

**THE NUTRITIONAL STATUS
OF PRE-SCHOOL CHILDREN IN RELATION TO
STANDARD OF LIVING**

A STUDY IN THREE SELECTED VDCs IN BHAKTAPUR DISTRICT, NEPAL

*Dissertation submitted to the Jawaharlal Nehru University
in partial fulfillment of the requirements
for the award of the degree of*

MASTER OF PHILOSOPHY

SHER BAHADUR RANA



**CENTRE FOR SOCIAL MEDICINE AND COMMUNITY HEALTH
SCHOOL OF SOCIAL SCIENCES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI- 110 067
INDIA
2006**



CERTIFICATE

This dissertation entitled “**The nutritional status of pre-school children in relation to standard of living: A study in three selected VDCs in Bhaktapur district, Nepal**” submitted by **Sher Bahadur Rana**, Centre for Social Medicine and Community Health, School of Social Sciences, Jawaharlal Nehru University, New Delhi, for the partial fulfillment of the requirements for the award of the degree of **Master of Philosophy** is an original work and has not been submitted so far in part or in full, for any other degree or diploma of any university or institution.

We recommend that this dissertation be placed before the examiners for evaluation.

Dr Rajib Dasgupta
Asst. Professor
Supervisor

Dr. Mohan Rao
Professor
Supervisor

Dr. K. R. Nayar
Professor
Chairperson

Acknowledgements

The dissertation has come in final shape with critical suggestions and thorough guidance of Professor Mohan Rao and Asst. Professor Rajib Dasgupta, CSMCH/SSS, JNU. I am deeply indebted to them for their remarkable effort to shape my study level academically more focused and analytical.

I am very much grateful to Dr. Ritu Priya Merhotra, Associate Professor and Mr. C. B. Budhathoki, Ph.D. scholar, CSMCH/SSS who provided great help and encouraged me in joining M. Phil./PhD in such a highly reputed University. My heartfelt thanks goes to all the Nepalese M Phil/Ph.D. and Ph.D. scholars of this University particularly, Lal Rapacha, Govinda Subedi, Bikash Kumar K.C., Surendra Giri, Mahendra Maharjan, Shiba Lal Nepal and Yogendra Bahadur Shahi for their generous help in providing literatures, manage SPSS data base, editing and proof reading my dissertation. Similarly Mr. Dominic, Mr. Dilip Diwakar and Mr. Oomen Curian are also equally thankful for the same. I would like to deeply appreciate to all the faculty members of my Centre, whose constructive feedback during presentation of proposal and main findings of study helped me to be focused. My sincere thanks goes to research team of the Centre, administrative staff and other colleagues who provided me friendly environment during my study period.

My sincere appreciation goes to Nepal Health Research Council (NHRC) for allowing me formally to carry out this study in selected VDCs of Bhaktapur district. Mr. Krishna Prasad Subedi, Chief, Election Commission District Office; Mr. Arjun Adhikari, DPHO, Mr. Ram Bahadur K.C., *Nayab Subba*, DPHO; Ramesh Lamsal, Secretary, Tathali VDC; Puspa Koirala, Secretary, Nagarkot VDC; Basudev Bhattarai, Secretary, Chitapol VDC; Mr. Lokendar Bahadur Paudel, AHW, Nagarkot HP; Mr. Madhab Prasad Satyal, AHW Chitapol SHP; Ram Prasad Acharya, AHW, Sirutar SHP; Renuka Acharya, AHW, Balkot SHP; Mr. Dilli Sher K.C., VHW, Chitapol SHP; Tathali and; Nangkhel HP, Bhaktapur, are highly thankful for their support to make this study a milestone. I became able to get information for the field activities of study area, received voter list from election commission and VDC, and got support of weighing machine to weigh children and other strong moral support during my study.

My fieldwork wouldn't have been feasible and so enjoyable without the wholehearted support from Deepak Thapa, Khim Gharti, Laxmi Acharya, Mina Adhikari and Bhes Raj Bhusal and local community people, so thanks a lot for them. Support and contribution provided from my family members and relatives in this concern is remarkable too. I am thankful to Ganga Ram, Keshara Bhusal and Suraj Thapa for their help in recoding data in interview schedule. I am equally thankful to all of them who assisted me directly or indirectly from beginning to end of the study. My sons Saroj and Manoj and my daughter Nabina are highly appreciated for their assistance during my data collection and entry in SPSS package. At last but not the least, I am very much thankful to my wife, Bimala Rana, who passionately encouraged me for the completion of M. Phil. by taking responsibility of family and other household endeavors in my absence.

Sher Bahadur Rana
Brahmaputra Hostel-234E, JNU

List of Tables

Tables	Page
2.1 Trend on prevalence of nutritional status of children in Nepal (Percentage)	25
2.2 Trend on prevalence of Vitamin A Deficiency (Night Blindness) in Nepal (Percentage)	26
2.3 Trend on prevalence of Iron Deficiency Anemia (In percentage)	26
3. 1 Priority ranking of the VDCs on the basis of least developed with regard to 4 indicators	41
3.2 Sampling based on the category of administrative division and caste	42
4. 1 Distribution of caste in household population according to VDCs	57
4.2 Age and sex distribution of household population	58
4.3 Marital status of the household population 10 years of age and above	59
4.4 Marital status of the household population in relation to sex	60
4.5 Percentage distribution of marital status of the household population according to age group and sex	60
4.6 Percentage distribution of education level among household population by 6 and above according to caste and sex	62
4.7 Percentage distribution of education level among household population by 6 and above according to SLI	63
4.8 Distribution of household population on main occupation according to sex	64
4.9 Household's main occupation in relation to caste	64
4.10 Household's main occupation in relation to SLI	65
4.11 Percent distribution of household population on main occupation according caste	65
4.12 Distribution of household population on main occupation according SLI	66
4.13 Mother's income pattern with regard to caste and SLI	67
4.14 Type of housing in relation to caste and SLI	69

4.15 Landholding pattern at household level according to caste and SLI	70
4.16 Type of latrine in relation to caste and SLI	70
4.17 Source of drinking water in relation to caste and SLI	71
4.18 Type of light according to caste and SLI	72
4.19 Distribution of SLI of households according to VDCs, religion and caste	73
4.20 Percentage of households' access to facilities	73
4.21 Distribution of mother's age group	74
4.22 Age and sex distribution of child	75
4.23 Education level of mother in relation to caste and SLI	76
4.24 Distribution of children according to exclusive breast feeding and continuity of breast feeding	
4.25 Distribution of children according to exclusive breastfeeding and continuity of breastfeeding.	77
4.26 Household's food sufficiency in relation to caste and SLI	79
4.27 Calorie intake by a child in relation to caste and SLI	80
4.28 Distribution of weight for age, height of age and weight for height among preschool children	82
4.29 Distribution of weight for age, height for age and weight for height of preschool children in relation to VDCs, religion and caste	84
4.30 Distribution of weight for age, height for age and weight for height of preschool children with religion, caste and sex of a child	85
4.31 Distribution of weight for age, height for age and weight for height of preschool children with regard to characteristics of households	86
4.32 Distribution of weight for age, height for age and weight for height of preschool children in relation to households' basic facilities	88
4.33 Distribution of weight for age, height for age and weight for height of preschool children in relation to SLI, food sufficiency and calorie intake at the household level	89
4.34 Distribution of weight for age, height for age and weight for height of preschool children by parent's level of education	90
4.35 Distribution of weight for age, height for age and weight for height of preschool children according to main occupation at household level, mother's income and caretakers	91

4.36 Distribution of weight for age, height for age and weight for height of preschool children in relation to child feeding practices	93
4.37 Distribution of weight for age, height for age and weight for height of preschool children in relation to the type of child's sickness and its duration	94

List of Figures

Figures	Page
2.1 Location of Nepal in world	20
3.1 Conceptual framework	39
3.2 Flow chart of study design	40
3.3 Bhaktapur district in Nepal	43
3.4 Map of Bhaktapur district and study area	44

Acronyms

AHW	Auxiliary Health Worker
ARI	Acute Respiratory Infection
APP	Agriculture Perspective Plan
CBS	Central Bureau of Statistics
CBO	Community Based Organization
CDD	Control of Diarrheal Diseases
CEFS	Centre for Environment and Food
CSMCH	Centre for Social Medicine and Community Health
CSRD	Centre of Study for Regional Development
CSSS	Centre for Social Science Systems
DPHO	District Public Health Office/Officer
DoHS	Department of Health Services
EGA	Employment Guarantee Act
FAO	Food and Agriculture Organization
FCHV	Female Community Health Volunteer
FP/MCH	Family Planning/Maternal and Child Health
GDP	Gross Domestic Product
GIS	Geographical Information System
GON	Government of Nepal
HDR	Human Development Report
HMG/N	His Majesty's Government
HELIN	Health-net in Nepal
HP	Health Post
ICDS	Integrated Child Development Services
ICIMOD	International Centre for Integrated Mountain Development
ICMR	Indian Council of Medical Research
ICN	International Conference of Nutrition
ICRSC	Informal Sector Research and Study Centre
IIPS	International Institute for Population Sciences

IMCI	Integrated Management of Childhood Illness
INGO	International Nongovernmental Organization
JNSP	Joint Nutrition Support Program
JNU	Jawaharlal Nehru University
JSI	John Snow Incorporated
MCHW	Maternal and Child Health Worker
MDG	Millennium Development Goal
MOH	Ministry of Health
NCHS	National Centre for Health Statistics
NDHS	Nepal Demographic Health Survey
NESAC	Nepal South Asia Centre
NERP	Nutrition Education and Rehabilitation Programme
NFHP	Nepal Family Health Programme
NFHS	National Family
NGO	Nongovernmental Organization
NHRC	Nepal Health Research Council
NIN	National Institute of Nutrition
NMIS	Nepal Multiple Indicator Survey
NMIS	Nepal Multiple Indicator Survey
NMSS	Nepal Micro-nutrient Status Survey
NNIP-S	Nepal Nutrition Intervention Project-Sarhali
NNPCC	National Nutrition Policy Coordination Committee
PANP	Poverty Alleviation and Nutrition Programme
PACS	Poorest Areas of Civil Society
PHC	Primary Health Centre
RECPHEC	Resource Centre for Primary Health Care
SBI	State Bank of India
SC/US	Save the Children/United State
SC-	Special Correspondent
SD	Standard Deviation
SLI	Standard of Living Index
SIS	School of International Study
SPSS	Statistical Package for Social Science
SSS	School of Social Sciences

TBA	Traditional Birth Attendant
UIP	Universal Immunization Programme
UN	United Nation
UNDP	United Nation's Development Programme
UNICEF	United Nation's Children
VDC	Village Development Committee
VHW	Village Health Worker
WFP	World Food Programme
WHO	World Health Organization

TABLE CONTENTS

Acknowledgement	i
Abbreviations	iii
List of Tables	vi
List of Figures	vi
Acronyms	vii

CONTENTS	Page
-----------------	-------------

CHAPTER I

INTRODUCTION

1-15

Historical perspective of hunger and nutrition
Poverty, hunger and under-nutrition in the world
UN Summit and problem in solving hunger and nutrition
Governance, equality and accountability of the State
Nutrition problem in Nepal
Statement of the problem
Reference

CHAPTER II REVIEW OF LITERATURE

16-38

International context
Child nutrition program in Nepal
Issue of equity/equality in health
Rationale of the study
Reference

CHAPTER III RESEARCH METHODOLOGY	39-53
Study design	
Sampling design	
Study area	
Study population	
Test instrument and data collection	
Duration of field activities	
Data analysis	
Limitation of the study	
Ethical consideration	
Reference	
CHAPTER IV RESULTS AND ANALYSIS	54-96
Profile of district	
Results	
Characteristics of household population	
Socio-demographic characteristics at household level	
Nutritional status of preschool children and its determinants	
Reference	
CHAPTER V DISCUSSION AND CONCLUSION	97-115
ANNEXES	116-156

CHAPTER ONE

INTRODUCTION

Good nutrition is dependent on adequate food, health and care. Good nutrition has of late come to be seen as a basic human right for all. The Oxford dictionary defines nutrition as the process of taking in and absorbing nutrients (Soanes 2005). The same is the meaning in Collins dictionary- which is somewhat more elaborate. It says nutrition is the process of taking food into the body and absorbing the nutrients in those food items (Collins 2001). A balanced diet is necessary for the fulfillment of nutritional requirements of all the household members, providing them with necessary energy, proteins and micronutrients (Latham 1997). Human beings require a variety of nutrients as part of their daily consumption of food to maintain a healthy and active life. Day to day, all components of diet must be chosen judiciously, in adequate amount and proper proportion, in order to acquire all nutrients. The amount of each nutrient required depends on the individual's age and his/her physiological status. The amount of nutrients needed for a normal adult depends on his/her bodily requirements, that is, for maintaining constant body weight and ensuring proper body function. At the same time, for infants and young children, it depends on one more factor, i.e. the requirements of growth, which is about 2-3 times than what adults need, when nutrients are calculated as a ratio to the body weight. There are also some special physiological conditions which need additional nutrients to meet the extra demand, as the demand of fetal growth and maternal tissue during pregnancy of women and secretion of milk during lactation of mother (ICMR 1998).

The primary requirement during childhood is to have adequate food for one's growth. It is very much crucial during first 5 years and particularly so, in the first three years of life for rapid growth. In infancy and the early childhood, humans are entirely dependent on family, particularly the mother, for food. If a child has insufficient food, s/he becomes under-nourished, fails to gain weight and that delays and sometimes arrests growth. There are also chances that some infections may cause protein breakdown and affect body growth (Ghosh 2004). Such a child is not only more prone

to infections, but also has a higher probability of dying from these infections which would be innocuous in a well-fed child.

Hunger and Nutrition: A Historical Perspective

Hunger, it is often said with some accuracy, has always been with us. However, the fact of the matter is that today the hungry are largely concentrated among the poorer populations of the formerly colonised countries, and the problem is both massive and deep. The fact of the matter also is that globally food production has more than kept pace with population growth – which is in fact substantially declining. In other words, not one person in the world needs to go to bed hungry. Yet almost one in six people globally is unable to meet his/her basic calorie requirement.

Before the late eighteenth century when the agricultural and industrial revolutions were introduced in the West, hunger and epidemics like cholera were equally prominent. As a result massive deaths occurred in European countries at that time and life expectations were in the late thirty to forty years. After the agricultural revolution and the development of infrastructure like transportation, these countries escaped from historical hunger or subsistence crisis. McKeown concluded that human resistance to infectious diseases had demonstrably improved by the better availability of nutrition (Mc Keown 1972).

India had not been free from the death by hunger and communicable diseases. Massive levels of hunger and diseases marked the Indian landscape even as millions of Indians died in various famines in the era of colonial power. Many millions more died in pandemics of cholera, plague etc, which also characterized the colonial epidemiological landscape. As a result life expectations at birth were only at 22 years as per the 1901 Census. Many of these famines were policy driven with callous and willful neglect. Indeed, in just one year, 1876, over 6 million lives fell 'victims of Malthusian rulers' (Sainath 2005).

During the early twentieth century, advances were made in the basic sciences of nutrition. From the post War years however, market forces used nutrition science for

their profit, giving no attention on nutrition problem of a larger segment of population who are in various stages of under-nourishment. Until the decade of 1970s, the issue of under-nutrition itself was debated when nutrition scientists from the western countries with the interest of market forces speculated that under-nutrition, along with deficiency of protein, would lead to massive problems of mental retardation. The debate was resolved when Gopalan and Narasingarao in 1971 and Sukhatme in 1978 discovered that calorie deficiency is by far the most common nutritional disorder in the third world, particularly in South Asia. Their studies concluded that if cereals found in South Asia are consumed in appropriate amount it can fulfill both calorie and protein requirements (Banerjee 1988). Thus new concept developed by them termed under-nutrition as protein calorie malnutrition (PCM). Finally, it evolved into protein energy malnutrition (PEM).

Poverty, Hunger and Under-Nutrition in the World

More than 20 million people in the Horn of Africa are at risk of severe famine according to the head of the WFP. These countries are Kenya, Somalia, Eritrea, Ethiopia and Tanzania. At this time, 3.5 million Kenyans need emergency assistance.

It has been estimated that 25, 000 people die of hunger every day. Ninety percent of them would not have died in a slightly better situation. It will require £ 3 billion to eliminate hunger among children in Africa. Donations only in the form of food and grains do not work but needs money also; to buy food locally and manage food distribution, thus taking precaution against corruption (Campbell 2005). Forty-three years back Waterlow had figured out that in African countries- childhood malnutrition was very serious, under five mortality very high, still most of the children over 3 years old were within normal limits of weight for height, some mildly overweight. Irrespective of substantial advances in Jamaica in social and economic development after independence in 1963, however, severe primary under-nutrition was still a common cause in pediatric hospital but it is only the tip of the iceberg (Waterlow 1974). Thus childhood under-nutrition and mortality has not declined significantly till now.

UNICEF reports that the prevalence under-nutrition in South Asia is equal to that in countries of the Sub Saharan region in Africa. India, Bangladesh and Pakistan together account for nearly half of the world's under-nourished children. The rate of under-nutrition in India has the same rate of under-nutrition in Ethiopia (47%), Nepal and Bangladesh (48%) contrasting with the figures for China (8%), Thailand (18%) and even Afghanistan (39%). The prevalence of underweight and severely underweight children has come down to 47% and 18% (NFHS II 1998-99) from 52% and 20% (NFHS I 1992-93) but not in a significant way in India. The highest prevalence of under-nutrition is still among schedule tribe in India being remarkably highest prevalence of wasting. There is no symbol of decrease in the indicator of severely underweight. In contrast, there is trend of slow decrease among children of schedule caste but in other caste category considerable decreasing trend has been found in all in indices (IIPS1993, 2000). Further, in India, half of all children under 3 years of age are underweight, 25% of them are born low birth weight and two third of them and half of all adult women are anemic. In the case of India, the reason behind high prevalence of under-nutrition seems to be widespread poverty, unemployment, lack of purchasing power; equally, lack of safe drinking water, lack of sanitation, unhealthy working and living environments are also important causes. Besides, there are other factors which are poor food quality and safety; and women's low social and economic status (UNICEF 2005). UNICEF thus calls on the government to improve pre and post natal care, reduce under-nutrition ensuring that newborns are given colostrums, exclusive breast feeding for six months, adequate complementary food for 3-5 times a day, and immunization to children and micronutrient supplementation.

The extremely high prevalence of hunger and under-nutrition in the country is the overwhelming cause of the current, high and unconscionable levels of infant and child mortality. The UN *Human Development Report 2005* further says that inequalities within the countries weaken the link between economic growth and poverty reduction. Growth has little impact on reduction of poverty in highly unequal societies like India and China although they have global implications in development and these countries are at the forefront of economic growth in the region. China's per capita income growth increased from 8.1% in 1980 to 8.5% in 1990-2003 but the decline in child mortality remained slow from 2.3% in 1980 to 1.9% in 1990-2003. Declining child mortality in India remained even very slow from 2.9% in 1980 to 2.3% in 1990s. In

contrast, the declining trend of child mortality was rapid in Bangladesh and Vietnam as compared to these giant countries. The child mortality decreased from 239 per 1000 lives in 1970 to 69 in 2003 in Bangladesh. In the same way, the rate decreased from 87 in 1970 to 23 in 2003 in Vietnam. Had India experienced Bangladesh's child mortality reduction rate, 732, 000 fewer children would have died every year in India. 732, 000 fewer children would have died every year in India. With Vietnamese levels of decline in child mortality, China could save 276, 000 lives of children. Moreover, the report states that child mortality is a key indicator of human development and impressive economic growth alone does not necessarily translate into human development. Countries of high under five mortality besides China and India; are Maldives, Myanmar, Kampuchea, Laos, Bhutan, Nepal, East Timor and Papua New Guinea (UNDP 2005).

The HDR further points out those main causes of such inequality in India are rising rural unemployment, very slow agricultural output growth, stagnating agricultural wages, a large number of virtually jobless citizens (UNDP 2005). At the same time, substantial populations of dalits and adivasis have been marginalized. There is fresh evidence that economic growth alone may not balance social and human development in the country. In a telling example, about 2,675 children, and over 1000 infants – primarily *adivasis*, died of under-nutrition between April and June 2005 in the hinterland of Maharashtra; at the same time the Sensex steadily rose to cross 8,000. Similarly, gender inequalities have also played to make matters worse for India's children. Death rate for the 1-5 age groups is 50% higher for girls than that of boys resulting in 130,000 *missing* girls alone in India. So, gender gap is one of the major obstacles that need to overcome converting economic success into human development success.

UN Summit on Hunger and Under-nutrition

The General Assembly of the UN made four resolutions as follows: development, peace and collective security, human rights and the rule of law, and strengthening the United Nations. UN renewed its commitment to eradicate poverty and promote sustained economic growth, sustainable development and global prosperity for all in a

range of development goals and objectives already agreed at major United Nations conferences and summits. It reaffirmed that food security and rural and agricultural development must be adequately and urgently addressed in the context of national development and response strategies and, in this context, will enhance the contributions of indigenous and local communities, as appropriate. It is convinced that the eradication of poverty, hunger and malnutrition; particularly as they affect children, is crucial for the achievement of the Millennium Development Goals (MDGs). Rural and agricultural development should be an integral part of national and international development policies. It deemed that it necessary to increase productive investment in rural and agricultural development to achieve food security. Further it committed itself to increasing support for agricultural development and trade capacity-building in the agricultural sector in developing countries (UN 2005a).

One of the key issues of the MDGs is to promote development and reduce poverty. It has reflected international consensus that poverty in an increasingly prosperous world economy was unacceptable. These provided measurable targets, albeit imperfect, to track progress. For the first time, rich countries and international financial institutions such as the World Bank and the IMF were to be held accountable not just for their processes but in terms of outcomes (Hoge 2005).

Many of the MDGs will not be met in U.N. member states by 2015. None of them will be met in Africa. Poverty has stagnated or worsened in every region outside Asia. In Sub-Saharan Africa which already had the highest poverty rate in the world, the situation deteriorated further and a million more fell into deep poverty. The figures were poor for child mortality and malnutrition as well as gender parity. The number of people suffering from hunger has increased since 1997; over 150 million children in developing nations are underweight. The target to eradicate extreme hunger is projected to be missed in Africa, and South and East Asia. On current trends, the child mortality target will be missed in every region except East Asia and Latin America (UN 2005b).

United Nation has reflected social equity in international human rights law affirming the right of every child to adequate nutrition to ensure proper physical growth and mental development (UN 1989). Even in the 21st century, the health and nutritional

status of the world's children vary widely --a certain segment of children are living with optimum health status and enjoying every walk of healthy life. The case of other segments of children's life is totally different as they live at the subsistence level or below with a substandard health and nutritional status. Thus one small segment of the population is concerned with obesity, micro-nutrients, health foods etc while another segment of population is suffering from hunger and massive under-nutrition.

Good Governance, Equality and Accountability of the State

The nutritional status of children less than five years age has a key role in the context of *Human Development Index* and country's social development as well. There must be a democratic system in any country with widely fair representation from every class, caste, creed and gender in all sectors of the country with equality for overall development including rural areas of the country for the overall improved nutritional status of all children in the country. The democratic governance should be reflected as 'society centered' in partnership with government having its predominant role, private sector and civil society. All three are critical for sustaining human, economic and social development. The role of government is to create a conducive political, legal and living environment, the role of private sector is to promote enterprises and generate jobs and income and the role of civil society is to facilitate interaction by mobilizing groups to participate in economic, social and political activities. Thus democratic governance has to be created through constructive interaction among these three.

Democratic governance should adhere to certain functional norms and principles such as involvement of minorities and other disadvantaged groups in the political decision making process, transparency and accountability at all governmental and societal levels; citizen's participation in the process of social and public welfare, economic growth and development; a balanced relationship between all bodies of government and civil society; probity in public dealings the part of the government; social auditing of government programs and policies; mandatory establishment of ombudsman institutions and their fearless functioning; civil supremacy over the armed forces and an efficient and nondiscriminatory judicial system. Decentralization is the essence of

democratic governance. Only in a decentralized and disbursed scheme of decision making and implementation can there be meaningful participatory development and freedom of choice, which are the basic ingredients of the equitable growth initiative (Devasahayam 2005).

India, as a democratic country has become a frontrunner in its economic development in the developing world but blatant inequitable socio-economic development is still highly prevalent pushing people to chronic poverty. The following is an example of how tragic the situation is, as existing in the country today. There are tribal dominated populations in the districts of Maharashtra (Thane, Nandurbar, Nashik, Amravati and Gadchiroli) where there is not only the high prevalence of under-nutrition but also highest death of children due to this cause, compounded with infection that can be prevented by simple and inexpensive measures. The issue was highlighted by the Bang Committee established by the government of Maharashtra after newspapers reported a large number of malnutrition deaths among children. The Committee revealed in its study in the above stated districts that 2, 675 children died between April and July 2005 in which there were 1, 085 infants and 1, 590 children aged 1-6 years. It gave critical suggestions: like that the Department of Health must be accountable and the State should give the highest priority to launch a time-bound program to tackle child deaths making use of available sufficient funds to implement the concept of home based neo-natal care. It also recommended extending the Integrated Child Development Services (ICDS) to cover all children noting that of the 1.4 crore children only 62 lakh were on the ICDS registers, while 48 lakh could not avail themselves of the ICDS benefits. The report also cautioned that ICDS should be a program for all children after classification of malnutrition tackling poor growth instead of waiting children for acute malnutrition to set in and then take action. The target should be extended to children aged 1-2 years, pregnant and breast feeding mothers and adolescent girls. *Anganwadis* should serve as health care centers. Quoting official figures, the report said 1, 20, 000 children died each year. However, a study in 2002 by the Child Death Study Action Group put the toll at 175, 000. Based on evidence of Bang Committee the Bombay High Court ordered the Central and State Governments to coordinate and decide on the number of *anganwadis* needed to extend the ICDS to cover all children in Maharashtra. The Government launched the

Rajmata Jijau mother-child health and nutrition mission in January after the committee submitted initial report (SC 2005a).

Although inequality in development is highly prevalent in India, efforts have been made to eliminate such inequalities in order to alleviate poverty from the country. The following is an example from Delhi consultation process. A three-day consultation process had been set up in Delhi on empowering livelihoods related to rural economy and development with focus over 300 million people living below the poverty line. The Poorest Areas of Civil Society (PACS) program has to organize such national consultation workshop with 600 representatives from 108 poorest districts of six States- U.P., M.P., Bihar, Jharkhand, Chhattishgarh and Maharashtra in which participants will be from rural networks and civil society organizations. Under the program, the State Bank of India and NABARD have forged institutional partnership with community- led networks in Faizabad, Chitrakoot and Gorakhpur with targets to link 3,000 self-help groups in U.P. with SBI by 2007 and the process has already begun with SBI having provided credit totaling Rs. 20 lakhs in 20 selected districts. According to the address to the press by the chairperson of Development Alternatives, the Delhi based implementation institution, the national consultation was an annual stocktaking event that brought together various community groups and non-governmental organizations involved in the implementation of empowerment programs under the scheme. It will critically examine a cross-section of initiatives that are emerging from the grassroots (SC 2005b).

Though, the effort may not be able to address the grave situation of farmers fully, an effort has been made as a progressive step by Tamilnadu State in India where a social security scheme for 86 lakh farm workers and 51 lakh small and marginal farmers has been set up. All farm workers and small and marginal farmers in the age group of 18-65 are eligible. Beneficiaries have to pay IC¹Rs. 10 membership fee, but the Government will take care of that by earmarking Rs 13.70 crores. If a beneficiary dies, his kin will get Rs.1 lakh. Those who loose limbs in accidents will get financial assistance up to Rs. 1 lakh. In the case of natural death, the kin will get Rs. 10, 000 besides Rs. 2500 for funeral expenses. Academic assistance to their children has also

¹ Indian Currency

been extended. The provision for marriage assistance is also available in the amount Rs.3000 for men and Rs. 5000 for women. Maternity assistance of Rs. 2000 each will be given to expectant mothers. Those farm labours who have crossed 60 and find it difficult to work will get a lifelong monthly pension of Rs. 200(SC 2005c).

Social activists have a great role to play as pressure group to compel government for the equality of right of the people. An example can be seen from the districts of Rajasthan how people and social activists have struggled creatively for democratic accountability. Now, they are entitled to get work and to have a minimum wage for the period of droughts. It is as a result of their fighting for the right to information exposing corruption in rural works. For example, 'In 1998, the Sarpanches of Kukarkheda (Rajsamand district), Rawatmal and Surajpura (Ajmer district) apologized for committing fraud and publicly returned money after being confronted with irrefutable documentary evidence at a public hearing. In 2001, in Janawad Panchayat (Rajsamand district) the information of public works expenditure painted on a panchayat wall led the people to mobilize and protest, exposing fraud and ghost works amounting to Rs.70 lakh, at a public hearing.' Later the government had to take institutionalized measures for transparency and accountability from the lesson learned from that event. Such activist work is about to come into force at the National Right to Information Act India. The EGA can provide the basis of a permanent social security system if implemented transparently and effectively under this act and even act as an instrument for planned and equitable rural development (Roy 2005).

Nutrition Problem in Nepal

A very wide gap of inequality has still remained though governments of developing countries like Nepal despite efforts continued to reduce under-nutrition and alleviate poverty from the countries for last two and half decades. The goals of governments have been only a mirage rather than reducing under-nutrition among people within the country including child under-nutrition.

In Nepal, the trend of prevalence of under nutritional status from 1965 to 1996 was declining considerably as reflected by the data on children's anthropometric

measures. From 1996 onwards no improvement in the nutritional status of children less than 5 years of age have been observed, however, the measuring indices are not uniform in the surveys, in the sense of age group. Survey done by Save the Children

Fund in Surkhet district and in different Panchayats (now Village Development Committee) of Kathmandu district by United Mission to Nepal had found a severe problem of under-nutrition (Pradhananga 1980). In a study, the disparity of under-nutrition among children was found to concurrent with various socioeconomic strata of society and regional disparities. Children belonging to lower caste, of female gender, of large and medium sized family have been found to have more prevalence of under-nutrition in Nepal (Bhatta 1998). The national prevalence of under-nutrition is marginally higher than that of India (47% in 1999) and Cambodia (45% in 2000) and is similar to Bangladesh (48% in 2000).

With the aim of reducing poverty by accelerating economic development and expanding employment opportunities, the government in the early nineties initiated an extensive economic reform agenda as part of the influence of globalization after the restoration of democracy in 1990. However, these early reforms did not touch the important agricultural sector in a significant way; and consequently had little impact on rural poverty (HMG/N 2002). In the Ninth Plan (1995), Agriculture Perspective Plan (APP) brought plan of modern technology in agriculture and livestock, development of infrastructure to alleviate poverty from Nepal that was deeply persisted for decades including fulfilling the objective to expand nutrition program and make more effective. Another stratum of health facility (sub- health post at Village Development Committee –lowest administrative unit) was established making primary health care more accessible at the village level. But these plans were severely disrupted by the adverse domestic and external developments. The progress that was made especially in the eighties was also not sustained including in health and nutrition (HMG/N 2002).

Statement of the Problem

The type of land holding, agricultural pattern and food production, food security, food distribution and consumption of food pattern, employment and income level, inequality, access to a healthy environment and birth weight and disease factors (Ramalingaswami, 1997) play major roles for the nutritional status of the people of the country. If the people are landless or only have a small piece of land or if they mostly depend on the little amount of wage earning, the nutritional status, including that of their children, will be a problem.

The key policy makers, planners, managers, leaders, social workers and other key persons who are involved for the concern of child health and nutrition of all related sectors require having knowledge, coordinative effort and a multi-sectoral approach. Moreover, different civil society organizations (Nongovernmental organizations (NGOs), community based organizations (CBOs) and cooperative groups), International Nongovernmental Organization Organization (INGOs), bilateral and multilateral agencies should have equal accountability on the concern of child nutrition. NDHS 2001 has provided data correlating child nutritional status with its demographic and background characteristic like age group among children, sex differentiation, birth order, birth interval, size at birth, residence (urban and rural), ecological zone (mountain, hill and terai), administrative division like development region, according to mother's education and mothers age. However, from this we do not get an idea of which groups in the population are primarily affected. Hunger is not merely a biological phenomenon: it is affected above all by social, economic and political factors associated with access to resources. Thus while NDHS 2001 provides a great deal of data, they are not presented with reference to social or economic groups. Are certain groups in the population disproportionately affected? In addition to levels of under-nutrition what characterizes these groups with reference to the determinants of under-nutrition? This kind of information is especially important for policy reasons. Thus for example, if the primary reason for under-nutrition is landless and poor wages and unemployment, the policy option of behaviour change would have very little meaning.

Taking into consideration the trend of child under-nutrition still prevailing high, the study, further, has to explore which factors are the most prominent for the higher prevalence of under-nutrition among preschool children. The study presumes that the

stagnation of prevalence of under-nutrition in Nepal at a high level is due to the large pool of under-nourished children in the underprivileged castes, who have low living standard and food insufficiency and also, due to the unequal distribution of resources compounded also, by the food consumption pattern in the family.

Objectives:

1. To study the nutritional status of preschool children in three selected VDCs of Bhaktapur district in Nepal;
2. To relate the prevalence of under-nutrition to people's standard of living and socio- economic background.

REFERENCES

1. Bhatta, K. and et. al. (1998), "Nutritional Status of Children Under Five Years of Age in Social Perspective: A Case Study of Bishankhu Narayan Village", *Journal of Nepal Medical Association*, Vol. 137, Number 128 (Oct.-Dec.): 614-619
2. Banerji, D. (1988), "Knowledge of Human Nutrition and the People of the World", *World Review of Nutrition and Dietetics*, Basel Karger
3. Campbell, Duncan (2005), "20 million face threat of famine in Africa", *The Hindu*, Sunday, March 12 p.14
4. Collins *Co-build English Dictionary for Advanced Learners* © 2001 Harper Collins Publishers on CD
5. Devasahayam, M.G. (2005), "Governance key to 'equitable growth'", *The Hindu*, Sunday, August 14
6. Hoge, Warren (2005), "United Nations reform document addresses seven key issues", *The Hindu*, Wednesday, September 14
7. Ghosh, S.(ed.) (2004), *Nutrition and Child Care: A Practical Guide*, Second Edition, New Delhi: Jaypee Brothers, Medical Publishers (P) Ltd
8. ICMR (1998), *Nutrient Requirements and Recommended Dietary Allowances for Indians: A Report of the Expert Group of the Indian Council of Medical Research*, National Institute of Nutrition, Hyderabad
9. IIPS (1993), *National Family Health Survey –1 (1992-93)*, India.
10. IIPS and ORC Macro (2000), *National Family Health Survey –2(1998-99)*, India, Mumbai
11. HMG/N (2002), *Summary. The Tenth Plan (Poverty Reduction Strategy Paper (2002-2007)*, NPC, Kathmandu, Nepal
12. Latham, M.C. (1997), *Human Nutrition in the Developing World*, Food and Agriculture Organization, UN, Rome
13. Mc Kewon, T. et al (1972), "An Interpretation of the Modern Rise of Population in Europe", *Population Studies*, Vol. 26: 345-382

14. NESAC (1998), *Nepal Human Development Report*, NESAC on behalf of UNDP
15. Pradhananga, Y.P.(1980). *A Brief Introduction to Health and Health Services in Nepal* (Nepali Language), Chamudra Press, Yatakha, Kathmandu, Nepal.
16. Ramalingaswami, V. (1997), "Malnutrition: A South Asia Enigma", *Malnutrition in South Asia: A Regional Profile*, UNICEF, Regional Office for South Asia. (5)
17. Roy, Aruna & Dey, Nikhil (2005), "Guaranteeing action for employment", *The Hindu*, Monday, August 15
18. Sainath, P (2005), "The Raj and the famines of good governance", *The Hindu*, Tuesday, August, 16
19. SC (2005a), "Implement report to arrest malnutrition deaths: High Court", *The Hindu*, Saturday, August, 27
20. SC (2005b), "A fresh look at empowering livelihoods", *The Hindu*, Saturday, October 22
21. SC(2005c), "Social Security scheme for 86 lakh farm workers", *The Hindu*, Tuesday, August, 16
22. Soanes, C. et al. (ed.)(2005), *Compact Oxford Dictionary Thesaurus & Word Power Guide*, Indian Edition, Oxford University Press, New Delhi
23. UN (1989), *Convention on the Rights of the Child*, New York, United Nation's General Assembly Document A/RES/44/25. 5 December
24. UN(2005a), "Resolution adopted by the General Assembly", in *UN General Assembly 2005 World Summit Outcome*, A/RES/60/1: 1-38
25. UN (2005b), "Goal 8 Develop a global partnership for development", in *The Millennium Development Goals Report 2005*, New York, USA.
26. UNDP(2005), "The State of Human Development", in *Human Development Report 2005*, UNDP, New York, USA: 15-49
27. UNICEF(2005), *Annual Report 2005*, UNICEF
28. Waterlow, J.C. (1974), "Some Aspects of Childhood Malnutrition as a Public Health Problem", *British Medical Journal*, October,:88-89

CHAPTER TWO

REVIEW OF LITERATURE

Food including nutrition is a basic human need even then vast number of children still has not been able to meet required food and basic nutrition in developing countries of sub-Sahara Africa and South Asia. Nepal is one of the countries among them. Unless the effort is made to reduce the unfavorable environments of children's development, it will not only perpetuate the vicious cycle of poverty but will also lead to an enormous waste of human potential. If the nutritional well being of people is a precondition for the development of societies their policy makers should be made strongly concerned about it. Otherwise, governments will be unsuccessful in their efforts to accelerate economic development in any significant long-term sense until optimal child growth and development are ensured for the majority (de. Onis 1993).

Evidences clearly show that South Asia is the worst affected region for children's under-nutrition since just over 30% of children are underweight in Africa while this prevalence goes beyond 50% in South Asia. There are so much high figures of the under-nutrition in this region; still, the research is insufficient. On the other hand, there is no clear consensus among the scholars so to why the rate of child under-nutrition is so higher in South Asia than anywhere else in the world (Ramalingaswami 1997). While specific issues on causes of child under-nutrition in this region is still debatable, main causes of child under-nutrition are social, economic, political and ecological forcing the people at that living status in-affordable to eat well and/or they are forced to live under bad environmental conditions leading them to various deficiency disorders. Again, the major causes of poverty and hunger is the acute polarization of population between the rich and the poor and very pronounced social and economic injustice. (Banerji 1988).).

International Context

The Food and Agriculture Organization (FAO) and World Health Organization (WHO), in International Conference on Nutrition (ICN) held in Rome in December

1992 declared, "Our determination to eliminate hunger and to reduce all forms of malnutrition. Hunger and malnutrition are unacceptable in a world that has both the knowledge and the resources to end this human catastrophe"(Latham 1997). As committed by ICN, in a world there is enough food for everyone, but inequitable access is still the main problem. It is intolerable that more than 167 million (UNICEF1997) preschool-age children continue to suffer the consequences of under-nutrition around the world (de Onis 1993).

UNICEF places a predominant value related to cultural conceptions on feeding and saving the lives of children who lack a political voice, and in many societies civil and human rights. With WHO, UNICEF has lobbied for primary health care, child survival, and end to hidden hunger (micronutrient malnutrition) and a more healthful environment and reported annually on the state of the world's children as a way to sensitize and obligate governments to intervene and save children's lives where household economic or cultural resources may be insufficient. Children are also sometimes reached indirectly through their mothers via programs that are designed to improve women's nutrient intake and household functioning: and components for women are also part of UNICEF's child survival strategy (UNICEF1997). Since 1997, the World Bank's top priority is its health, nutrition and population outcomes of the world's poor, and to protect the population from the impoverishing effects of illness, malnutrition and high fertility. Reducing the disease burden of the poor is now WHO's first priority (Wagstaff 2000).

Thus, United Nations set global targets for nutrition by the year 2000 in 1990s as following;

- Reduction of infant and under 5 child mortality in all countries by one third or to 50 and 70 per live births respectively whichever is less.
- Reduction of severe and moderate malnutrition by half among children under 5 years of age.
- Special attention to the health and nutrition of the female child, and pregnant and lactating women.
- Growth promotion and its regular monitoring to be institutionalized in all countries by the end of the 1990s.

- Dissemination of knowledge and supporting services to increase food production to ensure household food security.
- Awareness creation about nutrition among the community and social workers through nutrition education.
- Empowerment of all women to exclusively breastfeed their child 4-6 months and continue breastfeeding with complementary food well into the second year (Aryal 1990) (Chataut 1990).

Concerning the mortality assessment, the registration of vital events has to be still developed though legal provision has been made. Reliable mortality information is very difficult by such system; however, hospital data (1998-99) shows that leading causes of reported mortality are pneumonia, other cardiac pulmonary diseases, encephalitis/meningitis, septicemia and diarrhea. Similar case is in morbidity also. Main morbidity reported in 1999-2000 are skin diseases, diarrhoeal diseases, acute respiratory infection (ARI), intestinal worms, gastritis, pyrexia of unknown origin, chronic bronchitis, anaemia and abdominal pain(WHO 2004).

Nepal has no such institution for nutrition studies and research training. Only few nutritionists are available in the country. In government health service also, a nutrition section is headed singly for all vertical micronutrient and nutrition programs in the country. Human resources are deficient who are adequately trained in comprehensive nutrition program with multi-sectoral approach. A focal person in District Public Health Office has been assigned but s/he might not have been adequately trained. Government leadership has to be developed to increase the scope of nutrition program. The partnership has not been still developed among Ministry of Health (MOH), development partners and NGOs for this program. Nepal is facing hunger and poverty but such data on hunger is not available till now. The only way to measure hunger is by poverty. As such, the progress has been unequal and more people than ever before still now live under the poverty line in Nepal. Millions of people's living standards have still deteriorated due to conflict situation in remote villages especially those castes that have been traditionally excluded including women and girls. It has become difficult to address the country's huge nutrition problem for development partners without any evidence of successful community based nutrition

interventions. Despite the poor record over the last two decades, nutrition is again gaining attention. The Department of Health Services (DoHS) is planning to set up a review commission to address the issue and development partners are looking for community based multi-sectoral approach to fund (Taylor 2003).

As stated in UNDP annual report, Nepal's Millennium Development Goals (MDG) poverty, hunger, child mortality and safe drinking water which are very basic to maintain nutritional status of children are as such. The one goal is to halve the proportion of people living below the national poverty line by 2015 which is likely to reach because the status of supporting environment is fair. The second goal is to halve the proportion of people who suffer from hunger between 1990 and 2015. It can also be potentially achieve being again fair environment of supporting agencies. The third goal is to reduce child mortality rate under 5 years of age by two third by 2015. This is most likely to be fulfilled since the past trend has shown that strong support is available from international level. The last goal is to half the proportion of people without drinking water. The country is getting only fair support even it is hoped that it would be likely to achieve (UNDP 2005). It appears that the MDGs goals of Nepal is less likely to be achieved given progress already achieved.

Sufficient amount of funding is needed for the developing countries to improve the nutritional status of children placing priority on it but not only focusing on available resources for the immediate solution of the medical problems like micronutrient deficiencies. These countries require support for the development of at least minimum basic infrastructure and empowerment of people with special attention of program on women empowerment. The support provided by the above organizations either concentrate only in medical care or is limited to only on interventions in micro level (focusing on small areas of rural community) leaving large segment of vulnerable population in the country. For example, Professor Jeffrey Sachs (also advisor to the UN, General Secretary, Kofi Annan) prescribes, in his 'The End of Poverty a set of interventions specific investments in education and infrastructure –through which to substantially reduce poverty in developing countries. The problems have been arisen in this prescription as explained by Sanjay Reddy and Antoine Heuty. The first problem is that it fails adequately to question the questionable orthodox prescription for economic development centred on liberalization and privatization. The second is

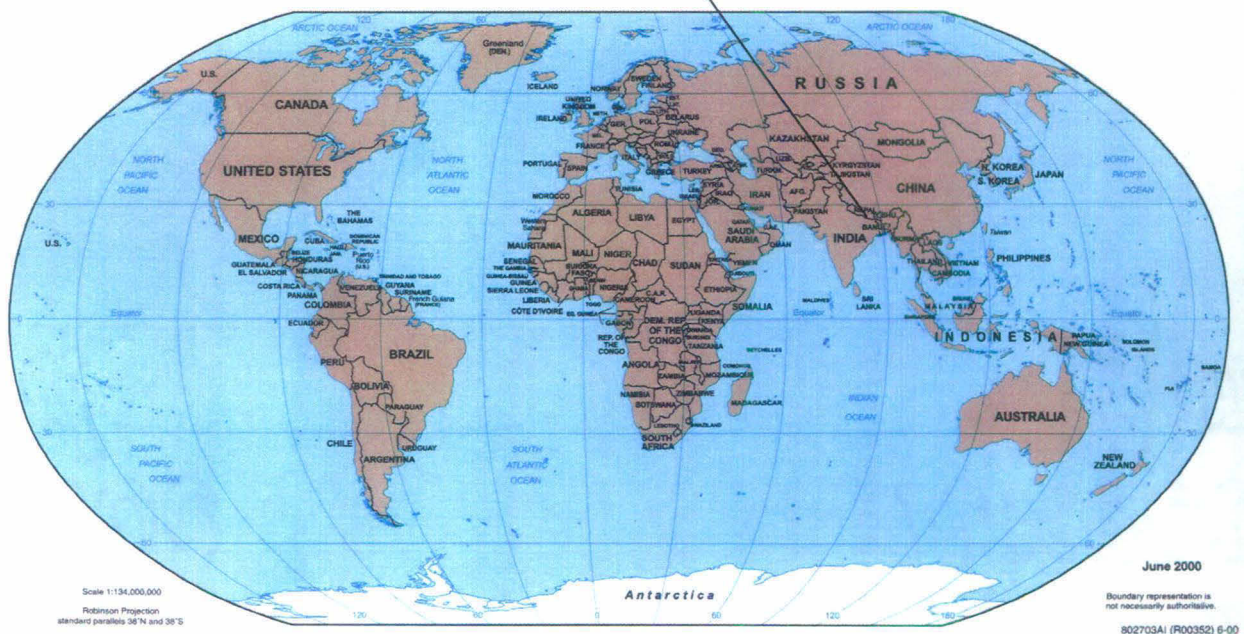
that it relies heavily on the idea that development problems have technical fix rather it requires institutional and political reforms (Reddy 2005).

Child Nutrition Program in Nepal

The Himalayan country Nepal is situated between 26° 22' to 30° 27' North and 80° 04' to 88 ° 12' East of South Asia in the world having its land area is of 147, 181 square Kilometer. It is rich in diversity of topography, climate and diversity of socio-cultural pattern with total population of 24, 811, 912. The country has diverse characteristics; however, it is among the least developed countries situated in the South Asia, which is in the 22nd rank from the bottom in Human Development Report in the world (NESAC 1998).

Fig. 2.1: Location of Nepal in World

Nepal in the World



1. Land, Production and Food Consumption

The country is mostly occupied by rural area and its economy is agriculture-based. Eighteen percentage of Nepal's land is cultivable with proportion of irrigated land up to 54% (CBS 2004). Majority of households (78%) have agricultural land and the

main cropping pattern in the country is paddy, maize, wheat, millet, soybean and lentil. Other crops that are grown in hills and terai are winter potato, garlic, mustard oilseed, summer and winter vegetables. Around 28% of households are found having non-farm enterprises with distribution more or less equally in manufacturing (31%), trade (32%) and services (29%) (CBS 2004).

Food production could barely keep pace with population growth indicating food deficit between 1991-92 and 1998-99 from 0.79 to 13%. The encouraging scenario was in the year 1990-91, 1999-00 and 2000-01 in which there was surplus of food production on macro-level in the country. The production of food was 4.5 million tons in the recent year 2001-01 against the requirement of 4.4 million tons. Despite the positive sign of food production in national level, the mountain and hill areas are always short of food in this country and the other four regions face vulnerable situation beside Eastern Development region. On top of that even though the surplus is seen in the food production the available average calories per person per day is just 1737 as of 1998-99 against the requirement of 2250 (Thakurathi 2004). Fifty nine percentage of household consumption is spent on food expenditure on an average in the country but poorest household spends 73% of expenditure on food of its household consumption (CBS 2004).

Approximately 6.0% of GDP is spent on health with most of the expenditure coming from private out of pocket contributions which was accounted nearly 70% in 2000 (HMG/N 2004). More than 40% of the total public expenditure is allocated to curative services. The rising share of public expenditure on health is relatively low and less emphasis has been given on public health issues (NESAC 1998).

2. Poverty, Low Purchasing Power and Poor Sanitation

Food security in terms of availability, accessibility and utilization has remained a distant dream for the majority of the people which is defined as a state of affairs where "all people at all times have access to safe and nutritious food to maintain a healthy and active life" (FAO, cited in Koirala and Thapa 1997). Thus, income growth has been narrowly based and there has been low employment intensity and intensification of uneven income distribution across sectors, regions and households. Low rate of income growth, skewed income distribution, and deteriorating terms of



TH-13055

trade of the agricultural sector vis-à-vis other sectors have intensified poverty (NESAC 1998).

According National Planning Commission's definition the incidence¹ of poverty in Nepal is 38% (HMG/N (2002) and as of international definition of absolute poverty², it is 70% (Kunwar 2003). Less than 25 to 49% population have access to safe drinking water and sanitation facilities (UNICEF 1997). Education being at very low level, people is obliged to have occupation mostly based on agriculture and informal sectors earning below the subsistence level. The low wage earning does not only remain in agriculture and informal sectors but in sales and services also due to high unemployment of human resource in the country. On the other hand, government employment policy is in rudimentary state. There is no such institutionalized concrete policy and plan for the employment of people within the country. All these factors compounding with low production rate in the country puts them at risk of hunger and various infections (including diarrhoea) and parasitic infestations (roundworm up to 94% and hook worm up to 83%) (Ibid 1997) leading to severe problems of malnutrition, especially among children.

3. Socioeconomic Condition

The characteristics of Nepalese economy is mostly mixed, majority (four fifth) of its population depending on the subsistence agrarian regime. The caste frame, on the other hand is primarily hierarchical. Fundamentally, root cause of caste system is Hindu religion that creates mutual cultural isolation of communities. Whether there may remain elements of hierarchy or not in ethnic and interethnic categories, the main feature among them is differentiation. In particular, deep, social rift and distance separate the high caste groups from those caste groups regarded as untouchables, not only in relation to ritual domain but also in political power and economic privileges (NESAC 1998).

¹ 2124 calorie as per capita per day on consumption; Per capita annual expense \$ 85 on food and non food items (exchange rate NRs. 72 per \$1)

² Purchasing power parity \$ 1.08 a day as of World Bank's WDR 1990

Literacy rate has been increasing very slowly in Nepal. Current literacy rate is 53.74% but women, many castes, ethnic and regional groups and the poor have much lower literacy ratio having as low as 10%. Majority of men (65%) and women (77%) have been employed in agricultural sector (CBS 2004) with low productivity. Women work participation is very high compared to other countries and starts at an early age. The average wage rate differs significantly between agriculture (\$1) and non-agriculture (\$1.8). Remittance has also become an important part of country's economy. Nearly 35% of all households' income comes from remittance earning in this country in which India accounts 23%, three Arab countries 27% and other countries 17%. The national average nominal household income is \$1097 and per capita income is \$ 207. About half of income comes from agriculture, one fourth from non-agriculture and one fourth from other sources. Agriculture accounts for one tenth of it in urban areas (CBS 2004) (NESAC 1998).

4. Inequality

There is extreme inequality in the country with widespread destitution. Inequity in the distribution of assets (especially land), income-earning opportunities and access to decision making have significantly influenced income distribution. The land holdings in agriculture are less than one hectare per family with agricultural pattern of low productivity and high underemployment. Bottom twenty percentages of the households receive only 3.7% of the national income while top 10% of them share nearly 50%. Inequity in gender has also been prevalent in concerned to income distribution having dominant role of male households members over family income. Thus inequity in assets and income have grossly affected on access to education, health, nutrition, employment and standard of living among women (Ibid 1998). South Asia including Nepal is ahead in subordination to women. Girls and women are less cared by their family, relatives and husbands. Critical issues related to gender inequality still exist that 60% of women in South Asia suffer from iron deficiency anaemia, men eat food first, and then women eat later giving their children prior serving self preferably to son again. Women barely can gain weight up to 5 kg during their pregnancy (Ramalingaswami 1997). Distribution of average level of income is uneven across the marginal and social groups and urban income is more than double than in the rural areas (NESAC 1998).

5. Medical Causes

Low birth weight has become the single predictor of malnutrition in all country and culture. In different research, the weight of a child less than 2500 grams is strongly correlated with poor growth not only in infancy but throughout the childhood. The range of low birth weight is 25-50% in Nepal as compared to nearly one third in India, one half proportions in Bangladesh but only one sixth in sub-Sahara Africa. The main reason behind to be so much high rate of low birth weight of baby is that women in South Asia are malnourished and less cared during their childhood, young lives and even during the period of pregnancy and lactation (Ramalingaswami 1997).

Food insecurity and inadequate nutrition lead to multiple ill consequences for health including high mortality and heightened susceptibility to diseases (NESAC 1998). Under-nutrition and infection, individually but more often together, are major contributors to morbidity and mortality worldwide, particularly in underprivileged young children (Chandra 1979). Various studies show that the diarrheas and the dysenteries of early life in developing countries are intimately associated with weaning. General mortality in the second year of life serves efficiently as an index of the nutritional state of community and infant mortality as a measure of general public health efficiency (Gordon et al 1962). It has been well documented that the combined effects of malnutrition and common infectious diseases are responsible for this staggering toll in child deaths (Kielmann 1978). Similar observations have been reported from Bangladesh. Thus the predominant effect of malnutrition appears to be on mortality rather than on disease prevalence.

The annual report has mentioned that important causes of Protein Energy Malnutrition (PEM) in Nepal are low birth weight, small girls becoming mothers in the early age thereby giving birth of small to date babies. Thus, its implication leads to intergenerational cycle of malnutrition (HMG/N 2002-03).

Trend of Child Nutrition Problem

To analyze the situation of malnutrition of under 5 children and start nutrition program as commitment, a national nutritional survey was carried in 1975 (HMG/USAID 1975). The survey shows that status of malnutrition among children

between 6-59 months children was as follows - stunting 69.4%, wasting 13% and underweight 69.1 % (Table 2.1). The stunting (48%), wasting (11%), and under weight (47%) among the children less than 3 years declined till 1996 then it was more or less stagnant or even worse among children less than 5 years of children in 2001 having stunting (50.5%), wasting (9.6%), and under weight (48.3%) in which the percentage of underweight is still higher than the global prevalence of underweight of preschool children in developing countries (HMG/N 1996 &2001).

Table 2.1: Trend on prevalence of nutritional status of children in Nepal (Percentage)

Year	Survey	Under-weight	Stunting	Wasting	Clinical malnutrition
1965	NHS ¹	-	-	-	4
1974	Pourbaix	65.5	-	-	5.1
1975	NNS ²	69.1	69.3	13	-
1996	FHS Nepal ³	47	48	11	-
2001	NDHS ⁴	48.3	50.5	9.6	-

From 1996 onwards no improvement in the nutritional status of children less than 5 years of age has been observed in the country. There is wide variation both ecologically and regionally in prevalence of underweight and wasting among children being highest in central terai (58% and 18.1% respectively) than hilly and mountain areas. Similarly, stunting is also higher (51.5) in that region (HMG/N 2002-03).

Micronutrient deficiencies accounts as a public health problem in addition to malnutrition. Even there is variation of children's age group in data source; it shows that the prevalence of night blindness is in declining trend from 1% in 1996 to 0.27% in 1998 remaining below WHO cut-off points which is significant public health problems. It indicates progress towards the goal of Vitamin A Deficiency (VAD) elimination at the national level (Table 2.2). However, the Bitot's spot in terai zone has exceeded the WHO cut-off point (HMG/N 1998).

¹ Nepal Health Survey, HMG/University of Hawaii (0-9 years children)
² National Nutritional Survey, HMG/USAID(0-71 months children)
³ Family Health Survey, Nepal(0-36 months children)
⁴ Nepal Demographic Health Survey(0-59 months children)

Table 2.2: Trend on prevalence of Vitamin A Deficiency (Night Blindness) in Nepal (Percentage)

Survey	Year	Age group	Area	Night Blindness (Serum retinol <0.70 μ mol/l)
NBS ¹	1980/81	0-6 years	National	0.64
NMIS ²	1995	24-36 months	National	0.9
NFHS	1996	6-36 months	National	1.0
NMSS ³	1998	6-59 months	National	0.27

The anemia in children of 6-71 months old is the most prevalent in the 24-35 months age group probably reflecting iron deficiency due to an inadequate dietary intake. (Brink1975). The prevalence of anemia in children has not declined but is seen still in higher level in the decade of nineties (78%) reflecting that nutrition program has not touch it yet (Table 2.3).

Table 2.3: Trend on prevalence of Iron Deficiency Anemia in Nepal (In percentage)

Survey	Year	Local/Coverage	Age group	Anemia Prevalence	Hb cut-off
NNS	1875	National	6-71 months	24.1	11 g/dl
NNIPS ⁴	1997	Sarlahi (terai)	3 months	57.5	10.9 g/dl
NMSS	1998	National	6-59 months	78	10.9 g/dl

Ninety percentages of Nepalese are facing problem of goiter in some hilly districts of the country. (Pradhananga 1980) but the age specific data of prevalence of goiter for children are not available.

¹ Nepal Blindness Survey
² Nepal Multiple Indicator Survey
³ Nepal Micronutrient Status Survey
⁴ Nepal Nutrition Intervention Project -Sarlahi

Child Nutrition Program – A Historical Perspective

Modern health services have a short history in Nepal which started as a medical care limiting to a few urban hospitals and few rural dispensaries until the early 1960s. The Ministry of Health was established in 1956 with first priority on control of communicable diseases. Four major vertical projects were initiated, namely malaria eradication (1958), leprosy and tuberculosis control (1965), and smallpox eradication (1967) (Acharya 2000). Till 2004, the infant mortality has gone down to 59 from 100 in 1990, child mortality (below 5 years) has been reduced to 76 per 1000 live births from 145 in 1990 (UNICEF 2004) but it has still to make effort to reduce these mortalities with controlling child under-nutrition. Maternal health has been also prime factor for the health status of the children. It indicates the health status of the particular society in general but the fact that still the maternal health is in a very bad situation and the maternal mortality is still high in this country having 415 per 100,000 live births (NDHS 2001).

His Majesty Government of Nepal (HMG/N) has initiated nutrition as a component of Family Planning and Maternal and Child Health Project since 1968 at the later phase of Third Five Year Plan (1966-1970). Following the Long Term Health Plan, government included nutrition program in the sixth five year plan (1981-1985). In this period, the National Nutrition Policy Coordination Committee (NNPCC) was established in 1977 for coordinating nutritional programs and National Nutrition Strategies were identified in first workshop held at Pokhara in 1978. Since that time, nutrition section was established under Public Health Division of Ministry of Health for implementation of regular nutrition activities. The nutrition section adopted a policy to control the prevalence of malnutrition following the Alma Ata declaration that government had developed strategies in 1979 for 'Health for All by 2000 (Aryal 1990). Strategies were to reduce malnutrition problem in cooperation and coordination with Panchayat, education, agriculture including other government and non-government organizations giving equal priority with other public health problems and including it as a health education, nutrition and environmental health in

comprehensive primary health care (basic health services) (Pradhananga 1980). The program activities were community feeding program as a supplement to moderately or severely malnourished children, pregnant and lactating women from poor households; primary school feeding program for school children (Gautam 1990).

In 1984, government agreed to implement an intensive nutrition program in 5 districts in the assistance of UNICEF and WHO for a 5 year initial period. The strategies of multi-sectoral inputs were done to reduce nutrition related morbidity and mortality creating 4 nutrition units on each ministries- Health, Agriculture, Education and Local Development. The second workshop again at Pokhara developed a strategy to eliminate malnutrition and its underlying causes by a multi-sectoral approach. The activities were implemented in every sector. The major activities within the health sector were growth monitoring, de-worming, anaemia control, iodine deficiency disease control, diarrhoea control, nutrition education and training of community health workers, vitamin 'A' deficiency control and promotion of breastfeeding. The Ministry of Agriculture focused family food production and consumption; low-cost weaning food; training of extension workers, teachers and community; preservation of fruits and vegetables and protection from pre-and post harvest losses. The Ministry of Education incorporated health and nutrition components in formal and non-formal education and teacher's training including adolescents education. It also produced educational materials including the Nutrition Bulletin. The Women Development Division of the Ministry of Local Development conducted various community development activities. The evaluation undertaken in 1988 found a low coverage of services of Joint Nutrition Support Program (JNSP) due to lack of sectoral coordination at periphery, however there was coordination among the participating Ministries at the centre. The program was stopped in July 1990, only continuing support to Iodine Deficiency Diseases and Vitamin 'A' activities (Aryal 1990).

Current Policy and Program

Committing for health and nutrition as a human right, GON has developed vision of the health system for equitable access to coordinated quality health care services in rural and urban areas. Health services are characterized by self-reliance, full

community participation, decentralization, gender sensitivity, and effective and efficient management, resulting in improved health status of the population in policy level (HMG/N 1999). On the other hand, the government often sees health promotion as a sectoral and technical exercise. As a consequence, Ministries other than The Ministry of Health have paid little attention in the promotion of health and nutrition. Similarly, the space for promotion of health and nutritional status by and through local representative bodies and communities is almost non-existent. Finally, health and nutrition remains to be promoted as a legitimate political agenda.

According to the annual report 2004, children under 3 years of age constitute 8.4% (2089, 947) out of total population of Nepal. Out of these children, only 1057 708 children less than 3 years were monitored their growth in the fiscal year 2003-04. Thus, the report shows that the national average of underweight children is only 18.3% (HMG/N 2003-04). Explicitly, the prevalence of malnutrition is seen unusual variation between the information received from survey and annual report. The reason is that under-nourished children those reach to government health facilities is only the tip of iceberg of large number of under-nourished children existed at community and there might be large number of under-reporting cases including less reliability in government reporting system.

The Report mentions that in order to improve the overall nutritional status of children the government has set the objective to reduce PEM in children less than three years of age through a multi-sectoral approach (Ibid 2002-03). Strategies to address the nutritional situation in Nepal are to develop understanding and effective coordination with other relevant divisions under the Department of Health, strengthen coordination among other government line agencies – Ministry of Agriculture, Education, Local Development and other external support agencies. In addition, the specific strategies are to develop national strategies on infant and young child feeding; adopting global strategy, create awareness, integrate breast feeding and growth monitoring promotion in government health facilities, establish mother's support group to protect existing breast feeding practices at community level and distribute de-worming tablets to children aged 2-5 years during Vitamin A capsule distribution in all 75 districts by the year 2004. With these stated strategies, government has focused addressing nutrition problems through sectoral technical approach rather than multi-sectoral approach.

Thus it obvious that program activities have less evidence of multi-sectoral approach and coordination with other sectors during implementation (Ibid 2002-03)

Certain problems and constraints have been foreseen at the level of service management in this health sector during implementation of program like insufficient supply of Salter weighing machine, inadequate practice of growth monitoring in all health facilities, non-existence of nutrition rehabilitation centres in all regions, inadequate supervision and monitoring of nutrition related activities and frequent transfer of nutrition related focal person (Ibid 2002-03).

The financial allocation seems very much minimal in proportion with other social and health sector. Only 5.9% budget has been allocated for tenth plan period in health sector out of total development budget. The budget allocated for the family planning, mother and child health care; female community health volunteer is only 6.1% of total budget disbursed for the health program (HMG/N 2002). Nutrition program is a part of mother and child health care, so, budget has been included in totality not as a separate part. Although, government has given first priority for family planning, mother and child health care and community health volunteer program the nutrition program has been subordinated from the point of view of budget. Budget for nutrition program has not been mentioned in other sectors also – as in agriculture, education and women development sectors.

Several international nongovernmental organizations (INGOs) have been supporting for nutrition program in Nepal known as positive deviance nutrition program for last one decade. Positive deviance is a community- based model recognized as a powerful method to improve the nutritional status of underweight children that seeks to improve the nutritional status of underweight children in a manner that harnesses the resources of a community using anthropometric measurements to identify both under-nourished children and healthy children from poor families in a community. The healthy children (positive deviance) are studied to determine the causes of their good health in terms of diet, feeding practices and other child rearing habits. These causes are contrasted with poor families' habits with under-nourished children. The lessons learned are then conveyed to the latter families at nutrition education rehabilitation

program (NERPs), where malnourished children are “rehabilitated (fed)” to improve their growth rate. NERP Centres are supported in part by participating children’s families, who are required to contribute a portion of food associated with positive deviance as the price of admission for their children into the rehabilitation program. This community based model consists of 4 components as follows: (a) identify nutritionally healthy children of less than three years of age among poor families (b) identify positive behaviours of those families based on four health behaviours - good habits in consuming nutritious foods, good health care, good child care and safe-motherhood. (c) Inspire to adopt these positive behaviours to the poor families of under-nourished children with wider people’s participation and (d) rehabilitate children from under-nutrition. The model was developed by Save the Children (SC)/US as part of its Poverty Alleviation and Nutrition Program (PANP) in Vietnam in 1991 later on introduced in Nepal by SC/Japan and Redd Barna (SC/Norway) in 1996 and by SC/US in 1998. The experience of SC/Japan in the terai district showed that the prevalence of 30-40% underweight in children in 8 Village Development Committee (VDC) has declined to 10% six month later and 7 to 8% after 20 months later. Participatory rapid appraisal is a key used by all three organizations when working with communities to define positive deviant behaviour stemming the success from the community based nature. Community members are, from the outset, involved in discussing nutritional problems and discovering ways to address under-nutrition in a sustainable manner. The meals served to under-nourished children are composed of locally available foods. Traditional cooking practices that are used in homes of well nourished children are encouraged and taught to the wider community and parents making them with a means of realizing responsibilities to their children. While the project may focus on positive feeding practices, inevitably, there are lessons learned regarding other positive child caring and rearing practices. It provides the potential for a sustainable way of addressing what is one of the most serious threats to a child’s survival and development (Save the Children 1999). Although, the under-nutrition of the children under 5 years of age can be reduced whose causes are from the behaviour of mothers and family members in regard to child care, under-nutrition, whose determinants are low birth weight of baby, infection, inequality and gender discrimination, would not be eliminated through positive deviance nutrition program only. The reason is that it does not touch on the infrastructure development of community for better safe drinking water and basic sanitation so that child would

not be sick frequently in the absence of such basic minimum infrastructure. The unjust food distribution among family members specially women and children and less power for women to have full decision making and better health for them would not be solved from this micro-level program only.

In collaboration with ten International and national nongovernmental organization, Nepal Family Health Program (NFHP) was established since 2001 to assist the Ministry of Health to implement specific activities to strengthen the delivery and use of high impact family planning/maternal and child health services (FP/MCH) delivered at the household and community levels in close collaboration with District Health Office to maximize to quality of the FP/MCH services available in the district. It has separate functional mechanism to support the Government of Nepal from central to district level funding directly with its own project office set up. The aim of this program is to assist the community level services in the seventeen core program districts throughout its life (JSI 2001). Integrated management of childhood illness is one of the major support program in which clinically under-nourished children are managed and counseled at the local health facility level and it has referral provision from Female Community Health Workers (FCHV/VHW) to health facilities. The primary aim of the nutrition component of the IMCI algorithm (Annex-1), like that of the other components, is to facilitate the diagnosis and treatment of acute, severe or potentially life-threatening conditions, which are likely to benefit from clinical intervention.(Bern 1997). Though, this program has specifically focused for the management of severely undernourished children with intention to reduce child death. in overall, it does not encompass to reduce the under-nutrition in comprehensive way.

Issues of Equity/Equality in Health

Analyzed and computed from the Survey of causes of death 1998 in India, it has shown that more than 50% of deaths are due to communicable diseases. The commonest causes are diarrhea, fevers and respiratory infections. Out of all deaths, 20 % occurs in children less than 4 years of age of which 75% death happens among the children 0-1 years of age. In under five mortality, the percentage of girls death is higher than boys, higher deaths have been reported from rural areas than urban areas

and the most of the deaths recorded are from deprived section of the society. Therefore, Planning Commission of India has stated that social group and gender bias are the significant predictors for 50% deaths of under 5 children. Major contributory factors for these children are anaemia and under-nutrition (Sagar 2004).

Diseases are responsible for the children's death in high number which is easily preventable through measures of employment, reasonable wages, and access to food, safe drinking water and basic effective health care services in India. Common causes for 35% of mortality in infancy are premature birth, low weight of babies at birth. Children are born low weight at birth while mothers are under-nourished. Acute respiratory infection (particularly pneumonia) is responsible for a quarter of death of infant while diarrhea is responsible for the infant deaths in 6%. In the same way, major causes on deaths of children of 1-4 years of age are respiratory infections (22%), diarrhea (20%) and anaemia (9%) (Ibid 2004).

A study done in the surrounding of Kali Gandaki valley in Nepal also gave some pictures in concern to inequity in health in the hilly areas of the country. People of these clusters of villages experience a disproportionate burden of health problems. However, a fraction of population uses the government system each year (28.1% in 1996-97 compared to 32.8% in 1997-98). People who are able to pay can get medical care by paying for it the private sector. The poor have unmet needs, even where health facilities are present. Those in greatest need have not benefited much. The tradition of seeking Dharmi Jhankri (traditional practitioners) is still rampant among the poor but the overall costs are relatively high. Some do family remedies. About of half of the poor also seek treatment from health post or private medical shop but taking out loans and going into debt which becomes a long time burden for the family. There is provision of charity in some health facilities, community group and donation from VDCs but after all it does not work in significant way (Taylor 1999).

Two simple, practical and useful indicators were used for equity on health service at the village level. The first was simple question of asking knowledgeable informants. "What proportion of village families would be unable to pay the Rs. 2 to 3 required to register at a health post for illness care? Then the estimates of this extreme level of

poverty identified were 25% families in most villages. These were clustered in the artisan and were of lower castes. The another indicator was a standard food security question, "What proportion of village families run out of food stored in their homes for how many months in each year? Thus in this question, these estimates ranged from about 25% of families running out of food for about 3 months a year to 75% of families running out of food for six months a year. Therefore, such families are now unable to meet their minimal nutritional needs. The aspiration for agricultural growth is also slim if new approach could not be done. Anyway, community empowerment is must and requires local solution for local needs and resources (Ibid 1999).

Rational for the Study

From the effect of globalization and conflict within the country from 1990s onward, the economic condition of the rural poor is worsening. Between 300 and 420 million people are trapped in chronic poverty experiencing deprivation over many years, often over their entire lives, and commonly pass poverty on to their children. The largest numbers live in South Asia (135 to 190 million). Most chronic poverty is a result of multiple interacting factors operating at levels from the intra-household to the global (HELIN 2004). The major segment of population is starving due to various geopolitical, socio-economic and ecological factors. So, still majority of population do not have enough food to eat. Thus, under-nutrition in children has increased rather than declining. If people get opportunities to get enough food to satisfy their hunger and meet their caloric needs, the need for intervention for the control of under-nutrition will be limited only to a few problems (Banerji 1988). On the other hand, the program implementation is on fragmented basis with more attention diverting to micronutrient supplementation like Vitamin A and Iodized salt and nutrition education. Observing the policy and implementation pattern of government it is explicit that the country's program activities are concentrated on dealing with medical causes of under-nutrition rather than comprehensive program on development of minimum basic infrastructure and socio-economic development as a part of rural development. Clearly, the program seems inadequate in dealing with the problem without simultaneous agricultural and rural development with increasing employment and income of the poor together with equality and gender balance. Surveys have been

done in regard to food production, consumption and purchasing power but it has not been reflected explicitly in policy on how the function of all sectors are coordinated to reduce poverty and thereby malnutrition in children less 5 years.

It is time investigate in which strata of community people under-nutrition of children does exist most so that the prevalence in national average has not lowered down in Nepal. The study also requires finding out how do basic minimum infrastructure, socio-economic status of people in terms of standard of living and caste interact for still existence of high prevalence of under-nutrition.

Research Problem

- 1) What is the prevalence of nutritional status among preschool children with regard to caste, living standard of people and level of hunger satisfaction?
- 2) What are the main causes of high prevalence of protein energy malnutrition among preschool children in this population that still exists till now?

REFERENCES

1. Aryal, Prakash (1990), "Status Paper on Nutrition", Proceeding of the National Seminar on the Goals for Children and Development for the 1990s, Kathmandu, Nepal
2. Banerji, D. (1979), "Epidemiological Issues in Nutrition", *Indian Journal of Nutrition and Dietetics*, Vol.16: 89-100
3. Banerji, D. (1988), "Knowledge of Human Nutrition and the People of the World", *World Review of Nutrition and Dietetics*, Basel Karger
4. Bern, C., et al. (1997), "Assessment of potential indicators for protein-energy malnutrition in the algorithm for integrated management of childhood illness", *Bull World Health Organization*, 75 Suppl 1: 87-96.
5. Chataut, B.D. (1990), "Status Paper on Child Health and Development", *Proceeding of the National Seminar on the Goals for Children and Development for the 1990s*, Kathmandu, Nepal
6. CBS (2004), *Living Standard Survey 2003/04*, National Planning Commission Secretariat (NPC), Kathmandu, Nepal.
7. CBS 2001, *National Population Census 2001*, Kathmandu, Nepal
8. Chandra, R. K. (1979), "Nutritional Deficiency and Susceptibility to Infection", *Bulletin of the World Health Organization*, 57 (2):167-177
9. de Onis. M. et al. (1993), "The Worldwide Magnitude of Protein Energy Malnutrition: An Overview from WHO Global Database on Child Growth", *Bulletin of the World Health Organization*, 71: 703-712
10. Gautam, Madhav (1990), "*Status Paper on Poverty and Food Security*", Proceeding of the National Seminar on the Goals for Children and Development for the 1990s, Kathmandu, Nepal
11. Gordon, J.E. and et al (1962), "Weanling Diarrhea", *American Journal of Medicine* :345
12. HMG/N (1996), *Family Health Survey*, Ministry of Health, Nepal, New ERA and ORC Macro, Kathmandu
13. HMG/N (2001), *Nepal Demographic Health Survey*, Ministry of Health, Nepal. New ERA and ORC Macro. P-191

14. HMG/N (2002), *Summary. The Tenth Plan (Poverty Reduction Strategy Paper (2002-2007))*, NPC, Kathmandu, Nepal
15. HELIN Nepal (2004): *The Chronic Poverty Report 2004–05*, (Online: web) HELIN Nepal
16. HMG/N (2002/03), *Annual Report*, Department of Health Services, Nepal: 32-47
17. HMG/N (1996), *Family Health Survey*, Ministry of Health, Nepal, New ERA and ORC Macro, Kathmandu, Nepal
18. HMG/N (1999), *Second Long Term Health Plan (1997-2017)*, Ministry of Health, Kathmandu, Nepal: 9
19. HMG/N (2002), *The Tenth Plan (2002-2007)*, NPC, Kathmandu, Nepal
20. HMG/N (2004), *Vulnerable Community Development Plan for Nepal Health Sector Program Implementation Plan (2004/5-2008/9)*, MOH, Kathmandu, Nepal
21. HMG/USAID (1975), *National Nutritional Survey*, Kathmandu, Nepal
22. HMG/N (1998), *Nepal Micronutrient Status Survey 1998*, UNICEF& New Era, Kathmandu, Nepal
23. IIPS(2000), *National Family Health Survey –2(1998-99)*, India, Mumbai
24. JSI (2001), *Technical Approach*, Nepal Family Health Program, Kathmandu
25. Kielmann, A. A. and et al (1978). “The Narangawal Experiment on Interactions of Nutrition and Infection: Morbidity and Mortality Effects”, *Indian Journal of Med. Res.* Vol. 68, Supplement December: 21-41
26. Koirala, G.P. and Thapa, G.B. (1997) ‘Food Security Challenges: Where Does Nepal Stand?’ *Research Report Series 36*, Kathmandu: Winrock International Institute for Agricultural Development.
27. Kunwar, KB (ed.) (2003), *The Himalayan Poverty: Prosperity through Rural Development*, Publisher Meena Kunwar, Bafal Height, Kathmandu.
28. Latham, M.C. (1997), *Human Nutrition in the Developing World*, Food and Agriculture Organization, UN, Rome
29. Nepal South Asia Center (NESAC) (1998), *Nepal Human Development Report*. NESAC on behalf of UNDP
30. *National Family Health Survey –1 (1992-93)*, India
31. Pradhananga, Y.P.(1980), *A Brief Introduction to Health and Health Services in Nepal* (Nepali Language), Chamudra Press, Yatakha, Kathmandu,

32. Nepal.Ramalingaswami, V. (1997), "Malnutrition: A South Asia Enigma", *Malnutrition in South Asia: A Regional Profile*, UNICEF, Regional Office for South Asia. (5)
33. Reddy, S & Heuty, Antoine (2005), "A forceful message, but will it end poverty?", *The Hindu*, Friday, April 22
34. Sagar, A. and Qadeer, I.(2004), "Health", *Magnifying Mal-Development: Alternative Economic Survey India*, Alternative Economic Survey Group. Rainbow Publishers, Zed Books London: 138-144
35. Save the Children (US, Japan, Redd Barna) (1999), *Positive Deviance Nutrition Program. Community Health Training Manual* (Nepali language), Janak Offset Printers, Lahan, Nepal
36. Taylor, M. et al: (2003), *Nepal Child Survival Case Study Program Evolution and Lessons Learned, Draft Report*, June, USAID/Nepal
37. Thakurathi, M. (2004), "Food Security and Issue of Urban Nutrition in Nepal. Nepalese", *Journal of Development and Rural Studies*. Vol.1, No.2
38. Taylor, H.G. et al.(1999), *Health Equity in Nepal: A Half Century of Health Development in the Kali Gandaki Valley, Western Region*, Johns Hopkins University, School of Hygiene and Public Health, U.S. A.
39. UN (1989), *Convention on the Rights of the Chil.*, New York, United Nation's General Assembly Document A/RES/44/25, 5 December
40. UNDP (2005), *Annual Report: Support Progress through Equality*, UNDP, Nepal
41. UNICEF (1997). *Maps. Malnutrition in South Asia: A Regional Profil.*, UNICEF, Regional Office for South Asia (5)
42. Wagstaff, A. (2000), "Socioeconomic inequalities in child mortality: comparisons across nine developing countries", *Bull World Health Organ*, 78(1):19-29.
43. WHO(2004), *Country Health Profile, Nepal*, SEARO

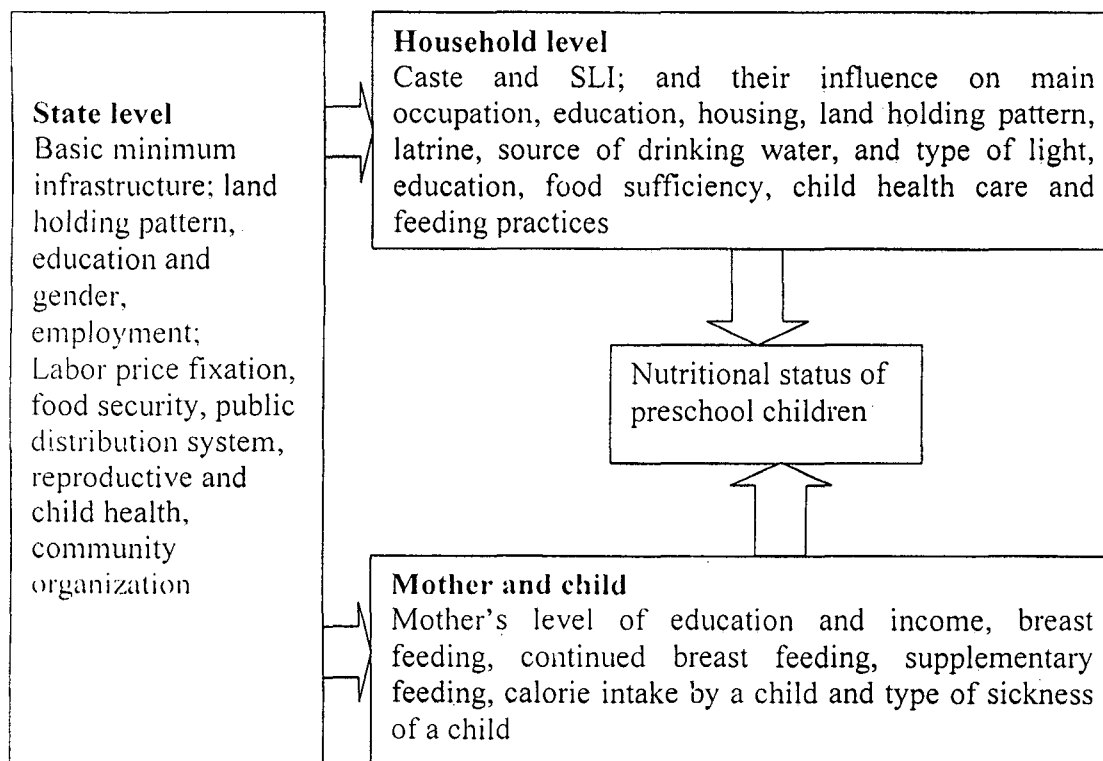
CHAPTER THREE

RESEARCH METHODOLOGY

Conceptualization of the Research Problem

Various factors play role to determine the nutritional status of the children in the State and household level, and in the level of mother and child care as given in fig.3.1. Available literatures indicated that prevalence of under-nutrition among preschool children is still high in Nepal. There are several survey reports describing on distribution of under-nutrition among children in relation to geographic and demographic factors however root causes of under-nutrition has to be looked among these children. Our proposition is that the high prevalence of under-nutrition among children in Nepal is due to very low socio-economic status and disadvantaged castes. Therefore, the present study was focused on nutritional status of children in relation to main factors SLI and caste.

Figure3.1: Conceptual framework



Study Design

The study is a quantitative cross sectional survey undertaken among under-5 children three selected VDCs to assess the nutritional status of children. The study sought to associate nutritional status of children less than 5 years primarily with socio-economic and then with environmental and behavioural determinants. The statistical measures used according to this study design were prevalence as proportion and ratios (Detels 2004). The data were analyzed according to flow chart as shown in fig.3.2.

Figure3.2: Flow chart of study design

		Main Variables		Intermediate Variables		Dependent variables	
			Caste	Main occupation	Nourished children		
				Housing			
				Landholding			
				Latrine			
				Source of drinking water			
				Type of light			
				Mother's income	Under-nourished children		
				Mother's level of education			
				Food sufficiency at household level			
				Child feeding practices			
				Calorie intake by a child			
Total Popuation	→	Sample (300) households	→	Type of child sickness			
			SLI	Main occupation	Under-nourished children		
				Housing			
				Landholding			
				Latrine			
				Source of drinking water			
				Type of light			
				Mother's income	Nourished children		
				Mother's level of education			
				Food sufficiency at household level			
				Child feeding practices			
				Calorie intake by a child			
				Type of child sickness			

(Source: Klienbaum, David G. (1982), Epidemiologic Research)

Sampling Design

The population and total households of three VDCs is the target population of the study. Three hundred households sample population were selected from these VDCs. District was selected purposively for the study at first. Then three VDCs were selected randomly from total 16 VDCs in the district. The ranges of proportions of female literacy among these VDCs were distributed from 20.9 % to 31.4 %, Dalits from 0.6% to 6.2 %, participation on non agriculture economy from 0.3 % to 34.9 % and economically active population from 1.5 % to 31.1%. Thus, the rank of selected VDCs were distributed according to Table 3.1 on the basis of these above stated four socio-economic development indicators which were taken from Census 2001 (CBS 2001).

Table 3.1: Ranking of the VDCs based on least development with regard to four indicators

Selected VDCs	Female literacy		Dalits castes		Participation on non agriculture economy		Economically active population	
	%	Ranking	%	Ranking	%	Ranking	%	Ranking
Nagarkot	23.4	13th	4.5	6 th	1.8	11th	2.2	12th
Tathali	20.9	14th	4.5	6 th	2.4	8th	2.9	8th
Chitapol	26.6	8th	5.5	3 th	0.3	14th	2.3	11th

From each selected VDCs, 85 households out of 799 from Nagarkot, 108 out of 998 from Chitapol and 107 out of 1035 from Tathali were selected. The sampling was done with proportionate stratified random sampling based on administrative division and caste (Table3.2) using the sampling frame of voter list of the three VDCs of 2004 available from Election commission, District Office, Bhaktapur. Finally, 300 households were selected for the purpose of the study. Sample population was taken from total households in the way that proportion of sample households from each caste would resemble approximately 10%.

Table3.2: Sampling based on the category of administrative division and caste

S#	Caste	VDCs						Total Sample
		Nagarkot		Chitapol		Tathali		
		Total households	Sample	Total households	Sample	Total households	Sample	
1	Brahmin	140	15	19	2	68	7	24
2	Chhetri	37	4	609	66	464	48	118
3	Newar	75	8	241	26	426	44	78
4	Dalit	47	5	55	6	48	5	16
5	Magar	11	1	56	6	0	0	7
6	Tamang	479	51	0	0	0	0	51
7	Giiri	10	1	18	2	29	3	6
Total		799	85	998	108	1035	107	300

Study Area

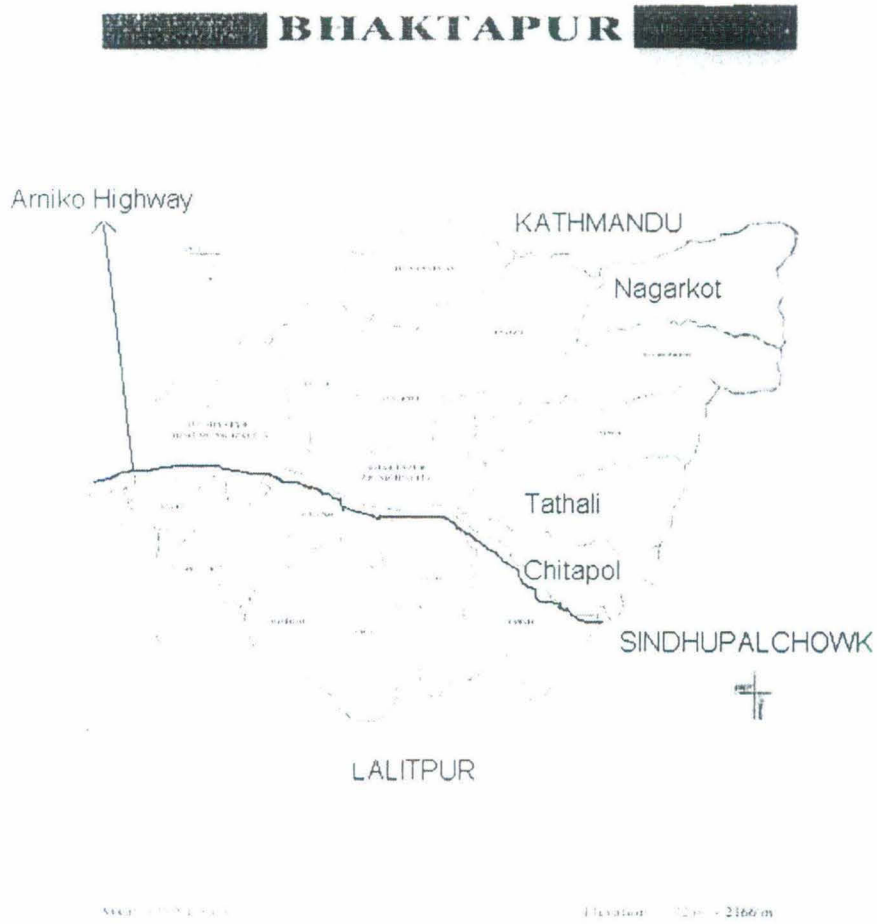
We were familiar with the district and doing study was not possible in other parts of the country due to civil unrest. However, the area of study resembles rural area of the district. Therefore, study was carried out in three selected Village Development Committees (VDCs) – Nagarkot, Chitapol and Tathali (Fig. 3.3) which lie in the North East of the Bhaktapur district of Nepal (Fig.3.2).

Figure 3.3: Bhaktapur District in Nepal



Source: NPC 2004

Figure 3.4: Map of Bhaktapur and Study Area



Source: ICRC 2004

Study Population

The study covers three village development committees (VDC) (lowest administrative division of the country in which population on an average consists 5, 000) comprising 49 villages/toles ranging 10-25 villages in a VDC with two religions (Hindu and Buddhist) and different castes. Household heads, mothers/caretakers of the households and children less than 5 years in the rural community of the district have been covered in the study population. As such, the total population is 1988, the number of preschool children is 395 and the number of mother is 314 in 300 households of three VDCs.

Test Instrument and data collection

Three types of tools were developed to elicit information. These are; 1) Interview schedule for head of household or other respondents for household information and to assess household environment and some assets of households (part 1, 2 and 3) consisting 31 questions, 2) Interview schedule for mother/care taker for mother's education, income status, breast feeding, supplementary feeding, child's food consumption pattern, sickness status of child and anthropometrics measurement of children less 5 years of age (Part 4) consisting 20 questions. The interview schedule was pre-tested in Balkot VDC situated in the same district before refining it for utilization in the study.

Duration of field activities

The field activities of the study took entire 2 months that includes approval of proposal from Nepal Health Research Council Nepal, visiting Central Bureau of Statistics for collection of literature to select VDCs and households randomly, visiting District Public Health Office to take consent from there and to get required assistance like cooperation from concerned local health facilities and VDCs; to have Salter weight machine to weigh children less than 5 years of age from health facilities, visiting District Election Office and VDCs for primary information and to get voter lists of the 3 VDCs; and health facilities to get information on their primary location and finally to interview 300 household heads/interviewers and mothers of preschool children (less than 5 years of age). It took 30 days to take interview in 300 households from 1-30 December 2005.

Data analysis

The quantitative data have been analyzed in computer using SPSS 11.5 version for all variables except anthropometric data. Anthropometric data have been analyzed using EPI Info version 3.3.2 (WHO 1997) for the anthropometric measurement of nutritional status of children under 5 years. Data have been entered, recoded several variables and have been analyzed with recoding, edition, cleaning and refinement.

Variables analyzed in this study are VDCs, family type; age; sex; religion; caste/ethnicity; marital status; education level of household members including mother and father; main occupation of households and its members; landholding pattern, housing

and domestic animal of households; household assets; Standard of Living Index(SLI), access to facilities for households; mother's income pattern; caretaker of children; breast feeding and child feeding practices of mother and caretaker; food sufficiency at household level; calorie intake by child; and sickness of child. The main dependent variables analyzed in the study for nutritional status are weight for age, height for age and weight for height. The operational definitions of these variables are as follows;

VDC

It is a lowest administrative unit of the country Nepal consisting on an average 5000 population in a geographical area and further divided into 9 wards and small villages.

Family type

The type of family has been divided into joint or nuclear family of the study population. The family is nuclear in which married couple and their children without marriage have been living. The family is a joint in which married couple, their parents and children live together.

Age

The completed year or months whether it is of study population or mother or child is the age defined. In this regard, the study has defined years for population 5 years and above; and months for the population less than 5 years. The child's age has also been counted in years when age group of the whole population has been constructed. The purpose to define child's age in months is to analyze their nutritional status with regard to their age group in months since this age is crucial for the growth and development of child up to the age of 4 years.

Sex

The biological difference of population as male and female has been defined as sex.

Caste

Brahmin places at the highest level of upper caste strata in the community either belong to the ruling classes or not and supposed to be pure which caste wear sacred thread in the body. Its occupation by birth is to read and write according to division of labour and do function of priesthood. Kshyatria places as a second highest level upper caste in the community again. It may also be from ruling classes or not whose function according to division of labor through caste is to take part either in politics or security forces in the country. Newar is the caste whose function is mainly trade and business and falls under Vaishya and the Matawali (liquor drinkers). Few segments of this caste are in power involving in political and social spectrum. This caste holds as endogenous people in government official document though it is debatable. Nevertheless, its large segment is powerless and the occupation of majority of them in the study are peasants, farmers, bricklayers, potters, florists and vegetable growers and other occupations that are

collectively called Jyapu. The literary meaning of Jyapu in Newari language is competent worker (Bista 1993). The caste Magar also holds as a warrior and its population is recruited in security forces like in Nepal army, Gorkha army in India and British Gurkha army. This caste also falls under the category of Vaishya and liquor drinkers and belongs to the indigenous population getting less opportunity in other civil service sectors within the country. Tamang (also in the category of liquor drinker) is historically an indigenous caste and it is less advanced than other castes. Dalit is also a group of castes which is so called Sudra (untouchable) given by the social custom although equal in the eye of law. This caste is the most disadvantaged out of all castes. Besides, the other caste is also existed in which mostly Giri belongs to this. This caste is supposed to have been the descendants of hermit and noble family. Although Brahmin, Kshyatria and Giri supposed to be from noble families; majority of population in these castes are also poor and powerless. It can not be generalized from the few who are powerful and privileged in association with ruling class families.

Main occupation

Main occupation plays major role in leading to subsistence or sustained livelihood of family in the study either through kinds or cash. Main occupations found in the study are agriculture/ animal husbandry, government/NGO/private service, trade/business, labour work and working abroad. The household has main occupation of agriculture/animal husbandry in which household members are solely depended to their sustenance in livelihood through agriculture/animal husbandry. The numbers of household members are also holding job in government/NGO/private services whatever their position is higher or lower and their occupations have ensured financial security at least throughout the year. On the other side, the numbers of household members are working as labor force whose lands are very less and landless. Their earning does not sustain livelihood throughout the year. In a very limited number of household, members are working abroad. There are also other areas in which some segment of economically productive population has been involved but that can not be exactly said main occupation.

Landholding pattern

Households which have owned and rented from landowners certain piece of land for the livelihood for their families have owned land in certain patterns. Some households do not have their own land. On the other hand, households do have own land from 0.5 acres and less to 2 acres and above.

Housing

Housing is based on certain type and standard. A house with external walls and a roof made of brick, cement, rode like permanent materials is known as permanent (*pakki*) house; those made of permanent materials either walls only or the roof is known as semi-permanent(*semi-pakki*); and those made walls of mud and temporary brick; and thatched roof is known as temporary (*kachchi*) house. The study has tried to explore the condition

of basic housing facilities like latrine, light, and source of drinking water; whether it is own or rented; what kind of fuel is used for the purpose of cooking; if these are available what types of these facilities are available in the house.

Household assets

The possession of durable goods by the households with their earning capacity is household assets. These have need used to determine socio-economic indicator of the households.

SLI

Following scores are calculated, scores are added and SLI is determined based these total scores with reference to NFHS-II, India ;

House type: 4 for *pakki*, 2 for *semi-pakki* , 0 for *kachhi*

Toilet facility: 4 for own flush toilet; 2 for public or shared flush toilet or own pit toilet. 1 for shared or public pit toilet; 0 for no facility.

Source of lighting: 2 for electricity, 1 for kerosene, gas, or oil; 0 for source of lighting

Main fuel for cooking: 2 for electricity, liquid petroleum gas, or biogas; 1 for charcoal, wooden dust or kerosene; 0 for other fuel

Source of drinking water: 2 for pipe, hand pump, or well in residence/yard/plot; 1 for public tap, hand pump or well; 0 for other water source

Separate room for cooking: 1 for yes, 0 for no

Ownership of house: 2 for yes, 0 for no

Ownership of agricultural land: 4 for 2 acres or more; 3 for 1.0-1.9 acres; 2 for 0.5-0.9 acres; 1 for 0.5 acres and less; 0 for no agricultural land

Ownership of irrigated land: 2 if household owns at least some irrigated, 0 for no irrigated land

Ownership of livestock: 2 if owns livestock, 0 if does not own livestock

Ownership of durable goods: 4 each for a car or tractor; 3 each for a moped/scooter/motorcycle, telephone, refrigerator, or color television; 2 each for a bicycle, radio/transistor, sewing machine, black and white television, water pump, or thresher; and 1 each for a mattress, pressure cooker, chair, cot/bed, table, or clock/watch

Index score range from 0-19 for a low SLI, 20-33 for a medium SLI and 34-94 for a high SLI (IIPS 2000).

Access to facilities for households

Facilities should be available to the local people for their livelihood, development and health services. These are at least primary school, health facility, metalled road, dirt road, local shop/store, city market, agriculture service center, cooperative institutions and bank. Transportation facilities available are bus, car, motorbike and bicycle/rickshaw.

Mother's income pattern

It is the exploration of earning whether mothers of children have been involved or not in income generation activities besides other family members- the starting point of their empowerment- and whether it has affected to the nutritional status of their children. Thus, the categories divided are selling agriculture; livestock and dairy products; government/NGO service, handicraft and shop keeping; wage earning, household wives and no income at all.

Care taker of child

Caretaker of a child is an individual of family or neighbor or any friend of mother who bears whole responsibility of the child feeding, security and playfulness in the absence of mother during her work way from home. There are mainly five categories of caretakers in this study. These are father/mother-in-laws; husband and other family members; brother/sister; other relatives, neighbors/friends; nursery; self care/bring self; and leave alone.

Food sufficiency at household level

It is the availability of at least two squares meal a day enough for all family members for a specified time period at the household level. Three categories specified in this study are sufficient round the year, enough for 9-11 months and enough for 8 months and less at the household level.

Breast feeding practices

Exclusive breast feeding: Exclusive breast feeding is the breast feeding by a mother to her child in which she does not give any kind of foods including water until the child completes his/her age up to 5 months. The officially recommended time for exclusive breast feeding to her child is 5 months in Nepal.

Continued breast feeding: Continuous breast feeding is the breast feeding by a mother to her child till the child completes his/her age up to 24 months including supplementary feeding.

Child feeding practices

Age of child initiated supplementary feeding: When a child completes his/her age 5 months, he or she requires certain semi-solids for his/her growth and development with continuous breast feeding for body building, requirement of energy and protection from infection. At this age, child needs such supplementary feeding.

Type of food for supplementary feeding: Food is needed for a child after completion of 5 months in a small quantity at frequent intervals. Such food should be in the form of semi-solid so that child can swallow easily. These foods can be made at home in very cheaper cost (NIN 2003). In this study, various kinds of foods have been fed to the child. Children are fed cereal food made from rice, wheat, millet, maize and other local grains that

provides child energy; pulses, food made from beans, animal and chicken meat and fish that helps for growth and development of child; pumpkins, carrots, sweet potatoes, potatoes, yam, green leafy vegetables, fruits like mango, papaya, banana, orange, egg, ground nuts; peanuts; yogurt/cheese/milk that works as a protective role for the body and gives energy also and other oily foods like fat and butter.

Frequency of child feeding: How many times in a day child will be fed is the frequency of child feeding. Usual requirement to feed child in a day is 5-6 times a day.

Calorie intake by a child

Calorie intake of a child is the total calorie received by a child from cereals, pulses, green leafy vegetables, fruits, milk, animal or chicken meat, fish, egg as against his/her calorie requirement based on age and body weight.

Sickness of a child

It is a condition of a child health that is identified by parents or other family members as being abnormal or clinically manifested and diagnosed by medical practitioners.

Nutritional status of a child

Simple anthropometric measurement and dietary survey among children have been done to assess the nutritional status of children less than 5 years of age. The weight of a person is the most important single anthropometric measurement that can be taken and its interpretation is dependent on knowing the age of the child with some degree of accuracy (Latham 1997). The measurement further is based on weight and height of these children. Weight of the children in the study has been taken wearing minimum light dresses and without bare foot using Salter weighing machine that was distributed to government health facilities by UNICEF. Height is also equally important measurement in the assessment of nutritional status and its interpretation in children is dependent on knowing the age of child (Latham 1997). Height of children has been taken with bare foot with the help measuring tape child standing straight against the vertical wall with face outward and small child letting him/her in the supine position and pressing his/her knee to the bed or floor level.

Measurements have been developed as indices; three indices have been calculated to assess the nutritional status of children and compared these indices with reference values of United States National Center for Health Statistics (NCHS) as recommended by the World Health Organization (Latham 1997). The cut-off points for defining under-nutrition vary with index. Thus, it is 80% for weight for height and 90% for weight for age and height for age (Sachdev 1994). On another assessment, the three indices of nutritional status are expressed in standard deviation units (SD-z-scores) from the median of the International Reference Population. Calculation has been done of nutritional status of children with these three indices and further has been compared as such with reference

population. Children are categorized as undernourished who are more than two standard deviations below the reference median on any indices. Those children who fall more than three standard deviations below reference median have been categorized as severely undernourished. A scientific report from the Nutrition Foundation of India has concluded that the WHO standard is generally applicable in Indian children (IIPS 2000). Therefore, it also can be applicable to Nepalese children. The details of these indices and how the nutritional status of children has been assessed are given below;

Weight for age: It is a composite measure of under-nutrition that assesses both chronic and acute under-nutrition. Children are characterized as underweight when they are more than two standard deviations below the reference median with their weight for age and as severely underweight when they are more than three standard deviations below the reference median while compared with the median reference child of the same age and sex.

Height for age: It is a measurement of linear growth retardation of children and prevalence of chronic under-nutrition. Children are categorized as stunted if they are under-nourished. Thus, children fall under the category of stunted when they are more than two standard deviations below the median of the reference population with regard to their height for age and as severely stunted when they are more than three standard deviations below the median of the reference population in comparison with reference child of the same age and sex.

Weight for height: It is a measurement of body mass with regard to body length and is used to measure the prevalence of acute under-nutrition. Children become wasted while they remain more than two standard deviations below the median of reference population in relation to weight for height and as severely wasted while they remain more than three standard deviations below the median of reference in comparison with reference child of the same height/length and weight.

Limitation of the study

The results of this study will not be generalizable and comparable to other part of the country since it has been carried out in such a district which is very close to capital or it can be said that it falls within the capital territory in the country though these VDCs are of agrarian in nature. Usually all part of the study areas have well developed infrastructure of road, electricity, other transportation means, communication, health facilities including job opportunities. People can have access of any job since it is very close to large market area of the Sub-Metropolitan City of this district itself and Lalitpur district; and Metropolitan City of Kathmandu. The district itself has many types of industries including major industry of tourism. Therefore, most people's living standard is from medium to high. These are major limitations of the study. Other reason for this is that the nature of sampling is both purposive and random. Being a part of study of a

student, it was not possible to study in other remote areas of the country; the study was concentrated mainly in these VDCs. The representation of Magar, Giri and Dalits caste is very low. Therefore, comparison of these castes to other parts of country would not be possible again. Other limitations might have also arisen in the process of sampling and field activities like information bias, error during measurement of height and weight of children. These were tried to be avoid with minimizing interviewer's information bias, checking accuracy of weighing machine prior taking child's weight. The measurement is based on NCHS reference, therefore, the standard of measurement may vary in this study, and however, Habicht has recently suggested that whatever differences there may be in final stature, there is no evidence for ethnic differences in growth potential during the early years of life. In his view, it is justifiable to apply the norms of developed countries to other communities where under-nutrition is common (Waterlow 1974). Recall bias might have affected for variables like continuation of breast feeding and sickness of child since mothers/caretakers of children up to 59 months have been asked for continuation of breast feeding; and for sickness of child duration of 30 days have been taken.

Ethical consideration

Though, there is provision to take written consent from the study subjects as made mandatory by Nepal Health Research Council for the researchers who are likely to study within Nepal, verbal consent was enough during interview of respondents and children's height and weight was taken with permission of mothers or care takers. Conflict of interest was avoided thus. Villagers were very attentive during the interview. They took keen interest and asked from where the interviewer came. Their questions were the whether the interview came from any NGO. I made them clear that I am a student studying at JNU and it is my part work for the study. So they were happy to talk with me and responded as well. It appears there were reservations against the NGOs.

REFERENCES

1. CBS 2001, *National Population Census 2001*, Kathmandu, Nepal
2. Detels, R. et al. (2004), "Cross Sectional Studies", in *Oxford Textbook of Public Health*, Fourth Edition, New York: Oxford University Press Inc.:509-528
3. Informal Sector Research and Study Center (2004), *District Development Profile of Nepal 2004*, Kathmandu, Nepal: 307-319
4. International Institute for Population Sciences (IIPS) and ORC Macro (2000), *National Family Health Survey –2(1998-99)*, India, Mumbai
5. Klienbaum, David G. (1982), *Epidemiologic Research*, Belmont, California, USA
6. Latham, M.C. (1997), *Human Nutrition in the Developing World*, Food and Agriculture Organization, UN, Rome
7. National Institute of Nutrition (2003), *Dietary Guideline for Indians- A Manual*, NIN, Hyderabad.
8. NPC(2004), *GIS Facility*, LPBPP, Nepal
9. Sachdev HPS (1994), "Assessment of Nutritional Status", *Nutrition in Children – Developing Country Concerns*, New Delhi, Maulana Azad Medical College:171-196
10. WHO(1997) *Bulletin* 75:11-18
11. WHO(1997) *Bulletin* 75: 333-342

CHAPTER FOUR

RESULTS AND ANALYSIS

This chapter deals with the scenario of the population under study with its households and sample population. It includes basic characteristics including profile of the district and socio-demographic characteristics of the study population in its first part. The study has analyzed following variables - geographical location, religion, caste, age, sex, education, employment status, housing and its basic facilities, standard of living of the households, parent's literacy and level of education, income status of mother, breast feeding and child feeding practices of mothers, type of food child received and calorie intake by child, child sickness and its duration, and treatment seeking behavior of parents or caretakers. Nevertheless major independent variables of the study are caste and SLI. So, it tries to relate caste and SLI with social phenomena in the second part and then nutritional status of children with its other possible determinants in terms of basic minimum physical infrastructure, standard of living index, food sufficiency and calorie intake of child. The study has made effort to compare several variables wherever it is possible with NDHS 2001 or NFHS -II 2000.

Profile of Bhaktapur District

Bhaktapur, one of the three districts in Kathmandu valley of Nepal, is situated in the Central Development Region. It is one of the richest districts in cultural heritage in the country. With an area of 12,017 square kilometer, the climate is cold to temperate ranging from 0.5 ° C in February to 27.5°C in May. Concerning the profile of this district, the total population of the district consists 250,327 with 41,253 total households having 20,245 children (male-10, 542 and female 9703) less than five years. Nearly 14% population lives under thatched houses but most households (78%) have electric facilities. Most of the households (68.3%) have land those depend on agriculture, livestock and poultry. Only 78% of land area is cultivable and 57% land is irrigable in which main crops in this district are paddy, maize, millet, wheat and barley. Besides, the other important crops are cash crops like oil seed, potato and other green vegetables which have become major income sources for the farmers.

Pulses like lentil, chick pea, black gram and soybean are also harvested every year. Livestock and poultry are the farmers' secondary source of income but this occupation has been going to down. Economically active population is 56.7% (projected) (ISRSC 2004). Farmers (55.5%) and craft and trade workers (30.4%) constitute the major occupation occupations as professionals; semiprofessionals; skilled, semi-skilled and unskilled workers and farmers in the districts. The predominant castes comprise Newar, Chhetri and Brahmin while minorities remain Sarki, Damai/Dholi (dalit –schedule caste). The other castes are Tamang, Sanyasi and Magar (ISRSC 2004) (UNDP2004).

Total literacy rate in the district is 70.6% (Male-81.1% and Female-59.6%) and adult literacy rate is 64.3% (Male-77.9% and Female-50.4%) (ICIMOD2003). The education system has been developed but not to that expected level being as a part of capital valley. In total, there are 289 schools including 148 private schools. There is a provision of education up to bachelor level in humanities and education in two public campuses and nine private campuses. The food in this district has been always in deficit. In 2001-2002 also, there was 17, 361 metric tones cereal food deficit. Forest could be a vital source of income for the people if it could be managed in a proper way. The effort has been made to promote community forest from the side of government. As a result, 53 forest users groups (FUG) are formed and average income of them is \$ 1066¹(ISRSC 2004).

During the time of multiparty democracy, numerous cooperatives emerged in the country and in this district too. Now, there are 144 cooperative institutions of different categories-multipurpose, savings, dairy, consumers and others. At that time, large numbers of NGOs were also registered but only 147 of them are continuing to involve in social service. Among them, 11 NGOs have been directly involved in child welfare and health services. Transport and communication facilities have been concentrated mainly in urban and suburban areas. Only some progress can be seen in rural areas. Industrial development is in the form of small and cottage industries which were registered in a number of 172 in 2003. A number of national and international commercial bank are also working in this district in which Asian Development Bank

¹ Exchange rate \$1=Rs.72

has invested in agriculture/non-agriculture, marketing, irrigation and land development. The total coverage of drinking water supply was 55% in 2003. Migration from other districts to Kathmandu valley has also affected to this district. As of record, 12.6% population has been migrated so far (ibid 2004).

Twenty two health facilities exist throughout the district including with a 56 bedded district hospital and a cancer hospital. Besides District Hospital, there are two Primary Health Centres (PHC), 7 Health Posts (HP) and 12 Sub-health Posts in this district. Two wings of health service system are in operational in the district. District Hospital provides all general curative services including maternity care. District Public Health Office (DPHO) manages public health program throughout the district. Three technical sections conduct public health program under DPHO. Child health section manages on Control of Acute Respiratory Infection (ARI), Control of Diarrhoeal Diseases (CDD), Expanded Program of Immunization and Nutrition Programs (EPI). Epidemiological and Disease Control section manages prevention and control of Tuberculosis, Leprosy, Vector Borne Diseases (filariasis) and HIV/AIDS. Family Health section manages family planning, safer motherhood, PHC Outreach clinics, Female Community Health Volunteers (FCHV) and Traditional Birth Attendants programs (TBA). Besides these sections, other sections include statistical, administrative and store. DPHO coordinates with other government line agencies, bilateral and multilateral agencies, I/NGOs and NGOs for management of overall public health programs in the district. In total, 120,383 patients were reported in the fiscal year 2003-04 from all health facilities including hospitals. The most common infections were ARI, skin diseases, ear infection, sore eye complaints and urinary tract infection as reported in morbidity reports from different health facilities. Other common conditions included were chronic bronchitis (COPD), gastritis, pyrexia of unknown origin, falls/injuries/fractures, toothache and other complaints; and abdominal pain. Total deliveries conducted were 1179, total surgeries done were 408 and total death recorded were 22 according to hospital based data (Rimal 2006). Only 23% of new children less than 3 years of age were visited for growth monitoring in the whole district. Among them, 6.4% was found underweight.

Results

The study covers 3 VDCs (lowest administrative division of the country) comprising 49 villages/toles ranging 10-25 villages in a VDC with two religions (Hindu and Buddhist) and different casts/ethnicities. The total population of the study is 1988 of 300 hundred households in which the sample population consists of 311 fathers, 313 mothers and 387 children including 35 children less than 6 months. The population above 10 years of age is 1403. The population above 6 years is 1563.

Characteristics of Household Population

The household information was taken in the sampling basis with *de jure* population Table 4.1 shows distribution of different characteristics of household members as age, sex, geographical distribution, religion and caste.

Household Composition

Eighty five households belonged to Nagarkot VDC, 107 to Chitapol and 108 to Tathali in the study population in which there were 92 households with nuclear family and 208. The ethnic representation from Magar in Nagarkot and Tathali VDC was nil. Similarly, such representation from Tamang was nil in Chitapol and Thathali

Table 4.1: Distribution of caste of household population according to VDCs

Caste	Village Development Committee			Total
	Nagarkot	Chitapol	Tathali	
Brahmin	118(21.0%)	25(3.4%)	45(6.6%)	188(9.5%)
Kshyatriya	17(3.0%)	443(59.5%)	298(43.6%)	758(38.1%)
Newar	56(10.0%)	197(26.5%)	287(42.0%)	540(27.2%)
Magar	0(0.0%)	42(5.6%)	0(0.0%)	42(2.1%)
Tamang	342(61.0%)	0(0.0%)	0(0.0%)	342(17.2%)
Dalit	20(3.6%)	33(4.4%)	35(5.1%)	88(4.4%)
Others	8(1.4%)	4(0.5%)	18(2.6%)	30(1.5%)
Total	561(100.0%)	744(100.0%)	683(100.0%)	1988(100.0%)

with joint family. The population of the study covers 28.2% population from Nagarkot, 37.4% from Chitapol and 34.4% from Tathali. More than four fifth of the

population adhere to Hindu religion and only less than one fifth of that consist of Buddhists. Kshyatriya represents majority of population (more than one third) among caste/ethnicity followed by Newar (more than quarter) and Tamang (more than one sixth). The proportion of population is very small of Brahmin, Dalit, Magar and other respectively. In regard to the representation of population in the study by VDCs, Tamang belongs 61.0% of the household population in Nagarkot VDC which shows highest representation.

Kshyatriya has the highest representation in two VDCs- Chitapol and Tathali being 59.5% and 43.6% in respect followed by Newar having 26.5% and 42% respectively

Age-Sex Distribution of the Household Population

The majority of the population comprises the economically productive age group (15-59 years) which is 57.8% followed by the population of school age children i.e.

Table 4.2: Age and sex distribution of household population

Age group (Years)	Sex				Total	
	Male		Female		Number	Percent
	Number	Percent	Number	Percent		
Less than 1	41	2.1	40	2.0	81	4.1
1-4	186	9.4	128	6.4	314	15.8
5-9	81	4.1	109	5.5	190	9.6
10-14	56	2.8	58	2.9	114	5.7
15-19	51	2.6	63	3.2	114	5.7
20-24	136	6.8	174	8.8	310	15.6
25-29	140	7.0	120	6.0	260	13.1
30-34	85	4.3	43	2.2	128	6.4
35-39	29	1.5	28	1.4	57	2.9
40-44	34	1.7	36	1.8	70	3.5
45-49	36	1.8	47	2.4	83	4.2
50-54	30	1.5	31	1.6	61	3.1
55-59	32	1.6	34	1.7	66	3.3
60-64	31	1.6	33	1.7	64	3.2
65-69	17	0.9	12	0.6	29	1.5
70-74	13	0.7	9	0.5	22	1.1
75 and above	15	0.8	10	0.5	25	1.3
Total	1013	51.0	975	49.0	1988	100.1

between 5-14 years of age (15.3%). The population of children less than 5 years of age comprises 19.9% being lowest percentage of senior citizens those belong to 60 years and above (7.0%). Male population is higher (51%) than female (49%). Thus, females are 962 per 1000 males. The fertility has declined in this study population

with low proportion of the population in the younger age group (below 15 years) and older age group 65 and above (Table 4.2).

Marital Status

The study shows the finding of marital status in table 4.3 of all household members 10 years of age and above. The total population of 10 years and above is 1403 in which large proportion (72.7%) of population was married with only negligible percentage of couple living with divorce or separation. Early marriage of the girl child is still continuing but does not seem so much highly prevalent. There is difference in proportion of boys who marry later than girls. Still again, both boys and girls marry in early age (Table 4.4). Widowhood is seen in higher percentage among men than women the proportion of widowhood being remarkably higher in male (93.8%) than female (78.0%). Also, the proportion of widowhood rises highest in both sexes when the age reaches 50 years and over.

Table 4.3: Distribution of marital status of household population 10 years of age and above

Marital status	Number(n=1403)	Percent
Married	1020	72.7
Divorce	3	0.2
Separated	4	0.3
Widowed	82	5.8
Unmarried	294	21.0

The table 4.5 denotes that early marriage does seem to be declining since there was no marriage below 15 years, unmarried boys and girls were 34.1% and 44.6% respectively. The pattern of early marriage is seen higher among young girls than young boys since the percentage of married girls is three times higher (2.9%) than boys (0.8%) in teenage group 15-19 of years. Variation is also remarkable in the age group 20-24 years having higher proportion of women (30.1%) married in this age than men (18.0%). Thus, the table shows that women in this area marry at much younger ages than men, and that both men and women marry at younger ages

Table 4.4: Marital status of the household population in relation to sex

Marital status	Sex				Total	
	Male		Female		Number	Percent
	Number	Percent	Number	Percent		
Married	505	71.6	515	73.8	1020	72.7
Divorce	3	0.4	0	0	3	0.2
Separated	1	0.1	3	0.4	4	0.3
Widowed	32	4.5	50	7.2	82	5.8
Unmarried	164	23.3	130	18.6	294	21
Total	705	99.9	698	100.0	1403	

Table 4.5: Percentage distribution of marital status of the household members according to age group and sex

Age group (yrs)	Marital Status(n=1403)									
	Married (n= 1020)		Divorce (n=3)		Separated (n=4)		Widow (n=82)		Unmarried (n=294)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
10-14	0	0	0	0	0	0	0	0	34.1	44.6
15-19	0.8	2.9	0	0	0	0	0	0	28.7	36.9
20-24	18.0	30.1	0	0	0	0	0	2.0	27.4	13.8
25-29	25.4	22.9	0	0	100	0	3.1	0	6.1	1.5
30-49	34.5	26.8	100	0	0	66.7	3.1	20.4	3.7	3.2
50+	21.4	17.3	0	0	0	33.3	93.8	78.0	0	0
Total	100	100	100	0	100	100	99.9	100	100.1	100

Level of Education

One of the indicators of development in the community is the level of education of household member which can play role for better health and nutrition status. More than three quarters of population (76.9%) were literate thus indicating higher literacy rate than district average figure (70.6%)(CBS 2001). Although, literacy rate is high, the proportion of level of education in matriculation and higher education is lowest (13.1%)(Annex-5). Education also varies according to the VDCs, caste and sex. The results show that the opportunity to get education is not still equal with regard to religion, caste, sex and geographical location. Illiteracy is seen highest in Nagarkot VDC than other two VDCs- Chitapol and Tathali, does so in Tamang and Dalits population and in females. Tamang are still behind to achieve education and the

opportunity for Dalits is still remote. On the other hand, Brahmin has the predominant opportunity to achieve education and higher education as well. However, over the period of 15 years, the trend of achieving education has been dramatically changed. The male and female ratio of education is going to be balanced. Even in the new generation female ratio is more than that of male. In spite of the fact that male and female have equal opportunity to have education, this varies in higher education females getting less opportunity for higher education and are married earlier than males.

The result reveals that illiteracy among females is more than double of males (Annex-6). Male participation is more than triple than female in concern to receive higher level of education. Thus the data clearly states that gender discrimination still exists in getting opportunity for education. Even then it can be seen that females are gradually receiving equal opportunity to for education in younger generation.

In caste wise comparison on level of education as of table 4.6, illiteracy is highest in both males (25.8%) and females (54.1%) among Dalits but the lowest in both males (5.6%) and females (17.1%) belonging to Brahmin. When compared by male and female, the variation is seen very wider in all castes being higher illiteracy among females than males being overall more than two times gap between them. It is obviously seen that females (32.6%, 35.3%) are in higher percentage than males (13.3%, 30.8%) in both lower levels- illiteracy; and literate and primary school. As the level of education grows the proportion of females lower down. The proportion of level of matriculation and higher education is highest among males of (Giri)(38.5%) followed by males(33.3%) of Brahmin. Males (20.3%, 35.5%) were three times higher than females (6.1%, 20.3%) in the level of matriculation and higher education; and higher in lower secondary and secondary school.

Although, the literacy level is seen higher in this study population than other parts of the countries, the analysis clearly indicates that females are still behind males in terms of receiving education and continuing towards higher education in majority of proportion particularly the females of Dalits and Tamang. When compared across caste groups, illiterate females among Dalits and Tamang were three times more than illiterate females among Brahmin.

Table 4.6: Percentage distribution of education level among household population by 6 and above according to caste/ethnicity and sex

Caste	Sex	Level of education (n=1563)			
		Illiterate (n=361)	Literate & primary school (n=517)	Lower secondary and secondary school (n=480)	Matriculation and higher education (n=205)
Brahmin	Male	5.6	29.2	31.9	33.3
	Female	17.1	44.7	25.0	13.2
Kshyatriya	Male	7.5	27.1	39.0	26.7
	Female	28.8	32.5	30.1	8.6
Newar	Male	19.1	23.9	38.3	18.7
	Female	30.7	36.4	28.4	4.4
Magar	Male	20.0	40.0	33.3	6.7
	Female	38.9	38.9	16.7	5.6
Tamang	Male	18.6	48.6	26.4	6.4
	Female	48.4	33.1	17.7	0.8
Dalit	Male	25.8	35.5	35.5	3.2
	Female	54.1	37.8	8.1	0.0
Giri	Male	7.7	23.1	30.8	38.5
	Female	22.2	33.3	44.4	0.0
Total	Male	13.3	30.8	35.5	20.3
	Female	32.6	35.3	26.0	6.1

Table 4.7 illiterate that females are in highest proportion (44.1%) in those households whose SLI is low varying remarkably between genders and being higher among females than males nearly double in households with medium SLI and triple in households with high SLI. The case is different in the level of literate and primary education. In this level, the proportion of female is seen still higher in households with low SLI but lower in households with medium and high SLI. The proportion of females starts to decline with the rising level of education. So, the proportion of males is two times higher than females among the households with low SLI in the level of lower secondary and secondary school education. There is no need to compare between male and female in the level of matriculation and higher education in the households with low SLI because of nil in number among females.

Table 4.7: Percentage distribution of education level among household population by 6 and above according to SLI

SLI	Sex	Level of education (n=1563)			
		Illiterate (n=361)	Literate & primary school (n=517)	Lower secondary and secondary school (n=480)	Matriculation and higher education (n=205)
SLI Low	Male	16(18.8)	41(48.2)	25(29.4)	3 (3.5)
	Female	41(44.1)	41(44.1)	11(11.8)	0(0.0)
SLI Medium	Male	52(18.5)	92(32.7)	109(38.8)	28(10.0)
	Female	91(31.2)	111(38.0)	80(27.4)	10(3.4)
SLI high	Male	36(8.8)	105(25.8)	140(34.4)	126(31.0)
	Female	125(30.9)	127(31.4)	115(28.4)	38(9.4)

The proportion of males is two times higher than females in the households with medium SLI and three times higher in the households with high SLI in this level.

Main Occupation

Most of the population depends on agriculture and animal husbandry (49.5%) followed by employment in government job (11.4%) mostly in the lower position like army jawan, police constable and in other lower level position of government office like post man and very few being government officers and teachers (Annex-7). The agriculture and animal husbandry are the main occupations. People are also self-employed with small businesses and trade in the local market area of the villages. There is also a growing tendency to work abroad in both skilled and unskilled sector since job opportunity within country is slim due to political instability and conflict between Maoists and government armed forces. The next main factor is that their pay is many times higher in abroad than within the country even for the skilled. The pay or wages is very low within the country which can barely reach the workers for the subsistence of their family members. Thus, nearly 5% of economically active population is engaged abroad in work other than India. Others are those persons who have already retired and have pension, the persons who are waiting for job, or just quit job.

The proportion of females (69.9%) engaged in agriculture is more than double of males (29.4%). In contrast, proportions of females (1.4% and 2%) have joined government and NGO/Private service compared to males (21.3% and 10.6%)

Table 4.8: Distribution of household population on main occupation according to sex

Main occupation	Sex of household population			
	Male		Female	
	Number	Percent	Number	Percent
Agriculture/animal husbandry	177	32.2	468	85.9
Government service	127	23.1	8	1.5
NGO/Private Service	63	11.5	12	2.2
Trade/Business	56	10.2	14	2.6
Labour work	59	10.7	30	5.5
Job abroad	21	3.8	1	0.2
Other(pension, jobless)	46	8.4	12	2.2
Total	549	99.9	545	100.1

Male participation of labor is also double of females. The females (0.2%) working abroad was also negligible percentage as compared to males (3.5%). The proportion of males (7.7%) in other occupations is also very much higher than females (2.0%). In these categories, the persons include those who have already had pension, who are waiting or searching or not getting job.

Table 4.9: Household's main occupation in relation to caste

Caste	Household's main occupation						Total
	Agriculture/ Animal husbandry	Government Service	NGO/Private Service	Trade/ Business	Labour work	Job abroad	
Brahmin	4(16.0)	6(24.0)	3(12.0)	8(32.0)	2(8.0)	2(8.0)	25
Kshyatria	28(23.7)	54(45.8)	18(15.3)	13(11.0)	1(0.8)	4(3.4)	118
Newar	17(22.4)	16(21.1)	9(11.8)	10(13.2)	14(18.4)	10(13.2)	
Magar	2(33.3)	1(16.7)	1(16.7)	1(16.7)	1(16.7)	0(0.0)	6
Tamang	24(44.4)	6(11.1)	8(14.8)	6(11.1)	9(16.7)	1(1.9)	54
Dalit	1(6.3)	1(6.3)	0(0.0)	2(12.5)	10(62.5)	2(12.5)	16
Giri	1(20.0)	3(60.0)	0(0.0)	0(0.0)	1(20.0)	0(0.0)	5
Total	77(25.7)	87(29.0)	39(13.0)	40(13.3)	38(12.7)	19(6.3)	300

Table 4.9 indicates that households of Giri (60.0%) and then Kshyatria (45.8%) Brahmin (24%) castes are predominantly in government service. Households of Tamang and Magar mainly depend in agriculture and animal husbandry. Dalits households are largely in labour work followed by Giri.

Table 4.10: Household's main occupation in relation to SLI

Main occupation	SLI with households			Total
	SLI Low	SLI Medium	SLI high	
Agriculture/Animal husbandry	18(37.5)	42(33.6)	17(13.4)	77(25.7)
Government Service	5(10.4)	32(25.6)	50(39.4)	87(29.0)
NGO/Private Service	7(14.6)	17(13.6)	15(11.8)	39(13.0)
Trade/Business	1(2.1)	13(10.4)	26(20.5)	40(13.3)
Labour work	16(33.3)	14(11.2)	8(6.3)	38(12.7)
Job abroad	1(2.1)	7(5.6)	11(8.7)	19(6.3)
Total	48	125	127	300

According to Table 4.10 majority of proportions of households which hold government service are under high SLI, most households which are engaged in agriculture and animal husbandry are under medium SLI and most households which depend on labour work are under low SLI.

Table 4.11: Distribution of household population on main occupation according to caste

Main occupation	Caste							Total
	Brahmin	Kshyatria	Newar	Magar	Tamang	Dalit	Giri	
Agriculture/animal husbandry	60 (58.3)	267 (61.0)	163 (56.8)	16 (72.7)	110 (64.7)	17 (30.9)	12 (63.2)	645 (59.0)
Government service	13 (12.6)	83 (18.9)	23 (8.0)	1 (4.5)	10 (5.9)	1 (1.8)	12 (21.1)	135 (12.3)
NGO/Private service	7 (6.8)	31 (7.1)	19 (6.6)	3 (13.6)	15 (8.8)	0 (0.0)	0 (0.0)	75 (6.9)
Trade/Business	11 (10.7)	26 (5.9)	16 (5.6)	0 (0.0)	13 (7.6)	4 (7.3)	0 (0.0)	70 (6.4)
Labour work	4 (3.9)	8 (1.8)	36 (12.5)	1 (4.5)	13 (7.6)	25 (44.3)	1 (5.3)	88 (8.1)
Job abroad	3 (2.9)	4 (0.9)	11 (3.8)	0 (0.0)	2 (1.2)	2 (3.6)	0 (0.0)	22 (2.0)
Other(pensions, jobless)	5 (4.9)	19 (4.3)	19 (6.6)	1 (4.5)	7 (4.1)	5 (9.1)	2 (10.5)	58 (5.3)
Total	103	438	287	22	170	55	29	1094

As given in Table 4.11, predominantly, all castes' main occupation is agriculture/animal husbandry. Magar (72.7%) is on top of them followed by other caste (Giri)(63.2%). Around half of the proportion of Brahmin, Kshyatria and Newar

are also involved mainly in this occupation. Government service is the second major source of income in this study population. Giri (21.1%) is most ahead among all castes followed by Kshyatria (18.9%) and Brahmin (12.6%) but Dalit (1.8%) is still far behind in this concern. NGO/Private service is also growing the next source usually headed by Magar (13.6%). Brahmin (10.9%) places front in trade/business thereby Tamang (7.6%) and Dalits (7.1%). Dalit (44.3%) represents highest proportion in labour work followed by Newar (12.5%) and Tamang (7.6%). The new tendency has also been developed to work abroad but it is in very few percentages. Several percentage of population is also existed who are already retired depending on pensions and who are jobless.

Table 4.12: Distribution of household population on main occupation according to SLI

Main occupation	SLI low	SLI Medium	SLI High	Total
Agriculture/animal husbandry	74(64.3)	257(63.6)	314(54.6)	645(59.0)
Government Service	4 (3.5)	42(10.4)	89(15.5)	135(12.3)
NGO/Private Service	6(5.2)	21(5.2)	48(8.3)	75(6.9)
Trade/Business	2(1.7)	16(4.0)	52(9.0)	70(6.4)
Labour work	23(20.0)	34(8.4)	32(5.6)	89(8.1)
Job abroad	1(0.9)	9(2.2)	12(2.1)	22(2.0)
Other (pension, jobless)	5(4.3)	25(6.2)	28(4.9)	58(5.3)
Total	115(100.0)	404(100.0)	575(100.0)	1094(100.0)

Table 4.12 denotes that in all categories of households, agriculture/animal husbandry is the predominant occupation since more than half proportion of population depend mainly in this occupation in the households with low to medium SLI low (57.3%, 55.5%) and close to half proportion with high SLI (44.1%). Government services and trade/business are linearly associated with the living standard of households. The proportion engaged in government services is two and three times higher in households with medium and high SLI respectively than those with low. Similarly, the proportion of population involved in trade/business is two and four times higher in households with medium and high SLI in respect than those with low. The trend is just opposite if looked at labor work. The proportion of population in households with low SLI who are involved in labor is two times higher than households with medium and four times higher than high SLI.

The empowerment of women is her involvement of economic activity and decision for her self development and development of her child. Majority of mothers either work as housewives or do not have any source of income (64.0%). Only 21.3% mothers are earning through selling, agricultural, livestock, and dairy products and very few of them (5.4%) joined government /NGO job or are engaged in handicraft work or doing shop keeping. In regard to caretaker for the children, more than one third of them have fathers-in-law or mothers-in-law, 14.0% of them have their mothers either staying at home or bringing him/her in the worksite. There are other care takers including husbands, other family members, elder brothers/sisters, relatives, neighbors, and friends and leave alone at home (Annex-9).

Table 4.13: Mother's income pattern with regard to caste and SLI

Caste	Mother's income					Total
	House-wives	Selling agriculture, livestock and dairy product	Gvt/NGO Service, handicraft, shop keeping	Wage earning	No income	
Brahmin	2(7.1)	15(53.6)	0(0.0)	3(10.7)	8(28.6)	28
Kshyatria	35(29.2)	27(22.5)	6(5.0)	4(3.3)	48(40.0)	120
Newar	17(21.3)	9(11.3)	8(10.0)	7(8.8)	39(48.8)	80
Magar	1(14.3)	1(14.3)	0(0.0)	0(0.0)	5(71.4)	7
Tamang	15(26.3)	8(14.0)	5(8.8)	6(10.5)	23(40.4)	57
Dalit	3(18.8)	0(0.0)	0(0.0)	9(56.3)	4(25.0)	16
Others(Giri)	0(0.0)	5(100.0)	0(0.0)	0(0.0)	0(0.0)	5
Total	73(23.3)	65(20.8)	19(6.1)	29(9.3)	127(40.6)	313
SLI						
Low	14(28.6)	5(10.2)	2(4.1)	10(20.4)	18(36.7)	49
Medium	36(28.6)	25(19.8)	5(4.0)	12(9.5)	48(38.1)	126
High	23(16.7)	35(25.4)	12(8.7)	7(5.1)	61(44.2)	138
Total	73(23.3)	65(20.8)	19(6.1)	29(9.3)	127(40.6)	313

According to Table 4.13, the highest proportion of mothers is not involved directly in activities of income source. Nearly 40.6% mothers do not have income source and 23.3% mother work as housewives. Among mothers who are involved in activities of income source, 20.8% had income from selling agriculture, livestock and dairy products. Six percentages of them are either employed in government or NGO job or handicraft or doing shop keeping close to the roadside or local markets alone or with their husbands. In relation to caste, majority mothers in Giri (100.0%) and Brahmin (53.6%) had their incomes selling agriculture, livestock and dairy products. Mothers in Newar (10.0%), Tamang (8.8%) and Kshyatria (5.0%) have joined on government/NGO job, handicraft and shop keeping in negligible amount. Mothers in Dalits(56.3%) are far ahead as wage earners. Involvement of mothers in Brahmin,

Tamang and Newar are also seen but not in significant numbers. The proportion of mothers of households with high and medium SLI is double than the proportion of mothers of households with low SLI among those with income from selling agriculture, livestock and dairy products. The percentage of mothers in joining government/NGO job, handicraft business and shop keeping is more than double in the households with medium and high SLI than those with low. On the contrary, the percentage of mothers in wage earning in the households with low SLI is double of households with medium SLI and four times more than households with high.

Household Assets and SLI

Households are analyzed with the type of land holding, housing with basic facilities and having domestic animals. Majority of households consist of *kachchi* (temporary or thatched) houses (44%) followed semi-*pakki* (semi-permanent) (43%) and in very low percentage *pakki*(permanent or cement plastered)(13%). More than one fifth households do not have latrine. Those who have latrine mostly have own latrine either pit or flush toilet but public toilets are very few. The next most basic facility is source of light. A high proportion of households (93.7%) have electricity as a source of light. Eighty three percentage households cook food by wood, cattle dung, and wooden dust. Houses using sources of drinking water rather than public tap and hand pump are seen only in few households (3.0%). These other sources are springs and natural stone taps. Very low incidence of diarrhea, vomiting and worm infestation (8%) among the children reported by respondents indicated that drinking water was safe. More than two third of households have separate cooking room. Almost all have their own house, leaving only 1.7% of them without their house. Those who do not have a house have stayed either in rented house or they have made small temporary thatched house in public places for their shelter (Annex-4).

Very few (2.3%) households are without land but they have maintained their livelihood with agriculture renting land from land owners less than 0.5 acres or doing as a labour work. Most households (49.3%) represent those which have 0.5 acres land and less followed by the households (35.0%) which have land from 0.5 to 0.9 acres. There is no irrigation system in this area but it is done in traditional way constructing small scale irrigation canal from streams. These might be convenient round the year

or might not be. Such type of facility also is only for the 46.8% of households which own and. The farmers who depend on agriculture also practice animal husbandry.

Mattresses, watches, and pressure cookers were owned by 91%, 88.7% and 69.3% of households respectively. Fifty four percentages households own radio/transistor and 44.3% have black and white TV. Households which owned cars and tractors were only 2.0% and 1%. Ownership of motorbike was reported by 10% households (Annex-8).

While examining housing in relation to caste (Table 4.14) and SLI it was observed that Tamang, Dalit and Giri caste do not have any single *pakki* house, same is the case in regard to the households with low SLI. Magar (33.3%) is seen ahead among the castes followed by Brahmin (16.0%) and Kshyatria (9.5%) with *pakki* houses. Newar (64.5%), Giri (60.0%) and Kshyatria (53.4%) mostly had semi-*pakki* houses while Tamang (92.6%), Dalits (68.8%) and Brahmin (68.8%) in higher to have *kachchi* houses.

Table 4.14: Type of housing in relation to caste and SLI

Caste	Type of housing			Total
	Kachchi	Semipakki	Pakki	
Brahmin	17(68.0)	4(16.0)	4(16.0)	25
Kshyatria	32(27.1)	63(53.4)	23(19.5)	118
Newar	17(22.4)	49(64.5)	10(13.2)	76
Magar	3(50.0)	1(16.7)	2(33.3)	6
Tamang	50(92.6)	4(7.4)	0(0)	54
Dalit	11(68.8)	5(31.3)	0(0)	16
Giri	2(40.0)	3(60.0)	0(0)	5
Total	132(44.0)	129(43.0)	39(13.0)	300
SLI				
Low	42(87.5)	6(12.5)	0(0)	48
Medium	61(48.8)	61(48.8)	2(2.4)	125
High	29(22.8)	62(48.8)	36(28.3)	127
Total	132(44.0)	129(43.0)	39(13.0)	300

Table 4.15 shows that the proportion of the households with no land is only 2.3%. The proportion of households of Dalits (18.8%) and Magar (16.7%) fall under the categories of no land and having 0.5 acre and less. Three quarters of Dalits had share of land with 0.5 acre and less followed by Tamang (66.7%). Large proportion of Magar, Kshyatria, Newar and Brahmin had share of land area with 0.5 to 0.9 acres. Giri (60.0%), Magar (16.7%) and Kshyatria (12.7%) hold the shares of land area with

1-1.9 acres while Brahmin (8.0%), Kshyatria (5.9%) and Newar (2.6%) hold the largest share of land area (2 acres and above).

Table 4.15: Landholding pattern at household level according to caste and SLI

Caste	Landholding pattern at household level					Total
	No land	0.5 acres and less	0.5-0.9 acres	1-1.9 acres	2 acres and above	
Brahmin	1(4.0)	12(48.0)	8(32.0)	2(8.0)	2(8.0)	25
Kshyatria	0(0.0)	48(40.7)	48(40.7)	15(12.7)	7(5.9)	118
Newar	1(1.3)	38(50.0)	30(39.5)	5(6.6)	2(2.6)	76
Magar	1(16.7)	1(16.7)	3(50.0)	1(16.7)	0(0.0)	6
Tamang	1(1.9)	36(66.7)	14(25.9)	3(5.6)	0(0.0)	54
Dalit	3(18.8)	12(75.0)	1(6.3)	0(0.0)	0(0.0)	16
Others	0(0.0)	1(20.0)	1(20.0)	3(60.0)	0(0.0)	5
Total	7(2.3)	148(49.3)	105(35.0)	29(9.7)	11(3.7)	300
SLI						
Low	4(8.3)	35(72.9)	7(14.6)	2(4.2)	0(0.0)	48
Medium	3(2.4)	67(53.6)	42(33.6)	12(9.6)	1(0.8)	125
High	0(0)	46(36.2)	56(44.1)	15(11.8)	10(7.9)	127
Total	7(2.3)	148(35.0)	105(35.0)	29(9.7)	11(3.7)	300

While land sharing is looked at by SLI, 8.3% of landless and 72.9% with landholding of 0.5 acre and less belonged to households with low SLI. Landholding is two and three times higher in households with medium and high SLI than that of low in the category of 0.5-0.9 acres. Households with low SLI do not obtain landholding of the category of two acres and above.

Table 4.16: Type of latrine in relation to caste and SLI

Caste	Type of latrine				Total
	No latrine	Public toilet	Own pit latrine	Flush toilet	
Brahmin	10(40.0)	2(8.0)	8(32.0)	5(20.0)	25
Kshyatria	10(8.5)	6(6.8)	52(44.1)	48(40.7)	118
Newar	7(9.2)	2(2.6)	35(46.1)	32(42.1)	76
Magar	0(0.0)	3(50.0)	1(16.7)	2(33.3)	6
Tamang	29(53.7)	8(14.8)	10(18.5)	7(13.0)	54
Dalit	6(37.5)	2(12.5)	4(25.0)	4(25.0)	16
Others	1(20.0)	1(20.0)	2(40.0)	1(20.0)	5
Total	63(21.0)	26(8.7)	112(37.3)	99(33.0)	300
SLI					
Low	27(56.3)	10(20.8)	10(20.8)	1(2.1)	48
Medium	27(21.6)	13(10.4)	60(48.0)	25(20.0)	125
High	9(7.1)	3(2.4)	42(33.1)	73(57.5)	127
Total	63(21.0)	26(8.7)	112(37.3)	99(33.0)	300

Households with high SLI had eight times higher proportion of landholding of the category of 2 acres and above than households with medium SLI.

All households of Magar have some types of latrines in relation to caste and very few percentages of households with high SLI do not have latrine as seen in Table 4.16. More than 90.0% households of Kshyatria and Newar also have latrines. Only one fifth households of Giri does not have latrine. In contrast, more than 50.0% of Tamang does not have latrine in their households. Brahmin and Dalits households are also behind on it since 40.0% and 37.5% of these households do not have any types of latrine. If looked in accordance with SLI, any type of latrine barely reaches to 45.0% in households which are low in SLI. On the contrary, only one fifth of households do not have latrine which are in medium SLI. Such proportion is less than 10.0% in regard to the households with high SLI.

Table 4.17: Source of drinking water in relation to caste and SLI

Caste	Source of drinking water			Total
	Other sources	Public tape, hand pump or well	Pipe, hand pump or well in residence /yard/plot	
Brahmin	1(4.0)	17(68.0)	7(28.0)	25
Kshyatria	2(1.7)	91(77.1)	25(21.2)	118
Newar	3(3.9)	64(84.2)	9(11.8)	76
Magar	0(0.0)	2(33.3)	4(66.7)	6
Tamang	0(0.0)	49(90.7)	5(9.3)	54
Dalit	1(6.3)	11(68.8)	4(25.0)	16
Others(Giri)	2(40.0)	1(20.0)	2(40.0)	5
Total	9(3.0)	235(78.3)	56(18.7)	300
SLI				
Low	1(2.1)	44(91.4)	3(6.3)	48
Medium	2(1.6)	108(86.4)	15(12.0)	125
High	6(4.7)	83(65.4)	38(29.9)	127
Total	9(3.0)	235(78.3)	56(18.7)	300

Table 4.17 indicates that Magar and Tamang are receiving safer source of drinking water from supply since they do not use drinking water from other sources like spring, stream and stone tapes. Certain households of Giri are in higher proportion to use drinking water from other sources but in few percentages (6.3%). Majority households of Tamang (90.7%), Newar (84.2%) and Kshyatria (77.1%) are receiving drinking water from public tap, hand pump and well. On the other hand, majority households of Magar (66.7%) and Giri (40%) have their pipe, hand pump or well in their residence, yard or plot. Although, majority households with all SLI drink water from public tap, hand pump or well; households with low SLI are in lowest position to get drinking water from pip, hand pump or well in residence at their own.

Table 4.18: Type of light according to caste and SLI

Caste	Type of light			Total
	Other source	Kerosene, Gas or Oil	Electricity	
Brahmin	0(0.0)	1(4.0)	24(96.0)	25
Kshyatria	2(1.7)	3(2.5)	113(95.8)	118
Newar	1(1.3)	2(2.5)	73(95.8)	76
Magar	0(0.0)	0(0)	6(100.0)	6
Tamang	1(1.9)	5(9.3)	48(88.9)	54
Dalit	1(6.3)	3(18.8)	12(75.0)	16
Others	0(0.0)	0(0.0)	5(100.0)	5
Total	5(1.7)	14(4.7)	281(93.7)	300
SLI				
Low	1(2.1)	10(20.8)	37(77.1)	48
Medium	1(0.8)	3(3.2)	120(96.0)	125
High	3(2.4)	0(0)	124(97.6)	127
Total	5(1.7)	14(4.7)	281(93.7)	300

In totality, only 6.4% households have source of light other than electricity as given in Table 4.18. More than 90% households of all castes except Dalits have facility of electricity. The proportion of households with medium and high SLI having electricity as a source of light goes beyond 95.0% the corresponding figure was 77.1% in the households with low SLI.

Analyzing households in Table 4.19 with SLI with regard to VDC, religion and caste; majority of households with medium SLI are in Nagarkot and Tathali; households with high SLI are in Chitapol as shown in the table 4.18. Nagarkot has highest proportion of households in the category of low SLI. Households with low SLI are three times higher in Buddhist (37.0%) than Hindu (11.4%). In contrast, households with high SLI are more than four times higher in Hindu (49.2%) than Buddhist (11.1%). Households with medium SLI are considerably higher in Buddhist (51.9%) than Hindu (39.4%) with not so much different as in other SLIs.

Analyzing by caste, the highest percentage of households with low SLI is in Tamang (37%) followed by Magar (33.3%) and Dalits (31.3%) thereafter. In concern to the high SLI, the percentage of households of Giri (80%) is highest followed by Kshyatria (54.2%), Magar(50%), Brahmin(48%) and Newar (46.1%) respectively. The percentage of households with high SLI is lowest in Tamang and second lowest in Dalits.

Table 4.19: Distribution of household's SLI according to VDCs, religion and caste

(n=300)	SLI Low		SLI Medium		SLI high		Total
	Number	Percent	Number	Percent	Number	Percent	
VDCs							
Nagarkot	29	33.7	38	44.2	19	22.1	86
Chitapol	7	6.5	38	35.5	62	57.9	107
Thathali	12	11.2	49	45.8	46	43.0	107
Religion							
Hindu	28	11.4	97	39.4	121	49.2	246
Buddhist	20	37.0	28	51.9	6	11.1	54
Caste							
Brahmin	4	16.0	9	36.0	12	48.0	25
Kshyatriya	7	5.9	47	39.8	64	54.2	118
Newar	10	13.2	31	40.8	35	46.1	76
Magar	2	33.3	1	16.7	3	50.0	6
Tamang	20	37.0	28	51.9	6	11.1	54
Dalit	5	31.3	8	50.0	3	18.8	16
Giri	0	0.0	1	20.0	4	80.0	5

Facilities Available to the Study Population

All basic facilities like primary education to children, government health services, private medical services and pediatric hospitals are available within the reach of one hour from study area as indicated in Table 4.20. Local shops are also available in each cluster and metalled or dirt road as well. City market is not also so far since people can reach within an hour for their shopping. The government agriculture service center is also close to study area. Cooperative institutions are widely prevalent in the

Table 4.20: Distribution of households' access to facilities

S#	Access to facilities	Number	Percentage
1	Facilities		
	Primary school	300	100
	Health Facilities	300	100
	Black Topped road	280	93.3
	Dirt road	32	10.7
	Local shop/store	300	100
	City Markets	300	100
	Agriculture Service center	300	100
	Cooperative institutions	125	41.7
	Bank	300	100
2	Type of transportation		
	Bicycle/Rickshaw	8	2.7
	Motorbike/Tempo	47	15.7
	Car	7	2.3
	Bus	238	79.3
3	Time to be taken for health facility(less one hour)	300	100

local level helping people towards in saving money and accessing loan easily with soft interest. People with medium to high SLI accessed loan from finance company in city area also. Nearly 42% households of this study population are involved in

local cooperative institutions. People have easy access to bank as well. Transportation facility is also available throughout the year.

Principal means of transportation is private bus or mini bus. Very few percentage of them use cars, motorbike and tempo. All households have access of health services either in public or private sector. Primary level government health services were available in Health Posts and Sub-health Posts. They prefer to seek treatment usually in hospital of city area which is specialized in child health services. Otherwise, they seek treatment through private medical services where usually paramedical practitioners provided the services. People who can not afford such type of institutions seek treatment from local government health facilities. However, all these facilities are within the reach of an hour.

Socio-Demographic Characteristic at Household Level

The total number of mothers in the study is 313 as indicated in Table 4.21. One mother died out of 314 but not related to maternal cause. She had died due to cancer. The study focused on under five children. The mothers were mostly in the age group of 20-24 and 25-29 years.

Table 4.21: Distribution of mother's age group

Age group (years)	Number(n=313)	Percent
19 and below	11	3.5
20-24	146	46.6
25-29	97	31.0
30-34	32	10.2
35-49	27	8.6

The study comprised of 387 children below 5 years of age reported in Table 4.22. The proportion of male children was remarkably higher than female children in all age groups except in the age group of 5 months and below. The experience during interview at the households showed that number of older children above 5 years was usually female in many households. So, parents might have expected to have son later on resulting in selection of male children. This raises the question that whether sex selection tendency has arisen among parents in this community.

Table 4.22: Age and sex distribution of child

Age group (months)	Sex of child(n=387)				Total	
	Male		Female			
	Number	Percent	Number	Percent	Number	Percent
5 and below	15	41.7	21	58.3	36	9.3
6-11	26	60.5	17	39.5	43	11.1
12-24	50	58.8	35	41.2	85	22.0
25-35	49	52.1	45	47.9	94	24.3
36-59	81	62.8	48	37.2	129	33.3

The proportion of illiterate mothers is only one fifth of its population but the percentage on achievement of level of education for matriculation and higher education seems still very low (11.8%, Annex-9). The disparity in gaining education looks very high between husbands and wives since only 5.5% husbands are illiterate and if looked at the level of matriculation and higher education percentage of husbands (26.7%) is more than double of wives (11.8%) receiving range of education extended up to master level.

Mothers of children less than 5 years of children were included for analysis (Table 4.23). The percentage of illiteracy is high among mothers in castes of Tamang (47.4%) and Dalits (37.5%). Mothers who achieved level of literate and primary school education in caste of Magar were 57.1%, of Dalits 56.3% and of Brahmin 42.9%. Mothers who received level of lower secondary and secondary education in caste of Giri were 80.0%, of Kshyatria 41.7%. Mothers in caste of Brahmin (21.4%) and Kshyatria (18.3%) were in highest proportion that were matriculates or higher. No mothers in Tamang, Dalits and Giri were matriculates or higher. Analyzing the level of education of mothers with SLI, higher the household's SLI, lower the rate of illiteracy of mother but lower the household's SLI, higher the rate of illiteracy of mother. This trend is reversed while observing in the higher level of education. The mother's proportion in the level of lower secondary and secondary school is two times lower in households with low SLI than those with medium and high. No mothers of households with low SLI were matriculates or higher. In the same way, there is also

Table 4.23: Education level of mother in relation to caste and SLI

Caste	Education level of mother				Total
	Illiterate	Literate and primary school	Lower secondary and secondary school	Matriculation and higher education	
Brahmin	1(3.6)	12(42.9)	9(32.1)	6(21.4)	28
Kshyatria	10(8.3)	38(31.7)	50(41.7)	22(18.3)	120
Newar	18(22.5)	27(33.8)	28(35.0)	7(8.8)	80
Magar	2(28.6)	4(57.1)	0(0.0)	1(14.3)	7
Tamang	27(47.4)	19(33.3)	11(19.3)	0(0.0)	57
Dalits	6(37.5)	9(56.3)	1(6.3)	0(0.0)	16
Giri	0(0.0)	1(20.0)	4(80.0)	0(0.0)	5
Total	64(20.4)	110(35.1)	103(32.9)	36(11.5)	313
SLI					
Low	23(46.9)	18(36.7)	8(16.3)	0(0.0)	49
Medium	26(20.6)	50(39.7)	44(34.9)	6(4.8)	126
High	15(10.9)	42(30.4)	51(37.0)	30(21.7)	138
Total	64(20.4)	110(35.1)	103(32.9)	36(11.5)	313

remarkable difference in proportion of mothers between households of SLI medium and high in matriculation or higher education. Thus, mother's proportion is four times higher in households of SLI high than those of SLI medium.

Table 4.24: Caretaker with regard to household's SLI

Caretaker	SLI			Total
	SLI Low	SLI Medium	SLI high	
Father/mother-in-law	25(9.4)	96(36.2)	144(54.3)	265
Husband/other family members	12(36.4)	12(36.4)	9(27.3)	33
Brother/Sister, relative, neighbour /friends or leave alone at home	6(33.3)	10(55.6)	1(11.1)	18
Nursery	1(5.9)	11(64.7)	5(29.4)	17
Self care/bring self	15(27.8)	24(44.4)	15(27.8)	54
Total	59(15.2)	153(39.5)	175(45.2)	387

Table 4.24 indicates that husband or other family members as caretakers are in highest (36.4%) proportion in households with low SLI while children bringing in nursery are the lowest proportion. Instead, the trend bringing in nursery is in highest (64.7%) proportion from households with medium SLI and in lowest proportion of fathers/mothers-in-laws being as caretakers. On the other hand, fathers/mothers-in-laws are among the highest (54.3%) in taking care in households with high SLI but husband/other family members in the lowest proportion (27.3%). The practice to bring children to nursery is in growing tendency due to urbanization as there is raising

nuclear families and tendency of parents' involvement of work is also growing. Such nurseries are growing in number both public school and private boarding schools.

Breast Feeding Practices of Mother

Very low proportion (48.6%) of children is exclusively breast fed in this study as compared to national figure (78.8%) as given in Table 4.25. The highest proportion of feeding of goat or cow or buffalo milk suggests that people are still ritualistic. Despite the low proportion of exclusive breast feeding, the continuation of mothers to breast feed their children is proportionately high although lower than the national average and median age till 24 months.

Table 4.25: Distribution of children according to exclusive breast feeding and continuity of breast feeding

S#	Breast feeding practices	Number(n=35)	Percent
1	Exclusive breast feeding(5 months and below)		
	Children having exclusive breast feeding	17	48.6
	Children not having exclusive breast feeding	18	51.4
	Children given water	3	8.6
	Children bottle fed or given can milk	3	8.6
	Children goat/cows/buffalo milk fed	9	25.7
	Children fruits/fruit juice fed	1	2.9
	Children other fluids fed	6	17.1
	2	Continuity of breast feeding(0-59 months)	(n=387)
Up to 18 months		15	3.9
Up to 24 months		167	43.2
Up to 30 months		21	5.4
Up to 36 months		125	32.3
Median duration of breast feeding (in months)		24	

Mothers are continuing breast feeding for their children till very longer period beyond 36 months of child age. The median age of child being breast fed is 24 months (43.2%). Still close to one third mothers either continuing breast feeding or they were prepared to continue breast feeding till the age of 36 months. If combined the continuity of breast feeding of children both till 24 and 36 months it reaches to 75% but still it is considerably lower than the national figure (87.3%, NDHS 2001).

Mothers also leave to breast feed their children at earlier age of the child i.e. 18 months (3.9%, Table 4.25).

Child Feeding Practices

Government has recommended that children should be given supplementary foods (solid or semi-solid foods) after child completes 5 months but such feeding to children by their parents barely reaches two third. On the contrary, they start to give complementary food to their children in earlier months. So, the majority of parents are not complying with the government's recommendation in both exclusive breast feeding and initiation of supplementary feeding with their children.

The percentage of children, who are initiated supplementary feeding at 5 months, is only 63.7% though the median age of child to initiate supplementary feeding is the same age. As of Annex-15, the percentage of children to initiate supplementary feeding in early age of the child is seen in growing tendency which is 25% those initiated such feeding from 1 to 3 months. So, the risk of vulnerability is growing to the children less than 5 months who should be exclusively breast fed till the age of 5 months.

On asking questions to mothers or caretakers in feeding their children in previous days, it is found that the types of food consumed by children are in various patterns (Annex-15). Children from 5 months onward are analyzed in regard to child feeding practices. The daily food consumption pattern of children in the interviewed households depends mainly on cereal (98.5%), pulse (69.5%) and vegetables (57.2%). Most families' usual food consumption pattern is cereals and vegetables. They consume pulses with cereals alternatively. They usually have beans in vegetables during rainy and winter both seasons. Therefore, protein requirement for them may be maintained together with cereals. The diet of children does not differ with the diet of adults. Caretakers give extra care to the children in providing milk or eggs whatever they have. One third children have received fruits out of all children above 5 months in the interviewed households. They also received seasonal fruits. Parents are also able to feed children seasonal fruits whatever it is found in season like orange. It depends on the purchasing power of the family according to their living standard. As revealed by the results, very few children are getting animal and chicken meat, fish

and eggs. A large proportion of children is receiving milk and milk product and green vegetables in their meal, so, it can be assumed that children are receiving food rich in Vitamin 'A'. Children require feeding at least 4-5 times in a day but the usual frequency of feeding of children in the study is 3 times in a day in which median frequency of child feeding is the same. Still one quarter of mothers of children responded that they feed their child 4 times in a day too which is encouraging. The proportion of children who receive food 5 times a day and 2 times a day is very low.

Food Sufficiency and Calorie Intake by Children

Food sufficiency at household level and food consumption pattern thereby calorie intake also determines the nutritional status of children. The result indicates that more than half of the households were food sufficient (Annexe-10). The calorie intake according to recommended dietary allowances (RDA) varies from 22% to 139.8% depending upon the appetite of the child, his/her requirement, sickness and convalescent period of sick child. The calorie intake was calculated of the child who took food in the previous day of interview. The percentage of children whose calorie intake is 90% and above is remarkably highest out of 5 groups of calorie intake.

Table 4.26: Household's food sufficiency in relation to Caste and SLI

Caste	Food Sufficiency			Total
	Round the year	9-11 months	8 months and less	
Brahmin	14(56.0)	7(28.0)	4(16.0)	25
Kshyatria	83(70.3)	25(21.2)	10(8.5)	118
Newar	49(64.5)	17(22.4)	10(13.1)	76
Magar	3(50.0)	1(16.7)	2(33.3)	6
Tamang	14(25.9)	20(37.0)	20(37.0)	54
Dalit	4(25.0)	6(37.5)	6(37.5)	16
Giri	5(100.0)	0(0.0)	0(0.0)	5
Total	172(57.3)	76(25.3)	52(17.3)	300
SLI				
SLI Low	1(2.1)	0(0.0)	47(97.9)	48
SLI Medium	52(41.6)	72(57.6)	1(0.8)	125
SLI high	119(93.7)	4(3.1)	4(3.1)	127
Total	172(57.3)	76(25.3)	52(17.3)	300

The percentages of calorie intake lower than 90% are relatively very low indicating that prevalence of under-nutrition among the children in this study should be relatively very low though this indicator itself is dependent to other socio-economic status of the family.

Hundred percentage households of Giri, nearly three quarter of Kshatria and more than two third of Newar have enough food to eat round the year at household level as seen in Table 4.26. The proportion of households of other castes is relatively highly lower than these castes in this category. More than one third households of Tamang, Dalits and Magar have enough food to eat either from 9 to 11 months or 8 months and less that. The proportion of other castes in these categories is relatively very low. Marked variation is clearly seen while looked in an analysis with SLI from the same table. More than 90% of households with high SLI have enough food for them round the year as responded interviewers. Conversely, 98% households with low SLI have enough food only for 8 months and less.

The proportion of children of Giri, Dalits, Magar and Newar is lower than 50% in terms of 90% and above calorie intake by a child as stated by Table 4.27. The

Table 4.27: Calorie intake by a child in relation to caste and SLI

Caste	Calorie intake by a child					Total
	Less than 60%	60-69.9%	70-79.9%	80-89.9%	90% and above	
Brahmin	0(0.0)	3(10.3)	2(6.9)	6(20.7)	18(62.1)	29
Kshyatria	17(12.7)	12(9.0)	17(12.7)	14(10.4)	74(55.2)	134
Newar	16(18.2)	12(13.6)	13(14.8)	5(5.7)	42(47.7)	88
Magar	1(14.3)	2(28.6)	0(0.0)	1(14.3)	3(42.9)	7
Tamang	0(0.0)	7(12.5)	14(25.0)	7(12.5)	28(50.0)	56
Dalits	1(5.9)	3(17.6)	5(29.4)	1(5.9)	7(41.2)	17
Giri	0(0.0)	1(33.3)	0(0.0)	1(33.3)	1(33.3)	3
Total	35(10.5)	40(12.0)	51(15.3)	35(10.5)	173(51.8)	334
SLI						
SLI Low	3(6.3)	8(16.7)	11(22.9)	2(4.2)	24(50.0)	48
SLI Medium	16(11.8)	19(14.0)	22(16.2)	15(11.0)	64(47.1)	136
SLI high	16(10.7)	13(8.7)	18(12.0)	18(12.0)	85(56.7)	150
Total	35(10.5)	40(12.0)	51(15.3)	35(10.5)	173(51.8)	334

proportion of children of Newar falls above 50% while it included group of 80%-89.9% calorie intake by a child. The proportion of children in households with SLI medium to low is 50% and less in regard to calorie intake of 90% and above. It is above 50% in households with high SLI but marginal.

One of the determinants for nutritional status of children is how frequently a child becomes sick and for how long his/her sickness last. In this study, nearly half of children's population reported sickness. Mothers or caretakers responded that 187 children out of 387(48.3%) were sick within the last 30 days (Annex-16). Cough/fever (51.9%) and fever (23.0%) are the most frequently occurring sicknesses in the children less than five years of age. Acute Respiratory Infection (ARI) was reported for 60.5% of the children. Other sickness like diarrhea, vomiting and worm infestation, skin infection/scabies, dental and oral infection also prevailed but in small numbers of children. Diarrhoeal diseases a major contributor for child under-nutrition featured in the third rank. In the interaction with health facility staff, it also came out that the prevalence of diarrhoeal diseases has gone down in comparison to decade of 1980s. ARI might have been highly prevalent due to winter season and viral diarrhea might have been lowered down due to the toilet facilities available in the most households. ARI was thus the most frequently occurring sickness (during winter season) leading to under-nutrition and stunting. It was further observed that 75.4% of children suffered about 7 days. The proportion of child sickness decreased according to the duration of sickness as such 13.9% and 10.7% for the duration of 8-14 days and 15-30 days respectively. Most of the diseases were acute in nature. The chronic disease with disability was very little.

Parents or caretakers mostly seek treatment from private medical practitioners practicing modern medicine at the initial or later phases. A small proportion went to traditional healers or practiced home remedies. In case of emergency, they seek treatment from hospitals. They come back seeking treatment from traditional healers if the modern medicine did not cure the patient. Larger proportion of parents/caretakers spent money for the treatment of sick child in which 48.7% incurred cost of \$ 42 and less. Only 21.4% parents/caretakers did not require cost for

the treatment or children were self cured. Even \$ 139 was spent for two sick children for the treatment may be due to seriousness of child sickness (Annex-16).

Nutritional Status of Preschool Children and Its Determinants

Demographic Characteristics and Child Nutrition

The levels of under-nutrition were underweight 19.8%, stunting 36.4% and wasting 4.7% according to Table 4.28. Overall, the prevalence of under-nutrition of preschool children is seen much lower than central hill of the country in which the prevalence of underweight is 48.9%, stunting 74.8% and wasting 3.8%.

Table 4.28: Distribution of weight for age, height of age and weight for height among preschool children

Weight for age(n=363)			Height for age(n=370)			Weight for height(n=357)		
Status	Number	Percent	Status	Number	Percent	Status	Number	Percent
< -3SD	7	1.9	< -3SD	49	13.2	< -3SD	4	1.1
< -2SD	65	17.9	< -2SD	86	23.2	< -2SD	13	3.6
Normal	291	80.2	Normal	235	63.5	Normal	340	95.2
Total	363	100	Total	370	99.9	Total	357	99.9

Some interesting results were observed with analysis of nutritional status of children according to demographic characteristics (mother's age, children's age, sex and type of family) (Annex-17). Highest prevalence (23.4%) of under-weight is found in children of mothers aged 35 and above. One striking observation is that the lowest prevalence (17.1%) of under-weight is found among the children of mothers aged 25-29 years however there is no such considerable variation in same trend as NDHS 2001 (HMG/N 2001). The case is different in concern to the stunting on that the highest prevalence (40.7%) of stunting is among the children of mothers aged 25-29 years with considerably wider variation with other age groups, having the lowest prevalence (30.0%) among children of mothers aged 19 years and below differing with NDHS 2001 (HMG/N 2001). The scenario is very much different in case of wasting. Highest prevalence of wasting is seen among the children of mothers aged 19 years and below.

While analyzing the nutritional status with children's age groups, it was observed that the prevalence of underweight and stunting is very low when child do not reach his/her first birth day. After that there is increased tendency in proportion of underweight with increased age group of children up to 24-35 months. By then it is declining again. The proportion of under-weight starts to rise remarkably high (23.2%) when the child completes its first birthday as in NDHS 2001(HMG/N 2001). After completing its third birth day, the proportion of under-weight starts to decline with marginal variation. The trend is different in relation of stunting. As age group of children increases, its proportion also increases as typically identical with NDHS 2001(HMG/N 2001). As such many children are still significantly underweight because of stunting rather than wasting by the age of 3-4 years (retarded in linear growth) but of more or less normal weight for height (Waterlow 1974). More than 92.7% of children in all age groups are normal in case of weight for height.

The analysis of nutritional status of children in relation to sex revealed very wide variation. The proportion of under-weight among female children (23.6%) was much higher than male children (17.0%) and figures for stunting was similar. The trend is opposite in case of wasting, male children are seen more wasted than female; similar variation is found in NDHS 2001(HMG/N 2001).

The nutritional status of children was correlated with the type of family. By this observation, both proportions of under-weight and stunting among children were found higher in nuclear families than joint families besides wasting.

Child Nutrition in relation to VDC, Religion and Caste

Interesting variation was observed in analysis by VDCs; religion and caste also as shown in Table 4.29. Highest percentages of under-weight (24.1%) and stunted (42.1%) children are in Nagarkot VDC which is relatively far from the city and where majority of ethnic group consist Tamang with highest percentage of low SLI but the weight for height is normally more than 94.3% in all VDCs. On the other hand; lowest percentages of under-weight (17.3%) and stunted (33.1%) children are in Chitapol VDC in which households with high SLI are in highest percentage and are relatively

close to city area of the district. Underweight and stunted children are in higher percentages among Buddhist than Hindu being more percentage of severe stunting in Buddhist children. Here also if it is looked back to the SLI it is consistently showing

Table 4.29: Distribution of weight for age, height for age and weight for height of preschool children in relation to VDCs, religion and caste

Variables	Weight for age (n=363)		Height for age (n=370)		Weight for height (n=357)	
	% <-3SD	% <-2SD	% <-3SD	% <-2SD	% <-3SD	% <-2SD
VDCs						
Nagarkot	1.0	23.1	20.6	21.5	0.0	2.9
Chitapol	3.8	13.5	10.3	22.8	1.5	3.8
Tathali	0.8	18.3	10.2	25.2	1.6	4.1
Religion						
Hindu	2.0	16.2	11.1	24.2	1.3	4.0
Buddhist	1.6	26.2	23.4	18.8	0.0	1.7
Caste						
Brahmin	0.0	23.5	17.6	23.5	3.0	12.1
Kshyatriya	3.5	18.4	8.3	22.9	0.7	5.7
Newar	0.0	9.6	10.5	26.3	1.1	0.0
Magar	11.1	0.0	22.2	11.1	0.0	0.0
Tamang	1.6	26.2	23.4	18.8	0.0	1.7
Dalit	0.0	33.3	22.2	33.3	5.6	0.0
Giri	1.9	17.9	0.0	16.7	0.0	0.0

that Hindu households represent highest percentage of high SLI and Buddhist households represent highest percentage of low SLI. The prevalence of underweight and stunting is seen considerably higher in Dalits followed by Tamang. The lowest prevalence of under-weight is seen among Newar and stunting among Giri. On the other hand, wasting is highest in Brahmin and height for weight is cent percent normal in other caste and Magar.

Table 4.30 tries to analyze extensively the nutritional status of children in accordance with religion by sex. It obviously shows that whether children are in Hindu or Buddhist community the proportions of underweight and stunting are higher among female children than male children except wasting. The major difference between

these two religions is that both the percentages of underweight and stunted female children are remarkably higher than male children. The variation is not so wide between male and female children in Hindu religion. It is noteworthy that there is great variation while compared the nutrition status of children by caste and sex. It

Table 4.30: Distribution of weight for age, height for age and weight for height of preschool children according to religion, caste and sex of a child

Variables	Sex	Weight for age (n=363)		Height for age (n=370)		Weight for height (n=357)	
		% <-3SD	% <-2SD	% <-3SD	% <-2SD	% <-3SD	% <-2SD
Religion							
Hindu	Male	2.9	13.8	8.5	24.4	1.2	5.2
	Female	0.8	19.5	14.6	23.8	1.6	2.4
Buddhist	Male	0.0	18.8	20.0	14.3	0.0	0.0
	Female	3.4	34.5	27.6	24.1	0.0	3.6
Caste							
Brahmin	Male	0.0	27.8	11.1	27.8	5.6	11.1
	Female	0.0	18.8	25.0	18.8	0.0	13.3
Kshyatriya	Male	5.7	13.6	6.7	21.3	0.0	8.0
	Female	0.0	26.4	10.9	25.5	1.9	1.9
Newar	Male	0.0	8.2	8.0	24.0	2.1	0.0
	Female	0.0	11.1	13.3	28.9	0.0	0.0
Magar	Male	0.0	0.0	0.0	20.0	0.0	0.0
	Female	25.0	0.0	50.0	0.0	0.0	0.0
Tamang	Male	0.0	18.8	20.0	14.3	0.0	0.0
	Female	3.4	34.5	27.6	24.1	0.0	3.6
Dalit	Male	0.0	27.3	27.3	45.5	0.0	0.0
	Female	0.0	42.9	14.3	14.3	14.3	0.0
Giri	Male	0.0	0.0	0.0	33.3	0.0	0.0
	Female	0.0	0.0	0.0	0.0	0.0	0.0

consistently denotes that underweight and stunted children are in higher percentage in female children than male children in all castes except in underweight in Brahmin and stunting in Dalits. The marginal variation can be observed even there is higher percentage of under-weight and stunting of female children than male in Kshyatria, and Newar but there is wide variation in proportion of underweight and stunting with

higher proportion among female children than male in Magar, Tamang and Dalits. Instead, underweight in male children in Brahmin and stunted in male children in Dalits are higher than female children. The notable observation can be seen among Dalits. It is that there is remarkably higher proportion of underweight male children than female.

Child Nutrition with Regard to Household Characteristics

The result shows the nutritional status of children according to characteristics of households like type and ownership of house, type of land holding and assets at household level according to Table 4.31. According to type of house, underweight and stunted children are found highest percentage in those households which have *kachchi* house (22.2%, 40.7%) and lowest in those households which have *pakki*

Table 4.31: Distribution of weight for age, height for age and weight for height of preschool children in regard to characteristics of households

Characteristics Of households	Weight for age (n=363)		Height for age (n=370)		Weight for height (n=357)	
	% <-3SD	% <-2SD	% <-3SD	% <-2SD	% <-3SD	% <-2SD
Housing						
Kachchi	2.0	21.2	16.8	23.9	1.4	4.1
Semi-kachchi	1.9	15.9	11.9	24.4	0.6	2.6
Pakki	1.8	14.5	7.3	18.2	1.9	5.6
Ownership of house						
Having own house	1.9	17.3	13.2	22.7	1.1	3.7
Not having own house	0.0	75.0	20.0	60.0	0.0	0.0
Landholding pattern						
No land	12.5	25.0	25.0	62.5	0.0	0.0
Less than 0.5 acres	1.7	19.1	17.6	24.7	0.6	2.9
0.5-0.9 acres	2.4	19.7	9.2	23.1	1.6	5.5
1-1.9 acres	0.0	8.6	8.6	11.4	0.0	3.0
2 acres and above	0.0	6.7	0.0	13.3	6.7	0.0
Domestic animal						
Having domestic animal	1.6	18.1	13.6	22.8	1.0	3.6
Not having domestic animal	3.7	16.7	11.1	25.9	1.9	1.9

(16.3%, 25.5%). Though wasting is higher among households having *pakki* and semi-kachchi houses than *kachchi* the difference is marginal. The figures clearly disclose that underweight and stunted children are remarkably higher in those households which do not have own house (75%, 80%) than which have own house (19.2%, 35.9%), a reflection of SLI.

By the type of land holding, the percentage of underweight and stunted children is negatively associated with households from which have lands or not to how much area the households hold land. Thus, it can be observed that no land or less land holding of the households higher the percentage of underweight and stunting (37.5%, 87.5%); and larger area of the land holding lower the percentage of underweight and stunting (6.7%, 13.3%). By the category of domestic animal at household level, the variation existed. Underweight and stunted children are in higher percentage in those households which do not have domestic animal (20.4%, 37%) and in lower percentage in those which have domestic animal (19.7%, 36.4%) but the difference is very minimal by this variable alone.

The study also tried to look at the nutritional status of children by households' basic facilities like type of latrine, source of drinking water, type of light, cooking fuel, households with separate kitchen which is presented Table 4.32. While looked at with the type of latrine, same negative relation can be observed with regard to nutritional status of children as in the type of land holding. The proportions of underweight and stunting among children are highest in the households which do not have latrine (22.2%, 44%).

In contrast, the proportions are lowest in the households which have flush toilets (18.9%, 28.9%). There was wide variation in the proportion of stunting. The nutritional status of children also differs in source of drinking water. Prevalence of underweight and stunting among children is lowest (16.5%, 28.7%) in these households where source of drinking water pipe, hand pump or well in residence or yard but it is highest (23.1%, 30.8%) among children of these households where there is other sources of water. Even though it should be keep in the mind that the variation is not so high with this variable only.

The percentage of underweight and stunting among children is also seen lowest (19.6%, 35%) in which households the source of light is electricity. These two indices have become highest (underweight 50% in other source of light and stunting 61.1% in kerosene, gas or oil) in case of these other sources of light except electricity. Here the remarkably notable thing is that the variation has become so much wide in both

Table 4.32: Distribution of weight for age, height for age and weight for height of preschool children in relation to households' basic facilities

Household basic facilities	Weight for age (n=363)		Height for age (n=370)		Weight for height (n=357)	
	% <-3SD	% <-2SD	% <-3SD	% <-2SD	% <-3SD	% <-2SD
Type of latrine						
No latrine	0.0	22.2	18.7	25.3	0.0	4.3
Public toilet	3.6	14.3	17.2	24.1	0.0	0.0
Own pit latrine	3.7	16.2	13.0	25.4	1.5	4.4
Flush toilet	0.8	18.1	9.4	19.5	1.6	3.2
Source of drinking water						
Other sources of water	0.0	23.1	7.7	30.8	0.0	8.3
Public tap, hand pump or well	2.2	18.4	14.8	23.6	1.1	3.3
Pipe, hand pump or well in residence/yard/plot	1.4	15.1	8.2	20.5	1.4	4.2
Type of light						
Other source of light	0.0	50.0	33.3	16.7	0.0	0.0
Kerosene, gas or oil	0.0	23.5	16.7	44.4	0.0	0.0
Electricity	2.1	17.1	12.7	22.3	1.2	3.9
Cooking fuel						
Wood, cattle dung	2.2	17.6	15.4	23.5	0.7	2.9
Coal, kerosene, wooden dust	0.0	20.0	0.0	40.0	0.0	0.0
Electricity or biogas	0.0	19.6	0.0	19.6	1.1	3.6
Households with separate kitchen						
With separate kitchen	2.1	15.6	10.5	23.1	0.0	2.5
Without separate kitchen	1.2	25.9	22.6	23.8	1.4	4.0

indices. No such difference can be observed in comparison with cooking fuel in regard to underweight of children but difference is considerable in stunting of children between the households which cook with electricity or biogas and the households

which cook with coal, kerosene, wooden dust; and wood or cattle dung. Underweight and stunted children are in lower percentage (17.6%, 33.6%) in the households which have separate cooking room than the households which do not have (27.1%, 46.4). Considerably, there is variation with this variable (Table 4.32).

Child Nutrition in Relation to SLI and Food Sufficiency

The nutritional status of children consistently varies with the SLI of households as demonstrated in Table 4.33. It can be said that the SLI is directly related with

Table 4.33: Distribution of weight for age, height for age and weight for height of preschool children in relation to SLI, food sufficiency and calorie intake at the household level

Indicators	Weight for age (n=363)		Height for age (n=370)		Weight for height (n=357)	
	% <-3SD	% <-2SD	% <-3SD	% <-2SD	% <-3SD	% <-2SD
Standard of Living Index						
SLI low	3.5	28.1	29.3	22.4	0.0	1.8
SLI medium	0.7	20.4	13.0	25.3	0.7	4.3
SLI high	2.4	12.2	7.8	21.7	1.9	3.7
Food sufficiency at household level						
Sufficient round the year	1.9	14.0	8.3	22.5	1.9	3.8
Enough for 9-11 months	1.2	20.9	15.7	23.6	0.0	4.7
Enough for 8 months and less	3.2	27.4	27.0	25.4	0.0	1.7
Calorie intake by the child		(n=323)		(n=329)		(n=323)
Less than 60%	3.0	24.2	14.7	23.5	3.0	6.1
60-69.9%	2.6	28.2	15.0	32.5	0.0	0.0
70-79.9%	2.0	24.5	15.7	23.5	0.0	8.2
80-89.9%	0.0	20.6	5.9	26.5	0.0	5.9
90% and above	1.8	14.9	14.7	21.8	1.8	1.8

nutritional status of children. Higher the SLI higher the nutritionally normal children lower the SLI lower the nutritionally normal children. In other sense, the percentages of underweight and stunted children are highest (31.6%, 51.4%) in the households whose SLI is low but these indices are lowest (14.6%, 29.5%) in the households

whose SLI is high similar to the result of NHS-2 (IIPS 2000). The variation is remarkably high in both indices. The prevalence of underweight and stunting is lowest (15.9%, 30.8%) among the households which have enough food sufficiency round the year and highest (30.6%, 52.4%) in those households which have food sufficiency for only 8 months and less. Therefore, it shows that there is relationship between food sufficiency at household level and nutritional status of children although it is dependant variable to other livelihoods of the households.

Parents' Level of Education and Child Nutrition

The prevalence of underweight and stunting among children is quite obviously highest (33.3%, 49.4%) whose mothers are illiterate but this does not linearly coincide with their education level as in NDHS 2001 (HMG/N 2001) as indicated by the table 4.32. Rather these indices are considerably lowest (15.1%, 32.2%) among children

Table 4.34: Distribution of weight for age, height for age and weight for height of preschool children with regard to parent's level of education

Variables	Weight for age		Height for age		Weight for height	
	%	%	%	%	%	%
	<-3SD	<-2SD	<-3SD	<-2SD	<-3SD	<-2SD
Mother's level of education		(n=362)		(n=369)		(n=356)
Illiterate	4.0	29.3	23.4	26.0	0.0	0.0
Literate & primary school	1.6	15.3	11.0	25.2	3.3	4.1
Lower secondary and secondary school	1.7	13.4	13.2	19.0	0.0	4.3
Matriculation completion and above	0.0	18.2	2.3	25.0	0.0	6.8
Father's level of education		(n=358)		(n=365)		(n=353)
Illiterate	0.0	26.1	17.4	13.0	0.0	0.0
Literate & primary school	1.8	22.8	14.8	34.4	1.8	1.8
Lower and secondary school	3.3	16.0	14.8	20.3	1.1	3.9
Matriculation completion and above	0.0	15.5	7.1	24.2	1.1	5.3

whose mothers' level of education is lower secondary and secondary schooling. Interestingly, weight for height is cent percent normal among children whose mothers are illiterate, on the contrary (Table 4.34). While looked with the education level of

father, the highest prevalence (26.1%) of underweight is seen in children whose fathers are illiterate and the highest prevalence (49.2%) of stunting is seen in children whose fathers are literate and have primary schooling. Reversely, both underweight and stunting among children are considerably highly lowest (15.5%, 31.3%) whose fathers' level of education have reached up to matriculation completion and above fathers. These reveal considerably high difference with other education levels.

Main Occupation and Child Nutrition

As given by the 4.35, in comparison with main occupation at household level, making

Table 4.35: Distribution of weight for age, height for age and weight for height of preschool children according to main occupation at household level, mother's income and caretakers

Indicators	Weight for age		Height for age		Weight for height	
	%	%	%	%	%	%
	<-3SD	<-2SD	<-3SD	<-2SD	<-3SD	<-2SD
Main occupation at household level		(n=363)		(n=370)		(n=357)
Agriculture/animal husbandry	2.1	20.0	17.3	23.5	0.0	4.3
Government service	1.0	11.8	7.7	20.2	2.9	2.9
NGO/Private Service	2.1	25.5	14.6	16.7	0.0	4.4
Trade/Business	2.0	20.4	12.2	20.4	0.0	8.3
Labor work	4.3	23.9	19.1	38.3	2.2	0.0
Job abroad	0.0	4.2	8.3	25.0	0.0	0.0
Mother's income		(n=362)		(n=369)		(n=356)
House-wives	3.5	8.1	13.5	19.1	2.4	1.2
Selling agricultural, livestock and dairy products	2.5	22.2	13.6	19.8	1.3	5.1
Government/NGO Service, handicraft, shop keeping	0.0	5.6	5.6	22.2	0.0	0.0
Wage earning	2.9	29.4	11.4	34.3	0.0	5.9
No income	1.9	18.0	14.4	25.3	0.0	5.9
Caretaker		(n=363)		(n=370)		(n=357)
Father/mother-in-law	2.0	19.7	12.7	23.1	0.8	4.9
Husband and other family members	3.2	29.0	21.2	27.3	0.0	0.0
Elder brother/Sister, relative, neighbor/friends, leave alone at home	0.0	17.6	16.7	22.2	0.0	0.0
Nursery	6.3	0.0	12.5	18.8	0.0	6.3
Self care/bring self	0.0	8.0	9.6	23.1	4.0	0.0

categories of occupation as agriculture/animal husbandry, government and NGO/Private services, trade/business, job our work and working abroad, it is seen that the lowest prevalence (4.2%) of underweight in children is in households whose main occupation is working abroad but the highest (28.2%) prevalence of underweight in children is in households whose main occupation is labor work. In the same way, the lowest prevalence (27.9%) of stunting is in households whose main occupation is government service but the highest (57.4%) prevalence of stunting is in households whose main occupation again is labour work. Thus, the variation in prevalence of these two indices in these occupations is seen highly contrasting.

In relation to income pattern of mothers, variables are taken as house-wives; selling agricultural, livestock and dairy products; wage earning, mothers who do not have income at all. By this, the lowest (11.6%) prevalence of underweight is usually seen among children whose mothers are house-wives but nearly three times highest (32.3%) in children whose mothers' livelihood depends on wage earning. The similar trend is seen in this regard as compared to the NHFS-2 since the lowest proportion of underweight is among the mothers who are not working in past 12 months (IIPS Macro 2000). The lowest (27.8%) prevalence of stunting among children, on the other hand, is seen whose mothers are continuing government or NGO service, have income from handicraft and are doing shop keeping but again it is highest (45.7%) with highly difference among children whose mothers are involved in wage earning. Weight for height is more than 90% normal among all categories of mother's income.

The study also tried to look at the nutritional status of children with regard to care taker. The individuals are taken as care taker either mother herself or any other who take care of children all over the day for his/her security, food and his/her play. Children's nutritional status is seen better who are enrolled in nursery schools since it can be observed from the table that the lowest (6.3%, 31.3%) prevalence of underweight and stunting is in children who are enrolled in nursery schools but very noteworthy fact is that the highest (32.2%, 48.5%) prevalence of underweight and stunting is in children to whom husband and other family members take care.

Child Nutrition in Relation to Their Feeding Practices

The study reveals that children below 6 months are cent percent nutritionally normal in weight for age and 18.8% stunted who are exclusively breast fed (Table 4.36). Nevertheless, underweight (18.8%) and stunting (25.0%) is in very low percentage among children who are not exclusive breast fed. The pattern is opposite in concern to wasting on them. In the relationship of continuation of breast feeding with

Table 4.36: Distribution of weight for age, height for age and weight for height of preschool children by child feeding practices

Child feeding practices	Weight for age		Height for age		Weight for height	
	% <-3SD	% <-2SD	% <-3SD	% <-2SD	% <-3SD	% <-2SD
Children with exclusive breast feeding (5 months and below)		(n=32)		(n=32)		(n=26)
Without exclusive breast feeding	6.3	12.5	12.5	12.5	0.0	0.0
With exclusive breast feeding	0.0	0.0	6.3	12.5	0.0	15.4
Age at child with continuation of breast feeding (0-59 months)		(n=363)		(n=370)		(n=357)
18 and below	4.0	8.0	16.0	20.0	0.0	0.0
19-24	1.2	14.5	12.5	22.0	1.2	6.2
25-35	0.0	13.8	9.7	35.5	0.0	0.0
36 and above	2.8	24.3	14.4	22.6	1.4	2.1
Age at child with initiation of supplementary feeding(months)		(n=326)		(n=333)		(n=326)
1 and less	8.6	22.9	31.4	17.1	2.9	2.9
2	0.0	9.1	12.5	12.5	0.0	4.5
3	3.4	13.8	6.7	26.7	0.0	3.4
4	0.0	18.8	11.1	27.8	0.0	0.0
5 and above	1.8	19.3	12.4	26.1	1.3	3.6

nutritional status of children, four groups of age are categorized as 18 months and below, 19-24, 25-35; and 36 above. The lowest prevalence (12%) of underweight are found in the children to who breast feeding continued till the age of 18 months and less. In contrast, highest prevalence (27.1%) of underweight is found in the children to who breast feeding continued till the age group of 36 months and above. The case is different in connection to stunting. Its prevalence is lowest (34.5%) in children to who breast feeding continued till the age group 19-24 months but highest (45.2%) in

children to who breast feeding continued till the age group of 25-35 months. These indices are seen to be widely varied with this variable.

In regard to the initiation of supplementary feeding of the child, it tried to look at what month of child, mother initiated supplementary feeding in the same table above. The study tried to make comparison the nutritional status of children with initiation of supplementary feeding at 1, 2, 3, 4 and 5 months of child age. The surprising result appeared that the lowest (9.1%, 25%) prevalence of underweight and stunting is in children to who supplementary feeding was initiated at two months but the highest (31.5%, 48.5%) in children to who it was initiated at the age of one month underweight being three times higher and stunting nearly two times higher.

Child's Sickness and Nutrition Status

Analyzed with the sickness of the child, prevalence of underweight is lowest (18.8%) in children who are sick from pneumonia and other sicknesses like skin

Table 4.37: Distribution of weight for age, height for age and weight for height of preschool children in relation to the type of child's sickness and its duration

Child's sickness and its duration	Weight for age (n=183)		Height for age (n=187)		Weight for height (n=181)	
	%	%	%	%	%	%
	<-3SD	<-2SD	<-3SD	<-2SD	<-3SD	<-2SD
Type of sickness						
Cough and fever	3.2	15.8	12.4	28.9	1.1	3.2
Fever	0.0	26.8	9.3	18.6	2.4	7.3
Diarrhoea, vomiting, worm infestation	6.7	13.3	26.7	0.0	0.0	0.0
Pneumonia	0.0	18.8	6.3	12.5	6.3	6.3
Other sicknesses like skin infection/scabies; under-nutrition; chest, dental and oral infection	0.0	18.8	12.5	25.0	6.7	0.0
Duration of sickness						
1 -7 days	2.2	18.8	10.6	25.5	2.9	4.4
8-14 days	0.0	19.2	15.4	19.2	0.0	0.0
15-30 days	5.3	15.8	20.0	5.0	12.3	22.5

infection /scabies or dental or oral infection (Table 4.37). Opposite to it, the index is highest (26.8%) in children who are sick from fever with wide difference. In terms of stunting, its prevalence is lowest (18.8%) in children who are sick again from pneumonia but highest (41.3%) in children who are sick from cough and fever. The variation is seen more than double in this index. On the contrary, this does not happen in concern to wasting. In all type of sicknesses, the normalcy of weight for height denoted more than 87.5%.

While looked from the perspective of the duration of sickness in children, the highest (21%, 36.1%) prevalence of underweight and stunting are found among the children whose duration of sickness is of short period i.e. 1-7 days. On the other hand, underweight is lowest (19.2 %) in children whose duration of sickness is 8-14 days and stunting is lowest (25%) in children whose duration of sickness 15-30 days. Nevertheless, the difference is very minimal in underweight besides stunting. The notable observation here it is that wasting is highest (34.8%) in children whose duration of sickness is 15-30 days.

REFERENCES

1. HMG/N (2001), *Nepal Demographic Health Survey*, Ministry of Health, Nepal, New ERA and ORC Macro.
2. ICIMOD (2003), *Mountain Environment and Natural Resources Information Systems (ICIMOD/ MENRIS)*, Central Bureau of Statistics(CBS), December
3. ISRSC(2004), *District Development Profile of Nepal 2004*, Kathmandu, Nepal: 307-319
4. IIPS (2000), *National Family Health Survey –2, 1998-99*, India, Mumbai
5. Rimal, S. and Rimal, R.(2006), “Bhaktapur District”, in *Nepal Development Record, Nepal District Profile 2006(A District-wise Socio-economic Profile along with A Comprehensive National Profile of Nepal)*, Nepal Development Information Institute(NIDI), PO Box 1857, Kathmandu, Nepal
6. UNDP (2004), “Empowerment and Poverty Reduction”, *Nepal Human Development Report 2004*, UNDP:180

CHAPTER FIVE

DISCUSSION AND CONCLUSION

Discussion

It is not surprising that the present study has found relatively lower prevalence of underweight, stunting and wasting in the study area than the central hills of Nepal. The main reason behind it is that the study area is relatively highly prosperous as compared to the other parts of the country. We were not attempting primarily in this study to study the prevalence of under-nutrition but to relate them to socio-economic class. The proxies for class that we have utilised in the study are caste and standard of living.

The study area is thus not representative of Nepal. What the study does however attempt to do is to bring in a socio-economic dimension to the biological problem of under-nutrition. In this sense, what the study findings are could be relevant to other areas of the country also. It is then, not simply enough to know the problem of nutrition in different areas, but to know which sections of the population bear the brunt of the state's failure of social policy and why.

In this study population, the proportion of households with low SLI is very low. The primary health care has been extended within the reach of the least developed communities and it is easily available and accessible. Other basic infrastructures and facilities are also available to most of the households. Organized efforts for health care activities through Female Community Health Volunteers (FCHV) and institutionalized outreach services through the government health facilities and Village Health Workers (VHW) and Maternal and Child Health Workers (MCHW) are undergoing including focused program universal immunization program (UIP).

There is a system of monitoring nutrition of children in the government health facilities in terms of weight for age with support of United Nations Fund for Population Activities (UNFPA) monitoring sheet. According to the sheet, there are provisions to measure a child's growth with weight for age and categorize children as

nourished and malnourished only. Under-nutrition here, as elsewhere, has seasonal dimensions. While observing the weight of children in these facilities, the proportion found is lowest mainly during the month of January but the reported cases in the past show lowest similar to the finding of the study. Thus, underweight in very low percentage and stunting relatively in higher percentage confirms that another factor may be that children get normally adequate amount of food during this season and the nature of sickness is also not so serious in general.

Determinants with Strong Influence on the Nutritional Status of Children

Remarkably higher proportion of under-nutrition among children with the determinants of SLI, main occupation, type of housing, pattern of land holding, source of light, mother's level of education, income pattern of mother, care taker, supplementary feeding, food sufficiency of the households and types of sickness indicate that these variables may have a strong influence to determine the nutritional status of children. In other words, socio-economic class, which determines access to all these resources that are determinants of the nutritional status of children, has a profound bearing.

The highest proportion of households with low SLI and lowest proportion of households with high SLI are among caste groups of Tamang and Dalits. Caste then, continues to be an extremely important factor in shaping access to resources. Conversely, the households of Giri, Kshyatria, Magar, Brahmin and Newar are in higher proportion with high SLI. Further, the comparison is very striking on children's nutrition in relation to SLI. The proportion of underweight and stunting among pre-school children is remarkably highest (31.6%, 51.4%) in households with low SLI. In this case, stunting looks higher than national average. Thus, it indicates very strong relations between SLI of the households and children's nutritional status. The greater the socioeconomic deprivations in sections of a community, the greater, generally, are the extent and degree of stunting in it. Among communities subject to socio-economic deprivations, these attributes of the "poverty syndrome" invariably co-exist and tend mutually to reinforce their respective ill effects. Children and adults caught up in this situation cannot but be stunted (Gopalan 1972). Thus, the variation

has been remarkably high in both indices with consistent finding as explained by Gopalan.

The majority of Giri, Kshyatria and Brahmin; and households with high SLI in general, are employed in government services. This underscores the importance of regular paid employment in the population. It is of course largely men who are employed while the women are employed in a range of productive household and farm activities – productive but unpaid, and indeed unaccounted work. Females are double than male in agriculture and animal husbandry in all castes. On the other hand, main occupations of majority of Tamang, Magar; and households with medium SLI is agriculture and animal husbandry while most of Dalits and households with low SLI do wage-earning work. Children seem less under-nourished (4.2%, 12.8%) in households whose main occupation is job abroad and government services while they are more under-nourished in households whose main occupation is wage-earning work (28.2%, 57.4%). In this case also, stunting is observed relatively higher than the national average. This shows strong relation between main occupation with SLI and nutritional status of pre-school children. Households must have income sources those who can adequately fulfill the demand to have adequate resource for food security throughout the year. An uncertain income source cannot fulfill adequately the demand of food security at the household level. This indicates that either adequate amount of food production at household levels or unconditional employment guarantee must be given to every economically active citizen with payment of minimum wages to ensure food security and maintain standard of living at household levels.

In epidemiological history, it is known that the decline of hunger in 19th century Europe is related to and shaped by regularity and security of employment, hours of work, energy demands of physical labor, and even more profoundly by structure of work for women including care and feeding of their young children together with those which are in *utero* (Zubrigg 1994). The reports of ILO and FAO also emphasize that employers of the agricultural workers must improve the social, economic and environmental well-being of these workers. The reports have speculated to help promote sustainable agricultural and rural development by ensuring that waged workers can feed and clothe themselves and their families to produce good quality,

safe and affordable food for communities and consumers globally (Himalayan News 2005).

Although our study does not show much problem on unemployment, the rate of unemployment is very high in the context of Nepal. In this study, the proportion of SLI low is observed very low but in slum area of the cities and rural part of the country, it is very high, the prevalence of poverty indicates as such. Nepal is similar to India and indeed even worse than India in some cases. Therefore, India's case may have some import for Nepal. Utsa Patnaik argues, 'Rural India is in acute distress and the distress is bound to turn to turmoil if its crisis is not addressed. It is not too late. The need of the hour is to implement immediately and with sincerity a demand driven, universal employment guarantee and at the same time to abolish the arbitrary division between the 'above' and below poverty line population to allow the poor to access affordable food (Paitnak 2005). The step taken by India on EGA bill may not be complete for social security system for the whole nation. Even it is a progressive signal to bring nation towards social security system in the long run. Later on, the aim of the "historic bill" brought by the Union Progressive Alliance government is to banish poverty through assured employment and to make prosperous people reducing their poor economic conditions as a part of common minimum program. Though, it is not free from criticism it has promised wage employment to every rural household, in which adult members volunteer to do unskilled manual work and are subjected to get minimum wage at Rs. 60. This original bill has identified families below the poverty line as beneficiaries (SC 2005).

Housing is one of the most important components to determine SLI of households. Not a single *pakki* house is available among Tamag, Dalits and Giri while most of Magar and Kshyatria; and most of the households with high SLI have *pakki* houses. In reverse, most of Tamangs, Dalits and Brahmins; and most of households with low SLI have *kachchi* houses. The proportion of underweight and stunted children is highest (23.2%, 40.7%) in *kachchi* households and lowest in *pakki* (16.3%, 25.5%) houses. Thus, the finding suggests that there is a substantial relation between socio-economic status, housing and children's under-nutrition.

Landholding is also a key component in determining the SLI of households. So, it has been analyzed singly with caste groups and SLI. The result spells out that majority of households of Dalits and Tamangs either do not have land or land with area of 0.5 acre and less whereas the largest share of landholding goes to only a few Brahmins, Kshyatrias and Newars. The same case is in relation to SLI also. The majority households with low SLI either do not have land or land with area of 0.5 acre and less but households with medium and high SLI have notably higher proportion of land with area of 0.5 to 0.9 acres. Remarkably high proportion of land with area of 2 acres and above goes to households with high SLI. While comparing with the nutritional status of children with the patterns of landholding; the households with no land or less area of landholding have amazingly highest percentage of underweight (37.5%) and stunting (87.5%) while households with larger area of landholding is very low percentage of underweight and stunting (6.7%, 13.3%). It is very important to note that the percentage of stunting is much higher than the national average. It seems that there is a very strong relation between landholding pattern and children's nutritional status. Since the country is predominantly agriculture based and landholding among population has to fairly distribute throughout the country. The major revolution should be land reform as done in Kerala, India many years ago including agricultural revolution providing farmers' adequate standard of living environment with fully social security. Most effective safety net against hunger and deprivation among farmers has to develop including union farm workers from the bottom level. These are some examples to intensify our efforts to improve productivity, quality and income.

An urgent need in this area is the strengthening of institutional structures, which can help to confer on small and marginal farmers the ecological and economic benefits of scale at both the production and post-harvest phases of farming. Cooperative, self-help groups and other forms of group endeavor are now being promoted. In addition, contract farming involving private sector –farm family partnership is also spreading. All sustainable partnership will have to be based on a win-win model. This is where learning from successes will help to purchase time. Australia has several models of group endeavor such as land and grain care movements (Swaminathan 2005). Nepal will have brighter future if such models of group cooperative can be introduced and adopt enhancing the income and work security of farm families who are very less advanced in this area of concern.

Level of literacy among all household members and mother's level of education has been analyzed with regard to education. Illiteracy is highest among both males and females (25.8%); and among females (54.1%) in caste of Dalits but the lowest in both males (5.6%) and females (17.1%) belonging to the Brahmins in analysis of education of all household members of the study population. Female literacy is still lower than male. While looked with regard to female illiteracy, females of Dalits and Tamang are three times behind with that of female Brahmins. The illiteracy among females is double than that of males in households with low and medium SLI, and more than triple of males in households with high SLI. The proportion of illiterate mother of the under five children is remarkably higher among Tamang (47.4%), Dalits (37.5%), Magar and Newar. Similarly, the proportion of mothers receiving higher education is nil among Tamang, Dalits and Giri. The relation of mother's literacy is also seen in concern to the SLI of households. The higher the household's SLI lower the rate of illiterate mothers, lower the household's SLI higher the rate of illiterate mothers. Marked variation can be found in two indices in terms of mother's education. Literature suggests that mother's education has a profound influence on a child's nutritional status. While this study also points in the same direction, it also indicates that literacy co-varies with socio-economic status and is perhaps not to be seen as a discrete independent variable.

The result shows that more than two third mothers of the under five children do not have income. Majority of mothers in caste groups of Giri and Brahmin do have income relatively; and in households with SLI high and medium get income through selling agricultural products, livestock and dairy products, joining government services, involving in handicrafts and shop keeping while majority of mothers in castes of Dalits; and in the households with low SLI get income doing daily wage-earning work. The lowest prevalence (11.6%) of underweight is usually observed among children whose mothers are house-wives but nearly three times highest (32.3%) in children whose mothers' livelihood depends on wage earning in analysis of nutritional status of children in relation to mother's income. The lowest prevalence of stunting among children on the other hand, is observed whose mothers are continuing government or NGO service, have income from handicraft and are doing

shop keeping but again it is highest (45.7%) near about close to national average with highly difference among children whose mothers are involved in wage-earning.

Being majority husbands or other family members as caretakers from households with low SLI and majority of children bringing to nursery from households with medium and high SLI, the study denotes that proportions of underweight and stunting among children are observed higher (32.2%, 48.5%) among them whose caretakers are husbands or other family members than from nursery (6.3%, 31.3%). There is a clear indication that it is not due to only caretakers themselves but due to living standard of households.

Perhaps one of the most important factors is that all young children under the age of five require far more than two meals a day because of their high food requirements for growth and relatively small stomach size. Yet the value of such a general framework lies in that it highlights basic distinctions in the character of hunger, which are critical for tracing secular trends in access to food (Zurbrigg 1994). All pre-school children up to the age of 5 years should not be treated as if they were the same. If it is a question of providing supplementary food, priority should be given to children below the age of 2 years, and probably to the women in the last trimester of pregnancy. Older children, of course, need food intake which will meet their requirements for energy, protein and other nutrients, but attempts at nutritional "rehabilitation" of the stunted children are unlikely to accomplish very much (Waterlow 1974). Government food program has recommended that children should be given supplementary foods (solid or semi-solid foods) after a child completes 5 months but such feeding to children by their parents barely reaches two third. On the contrary, they start to give complementary food to their children in earlier months. So, majority of parents are not complying with the government's recommendation in both exclusive breast feeding and initiation of supplementary feeding for their children. Most families' food consumption pattern is cereals and vegetable/pulse. Most children also receive such foods as their parents. Most of the children start food intake from five month onwards. Therefore, the median age of a child receiving supplementary feeding is five months although the proportion of children who start supplementary feeding is lower than the national average. The supplementary foods must be inexpensive, locally available and within the economic reach of the least developed people. Furthermore, there is a dire

need to educate health workers and mothers on how such locally available foods can best be successfully used for infant feeding (Gopalan 1972). While it is related with child nutrition, the prevalence of underweight and stunting is highest (31.5%, 48.5%) among children those started supplementary feeding at one month but the lowest (9.0%, 25.0%) among children whose supplementary feeding started at 2 months. It contrasts with the evidence from Gopalan's study since the growth faltering in his study has occurred by the end of two months of children's age. The growth faltering as such may be related to faulty breast feeding practices like offering water to the infants in between feeds, not putting the infant to the breast as often as may be necessary being busy in working and so on. What may be needed, then, is education with respect to improving breast-feeding practices and not early supplementation (ibid 1972).

Food sufficiency at the household level and food consumption patterns can also determine the nutritional status of children. The Giris, Kshyatrias and Newars have higher proportion of households, which have enough food round the year. Other caste groups like Tamang, Dalits and Magar have higher proportion of households, which have enough food for 9-10 months or 8 months and less. Ninety percentage households with high SLI can have enough food round the year while 98% households with low SLI can have enough food for 8 months and less. Regarding the relation of under-nutrition of children with food sufficiency of households both prevalence of underweight and stunting among children are remarkably higher (30.6%, 52.4%) in households whose food sufficiency is 8 months and less than in households (15.9%, 30.8%) whose food sufficiency is enough round the year. Thus, food sufficiency has played very crucial influence on nutritional status of children. In other words, households with access to adequate resources - in this case land - to enable to grow enough food does not in general suffer from childhood under-nutrition. That is to say, very frequently, policy options such as education and behaviour change through IEC have a very limited role in dealing with the problem of under-nutrition.

One of the determinants for nutritional status of children is how frequently child becomes sick and for how long his/her sickness last with its severity. In this study, nearly half of children's population under 5 years of age reported sick but it seemed

that the nature and seriousness of sickness varied widely. Infections (respiratory and gastrointestinal) account for much of the under-nutrition (and stunting) in children in poor communities (ibid 1972). Underweight is lowest (18.8%) among children who were sick with pneumonia and skin infection/scabies, dental or oral infection but highest (26.8%) among them who were sick from fever only. Stunting is lowest (18.0%) among children who were sick from pneumonia but highest (41.3%) among them who were sick from cough and fever. Still, ARI is the number one disease for the suffering of children as in similar pattern among the top ten diseases in health facilities of the study area. Diarrhoeal diseases which appeared to be the major contributor for child under-nutrition have lowered down to the top 3 diseases. In interaction with health facility staff, they also accepted that the prevalence of diarrhoeal diseases has gone down in comparison to decade of 1980s. ARI might have been highly prevalent due to winter season and viral diarrhea might have been lowered down due to the toilet facilities available in the most households. Most of the disease pattern is acute in nature as shown by the high proportion of children in the duration sickness of 7 days. The chronic disease with disability seems in very low proportion. Parents or caretakers mostly seek treatment from government health facilities or private practitioners following practice of modern medicine due to dominance of it. Only less proportion go to traditional healer or remain on home remedy even it depends on the severity of child sickness. In case of emergency, they seek treatment from hospitals. They come back seeking treatment from traditional healers if the modern medicine did not respond and they perceive that modern medicine is no longer assurance to their child's health or life.

Determinants with Moderate Influence on Nutritional Status of Children

Considerably higher proportion of under-nutrition among children with the determinants of sex of child, type of family, topographical situation; type of latrine, house with or without separate kitchen, father's literacy and calorie intake by children, continuation of breast feeding reveals that these variables have moderate influence on nutritional status of pre-school children.

Higher proportion of underweight and stunting is among female children than male in both religions. Wide variations are observed in proportion of underweight and

stunting with higher proportion among female children than male in Magar, Tamang and Dalits.

Geographically, the prevalence of underweight and stunting is observed high in VDC situated far from the city area. It is not due to the reason that the village being distant but people's living standard low in that VDC.

Another component in determining the standard of living of household is latrine. Caste-wise observation shows that most of Kshyatria and Newar have high proportion of latrine while most of Tamang, Brahmin and Dalits have low. Majority of the households with high SLI have latrines but the majority of the households with low SLI do not. Again, the access to sanitary facilities is a matter of socio-economic status. When nutritional status of children is compared with the type of latrine, the proportion of underweight (22.2%) and stunted (44%) children is higher in households where there is no latrine than those where there is flush toilet (18.9%, 28.9%). The variation is marginal with regard to underweight but very high in relation to stunting. Thus, it has noticeable influence on nutritional status of children under the age of five.

Kitchen, as a component of SLI of households, has also sizable effect on child nutrition since the finding shows that the percentages of underweight and stunting are low (17.6%, 33.6%) in the households which have separate kitchen while high (27.1% and 46.4%) in the households which do not have separate kitchen. The reason behind it may be that the households have high living standard, which have separate kitchen. The reason is that children are likely to become sick less frequently from ARI and fever in those households, which have separate kitchen.

Calorie intake is also a factor that can influence in the child nutrition. On asking questions to mothers or caretakers in feeding their children in previous days, it is found that the types of food consumed by children are in various patterns. In regard to child feeding practices, children from 5 months onwards have been taken for analysis. As observed in the pattern, it can be speculated that majority of families' daily consumption of food depends only on cereal, pulse and vegetables. Most families' usual food consumption pattern is cereals and vegetables. They consume pulses with

cereals alternatively. They are fortunate that they usually have beans in vegetables during rainy and winter both seasons. Therefore, their protein diet may be maintained together with cereals. The diet of children does not differ with the diet of adults. They serve the meal whatever adult serve during meals. Caretakers give extra care to the children in providing milk or eggs when they have them. One-third children have received fruits out of all children above 5 months in the interviewed households. Basically, they receive fruits on a seasonal basis, when it is locally available. Parents are also able to feed children seasonal fruits whatever it is found in season like orange. It depends on the purchasing power of the family according to their living standard. As revealed by the results, very few children are getting animal protein in the form of meat, fish and eggs and this is not because of cultural or religious reasons. The great proportion of children is receiving milk and milk product and green vegetables in their meal, so, it can be assumed that children are receiving food rich in Vitamin 'A'. The highest proportion of children has been fed three times in a day which implies that the frequency of child feeding is still inadequate. Foods consumed by children have been calculated in terms of calorie from cereals, pulse, vegetable, milk or egg, meat or fish and fruits. Calorie intake of the children has been calculated based on their average requirement of same age and same weight of the normal children. It is pertinent to note that in a balanced diet, of the total calories, 60-70% should come from carbohydrates, i.e. cereals. Thus, while foods with high protective value are important, it is also important to appreciate that cereals are the cheapest food sources for energy and proteins. In fact, in absence of adequate quantities of cereals (energy), optimum dietary protein utilization does not take place for which sufficient energy is necessary (Qadeer 2005). Thus, less than 50% children of Giri, Dalits, Magar and Newar; and of households with medium and low SLI consume calorie intake 90% and above while more than 50% of households with high SLI consume 90% and above with marginal difference. Sizable variation in nutritional status of children has indicated in relation to calorie intake by a child. Underweight and stunting are relatively low (16.7%, 32.4%) among children whose calorie intake is 90% and above; and 80-89.9% respectively but relatively high (27.2%, 48.2%) among children whose calorie intake is 60% and less.

The prevalence of underweight children is highest among mothers who breast feed for 36 months (27.1%) while lowest (12%) among those who are breast fed till 18 months

and below. Similarly, the prevalence of stunting is highest (45.2%) among children to who breast feeding continued in the group 25-35 months while lowest (34.5%) among those who are breast fed in the age group 19-24 months.

Marginally higher proportion of under-nutrition among children with the determinants of source of drinking water, mother's age, child's age, type of family, religion and pattern of breast feeding within six months points out that these variables have less influence on nutritional status of children of less than 5 years of age.

Drinking water as a component of SLI has also influence on the nutritional status of children. There is no developed system as such in purification of water in this area even then water from public tap, hand pump and well are relatively safe to drink. Besides, the season of study is also relatively safe period for water borne diseases. In using water, cent percent households of Magar and Tamang; and majority of Newar and Kshyatria drink water from public tap, hand pump and well. Higher proportion of households with high SLI drink water from public tap, hand pump or well but lowest proportion of households with low SLI drink supplied water. The proportions of underweight and stunting differ in those households where source of drinking water varies. The proportions of underweight and stunting are low (16.5%, 28.7%) in households whose source of drinking water are pip, hand pump and well in residence but these indices are high (23.1%, 30.8%) in households whose source of water are others like stone tap, ground well and stream. The marginal difference in proportion in under-nutrition might be due to that only 3% of households drink water from outside source.

The higher proportion of underweight among the children of mothers 35 and above might have been due to pre-term birth or low birth weight having mother's age biologically risk for both of them in terms of childbirth. The notable concern over high proportion of stunting by age of mother in 25-29 might be due to that at this age the child's age concentrates around 12 to 35 months which age is most vulnerable to infection and malnutrition and/or the mother at this age being economically active might have gone frequently to outside work not getting for proper care to their children. Much interesting result in regard to stunting is that its proportion is lower in

children of mothers aged 19 years and less. The reason may be that most children are in the age below 12 months born with mothers in their young age.

The prevalence of under-nutrition – both weight for age and height for age – is very low in the first year. After the completion of it both indices increase to very peak level in terms of under-nutrition since this age of child becomes vulnerable to infection. If it combines with hunger, the effect may be much pronounced even leading to death. After the age of three years of child, proportion of underweight has tended to decline but stunting continued to prevail in higher proportion. As such many children are still significantly underweight because of stunting rather than wasting by the age of 3-4 years (retarded in linear growth) but of more or less normal weight for height (Waterlow 1974). Inequality in terms of gender in nutritional status of children has also existed since female under-nutrition is observed always high with regard to underweight and stunting.

The highest proportion of households with low SLI is among the Buddhist while the highest proportion of households with high SLI is among the Hindu. The highest proportion of underweight and stunting among children is in Buddhist religious, Dalits and Tamang caste groups.

Infants can be reared successfully through exclusive breast feeding for six months by the mothers even though they live in the poorest communities in unsanitary surroundings (Gopalan 1972, HMG/N 2001). Besides, Nepal's government has recommended to exclusively breast feed children exactly up to 5 months of age and thereby start supplementary feeding from that age onwards (HMG/N 2002/03) but Gopalan's study has recommended that supplements to breast milk to be introduced after at least four months of exclusive breast feeding (Gopalan 1972). WHO has recommended the introduction of solid food to infants around the age of six months because by that age, breast milk by itself is no longer sufficient to maintain a child's optimal growth (HMG/N 2001). Exclusive breast feeding is very low (48.6%) as compared to national average and continued breast feeding (63.7%) is also lower than national average. There are cent percent normal children below 6 months in weight for age who are exclusively breast fed. Both indices underweight and stunting are very low though children are not exclusively breast fed. Breast feeding for infants by

mothers for very long period has become the most valuable national asset in developing countries. Women in these countries have such remarkable capacity with very long tradition. Instead, the scenario of child nutrition would have become even worse. This salutary practice, which now faces the threat to progressive erosion, must be preserved and protected (Gopalan 1972). When we look at exclusive breast feeding among children less than 5 years, this practice seems to be getting eroded. The relatively very low proportion of exclusively breast fed children in this study as compared to national average may perhaps be because this population is relatively more urbanized. However, it should be noted that supplementation is most often with goat or cow or buffalo milk and not with artificial supplements. Despite the low proportion of exclusive breast feeding, the continuation of mothers to breast feed their children is proportionately high although lower than the national average and median age till 24 months. Thus, the study still reveals that continuity of mother to breast feed their child has still remained intact.

A Brief Summary

This study commenced with the hypothesis that the prevalence of under-nutrition in a population is not uniform, and that it is influenced profoundly by socio-economic factors. In other words, that hunger and under-nutrition are social issues, and are shaped by a range of factors both social and economic. Most studies on under-nutrition present data in relation to such factors as illiteracy, age at marriage, number of children, period of breast-feeding, access to water and sanitation, but each of these are presented in relation to under-nutrition as if they are discrete variables, not interdependent, and themselves dependent on social class. What we attempted to do is to see not only how under-nutrition was distributed within a population – a relatively better endowed population in Nepal – but also to see how these other variables were also distributed unevenly within the same population.

This is a cross sectional study with population having children less than 5 years of age with quantitative analysis. The study assesses the nutritional status of children with anthropometric measurement and tries to relate with its determinants. The statistical measure used in this study is prevalence rate of the nutritional status as proportion and

ratios for the measurement of population. The district was selected purposively due to familiarity of it and civil unrest in other parts of the country. Then VDCs were selected randomly. Three hundred households were also selected with proportionate random sampling from these three VDCs based on administrative division and caste in which the proportions of female literacy, participation on non agriculture economy of population and economically active population were less 35% in overall. It took one month to get approval from Nepal Health Research Council and sampling procedure. Data were collected in one-month duration. Interviews with household heads and mothers were undertaken using interview schedules. Heights and weights were measured of children less than 5 years. Analysis was done for nutritional status using Epi Info and other variables using SPSS statistical software package. There are overall 31 variables in which main independent variable are caste and SLI; and dependent variables are weight for age, height for age and weight for height. The study is carried out in prosperous villages of the prosperous district close to the capital city of Nepal. Therefore, the generalization to the other segments of population in the country might be of limited value.

Conclusion

1. By and large, the upper castes in the three VDCs have high SLI while the lower castes have low SLI. In general, again, more Hindus have a high SLI than Buddhists – who are typically from the lower castes. Caste, however, cannot be used as a proxy for class.
2. Higher the SLI of households remarkably lower the under-nourished children lower the SLI of households remarkably higher the under-nourished children.
3. Main occupation in relation to caste, SLI and gender
 - a. Households predominantly involved in agriculture, and in particular, agricultural labour, have higher prevalence of under-nutrition. Households with secure sources of livelihood – whether in government service or abroad – have negligible levels of under-nutrition. Women in this study are at the top on involvement in agriculture and animal husbandry.
4. Households, typically upper caste, and with secure employment have better houses, along with lower levels of under-nutrition.

5. Largest share of landholding goes mainly to Brahmin, Kshyatria and Newar; and households with high and medium SLI while most of Dalits and Tamang; and households with low SLI either do not have land or have only small share of land with area of 0.5 acre and less.
6. All households of Magar and Tamang, majority of Newar and Khshyatria, and most households with high SLI drink water from public tap, hand pump or well. On the other-hand, very few households with low SLI drink water from these sources stated above comparatively sources of low risk.
7. The proportion of underweight and stunted children is higher in *kachchi* households, land or less area of landholding of the households and households with no latrine. It is lower among the community people using pipe, hand pump and well as the drinking water sources. Similarly the proportion of underweight and stunting of children in relation to source of light indicated remarkably higher among the residence using kerosene, gas and oil than having electricity supply while considerably lower among households using separate kitchen.
8. Female literacy is remarkably lower than male in households with low SLI particularly among Tamang and Dalits, while considerably low in the households with medium and high.
9. Majority of mothers are illiterate among Tamang, Dalits, Magar and Newar; and in households with SLI but the rate of illiteracy is low in households of high SLI.
10. Parents' education level have direct impact in both indices (underweight and stunting) of children showing higher proportion of stunting among children whose parents are illiterate but the result indicated considerably no relation with father's education with regard to underweight of the children.
11. Most of households of Giri, Kshyatria and Newar, and households with high SLI have enough food to consume round the year. On the other-side, most of households of Tamang, Dalits and Magar, and households with low SLI have enough food to consume for 9-10 months or less than 8 months.
12. It is noteworthy that both of the indices (underweight and stunting) vary with the pattern of food sufficiency of the households showing higher in households having food sufficiency less than eight month.

13. Morbidity rate is 48.3% among children less than 5 years of age. ARI and fever are the most common sicknesses occurring among them. Majority of parents seek treatment from private medical practitioners and then government health facilities.
14. Kshatria and Newar; and households with high SLI have higher proportion of latrine while Tamang, Brahmin and Dalits; and households with low SLI have lower proportion of latrine.
15. Majority of families' food consumption pattern is cereals, vegetable and/or pulse. The very low proportion of children consumes meat, fish and fruits. Majority of children's calorie intake is 90% and above. The median frequency of child feeding is three times a day.
16. Relatively high number of children in households with high SLI but relatively low number of children among Giri, Dalits and Newar; and in households with low SLI consume calorie intake 90% and above.
17. Both indices (underweight and stunting) are lower among children whose calorie intake is 90% and above, and 80-89.9% respectively but higher among children whose calorie intake is less than 60%.
18. Exclusive breast feeding among children less than 6 months age and continued breast feeding among children till 24 months is remarkably lower than national average. The median age of a child receiving supplementary feeding is of 5 months.
19. Underweight is linearly related with the age group of children up to 25-34 months which declines after that, while the age group up to 59 months are associated with stunting. Higher proportion of children is under-nourished in nuclear families.
20. Highest proportion of underweight and stunting among children is in Nagarkot VDC, among Dalits and Tamang caste, and Buddhist. The same is higher among female children than male particularly among Magar, Tamang and Dalits caste and in both religions.
21. The proportions of all indices- underweight, stunting and wasting- are below the national average.

To sum up, the study reveals the importance of stratification of a study population. Undernutrition was not only concentrated in the most vulnerable populations on the

basis of caste, but also that the majority of these households also were deprived in terms of SLI. Such households, typically, do not have enough food to eat throughout the year, are dependent on inadequate wage labour. They tend not to own land or very marginal pieces of land, live in *kachi* houses, drink relatively unsafe drinking water, have relatively less electricity facility, and do not own latrines and majority of mothers of children less than 5 years are illiterate. Typically they are either the Tamangs or Dalits. It concludes that large pool of under-nourished children of preschool age is existed in the caste, which is under-privileged and the households having low SLI. Therefore, nutritional status of children is primarily related to the prosperity of family, gender balance and basic requirement of infrastructural facilities. The other associated determinants are observed like child's age, mothers' age on childbirth, food sufficiency and calorie intake and sickness of child.

Thus the problem of undernutrition in Nepal is not one of "culture of poverty" or of ignorance: there are complex inter-related social and economic factors that shape the occurrence of hunger. The frequent policy recommendation of behaviour change through IEC thus has very limited potential in attending to the problem adequately; while they may indeed be important in a relatively small fraction of cases, in the large proportion, there are acute economic issues involved.

REFERENCES

1. Gopalan C. (1972), "Stunting—Significance and Implications for Public Health Policy," *NFI*, New Delhi: 49-63
2. Himalayan News Services (2005), "540 million people live off agriculture globally", *The Himalayan Times*, Thursday, October 20 p.9
3. HMG/N (2001), *Nepal Demographic Health Survey*, Ministry of Health, Nepal, New ERA and ORC Macro.:191
4. HMG/N (2002-03), *Annual Report*, Department of Health Services, Nepal:32-47
5. Patnaik, Utsa (2005), "It is time to Kumbhakarna to wake up", *The Hindu*, Friday, August 5
6. Qadeer, Imrana, Priyadarshi, Anju (2005), "Nutrition Policy; Shifts and Logical Fallacies", *Economic and Political Weekly*, January
7. Special Correspondent (2005), "Historic' Bill for jobs in rural areas", *The Hindu*, Friday, August, 19
8. Swaminathan, M.S. (2005), "Science and India's agricultural future", *The Hindu*, Monday, October 17
9. Waterlow, J.C. (1974), "Some Aspects of Childhood Malnutrition as a Public Health Problem," *British Medical Journal*, October:88-89
10. Zubrigg, Sheila (1994), "The Hungry Rarely Write History and Historian are Rarely Hungry", *Paper first presented at the Center for Health Studies, York University, Toronto, Canada*, March

ANNEXE-1

The nutrition component of the Integrated Management of Childhood Illness algorithm; Earlier versions differed in criteria and times for follow-up from this December 1995 version.

Criteria	Classification	Treatment and follow-up
Visible severe wasting or severe palmer pallor or oedemena of both feet	Severe malnutrition or severe anaemia	<ul style="list-style-type: none"> *Give Vitamin A *Refer urgently to hospital
Some palmer pallor or Very low weight –for- age	Anaemia or very low weight	<ul style="list-style-type: none"> * Assess child's feeding and counsel the mother on feeding according to the Food Box on Counsel the Mother chart if feeding problem, follow-up in 5 days
		<ul style="list-style-type: none"> * Give iron *Give oral anti-malarial if high mlaria risk * Give mebendazole if child is 2 or more than two years and no dose in last 6 months
		<ul style="list-style-type: none"> *Advise mother when to return Immediately * If pallor, follow-up in 14 days *If very low weight, follow-up in 30 days
Not very low weight	No anaemia and not very low weight	<ul style="list-style-type: none"> * If child is less than years old, assess the child's feeding and counsel the mother on feeding according to the Food Box on Counsel the chart *If feeding problem, follow-up in 5 days * Advise mother when to return immetiately

ANNEXE-2
M. Phil. Dissertation, CSMCH, SSS, JNU
Interview Schedule

IDENTIFICATION No.: _____ Phone number _____

Household Number: _____ Interview Date: _____ Interviewer's Name: _____ VDC _____ Ward
 No. _____ Village: _____

SECTION 1 HOUSEHOLD INFORMATION

Household Information A

I D C O D E	1.	2.	3.	4.	5.	6.	7.	8.
	Name	Male/Female	Caste/Ethnicity	Relationship with H/H	Place of birth	Age	Marital Status	As of definition of the "family" of this survey whether s/he is a member or not?
		Male.....1 Female....2	Brahmin.....1 Chhetri.....2 Newar.....3 Magar.....4 Tamang.....5 Schedule.....6 Other.....7	Household head.....1 Spouse.....2 Children.....3 Grandchildren.....4 Parents.....5 Brothers/Sisters.....6 Nephew/Niece.....7 Son-in-law/Daughter-in-law...8 Brother-in-laws/Sister-in-law...9 Father-in-law/Mother-in-law...10 Other relation.....11 Servant/Servant's Relative.....12 Tenant/Tenant Relative.....13	Urban...1 Rural....2	Month /Year	Married.....1 Divorced.....2 Separated....3 Widow.....4 Unmarried...5	Yes...1 No.....2
1								
2								
3								
4								
5								

Household Information B

I D C O D E	1. Level of Education	2. Main occupation	During past 12 months			During past 7 days		8. Place of work	9. Reason for not working in the past 7 days
			3. Worked in the past 12 years (If no go to 6) Months	4. Worked in last months Months	5. Worked in a day Hours	6. Worked in last 7 days (If no go to 9) Days	7. Worked in a day Hours		
	Illiterate.....1 Literate.....2 High School.....3 Intermediate.....4 Bachelor.....5 Master and above....6 Insert ID CODE(HIA)	Agriculture/ Animal husbandry.....1 Government Service.....2 NGO/Private service w.....3 Unskilled Trade Business.....4 Labour work.....5 Job abroad.....6 Others.....7 (Specify)						Urban...1 Rural....2	Enough work at present1 Student.....2 Housewife.....3 Old age.....4 Sickness.....5 Disabled.....6 Stayed on Leave.....7 Waiting employer's call.....8 Searching for new job.....9 Job not available.....10 Other.....12
1									
2									
3									
4									
5									

Note: HIA= Household Information A

SECTION 2 LAND HOLDING AND HOUSING

S#	Questions	Answers
1	Type of house	Cement plastered (Pucca).....4 Brick Wall (Semi Pucca).....2 Mud and stone or Hut (Kachcha).....0
2	What type of latrine do you use	Own flush toilet with public drainage...4 Public or shared flush toilet or own pit latrine.....2 Shared or public pit latrine1 None.....0
3	Source of lighting	Electricity.....2 Kerosene, gas or oil.....1 Other source of lighting.....0
4	Main fuel for cooking	Electricity, liquid petroleum gas or biogas.....2 Coal, charcoal or kerosene.....1 Other fuel.....0
5	Source of drinking water	Pipe, hand pump, . or well in residence/yard/plot.....2 Public tap, hand pump or well.....1 Other sources of water.....0
6	Separate room for cooking	Yes.....1 No.....0
7	Ownership of house	Yes.....2 No.....0
8	Ownership of agricultural land	5 acres or more.....4 2.0-4.9 acres.....3 2 < 2 acres or acreage not known.....2 No agricultural land.....0
9	Ownership of irrigated land	If household owns at least Some irrigated.....2 No irrigated land.....0
10	Ownership of livestock	If owns livestock.....2 If does not own livestock.....2
11	Ownership of durable goods(Each number for each item e.g. a car =4, two cars =8	Car.....4 Tractor.....4

S#	Questions	Answers
	Household assets	Moped.....3 Scooter.....3 Motorcycle.....3 Telephone.....3 Refrigerator.....3 Color television.....3
		Bicycle.....2 Electric fan.....2 Radio/transistor.....2 Sewing machine.....2 Black and white television.....2 Water pump.....2 Bullock cart.....2 Thresher.....2
		Mattress.....1

		Pressure cooker.....1
		Chair.....1
		Cot/bed.....1
		Table.....1
		Clock/watch.....1

SECTION 3 ACCESS TO FACILITIES

1. How far the following facilities are from your house?

- Primary School.....1
- Health Center.....2
- Bus stop.....3
- Black-topped road.....4
- Dirt road.....5
- Trial/horse road.....6
- Local shop/store.....7
- Weekly haat.....8
- Markets.....9
- Agriculture center.....10
- Cooperative institutions.....11
- Bank.....12

2. 2. Type of transportation:

- On foot (without load).....1
- Bicycle/Rikshwa.....2
- Motorbike/Tempo.....3
- Car/Bus.....4
- Mixed (on foot/vehicle).....5
- Close from home.....6
- Does not require.....7

3. Total time to be taken Day___ Hour___ Minute___

SECTION: 4 INFORMATION FROM MOTHER

Name: _____ Age: (In Years) _____

Caste/Ethnicity: _____

1. Can you read?
 1. Yes
 0. No Go to question no.3

2. If yes, level of literacy
 1. Illiterate
 2. Literate
 3. High School
 4. Intermediate
 5. Bachelor
 6. Master and above

3. Can your husband read?
 1. Yes
 0. No (go to question no.5)

4. If yes, level of literacy
 1. Illiterate
 2. Literate
 3. High School
 4. Intermediate
 5. Bachelor
 6. Master and above

5. How many under five children do you have?
Number _____

6. Do you work outside home to earn money?
 1. No outside work/household workers
 2. Handicraft
 3. Selling agriculture product/harvesting
 4. Shop keeper/Street vendors
 5. Service (GO/NGO/INGO)
 6. Sell dairy products (milk, cord, ghee)
 7. Wage earner
 8. Selling livestock (sheep, goat, pig, chicken)

7. How many children living in this house household are under age five?
Number _____

8. Who takes care of (Name) when you are away from home?
 - A Leave alone at home
 - B Husband
 - C Brother/Sister
 - D Relatives
 - E Neighbors/friends
 - F Maid
 - G Nursery School
 - H Mother-in-law
 - I Father-in law
 - J Other family member

9. Did you ever breastfeed (Name)?
 1. Yes
 0. No

10. Are you currently breastfeeding (Name)?
 1. Yes
 0. No
11. Does (Name) eat or drink anything besides breast milk?
 (Ask this question of child is below 6 months)
- A. Breast milk
 1. Yes 0. No
- B. Plain water
 1. Yes 0. No
- C. Commercially produced infant formula
 1. Yes 0. No
- D. Other milk (goat/ buffalo/cow, fresh, tinned, powdered etc)
 1. Yes 0. No
- E. Fruit/ juice.
 1. Yes 0. No
- F. Coffee and tea
 1. Yes 0. No
- G. Other liquid/food (sugar water, grape water, carbonated drink, soup)
 1. Yes 0. No
12. Up to what age of (name) will you continue to breastfeed?
 Age of child in months _____
13. At what age of (name) did you stop breast-feeding?
 Age of child in months _____
14. At what age of (name) did you feed solid/semisolid food?
 Age of child in months _____
15. Now I would like to ask you about the types of foods (NAME) ate yesterday during the day and at night (during the last 24 hours).

Did (Name) eat any of the following foods yesterday during the day or at night?

(Read the list of foods. Place check mark in the alphabetical number if child ate the food in question and write alphabet in the box given below)

- A Any foods made from grain (for example, made with millet, sorghum, maize, rice, wheat, or other local grains, porridge, bread)?
- B Pumpkin or yellow/orange-fleshed squash, carrots, or yellow/orange-fleshed sweet potatoes?
- C Any other food made from roots or tubers (for example, white potatoes, white yams, manioc, cassava, or other local roots/tubers)?
- D Any dark green leafy vegetables (for example, cassava leaves, bean leaves, kale, spinach, pepper leaves, taro leaves, amaranth leaves, or other dark green leaves)?
- E **Ripe** mango, **ripe** papaya (or other local vitamin A-rich fruits)?
- F Any other fruits and vegetables (for example, bananas, avocados, tomatoes, onions, apples, oranges, others)?
- Do you eat non vegetarian foods (?) 1. Yes 2. No.....go to J

- G Any beef, pork, lamb, goat, rabbit (or wild game meat such as antelope/deer)?
- H Any chicken, duck, or other birds (for example, pigeon, guinea hen, others)?
- I Any fresh or dried fish, or shellfish?
- J Any eggs?
- K Any foods made from beans or lentils (for example, made with cowpeas, pinto beans, pink beans, red beans, black beans, lentils, chickpeas, dal, soybeans or others)?
- L Any groundnuts/peanuts, or any other nuts?
- M Any cheese or yogurt?
- N Any food made with oil, fat, or butter?

S#	Name	Alphabetical numbers	Times
1			
2			
3			

16. Place the amount of food items (Name) ate yesterday day and night.

S#	Name	Rice, Bread, porridge	Pulses or beans	Milk	Egg	Fruits	Meat	Fish
1								
2								
3								

17. Did children less than 5 years of age become sick within last 30 days?
 1. Yes 0 No
18. If yes,

Name	Type of sickness	Place first treatment sought	Place last treatment sought	Treatment expenditure

19. May I weigh (name) measure his/her height? 1. Yes 0 No
20. If mother agrees, weigh and measure the height

Weight of (name) _____ gm
 Height of (name) _____ cm
 MUAC of (name) _____ cm

The End

ANNEXE-3

Distribution of households by VDC, age, sex, household type and size of the study sample

S#	Characteristic of household	Number	Percentage
1	Households in VDC	(n=300)	
	Nagarkot	85	28.3
	Chitapol	107	35.7
	Tathali	108	36.0
2	Family Type	(n=300)	
	Nuclear	92	30.7
	Joint	208	69.3
3	Population in VDC	(n=1988)	
	Nagarkot	561	28.2
	Chitapol	744	37.4
	Tathali	683	34.4
4	Age group (in years)	(n=1988)	
	0-4	395	19.9
	5-14	304	15.3
	15-59	1149	57.8
	60 and over	140	7.0
5	Sex	(n=1988)	
	Male	1013	51
	Female	975	49
6	Households with religion	(n=300)	
	Hindu	246	82.0
	Buddhist	54	18.0
7	Population with Religion	(n=1988)	
	Hindu	1648	82.9
	Buddhist	340	17.1
8	Households with Caste	(n=300)	
	Brahmin	25	8.3
	Kshyatriya	118	39.3
	Newar	76	25.3
	Magar	6	2.0
	Tamang	54	18.0
	Dalit	16	5.3
	Others	5	1.7
9	Caste/Ethnicity	(n=1988)	
	Brahmin	188	9.5
	Kshyatriya	758	38.1
	Newar	540	27.2
	Magar	42	2.1
	Tamang	342	17.2
	Dalit	88	4.4
	Others	30	1.5

ANNEXE-4

Distribution of households with land holding, housing and domestic animal

S#	Land holding, housing and domestic animal	Number (n=300)	Percent
1	Type of house		
	Kachchi	132	44.0
	Semi-pakki	129	43.0
	Pakki	39	13.0
2	Type of latrine		
	No latrine	63	21.0
	Public toilet	26	8.7
	Own pit latrine	112	37.3
	Flush toilet	99	33.0
3	Type of light		
	Other source of light	5	1.7
	Kerosene, gas or oil	14	4.7
	Electricity	281	93.7
4	Cooking fuel		
	Wood, dung	259	86.3
	Coal, Kerosene, bhush fire	5	1.7
	Electricity or biogas	36	12.0
5	Source of drinking water		
	Other source of water	9	3.0
	Public tap, hand pump or well	235	78.3
	Pipe, hand pump or well in residence/yard/plot	56	18.7
6	Households with separate cooking room		
	Without separate cooking room	73	24.3
	With separate cooking room	227	75.7
5	Family with own house		
	Without own house	5	1.7
	With own house	295	98.3
6	Household with pattern of land holding		
	Without own land	7	2.3
	Having 0.5 acre and less	148	49.3
	Having 0.5 to 0.9 acre	105	35.0
	Having 1 to 1.9 acres	29	9.7
	Having 2 acres and above	11	9.7
7	Households with irrigation pattern of land		
	without irrigated land	156	52.0
	with at least some irrigated land	137	45.8
8	Household with domestic animal		
	without domestic animal	50	16.7
	With domestic animal	250	83.3

ANNEXE-5

Education level of the household population

Level of education	Number	Percent
Illiterate	361	23.1
Literate, primary school	517	33.1
Lower and secondary school	480	30.7
Matriculation and higher education	205	13.1
Total	1563	100

Distribution of education level of household population according to VDCs

VDC	Education level				Total
	Illiterate	Literate & primary school	Lower & higher secondary school	Matriculation completion and higher education	
Nagarkot	112(25.6%)	169(38.7%)	117(26.8%)	39(8.9%)	437 (100.0%)
Chitapol	126(21.3%)	167(28.4%)	191(32.5%)	104(17.9%)	588(100.0)
Tathali	123(22.9%)	181(33.6%)	172(32.0%)	62(11.5%)	538(100.0%)
Total	361(23.1%)	517(33.1%)	480(30.7%)	205(13.1%)	1563(100.0%)

ANNEXE-6

Percentage distribution of the household population by 6 and above by literacy and level of education according to age and sex

Age group (years)	Sex	Level of education (n=1563)			
		Illiterate (n=361)	Literate & primary school (n=517)	Lower secondary and secondary school (n=480)	Matriculation and higher education (n=205)
6-9	Male	3.0	97.0	0.0	0.0
	Female	2.2	97.8	0.0	0.0
10-14	Male	0.0	44.6	55.4	0.0
	Female	0.0	46.6	53.4	0.0
15-19	Male	5.9	5.9	60.8	27.5
	Female	11.1	20.6	65.1	3.2
20-29	Male	2.9	10.5	54.7	31.9
	Female	14.3	33.3	38.8	13.6
30-39	Male	7.9	20.2	39.5	32.5
	Female	47.9	21.1	23.9	7.0
40-49	Male	24.3	41.4	17.1	17.1
	Female	68.7	27.7	2.9	1.2
50+	Male	46.4	46.4	2.9	4.3
	Female	89.9	9.3	0.8	0.0
Total	Male	13.3	30.8	35.5	20.3
	Female	32.6	35.3	26.0	6.1

ANNEXE-7

Pattern of main occupation among household study population

Main occupation	Number	Percent
Agriculture/animal husbandry	645	59.0
Government service	135	12.3
NGO/Private Service	75	6.9
Trade/Business	70	6.4
Labour work	89	8.1
Job abroad	22	2.0
Other(pension, waiting/searching/not getting job)	58	5.3
Total	1094	100.0

ANNEXE-8

Distribution of households according to household assets

S#	Household having household assets	Number (n=300)	Percent
1	Cars	6	2.0
2	Tractors	3	1.0
3	Motorbike	31	10.3
4	Telephone	85	28.3
5	Refrigerator	13	4.3
6	Colour TV	111	37.0
7	Bicycle	23	7.7
8	Radio/Transistor	163	54.3
9	Sewing machine	30	10.0
10	Black and white TV	133	44.3
11	Water pump	15	5.0
12	Thresher	27	9.0
13	Mattress	273	91.0
14	Pressure cooker	208	69.3
15	Chair	123	41.0
16	Bed	300	100.0
17	Table	121	40.3
18	Watch	266	88.7
	Standard of living index(SLI) of household		
	Low	49	16.3
	Medium	124	41.3
	High	127	42.3

ANNEXE-9

Distribution of parent's education; income of mother, household's main occupation and caretaker of child

Mother's education level	Number(n=313)	Percent
Illiterate	64	20.4
Literate & primary school	110	35.1
Lower & higher secondary school	103	32.9
Matriculation completion and above	36	11.5
Father's education level	Number(n=311)	Percent
Illiterate	17	5.5
Literate & primary school	52	16.7
Lower & higher secondary school	159	51.1
Matriculation completion and above	83	26.7
Household's main occupation	Number=300	Percent
Agriculture/animal husbandry	77	25.7
Government Service	87	29.0
NGO/Private Service	39	13.0
Trade/Business	40	13.3
Labour work	38	12.7
Job abroad	19	6.3
Income activities of mother	Number(n=313)	Percent
Housewives	73	23.3
Selling agriculture, livestock and dairy products	65	20.8
Government /NGO Service, handicraft, shop keeping	19	6.1
Wage earning	29	9.3
No income	127	40.6
Caretakers	Number(n=387)	Percent
Father/Mother-in-law	265	68.5
Husband and other family members	33	8.5
Elder brother/Sister, relatives, neighbors/friends or leave alone at home	18	4.7
Nursery school	17	4.4
Self care/bring self	54	14.0

ANNEXE-10

Table26: Food sufficiency at household level and percentage of calorie intake by the child

Food sufficiency at household level	Frequency(n=300)	Percent
Round the year	172	57.3
9-11 months	76	25.3
Eight months and less	52	17.3
Percentage of calorie intake by the child	(n=334)	Percent
Less than 60%	35	10.5
60-69%	40	12.0
70-79%	51	15.3
80-89%	35	10.5
90 % and above	173	51.8
Total	334	100.0

ANNEXE-11

Recommended dietary allowances for Indians (macronutrients and minerals)

Groups	Particulars	Body Wt.(Kg)	Net Energy Kcal/day	Protein g/day	Fat g/day	Calcium Mg/day	Iron Mg/day
Infants	0-6 months	5.4	108/Kg	2.05/Kg	500		
	6-12 months	8.6	98/Kg	1.65/Kg			
Children	1-3 years	12.2	1240	22	25	400	12
	4-6 years	19.0	1690	30			18
	7-9 years	26.9	1950	41			26

Source: NIN 2003: 65

Some nutrient-rich foods

Nutrients	Food Groups	Foods	Nutrient content unit/100 g edible portion
Energy	Cereals and Tubers	Rice, wheat and tapioca	340 Kcal
	Nuts and Oilseeds	Almond, cashew-nut, dry coconut and groundnut	600 Kcal
	Vegetable oil, ghee and <i>Vanaspatti</i>		900 Kcal
Protein	Pulses and Legumes	Bengalgram, blackgram, greengram, lentil and redgram	22 g
	Nuts and Oilseeds	Groundnuts, cashew-nuts and almond	23 g
	Fish		20 g
	Meat and Poultry	Meat, Egg white	11 g
	Milk products	Cheese, khoa, skimmed milk, powder(cow) and whole milk powder(cow)	30 g
Beta-carotene	Leafy vegetables	<i>Ambat chukka</i> , coriander leaves, <i>ponnaganti</i> , spinach, leaves, mint, radishes leaves Some other leafy vegetables like agathi, amaranth, curry leaves, fenugreek leaves and <i>gogu</i>	2-6 mg 7-15 mg
	Other vegetables	Pumpkin and green chilies Carrot	1 mg 6.5 mg

Source: NIN 2003: 67

ANNEXE-12

PORTION SIZES FOR MENU PLAN

Portion Size of Foods (raw) and Nutrients

Food Groups	g/Portion	Energy (Kcal)	Protein (g)	Carbohydrate (g)	Fat (g)
Cereals & millets	30	100	3.0	20	0.8
Pulses	30	100	6.0	15	0.7
Egg	50	85	7.0	-	7.0
Meat/chicken/fish	50	100	9.0	-	7.0
Milk(ml)@	100	70	3.0	5	3.0
Roots & Tubers	100	80	1.3	18	-
Green leafy vegetables	100	45	3.6	-	0.4
Other vegetables	100	30	1.7	-	0.2
Fruits	100	40	-	10	-
Sugar	5	20	-	5	-
Fats & Oils	5	45	-	-	5.0

Source: NIN 2003: 72

Note:

The balanced diets are given as multiples of these portion sizes

@ Toned milk

ANNEXE-13

Balanced Diet for Infants, Children and Adolescents (Number of portions)

Food Groups	g/portion	Infant 6-12 months	Years						
			1-3	4-6	7-9	10-12		13-18	
						Girls	Boys	Girls	Boys
Cereals & millets	30	1.5	4	7	9	9	11	10	14
Pulses	30	0.5	1	1.5	2	2	2	2	2
Milk(ml)	100	5a	5	5	5	5	5	5	5
Roots and Tubers	100	0.5	0.5	1	1	1	1	1	2
Green leafy vegetable	100	0.25	0.5	0.5	1	1	1	1	1
Other vegetables	100	0.25	0.5	0.5	1	1	1	1	1
Fruits	100	1	1	1	1	1	1	1	1
Sugar	5	5	5	6	6	6	7	6	7
Fats/oils(visible)	5	2	4	5	5	5	5	5	5

Source: NIN 2003: 73

a Quantity indicates top milk breastfed infants, 200 ml top milk required.

One portion of pulse may be exchanged with one portion (50 g) of egg/meat/chicken /fish.

For infants introduce egg/meat/chicken/fish around 9 months

Specific recommendations as compared to a sedentary woman:

Children:

- 1-6 years - $\frac{1}{2}$ to $\frac{3}{4}$ the amount of cereals, pulse and vegetables and extra Milk
- 7-12 years - Extra cup of milk
- Adolescent girls- Extra cup of milk
- Adolescent boys- Diet of sedentary man with extra cup of milk

ANNEXE-14

Approximate Calorific Value of Some Cooked Preparations

Preparation	Quantity for one serving	Calories
Cereals		
Rice	1 cup	170
Phulka	1 No.	80
Paratha	1 No.	150
Puri	1 No.	170
Bread	2 slices	170
Poha	1 cup	270
Upma	1 cup	270
Idli	2 Nos.	150
Dosa	1 No.	125
Kichidi	1 cup	200
Wheat porridge	1 cup	220
Semolina porridge	1 cup	220
Cereal flakes with milk (corn/wheat/rice)	1 cup	220
Pulse		
Plain Dal	½ cup	100
Sambar	1 cup	110
Vegetable		
With gravy	1 cup	170
Dry	1 cup	110
Non-vegetarian		
Boiled egg	1 No.	90
Omelette	1 No.	160
Fried egg	1 No.	160
Mutton curry	¾ cup	260
Chicken curry	¾ cup	240
Fish fried	2 big pieces	220
Fish cutlet	2 Nos.	190
Prawn curry	¾ cup	220
Keema kofta curry	¾ cup(6 small koftas)	240

Source: NIN 2003: 77

ANNEXE-15

Table 25: Distribution of children in feeding practices

S#	Feeding practices	Number(n=339)	Percent
1	Age of child initiated supplementary feeding		
	At 1 months	31	9.1
	At 2 months	24	7.1
	At 3 months	30	8.8
	At 5 months	216	63.7
	Median age of child supplementary feeding initiated	5 months	
2	Type of food child received for supplementary food		
	Cereals	334	98.5
	Pulses	337	69.7
	Pumpkin, carrots, sweet potatoes	42	12.4
	Boiled potatoes, white yams etc	69	20.4
	Green leafy vegetables	194	57.2
	Fruits like mango, papaya rich in Vit A	16	4.7
	Other fruits like banana, orange	102	30.1
	Animal meat	41	12.1
	Chicken meat	13	3.8
	Fish	3	0.9
	Egg	29	8.6
	Ground nuts, peanuts	10	2.9
	Milk/yogurt/cheese	195	57.5
	Any food made with oil, fat or butter	11	3.2
3	Frequency of child feeding		
	2 times a day	29	8.6
	3 times a day	205	60.5
	4 times a day	85	25.1
	5 times a day	12	3.5
	Median frequency of child feeding	3 times	

ANNEXE-16

Distribution of sickness, seeking pattern among children below 5 years of age

Type of sickness	Frequency(n=187)	Percent
Cough and fever	97	51.9
Fever	43	23.0
Diarrhoea, vomiting, worm infestation	15	8.0
Pneumonia	16	8.6
Other sicknesses like skin infection/scabies; under-nutrition; chest, dental and oral infection	16	8.8
Duration of sickness		
1 -7 days	141	75.4
8-14 days	26	13.9
15-30 days	20	10.7
Treatment seeking in the initial phase		
Hospital	37	19.8
PHC/HP/SHP	18	9.6
Private medical	76	40.6
Traditional healer and home remedy	39	20.9
Nothing done	17	9.1
Treatment seeking in the later phase		
Hospital	36	19.3
PHC/HP/SHP	18	9.6
Private medical	54	28.9
Traditional healer and home remedy	30	16.0
Nothing done	49	26.2
Treatment Expenditure (NRs.)		
No cost	40	21.4
300 and less	91	48.7
301-600	38	20.3
601-1000	8	4.3
1001-10,000	10	5.3

ANNEXE-17

Distribution of weight for age, height for age and weight for height of preschool children by demographic characteristics

Demographic characteristics	Weight for age (n=363)			Height for age (n=370)			Weight for height (n=357)		
	% <-3SD	% <-2SD	% Normal	% <-3SD	% <-2SD	% Normal	% <-3SD	% <-2SD	% Normal
Mother's age(years)									
19 and below	0.0	20.0	80.0	0.0	30.0	70.0	0.0	30.0	70.0
20-24	0.0	21.3	78.7	12.8	22.2	65.0	1.1	2.8	96.0
25-29	4.5	12.6	82.9	13.3	27.4	59.3	1.8	3.7	94.5
30-34	0.0	17.6	82.4	17.1	17.1	65.7	0.0	0.0	100.0
35 and over	6.7	16.7	76.7	15.6	18.8	65.6	0.0	3.4	96.6
Children's age (in months)									
Less than 6	2.9	5.9	91.2	8.8	14.7	76.5	0.0	7.1	92.9
6-11	0.0	12.2	87.8	7.1	19.0	73.8	4.9	2.4	92.7
12-23	1.2	22.0	76.8	9.5	21.4	69.0	1.2	6.1	92.7
24-35	2.2	21.1	76.7	12.1	22.0	65.9	1.1	1.1	97.8
36 and over	2.6	18.1	79.3	20.2	29.4	50.4	0.0	3.4	96.6
Sex of child									
Male	2.4	14.6	83.0	10.4	22.7	66.8	1.0	4.4	94.6
Female	1.3	22.3	76.4	17.0	23.9	59.1	1.3	2.6	96.1
Type of family									
Nuclear	2.0	21.8	76.2	14.3	28.6	57.1	2.0	1.0	97.0
Joint	1.9	16.4	81.7	12.8	21.1	66.0	0.8	4.7	94.6

ANNEXE-18

Weight for age, both sexes, birth to 60 months

Age(months)	Weight(Kg)			Age(months)	Weight(Kg)		
	Median	80% of median	70% of median		Median	80% of median	70% of median
0	3.2	2.6	2.3				
1	4.1	3.3	2.9	31	13.5	10.8	9.5
2	4.9	4.0	3.5	32	13.6	10.9	9.6
3	5.7	4.6	4.0	33	13.8	11.0	9.7
4	6.4	5.1	4.5	34	14.0	11.2	9.8
5	7.0	5.6	4.9	35	14.1	11.3	9.9
6	7.5	6.0	5.3	36	14.4	11.5	10.0
7	8.0	6.4	5.6	37	14.5	11.6	10.2
8	8.5	6.8	6.0	38	14.7	11.8	10.3
9	8.9	7.1	6.2	39	14.9	11.9	10.4
10	9.2	7.4	6.4	40	15.0	12.0	10.6
11	9.6	7.6	6.7	41	15.2	12.2	10.6
12	9.8	7.9	6.9	42	15.4	12.3	10.8
13	10.1	8.1	7.1	43	15.5	12.4	10.9
14	10.3	8.3	7.3	44	15.7	12.6	11.0
15	10.6	8.4	7.4	45	15.9	12.7	11.1
16	10.8	8.6	7.6	46	16.0	12.8	11.3
17	11.0	8.8	7.7	47	16.2	12.9	11.3
18	11.1	8.9	7.8	48	16.3	13.1	11.5
19	11.3	9.1	8.0	49	16.5	13.2	11.6
20	11.5	9.2	8.1	50	16.6	13.3	11.6
21	11.7	9.4	8.2	51	16.8	13.4	11.8
22	11.9	9.5	8.3	52	16.9	13.6	11.9
23	12.1	9.7	8.5	53	17.1	13.7	12.0
24	12.2	9.8	8.5	54	17.2	13.8	12.1
25	12.4	9.9	8.7	55	17.4	13.9	12.3
26	12.6	10.1	8.8	56	17.6	14.0	12.3
27	12.8	10.2	9.9	57	17.7	14.2	12.4
28	13.0	10.4	9.0	58	17.9	14.3	12.5
29	13.1	10.5	9.2	59	18.0	14.4	12.6
30	13.3	10.6	9.3	60	18.2	14.5	12.7

Source: FAO 1982(Latham 1997)

ANNEXE-19

Weight for age, girls 12 to 60 months

Age(months)	Weight(kg)			
	-2SD	Median	80% of median	70% of median
12	7.4	9.5	7.5	6.7
13	7.6	9.8	7.8	6.9
14	7.8	10.0	8.0	7.0
15	8.0	10.2	8.2	7.1
16	8.2	10.4	8.3	7.3
17	8.3	10.6	8.5	7.4
18	8.5	10.8	8.6	7.6
19	8.6	11.0	8.8	7.7
20	8.8	11.2	9.0	7.8
21	9.0	11.4	9.1	8.0
22	9.1	11.5	9.2	8.1
23	9.3	11.7	9.4	8.2
24	9.4	11.8	9.4	8.3
25	9.6	12.0	9.6	8.4
26	9.8	12.2	9.8	8.5
27	9.9	12.4	9.9	8.7
28	10.1	12.6	10.1	8.8
29	10.2	12.8	10.2	9.0
30	10.3	13.0	10.4	9.1
31	10.5	13.2	10.6	9.2
32	10.8	13.4	10.7	9.4
33	10.8	13.6	10.9	9.5
34	10.9	13.8	11.0	9.7
35	11.0	13.9	11.1	9.7
36	11.2	14.1	11.3	9.9
37	11.3	14.3	11.4	10.0
38	11.4	14.4	11.5	10.1
39	11.5	14.6	11.7	10.2
40	11.6	14.8	11.8	10.4
41	11.8	14.9	11.9	10.4
42	11.9	15.1	12.1	10.6
43	12.0	15.2	12.2	10.8
44	12.1	15.4	12.3	10.8
45	12.2	15.5	12.4	10.9
46	12.3	15.7	12.6	11.0
47	12.4	15.8	12.6	11.1
48	12.6	16.0	12.8	11.2
49	12.7	16.1	12.9	11.3
50	12.8	16.2	13.0	11.3
51	12.9	16.4	13.1	11.5
52	13.0	16.5	13.2	11.6
53	13.1	16.7	13.4	11.7
54	13.2	16.8	13.4	11.8
55	13.3	17.0	13.6	12.9
56	13.4	17.1	13.7	12.0
57	13.5	17.2	13.8	12.0
58	13.6	17.4	13.9	12.2
59	13.7	17.5	14.0	12.3
60	13.8	17.7	14.2	12.4

Source: FAO 1990c (Latham 1997)

ANNEXE-20

Weight for age, boys 12 to 60 months

Age(months)	Weight(kg)			
	-2SD	Median	80% of median	70% of median
12	8.1	10.2	8.2	7.1
13	8.3	10.4	8.3	7.3
14	8.5	10.7	8.6	7.5
15	8.7	10.9	8.7	7.6
16	8.8	11.1	8.9	7.8
17	9.0	11.3	9.0	7.9
18	9.1	11.5	9.2	8.1
19	9.2	11.7	9.4	8.2
20	9.4	11.8	9.4	8.3
21	9.5	12.0	9.6	8.4
22	9.7	12.2	9.8	8.5
23	9.8	12.3	9.8	8.6
24	10.1	12.4	9.9	8.7
25	10.2	12.5	10.0	8.8
26	10.3	12.7	10.2	8.9
27	10.4	12.9	10.3	9.0
28	10.5	13.1	10.5	9.2
29	10.6	13.3	10.6	9.3
30	10.7	13.5	10.8	9.5
31	10.9	13.7	11.0	9.6
32	11.0	13.9	11.1	9.7
33	11.1	14.1	11.3	9.9
34	11.2	14.3	11.4	10.0
35	11.3	14.4	11.5	10.1
36	11.4	14.6	11.7	10.2
37	11.5	14.8	11.8	10.4
38	11.7	15.0	12.0	10.5
39	11.8	15.2	12.2	10.6
40	11.9	15.3	12.2	10.7
41	12.0	15.5	12.4	10.9
42	12.1	15.7	12.5	11.0
43	12.3	15.8	12.6	11.1
44	12.4	16.0	12.8	11.2
45	12.5	16.2	13.0	11.3
46	12.6	16.4	13.1	11.5
47	12.8	16.5	13.2	11.6
48	12.9	16.7	13.4	11.7
49	13.0	16.9	13.5	11.8
50	13.1	17.0	13.6	11.9
51	13.3	17.2	13.6	12.0
52	13.4	17.4	13.9	12.2
53	13.5	17.5	14.0	12.3
54	13.7	17.7	14.2	12.4
55	13.8	17.9	14.3	12.5
56	13.9	18.0	14.4	12.6
57	14.0	18.2	14.6	12.7
58	14.2	18.3	14.6	12.8
59	14.3	18.5	14.8	13.0
60	14.4	18.7	15.0	13.1

Source: FAO 1990c (Latham1997)

ANNEXE-21

Length for age, both sexes, birth to 24 months

Age (months)	Length		
	Median	90% of median	80% of median
0	50.2	45.2	40.1
1	54.1	48.7	43.3
2	57.4	51.7	45.9
3	60.3	54.3	48.2
4	62.8	56.5	50.2
5	65.0	58.5	52.0
6	65.9	60.2	53.5
7	68.5	61.7	54.8
8	70.0	63.0	56.0
9	71.4	64.3	57.1
10	72.7	65.4	58.2
11	74.0	66.6	59.2
12	75.2	67.7	60.2
13	76.4	68.7	61.1
14	77.5	69.8	62.0
15	78.5	70.7	62.9
16	79.7	71.7	63.8
17	80.7	72.8	64.6
18	81.7	73.5	65.4
19	82.6	74.4	66.1
20	83.6	75.2	66.9
21	84.4	76.0	67.6
22	85.4	76.8	68.3
23	86.2	78.6	69.0
24	87.1	78.4	69.7

Source: Cameron and Hofvander, 1983 (Latham 1997)

ANNEXE-22

Length for age, girls 12 to 23 months

Age(months)	Length(cm)			
	-2SD	Median	90% of median	80% of median
12	68.6	74.3	66.9	59.4
13	69.8	75.5	68.0	60.4
14	70.8	76.7	69.0	61.4
15	71.9	77.6	70.0	62.2
16	72.9	78.9	71.0	63.1
17	73.8	79.9	71.9	63.9
18	74.8	80.9	72.8	64.7
19	75.7	81.9	73.7	65.5
20	76.6	82.9	74.6	66.3
21	77.4	83.8	75.4	67.0
22	78.3	84.7	76.2	67.3
23	79.1	85.6	77.0	68.5

Source: FAO 1990c (Latham 1997)

Length for age, boys 12 to 23 months

Age(months)	Length(cm)			
	-2SD	Median	90% of median	80% of median
12	70.7	76.1	68.5	60.9
13	71.8	77.2	69.5	61.8
14	72.8	78.3	70.5	62.8
15	73.7	79.4	71.5	63.5
16	74.6	80.4	72.4	64.3
17	75.5	81.4	73.3	65.1
18	76.3	82.4	74.2	65.9
19	77.1	83.3	75.0	66.6
20	77.9	84.2	75.8	67.4
21	78.7	85.1	76.6	68.1
22	79.4	86.0	77.4	68.8
23	80.2	86.8	78.1	69.4

Source: FAO 1990c (Latham 1997)

ANNEXE-23

Height for age, girls 24 to 60 months

Age(months)	Height(cm)			
	-2SD	Median	90% of median	80% of median
24	78.1	84.5	76.1	87.6
25	78.8	85.4	76.9	68.3
26	79.6	86.2	77.6	69.0
27	79.9	87.0	78.3	69.6
28	80.3	87.9	79.1	70.3
29	81.0	88.7	79.8	71.0
30	81.8	89.5	80.6	71.6
31	82.5	90.2	81.2	72.2
32	83.2	91.0	81.9	72.6
33	83.8	91.7	82.5	73.4
34	84.5	92.5	83.3	74.0
35	85.2	93.2	83.9	74.6
36	86.5	93.9	84.5	75.1
37	87.1	94.6	85.1	75.7
38	87.7	95.3	85.8	76.2
39	88.4	96.0	86.4	76.8
40	89.0	96.6	86.9	77.3
41	89.6	97.3	87.6	77.8
42	90.2	97.9	86.1	78.3
43	90.7	98.6	88.7	78.9
44	91.3	99.2	89.3	79.4
45	91.9	99.8	89.8	79.8
46	92.4	100.4	90.4	80.3
47	93.0	101.0	90.9	80.8
48	93.5	101.6	91.4	81.3
49	94.1	102.2	92.0	81.8
50	94.6	102.8	92.5	82.2
51	95.1	103.4	93.1	82.7
52	95.8	104.0	93.6	83.2
53	96.1	104.5	94.1	83.6
54	96.7	105.1	94.6	84.1
55	97.1	105.6	95.0	84.5
56	97.6	106.2	95.6	85.0
57	98.1	106.7	96.0	85.4
58	98.6	107.3	96.6	85.8
59	99.1	107.8	97.0	86.2
60	99.5	108.4	97.6	86.7

Source: FAO 1990c (Latham1997)

ANNEXE-24

Height for age, boys 24 to 60 months

Age(months)	Height(cm)			
	-2SD	Median	90% of median	80% of median
24	79.2	85.6	77.0	68.5
25	79.9	86.4	77.8	69.1
26	80.6	87.2	78.5	69.8
27	81.3	88.1	79.3	70.5
28	82.0	88.9	80.0	71.1
29	82.7	89.7	80.7	71.8
30	83.4	90.4	81.4	72.3
31	84.1	91.2	82.1	73.0
32	84.7	92.0	82.1	73.6
33	85.4	92.7	83.4	74.2
34	86.0	93.5	84.2	74.8
35	86.7	94.2	84.8	75.4
36	87.3	94.9	85.4	75.9
37	87.9	95.6	86.0	76.5
38	88.6	96.3	86.7	77.0
39	89.2	97.0	87.3	77.8
40	89.8	97.7	87.9	78.2
41	90.4	98.4	88.6	78.7
42	91.0	99.1	89.2	79.3
43	91.6	99.7	89.7	79.8
44	92.1	100.4	90.4	80.3
45	92.7	101.0	90.9	80.8
46	93.3	101.7	91.5	81.4
47	93.9	102.3	92.1	81.8
48	94.4	102.9	92.8	82.3
49	95.0	103.6	93.2	82.9
50	95.5	104.2	93.8	83.4
51	96.1	104.8	94.3	83.8
52	96.6	105.4	94.9	84.3
53	97.1	106.0	95.4	84.8
54	97.7	106.6	95.9	85.3
55	98.2	107.1	96.4	85.7
56	98.7	107.7	96.9	86.2
57	99.2	108.3	97.5	86.6
58	99.7	109.8	97.9	87.0
59	100.2	109.4	98.5	87.5
60	100.7	109.9	98.9	87.9

Source: FAO 1990c (Latham 1997)

ANNEXE-25

Weight for length, both sexes 50 to 109 cm

Length (cm)	Weight(Kg)			
	-2SD	Median	80% of median	70% of median
50	2.6	3.4	2.7	2.4
51	2.7	3.5	2.8	2.4
52	2.8	3.7	3.0	2.6
53	2.9	3.9	3.1	2.7
54	3.1	4.1	3.3	2.9
55	3.3	4.3	3.4	3.0
56	3.5	4.6	3.7	3.2
57	3.7	4.8	3.8	3.4
58	3.9	5.1	4.1	3.6
59	4.1	5.3	4.2	3.7
60	4.3	5.6	4.5	3.9
61	4.6	5.9	4.7	4.1
62	4.8	6.2	5.0	4.3
63	5.1	6.5	5.2	4.6
64	5.4	6.7	5.4	4.7
65	5.6	7.0	5.6	4.9
66	5.9	7.3	5.8	5.1
67	6.1	7.6	6.1	5.3
68	6.4	7.9	6.3	5.5
69	6.7	8.2	6.6	5.7
70	6.9	8.5	6.8	6.0
71	7.2	8.7	7.0	6.1
72	7.4	9.0	7.2	6.3
73	7.6	9.2	7.4	6.4
74	7.8	9.5	7.6	6.6
75	8.1	9.7	7.8	6.8
76	8.3	9.9	7.9	6.9
77	8.5	10.1	8.1	7.1
78	8.6	10.4	8.3	7.3
79	8.8	10.6	8.5	7.4
80	9.0	10.8	8.6	7.6
81	9.2	11.0	8.8	7.7
82	9.4	11.2	9.0	7.8
83	9.6	11.4	9.1	8.0
84	9.7	11.5	9.2	8.0
85	9.9	11.7	9.4	8.2
86	10.1	11.9	9.5	8.3
87	10.3	12.1	9.7	8.5
88	10.5	12.3	9.8	8.5
89	10.7	12.6	10.1	8.8
90	10.8	12.8	10.2	9.0
91	11.1	13.0	10.4	9.1
92	11.3	13.2	10.6	9.2
93	11.5	13.5	10.8	9.4
94	11.7	13.7	11.0	9.6
95	11.8	14.2	11.4	9.9
96	12.0	14.5	11.6	10.2
97	12.2	14.8	11.8	10.4
98	12.4	15.0	12.0	10.5
99	12.6	15.3	12.2	10.7

Source: FAO 1982 (Latham 1997)

(continued)

Length (cm)	Weight(Kg)			
	-2SD	Median	80% of median	70% of median
100	12.8	15.5	12.4	10.8
101	13.0	15.8	12.6	11.1
102	13.3	16.1	12.9	11.3
103	13.5	16.4	13.1	11.5
104	13.7	16.7	13.4	11.7
105	14.0	16.9	13.5	11.8
106	14.2	17.2	13.8	12.0
107	14.5	17.5	14.0	12.2
108	14.7	17.8	14.2	12.5
109	15.0	18.2	14.6	12.7

Source: FAO 1982 (Latham 1997)

ANNEXE-26

Weight for length, girls, length 65 to 95 cm

Length (cm)	Weight(kg)			
	-2SD	Median	80% of median	70% of median
65	5.5	7.0	6.5	4.9
66	5.8	7.3	5.8	5.1
67	6.0	7.5	6.0	5.3
68	6.3	7.8	6.2	5.5
69	6.5	8.1	6.5	5.7
70	6.8	8.4	6.7	5.9
71	7.0	8.6	6.9	6.0
72	7.2	8.9	7.1	6.2
73	7.5	9.1	7.3	6.4
74	7.7	9.4	7.5	6.6
75	7.9	9.6	7.7	6.7
76	8.1	9.8	7.8	6.9
77	8.3	10.0	8.0	7.0
78	8.5	10.2	8.2	7.1
79	8.7	10.4	8.3	7.3
80	8.8	10.6	8.5	7.4
81	9.0	10.8	8.6	7.6
82	9.2	11.0	8.8	7.7
83	9.4	11.2	9.0	7.8
84	9.6	11.4	9.1	8.0
85	9.7	11.6	9.3	8.1
86	9.9	11.8	9.4	8.3
87	10.1	11.9	9.5	8.3
88	10.3	12.2	9.8	8.5
89	10.5	12.4	9.9	8.7
90	10.7	12.6	10.1	8.8
91	10.9	12.8	10.2	9.0
92	11.1	13.0	10.4	9.1
93	11.3	13.3	10.6	9.3
94	11.5	13.5	10.8	9.5
95	11.8	13.8	11.0	9.7

Source: FAO 1990c (Latham 1997)

ANNEXE-27

Weight for length, boys, length 65 to 95 cm

Length (cm)	Weight(kg)			
	-2SD	Median	80% of median	70% of median
65	5.7	7.1	5.7	5.0
66	6.0	7.4	5.9	5.2
67	6.2	7.7	6.2	5.4
68	6.5	8.0	6.4	5.6
69	6.8	8.3	6.6	5.8
70	7.0	8.5	6.8	6.0
71	7.3	8.8	7.0	6.2
72	7.5	9.1	7.3	6.4
73	7.8	9.3	7.4	6.5
74	8.0	9.6	7.7	6.7
75	8.2	9.8	7.8	6.9
76	8.4	10.0	8.0	7.0
77	8.6	10.3	8.2	7.2
78	8.8	10.5	8.4	7.4
79	9.0	10.7	8.6	7.5
80	9.2	10.9	8.7	7.6
81	9.4	11.1	8.9	7.8
82	9.6	11.3	9.0	7.9
83	9.6	11.5	9.2	8.1
84	9.9	11.7	9.4	8.2
85	10.1	11.9	9.5	8.3
86	10.3	12.1	9.7	8.5
87	10.5	12.3	9.8	8.6
88	10.6	12.5	10.0	8.8
89	10.8	12.8	10.2	9.0
90	11.0	13.0	10.4	9.1
91	11.2	13.2	10.6	9.2
92	11.4	13.4	10.7	9.4
93	11.6	13.6	11.0	9.6
94	11.9	13.9	11.1	9.7
95	12.1	14.1	11.3	9.9

Source: FAO 1990c (Latham 1997)

ANNEXE-28

Weight for height, girls, height 75 to 135 cm

Height (cm)	Weight(Kg)			
	-2SD	Median	80% of median	70% of median
75	7.7	9.7	7.8	6.8
76	7.9	10.0	8.0	7.0
77	8.1	10.2	8.2	7.1
78	8.3	10.4	8.3	7.3
79	8.5	10.6	8.5	7.4
80	8.7	10.8	8.6	7.6
81	8.9	11.0	8.8	7.7
82	9.1	11.2	9.0	7.8
83	9.3	11.4	9.1	8.0
84	9.5	11.6	9.3	8.1
85	9.7	11.8	9.4	8.3
86	9.9	12.0	9.6	8.4
87	10.1	12.3	9.8	8.6
88	10.3	12.5	10.0	8.8
89	10.5	12.7	10.2	8.9
90	10.7	12.9	10.3	9.0
91	10.8	13.2	10.6	9.2
92	11.0	13.4	10.7	9.4
93	11.2	13.6	10.9	9.5
94	11.4	13.9	11.1	9.7
95	11.6	14.1	11.3	9.9
96	11.8	14.3	11.4	10.0
97	12.0	14.6	11.7	12.2
98	12.2	14.9	11.9	10.4
99	12.4	15.1	12.1	10.6
100	12.7	15.4	12.3	10.8
101	12.9	15.6	12.5	10.9
102	13.1	15.9	12.7	11.1
103	13.3	16.2	13.0	11.3
104	13.5	16.5	13.2	11.6
105	13.8	16.7	13.4	11.7
106	14.0	17.0	13.6	11.9
107	14.3	17.3	13.8	12.1
108	14.5	17.6	14.1	12.3
109	14.8	17.9	14.3	12.5
110	15.0	18.2	14.6	12.7
111	15.3	18.6	14.9	13.0
112	15.6	18.9	15.1	13.2
113	15.9	19.2	15.4	13.4
114	16.2	19.5	15.6	13.7
115	16.5	19.9	15.9	13.9
116	16.8	20.3	16.2	14.2
117	17.1	20.6	16.5	14.4
118	17.4	21.0	16.8	14.7
119	17.7	21.4	17.1	15.0
120	18.1	21.8	17.4	15.3
121	18.4	22.2	17.8	15.5
122	18.8	22.7	18.2	15.9
123	19.1	23.1	18.5	16.2
124	19.5	23.6	18.9	16.5

ANNEXE-29

Weight for height, girls, height 75 to 135 cm

Height (cm)	Weight(Kg)			
	-2SD	Median	80% of median	70% of median
125	19.9	24.1	19.3	16.9
126	20.2	24.6	19.7	17.2
127	20.6	25.1	20.1	17.6
128	21.0	25.7	20.6	18.0
129	21.4	26.2	21.0	18.3
130	21.8	26.8	21.4	18.8
131	22.3	27.4	21.9	19.2
132	22.7	28.0	22.4	19.6
133	23.1	28.7	23.0	20.1
134	23.6	29.4	23.5	20.6
135	24.0	30.1	24.1	21.1

Source: FAO 1990c (Latham 1997)

Weight for height, boys, height 75 to 135 cm

Height (cm)	Weight(Kg)			
	-2SD	Median	80% of median	70% of median
125	20.4	24.3	19.4	17.0
126	20.7	24.8	19.8	17.4
127	21.1	25.2	20.2	17.6
128	21.5	25.7	20.8	18.0
129	21.9	26.2	21.0	18.3
130	22.3	26.8	21.4	18.8
131	22.7	27.3	21.8	19.1
132	21.1	27.8	22.2	19.5
133	23.6	28.4	22.7	19.9
134	24.0	29.0	23.2	20.3
135	24.4	29.6	23.7	20.7

Source: FAO 1990c (Latham 1997)

ANNEXE-30

Weight for height, boys, height 75 to 135 cm

Height (cm)	Weight(Kg)			
	-2SD	Median	80% of median	70% of median
75	7.9	9.9	7.9	6.9
76	8.1	10.1	8.1	7.1
77	8.3	10.4	8.3	7.3
78	8.5	10.6	8.5	7.4
79	8.7	10.8	8.6	7.6
80	8.9	11.0	8.8	7.7
81	9.1	11.2	9.0	7.8
82	9.3	11.5	9.2	8.1
83	9.5	11.7	9.4	8.2
84	9.7	11.9	9.5	8.3
85	9.9	12.1	9.7	8.5
86	10.1	12.3	9.8	8.6
87	10.3	12.6	10.1	8.8
88	10.5	12.8	10.2	9.0
89	10.7	13.0	10.4	9.1
90	10.9	13.3	10.6	9.3
91	11.1	13.5	10.8	9.5
92	11.3	13.7	11.0	9.6
93	11.5	14.0	11.2	9.8
94	11.7	14.2	11.4	9.9
95	11.9	14.5	11.6	10.2
96	12.1	14.7	11.8	10.3
97	12.4	15.0	12.0	10.5
98	12.6	15.2	12.2	10.6
99	12.8	15.5	12.4	10.9
100	13.0	15.7	12.6	11.0
101	13.2	16.0	12.8	11.2
102	13.4	16.3	13.0	11.4
103	13.7	16.6	13.3	11.6
104	13.9	16.9	13.5	11.8
105	14.2	17.1	13.7	12.0
106	14.4	17.4	13.9	12.2
107	14.7	17.7	14.2	12.4
108	14.9	18.0	14.4	12.8
109	15.2	18.3	14.6	12.8
110	15.4	18.7	15.0	13.1
111	15.7	19.0	15.2	13.3
112	16.0	19.3	15.4	13.5
113	16.3	19.6	15.7	13.7
114	16.6	20.0	16.0	14.0
115	16.9	20.3	16.6	14.2
116	17.2	20.7	16.6	14.5
117	17.5	21.1	16.9	14.8
118	17.9	21.4	17.1	15.0
119	18.2	21.8	17.4	15.3
120	18.5	22.2	17.8	15.5
121	18.9	22.6	18.1	15.6
122	19.2	23.0	18.4	16.1
123	19.6	23.4	18.7	16.4
124	20.0	23.9	19.1	16.7

ANNEXE-31

Formula for calculation of the SD/Z score of subjects with a weight below the median weight for the subject's height:

$$\text{SD/Z score of subject} = \frac{\text{Median weight for height} - \text{weight of subject}}{1.0 \text{ SD lower}}$$

Formula for calculation of the SD/Z score of subjects with a weight above the median weight for the subject's height:

$$\text{SD/Z score of subject} = \frac{\text{Weight of subject} - \text{Median weight for height}}{1.0 \text{ SD lower}}$$

ANNEXE-32

Denominator for different variables

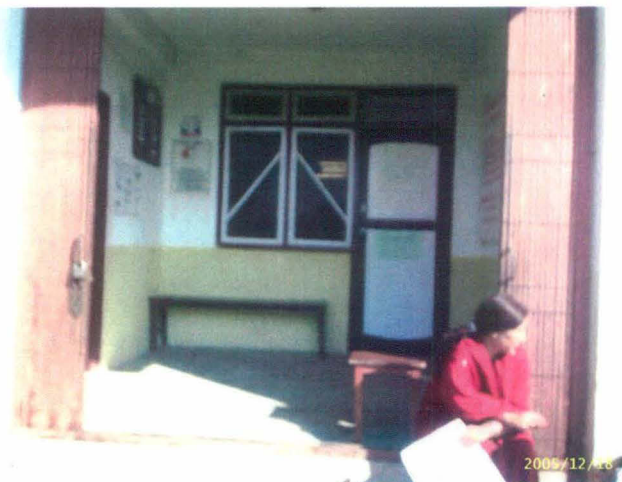
S#	Characteristics of variables	Actual #	Missed	Reason
1	Total population of households	1988	-	-
2	Households	300	-	-
3	Father	311		One died, two separated
4	Mother	313	1	One mother died
5	Population above 10 years of age for marital status	1403	-	-
6	Population above 6 years of age for literacy status	1563	-	-
7	Population between 15 to 59 years and above 60 years for main occupation	1094	89	Students excluded
8	Children less than six months for exclusive breast feeding	35	-	-
9	Children less than 5 years for continued breast feeding	387	8	Under-reporting
10	Children less than 5 years for feeding practices	339	56	"
11	Children less than 5 years for calorie intake	334	61	"
12	Children less than 5 years for sickness	187	-	-
13	Children less than 6 months for weight for age	32	3	Measurement not done
14	Children less than 6 months for height for age	32		"
15	Children less than 6 months for weight for height	26		"
16	Children less than 5 years for weight for age	363		"
17	Children less than 5 years for height for age	370		"
18	Children less than 5 years for weight for height	357		"

ANNEXE-33

A glimpse of study area



Nagarkot



Tathali Health Post



Chitapol

ANNEXE-34

Few under-nourished children



A child of Nagarkot



A child of Tathali



A child of Chitapol

