Food Consumption and Nutrition Baseline and Impact Assessment Survey for Rapti and Bheri Zones, Nepal

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by

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"Nutrients can dramatically affect overall health, child survival, productivity, and mental performance. The human and economic value of addressing nutrient deficiency far surpasses the cost of interventions, some of which are estimated at only a few rupees per person per year. The reduced burden of illness, death, and poor mental and physical capacity that can be brought about by remedying nutrient deficiencies represents a saving to families and communities, [as well as] agriculture, education, industry, and other sectors that rely on human resources."

Anonymous

An important advantage of dealing with nutrients is their availability A range of program options exists to make people aware of nutrient availability, based on varying conditions across countries. Nepal cannot be an exception. Everyone involved in saving and improving the lives of mothers and children — from policy makers to food-for-work workers, academicians, and voluntary health workers — all can make a difference.

Anonymous

FOREWORD

The promotion of vegetables, fruits, and high-value cash crop production has been an important strategy for increasing the income and nutritional status of rural people in Nepal during the past decade. The United States Agency for International Development (USAID) has been providing grant assistance to rural Nepal through the Vegetables, Fruits, Cash Crops, and Animal Products (VFC/A) Project in selected potential pocket areas of Rapti Zone during the last several years

USAID is now expanding its pilot approach with VFC/A to encompass a larger project, the Market Access for Rural Development (MARD) Project Through MARD, USAID intends to have a greater impact in Rapti Zone, as well as the Surkhet, Dailekh, and Jajarkot Districts of Bheri Zone. USAID contracted Development Alternatives, Inc (DAI), which in turn subcontracted the Agricultural Projects Services Centre (APROSC), to conduct a series of studies to measure the effect of previous interventions and serve as a baseline for the MARD project. This report examines previous interventions' impact on food consumption and nutritional status among children from 12 months to 59 months of age, and among the entire family, in the intervention areas. The research team also measured food consumption patterns in the three aforementioned districts of Bheri

APROSC would like to express its deep appreciation to DAI for entrusting us to conduct these important studies, as well as to USAID for its continued cooperation with APROSC. I would like to thank Drs David Nelson, Ken Swanberg, and John Bowman, as well as Ms Mary Lineahan and Ms. Bagie Sherchand for their professional input and support in completing this study. I would also like to thank Ms. Molly Gingerich, Mr. Jim Gingerich, Ms. Judy Hollander, and other USAID personnel for their valuable help. Thanks are also due to Messrs Ram Shrestha, Pawan Maskey, Subarna Shrestha, Madhav Gautam, and Sailesh Neupane, as well as Dr. Badri Kayastha and Mr Tika Pradhan for their cooperation during the course of this study.

I would like to commend the fieldwork completed by Messrs Surya Adhikari, Subarna Shrestha, Madhu Bhattarai, and Chiranjibi Sharma along with the work of their team members I would like to thank Mr Raja Singh for his dedicated computer work and Messrs Janak Upadhaya, Khagendra Basnyat, Ananta Parajuli, and Kishor Gyawali, and Mrs. Uma Baral, Mrs Sama Pradhananga, and other APROSC support staff for their continuous help in completing this study

Finally, I would like to thank Dr Bhakta R Dahal for his dedication in successfully completing this report, and Dr. Janardan Khatri-Chhetri for coordinating and taking overall responsibility for this study

Dr. Shyam Krishna Poudyal
Executive Director

ACKNOWLEDGMENTS

It was a great pleasure, as well as an excellent learning opportunity, for all of us to be involved in such a novel task as (1) assessing the nutritional status of Nepalese children living in far-flung remote areas; and (2) evaluating the impact of previous activities conducted to improve that status, which was poor. We had our aches and pains in the process not because of difficulty while at work but because of inadequate communication among ourselves. At times, for example, an anesthetist was unavailable or instruments, such as forceps, were inadequately prepared But, we all enjoyed the work.

Sincere appreciation must go to the United States Agency for International Development (USAID) for its continuous interest in improving the nutritional status of the Nepalese people, and to Development Alternatives, Inc. (DAI) for entrusting APROSC to carry out the study.

I appreciate very much the cooperation extended by the immediate past and present executive directors of APROSC for their congenial help and guidance throughout the project period despite their busy schedule and several other important responsibilities. Dr Janardan K C., the principal coordinator and focal point of both the nutrition and income surveys, was in fact the true source of the success of the overall project activities I express gratitude for his novel attitude toward the health of the Nepalese.

This study would have been incomplete without guidance from Dr. David Nelson, Professor John Mellor, Dr. Ken Swanberg, Ms Mary Lineahan, Dr John Bowman, and Ms Bagie Sherchand. Mr. Jim Gingerich, Ms Molly Gingerich, Mr Roger Bloom, Ms Judy Hollander, Mr. Ram Shrestha, Mr. Subarna Shrestha, and Mr Pawan Maskey were very helpful during the course of this study. The help extended by Mr Madhav Gautam from VITAG, Mr Sailesh Neupane from VaRG, and Mr Tika Pradhan and site coordinators from the VFC/A project office, along with that of their teams, was praiseworthy. I would like to express my sincere appreciation to all of them on behalf of the FNBIA survey team at APROSC.

Mr Raja Singh, with the assistance of Mr Kishor Gyawali, took painstaking effort with data entry, data processing, and printing numerous versions of this report Mr. Janak Upadhaya, Mr. Ananta Parajuli, Mr Khagendra Basnyat, Mrs Uma Baral, and Mrs Sama Pradhananga were very helpful despite their regular office duties during the project period All of them deserve sincere appreciation for their most commendable contributions to make this effort a success

B.R. Dahal
APROSC, Kathmandu

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EXECUTIVE SUMMARY

The promotion of vegetables, fruits, and high-value cash crop production has been an important strategy for increasing the income and nutritional status of rural people, particularly in the hill regions of Nepal, during the past decade. USAID's Vegetables, Fruits, Cash Crops, and Animal Products (VFC/A) Program served as a pilot project to increase incomes and nutritional status of rural people. This pilot project was successfully implemented in selected pockets in the five districts of Rapti Zone in Nepal. To examine the VFC/A program's nutritional and income impact on the lives of the target population, and at the same time record their nutritional and income status, USAID commissioned a baseline survey called the Income and Nutrition Status Baseline Survey (INBS).

The INBS was conducted by APROSC for USAID under a larger Regional Agribusiness Project (RAP) initiative known as the Nepal Mid-Western Development Region Baseline Survey Activity (MWDR-BSA). The INBS comprised two surveys: the Food Consumption and Nutrition Baseline and Impact Assessment (FNBIA) survey, and the Income Survey This report presents findings from the FNBIA survey only; the findings from the income survey are presented in a separate report [1]

The FNBIA survey, conducted in 1996, had three main objectives. (1) to provide baseline information on the nutritional status of the target population, (2) to evaluate the nutritional status of children ages 12 to 59 months (index children), and (3) to evaluate the adequacy of nutrient consumption of index children and family members in terms of total vitamin A, total protein, and total calories.

Selected pockets were identified by No-Frills Consultants, Inc , the firm that implemented the VFC/A program. Within these pockets, households were randomly selected from among those participating in the VFC/A program. Households in Bheri Zone were randomly selected from those that live in altitudes and distances corresponding to Rapti Zone A total of 900 target households were selected for the INBS survey, but only 854 households were part of the effective sample for the FNBIA survey. Of the total sample, 70 percent were from the intervention areas (Rapti), whereas 30 percent represented the nonintervention areas (Bheri) and served as a control group In selecting the sample, only those households with at least one index child (child belonging to the 12-to-59-month age group) were considered eligible Nutrition and income surveys were conducted on the same households simultaneously

Detailed household- and individual-level data were collected on crop production, crop acreage; cropping patterns, income sources, including remittances and family assets; food consumption; food expenditure patterns; nutritional status, and morbidity indicators.

Food consumption information for both the family and index child was determined by using the 24-hour recall method On-the-spot measurement of food items was done using internationally

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[1] "Household Income Survey of Rapti and Bheri Zones, Nepal " May 1997 RAP Technical Report No 14, Development Alternatives, Inc (DAI), Bethesda, Maryland, U S A

accepted equipment. Nutrient consumption analyses were conducted for at least one child per household; anthropometric measurements were recorded only for the index child

The nutritional analyses conducted under FNBIA show that both stunting (height-to-weight) and wasting (weight-to-height), two key indicators of malnutrition, are a serious problem in Nepal. The data show that almost one out of every two index children living in the plains is stunted. The prevalence of stunting is even more severe in the hill areas of Rapti and Bheri. Compared with those living in the plains (elevations below 1,000 meters), the data show that the incidence of stunting is approximately 20 percent greater among index children living at altitudes above 1,000 meters When compared by distances, the incidence of stunting is most severe (70 percent) among children living within one-half to one day's walk of the closest road Children ages 48 to 59 months are the hardest hit: one out of every 1.4 children in this group is stunted

Stunting is highest (73 percent) among the Tibeto-Burman-and-related ethnic group, followed by Matwalis, Chhetris, and Bahuns Conversely, the Chaudharis experience a much lower incidence of stunting (37 percent) This is not to say that stunting is not a problem among the Chaudharis; in fact, the prevalence of stunting among this group is also quite high, with one out of almost three children stunted.

Wasting is also quite severe among index children, particularly among those living in the plains and low hills, where one of every eight children (12 percent) is afflicted Wasting is less severe among those living above 2,000 meters (6 percent). Wasting, for some reason, is also most severe among those children (13 percent) living one-half to one day's walk from the nearest road The incidence of wasting is most severe among children ages 12 to 23 months, with about 2 of every 10 children in that age group suffering from the condition However, wasting was found to decrease with an increase in age, in contrast to stunting, which increases with age.

Acute malnutrition (wasting) is most prevalent among children belonging to the Chhetri, Matwali, and Chaudhari groups. In the sample, wasting was least frequent among Bahun and Tibeto-Burman children.

In Nepal, wasting is mainly a result of protein-energy malnutrition The underlying causes of protein-energy malnutrition are low quality of protein, insufficient levels of energy consumption, and lack of access to sufficient varieties of nutrient-rich foods These shortfalls are exacerbated by increased susceptibility to infection and infestations resulting from the country's inadequate and inaccessible health-care services. Lack of adequate health care exposes the vulnerable, mostly children, to diseases The state of wasting, when extended for longer periods, can lead to chronic malnutrition or stunting.

Protein-energy deficiency is also closely associated with deficiency in important nutrients such as vitamin A. Vitamin A deficiency is the most common cause of preventable childhood blindness and is also linked with increased risk of childhood morbidity and mortality Even moderate levels of vitamin A deficiency reduce the effectiveness of the immune system, making children more susceptible to measles, diarrhea, and respiratory infections This study found that adequate

consumption of the nutrients under study — vitamin A, protein, and calories — is directly correlated with altitude and distance, with an increase in adequacy corresponding with an increase in elevation and remoteness. This finding corroborates national figures, which show that Nepal's southern districts are vitamin A deficient.

When comparing the adequacy of nutrient consumption by castes, the Tibeto-Burman-and-related groups were found to consume the most adequate amounts of calories and protein, with the Bahun and Chhetri groups consuming the highest amount of vitamin A The Chaudhari index children consume the least of all three nutrients Children ages 12 to 23 months across all caste groups were found to be worst off in terms of caloric and protein intake, whereas children ages 36 to 47 months are the worst off in terms of vitamin A consumption However, families in general were found to consume more adequate levels of nutrients than do children

Factors influencing nutritional status of children other than nutrient consumption were also studied. Such non-nutrient factors as illnesses were studied because children in Nepal are vulnerable to many illnesses that deplete nutrients and energy Among the most prevalent are diarrhea, fever, measles, and respiratory infections. In this study, only the prevalence of diarrhea and fever were recorded. The survey also obtained information on night blindness during pregnancy and the practice of breast-feeding. The results indicate that the highest prevalence of diarrhea and fever is among children, mostly ages 12 to 23 months, living in high altitudes and remote areas Susceptibility to both diarrhea and fever among the sampled children was found to decrease with age.

Given the importance of iodine in the human diet, the study team also measured iodine consumption levels among the sampled households Iodine content was estimated by analyzing edible salt, the principal source of iodine in Nepal Iodine content varies by type of salt, where it was purchased, and how it is stored. Whereas powdered salt was found to retain the most iodine of all salt, it was the least consumed, reflecting perhaps the problem of iodine deficiency in the hills of Nepal. It is not surprising, therefore, to find that across all elevations and distances, most of the salt consumed by households contains 7 or fewer parts per million of iodine

The impact of VFC/A on food consumption patterns and nutritional status among children indicates that positive results have been achieved Findings show improvement, however modest, in the nutritional status of families and children participating in the program. Even at this early stage of development, VFC/A has had a positive impact on the lives of the participants. A more detailed analysis conducted at a later period will likely demonstrate a more visible, measurable impact on health and nutrition.

CHAPTER ONE

INTRODUCTION

The United States Agency for International Development (USAID) has been actively providing development assistance to Nepal for several decades. A major proportion of this assistance has been directed toward Rapti Zone in Nepal's midwestern development region (MWDR). More recently, USAID's development plans have included extending its support beyond Rapti to adjoining zones as well, under its Market Access for Rural Development (MARD) Project. To support the implementation of its plans, USAID, through Development Alternatives, Incorporated (DAI), decided to conduct a baseline survey to record the existing nutritional and income status of the target population, and to determine the extent of the impact on income and nutrition of previous interventions in and around Rapti DAI, a U S -based consulting firm, contracted Agricultural Projects Services Centre (APROSC) to execute the baseline survey, called the Income and Nutrition Status Baseline Survey (INBS), and to assess and evaluate the impact of previous activities in the identified target areas.

The Food Consumption and Nutrition Baseline and Impact Assessment (FNBIA) survey is part of the overall INBS information base The report provides information on food consumption and nutritional status among children between the ages of 12 and 59 months living in the intervention areas in Rapti and in randomly selected areas of Surkhet, Dailekh, and Jajarkot Districts of Bheri Zone. It also provides detailed information on food consumption patterns among the households in the same surveyed areas.

The intervention areas are defined as those locations where at least one of the several activities of USAID's existing Vegetables, Fruits, Cash Crops, and Animal Products (VFC/A) Project, such as off-season vegetables, vegetable seeds, fruit, and animal products production, were promoted based on their potential and suitability to the areas Given that these activities operated with the objective of improving the socioeconomic status of area residents, these development interventions are expected to have had some influence on the general health and nutritional status of the people living in the intervention areas

Improvement in economic status influences food consumption patterns Improvement in food consumption, in turn, is likely to show improvement in a population's overall health and nutritional status. Because health and the development process are intrinsically linked, factors determining cause-and-effect relationships are prerequisites for maximizing health benefits and contributing to formulating effective and efficient future development activities and projects With this in mind, food consumption patterns and nutritional status were included for study in the baseline survey.

Bheri and Rapti are adjacent to each other, and both belong to the MWDR of Nepal. In addition, the two zones share many cultural and social similarities However, Bheri was neither a part of USAID's Rapti Integrated Rural Development Project (IRDP) nor of the VFC/A project As a result, Bheri proved to be the perfect "control" for this study, serving as a reference for comparing the impact of previous interventions in Rapti

BACKGROUND

Nutritional status, irrespective of age and sex, depends on the interaction of two principal factors: food consumption and illness (see Figure 1). These two factors in turn depend on several other factors, acting independently or in concert, as illustrated in Figure 1 Thus far, nutrition promotion activities have focused more on consumption, illness and other factors leading to it have received little attention. This practice isn't surprising because the prevailing perception in Nepal is that poor nutritional status is the result of inadequate food intake. This belief is further reinforced by existing ignorance as to the importance of vegetables and fruit in one's diet. Consequently, poor nutritional status continues to be addressed by increasing food volumes and the frequency of feeding; other factors go unattended. The absence of an approach that integrates both food consumption and factors leading to illness has led to the formulation of nutritional programs that are curative only. There is an acute need for programs that promote nutrition in totality.

Planning and programming activities dealing with improving nutritional status call for addressing nutritional issues for the entire population. However, being constrained by limited resources and time, this study focused only on the most vulnerable groups. A vulnerable group is defined as a group of individuals that falls within that critical age range in which the long-term effect of malnutrition is most severe In most cases, children invariably fall within this group; hence the selection of children between the ages of 12 and 59 months as the main focus of this study.

Protein, calories, and vitamin A were identified as the most important indicators of nutritional status and thus were selected as the focus of the study. This is not to say that other nutrients, such as carbohydrates, fat, minerals, other vitamins, and fiber, are not equally important for improved health and nutritional status

Nepal is an agricultural country However, despite its agricultural base, the nutritional status of the Nepalese people is one of the worst in Nepal's region of the world (see Table 1) As shown in Table 1, principal indicators of nutritional status, such as stunting and average weight, are worse in Nepal than among neighboring countries, implying the continuing seriousness of this problem. The extent, severity, and consequences of such nutritional deficiencies are well recognized. As a result, nutrition promotion activities in Nepal have been in operation since 1975. But the rate of improvement in nutritional status among the population has not taken place at a satisfactory rate, and in some places it has even deteriorated (see Table 2) Consequently, His Majesty's Government of Nepal has given high priority to health and nutritional activities. Goals, policies, plans, and implementation strategies based on limited studies have been worked out and are in the process of being implemented. The findings from the present study are expected to strengthen future implementation strategies geared toward achieving the nutritional goals for the nation as a whole, and for Rapti and Bheri in particular

FIGURE 1

NUTRITIONAL STATUS CAUSAL MODEL

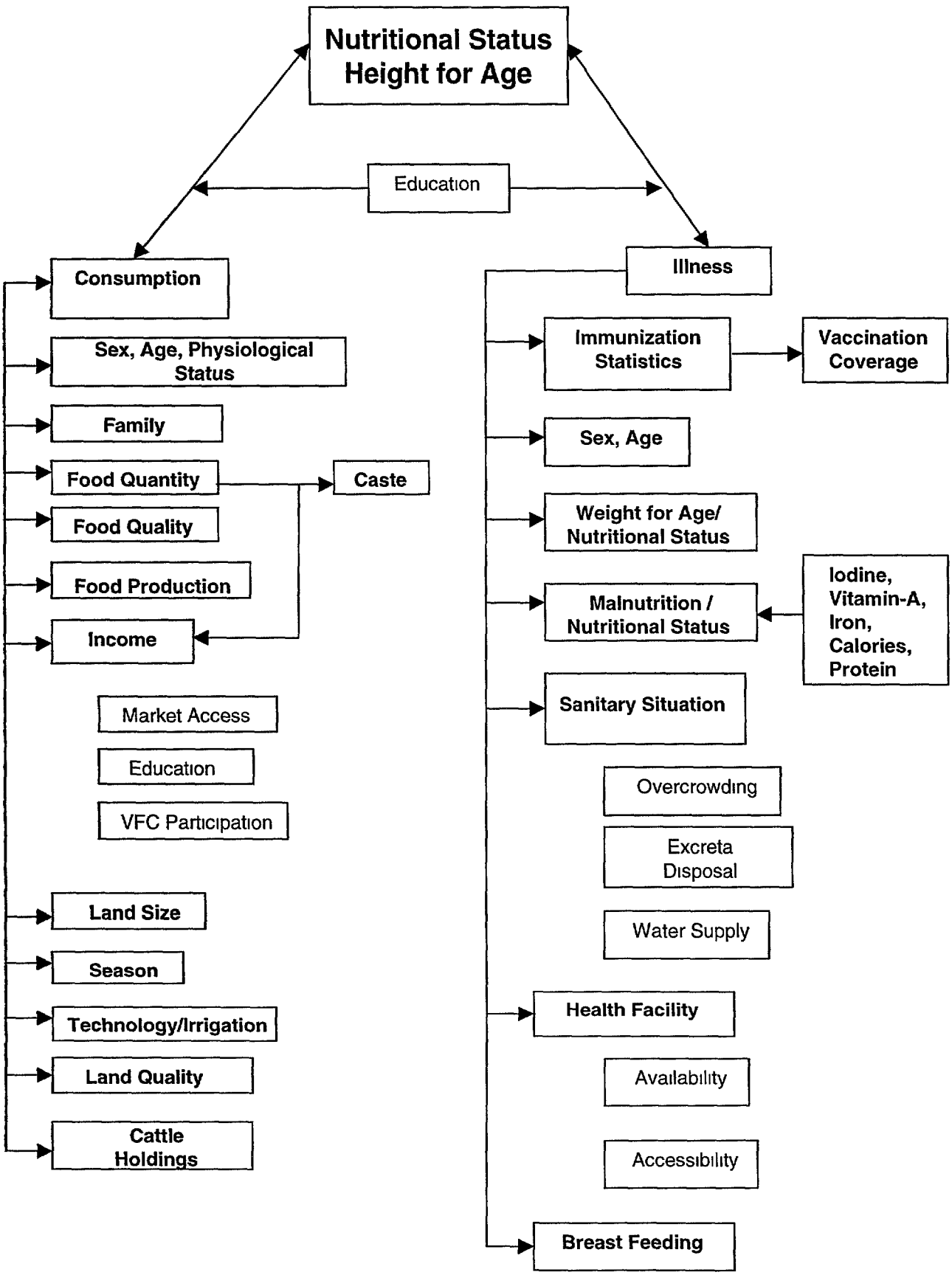


Table 1
Prevalence of Malnutrition in Children under 5 Years of Age, by Country

Country	Underweight (Percent)	Wasting (Percent)	Stunting (Percent)	E A [1] (Percent/p/d)
Nepal	70	14	69	100
Bangladesh	67	25	17	88
Bhutan	38	4	56	128
India	69	NA	65	101
Pakistan	40	9	50	99
Sri Lanka	38	16	24	101

1 E A percent/p/d= Percentage energy adequacy per person per day
Source. The State of the World's Children, UNICEF, 1996

Table 2
Nutritional Status by Development Region Comparative View
(1975 vs 1986)

	1975 W/A Malnutrition		1986 W/A Malnutrition	
	Total	Severe	Total	Severe
Eastern Hills	92 9	5 9	83 4	12 2
Central Hills	94 2	5 1	81 4	6 9
Western Hills	92 3	3 1	77 3	2 7
Far Western Hills	95 1	6 1	91 9	12 6

Source Children and Development National Plan of Action for the 1990s,
National Planning Commission, Kathmandu, Nepal 1992

Furthermore, there is also the belief in Nepal that measles is a principal non-nutritional factor affecting nutritional status As a result, health-care facilities and nutritional programs have been promoting vaccination campaigns. Thus far, approximately 32 percent of Nepalese children have been vaccinated (see Table 3) The low vaccination rate indicates that more than 68 percent of the country's children continue to be exposed to measles The presence of such a high number of vulnerable children further reiterates the need to promote an integrated approach that emphasizes both food consumption and illness

Table 3
Nutritional Status of Children in Nepal

Stunting H/A	Wasting W/H	Measles Vaccination Coverage (%)	Measles Attack Rate (%)
64	5 5	32	12

Source Nepal Multiple Indicators Surveillance Survey, National Planning Commission,
Kathmandu, Nepal 1996

Sample size for this study was determined by factors such as time frame and available resources. As a result, a representative sample of households from pocket areas participating in the VFC/A project in all five districts was selected Because Bheri had had no previous interventions, the study team selected as the control group households from three Bheri districts (Surkhet, Dailekh, and Jajarkot) that are similar to districts in Rapti. General characteristics of the districts surveyed are presented in Table 4.

Table 4
General Characteristics of Sample Districts

Area	Density of Population[1]	Human Development Index[2]	VFC/A Households[3]	Sample Households
Rapti				
Dang	120	53	171	108
Salyan	124	64	318	162
Pyuthan	134	50	300	108
Rukum	54	65	136	162
Rolpa	95	63	184	108
Bheri				
Surkhet	92	33	-	102
Dailekh	124	67	-	96
Jajarkot	51	73	-	54

1. Number of people living in area per square kilometer, according to 1991 data from the Central Bureau of Statistics, Kathmandu, Nepal
2. District ranking based on human development, with the smaller the rank the better the district Kathmandu, being the best, has a rank of 1, according to S Thapa in "A Human Development Portrait of the 75 Districts in Nepal" The Rising Nepal, June 1995
3. Number of households visited during the survey in the VFC/A pocket areas and identified by No-Frills Consultants, the executing agency

Rapti and Bheri Zones in the MWDR of Nepal extend from inner terai in the south all the way to the snow-covered mountains in the north Map 1 shows administrative and geographical locations, as well as the altitudes of the surveyed areas and sites.

Because type of food production varies by altitude, it is assumed that the nutritional status in the surveyed localities varies as well As shown in Map 1, the localities surveyed for this study fall into four different altitudes. below 1,000 meters, from 1,000 to 1,500 meters, from 1,501 to 2,000 meters, and above 2000 meters.

Food consumption patterns are influenced not only by changing lifestyles, but also by such factors as access to roads and communication systems Therefore, the distance of a house or homestead from the nearest road head is another location variable considered to have some effect on nutritional status. In this study, distance is categorized into three groups less than half a day's walk from house to the nearest motorable road head, between half and one day's walk to the nearest road head, and more than one day's walk to the nearest road head

The IRDP and the VFC/A project must have had some effect on the income-generating behavior of the people in Rapti The effect on income-generating behavior in turn must also have affected food consumption patterns, which may be reflected in nutritional status The difference evidenced from the comparison of nutritional status between Rapti and Bheri households suggests the impact of the interventions in Rapti

The baseline survey collected both nutritional and income data. Simultaneous economic data collected from the same households provided an opportunity to look at nutritional issues from an economic perspective as well Nonetheless, this report presents information only on nutritional status in Rapti and Bheri; information on the general economic status of residents of Rapti and Bheri can be found in a separate report[1]

OBJECTIVES

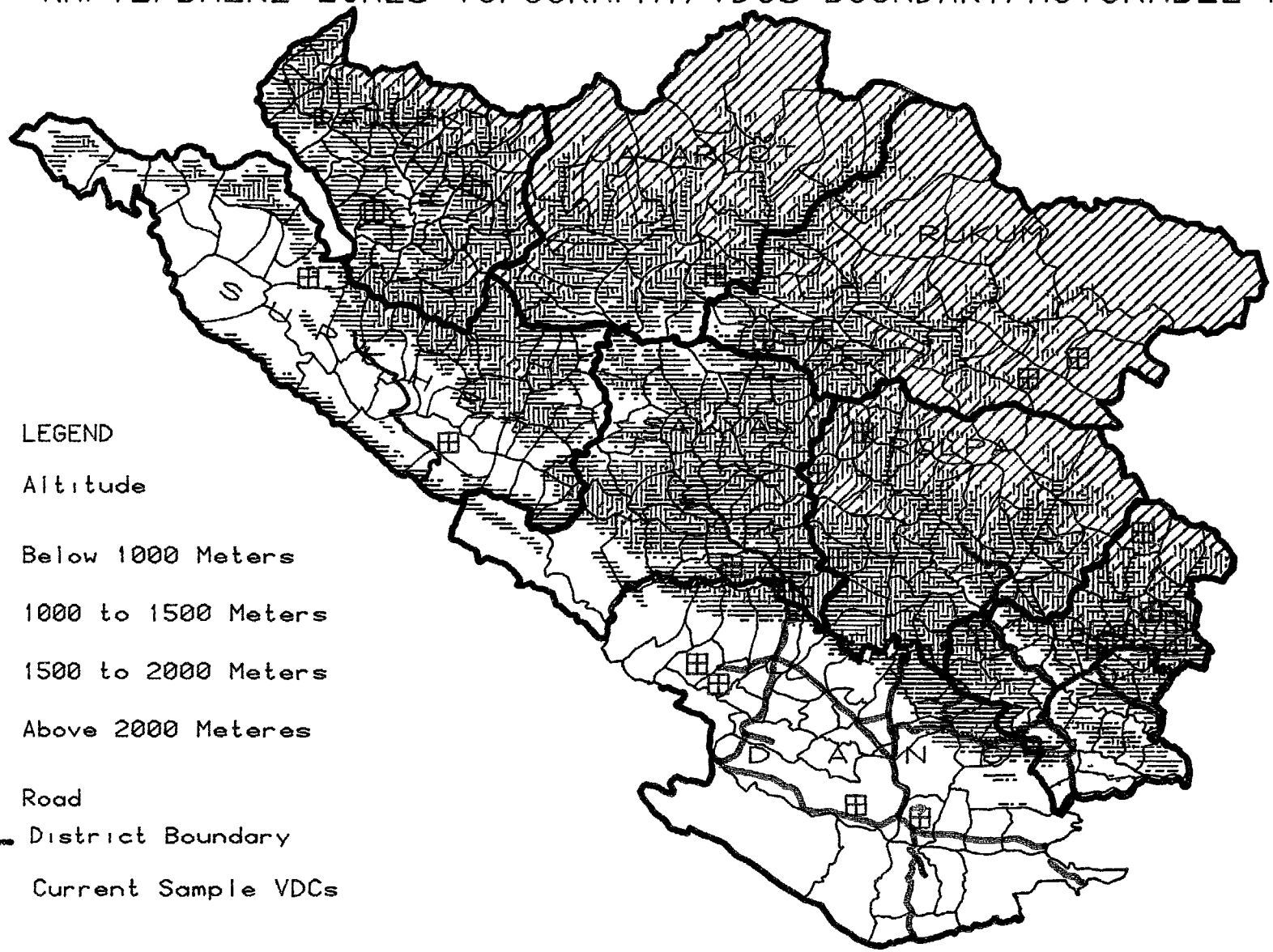
The overall objectives of this study are to provide baseline information for MARD project activities and to examine the impact of the VFC/A program on the nutritional status of children in the study area. The specific objectives of the nutritional component of the baseline survey are to:

1. Evaluate the nutritional status of index children; and

2 Evaluate the adequacy of nutrient consumption for the index child and family in terms of total protein, total calories, and total vitamin A.

[1] See "Household Income Survey of the Rapti and Bheri Zones, Nepal " RAP Technical Report No 14 Bethesda, Md Development Alternatives, Inc , May 1997

RAPTI/BHERI ZONEs TOPOGRAPHY/VDCs BOUNDARY/MOTORABLE ROAD



LEGEND

Altitude

- Below 1000 Meters
- 1000 to 1500 Meters
- 1500 to 2000 Meters
- Above 2000 Meteres
- Road
- District Boundary
- Current Sample VDCs

GIS/APROSC

CHAPTER TWO

METHODOLOGY

As noted in Chapter One, the FNBIA survey is part of the broader Income and Nutrition Status Baseline Survey (INBS), designed to evaluate the impact of the VFC/A project and to generate a database for use in MARD activities. The FNBIA survey was carried out for the same households identified for INBS's income component The VFC/A project "pockets" were identified based on the suggestion of the VFC/A program coordinator from No-Frills Consulting, a local consulting firm that implemented VFC/A.

In conducting the FNBIA survey, the research team recorded a single 24-hour food intake period for each surveyed family as well as for the index child in every interviewed household, that is, the researchers noted all foods prepared for, and consumed by, the family and the index child 24 hours before the interview Information on portions prepared and consumed by the index child was obtained via a 24-hour recall method

In addition to recording food intake, the researchers measured the anthropometry (height and weight) of the index child The age of the index child was determined by asking a family member, preferably the mother, the child's date of birth

SITE AND SAMPLE SELECTION

Once the pockets were identified, No-Frills obtained a list of households within them that were participating in the VFC/A project The list was updated in the field and sample households were randomly selected for interview. After interviewing 900 target households, the study team selected an effective sample of 854 households· 595 from a total of 648 in the VFC/A project in Rapti, and 259 from Surkhet, Dailekh, and Jajarkot Districts in Bheri.

INTERVIEW PROCESS

Team Composition

Four teams were formed to interview the 900 target households within a specified time frame. Each team, consisting of six enumerators and two supervisors, was expected to survey, on average, 225 households in 60 days Of the six enumerators, three were for the nutrition survey and three for the income survey The two supervisors each supervised the nutrition and income enumerators, in addition to conducting interviews The income supervisor also served as the team leader of the overall team.

The study team hired a crew of three local porters to carry measurement instruments and to act as field guides. Each team covered two districts and completed an average of two to three interviews each day (A list of team members is attached as Annex I)

Approach

Households to be interviewed were identified and selected in consultation with local village development committees (VDCs), the ward chairmen, and the VFC/A site coordinator or local elite such as teachers and social workers When the team arrived at each target house to begin the interview process, the household head or another adult was politely approached and the purpose of the interview, its importance, and its potential impact explained. Afterward, the team further discussed the survey to gain the confidence of the adult present, preferably the head of the household The team then requested permission to conduct the interview and take anthropometric measurements of the index child. After obtaining approval from the household head or another adult, team members identified an appropriate place to conduct both the income and nutrition surveys.

Each team interviewed separately Generally, males participated in the income survey, whereas females tended to be interviewed for nutrition information. When confusion about appropriate responses arose in the interview process, males and females tended to discuss among themselves the appropriate answer.

Anthropometric measurements were recorded only for children. Nonetheless, the team members had to weigh and measure the adults as well, as they were eager to get their measurements taken. The team had to acquiesce in order to secure the adults' confidence and cooperation during the measuring of the children. The adults' anthropometric measurements, however, were not recorded.

SURVEY SUPERVISION

In addition to having a team supervisor, each team received visits from the study coordinator and a central-office nutrition consultant during the early part of the fieldwork The supervisors paid surprise visits at spots where interviews were being conducted, spending about two days with each team in the field In addition, VFC/A site coordinators were requested to help the teams when needed, and to monitor the survey process as a quality-assurance measure.

While the teams were in the field, representatives from the USAID mission based in Kathmandu and from Development Alternatives Incorporated (DAI), based in Bethesda, Md , also visited the interview sites In this way, the representatives were able to observe firsthand the data collection process used for the survey.

FOOD CONSUMPTION INTERVIEW

Based on a series of focus group discussions held in the field, the study team developed a set of questionnaires with the help of DAI personnel and the nutrition consultant The questionnaires were pretested and then revised prior to the final interviews for the survey. (A copy of the pretest results is attached as Annex II, and a copy of the final questionnaire is attached as Annex III)

As mentioned previously, before each interview, the interviewing team obtained information about household members' food preparation and consumption for the 24 hours preceding the interview. This information was collected from the person preparing the food. It was assumed that this methodology would have the least bias because it involved recalling information from just a day

earlier. The team identified and measured the foods in local units of measurement at first, team members then measured the same foods in standard units with measurement equipment the team enumerators brought from the central office. The identified foods were recorded only after measurements were taken using the standard method

Foods prepared in the morning, during the day, and in the evening were recorded separately to reflect the frequency of main-meal preparation. Foods other than main meals consumed during the day were recorded as snacks (nasta/khaja). Similarly, foods prepared especially for the index child or consumed by the index child were also recorded separately

In addition to the foods identified during focus group discussions, other locally prepared and consumed foods were recorded and coded. The nutrition supervisors verified locally all measurements of foods the households consumed When measurements were in doubt, the household was visited again to verify the measurements

INDEX CHILD SELECTION

Children between the ages of 12 and 59 months on the day of the interview were defined as index children in the study The study required only one index child per household for investigation Thus, in cases in which there was more than one index child in a household, the youngest child was selected and measured The birth date of the children was determined by asking any available member of the household, preferably the child's mother, followed by the father, caretakers, and, if possible, a nearest literate relative Whenever the exact birthday was difficult to determine, the enumerators approximated the month of the child's birth

INDEX CHILD MEASUREMENT

As noted above, the team brought with it from the United States standard measuring equipment, including battery-operated scales precise to 100 grams and a Shore Height Measuring Board precise to 1 millimeter Older and cooperative children were weighed alone, whereas younger, uncooperative children were weighed together with their mother, the mother's weight was then subtracted from the combined weight to record the child's weight.

The team measured the height of the index children in two ways: Those who were cooperative were allowed to stand on the measuring board, those who were uncooperative or unable to stand properly by themselves were asked to lay flat on the board.

SALT AND IODINE TESTING

Household members who were interviewed were requested to provide a sample of salt they consumed for testing purposes Team members first visually inspected the sample, and then, depending on the size of the salt crystals, graded it. Enumerators then tested the salt for iodine using a salt-testing solution obtained from the Ministry of Health's Department of Health Services The solution causes salt to change color based on its iodine content, to complete the test, the tester compares the resulting color with a color chart provided in the testing kit (The teams' color charts

were specially prepared to protect against fading) After matching the color of the salt with that in the chart, the enumerators recorded the appropriate codes on the questionnaire In addition, they discussed with interviewees the importance of iodine for good health and well-being.

VARIABLES OF INVESTIGATION

Based on a survey's objectives, variables under study are generally grouped into two categories: dependent and independent.

Independent Variables

For the current survey, the teams identified the following as independent variables: altitude of the area where households are located, distance of households as measured by the number of days it takes to walk to the nearest road head, number of family members, ethnic background, and whether participating in the VFC/A program Because gender difference and age are important variables in terms of food consumption, the teams also included the age and sex of the index child in the list of independent variables.

Dependent Variables

Because one of the overall objectives of the INBS is to determine the impact of income on nutrition, dependent variables were categorized into two subcategories (1) variables measuring stunting and wasting of index children, and adequacy of energy, protein, and vitamin A consumption in index children; and (2) variables measuring the adequacy of energy, protein, and vitamin A consumption in the family overall.

Stunting

Stunting is a term used in the field of nutrition to denote chronic malnutrition. It is calculated mathematically, being a ratio of height to age Stunting is gender specific A height-to-age (HA) ratio that is two standard deviations below the median set by the World Health Organization (WHO) is regarded as stunting

Wasting

Wasting is another term used in the field of nutrition to denote acute malnutrition. Like stunting, it is calculated mathematically, being a ratio of weight to height Wasting, too, is gender specific and follows an internationally acceptable standard for a given age, in this case, a weight-to-height (WH) standard For a given child, a WH ratio that is two standard deviations below the WHO median is regarded as wasting.

Nutrient Adequacy

Caloric adequacy. Every individual requires a certain number of calories to carry out his or her daily activities The amount varies according to age, sex, physiological condition, and the type of work one performs. Based on these factors, an internationally accepted recommended daily intake (RDI) of calories, or food energy, has been determined specific to age, sex, physiological condition, and type of work. (The U.S recommended daily energy intake for children ages one to three years is 1,300 calories, for children ages four to six years, 1,800 calories)

Caloric adequacy is calculated by comparing an individual's RDI with the total number of calories he or she obtained from food consumed on a given day Caloric adequacy in this report is expressed in terms of percentage of adequacy, which is the product of the ratio of consumption to RDI multiplied by 100

Protein adequacy. Everyone also requires a certain amount of protein to carry out his or her daily activities. Adequate protein is also needed to repair worn tissues, synthesize various enzymes and hormones, and promote overall growth and development The amount one needs varies according to age, sex, physiological condition, and type of work one performs. Based on these factors, an internationally accepted RDI of protein has been determined specific to age, sex, physiological condition, and type of work. (The U S. recommended daily allowance for children of average height and weight who engage in light to medium physical activity is 16 grams for those age one to three years, and 24 grams for those age four to six years)

Protein adequacy is calculated by comparing an individual's RDI of protein with the total amount of protein he or she obtained from foods consumed on a given day Protein adequacy in this report is expressed in terms of percentage of adequacy, which is the product of the ratio of consumption to RDI multiplied by 100

Vitamin A adequacy. A set amount of vitamin A is also essential for every human being. Adequate vitamin A is needed to keep the body's epithelia (membranous tissue) healthy, maintain the immune system, continue the regeneration of cells, and promote overall growth and development. The amount needed varies according to age, sex, and physiological condition. Based on these factors, a universally accepted RDI of vitamin A has been determined specific to age, sex, and physiological condition (The U.S. recommended daily allowance for children of average height and weight who engage in light to medium physical activity is 400 RE for children age one to three years, and 500 RE for those age four to six years)

Vitamin A adequacy is calculated by comparing an individual's vitamin A RDI with the total amount of vitamin A he or she obtained from foods consumed on a given day Vitamin A adequacy is expressed in terms of percentage of adequacy, which is the product of the ratio of consumption to RDI multiplied by 100.

In this study, the total amount of food prepared and consumed in the family was calculated by measuring the same food items on the spot during the interview process The total amount of protein, energy (calories), and vitamin A that could be obtained from the total amount of food prepared and consumed was also calculated to check for nutrient adequacy. Nutrient adequacy among the family was then determined by comparing the data generated from this calculation with the appropriate RDIs The calculations were based on the nutrient density of Nepali foods according to statistics from the Central Food Research Laboratory in Kathmandu.

DATA ENTRY AND ANALYSIS

All recorded observations from the field were brought to APROSC and entered into a computer. A single individual was assigned the job of data entry The data entry person was supervised and assisted by the nutrition coordinator during the entire data-entry stage The total sample was carefully analyzed after data had been entered in order to correct for human error during entry. The entire data set was cross-checked for quality by the principal coordinator of the study, a DAI nutritional consultant, and an advisor from USAID/Nepal. Once data entry was complete, analysis of the data was carried out using EPIinfo[2].

[2]EPIinfo is a word processing, database, and statistical microcomputer system used in epidemiology

CHAPTER THREE

GENERAL CHARACTERISTICS OF SAMPLE HOUSEHOLDS

This chapter presents the general characteristics of sample households selected from both the intervention (Rapti) and nonintervention (Bheri) areas The first section discusses study area characteristics, in terms of altitude and distance The second section provides information on demographic characteristics, such as household size, caste, and the distribution of index children by sex and age.

CHARACTERISTICS OF THE STUDY AREA

The different kinds of food items consumed locally vary according to altitude, because in Nepal altitude plays an important role in determining cultivation practices and types of commodities cultivated. For that reason, as alluded to earlier, the sample households in this study are grouped into four categories based on their elevation those in inner terai, at elevations below 1,000 meters; those in river valleys and low hills, at elevations from 1,000 to 1,500 meters; households in mid hills, at altitudes from 1,501 to 2,000 meters; and households in high hills and the mountain region, situated above 2,000 meters.

As shown in Table 5, of the 854 households surveyed, almost half (47 8 percent) live in mid hills. Only 4.2 percent live in high hills, and 24.2 percent reside in inner terai. The rest are located in low hills. The large variation in geographic distribution of the households can be partially explained by the fact that about 70 percent of the sample were collected from VFC/A intervention areas (see Table 6), whereas the other 30 percent came from nonintervention areas The VFC/A project mostly targeted its effort in the pocket areas of Rapti's mid hills. The variation also indicates that factors such as population density, in addition to VFC/A participation, need to be factored into the analysis.

Table 5
Distribution of Sample Households, by Altitude

Altitude in Meters	No of Households	Percent of Households
Below 1,000 m	207	24 2%
1,000-1,500 m	203	23 8%
1,501-2,000 m	408	47 8%
Above 2,000 m	36	4 2%
Total	854	100%

Table 6
Distribution of Households, by Participation in the VFC/A Project

Zones	VFC/A Participants	No of Households	Percent of Total
Rapti Bheri	Yes No	595 259	69 7% 30 3%
Total	Y/N	854	100%

It is believed that people living closer to roads or trails participate in market transactions more frequently than those living in remote areas As a result, this study has included household distance from the nearest road head as one of the independent variables important in explaining the household's nutritional status (see Table 7).

The distance variable represents all major highways, interdistrict motorable roads, seasonal roads, and trails In the survey, distance represents the number of days it takes to walk from the homestead to the nearest road head or trail head, with a day's walk defined as taking eight hours. Distance is divided into three categories, each specifying a certain length of time it takes to walk from the household to the nearest road head or trail head: less than one-half day; one-half to one day; and more than one day. Table 7 shows that of the total sample, approximately 61 percent live in areas that are less than a day's walk to the nearest road head or trail head

Table 7
Distribution of Households, by Walking Distance to the Nearest Road Head

Walking Distance	No. of Households	Percent of Households
Less than ½ day ½ - 1 day More than 1 day	313 205 336	36 7% 24 0% 39 3%
Total	854	100%

DEMOGRAPHIC CHARACTERISTICS

Family size, particularly in the context of Nepal, is known to play a fairly significant role in household food distribution and, consequently, in the nutritional status of family members Therefore, even though family size was not considered while designing the study, it was recorded and analyzed during implementation

According to the Central Bureau of Statistics, the national average household size for Nepal in 1995 was 5 6. In the sample, approximately 60 percent of the households have up to 6 members, another 25 percent have 7 to 9 members, and 15 percent have more than 9 members (see Table 8)

Table 8
Distribution of Households, by Family Size

Family Size	No of Households	Percent of Households
< 5 members	253	29.6%
5-6 members	262	30.7%
7-9 members	208	24 4%
> 9 members	131	15 3%
Total	854	100%

The survey revealed the existence of several castes in the sample area. However, these castes were regrouped into six categories primarily because the number of households representing some castes was very small; for example, there were only 3 Muslim households in the entire sample. The decision to regroup the different castes into six was based on similarities in food consumption habits and customs Thus, all Bahuns, Yogis, Giris, and Puris were lumped into the Bahun-and-related category; the Sunuars, Lohars, Charmarkars, Suchikars, Parihars, and Kuchikars were placed in the Matwali-and-related category (occupational caste group); and the Newars, Kumals, Magars, and Gurungs were placed in the Tibeto-Burman-and-related category. The Chhetris, Chaudharis and related, and Mohamadans each represented a category by itself (see Table 9).

When organizing the data by the six categories indicated, the Chhetris and Chaudharis appear to be the largest groups — approximately 68 percent of the entire sample were made up of these two caste groups These two castes are then followed by the Tibeto-Burman and Matwali groups.

Table 9
Distribution of Households, by Ethnic Background

Ethnic Background	No of Households	Percent of Households
Bahun and related	70	8 2%
Chhetri and related	297	34 8%
Matwali and related	96	11 2%
Tibeto-Burman and related	101	11.8%
Chaudhari and related	287	33.6%
Mohamadan	3	0 4%
Total	854	100%

The gender distribution of children between the ages of 12 and 59 months, for the nation as a whole, is 51 percent male and 49 percent female (Central Bureau of Statistics, 1995). In this study, 47 percent of the sample children are girls, 53 percent boys (see Table 10) Of the total number of children surveyed, about 80 percent were 47 months or younger at the time of the interviews, the other 20 percent or so were 48 to 59 months old Compared with the national average of 26 4 percent, the near-five-year-olds in the sample appear to be underrepresented at 19 6 percent. One reason for this gap could be that the survey team selected only those households with children under 60 months old, those without children in this age range were left out of the sample, as in the case of Jinabang.

Table 10
Distribution of Households, by Gender and Age of Index Children

Gender and Age	No of Index Children	Percent of Index Children
Gender		
Male	456	53 4%
Female	398	46.6%
Age		
12-23 months	231	27 0%
24-35 months	246	28 8%
36-47 months	210	24 6%
48-59 months	167	19 6%

CHAPTER FOUR

FINDINGS ON NUTRITIONAL STATUS OF INDEX CHILDREN

This chapter presents the findings on the nutritional status of children between the ages of 12 and 59 months living in the sampled areas. The nutritional status of adults was not recorded, for reasons already discussed Nutritional as well as nonnutritional factors determining nutritional status are presented below The first section discusses the anthropometric indicators among the index children. The second section presents other factors affecting nutritional status, such as the prevalence of diarrhea and fever and the practice of breast-feeding

STUNTING AND WASTING AS INDICATORS OF NUTRITIONAL STATUS OF INDEX CHILDREN

Stunting (height-to-age) and wasting (weight-to-height) are two key indicators of malnutrition. When analyzed by altitude, the survey data show that stunting among children is most prevalent in the hill areas of Rapti and Bheri. Table 11 shows that the incidence of stunting is approximately 20 percent greater among households at altitudes above 1,000 meters than below. Families in the mid hills (1,501 to 2,000 meters) were found to experience stunting at a 4-percent-higher rate than those living in other elevations of the hill region The higher prevalence of stunting at greater altitudes is perhaps attributable to increased exposure to illness as well as inadequate availability of and accessibility to health care, a chronic problem within the Nepalese health-care system.

The prevalence of wasting, a term indicating acute malnutrition, was found to be highest in the plains and lower hills of Rapti and Bheri Wasting in the surveyed areas appears to be inversely related to altitude it occurs among only 6 percent of children in the high hills but climbs to 12 percent in the plains and low hills The lower incidence of wasting with increased altitude is consistent with the study team's findings regarding nutrient consumption, especially in relation to protein and calories (see Chapter Five).

Table 11
Nutritional Status of Index Children, by Altitude

Altitude in Meters	Stunting (percent)	Wasting (percent)
Below 1,000	49%	12%
1,000-1,500	67%	12%
1,501-2,000	71%	8%
Above 2,000	67%	6%

Stunting and wasting, for some reason, occur more often among children living one-half to one day's walk from the nearest road than among those living either less than half a day or more than a day from the closest road (see Table 12) This finding appears to be related to the quality of health care available in remote areas To establish the exact nature of the relationship between location and health care, the quality of health care in and around the study area needs further examination

The role of nutrient consumption in the prevalence of infectious diseases in children also requires further detailed study Nonetheless, even if children at midway points between roads were found to consume more nutrients than their peers, they would have less access to health care than those living close to roads

Table 12
Nutritional Status of Index Children, by Distance

Walking Distance	Stunting (percent)	Wasting (percent)
Less than ½ day	60%	10%
½ -1 day	70%	13%
More than 1 day	65%	11%

Contrary to prevalent assumptions, the incidence of malnutrition among children between the ages of 12 months and 59 months was found generally to decrease with an increase in family size (see Table 13). Wasting is dramatically less frequent in families with five or more members than in those with fewer than five. One explanation for this finding is that large families have more hands to share the child-care responsibilities, which results in the proper care and timely feeding of children Large families also have more members available to seek health-care facilities In small families, people find it difficult to provide good, attentive child care while simultaneously spending long hours on the farm or in the field.

In the case of stunting, the difference by family size is less marked than with wasting Nonetheless, stunting remains a major problem even in large families, where every one of two children ages 12 to 59 months was found to be suffering from severe chronic malnutrition.

Table 13
Nutritional Status of Index Children, by Family Size

Family Size	Stunting (percent)	Wasting (percent)
<5 members	68%	16%
5-6 members	65%	9%
7-9 members	63%	8%
>9 members	57%	9%

In the sample population, the incidence of stunting is highest (73 percent) among the Tibeto-Burman-and-related ethnic group, followed by the Bahun, Chhetri, and Matwali groups (61 to 68 percent). (See Table 14) Conversely, the Chaudharis, an ethnic group living in the terai and inner terai, experience a much lower incidence of stunting (37 percent) This is not to say stunting is not a problem among the Chaudharis, as a matter of fact, the prevalence of stunting among this group is high.

Wasting is most prevalent among children belonging to the Chhetri, Matwali, and Chaudhari groups. In the sample, wasting was found to be least frequent among Bahun and Tibeto-Burman children.

Table 14
Nutritional Status of Index Children, by Ethnic Background

Ethnic Background	Stunting (percent)	Wasting (percent)
Bahun and related	61%	7%
Chhetri and related	64%	13%
Matwali and related	68%	18%
Tibeto-Burman and related	73%	7%
Chaudhari and related	37%	13%

The incidence of stunting in the sample increases as age increases (see Table 15) For every 10 children ages 48 to 59 months in the sample, 7 are stunted Conversely, the incidence of wasting decreases with age. Wasting was found to be most severe among those ages 12 to 23 months, with about 2 of every 10 children in that age category suffering from the condition Among the oldest children (48 to 59 months), 3 of every 50 suffer from acute malnutrition

Table 15
Nutritional Status of Index Children, by Age Group

Age in Months	Stunting (percentage)	Wasting (percentage)
12-23	59%	19%
24-35	62%	10%
36-47	68%	7%
48-59	71%	6%

The overall nutritional status of children in the study area, especially in relation to chronic malnutrition, is consistent with the findings of the 1996 Nepal Multiple Indicator Surveillance (NMIS) health and nutrition study, carried out under the direct supervision of the National Planning Commission. NMIS found a national average stunting rate of 63 percent and a wasting rate of 6 percent less than the finding of the present survey NMIS, however, studied children between the ages of 6 and 36 months of age

NONNUTRITIONAL DETERMINANTS OF NUTRITIONAL STATUS OF INDEX CHILDREN AND THEIR FAMILIES

Nutritional status is the result of the interaction between food consumption (a nutritional factor) and the prevalence of illness (a nonnutritional factor) In Nepal, children are vulnerable to many illnesses that deplete nutrients and energy Among the most prevalent are diarrhea, fever, measles, and respiratory infections

In this study, the objective was to record only the prevalence of diarrhea and fever for every household. In addition, the survey team obtained information on household mothers' history of night blindness during pregnancy and the practice of breast-feeding.

Analysis of survey data based on nonnutritional factors by altitude, distance, family size, caste, and age group of the index children generally indicates the highest prevalence of diarrhea and fever among children at high altitudes and in inaccessible places, as indicated by walking distance to the nearest road (see Tables 16 and 17) The data also show that index children in large families generally are less susceptible to diarrhea and fever than are those in small families (see Table 18) Susceptibility to both diarrhea and fever among the sampled children was found to decrease with age (see Table 20). Consequently, those ages 12 months to 23 months are the most vulnerable in the sample.

Information on household mothers' history of night blindness during pregnancy and the practice of breast-feeding indicates that breast-feeding (to mostly one-to-two-year-olds) is more prevalent among households closest to road heads (see Table 16). Similarly, night blindness was found to be more prevalent among those living farthest from road heads and trail heads. (When analyzing the data by altitude, however, as shown in Table 17, the results indicate no discernible pattern.) This finding could result from the high workload in remote areas, where women are responsible for both house and farm work Such double loads leave little time for infant and child care. Furthermore, women living in inaccessible areas are less likely to know the advantages of breast-feeding as promoted by the nutritional education campaigns organized by the Ministry of Health.

Table 16
Prevalence of Diarrhea and Fever among Index Children, and
Prevalence of Breast-feeding and Night Blindness among Mothers,
by Distance (percentage of respondents)

Walking Distance	Diarrhea	Fever	Breast-feeding	Night Blindness during Pregnancy
Less than ½ day	8%	10%	53%	20%
½ - 1 day	12%	6%	53%	22%
More than 1 day	15%	15%	51%	34%

Table 17
Prevalence of Diarrhea and Fever among Index Children, and
Prevalence of Breast-feeding and Night Blindness among Mothers,
by Altitude (percentage of respondents)

Altitude in Meters	Diarrhea	Fever	Breast-feeding	Night Blindness during Pregnancy
Below 1,000	7%	7%	58%	21%
1,000-1,500	10%	7%	46%	19%
1,501-2,000	16%	14%	53%	33%
Above 2,000	11%	19%	34%	9%

Table 18
Prevalence of Diarrhea and Fever among Index Children, and
Prevalence of Breast-feeding and Night Blindness among Mothers,
by Family Size (percentage of respondents)

Family Size	Diarrhea	Fever	Breast-feeding	Night Blindness during Pregnancy
<5 members	15%	14%	58%	28%
5-6 members	14%	9%	51%	29%
7-9 members	9%	10%	50%	26%
>9 members	7%	9%	43%	14%

Table 19
Prevalence of Diarrhea and Fever among Index Children, and
Prevalence of Breast-feeding and Night Blindness among Mothers,
by Ethnic Background (percentage of respondents)

Ethnic Background	Diarrhea	Fever	Breast-feeding	Night Blindness during Pregnancy
Bahun and related	16%	4%	44%	33%
Chhetri and related	10%	10%	54%	24%
Matwali and related	16%	10%	59%	38%
Tibeto-Burman and related	15%	15%	49%	29%
Chaudhari and related	2%	9%	51%	3%

Table 20
Prevalence of Diarrhea and Fever among Index Children, and
Prevalence of Breast-feeding and Night Blindness among Mothers,
by Age Group of Index Children (percentage of respondents)

Age in Months	Diarrhea	Fever	Breast-feeding
12-23	23%	16%	88%
24-35	10%	12%	61%
36-47	7%	7%	30%
48-59	5%	7%	16%

Looking at nutritional status and the prevalence of infectious diseases among the surveyed population of children indicates an interesting relationship with Nepal's health-care system. As noted above, the survey results indicate that the prevalence of diarrhea and fever generally increases with household altitude and distance. Conversely, the quality and availability of health care and the availability of medical supplies are best at low altitudes and distances close to roads.

In addition to improving income status and food availability through interventions such as VFC/A, promoting health-care facilities and quality health care would likely promote good health and nutrition in Nepal, especially in the country's far-flung areas.

CHAPTER FIVE

FINDINGS ON NUTRIENT CONSUMPTION

Nutrients, such as vitamin A, calcium, protein, iodine, and iron, are assuming new importance as their wider roles in human health and development become better understood. Vitamin A deficiency, for example, is the most common cause of preventable childhood blindness worldwide and is linked with an increased risk of childhood morbidity and mortality Even moderate levels of vitamin A deficiency reduce the effectiveness of the immune system, making children more susceptible to measles, diarrhea, and respiratory infections.

The clinical manifestations of vitamin A deficiency include a range of eye disorders that are commonly seen in children These include night blindness, conjunctival xerosis (Bitot's spot), corneal dryness and ulcerations, and irreversible nutritional blindness Effective vitamin A control reduces morbidity load, prevents nutritional blindness, and even averts many childhood deaths

Vitamin A adequacy in this study is calculated from the total amount of vitamin A obtained from the foods consumed on a given day This amount is then compared with the appropriate RDI Vitamin A adequacy is expressed in terms of percentage of adequacy

Vitamin A deficiency is closely associated with protein-energy deficiency. If the level of protein-energy is increased, the levels of vitamin A and other micronutrients will also increase. The underlying causes of protein-energy malnutrition in Nepal often point to low-quality source of protein, insufficient levels of energy consumption, and lack of access to sufficient varieties of nutrient-rich food. In addition, increased susceptibility to infection, worm infestation, and inadequate and inaccessible health-care services further expose the vulnerable to diseases that accelerate and exacerbate malnutrition In the short run, protein-energy malnutrition leads to wasting, but when extended for a longer period, it can lead to chronic malnutrition or stunting in adolescents and growing children

This chapter presents information on the status of nutrient consumption among the sample households. The findings on nutrients are presented in three sections The first two focus on vitamin A, protein, and caloric intake by altitude, distance, family size, caste, and age group of the index children and their families. The third section addresses iodine adequacy All information was obtained using the 24-hour food preparation and consumption recall method described in Chapter Two.

NUTRIENT ADEQUACY AMONG INDEX CHILDREN

For various reasons, it was decided this study would focus only on vitamin A, protein, and calories in analyzing nutrient adequacy among the sample population The study team found that adequate consumption of these nutrients is directly correlated with altitude and distance, with an increase in adequacy corresponding with an increase in elevation and remoteness Table 21 shows that, generally, the higher the altitude, the higher the prevalence of children consuming adequate amounts of nutrients. This is particularly evident for protein and caloric consumption Similarly, Table 22 shows that adequate nutrient consumption generally increases with distance from the

nearest motorable road or trail This finding corroborates national figures, which show that Nepal's southern districts are vitamin A deficient. (Consequently, vitamin A distribution programs are under way to distribute synthetic vitamin A in capsules twice a year.)

Table 21
Percentage of Index Children Consuming Less Than 100 Percent of Adequate Nutrients, by Altitude

Altitude in Meters	Calories	Protein	Vitamin A
Below 1,000	89%	66%	58%
1,000-1,500	73%	42%	27%
1,501-2,000	67%	40%	35%
Above 2,000	53%	31%	39%

Table 22
Percentage of Index Children Consuming Less Than 100 Percent of Adequate Nutrients, by Distance

Walking Distance	Calories	Protein	Vitamin A
Less than ½ day	80%	56%	48%
½ - 1 day	70%	45%	31%
More than 1 day	69%	38%	36%

When comparing the adequacy of nutrient consumption by family size, households with five to nine members appear to be relatively better off across all surveyed nutrients (see Table 23). Although the smallest households consume fewer calories than all other families, they consume more protein and vitamin A than families with more than nine members (see Table 23)

Table 23
Percentage of Index Children Consuming Less Than 100 Percent of Adequate Nutrients, by Family Size

Family Size	Calories	Protein	Vitamin A
<5 members	79%	49%	41%
5-6 members	68%	43%	38%
7-9 members	71%	41%	30%
>9 members	77%	57%	50%

Among all the castes living in the survey areas, the Tibeto-Burman and related groups consume the most adequate amounts of calories and protein (see Table 24). Vitamin A consumption, however, is highest among the Bahun and Chhetri groups The Chaudhari index children are the worst off in terms of adequate consumption of all three nutrients

Table 24
Percentage of Index Children Consuming Less Than 100 Percent of Adequate Nutrients, by Ethnic Background

Ethnic Background	Calories	Protein	Vitamin A
Bahun and related	84%	53%	21%
Chhetri and related	75%	43%	30%
Matwali and related	77%	42%	42%
Tibeto-Burman and related	60%	38%	37%
Chaudhari and related	93%	78%	78%

Analysis of nutrient consumption and its adequacy by age group of the index children shows that those who were 36 to 47 months old at the time of the interviews were by far the best in terms of consuming adequate amounts of calories and protein (see Table 25). Children ages 12 to 23 months were the worst off in terms of caloric and protein intake, but their intake of vitamin A was the most adequate among all the age groups.

Table 25
Percentage of Index Children Consuming Less Than 100 Percent of Adequate Nutrients, by Age Group

Age in Months	Calories	Protein	Vitamin A
12-23	94%	74%	30%
24-35	75%	40%	32%
36-47	54%	29%	40%
48-59	66%	39%	33%

Nepal's diversity of ethnic groups and cultures is reflected in the variety of food preparation methods, consumption patterns, and food choices among its people Several food taboos, beliefs, and do's and don'ts prevail throughout the country. Because the availability of certain food items differs by geographic region, so does the staple food among regions Different food items have different nutrient densities, but many Nepalese lack adequate information about these differences Consequently, the Nepalese commonly feed their children based on traditional beliefs about food rather than its nutritional content

This may be one reason the study team found no discernible pattern of food consumption among the index children surveyed.

The team's varied findings regarding consumption and the prevalence of illness may also be related to the bioavailability of nutrients present in the food Worm infestation, which is very prevalent in Nepal, may also contribute to reduced nutrient absorption and increased intestinal loss Issues such as these need attention and should be addressed appropriately in future surveys Such analyses could be performed to clarify nutrient consumption and status among the survey population

NUTRIENT ADEQUACY AMONG SAMPLE FAMILIES

This section looks at the adequacy of nutrient consumption among family members other than index children. Tables 26 and 27 show that families living in hill areas and more than a day's walk from roads consume relatively more calories and protein than those living in inner terai Among hill-dwelling families, those living above 2,000 meters are dramatically better off than others in terms of adequate nutrient consumption

Consumption of vitamin A is also better in the hills, as well as among households that are more than one-half day but less than one full day from a road Families living in the mid hills (elevations of 1,500 to 2,000 meters), however, appear to lag other hill dwellers in terms of adequacy. Households in areas that are less than half a day's walk from the nearest road experience the most inadequate consumption of vitamin A Inadequate vitamin A consumption also occurs at a comparatively high rate among households located beyond a day's walk from a road.

Table 26
Percentage of Family Members Consuming Less Than 100 Percent of Adequate Nutrients, by Altitude

Altitude in Meters	Calories	Protein	Vitamin A
Below 1,000	47%	26%	54%
1,000-1,500	28%	9%	36%
1,501-2,000	29%	7%	41%
Above 2,000	11%	3%	14%

Table 27
Percentage of Family Members Consuming Less Than 100 Percent of Adequate Nutrients, by Distance

Walking Distance	Calories	Protein	Vitamin A
Less than ½ day	41%	17%	48%
½ - 1 day	33%	14%	35%
More than 1 day	23%	5%	40%

When analyzing the data by family size, adults in families with fewer than four members were found to be better off than others in terms of caloric, protein, and vitamin A consumption (see Table 28).

Table 28
Percentage of Family Members Consuming Less Than 100 Percent of Adequate Nutrients, by Family Size

Family Size	Calories	Protein	Vitamin A
<5 members	24%	8%	36%
5- 6 members	28%	8%	40%
7- 9 members	32%	13%	43%
>9 members	55%	24%	56%

In Nepal, food consumption varies by altitude and ethnic background (see Table 29) The survey team found that Tibeto-Burman families are best off in terms of caloric consumption, Matwali and Chhetri families consume the most protein, and Bahun families consume the most adequate levels of vitamin A. Chaudharis are worst off, taking in the poorest levels of calories, protein, and vitamin A Matwalis also consume relatively inadequate levels of vitamin A

Table 29
Percentage of Family Members Consuming Less Than 100 Percent of Adequate Nutrients, by Ethnic Background

Ethnic Background	Calories	Protein	Vitamin A
Bahun and related	30%	13%	29%
Chhetri and related	30%	8%	39%
Matwali and related	36%	10%	50%
Tibeto-Burman and related	27%	10%	39%
Chaudhari and related	49%	25%	60%

The team generally found families' consumption of nutrients to exceed that of children. Considering the foods and other edibles produced by the VFC/A project, it is likely that people in the intervention areas feed less food and fruit to children than they consume themselves Additionally, feeding raw food and fruit to children is prohibited in many instances in Nepal because several such foods are linked to various illnesses (for example, tomatoes are connected with the common cold, and plums are linked with dysentery).

IODINE ADEQUACY AMONG SAMPLE FAMILIES

Iodine is an important micronutrient in the human diet It is essential for thyroid hormone synthesis and the regulation of all metabolic activities in the body Inadequate levels of iodine can lead to goiters, cretinism, and decreased mental capacity and physical performance Iodine deficiency is also associated with increased spontaneous abortions, stillbirths, and neonatal death The importance of iodine is also increasingly being recognized in the performance and productivity of livestock

Iodine deficiency in Nepal is well known and continues to be emphasized by various international organizations and agencies working in the field of iodine-deficiency prevention and

control. Based on their findings, iodine-supplementation programs have been in operation in Nepal since 1973. However, despite nearly 25 years of supplementation activities, iodine deficiency in Nepal is not yet under control and continues to impair nutrient metabolism and utilization, a condition that has contributed to the extended state of malnutrition among the Nepalese population

Edible salt is the principal source of iodine in Nepal Iodine content varies by type of salt, and the type of salt consumed depends on where a household purchases it and how it is transported The method of storage and transportation of salt is crucial to the level of iodine retention, because iodine has a tendency to evaporate when exposed to sunshine and water. Studies to date suggest that powdered salt retains the most iodine.

Because of the importance of iodine and its deficiency in the Nepali diet, the study team examined salt consumption among the sample population. The following section discusses the types of salt consumed by households at various elevations and distances from roads The subsequent section discusses the iodine content of the salt most commonly consumed in Nepal and analyzes iodine adequacy among families in the sampled households.

Consumption of Salt by Type

In Nepal, edible salt generally comes in four forms crystal, granular, mixed (crystal and granular), and powder. Tables 30 through 33 show the consumption of salt type by altitude, distance, family size, and ethnic background From these tables, it is obvious that the most commonly consumed salt at all altitudes and distances and by all family sizes and ethnic groups is "big crystal" salt. Indeed, the tables show that at every altitude and distance, more than 73 percent of the salt consumed is in crystal form. At elevations above 2,000 meters, 94 percent of salt is consumed as crystals. Despite the fact that powdered salt retains the most iodine of all salt used in Nepal, its consumption among the sample population is almost negligible, reflecting the problem of iodine deficiency. Powdered salt is generally more expensive than other salt and is cumbersome to transport.

Table 30
Consumption of Salt Type, by Altitude

Altitude in Meters	Big Crystal	Granular	Mixed	Powder
Below 1,000	86%	4%	8%	2%
1,000-1,500	79%	2%	15%	4%
1,501-2,000	80%	3%	14%	2%
Above 2,000	94%	3%	3%	0%

Table 31
Consumption of Salt Type, by Distance

Distance	Big Crystal	Granular	Mixed	Powder
Less than ½ day	88%	3%	7%	2%
½ - 1 day	87%	1%	10%	1%
More than 1 day	73%	4%	19%	4%

Table 32
Consumption of Salt Type, by Family Size

Family Size	Big Crystal	Granular	Mixed	Powder
<5 members	86%	1%	11%	2%
5-6 members	78%	5%	13%	4%
7-9 members	81%	3%	13%	2%
>9 members	84%	3%	0%	3%

Table 33
Consumption of Salt Type, by Ethnic Background

Ethnic Background	Big Crystal	Granular	Mixed	Powder
Bahun and related	84%	4%	6%	6%
Chhetri and related	79%	1%	16%	4%
Matwali and related	84%	3%	11%	1%
Tibeto-Burman and related	84%	3%	12%	1%
Chaudhari and related	81%	8%	6%	5%

Iodine Content of Edible Salt

The survey team measured the iodine content of the most commonly consumed salt among sampled households As shown in Tables 34 through 37, the tests revealed that at all elevations, most of the salt consumed contains 7 parts per million or fewer of iodine. For 64 percent of the salt consumed by households above 2,000 meters, the iodine content is zero This is not surprising, given the fact that iodine has a tendency to evaporate when exposed to air and water for long periods of time.

The tests also revealed that very little of the salt consumed contains 30 parts per million or more of iodine, regardless of household altitude, distance, family size, or ethnic background Approximately 25 percent of the salt in all surveyed households contains 15 parts per million of iodine

Table 34
Iodine Content of Salt, by Altitude

Altitude in Meters	0ppm	7ppm	15ppm	30 ppm
Below 1,000	24	52	16	8
1,000-1,500	36	37	25	2
1,501-2,000	28	40	27	5
Above 2,000	64	36	0	0

Table 35

Iodine Content of Salt, by Distance

Distance	0ppm	7ppm	15ppm	30 ppm
Less than ½ day	23	50	21	6
½ - 1 day	35	33	30	3
More than 1 day	35	40	21	5

Table 36
Iodine Content of Salt, by Family Size

Family Size	0ppm	7ppm	15ppm	30 ppm
<5 members	21	57	17	6
5-6 members	29	41	23	4
7-9 members	30	41	24	5
>9 members	36	38	25	5

Table 37
Iodine Content of Salt, by Family's Ethnic Background

Ethnic Background	0ppm	7ppm	15ppm	30 ppm
Bahun and related	44	39	13	4
Chhetri and related	26	40	27	7
Matwali and related	34	36	28	2
Tibeto-Burman and related	34	39	24	4
Chaudhari and related	17	65	13	5

CHAPTER SIX

IMPACT OF THE VFC/A PROJECT

The overall objective of the VFC/A project was to increase household cash income, employment, and productivity in Nepal In order to achieve this objective, the project promoted the commercialization of small-farm agriculture through the production and marketing of site-specific, high-value commodities in the midwestern hills and mountain region of Nepal. The program has proved successful in helping small farmers diversify into commercial, high-value crops In fewer than five years, Rapti has experienced a tremendous increase in the commercial production and sale of fresh vegetables, vegetable seeds, and apples

The rate of growth of commercial VFC/A crop production has been truly astounding According to the 1997 Agricultural Practices and Crop Budget Survey, the highest growth rates have been achieved for fresh vegetables (36 percent), seed potatoes (31 percent), and vegetable seeds (23 percent), and the participation of households in the project has grown annually at a rate of 10 percent

The VFC/A project's impact on vegetable consumption has been significant. As explained in the income report, for each doubling of the amount of vegetables produced, vegetable consumption has increased by 90 percent (see "Household Income Survey of the Rapti and Bheri Zones, Nepal," as cited in footnote form in Chapter One).

RAP technical report #14, 1997). The effect on nutritional status of the increased availability and consumption of vegetables is complex, but in the long run it is expected to be beneficial. Findings so far show improvement in the nutritional status of families and children participating in VFC/A Preliminary analysis of the data, however, shows that these improvements are modest.

On the surface, the VFC/A project appears to have had an effect when one compares the improvements in nutritional status among those living in intervention areas with the nutritional status of those in nonintervention areas. This is especially true regarding the incidence of wasting among all surveyed children and of stunting among those ages 12 to 23 months This conclusion, however, requires further analysis, because a certain amount of time must pass before nutritional status indicators, particularly stunting, can be used to confirm a visible, measurable impact

In terms of consuming adequate amounts of calories, protein, and vitamin A, families that participated in the VFC/A project are relatively better off than those that did not. In Rapti, site of the intervention areas, only 30.4 percent of families consume inadequate amounts of calories, compared with 36.3 percent of families in Bheri, where no interventions took place (see Table 38). Similarly, for protein, 11 3 percent of Rapti families consume inadequate levels, versus 13 1 percent of Bheri households. Vitamin A consumption is also worse in Bheri (45.6 percent of families consume inadequate levels) than in Rapti (40 3 percent) Statistically, however, only the difference in caloric consumption is significant (P = 0.09)

Table 38
Percentage of Families Consuming Less Than 100 Percent of Adequate Nutrients

Zone	Total No.	Calories	Protein	Vitamin A
Rapti	595	30 4%	11 3%	40 3%
Bheri	259	36 3%	13 1%	45 6%

Given that diet and disease are closely linked, the study team examined the prevalence of fever and diarrhea and the practice of breast-feeding among the sample population in relation to the families' nutritional status Table 39 shows that more children from Bheri households suffer from diarrhea than do children from Rapti households More Rapti children, however, run a fever. Nonetheless, both findings are statistically insignificant. Thus, it is difficult to understand the effect of these illnesses on nutritional status

Table 39
Percentage of Children Experiencing Fever, Diarrhea, and Breast-feeding

Zone	Fever	Diarrhea	Breast-feeding
Rapti	11 6%	10 9%	49 5%
Bheri	9 3%	14 3%	57 5%

The effect of the VFC/A project on nutritional status can be observed in Table 40, which shows the nutritional status of children ages 12 to 59 months in both participating and nonparticipating households As illustrated, children who participated in the VFC/A project are less acutely malnourished (as measured by wasting) than those who did not participate. This finding indicates somewhat VFC/A's contribution to the reduction of acute malnutrition, or wasting Stunting, a longer-term manifestation of malnutrition than wasting, is marginally more prevalent among children in Rapti than in Bheri Neither the wasting nor the stunting figures, however, show any statistically significant difference between children of VFC/A program participants and those of nonparticipants.

Table 40
Status of Malnutrition among Children Ages 12-59 Months

Zone	Total Children	Nutritional Status	
		Stunting (Percentage)	Wasting (Percentage)
Rapti	595	64 9%	10 8%
Bheri	259	63.3%	11 6%

Data on adequate consumption of nutrients among children ages 12 to 59 months in Rapti and Bheri indicate that about 8 percent more children are consuming adequate amounts of calories in Rapti than in Bheri. For Rapti as a whole, however, approximately 72 percent of children in this age group are not consuming 100 percent of the required level of calories (see Table 41) The same is true for Bheri, where about 77 percent of children are getting inadequate amounts of calories

Adequate protein and vitamin A consumption also continues to pose a problem among children ages 12 to 59 months Table 41 shows that, in Rapti, 48.2 percent of children lack adequate levels of protein, and 41.2 percent receive inadequate amounts of vitamin A. The picture is also bleak in Bheri, where 40.9 percent of children have less than enough protein, and 33 6 percent have insufficient amounts of vitamin A.

Table 41
Percentage of Children Consuming Less Than 100 Percent of Adequate Nutrients

Zone	Total No	Calories	Protein	Vitamin A
Rapti	595	71 8%	48 2%	41 2%
Bheri	259	77 2%	40 9%	33 6%

CHAPTER SEVEN

CONCLUSIONS

The overall health and well-being of surveyed residents in Rapti and Bheri seem similar, as the difference in nutritional status between those living in intervention and nonintervention areas appears to be marginal. Nonetheless, having had the opportunity to observe household members in both Rapti and Bheri during the survey, the study team members say it is obvious that the VFC/A project had some beneficial effect on the health and nutritional status of the population in the intervention areas VFC/A participants show improved nutritional status as measured by certain indicators For example, total macronutrient consumption is better among families in Rapti than among those in Bheri. However, micronutrient consumption has shown little improvement, especially in children

Various factors could have caused the modest improvement in the nutritional status of children in the intervention areas. One key factor could be the weakness or absence of a system of evaluating VFC/A's influence on nutritional status Information from the field indicates that the intervention process was not implemented in all places, and that different types of "subintervention" were carried out in different places If the data were to be analyzed further, according to type of intervention activities and the duration and extent of benefit one might gain from them, the effect of the interventions would likely become more visible, even in children Such an analysis calls for some mechanism to measure the impact of VFC/A activities on the health and nutritional status of children, especially with regard to micronutrients.

Another factor contributing to the modest improvement in nutritional status of children could be due to the persistent faith in traditional practices and cultural beliefs about foods Households, particularly in rural areas, for example continue to link several foods with various illnesses, unaware of the nutritional value of the products they produce. Consequently, there is serious need to include educational efforts in future activities to maximum the benefits of programs like the VFC/A. Even though the VFC/A program did improve somewhat the nutritional status of participants, had some nutrition promotion activities been introduced along with the project, the degree of improvement could have been much more significant.

To improve nutritional status further, nutrition education, disease prevention, and the quality of health-care services, with an emphasis on availability and accessibility, must be considered, along with an increase in the variety of food production

ANNEX I
FNBIA TEAM

FNBIA TEAM

1.	Dr. Janardan K.C	Chief Coordinator	All Survey Areas
2	Dr. Bhakta R. Dahal	FNBIA Coordinator	All Survey Areas
3.	Mr Murari R. Kaini	Supervisor	
4.	Mr Subarna M Shrestha	Supervisor	
5.	Mr Surya P Adhikari	Supervisor	
6	Mr. Madhu Sudhan Bhattarai	Supervisor	
7	Mr Chudamani Bhandari	Supervisor FNBIA Team	
8	Mr. Hari Krishna Shah	Supervisor FNBIA Team	
9.	Mr. Shambhu Kafle	Supervisor FNBIA Team	
10	Mr. Bharat Mani Panta	Supervisor FNBIA Team	
11	Mr Pitamber Simkhada	Food Enumerator	
12.	Mr Dharma Raj Dahal	Food Enumerator	
13.	Mr. Khagendra Adhikari	Food Enumerator	
14	Mr Dilli Raj Bhandari	Food Enumerator	
15	Mr Janardan Pokharel	Food Enumerator	
16	Mr Ganesh Acharya	Food Enumerator	
17.	Mr. Krishna Simkhada	Food Enumerator	
18	Mr. Sarad Chandra Simkhada	Food Enumerator	
19.	Mr. Pandav R. Dahal	Food Enumerator	
20	Mr Lokendra Dhakal	Food Enumerator	
21.	Mr Sabin Kumar Karki	Food Enumerator	
22	Mr Bhan Bahadur Ayer	Food Enumerator	

ANNEX II

REPORT ON PRETEST RESULTS

Report Of Activities and Results of Pretest Carried out To Conduct A Baseline Survey on Nutrients & Vitamin-A Rich Food Consumption in Rapti and Bheri for Future Program Development

ASSESSMENT OF PATTERNS OF FOOD CONSUMPTION

A team of international and local experts funded by USAID visited the Dang valley and parts of Salyan to collect information on food consumption in the family Special focus was given to consumption of food rich in vitamin A, protein and calorie Five focus group discussions were carried out among two ethnic groups in Shantinagar VDC in Tulsipur, two ethnic groups at Kapurkot (Gorpa VDC) in Salyan district, and one from among women belonging to a vegetable production group in Rukum district Thirty-three different food items were identified as most commonly consumed food in the area Based on the preparation of food and amount served to the children, portion sizes were determined Portion size-one was defined as the amount of food consumed by children belonging to age 1-2, portion size-two for age 2-3 and portion size three for age 4 and 5 Vitamin A content on each portion size was estimated in terms of retinol equivalents (RE) or Beta carotin (BC) per portion size depending upon the RE or BC per 100 grams of specific food item

OBJECTIVES OF PRETESTING

General Objectives

The general objective of the pretest was to orient enumerators and provide opportunity to supervisors for overall field survey activities.

Specific objectives were to·

i) Provide practical orientation to enumerators & supervisors,

ii) Adjust questionnaire and procedures to ensure proper survey execution,

iii) Apply survey instruments in households

Pretesting of the questionnaire

Considering the feasibility of pretesting, Pachkhal (Rampur) VDC of Kavrepalanchowk district was chosen as one of the sites for pretesting twelve food items Twelve income baseline survey enumerators and four APROSC supervisors, along with three local professionals and an USAID Nutrition expert, visited the pretest areas. Thirty-two households were visited in Kavre and five households in Bhaktapur district. Family food consumption using 24 hour food consumption recall and anthropometry using common bathroom scales and measuring tapes for weight and height were carried out. A day-long training of supervisors and enumerators was undertaken in APROSC prior to the actual pretesting Training was organized to provide orientation on how to measure food items, and determine portion sizes using actual food items as identified in the Dang valley focus group discussions. Income baseline survey enumerators were also included in the training program based on the assumption that they would play a contributory role to the food consumption enumerator during the actual field data collection.

The training schedule was divided into three components Introduction, application of questionnaire and anthropometry The first component addressed institutional roles, purpose of the survey, and selection of household/children Components two and three covered such topics as questionnaire description, approaches to the households, food item measure and model, food densities, weight, volume, portion sizes and preparation and consumption practices, filling out the questionnaire, and cross checking and supervisors' role (See attached training programs).

Since actual instruments to be used in the field were not available during the training, as well as during pretesting in the field, it was decided that a separate training session focusing on anthropometry should be conducted at a later date, but before the fieldwork

Results

Table 1: Typical day meal in a given family

	Quantity	Rt/100gm	RE/day	Qu/1-2 yr child	RE/day
Rice	200 gm	0	0	100	0
Dal (Lentil)	800 gm	65	520	40	26
Sag	600 gm	150	900	20	45
Achar	50	100	50	5	5

* If cow ghee is used in Dhal, it is likely to add more REs for the family

Table 2: Source of typical supplementary Vitamin-A rich food for 1-2 year olds in a given family.

	RE/100 gm	1-2 yr child	RE/day
Breast milk	182	200	364
Milk & Butter milk	220	220	-
Pumpkin	17	50	-
Papaya	50	50	9
Curds	137	50	25
Liver	1000	30	300
Eggs	600	50	300

Table 3:Anthropometry of children 12-60 months of age.
n=38

HA			WA			WH		
Male	Percentile	Female	Male	Percentile	Female	Male	Percentile	Female
75%	<3	60	67	<3	53	25	<3	13
10	3	13	5	3	20	5	3	6.5
50	5	6.5	13	5	0	15	5	6.5
5	10	6.5	5	10	6.5	0	10	0
5	20	6.5	5	20	0	15	20	33
0	30	0	5	30	13	5	30	6.5
0	40	0	0	40	0	5	40	0
0	50	0	0	50	0	25	50	6 5
0	60	6.5	0	60	0	0	60	6 5
0	70	0	0	70	0	5	70	0
0	80	0	0	80	6 5	0	80	0
0	90	0	0	90	0	0	90	0
0	95	0	0	95	0	0	95	0
0	97	0	0	97	0	0	97	0
	>97	0	0	>97	0	0	>97	20
100		99	100		99	100		98.5

Table 4:Anthropometry of Adults (BMI)

	Female			Male		
	Under wt.	Ideal wt	Over wt.	Under wt	Ideal wt	Over wt
No	17	12	6	9	1	0
%	48.6	34 3	17.1	90	10	0

NB BMI= Body mass index, cut-off points for under- and over-weight females and males are 19, 20 and 22 and 23 respectively

Training of Nutrition Supervisor

Since four food consumption baseline survey supervisors had been hired from outside APROSC, a separate training was scheduled to after receiving accurate instruments Although the training was meant for the Food Consumption Baseline Survey (FCBS) supervisors, APROSC supervisors and enumerators were also included in the training program to improve the overall quality of information collection.

Two half-day training sessions were organized to cover both the theoretical and practical aspects of anthropometry The theoretical discussion covered such areas as the baseline survey, findings from the pretest, unpacking, checking, standardizing, safety and care of instruments, discussion on questionnaire, cross checking the field questionnaire and supervisors' role This was followed by a discussion on measurement of height and weight by each supervisor and enumerator After having a series of duplicate measurements, variations on duplicate measurements were checked and re measurement was done in areas showing large variation

In order to improve efficiency in taking anthropometric measurements and strengthen the confidence of enumerators, a field-visit and measurements in the field was carried out Each supervisor and enumerator measured four separate children independently, and each enumerator demonstrated each child's measurement to the coordinator, supervisors, and other enumerators The final questionnaire was prepared upon completing all pretest activities A copy of the final questionnaire is attached as annex 3 in this report.

Finally, considering the workload of the enumerators, concern of the funding agency and the advice of the USAID personnel, anthropometry of adults and dip stick test of urine, was omitted from the FCBS activity

CONCLUSION

The overall activity carried out during pre-test seemed adequate for carrying FCBS in the field Protein, calorie and vitamin-A consumption data have not been included in the report because of unavailability of computer software to analyze the collected information Therefore, relation of food consumption and nutritional status is not included here

Training Programs

Training of Enumerators and Supervisors for Nutrition Survey

A. Introduction to the Survey:

1. Institutional roles USAID, DAI, APROSC, NO-FRILLS Rapti project history. Procedures and organization of the survey—teams and supervisors
2 Purpose of survey, importance of vitamin-A, conclusions from Tulsipur pre-survey work, design of questionnaire and sample.
3. How to select households and index children Qualifying questions, substitution of households

B. Application of questionnaire:

1 Introduction and permission How to ask questions, sequence, not to direct response, write answers.
2. Use of measures and food models/pictures to estimate quantities and portions
3 Review of questionnaires between enumerators to ensure completeness

C. Anthropometry:

1 Theory and practice of anthropometry References, indices, cut-offs
2. Care and use of instruments, zering scales, sites to install
3 Preparation of subjects undress subject, remove shoes
4 Positioning and holding subjects
5. Reading of measurements Estimation Noting readings, including decimals.
6 Standardization repeat readings.
7 Interpretation and feedback of results to parents on cards Counseling?

Training of Supervisors for

Food Consumption Baseline Survey

1. Introduction. Dr K C.
2. Findings from the Pretest: Dr Bhakta R Dahal
3. Unpacking, checking, standardizing of instruments
4. Measuring index children
5. Safety and care of instruments
6 Questionnaire description
7. Cross checking between Economic and Nutrition survey process
8. Supervisor's role

a Quality of information Measurement, recording, facilitating

b Care of instrument. during weighing, transport, storage

c Management of posters

d Daily log of questionnaires

e Facilitating the interview process: Child selection, household selection, respondent selection, motivating selection for quality information

f Communication with coordinators.

ANNEX III
FINAL QUESTIONNAIRE

Sr No (to be filled afterwards) | | | | | |

AGRICULTURAL PROJECTS SERVICES CENTRE
FOOD CONSUMPTION SURVEY OF RAPTI/BHERI ZONES
HOUSEHOLD LEVEL QUESTIONNAIRE

					Q N
01	Card No				01
02	District				02
	Dang	1	Surkhet	6	
	Rolpa	2	Dailekh	7	
	Salyan	3	Jajarkot	8	
	Pyuthan	4			
	Rukum	5			
03	Village Development Committee Village (Tole)				03
04	Ward No				04
05	Household No				05
06	Name of the household head				
07	Ethnic group				07
08	Sex of the head of the household				08
	Male	1	Female	2	

Name of the Interviewer
Signature of the Interviewer
Date of interview:
Name of Supervisor:
Signature of Supervisor

0.9 Family details. Give names of all the members of your family (Note age, sex, literacy, educational level of each one of the members of the family. Also note the destination month of leaving and returning if members of the family have left home for more than a month during the last year) Refer to the code provided in seperate sheets

		01	02	03	04	05	06	07	08	09	10	11	12	13
Name of family Members	Number	Age (in years)	Sex code	Family status code	Martial Status code	Literacy code	Education Qualifi-cation passed code	Stud-ying at School code 6-25 yr	Code for destination after leaving home	Month of leaving home code	Year of leaving home	Month of returning home code	Year returned home	Purpose of leaving home code
	01													
	02													
	03													
	04													
	05													
	06													
	07													
	08													
	09													
	10													
	11													
	12													
	13													
	14													
	15													
	16													

III-4

Family Description

10 How many people received meal in your house yesterday ?

	Morning	Evening	Snacks	Total
Above 18 years of age				
5 - 18 years age				
Below 5 years				
Total				

11 Index child's* date of birth (Date, month, year) | | | |

12 Mother and child's weight (kg) together 00 0 | | | |

Anthropometry of index child

13. Weight of child kg. 00.0 | | | |

14. Height of childs c.m. 000 0 | |

15 Age of child completed months 00 0 | | | |

Food consumption questionnaire

16 Did you have feast/festival in your house yesterday ? | |
Yes = 1, No = 2

17 Did you (mother) fast yesterday ? | |
Yes = 1, No = 2

18 Did this index child take vitamin A cap during the last 6 months ? | |
Yes = 1, No = 2

19. Did this index child take vitamin A cap during six month prior to the last 6 month ? | |
Yes = 1, No = 2

20 What is the type of edible salt ? (Please ask for salt and see) | |
Crystal = 1, Mixed = 2, Granular = 3, Powder = 4

21 What is the iodine content in the salt ? (Please test with solution) | |
Nil = 1, 5 ppm = 2, 15 ppm = 3, 30 ppm = 4

22 Do you breast fed this index child ? | |
Yes = 1, No = 2

23 Are you (mother of index child) pregnant ? | |
Yes = 1, No = 2

24 Is this index child suffering from diarrhoea these days ? | |
Yes = 1, No = 2

* Note Index child means, child between 12-60 months of age. If two or more children are found, please take one child that has later month of birth in the year

25. Does this index child have fever these days ?
Yes = 1, No = 2 ☐

26. Do you (mother) prepare food for the family ?
Yes = 1, No = 2 ☐

Last 24 hours food consumption

Instructions:

	Family					Index child			
Food	Morning ml/gm	Day ml/gm	Evening ml/gm	Others ml/gm		Morning ml/gm	Day ml/gm	evening ml /gm	Others ml/gm
1 Rice (hand pounded)									
2 Rice (milled)									
3. Bitten rice									
4. Lentil									
5. Other dal									
6 Soybean									
7. Ghee in dal									
8. Green vegetable									
9 Buck wheat									
10. Maize yellow									
11. Maize white									
12 Wheat									
13 Millet									
14. Barley									
15. Meat									
16. Milk									
17 Butter milk									
18 Curd									
19 Eggs									
20 Horlicks/Cerelac/Viva									
21 Mango Ripe									
22. Yam yellow									
23 Papaya Ripe									
24 Orange									
25 Liver									
26 Hydroginated oil									
27 Pumpkin Ripe									
28 Carrot									
29 Ghee cow									
30 Ghee buffalo									
31. Oil									
32 Bread									

53