firstly, by providing information ie., facts and issues to the attention of audience in order to stimulate discussion in extension and awareness programmes. Next, the education component which aims to foster knowledge and thorough understanding of problems and possible solutions through formal and non-formal education. Finally, the 'communication' component by way of smaller research efforts, with an ambition to influence attitudes, disseminate knowledge and to bring about a desired and voluntary change in behaviour.

The nutrition education/communication programmes are still grounded in the 'extension' mode of activities and do not seem to address issues beyond mere sensitization or awareness creation. The larger

perspective of understanding the context of the audience and advocating for creation of enabling environment for bringing about the desired behaviour change seem to be lacking. Since capacity building and extension activities use inter-personal communication, face-to-face communication coupled with other communication tools such as posters, brochures, flip charts and films, they can be broadly characterized under the 'Education Communication Approach' mentioned by Valyasevi and Attig (1994) (detailed in earlier chapter on trends in nutrition communication). Some of the research projects of NIN (Subba Rao et al, 2007; Raghunatha Rao et al, 2008; Vijayapushpam et al., 2009 (on-going); NIN, 2001b, 2002, 2003, 2004, 2005, 2006, 2007) that adopted limited participation of the community for understanding the media preferences and involving them in adopting the communication material for further dissemination of knowledge, can be categorised under "Participatory Action" approach. Other projects (Vijayapushapm et. al., (unpublished), Subba Rao *et al.,* 2007, Ramadasmurthy *et. al.*, 1973, 1992a &b; Rau, 1991) seemed to be subscribing to the two-step / multi-step flow of communication approach by attempting to reach the primary target through 'agents of change' – like school teachers or student-volunteers as the case may be.

To sum up it appears that the selection of specific communication approaches is not primarily based on their analytical or normative value, but rather, on institutional factors and expectations such as the number of projects one handles, logistic compulsions, limited manpower, prospects of getting financial support , clearance from SAC, and career upgradation.

Discussion and Conclusions

The three case studies presented different institutional perspectives on nutrition communication. One obvious conclusion that can be drawn from all the three case studies is that they adopt not one method but different methods for nutrition communication. Although nutrition communication is one of the primary activities of both FNB and NIN, the methods adopted are predominantly rooted in top-down approaches with information dissemination as an important objective. The capacity building and community oriented extension activities of NIN or the awareness programmes and demonstrations of FNB largely adopt inter-personal or face-to-face communication aided with a range of small media (like folders, charts, folk dance forms in local languages). Many researchers have concluded that inter-personal or face-to-face communication is widely used and plays a key role in health communication (Piotrow et al, 1997). Smith (1997) who analysed nine case studies on nutrition communication approaches in different countries concluded that "it is generally agreed that interpersonal methods conducted in local communities are appropriate to address the common problems of nutrition, and no doubt will continue to be, a major focus for nutrition education programmes".

Although DDS adopts a participatory approach, its primary focus is not food and nutrition. The organisation views food and nutrition communication as a tool to engage women in achieving food autonomy among many other aspects towards attaining the broader goal of women

empowerment. The food and nutrition communication efforts are largely concentrated in reviving the traditional agriculture practices and thereby the traditional food habits in the region. This model truly meets the participatory approach, as described by Ad Boeren (1992), by stimulating critical analysis, to develop confidence and awareness by organizing groups and communities. Likewise, Servaes (1996) comments that participatory development requires the acknowledgement that the 'receiving community' has the knowledge and ability to develop themselves and their environment. But others (Dudely, 1993; Brownlee-Greaves, 1999) have raised concern about placing a great amount of knowledge and capacity within the hands of the 'community', which sometimes needs external inputs for right awareness.

It is possible that the participatory approach adopted by DDS is successful because of the limited area of operation of the NGO and its *Sanghams*. But this evidence is barely enough to conclude its effectiveness on a broader canvas. This seems to be an inherent limitation of participatory approaches to development communication. In this context it would be appropriate to quote Waisbord (2005: 84), who says “having successfully challenged old conventions, participatory approaches have not devoted sufficient time to the consideration of several questions. Under what conditions is participation possible? What happens when participatory ideals run counter to community norms or are rejected by local authoritarian practices? How is participation possible at different stages of development programs (e.g. funding, planning, instrumentation, evaluation,

sustainability)? How is community empowerment and participation measured?"

Yet another important observation is that the nutrition communication activities of all the three organizations lack evaluation in the planning. This makes it difficult to attribute any change be it in behaviour or in improvement of nutritional status to a particular communication process. The necessary evaluation component present in the research projects of NIN in a way make it possible to attribute change in the identified variables to a particular communication process in empirical terms, but this is obviously absent in the approaches adopted by other two organizations.

From these case studies, it can be concluded that the institutional goals and dynamics and budgetary constraints determine the use of communication approaches. The selection of specific communication approaches is purely based on institutional factors and expectations. The bureaucratic requirements and target-oriented tasks favour the use of informational models in FNB leaving no scope for participatory approaches to communication. The Standard institutional procedures of NIN in a way are based on the understanding and use of communication as a set of technical skills to disseminate messages. In case of DDS nutrition communication is only a support activity in achieving a broader goal of social change and development by lifting up the spirits of a local community to take pride in its own culture, intellect and environment.

Chapter 6

SUMMARY & CONCLUSIONS

India is today facing a strange paradox, being home to millions of undernourished on the one hand and confronting the alarmingly growing prevalence of overweight and obesity among its population on the other. The search for solutions to tackle these problems had often pointed at nutrition communication as one of the necessary conditions. Despite unequivocal constitutional commitments and a surfeit of national programmes to ensure food and nutrition security to its millions, India is far from reaching its own targets in alleviating malnutrition. Given the labyrinth of nutritional problems, the programmes that deal with them and the actors in the field of nutrition communication, diverse strategies are in use and they are expected to serve a range of purposes such as awareness creation, demand generation for nutrition programmes, building human resources, policy advocacy, bringing about behaviour change. Given the multitude of approaches and the actors in the area of nutrition communication an attempt was made to critically analyse various approaches and models in use.

In order to study these approaches, the evolution of nutrition research and theoretical underpinnings of the field of development communication were explored to track how nutrition communication research and practice (globally as well as in India), responded to these changing trends. Historically, nutrition has evolved as a specialised area only in the previous century, especially during the British rule. During the early part of the previous century, with emphasis on poverty alleviation and ‘rural

upliftment', nutrition along with sanitation, became an important part of the nationalist agenda during the colonial times. The terrible famines that hit the country provided for a string of operations on increasing food security by strengthening agriculture and availability of foodstuffs. However, in the post-colonial era with the planners using globally circulated 'new' medical technologies to fight infectious diseases (like malaria) and to mitigate population growth, nutrition appears to have been relegated to the backseat. With the assumption that improving some social and economic determinants and increasing agriculture production the nutrition of the people could be taken care, India embarked on the green revolution and some welfare measures. Hence, programmes for nutrition improvement have generally been looked upon as welfare relief operations, rather than as aspects of the fulfilment of an essential pre-condition for social and economic development. Only in recent years, has there been increasing recognition of the importance of the nutrition factor in development, and several large-scale nutrition intervention programmes have been attempted. Nutrition programmes, still do not enjoy high priority or adequate resource allocation in the development agenda.

As regards nutrition education and communication, the present study has indicated that the obvious shift in development communication thinking – from modernization to dependency to multiplicity and participation was more or less seen even in nutrition communication research and practice. Nutritional concerns were integrated into various developmental policies and

programmes of the Government of India. Non-Governmental Organizations (NGOs) and international organizations like WHO, UNICEF and FAO are also putting in considerable efforts in taking the message of nutrition to the community. But in many of these endeavours, there has hardly been any evidence of separate evaluation of the nutrition education/communication components, making it difficult to attribute the behaviour change or adoption of nutrition knowledge to practice directly as an outcome of education or communication. There is also a dearth of published literature even of the scattered studies and smaller experiments conducted in different parts of the country, especially by NGOs, University Departments and students. This draws our attention to the need for documenting all nutrition education and communication programmes and studies for use by the fraternity working in the area.

The methodological innovation attempted in the thesis by bringing together a number of case studies in different settings and community contexts (each employing a different approach), helped explore how content is determined by approach and how the approach is in turn influenced by the context. The case studies that dealt with different approaches of communicating nutrition information to young audiences in educational institutions, yielded interesting findings. These studies supported the idea that providing nutrition education to adolescents in classroom settings is effective and an efficacious way of imparting nutrition knowledge. But all the

approaches experimented only with achieving knowledge improvement after planned information dissemination. This may not necessarily lead to change in dietary practices.

These approaches heavily relied on inter-personal communication and suggest that person-to-person communication is still a very effective means of providing nutrition education. However, they also demonstrate the effectiveness of multi-media approach to complement interpersonal communication. Even though the benefits of using computer-based nutrition education tools in schools is widely documented, our studies using CD-Rom intervention did not result in any further improvement in nutrition over the traditional classroom teaching. Most of the adolescents who received computer aided education viewed computers as entertainment devices rather than educational devices. While the significant 'positive' increment observed using folk-dance based intervention as compared to the traditional teaching, indicates that the visual impact coupled with folk music helped in retaining attention of the young audiences. This suggests that indigenous media can still be an effective means to complement interpersonal communication.

But the key issue is the participation of teachers and schools to encourage nutrition communication. In all the three studies it was not very easy to get teachers to cover these 'extra' topics outside the curriculum. The reluctance of the educational institutions to take up activities outside the

regular curriculum can perhaps be overcome only by making nutrition education part of the school curricula or by strengthening the existing components pertaining to this subject.

Supporting this argument were the observations made from the detailed analysis of the nutrition component in the school science curricula, which draw our attention to the abysmally low space allocation for nutrition topics in school science textbooks. Nutrition component is almost elusive at high school level and even if it is covered, it only deals with food groups or nutrient deficiency disorders. It can be recommended that syllabi can be modified to include many important topics such as nutrition and growth, link between childhood malnutrition and non-communicable diseases in adulthood, nutritional requirements during adolescence, nutrition for girl child, hidden hunger, lifestyle factors and obesity, nutrition during pregnancy and lactation, importance of breast feeding, unhealthy foods, fortification etc. be covered in the curricula.

Taking a macro perspective, when the institutional approaches to nutrition communication at community level were studied, three organizations were purposively selected from three different sectors viz., Government, Voluntary Sector and Research. These case studies indicated that nutrition communication uses a combination of methods, but like in any many other health communication efforts elsewhere in the world, the

methods adopted are predominantly rooted in top-down approaches with information dissemination as an important objective. They largely adopt inter-personal or face-to-face communication aided with a range of small media (like folders, charts, folk dance forms in local languages). Even in some isolated cases where participatory approach is being used, nutrition communication is just one of the many tools in achieving broader goals of community empowerment and hence lack focus. Among many other factors our studies, especially with the Deccan Development Society established that they are stimulating critical analysis, to develop confidence and awareness among communities about their traditional food systems and practices. Their approach also focuses on changing the environment in which people see themselves. While doing so their approach also seems to underline the understanding that "people" (for the process of food and nutrition communication) does not only mean vulnerable target groups as in most nutrition communication programmes, but involves diverse audiences from a cross section of groups and villages. The alternative PDS (APDS) and the community radio and video initiatives have been pivotal in facilitating the shift from the non-nutritious ‘elite’ foods or ‘Government’ foods to the more traditional millets and greens.

Nutrition communication activities of all the three organizations studied lack evaluation components in their planning. This makes it difficult to attribute any change, be it in behaviour or in improvement of nutritional

status, to a particular communication process. The necessary evaluation component present in the research projects of NIN in a way make it possible to attribute change in the identified variables to a particular communication process in empirical terms, but this was obviously absent in the approaches adopted by the other two organizations.

The institutional goals and dynamics and budgetary constraints determine the use of disciplinary and theoretical approaches. The selection of specific communication approaches is not primarily based on normative value of the approach but purely based on institutional factors and expectations. The bureaucratic requirements and target-oriented tasks favour the use of dissemination approaches by FNB leaving no scope for participatory approaches to communication. The standard institutional procedures of NIN in a way are based on the understanding and use of communication as a set of technical skills to disseminate messages. In case of DDS, nutrition communication is only a support activity in achieving a broader goal of social change and development by lifting up the spirits of a local community to take pride in its own culture, intellect and environment. But there is always a concern about placing a great amount of knowledge and capacity within the hands of the 'community', which sometimes may need external inputs. One question that needs to be explored is whether the results from this community empowerment and participation project be trickled up or trickled-across, resulting in the uptake of the people’s knowledge into the health and nutrition science as well as policies with movement‘ across’ of successful

community-based communication approaches into other settings. Similarly from various approaches employed in the current study at micro-level or from the community based efforts of various organisations, there are persuasive explanations and findings about ‘what works’ in small-scale community projects but the concern about scaling them up for broader application still persists.

It may not be inappropriate to conclude that an array of disciplines and approaches, including, behavioural science, social marketing or health education and promotion has converged in the field of nutrition communication and continue to inform research and programmes. It is proven beyond doubt that no single approach will be continuously effective or suitable to the resolution of all problems of malnutrition, but each approach has proven effective for certain problems at certain stages of behaviour change or social development in certain contexts. Hardly any of such successes actually reach the frontlines of development programmes. What is more important today is to document and disseminate successes and failures of different approaches so that costly errors can be avoided. This can also produce a wealth of valuable insights and lessons, which are needed for future research and action as nutrition communication harps on a range of disciplines that account for the diversity of approaches, concepts, and methodological tools.

Despite the cross-pollination of models and multi-strategy interventions, the rift between institutional considerations and approaches for nutrition communication seems to continue. Behavior change appears to be the ultimate aim of communicating nutrition information ignoring local knowledge, with apparent assumptions – 'people are not aware 'or 'what they know is wrong'. The institutional choices of approaches to communication seem to emphasize on individual knowledge changes (with an assumption that knowledge gain would lead to behavior change), while underplaying the need to address larger political / policy issues that affect the quality of life. This location of the behavior in the individual is problematic because it ignores the role of context and structure in which the individuals exist, and is only cognitively oriented. Such approaches continue to be mainly concerned with measuring the success of different 'intervention strategies'. These diverse intervention strategies have often been seen as alternatives to extant nutrition communication approaches. However, even these seem to have been systematically integrated within a single framework and positioned against the backdrop of the dominant top-down, expert driven approaches. This highlights the need to examine the context in which the organizations function. The context for many organizations is created by the centres of authority (such as State, UN agencies or funding agencies), which often define, problematize nutrition priorities and frame solutions for the same. Added to these, the institutions in different sectors that operate in tandem with the priorities set by the state or centres of authority have to

invariably work in a predetermined framework of problematized issues, priorities and solutions. They are usually dogged by factors like bureaucratic dynamics, institutional procedures, ideological convictions of the policy makers, available funding, power hierarchies and changing national and international health priorities. Juxtaposing these institutional approaches to the participatory approaches that base themselves on articulations that emerge from within the cultures, one finds that the problems or priorities are configured and reconfigured by the community and solutions emerge from within the context in which the individuals function. In such a case the organizations become mere facilitators. However, if the priorities or solutions emerging from the community are not in tandem with those problematized and prioritized by the dominant centres of authority, it calls for parallel communication processes to take various stakeholders (even the state) into confidence.

Considering that the content of communication process is largely determined by the choice of approach, which, in turn, is determined by the context (both of the individuals and organizations), there is a need for expanding the locus of nutrition communication approaches from targeting the individual behaviors to creating a conducive social context. For organizations to do this there should be basic understanding that internal and external factors influencing the choice of communication approach are not independent of the context in which they (organizations) in turn function. The

centres of authority (such as State), which often define and problematize nutrition priorities should at least cease from framing solutions for creating an environment for the organizations to explore and experiment with various approaches and to integrate with other institutions deeply rooted in a given society. If this is not done immediately, the current dichotomy of some projects aiming to preserve and strengthen local beliefs / practices and others aiming to almost replace them with 'scientific' knowledge may end up in causing a mere cacophony of conflicting messages than alleviating people from the maladies of malnutrition.

It will be a worthy effort for communication researchers to understand how various socio-cultural and economic considerations influence the choice of approaches for communicating nutrition information. Documenting these, would go a long way in creating an evidence for defending the argument that for the process of communication to trigger a change, the context should be conducive.

In efforts related to promoting nutrition and health, communication's role should be seen as beyond merely producing materials for information dissemination or as a mere optional line in the programmes and budgets both at organizational and national levels. Communication should be a fundamental component of all health and nutrition programmes, with appropriate provision for budget and a strong evaluation component incorporated right at the planning stage.

As articulated in the previous sections, no one paradigmatic approach is adequately positioned to capture the complexities of the context and the process of communication. For nutrition communication to be successful, multiple levels of communication from diverse perspectives need to be simultaneously activated, with a concomitant dialogical engagement among the scholars and practitioners using different paradigmatic approaches operating at the different communicative levels. The reality of message exposure, understanding, behavioral change and the factors influencing the same can only be captured when the broader context is introduced into the framework of communication planning and practice. For this, the communicators should go beyond their institutional factors as well as individual beliefs to choose approaches from a synthesis of models and practices in order to harness the multiplicities of communication theories and lessons from the past, while addressing the diversity in the contexts.

BIBLIOGRAPHY

1. Achaya, K.T. (1994). *Indian Food: A historical companion*, New Delhi: Oxford University Press.
2. Achterberg, C. (1993). "Update on nutrition communication", *Report of the Inter-Country Workshop on Nutrition Education for South and East Asian Countries, Salaya, Thailand, 22-26 February 1993*. Rome: Food and Agriculture Organization.
3. Agunga, R.A. (1997). *Developing the Third world. A communication approach*. Commack, NY: Nova Science.
4. Albasena, N.G. (1971). "A giant step in nutrition education", *School Lunch Journal*, Vol.25: 106.
5. Amrith, S. (2006). *Health and well-being in colonial and post colonial India* (Unpublished). Available at: http://weblamp.princeton.edu/~chw/papers/amrith_health_wb_colonial_postcol_india2006.pdf (accessed: 1st May 2008).
6. Amrith, S. (2007). "Political culture of health in India", *Economic and Political Weekly*, Vol.42 (2): 141-121.
7. Amrith, S. (2009). *Heal in India since Independence,* BWPI Working Paper 79, Manchester: Brooks World Poverty Institute, University of Manchester. Available at: http://www.bwpi.manchester.ac.uk/resources/Working-Papers/bwpi-wp-7909.pdf (accessed: 18th November, 2009).
8. Andreasen, A.R. (1994). "Social Marketing: Its Definition and Domain", *Journal of Public Policy & Marketing*, Vol. 13 (1): 108-114.

9. Andrien, M. (1994). *Social communication in nutrition. A methodology for intervention*, Rome: Food and agriculture Organization.

10. Aranceta, J. (2003). "Community Nutrition", *European Journal of Clinical Nutrition,* Vol.57 (Suppl 1): S79–S81.

11. Arnold, D. (1993). *Colonizing the body: State medicine disease in nineteenth century in India*, University of California Press: Berkley. 241.

12. Arnold, D. (1994a). "Crisis and contradiction in India's Public Health", In: Porter, D. (ed.), *The History of Health and the Modern State*, Amsterdam, Netherlands: Clio Medica, Wellcome Institute Series in The History of Medicine, Vol.26 of. 335-353.

13. Arnold, D. (1994b). "The discovery of 'malnutrition and diet in colonial India", *The Indian Economic and Social History Review,* Vol. 31(1): 1-26.

14. Ascroft, J. and Masilela, S. (1989). *From top-down to co-equal communication: Popular participation in development decision-making.* Paper Presented At The Seminar On Participation: A key Concept in Communication and Change. University of Poona, Pune, India.

15. Bajaj, S. (1990). "Nutrition security system at household level - policy implications". *Women and nutrition - Nutrition policy discussion paper No. 6*, Geneva: United Nations Administrative Committee on Coordination - Subcommittee on Nutrition (ACC/SCN). Available at : http://www.unsystem.org/scn/archives/npp06/ch18.htm (accessed: 29th May 2008)

16. Bandura, A. (1977). *Social learning theory*, Englewood Cliffs, NJ: Prentice Hall.

17. Banerji, D. (2004). "The people and health service development in India: A brief overview", *International Journal of Health Services,* Vol. 34(1): 123-142.

18. Basu, A., Roy, S.K., Mukhopadhyay, B., Bharati, P., Gupta, R., and Majumder, P.P. (1986). "Sex bias in intra-household food distribution: Roles of ethnicity and socioeconomic characteristics", *Current Anthropology*, Vol. 27(5): 536-539.

19. Basu, A.K. (1982). "Some perspective of the cultural impact of European medical sciences on the development of scientific medicine in India", *Indian Journal of History of Science*, Vol. 17(2): 326-332.

20. Berg, A. (1987). *Malnutrition. What can be done? Lessons from World Bank experience*, Baltimore: John Hopkins University Press.

21. Berg, A.D. (1970). "Nutrition as a national priority – Lessons from the India experiment", *The American Journal of Clinical Nutrition,* Vol. 23(1). 1396-1408.

22. Berg, B. (1998). "Content Analysis", In: Berg B. *Qualitative Research Methods for the Social Science,* Boston: Allyn & Bacon. 233-252.

23. Berlo, D.K. (1960). *The Process of Communication: An Introduction to Theory and Practices,* San Francisco: Rinehart Press.

24. Bhaskaram, P. (2001). "The cycle of malnutrition and women's health", *Nutrition News,* Vol. 22(4): 1-6.

25. Boeren A. (1994). “Getting involved: Communication for participatory development”, *Community Development Journal*, Vol. 27: 259-273.

26. Bordenave, J. D. (1994). “Participative communication as a part of building the participative society”, In: White, S.A., Nair, S.K. and Ascroft, A. (Eds.), *Participatory Communication Working for Change and Development*, London: Sage.

27. Bradford, B. and Gwynee, M.A. (1995). *Down to Earth: Community Perspectives on Health, Development, and the Environment*, West Hartford, CT: Kumarian Press.

28. Brownlee-Greaves, T. (1999). *A Critique of Forms of Participatory Development and Communication: Phase – A Case Study*, Unpublished Honours Project Submitted to University of Natal - Durban, South Africa. Available at: http://ccms.ukzn.ac.za/docs/tracy.zip. (accessed: 30th April 2009).

29. Buchanan, D.R., Reddy, S. and Hossian, Z. (1994). “Social marketing: A critical appraisal”, *Health Promotion International*, Vol. 9 (1): 49-57.

30. Cannon, G. (2002). “Nutrition: The new world order”, *Asia Pacific Journal of Clinical Nutrition*, *V*ol.11 (Suppl): S498-509.

31. CARE-India (2003). “The right to food - Towards food & nutritional security in India”. India Policy Series: Briefing Paper/April 2006. Available at: http://www.careindia.org/DocumentLibrary/Right%20to%20Food%20CARE%20India.pdf (accessed: 29th May 2008).

32. CBSE (Central Board of Secondary Education) (2008). *Directory of Schools Affiliated to CBSE*. Available at: http://www.cbse.nic.in/welcome.htm (accessed: 31st May 2008).

33. Cerqueira, M.T. and Olsen, C.M. (1995). "Nutrition education in developing countries: An examination of recent successful projects", In Anderson, P. (ed.) *Child Growth and Nutrition in Developing Countries,* Cornell: Cornell University Press.

34. Champakam, S. and Balasubramanian, S.C. (1967a). "Nutrition in the syllabi and textbooks of elementary schools", *Journal of Nutrition and Dietetics*, Vol. 4: 36-40.

35. Champakam, S. and Balasubramanian, S.C. (1967b). "An assessment of teaching nutrition in elementary schools in Hyderabad", *Journal of Nutrition and Dietetics*, Vol. 4: 41-50.

36. Champakam, S. and Balasubramanian, S.C. (1967c). "Impact of nutrition education on prospective teachers", *Journal of Nutrition and Dietetics*, Vol. 4 :323-330.

37. Clancy-Hepburn, K., Hickey A.A. and Nevill, G. (1974). "Children's behaviour responses to TV food advertisements", *Journal of Nutrition Education*, Vol. 6: 93.

38. Contento, I., Balch, G. I., Bronner, Y. L., et. al. (1995). "The effectiveness of nutrition education and implications for nutrition education policy, programmes and research: A review of research", *Journal of Nutrition Education*, Vol.27: 284-418.

39. COVA (Confederation of Voluntary Associations) (2009). COVA – Profile. Available at: http://www.covanetwork.org/index.htm (accessed: 29th September 2009).

40. Dastur, K.S., Kundarpur, S. and Easwaran, S. (1977). "Nutrition Education in Community". In: *Proc. of Nutrition Society of India*, 1977, Vol. 21: 10-19.

41. Deccan Development Society (2009). Available at: www.ddsindia.com (accessed: 2nd February 2009).

42. Devadas, P.R. (1977). "Need for nutrition education". In: *Proceedings of the Annual Meetings of the Nutrition Society of India*, 1977, Vol. 21: 1-9.

43. Dreze, J. and Sen, A. (2002). *India: Development and Participation*, New York: Oxford University Press, 200-202.

44. Dube, A.K. (1993). "NIN- The story of development", *Souvenir – Platinum Jubilee 1993*, Hyderabad: National Institute of Nutrition, 1-7.

45. Dudley, E. (1993). *The Critical Villager: Beyond Community Participation*, London: Routledge.

46. DWCD (2002-03 to 2007-08). *Annual Reports of the Department of Women and Child Development 2002-03, 2003-04, 2004-05, 2006-07, 2007-08*, New Delhi: Department of Women and Child Development, Government of India. Available at: http://www.wcd.nic.in (accessed: 20th August 2008).

47. DWCW (2006). *Platform for Action 10 Years After: India Country Report*, New Delhi: Department of Women and Child Welfare, Ministry of Human Resource Development, Government of India.

48. Eisenhardt, K.M. (2002). “Building theories from case studies”. In: Huberman, A.M. and Miles, M.B. (Eds.) *The Qualitative Researcher’s Companion*, London: Sage.

49. Elliott, B.J. (1991). *A Re-Examination of the Social Marketing Concept*, Sydney: Elliott & Shanahan Research.

50. Famine Commission (1901). *Report of the Indian Famine Enquiry Commission*, Delhi: Government of India.

51. FAO (Food and Agriculture Organization) (1975). *Food and Nutrition Planning*, Nutrition Consultants Report Series 35, Rome: FAO.

52. FAO (Food and Agriculture Organization) (1994). “The International Conference on Nutrition”. In: Albert, J.L. (Ed.). *Food, Nutrition and Agriculture*, Rome: FAO.

53. FAO (Food and Agriculture Organization) (2001). *Feeding Minds, Fighting Hunger – A World Free from Hunger and Malnutrition*, Rome: Publishing and Multimedia Service, Information Division, FAO.

54. FASEB (Federation of American Societies for Experimental Biology, Life Sciences Research Office) (1995). *Third Report of Nutrition Monitoring in the United States: Executive Summary*, Washington DC: US Government Printing Press.

55. FNB (Food and Nutrition Board) (1993). *National Nutrition Policy*, New Delhi: Food and Nutrition Board (FNB), Department of Women and Child Development, Ministry of Human Resource Development, Government of India.

56. FNB (Food and Nutrition Board) (1995a). *National Plan of Action on Nutrition*, New Delhi: Food and Nutrition Board (FNB), Department of Women and Child Development Ministry of Human Resources, Government of India.

57. FNB (Food and Nutrition Board) (1995b). "Need for an integrated and inter-sectoral approach", *National Plan of Action on Nutrition*, New Delhi: Food and Nutrition Board (FNB), Department of Women and Child Development Ministry of Human Resources, Government of India.

58. FNB (Food and Nutrition Board) (2008). *Food and Nutrition Board*, New Delhi: Ministry of Women and Child Development, Government of India. Available at: http://www.wcd.nic.in/fnbweb.htm (accessed: 15th July 2008).

59. Foerster, S.B., Heimendinger, J., DiSogra, L.K. and Pivonka, E. (1997). "The National 5 A Day for Better Health! Program: An American nutrition and cancer prevention initiative", In: Wheelock, V. (Ed.). *Implementing Dietary Guidelines for Healthy Eating*, London: Chapman & Hall, 447–79.

60. Frank, A.G. (1969). *Capitalism and underdevelopment in Latin America: Historical Studies of Chile and Brasil*, New York: Modern Reader Paperbacks.

61. Frank, A.G. (1991). "No escape from the laws of the world economics", *Africa in a New World Order, Review of African Political Economy,* (Mar., 1991), No. 50: 21-32.

62. Freire, P. (1970). *Pedagogy of the Oppressed*, New York: Herder & Herder.

63. Friere, P. (1983). *Pedagogy of the Oppressed, New* York: Continuum.

64. Gangulee, N. (1938). *Health and Nutrition in India,* London: Faber and Faber, 144-161.

65. Geissler, C. (2003). "Stature and other economic indicators of development, comparisons in Thailand and the Philippines, Korea and Iran", In: Geissler, C. and Oddy, D.J. (Eds.) *Food, Diet and Economic Change, Past and Present*, London: Leicester University Press.

66. Gillespie, A.H. (1981). "Applying communication theory in nutrition education", *Journal of Nutrition Education,* Vol. 13(1) (Suppl.): S29-S33.

67. Glanz, K., Lewis, FM., and Rimer, BK (Eds.) (1990). *Health Behaviour and Health Education: Theory, Research and Practice*, San Francisco: Jossey-Bass Publishers.

68. Goldberg, J.P. (1992). "Nutrition and Health Communication: The message and the media over half a century", *Nutrition Reviews*, Vol.50 (3): 71-77.

69. Gopalan, C. (1974). **"**Nutrition and National Development", *Nutrition*, Vol. 8(1): 4-11.

70. Gopalan, C. (1992). "International Conference on Nutrition: An overview and commentary", *Food, Nutrition and Agriculture,* Vol. 5/6, 50-55.

71. Government of India (1941). *Report of Health Survey and Development Committee,* Manager of Publications: Delhi.

72. Government of India (1960). *Constitution of India,* New Delhi: Government of India Press.

73. Government of India (1967). *Comprehensive Nutrition Plan,* Working Document of Ministry of Health, New Delhi: Ministry of Health, Government of India.

74. Government of India (1970). The message accompanying the Prime Minister's 1970-71 Budget Speech, issued on 28th February 1970.

75. Graeff, J. A., Elder, J.P. and Booth, M. B. (1994). *Communication for health and behaviour change,* Washington: Academy for Educational Development.

76. Green, L. and Iverson, D. (1982). "School health education", *Annual Review of Public Health*, Vol. 3: 321-338.

77. Green, W.W. and Anderson, S.C. (1986). *Community Health,* St. Louis: Times Mirror / Mosby College Publishing.

78. Griffiths, P.L. and Bentley, M.E. (2001). "The nutrition transition is underway in India", *Journal of Nutrition,* Vol. 131(10): 2692-700.

79. Guha, S. (2001). *Health and Population in South Asia: From The Earliest Times to the Present*, London : Hurst & Company, 86.

80. Gussow, J.D. and Contento, I. (1984). "Nutrition education in the changing world: A conceptualization and selective review", In: Nutritional *C*onsiderations in a Changing World, *World Review of Nutrition and Dietetics*, Vol. 44:1-47.

81. Haddard, L. and Geissler, C. (2005). “Food and Nutrition Policies and Interventions”, In: Greissler, C. and Powers, H. (Eds.) *Human Nutrition*, 11th Edition, Living Stone: Elsevier, 634-639.

82. Hill, A.V. (1960). *Ethical Dilemma of Science and Other Essays,* New York: Rockefeller Institute Press, 375.

83. Hornik, R.C. (1985). *Nutrition Education: A State-of-the-Art Series,* ACC/SCN State-of-the-art Series, Nutrition Policy Discussion Paper No.1, Geneva: United Nations Standing Committee on Nutrition, 11.

84. Hornik, R.C. (1988). *Development Communication: Information, Agriculture and Nutrition in the Third World,* New York: Longman.

85. Hussain, A., Aaro, L.E. and Kvale, G. (1997). “Impact of health education programme to promote consumption of vitamin A rich foods in Bangladesh”, *Health Promotion International,* Vol. 12(2): 103-109.

86. ICCIDD (International Council for control of Iodine Deficiency Disorders) (1996). “Curriculum Development in micronutrient malnutrition”, *Proceedings of the Workshop on Micronutrient Malnutrition: Curriculum Development for Schools, 30th March 1996,* New Delhi: All India Institute of Medical Sciences.

87. ICMR (Indian Council of Medical Research) (1989). “Evaluation of National Nutritional Anaemia Prophylaxis Programme”, *ICMR Task Force Study,* New Delhi: Indian Council of Medical Research.

88. Inkeles, A. and Smith, D.H. (1974). *Becoming Modern*, Cambridge, MA: Harvard University Press.

89. Jain, B.L. (1983). “Development of life sciences in India in eighteenth-nineteenth century”, *Indian Journal of History of Science, V*ol. 17(1): 114-131.

90. Jeffrey, R. (1988). *The Politics of Health in India,* Berkley: University of California Press.

91. Johnson, D. W. and Johnson, R. T. (1985). “Nutrition education: A model for effectiveness, a synthesis of research”, *Journal of Nutrition Education*, Vol. 17(suppl.): S1-S44.

92. Kaliperumal, K. (1986). “Communication – Methods and media for rural areas in education for better health of mother and child in primary health care”, In: *Proceedings of the First South East Asia Conference, IUHE*. November, 1986, Chennai, 312-320.

93. Kapoor, I. (2002). “Capitalism, culture, agency: dependency versus postcolonial theory”, *Third World Quarterly*, Vol. 23(4): 647 – 664.

94. Katz, E. and Lazarsfeld, P.F. (1955). *Personal Influence: The Part Played by People in the Flow of Mass Communications*, New York: Free Press.

95. Kavinya, A., Alam, S. and Decock, A. (1994). *Applying DSC Methodologies to Population Issues: A Case Study in Malawi*, Rome: FAO.

96. Kelder, S.H., Perry, C.L., Lytle, L.A. and Klepp, K.I. (1995). “Community-wide youth nutrition education: long-term outcomes of the Minnesota Heart Health Programme”, *Health Education Research,* Vol.10: 119-131.

97. Khadka, N. (2000). “The participatory development communication paradigm: Communication challenges and change”, *Australian Journal of Communication*, Vol. 27(3): 105-122.

98. Khadka, N. B. (2003). “Participatory nutrition communication: rhetoric or reality?: A case study of Nepal”, *Paper presented at Designing Communication for Diversity Conference, Brisbane, July 2003,* Brisbane: Australia, New Zealand Communication Association. Available at: http://www.bgsb.qut.edu.au/community/ANZCA03/Proceedings/papers/khadka_full.pdf (accessed: 14th February 2007).

99. Klein, I. (1990). “Population growth and mortality in British India, Part II: The demographic revolution”, *The Indian Economic and Social History Review*, Vol. 27(1): 33-63.

100. Kondracki, N.L., Wellman, N.S. and Amundson, D.R. (2002). “Content analysis: Review of methods and their applications in nutrition education”, *Journal of Nutrition Education and Behavior,* Vol. 34(4): 224-230.

101. Kotler, P. and Roberto, E. (1989). *Social Marketing: Strategies for Changing Public Behavior,* New York, The Free Press.

102. Kotler, P. and Zaltman, G. (1971). “Social marketing: An approach to planned social change”, *Journal of Marketing,* Vol. 35: 3-12.

103. Koul, R. and Dana, T. (1997). “Contextualized science for teaching science and technology”, *Interchange, Vol.28* (2&3): 121-144.

104. Kreisel, K. (2004). “Evaluation of a computer-based nutrition education tool”, *Public Health Nutrition*, Vol.7(2): 271–277.

105. Kreuter, M.W. and Skinner, C.S. (2000). “Tailoring: What’s in a name?”, *Health Education Research, V*ol. 15: 1-4.

106. Krippendorff, K. (1980). *Content Analysis: An Introduction to Its Methodology*, Newbury Park, CA: Sage. 21.

107. Krippendorff, K. (1986). *Content Analysis: An Introduction to its Methodology*, Beverley Hills, London: Sage Publications.

108. Krishnaswami, K. (1998). “Country profile: India. Nutritional disorders – old and changing”, *The Lancet,* Vol. 351(9111): 1268–9.

109. Krishnaswami, K. (1999) ed. *Obesity in the Urban Middle Class in Delhi*. Scientific Report No.15, New Delhi :Nutrition foundation of India. Available at: http//www. NutritionfoundationofIndia.org/research 4 (accessed on 19th February 2008).

110. Kumar, D. (2000a). “Reconstructing India: Disunity in the Science and Technology for Development Discourse, 1900-1947”, *Nature and Empire: Science and the Colonial Enterprise. Osiris, 2nd Series*, Vol. 15: 241-257.

111. Kumar, D. (2000b). “Science and society in colonial India: Exploring an agenda”, *Social Scientist,* Vol. 28 (5/6): 24-46.

112. Kumar, K.J. (1994). “Communication approaches to participation and development: Challenging the assumptions and perceptions”, In: White, S.A., Nair, S.K. and Ascroft, J. (Eds.) *Participatory Communication – Working for Change and Development*, Thousand Oaks: Sage, 75-92.

113. Lal, M. (2003). “Gender, nationalism and health reform in colonial north India”, In: Stuphen, M. and Andrews, B. (Eds.) *Medicine and Colonial Identity,* New York: Routledge, 14-40.

114. Laxmiah, A., Balakrishna, N., Sharad Kumar, Ravindrnath, M., Brahmam, G.N.V. and Sesikeran, B. (2007). *Prevalence and Determinants of Overweight and Obesity among 12-17 year Old Urban Adolescents in Andhra Pradesh – A Report*, Hyderabad: National Institute of Nutrition, ICMR in Collaboration with India Representative Office, WHO, New Delhi.

115. Lerner, D. (1958). *The Passing of Traditional Society*, New York: Free Press.

116. Lionis, C., Kafatos, A., Vlachonicolis, J., Vakaki, M., Tzorttiz, M. and Petraki, A. (1991). “The effect of health education intervention programme among Cretan adolescents”, *Preventive Medicine*, Vol.20: 685-699.

117. Lytle, L. (1994). *Nutrition Education for School-aged Children: A Review of Research,* Alexandria, Virginia: Food and Consumer Service, US Department of Agriculture.

118. Majumdar, R.C. (1971). “Medicine”, In: Bose, D.M., Sen, S.N., and Subbarayappa, B.V. (Eds.), *A Concise History of Science in India,* New Delhi: Indian National Science Academy.

119. Mathur, M.S. and Joseph, A. (1986). “Effectiveness of different educational aids in changing knowledge”, In: *Proceedings of the First South East Asia Region Conference*, IUHE, Nov.1986, Madras, 384-395.

120. Mazhar, F., Buckles, D., Stheesh, P.V. and Akhter F. (2007). *Food Sovereignty and Uncultivated Biodiversity in South Asia – Essays on Poverty of Food Policy and the Wealth of Social Landscape,* New Delhi: Academic Foundation and Canada: International Development Research Centre.

121. McCarney, R., Warner, J., Iliffe, S., van Haselen, R., Griffin, M. and Fisher, P. (2007). "The Hawthorne Effect: a randomised, controlled trial", *BMC Medical Research Methodology,* Vol. 7: 30. Available at: http://www.biomedcentral.com/1471-2288/7/30 (accessed 29th September 2009).

122. McDermott, W. (1966). "Modern medicine and demographic disease pattern of overly traditional societies: A technological misfit", *Journal of Medical Education,* Vol. 41(9): 137-162.

123. McKee, N. (1992). *Social Mobilization and Social Marketing in Developing Countries,* Penang, Malaysia: Southbound.

124. McKee, N. (1994). "A community based learning approach: Beyond social marketing", In: White, S.A., Nair, S.K. and Ascroft, J. (Eds.) *Participatory Communication – Working for change and development,* Thousand Oaks: Sage, 194-228.

125. McKee, N. (1999). *Social Mobilization & Social Marketing in Developing Communities: Lessons for Communicators,* Penang: Southbound.

126. McKenzie, J.C. and Mumford, P. (1965). **"**The evaluation of nutrition education programmes: A review of present", *World Review of Nutrition and Dietetics,* Vol.5: 21-31.

127. McQuail, D. and Windahl, S. (1981). *Communication Models,* New York: Longman.

128. Melkote, S. R. and Steeves, H.L. (2001). *Communication for Development in the Third World – Theory and Practice for Empowerment*, 2nd Edition, Thousand Oaks: Sage.

129. Melkote, S.R. (1991). *Communication for Development in the Third World,* Newbury Park: Sage.

130. Meshesha, T. (2008). *Media Strategies for Awareness Creation: A Comparative Analysis of Three Organizations Working on Women's Rights in Ethiopia,* A dissertation submitted to The School of Graduate Studies Addis Ababa University, Addis Ababa. Available at: http://etd.aau.edu.et/dspace/bitstream/123456789/1886/1/Tezeta%20Meshesha.pdf (accessed: 6th August 2009).

131. Minkler, M. and Wallerstein, N. (1997). "Improving health through community organizing and community building", In: Glanz, K., Lewis, F.M. and Rimer, B.K. (Eds.) *Health Behaviour and Health Education: Theory, Research and Practice,* San Francisco: Jossey-Bass Publishers, 241-269.

132. Mody, B. (1991). *Designing Messages for Development Communication: An Audience Participation-based Approach,* Newbury Park, CA: Sage.

133. Moemeka, A.A. (Ed.) (1994). *Communicating for Development: A New Pan-Disciplinary Perspective.* Albany, NY: State University of New York Press.

134. Mohanram, M. (1997). "Development of health manpower trained in nutrition", In: *Proceedings of 29th Annual Meeting of the Nutrition Society of India,* Hyderabad: Nutrition Society of India, 63-70.

135. Mohanram, M. (2003). "Training for capacity building for nutrition research and services", *Proceedings of the 9th Asian Congress of Nutrition: Nutrition Goals for Asia--Vision 2020, New Delhi, India, 23-27 February 2003.*

136. MoHFW (Ministry of Health and Family Welfare) (1983). *National Health Policy, 1983,* New Delhi: MoHFW, Government of India. Available at: http://mohfw.nic.in/kk/95/ii/95ii0101.htm (accessed 28th May 2008)

137. MoWCD (Ministry of Women and Child Development) (2004). "Food and Nutrition Board", In: *Annual Report of the Department of Women and Child Development 2003-04,* New Delhi: MoWCD, Government of India. Available at: http://www.wcd.nic.in/ar0304/chapter5.pdf (accessed : 13th May 2008).

138. MoWCD (Ministry of Women and Child Development) (2008). *Integrated Child Development Scheme,* New Delhi: MoWCD, Government of India. Available at: http://wcd.nic.in/icds.htm (accessed 17th May 2008).

139. Mukherji, S., Priyadarshi, M. and Singh, S. (2005). *Communication in Public Health Programs: The Leprosy Project in India.* Washington, DC: International Bank for Reconstruction and Development/World Bank.

140. Nair, S.K. and White, S.A. (1994). "Participatory development communication as cultural renewal", In: White, S.A., Nair, S.K. and

Ascroft, J. (Eds.) *Participatory Communication – Working for Change and Development,* Thousand Oaks, CA: Sage, 138-193.

141. Narayan, K.M., Campagna, A.F. and Imperatore, G. (2001). "Type 2 diabetes in children: a problem lurking for India?", *Indian Pediatrics,* Vol. 38(7): 701–704.

142. Narsinga Rao, B.S. (2005). *Development of Nutrition Science in India,* New Delhi :Allied Publishers.

143. National Planning Committee (1948). *Report of the Sub-Committee on National Health (1938-40),* Bombay: Vora & Co.

144. Nayak, U.M. (1999). *Social Marketing Strategy for Nutrition Education to Combat Vitamin A Deficiency in the Rural Community*, PhD thesis submitted to Sri Padmavathi Mahila Visvavidyalayam, Tirupathi, India.

145. Neuendorf, K.A. (2002). *The Content Analysis Guidebook,* Thousand Oaks: Sage.

146. Newman, L.W. (1994). ''Field research'', In: *Social Research Methods – Qualitative and Quantitative Approaches*, 2nd ed., London: Allyn & Bacon, 358-359.

147. NFHS (National Family Health Survey) (2006). *Report of the National Family Health Survey –3,* Mumbai: Indian Institute of Population Studies.

148. NIN (National Institute of Nutrition) (1998). *Dietary Guidelines for Indians – A Manual,* Hyderabad: National Institute of Nutrition.

149. NIN (2001a). *About NIN (brochure),* Hyderabad: National Institute of Nutrition.

150. NIN (2001b). *Annual Report - National Institute of Nutrition 2000-01*, Hyderabad: National Institute of Nutrition.

151. NIN (2002). *Annual Report - National Institute of Nutrition 2001-02*, Hyderabad: National Institute of Nutrition.

152. NIN (2003). *Annual Report - National Institute of Nutrition 2002-03*, Hyderabad: National Institute of Nutrition.

153. NIN (2004). *Annual Report - National Institute of Nutrition 2003-04*, Hyderabad: National Institute of Nutrition.

154. NIN (2005). *Annual Report - National Institute of Nutrition 2004-05*, Hyderabad: National Institute of Nutrition.

155. NIN (2006a). *Annual Report - National Institute of Nutrition 2005-06*, Hyderabad: National Institute of Nutrition.

156. NIN (2007). "Extension and Training Division", *In: Annual Report of the National Institute of Nutrition 2006-07*, Hyderabad: National Institute of Nutrition.

157. NIN (2009). *About NIN*, Hyderabad: National Institute of Nutrition. Available at www.ninindia.org (accessed: 13th May 2009)

158. NIPCCD (National Institute of Public Cooperation and Child Development) (1992). *National Evaluation of Integrated Child Development Services*, New Delhi: NIPCCD.

159. NNMB (National Nutrition Monitoring Bureau) (2003). *Prevalence of Micronutrient Deficiency Disorders*, Technical Report No.23, Hyderabad: NNMB, 16.

160. NNMB (2009). *About Us*, Hyderabad: NNMB. Available at : www.nnmbindia.org (accessed: 13th May 2009).

161. NNMB. (2002). *Diet and Nutritional status of Rural Population, 2001, Technical Report No.21*. Hyderabad: NNMB.

162. Novelli, W. (1990). "Applying social marketing to health promotion and disease prevention", In: Glanz, K., Lewis, F.M. and Rimer, B.K. (Eds.) *Health Behaviour and Health Education: Theory, Research, and Practice*, San Francisco: Jossey-Bass Publishers, 324-369.

163. Okunna, C.S. (1995). "Small participatory media technology as an agent of social change in Nigeria: A non-existent option?", *Media, Culture & Society*, Vol. 17 (4): 615-627.

164. Palmer, N.D. (1977). "India in 1976: The Politics of Repoliticization: A Survey of Asia in 1976: Part Two", *Asian Survey*, Vol. 17(2): 160-180.

165. Panandiker, V.A. and Umashankar, P.K. (1994). "Fertility Control and Politics in India", *Population and Development Review*, Vol. 20: 89-104.

166. Pandit, C.G. and Rao, K.S. (1961). *Indian Research Fund and Indian Council of Medical Research, 1911-61 – Fifty Years of Progress*, New Delhi: Indian Council of Medical Research.

167. Park, K. (2000). *Park's Textbook of Preventive and Social Medicine*, 16th Edition, Jabalpur: Banarsidas Bhanot Publishers, 447-451.

168. Parlato, M., Green, C. and Fishman, C. (1992). "Communicating to improve nutrition behaviour. The challenge of motivating the audience

to act." *Proceedings of the International Conference on Nutrition, Rome, 5-11 December 1992,* Rome: Food and Agriculture Organization.

169. Patwardhan, V.N. (1961). *Nutrition in India,* Bombay: Indian Journal of Medical Sciences Press, 1-2.

170. Pavarala, V. and Malik, K.K. (2007). *Other Voices: The Struggle for Community Radio in India,* New Delhi: Sage.

171. Perez-Rodrigo, C. and Javier, A. (2001). "School-based nutrition education: lessons learned and new perspectives", *Public Health Nutrition*, Vol.4(1A): 131–139.

172. Perters, D., Sujatha Rao, K. and Fryatt, R. (2003). "Lumping and splitting: the health policy agenda in India", *Health Policy and Planning,* Vol. 18 (3): 249-260.

173. Planning Commission, Government of India (2008). *First Three Five Year Plan Documents.* Available at: http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html (accessed: 25th May 2008).

174. Poitrow, P.T., Kincaid, D.L., Rimon, J.G. and Rinehart, W. (1997). *Health Communication – Lessons from Family Planning and Reproductive Health,* London: Prager, 189.

175. Polasa, K., Sudershan, R.V., Subba Rao, G.M., Vishnu Vardhana Rao, M., Pratima Rao. and Sivakumar, B. (2006). *KABP Study on Food and Drug Safety in India- A Report,* Hyderabad: Food and Drug Toxicology Research Centre, National Institute of Nutrition (NIN).

176. Prakash, G. (1999). *Another Reason: Science and the Imagination of Modern India.* Princeton, New Jersey: Princeton University Press, 18-21.

177. Prasad, N.P. (2007). "Medicine, power and social legitimacy". *Economic and Political Weekly*. Vol. 42(34),

178. Raghavan, G.N.S. (1979). "The contemporary relevance of traditional media", *Communicator,* Vol. 14(1): 18-22.

179. Raghunatha Rao, D., Vijayapushpam, T., Subba Rao G.M., Anthony, G.M. and Sarma K.V.R. (2007). "Dietary habits and effect of two different educational tools on nutrition knowledge of school going adolescent girls in Hyderabad, India", *European Journal of Clinical Nutrition,* Vol. 61: 1081–1085

180. Rajagoaplan, S. (2003), "Nutrition: The challenges", *Sunday Magazine, The Hindu* (2nd March 2003), 1-3.

181. Rajagopaln, S. (2003). "Nutrition challenges in the next decade", *Food and Nutrition Bulletin,* Vol. 24(3): 275-280.

182. Ramanathan, S. and Siddiqi, N. (1994). "Representation of science in upper primary science textbooks: an assessment", *Indian Educational Review,* Vol. 29 (1-2): 1-12.

183. Ramdasmurthy, V. and Mohanram, M. (1991). "Community based training in nutrition for health professionals", *Indian Journal of Community Medicine,* Vol.16: 167-170.

184. Ramdasmurthy, V., Hanumantha Rao, D., Clarence, I. D. and Balasubramanian, S.C. (1978). "Nutrition education and SITE telecasts", *International Journal of Health Education*, Vol. 21(3): 168-173.

185. Ramdasmurthy, V., Mohanram, M., Visweswara Rao, K. and Balakrishna, N. (1992a). "Role of nutrition communication media in nutrition knowledge and awareness: An Indian urban study", *International Journal of Food Science and Nutrition*, Vol. 43: 121-128.

186. Ramdasmurthy, V., Mohanram, M., Visweswara rao, K. and Balakrishna, N. (1992b). "Interfaces of communication media and health and nutrition awareness in an Indian urban study", *International Journal of Food Science and Nutrition*. Vol.43: 129-138.

187. Randhawa, M.S. (1980). *A History of Agriculture in India*, New Delhi: Indian Council of Agriculture Research.

188. Ranganath, H.K. (1982). "Adaptability of Indian folk forms to contemporary themes", *Media Asia*, Vol. 9(1): 18-20.

189. Rao, M. (1999). "The structural adjustment programme and the World Development Report 1993: Implications for family planning in India", In: Mohan Rao (Ed.) *Disinvesting in Health: The World Bank's Prescriptions for Health*, New Delhi: Sage Publications, 82- 108.

190. Rao, M.S. (1968). "The history of medicine in India and Burma", *History of Medicine*, Vol.12: 52-61.

191. Rau, P. (1968). “Socio-cultural factors and malnutrition in Telangana Region of Andhra Pradesh”, *Proceedings of the Nutrition Society of India,* Vol.6: 37-43.

192. Rau, P. (1991). “Some folk forms in Andhra Pradesh and their use in nutrition education – A review”, *Nutrition,* Vol. 25(4): 3-14.

193. Rau, P. (1994). “Role of folk media in nutrition education”, *Cajanus,* Vol. 17: 368-374.

194. Rogers, E.M. (1962). *Diffusion of Innovations,* 1st edition, New York: Free Press.

195. Rogers, E.M. (1969). *Modernization among Peasants,* New York: Holt, Rinehart and Winston.

196. Rogers, E.M. (1976). “Communication and development: The passing of the dominant paradigm”, *Communication Research,* Vol. 3 (2): 213-240.

197. Rogers, E.M. (1983). *Diffusion of Innovations,* 3rd edition, New York: Free Press.

198. Rogers, E.M. (1995). “Quoted in theoretical frame work or model for nutrition education”, *Journal of Nutrition Education,* Vol.27: 287-297.

199. Saibaba, A. (2003). “Nutrition awareness through information, education and communication”, *Health Action*, Vol.16(2): 16-19.

200. Sainath, P. (1996). *Everyone Loves a Good Drought,* New Delhi: Penguin, 1-7.

201. Salomeyesudas, B. (2004). “Conservation of uncultivated foods by local communities”, *LEISA India,* Vol. 6(1): 18.

202. Salomeyesudas, B. and Satheesh, P.V. (2009). “Traditional food system of Dalit in Zaheerabad Region, Medak District, Andhra Pradesh, India”, In: Kuhnlein, H.V., Erasmus, B. and Spigelski, D. (Eds) *Indigenous Peoples' Food Systems: The Many Dimensions of Culture, Diversity and Environment for Nutrition and Health,* Rome: Food and Agriculture Organization. Available online: ftp://ftp.fao.org/docrep/fao/012/i0370e/i0370e10.pdf (accessed: 26th November 2009).

203. Sarma K.V.R., Ramana G.N.V., Hanmantha Rao, D. *et. al,* (1992). *Integrated Child Development Services: Status Appraisal in Four States,* Hyderabad: National Institute of Nutrition.

204. Satheesh, P.V. (2002). *Crops of truth – Farmers' perception of agrobiodiversity in the Deccan region of South India,* Zaheerabad, India: Deccan Development Society.

205. Satheesh, P.V. and Reddy, S. (2002). “Uncultivated food and the poor”, *Proceedings of the South Asian Workshop on Uncultivated Food and Plants,* Dhaka: UBINIG.

206. Satheesh, P.V. and Salomeyesudas, B. (2003). “Uncultivated greens - the potential realized”, *Indigenous Peoples' Contributions to Understanding Global Environmental Change,* Canada: McGill University.

207. Schmid, M.A. (2005). *Traditional Food Consumption and Nutritional Status of Dalit Mothers and Young Children in Rural Andhra Pradesh, South India.* PhD Thesis Submitted to the School of Dietetics and Human Nutrition,

Centre for Indigenous Peoples' Nutrition and Environment, McGill University, Macdonald Campus Montreal, Quebec, Canada.

208. Schmid, M.A., Egeland, G.M., Salomeyesudas, B., Satheesh P.V. and Kuhnlein, H.V. (2006a). "Traditional food consumption and nutritional status of Dalit mothers in rural Andhra Pradesh, South India", *European Journal of Clinical Nutrition*, Vol. 60: 1277-1283.

209. Schmid, M.A., Salomeyesudas, B., Satheesh, P.V., Hanley, J. and Kuhnlein, H.V. (2006b). "Traditional food is a major source of energy, protein, iron, vitamin C and vitamin A for rural Dalit mothers and young children in Andhra Pradesh, South India", *Asia Pacific Journal of Clinical Nutrition*, Vol. 16(1): 84-93.

210. Schramm, W. (1964). *Mass Media and National Development*, Stanford: Stanford University Press.

211. Schramm, W. (1971). "The nature of communication between humans". In: Schramm, W. and Roberts, D.F. (Eds.) *The Process and Effects of Mass Communication*, Urbana: University of Illinois Press, 3-53.

212. Scrimshaw, N.S., Taylor, C.E. and Gordon, J.E. (1968). *Interactions of nutrition and infection*, Geneva: WHO Monograph Series 57, 265.

213. Sen, S. (2005). "Dawn of nutrition research in India – Pre-independence era", *Indian Journal of History of Science*, Vol.40(1): 81-106.

214. Servaes, J. (1989). *One World, Multiple Cultures: A New Paradigm on Communication for Development*, Leuven, Belgium: Acco.

215. Servaes, J. (1996). “Introduction: Participatory communication and research in development settings”, In: Servaes, J., Jacobson, T. and White, SA. (Eds.), *Participatory Communication for Social Change,* Thousand Oaks: Sage.

216. Servaes, J. (2002). “By way of introduction”, In: Servaes, J. (Ed.) *Approaches to Development Communication, Part 1,* Paris: UNESCO; 3-24.

217. Servaes, J. and Malikhao, P. (2005). “Participatory communication: the new paradigm?”, In : Hemer, O. and Tufte, T. (Eds.) *Media and Global Change. Rethinking Communication for Development,* Buenos Aires: Göteborg: CLACSO Books / Nordicom, 91-103.

218. Shepherd, S.K. and Achterberg, C.L. (1992). “Quantitative research methodology: data collection, analysis and interpretation, and verification”, In: Monsen, E.R. (Ed.), *Research: Successful Approaches,* Chicago: American Dietetic Association, 82-88.

219. Shetty, P.S. (2002). “Nutrition transition in India”, *Public Health Nutrition,* Vol. 5(1A): 175-182.

220. Shore, L. (1980). “Mass media for development: A re-examination of access, exposure, and impact”, In: Mc Anany, G.E. (Ed.), *Communication in the Rural Third World,* New York: Preager Publishers, 19-45.

221. Siddiqui, J. (1995). “Creation of World Health Organization”, *World Health and World Politics: The World Health Organization and the UN System,* University of South Carolina Press: Columbia, 56-60.

222. Sims, L.L. (1987). "Nutrition education research: Reaching toward the leading edge". *Journal of American Dietetic Association,* Vol.87(9) (Suppl.): S10-18.

223. Singhal, A. and Rogers, E.M. (1986). "Prosocial television for development in India". In: Rice, R.E. and Atkin, C.K. (Eds.): *Public Communication Campaigns* (2nd Edition), California: Sage Publications, 331-350.

224. Singhal, A. and Rogers, E.M. (1999). *Entertainment-Education: A Communication Strategy for Social Change,* Mahwah, NJ: Lawrence Erlbaum.

225. Smitasiri, S. (1994). *Nutrition – Action – Analyses Going Beyond Good People and Adequate Resource,* Bangkok, Thailand: Institute of Nutrition, Mahidol University, 17-31.

226. Smitasiri, S., Attig, GA., Valyasevi, A., Dhanamitta, S. and Tontisirin, K (1993). *Social Marketing Vitamin A Rich Foods in Thailand – A Model Nutrition Communication for Behaviour Change Process,* Bangkok, Thailand: The Institute of Nutrition, Mahidol University.

227. Smith, B. (1997). "Past experiences and needs for nutrition education: Summary and conclusions of nine case studies", In : *Nutrition Education for the Public. Discussion papers of the FAO Expert Consultation (Rome, Italy 18-22 September 1995) - FAO Food and Nutrition Paper 62,* Rome: Food and Agriculture Organization, Available at: http://www.fao.org/docrep/W3733E/w3733e02.htm (accessed 5th March, 2007)

228. Spear, B.A. (2002). “Adolescent growth and development”, *Journal of American Dietetic Association*, Vol. 102 (Suppl): S23-S29.

229. Stake, R.E. (1995). *The Art of Case Study Research*, London: Sage Publications, 1-14.

230. Stetson, V. and Davis, R. (1999). *Health Education in Primary Health Care Projects: A Critical Review of Various Approaches*, Massachusetts: CORE Group, D-Lab, MIT. Available at: http://web.mit.edu/d-lab/fall-2003/haiti/files/health_ed.pdf (accessed: 21st July 2007).

231. Stuart, H.T. and Achterberg, C. (1997). ‘’Education and communication strategies for different groups and settings”, In: *Nutrition Education for the Public. Discussion Papers of the FAO Expert Consultation (Rome, Italy 18-22 September 1995) - FAO Food and Nutrition Paper 62*, Rome: Food and Agriculture Organization of the United Nations.

232. Stuart, T. & Achterberg, C. (1995). “Nutrition Education and communication strategies for different groups and settings”, In: *Nutrition Education for the Public – Report of an FAO Expert Consultation*, (*Rome, 18-22 September 1995) - FAO Food and Nutrition Paper No.59*, Rome: FAO. 19-23.

233. Subba Rao, G.M. and Sudershna, R.V. (2007). “Advocacy for food safety”, *Proceedings of the XXXIX Annual Conference of the Nutrition Society of India, 15-17th November, 2007*. Hyderabad : NSI (in press).

234. Subba Rao, G. M. (2004). “Nutrition –An index for development”, *Health Action*, Vol.16 (11): 4-7.

235. Subba Rao, G.M. and Vijayapushpam, T. (2009). “Nutrition education for student volunteers using videotaped folkdance form”, *Journal of Nutrition Education and Behavior,* Vol.41(6): 436-437.

236. Subba Rao, G.M., Choudhery, D.N., Ushakiran, T. and Sarma, K.V.R. (2005). “Micronutrient deficiencies – A drain on Indian economy: Use of PROFILES and scope for advocacy”. *Proceedings of the One-day State-Level Workshop on Micronutrient Deficiencies – A Drain on Indian Economy,* Hyderabad, September 2005, Hyderabad : Food and Nutrition Board.

237. Subba Rao, G.M., Raghunatha Rao, D., Venkaiah, K., Dube, A.K. and Sarma, K.V.R. (2006). “Evaluation of the Food and Agriculture Organization’s global school-based nutrition education initiative, Feeding Minds, Fighting Hunger (FMFH), in schools of Hyderabad, India”, *Public Health Nutrition*, Vol.9(8): 991–995.

238. Subba Rao, G.M., Sudershan, R.V., Pratima Rao, Vishnu Vardhana Rao, M. and Polasa, K. (2007). “Food safety knowledge, attitudes and practices of mothers - Findings from focus group studies in South India”, *Appetite,* Vol.49: 441-449.

239. Subba Rao, G.M., Vijayapushpam, T. Raghunatha Rao, D. and Pavarala, V. (2007). “Nutrition education for adolescents in classroom settings – Different approaches and lessons learnt – Pat II”, *Nutrition News.* Vol. 28(3): 1-4.

240. Subbarayappa, B.V. (1971). “Western Science in India up to the end of 19th Century AD”, In: Bose, D.M., Sen, S.N. and Subbarayappa, B.V.

(Eds.), *A Concise History of Science in India*, New Delhi: Indian National Science Academy.

241. Surujlal, M. and Badrie, M. (2004). "Household consumer food safety in Trinidad, West Indies", *Internet Journal of Food Safety*, Vol.3: 8-14.

242. Tarone, E. (1981). "Some thoughts on the notion of communication strategy", *TESOL Quarterly*, Vol. 15(3): 285-295.

243. Terris, M. (1992). "Concepts of health promotion: Dualities in public health theory", *Journal of Public Health Policy*, Vol. 13(2): 267-276.

244. The Communication Initiative Network (2009). *DDS Sangham Radio.* Available at: https://www.comminit.com/en/node/285673/348 (accessed: 24th October, 2009).

245. Thompson, B. and Pertschuck, M. (1992). "Community intervention and advocacy", In: Ockene, J.K. and Ockene, J.S. (Eds.) *Prevention of Coronary Heart Disease*, Boston: Little, Brown, 493-515.

246. Tones, K. and Tilford, S. (1994). *Health Education in Schools. Health Education: Effectiveness, Efficiency and Equity*, London: Chapman & Hall, 121.

247. Turay, K. (2007). "A population policy transition: Human rights and population politics in India during the emergency and at the present moment". A paper presented in the *Essays Workshop on Population Politics and Reproductive Rights: State Intervention and Fertility Control, 6th Berlin Roundtables on Transnationality, 14-19th February 2007*. Available at:

http://www.irmgard-coninx-stiftung.de/fileadmin/user_upload/pdf/roundtable07/Turay.pdf (accessed: 20th August 2009).

248. Turnin, M.C., Tauber, M.T., Couvaras, O., Jouret, B., Bolzonella, C., Bourgeois, O., *et al*. (2001). "Evaluation of microcomputer nutritional teaching games in 1,876 children at school", *Diabetes and Metabolism*, Vol. 27: 459–464.

249. UNDP (United Nations Development Programme) (2005). *Human Development Report*, New York: UNDP, 236-240.

250. UNICEF (United Nations International Children's Emergency Fund) (1993). *We Will Never go Back: Social Mobilization in the Child Survival and Development Programme in the United Republic of Tanzania,* New York: UNICEF.

251. Valyasevi, A. and Attig, G. (1994). "Nutrition communication in South and East Asia - Experiences and lessons learned", *Report of the Inter-country Workshop on Nutrition Education for South and East Asian Countries, Salya, Thailand, 22-26 February, 1993*. Rome: FAO.

252. Vijayapushpam, T., Menon, K.K., Raghunatha Rao, D. and Anthony, G.M. (2003). "A qualitative assessment of nutrition knowledge levels and dietary intake of schoolchildren in Hyderabad", *Public Health Nutrition,* Vol. 6(7): 683–688.

253. Vijayapushpam, T., Raghunatha Rao, D., Damayanthi, K., Antony, G.M., Sarma, K.V.R. and Gokilavani (2009). "Assessment of intra and extra

individual factors responsible for food consumption pastern of rural population – a diagnostic model approach". (*Unpublished)*

254. Vijayapushpam, T., Subba Rao, G.M., Antony, G.M. and Raghunatha Rao, D. (2008). "Nutrition education for student community volunteers: A comparative study of two different communication methods", *Food and Nutrition Bulletin,* Vol. 29(2): 108-112.

255. Vijayaraghavan, K. (1997). The Tamil Nadu Nutrition Project: A case study of the communication component. In: Smith, B (Ed.) *Nutrition Education for the Public. Discussion papers of the FAO Expert Consultation (Rome, Italy 18-22 September 1995) - FAO Food and Nutrition Paper 62,* Rome: Food and Agriculture Organization. Available at: http://www.fao.org/docrep/W3733E/w3733e02.htm (accessed 5th March, 2007).

256. Vijayaraghavan, K. and Rao, N. P. (1982). "An evaluation of the National Prophylaxis Programme against blindness due to vitamin A deficiency", *Nutrition Report International*, Vol. 25: 431-441.

257. Visvanathan, S. (1998). "A celebration of difference: Science and democracy in India", *Science,* Vol. 280(5360): 42-43.

258. Waisbord, S. (2000). *Family Tree of Theories, Methodologies and Strategies in Development Communication* (A document prepared for the Rockefeller Foundation). Available at: http://www.changeproject.org/pubs/familytreeoftheories00.pdf (accessed: 21st July 2007).

259. Waisbord, S. (2005). "Five key ideas: coincidences and challenges in development communication", In : Hemer, O. and Tufte, T. (Eds.) *Media and Glocal Change. Rethinking Communication for Development,* Buenos Aires: Göteborg: CLACSO Books / Nordicom. 77-90.

260. Wallack, L., Dorfman, L., Jernigan, D. and Themba, M. (1993). *Media Advocacy and Public Health: Power for Prevention,* Newbury Park: Sage.

261. Welsh, S. (1994). "Atwater to the present: Evolution of Nutrition Education", *Journal of Nutrition,* Vol.124 (Suppl): 1799S-1807S.

262. White, S. A. (1994), "The concept of participation: transforming rhetoric to reality", In: White, A.S., Nair, K.S. and Ascroft, A. (Eds.), *Participatory Communication Working for Change and Development,* London: Sage.

263. Whitehead, F.E. (1973). "Nutrition education research", *World Review of Nutrition and Dietetics,* Vol. 17: L91-149.

264. WHO (World Health Organisation) (2005). *Updating and Implementing Intersectoral Food and Nutrition Plans and Policies – Report of an Inter-country Workshop, Hyderabad, India, 4-8 April 2005,* New Delhi: WHO Regional Office for South-East Asia.

265. WHO (World health Organization) (1986). *Ottawa Charter for Health Promotion,* First International Conference on Health Promotion, 21 November, 1986. Available at: http://www.who.int/healthpromotion/conferences/previous/ottawa/en/ (accessed: 13th May 2008).

266. WHO (World Health Organization) (2008). *India- National Health System Profile,* New Delhi: WHO, Southeast Asia Regional Office

(WHOSEARO). Available at: http://www.searo.who.int/LinkFiles/India_CHP_india.pdf (accessed: 26th April, 2008).

267. WHO- India (2008). *Towards Health Promoting Schools,* New Delhi: WHO-Country Office, India. 2-3.

268. Winarno, F.G. (2002). "Communicating food science and technology: From a developing country to a developed country point of view", *Asia Pacific Journal of Clinical Nutrition*, Vol.11(S(6)): S207-S211.

269. Yang, S., Angulo, F.J. and Altekruse, S.F. (2000). "Evaluation of safe food handling instructions on raw meat and poultry products", *Journal of Food Protection*, Vol. 63(10): 1321-5.

270. Yarbourgh, P. (1981). "Communication theory and nutrition education research", *Journal of Nutrition Education*, Vol. 13(1): S16-S27.

APPENDICES

APPENDIX –1

KNOWLEDGE ASSESSMENT
QUESTIONNAIRE FOR SCHOOLCHILDREN

Implementation of Feeding Minds, Fighting Hunger (FMFH) Programme

1. Name :

2. School : Class:

3. Age :

4. Gender : Male / Female

5. Father's Education :
   1. Illiterate 2. Primary
   3. SSC 4. Graduate
   5. Post Graduate 6. Others (Specify - _____)

6. Mother's Education :
   1. Illiterate 2. Primary
   3. SSC 4. Graduate
   5. Post graduate 6. Others (Specify - _____)

7. Father's Occupation :
   1. Govt. Servant 2. Pvt. Service
   3. Business 4. Agriculture
   5. Technical 6. Professional

8. Mother's Occupation :
   1. Govt. Servant 2. Pvt. Service
   3. Business 4. Agriculture
   5. Technical 6. Professional
   7. House Wife

9. What is the size of your family?

10. Total Monthly Family Income : Rs. _____ (approx)

11. Do you have:

a. Own house	-	Yes / No
b. Two wheeler	-	Yes / No
c. Telephone	-	Yes / No
d. Four Wheeler	-	Yes / No
e. TV	-	Yes / No

QUESTIONNAIRE

II. Please underline the correct option to every given question.

1. Why do we need different varieties of food?
   a. To get all necessary vitamins and minerals
   b. For proper growth and development
   c. To avoid disease
   d. All the above

2. What are the types of nutrients contained in the food?
   a. Cereals, pulses, vegetables, fruits and oils
   b. Oxygen, Carbondioxide, nitrogen and helium
   c. Carbohydrates, proteins, fats, vitamins and minerals
   d. Roots, leaves and legumes

3. Lack of balanced diet leads to
   a. Poor growth
   b. Obesity and related problems
   c. Disease or morbidity
   d. All the above

4. Over nutrition and poor exercise causes
   a. Excellent growth
   b. Obesity and related disease
   c. Strength
   d. None of the above

5. People all round the world have the same kind of meal for getting essential nutrients
   a. Yes
   b. No
   c. Don't Know

6. What is Hunger?
   a. Not getting enough food to meet the nutritional requirement
   b. It is a state of mind
   c. Urge to eat more and more
   d. None of these

7. Hunger is a problem in
   a. Under developed countries only
   b. Developed countries only
   c. Developing countries only
   d. Around the world

8. Malnutrition is
    a. Only under nutrition
    b. Only over nutrition
    c. Both under nutrition and over nutrition
    d. None of the above

9. Food security means…
    a. Securing food and saving it
    b. Safeguarding food from insects, germs, rodents etc
    c. Having access to food we need for active and healthy life
    d. Security at the food storage points

10. Major Energy yielding foods are
    a. Cereals, fats and roots
    b. Pulses only
    c. Vegetables only
    d. Fruits only

11. Protein rich foods are
    a. Roots and tubers
    b. Fruits only
    c. Cereals only
    d. Pulses and some animal foods

12. Which of the following is / are Vitamin A rich foods
    a. Roots and tubers
    b. Fruits, ground nut oil and fish
    c. Green Leafy Vegetables, yellow and orange colour fruits and vegetables
    d. None of the above

13. Dietary iron is needed to
    a. Maintain haemoglobin level in the blood
    b. For the development of bones
    c. To maintain beauty
    d. For building the muscles

14. The food group which can be consumed liberally
    a. Fruits and vegetables
    b. Pulses
    c. Cereals
    d. Animal foods

15. The inadequate consumption of protein in children leads to
    a. Stunted growth
    b. Energy deficiency
    c. Poor looks
    d. Dark complexion

16. Lack of which mineral causes goiter
    a. Iron
    b. Folate
    c. Iodine
    d. Calcium

17. Calcium is important for
    a. Keeping away from goiter
    b. Body maintenance, strengthening bones and teeth
    c. Proper growth and development
    d. Building body tissues

18. Arrange the following steps of food system from field to table in right order
    a. Moving food from the field ( )
    b. Processing, selling or storing the food ( )
    c. Getting ready to grow food ( )
    d. Growing the food ( )
    e. Preparing and eating food ( )

19. World Food Day is celebrated every year on
    a. November 11th
    b. October 16th
    c. January 30th
    d. July 19th

20. FAO stands for
    a. Feeding All Obese
    b. Food Adulteration Organisation
    c. Food and Agriculture Organisation
    d. Forest and Aqua-culture Organisation

APPENDIX –2

KNOWLEDGE ASSESSMENT
QUESTIONNAIRE FOR SCHOOLCHILDREN

Study on effect of two different educational tools on nutrition knowledge of school- going adolescents.

1. School name : _____ :

2. Section :

3. Board : 1. State 2. CBSE

4. Name of the child :

5. Roll No. :

6. Age :

7. Gender : 1. Male 2. Female

8. Religion : 1. Hindu 2. Christian 3. Muslim 4. Any other

Family Background

9. Father's qualification :
   1. Illiterate 2. Primary 3. SSC 4. UG
   5. PG 6. Professional 7. Technical 8. Others

10. Mother's qualification :
    1. Illiterate 2. Primary 3. SSC 4. UG
    5. PG 6. Professional 7. Technical 8. Others

Occupation of the Parents

11. Father : 1. Govt. service 2. Pvt. Service 3. Business
    4. Agriculture 5. Technical 6. Professional

12. Mother : 1. Govt. service 2. Pvt. service 3. Business
    4. Agriculture 5. Technical 6. Professional
    7. House wife

13. Total income of the family per month :

ASSESSMENT OF KNOWLEDGE ON NUTRITION

A. Mark '√ ' for the statements that are TRUE and 'X' for FALSE (12 marks)

1. Carbohydrates are the main source of energy in our diet ☐
2. Fats provide higher energy than carbohydrates and proteins ☐
3. Excess water in which vegetables are cooked should be thrown away ☐
4. Vitamins are called as essential micronutrients ☐
5. Ragi and milk are rich sources of calcium ☐
6. Fermented food items are good for health ☐

B. Fill in the blanks with a suitable answer (10 marks)

7. Body building foods mainly consist of _____ nutrient.
8. _____ and _____ which are rich in vitamins and minerals, are considered as protective foods.
9. The mineral _____ is very much essential for growth and development of bones
10. Our staple foods (like rice, wheat, jowar etc) are main sources _____
11. Low levels of haemoglobin leads to _____

C. Match the NUTRIENTS in column 'A' with their FOOD SOURCES in column 'B' (10 marks)

'A'	**'B'**
12. Vitamin A	a. Guava, Orange, Amla, Lemon
13. Protein rich foods	b. Papaya, Leafy vegetables, Carrot
14. Vitamin B	c. Pulses, Fish, Egg, Meat
15. Vitamin C	d. Milk, Nuts, Pulses
16. Energy rich foods	e. Rice, Wheat, Jowar, Bajra, Ragi

D. Read the statement and <u>underline</u> the correct answer from the options in the brackets (20 marks)

17. The cooked food should be (covered / uncovered).

18. The consumption of street food is (hygiene / unhygienic).

19. Combination of pulses and legumes will _____ the nutritive value (increase / decrease)

20. Consumption of yellow and orange coulour fruits & vegetables will _____ the vision (improve / not improve)

21. Milk and soya bean are rich in (carbohydrates / protein)

22. Which one offers you more energy _____ (one banana / 100g grapes)

23. Sprouted gram should be included in the diet to get _____ (more vitamins / fat)

24. Grains should be stored in _____ (wet / dry containers)

25. Which will give more nutritive value _____ (fried green gram / sprouted green gram)

26. Which practice is correct _____ (Wash the vegetable and cut / Cut the vegetable and wash)

E. Indicate the correct answer in the box provided against each question (14 marks)

27. Vitamin D deficiency causes: ☐
    a. Night blindness b. beri beri
    c. Scurvy d. Rickets

28. Vitamin C deficiency causes ☐
    a. Scurvy b. Blindness
    c. Bone diseases d. Skin allergy

29. Iodine deficiency results in ☐
    a. Anaemia b. Goitre
    c. Rickets d. Pellagra

30. Dietary Iron is richly available in

a. Fruits b. Vegetables

c. Green leafy vegetables d. Nuts

31. Vitamin A deficiency leads to

a. Night blindness b. Pellagra

c. Anaemia d. Scurvy

32. Anaemia can be prevented by consuming

a. Plenty green leafy vegetables b. More fruits

c. Variety of cereals d. Exposure to sunlight

APPENDIX –3

KNOWLEDGE ASSESSMENT QUESTIONNAIRE

Study on nutrition education for student community volunteers –
A comparative study of two different communication methods

1. **Name of the College** :

2. **Subject** : a. Major literature b. Economics
   c. Commerce d. Science or Social Science

3. **Name** :

4. **Age** :

5. **Gender** : 1. Male 2. Female

6. **Religion** : 1. Hindu 2. Christian 3. Muslim 4. Any other

7. **Caste** : 1. FC 2. BC 3. SC 4. ST 5. Any other

8. **FAMILY BACKGROUND**

Father's qualification:

1. Illiterate	2. Primary	3. SSC	4. UG
5. PG	6. Professional	7. Technical	8. Others

Father's occupation:

1. Govt. service	2. Pvt. Service	3. Business
4. Agriculture	5. Technical	6. Professional

Mother's qualification:

1. Illiterate	2. Primary	3. SSC	4. UG
5. PG	6. Professional	7. Technical	8. Others

Mother's occupation :

1. Govt. service	2. Pvt. service	3. Business	
4. Agriculture	5. Technical	6. Professional	7. House wife

9. **Total income of the family per month: Rs.**

10. **Total number of family members:** Adult Children

11. KNOWLEDGE ASSESSMENT QUESTIONNAIRE

Underline the correct answer

1. The major energy yielding foods are
   a. Cereals
   b. Pulses
   c. Cereals and pulses
   d. Vegetables

2. The sources of plant proteins are
   a. Pulses and legumes
   b. Vegetables
   c. Pulses legumes and nuts
   d. None of the above

3. An adult man leading sedentary life needs
   a. 2100 kcal / day
   b. 2400 kcal / day
   c. 2700 kcal / day
   d. None of the above

4. Your energy needs are adequately met with
   a. Combination of cereals and millets
   b. Only rice
   c. Only wheat
   d. None of the above

5. Fats are basically needed to
   a. Absorb the fat soluble vitamins
   b. Provide essential fatty acids
   c. Absorb the vitamins (A,D,E and K)
   d. All the above

6. Using varieties of oils is
   a. Good
   b. Not good
   c. Good, only if one type of oil is taken
   d. None of these

7. Invisible fats are present in
   a. Legumes and pulses
   b. Mustard and fenugreek seeds
   c. Green leafy vegetables
   d. All together

8. Obesity is a causative factor
   a. Hypertension
   b. Diabetes
   c. Heart diseases
   d. All of the above

9. Excessive and regular consumption of meat
   a. is good for health
   b. improves stamina
   c. may cause more fat formation which may lead to diseases
   d. none of the above

10. Vitamin D is required for
   a. Bone growth and calcium metabolism
   b. Absorption of calcium
   c. Both a & b
   d. None of the above

11. Goiter and cretinism are associated with the deficiency of
   a. Iron
   b. Iodine
   c. Calcium
   d. None of these

12. Normal haemoglobin level for an adult man is
   a. <12 g / dl
   b. > 18g / dl
   c. 14-16 g / dl
   d. None of the above

13. Normal haemoglobin level for an adult woman is
   a. around 12 g / dl
   b. > 14 g / dl
   c. < 10 g / dl
   d. none of the above

14. The adolescent age for boys starts from
   a. 10-12 years
   b. 15 years
   c. 18 years
   d. 21 years

15. The adolescent age for girls starts from
   a. 10-12 years
   b. 15 years
   c. 18 years
   d. 21 years

16. The oral rehydration solution can be made up of
   a. pinch of salt, a teaspoonful sugar in a pre-boiled water
   b. teaspoon slat and a pinch of sugar
   c. none of these

17. During pregnancy a woman needs
    a. Extra amount of protein
    b. Needs no extra proteins
    c. Needs less protein

18. Anaemia can be prevented by consuming
    a. plenty of green leafy vegetables
    b. more fruits
    c. variety of cereals
    d. exposure to sun light

II. Fill in the blanks with correct answers

19. HIV is associated with the disease _____

20. The virus Hepatitis A is responsible for the disease _____

21. Hepatitis A spreads through _____

22. Cholera is a _____ borne disease

23. Malaria and Brain fever are caused by the bite of _____

24. Chickenpox is caused by the virus Varicella zoster True / false

25. DPT is vaccination for Diptheria-Pertussis-tetenus True / false

26. ELISA and Western blot methods are used to diagnose HIV True / false

27. Hypertension and obesity have strong association True / false

28. Ragi and milk are rich sources of calcium True / false

29. Fermented food items are good for health True / false

30. Milk and soybean are rich in proteins True / false

31. Sprouted gram increases the vitamin levels True / false

APPENDIX -4

IN-DEPTH INTERVEIWS WITH
KEY COMMUNICATORS IN VSRIOUS ORGANSISATIONS

PROFILE OF THE INTERVIEWEE

1. Name:
2. Age:
3. Gender:
4. Education:
5. Designation:
6. Organization:
7. No.of years spent in the current position:
8. Key activities in the current position:

THEME GUDE

1. **Various nutrition communication/education activities of your organization**

   Probes:

   (i) how do you communicate nutrition messages – what media, methods etc.
   (ii) Specific nutritional problems you refer to in your communication
   (iii) Who are your target audience

2. **Are the nutrition communication activities planned efforts?**

   Probes:

   (i) Were they planned to be carried out the way you mentioned them?
   (ii) What was the basis for selecting the media, methods or target audience?

3. **How do you evaluate the success of your communication or education activity?**

   Probes:

   (i) How d you measure success of your communication programmes
   (ii) Any impact evaluation done so far? If yes, was it ever done by an outside agency?
   (iii) What are/were parameters for success?
   (iv) Was evaluation component incorporated right at the planning stage?

4. **Finances for these activities? Are they usually budgeted before hand?**

5. **Community participation in nutrition communication activities?**

   Probes:

   (i) Is there any element of community participation in your programmes
   (ii) How are they involved in communication process (during planning, implementation, choice of media, methods etc)
   (iii) What are constraints you face for involving community at various stages of the communication process.