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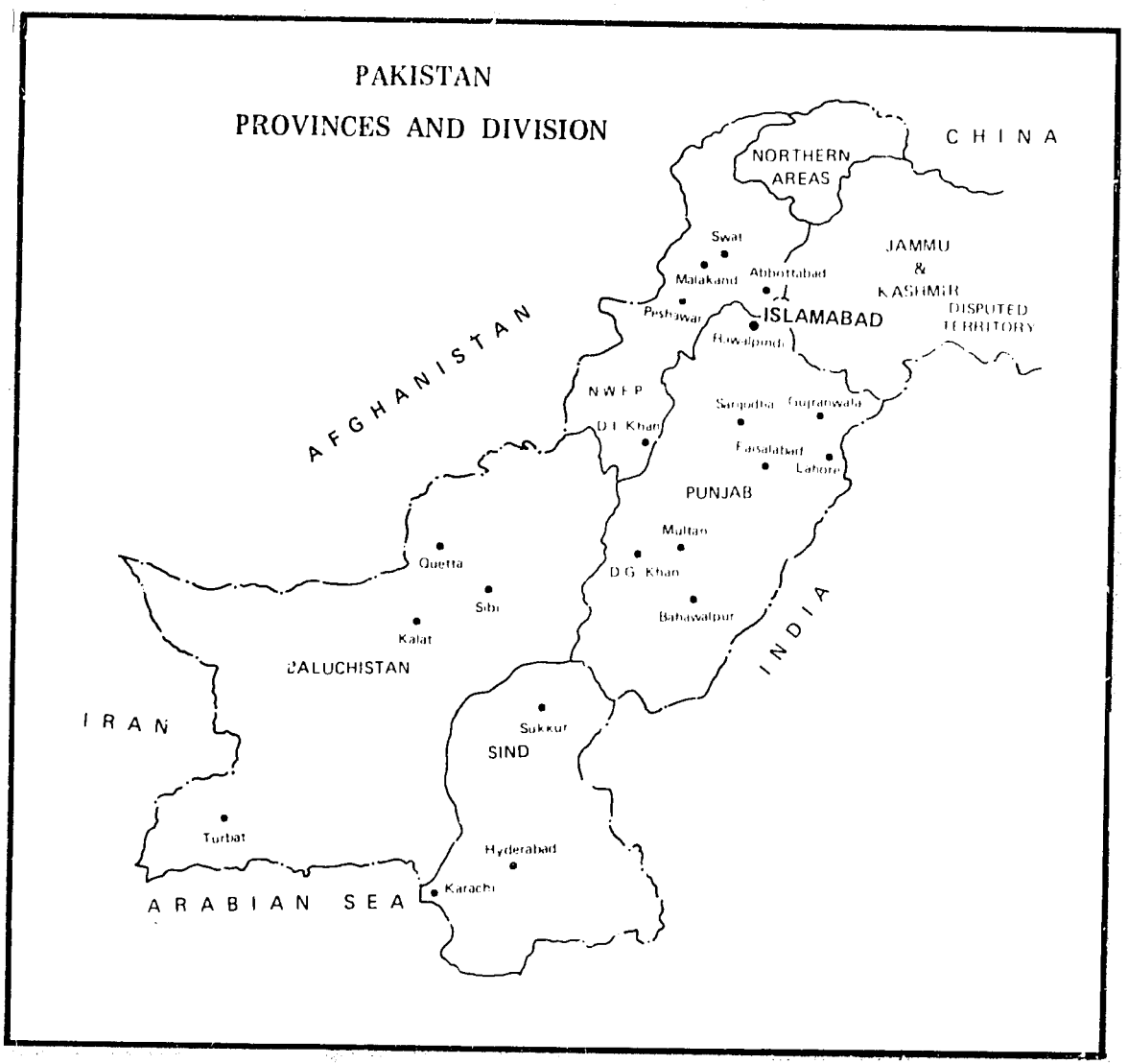

NUTRITION DIVISION
NATIONAL INSTITUTE OF HEALTH
GOVERNMENT OF PAKISTAN
1988

Jill Randell

NATIONAL NUTRITION SURVEY
1985 - 87
REPORT

NUTRITION DIVISION
NATIONAL INSTITUTE OF HEALTH
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REPORT OF THE NATIONAL NUTRITION SURVEY
1985-87, PAKISTAN

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FOREWORD

The Nutrition Division of the National Institute of Health is responsible for generating reliable data about the nutritional situation in the country, to be used by the Government of Pakistan for food and nutrition planning and development for the future.

It has been clear, over the few decades, that as Pakistan made great steps forward in general economic development and provision of social services for its population all was not well with the nutrition situation in the country. Surveys in 1965/66 and in 1976/77 as well as smaller local studies had indicated a substantial prevalence of malnutrition. Experience from Ministries like Health, Rural Development, Social Welfare, Planning and Development, also indicated a malnutrition component in many of the major health and development problems facing the country.

Monitoring this situation, the Nutrition Division of National Institute of Health in 1985, undertook the massive National Nutrition Survey both to clarify the situation regarding Nutritional problems through gathering a large truly representative sample of hard data, and to provide a baseline against which to assess the impact of future programmes.

This was the first time such a massive exercise for nutrition had been undertaken. Naturally, this could not be done by N.I.H. alone. It was a great effort of team work, invloving NIH, the Federal Ministry and Provincial Deptts of Health, Federal Bureau of Statistics, Planning and Development and many more. The help of these departments and agencies is gratefully acknowledged.

Data collection for the survey was conducted throughout the country on a multi-centric basis: teams were formed by Provincial Health Department at Divisional level to undetake the huge task of interviewing and taking samples from the 60,000 respondents. The professional and personal committment of these teams from the Provinces was beyond measure. They were really the ones who made this survey possible.

Other persons or agencies to whom special acknowledgement must be made are: the Federal Bureau of Statistics, for providing the sampling frame that gives the survey its credibility as representative of the whole country; Dr. Siraj-ul-Haq Mahmood Senior Chief Health and Dr. Mushtaq A. Khan, Chief Nutrition in the Ministry of Planning and Development and all their colleagues and staff at both Federal and Provincial level for support and encouragement; Dr. Alfred Zerfas, the USAID Consultant who assisted with the computerized data analysis- his unflagging energy, unfailing enthusiasm and unrivalled expertise helped raise the data analysis to a truly international standard; the Federal Health Ministry and the Provincial Departments of Health whose co-operation was all that could be desired.

Finally I must say a special word of ackowledgement to Dr. Zakaur Rehman Malik, Chief Nutrition Division for his experience and wisdom in supervising and guiding the work, and Dr.M.Motiur Rehman Khan, Principal Scientific Officer, Nutrition Division, who had the onerous responsibility of planning, directing, analysing and writing of the report of this survey, with the fullest participation of Mrs. Riffat Aysha, Mr. Mohammad Saleem, Miss. Fatima Sughra, Mr. Maqsood Ahmed, Mr. Mohammad Azhar, Sh. Arshad Aziz, Mr. Peter Godwin and all the staff of the Nutrition Division. Their effort was great, their achievement enormous.

Assistance with resources, expertise and constant support must also be very gratefully acknowledged, from outside agencies and donors, especially USAID, the ODA of the British Government, and UNICEF, who very kindly arranged to print this report.

Malnutrition is not merely the result of ignorance of what constitutes a blanced diet. It is a reflection of a wide range of socio-economic factors: poverty, lack of education and social and health services, high fertility, unhygenio living conditions, and real food shortages. As such its presence in the country is a reminder, and should be a goal to all Pakistani's, to continue striving for the development of their nation. At NIH we consider this struggle both a professional and a moral duty.

It is my hope that the report of this massive survey will fulfill our obligaton to provide useful advice to the Government of Pakistan, based upon reliable data, to help eradicate malnutrition.

Lt. General
(Dr. Syed Azhar Ahmad)
Executive Director,
National Institute of Health,
Islamabad.

PREFACE

Ever since the publication of the 1st National Nutrition Survey Report in June 1970 by the then Directorate of Nutrition Survey and Research, Ministry of Health, Government of Pakistan, the Nutrition Division of National Health Laboratories (now National Institute of Health) inter alia inherited the responsibility of coducting nutrition surveys and submitting the reports to the Government of Pakistan.

Normally these surveys should be conducted after every 10 years but because of the secession of East Pakistan, there has been a gap between 1971-75 on account of the departure of mostly East Pakistani staff. The present survey was planned in 1984 and conducted in 1985-87 . The current survey included a much larger sample of 60,000 individuals, as compareed to the 1st survey which was based on 8,800 indiv duals. Also the scope and approach of the persent survey has been greatly enlarged and updated in view of the newer knowledge, experience gained and the national requirements.

The purpose of this survey is to assist decision makers and their advisors to gather, interpret and use nutritional and associated information efficiently in order to prepare a realistic strategy for development programmes. Undoubtedly it is the aim of any government ultimatily to bring about better nutritional and health standards in the country.

It is in fact this image of the future which we see in the mirror of the past. Towards achieving this end, we work. And hope that this document i.e. 2nd National Nutrition Survey Report of Pakistan will be useful for the planners, administrators, trainers and researchers in medical institutions in particular, and the Government of Pakistan in general.

(Dr. Zaka-ur-Rehman Malik)
Chief
National Institute of Health
Islamabad.

ACKNOWLEDGMENTS

Malnutrition is widely recognized as a public health problem of critical national importance. The Government of Pakistan is concerned to tackle this problem and improve the nutritional status of the population in general and that of the children below the age of 5 years in particular. In order to suggest suitable policies for over-coming the problem, with available resources, accurate knowledge is required about the extent to which people consume sufficient food of adequate quality, the effect of infectious diseases, how these relate to human health and well being, and the determinants of these factors. Specifically the availability of uptodate and reliable information in respect of the current nutritional status of the population is of vital importance. The data available from the Nutrition Survey Report of West Pakistan (1965-66) are deficient in many respects and do not give a clear picture of this nutritional status.

As such, it was recognised by 1984 that there was an urgent need to undertake a fresh assessment of the nutritional status of the country's population on a wider scale with a view to gauging the extent of prevailing under-nutrition and mal-nutrition in Pakistan and to indicate effective remedial measures for the control of malnutrition.

There was no possibility that the Nutrition Division of NIH could have achieved alone, this massive task: to organize and conduct a National Nutrition Survey on a scale the country had not seen before. I very gratefully acknowledge all the support, advice, help and encouragement we received from so many quarters; to mention and few:

Lt. Gen. Dr.Syed Azhar Ahmad, Executive Director of NIH who made sure we completed the work;

Maj. Gen. (Retd) M.I.Burney, former Executive Director who made sure we started it, and followed it through;

Dr. Zaka-ur-Rehman Chief, Nutrition Division who oversaw all aspects;

My colleagues in the Nutrition Division whose energy and experience made the work possible;

Our colleagues in Federal and Provincial Health Departments, at all levels, throughout the country, who collected the data for us;

Colleagues, advisers and consultant from other Government and donor agencies who supplied expertise and assistance when we needed it;

Finally, the people of Pakistan who made the survey possible by answering willingly the questions we asked.

I know that, with a team like that behind us, we could not fail to achieve our goal.

A survey such as this one should be seen as providing at one and the same time a description of an existing situation, and a framework for analysis and prognosis. The patterns of malnutrition described by the survey reflect not only the suffering of children presently malnourished, but also the likely fate of future children, unless urgent action is taken.

Dr. M. Motiur Rehman Khan
Principal Scientific Officer
Nutrition Division
National Institute of Health,
Islamabad.

NATIONAL NUTRITION SURVEY 1985 - 87
PAKISTAN

1. Executive Summary

The Pakistan National Nutrition Survey 1985-87 provides information about the nutritional status of the nation with particular emphasis on at-risk groups - young children and their mothers. Similar studies conducted in 1965-66 (Nutrition Survey of West Pakistan) and 1976-77 (Micro-Nutrient Survey) and other smaller studies had indicated important nutritional problems, particularly Protein-energy malnutrition (PEM) and anaemia. It appeared that inappropriate weaning practices were widespread, that breast feeding was being increasingly compromised by that of the bottle and acute infections, especially diarrhoea were important causes of malnutrition. The current survey confirms these conclusions.

The National Nutrition Survey was a massive undertaking which began in 1985 as a joint Federal and Provincial Government activity. The Nutrition Division, National Institute of Health was responsible for the survey, from planning to report. The field work, done by Provincial Health Departments was completed in early 1987. The report was finalised in December 1988.

This National Survey was conducted to indicate the extent, severity and location of malnutrition in the country. According to a sampling frame supplied by the Federal Bureau of Statistics, 8,360 randomly selected households, almost 60,000 individuals including 11,285 children under five years, 1,135 pregnant and 2,949 lactating mothers were examined. Anthropometry, selected clinical signs and haemoglobin tests were conducted on all household members; questions on feeding habits, quantitative food weighment and laboratory tests were done on all at-risk subjects and subsample of others.

The food intake study component of over 10,000 subjects, provided insights into several problems associated with malnutrition. Not only were amounts of foods and nutrients considered, but also qualitative information concerning the percentage of subjects eating types of foods. This enabled comparisons between results for different ages and biological groups .

Extensive editing was performed on the anthropometric data to account for problems in bias and imprecision. We consider these estimates of malnutrition prevalences are a reasonable reflection of nutritional status.

This report indicates that:

Protein-energy malnutrition and anaemia continues as a serious, widespread problem throughout the country. Its scope and severity are essentially unchanged over the last ten years.

According to WHO criteria for low weight-for-age, 52% of young children are normal. 48% are malnutritioned within which 10% are severely so. Anaemia occurs in 65% of young children and in 45% of pregnant/lactating mothers.

Although the criteria of weight-for-age is more commonly used, detailed analysis also focuses on low height-for-age (stunting: an index of chronic malnutrition) and low weight-for-height (wasting : an index of acute malnutrition).

Protein-energy malnutrition is universal. It affects all groups within the nation. It occurs equally in boys and girls. There is little difference between urban and rural areas and cities, and between low and middle socio-economic status areas within cities. As expected, however, upper socio-economic status areas within cities had less malnutrition.

Infants, particularly those under six months of age, show a relatively high prevalence of acute malnutrition, compared with other age groups. This unexpected finding suggests a critical age group that needs priority attention. According to age, general malnutrition reaches a peak prevalence in the second year of life.

Among pregnant and lactating mothers, anaemia increases with age, from 38% of mothers aged 20-24 to 66% of mothers over 45. Of the 4,085 pregnant and lactating mothers surveyed, 34% are underweight for height (Body Mass Index under 19) and 6% perhaps severely so (Body Mass Index under 16). Low weight and height are more commonly among uneducated mothers.

Breast feeding information derived from mothers' recall indicated that 5% of mothers never breast fed and a further 18% introduced bottle feeding early on. These results tend to confirm other studies.

The majority (68%) of young children aged 7-9 months do not consume any food (apart from milk) even though a variety of nutritious foods is readily available in the same household.

Calorie deficiency is a much more serious problem than protein deficiency in young children as evidenced by higher prevalence rates for nutrient intakes.

Iron deficiency is very common in pregnant women and young children.

Because of the design of this survey the expected high rates of goitre indicating iodine deficiency in certain parts of the country could not be identified.

1.1. SUMMARY OF FINDINGS

I. Extent of malnutrition in vulnerable groups at National level

Children under five years of age

* 48% are malnourished (low weight-for-age)
  10% are seriously malnourished (very low weight-for-age)

* 46% have chronic malnutrition (stunting: low height-for-age)
  15% have acute malnutrition (wasting: low weight-for-height)
  Infants have a higher rate of acute malnutrition (20%)

* 65% are anaemic (under 11 gm% haemoglobin).
  28% are severely anaemic (under 9 gm%).

Pregnant/lactating mothers

* 34% are underweight for height (BMI under 19)
  6% are severely underweight (BMI under 16)

* 30% are below 150 cm in height and 6% below 145 cm.

* 45% are anaemic (under 11gm% haemoglobin)
  10% are severely anaemic (under 9 gm%).
  Anaemia occurs in 66% of mothers aged over 45 years.

II. Distribution of malnutrition

* Protein-calorie malnutrition affects all areas of the country.

* There is little difference in the prevalence of malnutrition between boys and girls.

* There is less chronic but more acute malnutrition in urban areas; this affects the children of lower socio-economic status more.

* Malnutrition is most prevalent in Baluchistan, where only 27% of children are normally nourished. In NWFP normal children are 31%, in Sind 36%, and in Punjab 49%.

III. Feeding Practices (recall information)

* 5% of mothers report never breast feeding.

* 18% report using bottle feeding as well as breast feeding.

* The most common reasons for stopping breast feeding are that the child is big, and pregnancy.

IV. Food intake (observation and weighing for one day)

* Breast feeding is practised almost universally throughout the country (90% from 1-5 months of age), although less in cities. The average duration of breast feeding is approximately 15-18 months. The adequacy of breast feeding is another matter.

* Bottle feeding occurs in 13% of infants aged 1-3 months, rises to a peak of 24% at 7-9 months and continues to about 20% during most of the second year of life.

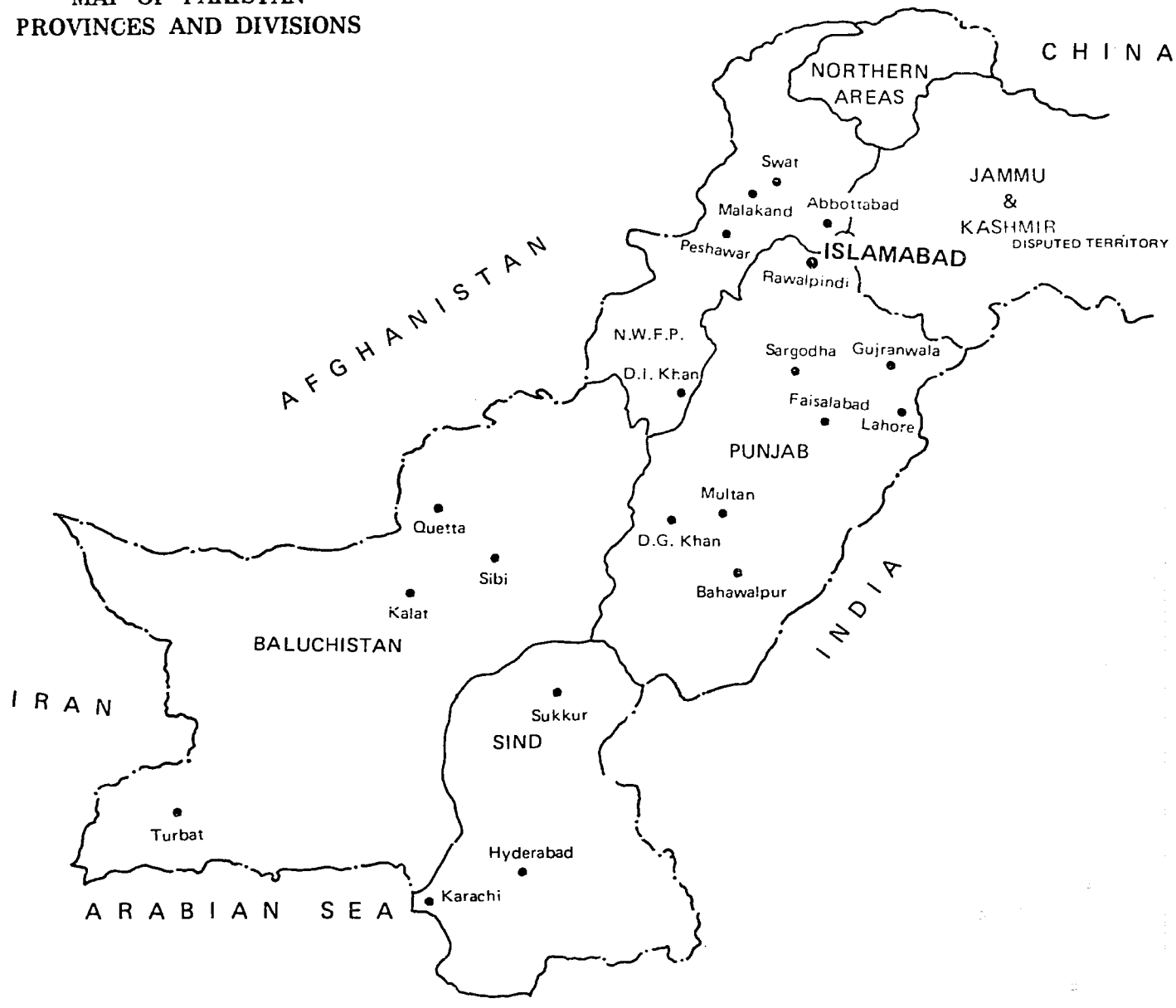
* Most children (68%) aged 7-9 months do not consume food apart from milk. Even by 12-17 months 30-50% eat no food.

* Young children do not eat readily available food (cereals, pulses, meat, vegetables) that is eaten by other members of the same household.

* Caloric deficiency (as shown by nutrient intake) was far more serious than protein deficiency in relation to Protein-energy Malnutrition in young children.

* Iron deficiency is extremely high in pregnant/lactating women as well as in very young children. This confirms the high levels of anaemia in these groups.

MAP OF PAKISTAN
PROVINCES AND DIVISIONS



2. INTRODUCTION

2.1 GENERAL INFORMATION (see also statistical sheet)

2.1.1 Geographical

The Islamic Republic of Pakistan is located between the latitude of 22 degrees 30 minutes and 36 degrees 31 minutes. The total area is 795,791 sq.km. The population according to the census in March 1981 was 83.8 millions growing at the rate of 3% and reached over 100 million by 1988.

Pakistan has three major geographic areas:

The North to North-Western mountainous belt; the arid Baluchistan plateau to its west; and the fertile plain of the Indus River Basin spreading from north-east to south-west, up to the Arabian Sea. The mountainous belt is a largely barren region with some of tallest peaks in the world, like K2.

The vast plain of the river Indus, criss-crossed by an extensive canal net-work, dominates the provinces of Punjab particularly as well as parts of N.W.F.P and Sind. It is thickly populated and extensively cultivated, producing the main food and cash crops of the country.

N.W.F.P. also has a mountainous area to the north. Its major crops are wheat, rice, sugar cane and tobacco. Sind comprises part of the Indus Basin as well as large barren areas. Sind is the most highly urbanized, with Karachi the most populous city and major port of the country. Baluchistan is a sand strewn stony plateau with negligible rainfall. Agricultural activity is limited to scattered subsistence farming and cattle grazing.

The country is on the margin of the monsoon belt. The climate is generally classified as tropical, with temperature variations which embrace both extremes. Rainfall in the plains varies from 30 cm in upper Sind to 150 cm in the Himalayan foothills, which poses occasional threat of floods.

The economy is mainly agrarian. Agriculture contributes 32% of GNP and provides employment to about 60% of the population. Pakistan comprises four provinces Punjab, Sind, N.W.F.P., Baluchistan. FATA, the State of A.J.K and Northern Areas are additional administrative areas. Distribution by population and rural/urban breakup is given in Table 2-1.

BACKGROUND STATISTICS - PAKISTAN (1988 unless otherwise stated)

MAIN INDICATORS	
Total population (millions)	103.8
Population aged 0-15 years (millions)	44.5
Population aged 0-4 years (millions)	17.8
Annual number of births (millions)	3.1
Infant mortality rate (0-1 yr) per 1,000 live births	80
Toddler death rate (1-4 yrs) per 1,000 children	15
Infant and child malnutrition (moderate /severe)	52%/10%
GNP per capita ($ US)	394
HEALTH	
Access to health services (% of population)	85%
Assess to safe water (% of population) urban/rural	53%
Pregnant women age 15-45 (%) immunized against tetanus	50%
One year olds (%) fully immunized	90%
NUTRITION	
Babies with low birth weight under 2.5 kg. (1982)	25%
Mothers breast feeding (%) 6/12 months	92/78
Daily per capita calorie supply (% of requirements)	90%
DEMOGRAPHY	
Life expectancy at birth (years)	61
Fertility rate	5.1
Crude birth rate (per 1,000 population)	42.2
Crude death rate (per 1,000 population)	11.0
Population annual growth rate (1970-1981) (%)	3.1%
EDUCATION	
Primary enrolment ratio (gross)	52.8%
Male/Female	68.5/35.3%
Secondary enrolment ratio (gross)	22.1%
Male /Female	30.9/12.3%
Children completing primary level (% of first grade)	35 %
Adult literacy rate (15 + years) (%)	30 %
Male/Female	35/6 %
ECONOMICS	
GNP per capita annual growth rate (1980-84)(%)	6.5%
Inflation rate (1970-84)(%)	7.1%
Percentage share of total income (top 20%/bottom 40%) 1969-1984	46.7/17.9%
Expenditure on health services as % of Central Government Expenditure	6.0%

Source : Nutrition Division from various Government data, 1988.

In all Pakistan, the urban population is 28%. By the turn of the century, Pakistan is likely to be 1/3 urban. 97% of the population is Muslim.

Table 2-1: Population of Pakistan by Province and Urban/Rural.

	% of total population	% Urban population
Punjab	56.1 %	28 %
Sind	22.6 %	43 %
N.W.F.P.	13.1 %	15 %
Baluchistan	5.1 %	16 %
FATA Islamabad	3.0 %	

(Source: Hand Book of Population Census Data, December, 1985)

Administratively there are 15 Divisions, 68 districts and 302 Tehsils in Pakistan. On an average there are 20-25 Union Councils in each Tehsil. An average cluster of 5-6 Union Councils generally comes under the administration.

There are 44,638 villages in Pakistan with populations ranging from 200 to 3000. In Punjab,the population of a Tehsil on average is 300,000 and of a district, 1,500,000 persons.

The local bodies are run by elected Union Councillors at the village level.

The position of women in society has an important bearing on both their own health and that of their children, and population and population planning. Women in Pakistan inherit property and are economically active in rural areas, though male domination and illiteracy prevents them from utilizing their full potential.

2.1.2 Literacy

Pakistan has very low literacy rates. The national averages are:

Pakistan	-	26.2 %
Urban	-	47.1 %
Rural	-	17.3 %

(Source: Hand Book of Population Census Data, December, 1985)

2.1.3 Agriculture

Land utilization figures are (in million hectares):

Total geographic area	-	79.6
Net area sown	-	15.5
Area sown twice in year	-	3.7
Total annual cropped area	-	19.3
Area under forest	-	2.7

(Source: Agriculture Statistics of Pakistan, 1982, Ministry of Food, Agriculture and Cooperatives, p.112,)

Only 28% of the total geographic area is utilized for cultivation, the rest being mountainous desert, buildup or culturable waste. Only 1/5 of the cultivated area is sown twice a year. A large part of the area therefore lacks intensive cultivation. The bulk of land, unfit for any agronomic or forestry crops, is grazing land and can be used for rearing animals only.

2.1.4 Trends in Agricultural Production.

The percentage breakdown of cropped area by types of crops in 1959/60 and 1981/82 shows the shift in trend in agricultural production.

Table 2-2: Agricultural Production 1959/60 and 1981/82.
(% Cropped Area)

	1959/60	1981/82
Food grains	54.8	57.0
Cash crops	12.1	16.6
Pulses	11.6	6.6
Oil Seeds	4.1	2.8
Vegetables	0.7	0.9
Condiments	0.3	0.6
Fruits	0.3	1.7
Others	15.8	13.8

(Source: Agricultural Statistics of Pakistan, 1982, Ministry of Food, Agriculture and Cooperatives, p.113)

The most striking feature of the agriculture pattern is increasing expansion of area under cereals and cash crops, with a corresponding drop in the area under pulses and oil seeds. During the last 20 years considerable research effort and resources were concentrated on development of high yielding cereal varities and thus pulses and oil seed production diminished. This has an important bearing on the nutritional status of the people of Pakistan.

2.1.5 Health

Health is the responsibility of Provincial Governments. The Federal Ministry sets policies, maintains standards of medical education, promulgates international health regulations and coordinates health care in FATA and a few other areas.

The crude birth rate is 40-42/1000 population while the crude death rate is estimated 10-12 per thousand, giving a growth rate of about 3% .

The estimated infant mortality is about 100-120 per thousand. The sex ratio is 111 males to 100 females. The life expectancy at birth of males is 54.6 and that of females is 54.4.

2.1.6 Primary Health Care.

Primary Health Care (PHC) is organized through an Integrated Rural Health Care (IRHC) complex. A Basic Health Unit (BHU) serves a population of 5000 to 10,000 according to the density, and a Rural Health Centre serves 5-7 BHU's and a population of 25,000-50,000. The complex is linked with the referral system to higher tiers of the health system.

There are about 2500 B.H.U, roughly one in 3 Union Councils. The B.H.U's are currently manned by a medical officer and three paramedics (curative,preventive and gynaecological). There are 488 R.H.C's (one per tehsil on average) each with two doctors and auxiliary workers. A third doctor, primarily for School Health Service and preventive work, has been authorized. The RHCs are planned to have 25 bedded village /community hospitals.

Table 2-3: HEALTH FACILITIES,1986.

Primary Health Centres	8481
Rural Health Centres	488
Basic Health Units	2500
Maternity Child Health Centres	867
Dispensaries	3994
Sub-centres	632
Hospital beds	61690
Doctors	28650
Nurses	7900
Auxiliaries	48920
T.B.As (trained)	30750

(Source: Rural Health Programme of Pakistan, p.8 Planning and Development Division, 1986).

2.2 NUTRITION STATUS

2.2.1 General

Two studies, the West Pakistan Nutrition Survey 1965/66 and the Micro-nutrient Survey 1976/77, and a number of smaller scale, more specialized studies, have been made in Pakistan. The main nutrition problems of Pakistan that emerged from these studies were :

* Protein-Energy Malnutrition manifested by
  - -Growth retardation.
  - -Low birth weight in 30% live born children.
  - -High incidence of marasmus among the peri-urban slum dwellers.
  - -High infant mortality.
  - -Infection and diarrhoea.
* Anaemia: Basically of iron deficiency type: 45% in male and 70% in female population.
* Biochemical evidence of Vitamin A deficiency - 30%.
* Goitre in localized areas of NWFP, most marked in Chitral District, AK and NA areas, Multan Region, Quetta region.

2.2.2 Malnutrition in Children.

The Micro-nutrient Survey 1976/77 used the Waterlow method to combine anthropometric indicators of malnutrition. It found the prevalence of stunting (low height-for-age indicative of chronic protein-energy malnutrition) and wasting (low weight-for-height : acute malnutrition) as follows:

Acute on Chronic	7.2
Acute malnutrition alone	9.5
Chronic malnutrition alone	43.0
Normal	40.3
	100.0

Thus only 40% of children were found to be normal (neither acute nor chronic malnutrition), over 16% had acute malnutrition and 50% chronic.

A more recent study was conducted in 1982 by Ashfaq for WHO, on 1260 children below two years of age. It revealed an especially serious problem among this age group using weight-for-age criteria. Important differences were also observed within the country, with moderate and severe malnutrition being more than twice as common in rural Baluchistan and Sind, as compared with urban Sind or in all of the Punjab.

These results are consistent with the wide extent of early growth faltering and failure in the first 12 months, reported by Paediatricians throughout Pakistan. This problem most likely has its origins in maternal factors and infant feeding practices such as failure to establish full breast feeding and early use of dilute, contaminated liquid feeds, especially related to bottle feeding.

2.2.3 Breast Feeding.

The West Pakistan Nutrition Survey (1966) reported that over 80% of children were breast fed at 21 months and almost 60% for two years or more. Only 0.7 percent of infants were never breast fed. By 1976, the Micronutrient Survey found a reduction in breast feeding duration to 56 % at 21 months and only 21% at two years or more. A number of recent community based studies confirm this trend and indicate that the adequacy of breast feeding has greatly deteriorated.

2.2.4 Bottle feeding

The 1976 survey did not report on bottle feeding, although several studies have indicated its widespread use, especially in urbanized areas. No national estimates, apart from this current survey, are available.

3. THE NATIONAL NUTRITION SURVEY, 1985/87

3.1 BACKGROUND

The Government of Pakistan Sixth Five Year Plan (83-88) had noted that " there still exists mild to severe malnutrition among the vulnerable groups and under specific geophysical conditions". With the Plan's emphasis on a PHC approach to the development of a nation wide health care system, concentrating upon vulnerable groups such as women and children, a critical element in achievement of the Plan's aims was an up-to-date description of the nutritional status of women and children in the country, both for the country as a whole and internally by various geophysical areas. It was decided therefore, to conduct a National Nutrition Survey of Pakistan.

The Project was approved in mid-1984 and funds released in 1985. Sampling and methodology were finalized in early 1985, training of teams was done between April and June 1985. Data collection began in July 1985 in Karachi. Most areas of the country were completed by June 1986. The remaining areas, primarily in Punjab, were finished in early 1987.

Primarily manual tabulation of data took place throughout 1986 and 1987. In September 1987 data was entered in a micro-computer to improve and extend analysis.

3.2 GOALS AND OBJECTIVES

The overall goal of the Pakistan National Nutrition Survey was to provide information about the nutritional status of the population, with particular emphasis on at-risk groups - young children and their mothers. This information can be used to help establish policy and priorities for the planning and implementation of remedial measures to improve the health and nutrition of the population.

The specific objectives of the survey were primarily to:

Estimate the level of the nutritional status of the population. For this, major reliance is provided by anthropometry (for Protein-energy malnutrition) selected clinical signs and laboratory measures (for iron and other nutrient deficiencies).

2. Determine the feeding habits of young children and their mothers.

3. Ascertain recent quantitative food intake of households and their members.

3.3 SAMPLING

The Federal Bureau of Statistics developed a sample design for the National Nutrition Survey. Their Divisional Statistical Officers (or representatives) accompanied terms in the field to identify the sampled blocks and households.

3.3.1 Universe

The universe consisted of all urban and rural areas of the four Provinces of Pakistan defined as such by the 1981 Population Census, excluding FATA, military restricted areas and the district of Kohistan Chitral. The population of the excluded areas constituted about 4% of the total population.

3.3.2 Stratification Plan:

Cities having a population of 500,000 and above (i.e. Karachi, Lahore, Faisalabad, Rawalpindi, Multan, Hyderabad, Peshawar, Islamabad, Quetta) were sampled separately. Within each city low, middle and high income areas had been identified by the Federal Bureau of Statistics and were sampled accordingly. After excluding the population of big cities from their respective districts, the remaining urban population in each district of N.W.F.P, Sind and Punjab Province and each division of Baluchistan Province were grouped together to comprise the urban sampled areas of the nation. The rural population of each district in Punjab, Sind, N.W.F.P were grouped together to comprise rural areas.

3.3.3 Sampling Frame

Each city/town was divided into blocks of approximately 200 to 250 households. These blocks were called enumeration blocks. The sample frame in rural areas was based on a village or a part of the village. The blocks and villages are thus the primary sample units (PSU), and sample households secondary sample units (SSU).

3.3.4 Sample Design:

A two stage stratified sample design was adopted for the Survey. Enumeration blocks in the urban areas and villages in the rural domain were treated as primary sampling units (PSUS). PSUs from each ultimate stratum were selected with probability proportional to size. For the selection of secondary sample units (SSUs), random start sample intervals, were provided by the Federal Bureau of Statistics with full particulars of PSUs and SSUs.

3.3.5 Sample Size and its Allocation.

A sample of 8334 households was fixed to yield the national estimate. The entire urban and rural sample was distributed among the four provinces in proportion to their population, according to the 1981 population census, with slight upward allocation to the smaller provinces of N.W.F.P. and Baluchistan.

The Urban and Rural distributions for blocks (PSU's) and households (SSU's) are given in Table 3-1.

Table 3-1: DISTRIBUTION OF SAMPLE

	No. of Blocks			No. of Households		
	Urban	Rural	**Total**	Urban	Rural	**Total**
Punjab	136	216	352	1904	2808	4712
Sind	94	66	160	1222	858	2080
N.W.F.P.	30	43	73	360	559	919
Baluchistan	19	26	45	285	338	623
Northern Area	-	-	9	-	130	130
Azad Kashmir	3	12	15	40	360	400
TOTAL:-	**282**	**363**	**654**	**3811**	**5053**	**8864**

The estimated sample size for individuals was based on the number of households for urban and rural areas of each province multiplied by their respective average household size, based on census results (Table 3-2).

Table 3-2 : ESTIMATED SAMPLE SIZE FOR NATIONAL NUTRITION SURVEY

	No. OF SSUs (HOUSEHOLDS)			AVE. HOUSEHOLD SIZE			ESTIMATED SAMPLE SIZES		
	URBAN	RURAL	TOTAL	URB	RUR	TOTAL	URBAN	RURAL	TOTAL
PUNJAB	1904	2808	4712	6.9	6.3	6.4	13138	17690	30828
SIND	1222	858	2080	7.0	7.1	7.0	8554	6092	14646
N.W.F.P	360	559	919	7.1	6.9	6.8	2556	3857	6413
BALUCHISTAN	285	338	623	7.6	7.6	7.3	2166	2569	4735
PAKISTAN	3771	4563	8334	7.0	6.6	6.7	26414	30208	56622

3.4 WEIGHTING

Within areas specially defined for sampling purposes (strata), a specified number of households were selected randomly according to population proportions as identified by the 1981 census. Hence the sum of the survey results for all sampled households and individuals in a specific stratum or area will reflect the status of the whole population of that stratum.

However, between these areas or strata, the selection was done randomly, but not necessarily according to population proportion. Hence, adjustments (weighting) must be made in the analysis to total the results which combine areas. These weightings and the basis of their derivation are presented in the following table.

Table 3-3 :WEIGHTING FACTORS USED FOR RURAL/URBAN SAMPLE ESTIMATES

	POPULATION		SAMPLE HHOLDS		WEIGHTING RATIOS		
SR CITIES	NUMBERS (0.1M)	% TOTAL	NUMBER HH	% TOTAL	URBAN	RURAL	PAKISTAN
--SIND--							
KARACHI	5.22	6.4	728	8.7	1.19		0.73
HYDERABAD	0.75	0.9	104	1.2	1.20		0.73
--PUNJAB--							
GUJRANWALA	0.60	0.7	112	1.3	0.89		0.54
LAHORE	2.95	3.6	462	5.5	1.06		0.65
FAISALABAD	1.10	1.3	140	1.7	1.30		0.80
RAWALPINDI	0.80	1.0	112	1.3	1.18		0.73
MULTAN	0.73	0.9	112	1.3	1.08		0.66
ISLAMABAD	0.34	0.4	56	0.7	1.01		0.62
PESHAWAR(NWFP)	0.57	0.7	108	1.3	0.88		0.54
QUETTA (BALU)	0.29	0.4	120	1.4	0.40		0.25
-TOTAL CITIES-	**13.35**	**16.3**	**2054**	**24.6**	**1.08**		**0.66**
SIND URBAN *	2.27	2.8	390	4.7	0.97		0.59
PUNJAB URBAN *	6.63	8.1	890	10.7	1.24		0.76
NWFP URBAN *	1.09	1.3	252	3.0	0.72		0.44
BALUCHISTAN URB*	0.39	0.5	165	2.0	0.39		0.24
-TOTAL URBAN-	**23.73**	**28.9**	**3771**	**45.2**	**0.62**		
SIND RURAL	0.97	13.4	858	10.3		1.00	1.30
PUNJAB RURAL	34.28	41.8	2808	33.7		0.96	1.24
NWFP RURAL	9.40	11.5	559	6.7		1.32	1.71
BALUCH RURAL	3.65	4.4	338	4.1		0.85	1.10
-TOTAL RURAL-	**58.30**	**71.1**	**4563**	**54.8**		**1.29**	
GRAND TOTAL	**82.03**	**100.0**	**8334**	**100.0**			**1.00**

* URBAN NON-CITIES

For example, Karachi has a population of 5.22 million, which is 6.4% of the total population of Pakistan. The number of households designated in the sample and visited on the survey totalled 728, i.e. 8.7% of the total number of households (8334) in the national sample. Hence more households were visited in the survey as compared with the number required for population

proportionality. This excess ratio (8.7%/6.4% = 1.36) had to be adjusted (weighted) in the analysis to ensure equal proportions across areas. The weighting factor (0.73 i.e. 1/1.36) brings the excess ratio for Karachi back to 1.00, which is population proportionality for the national sample as indicated in the lowermost row of the table.

The weighting factors for all rural areas in relation to Pakistan are greater than 1.00 (e.g. NWFP rural = 1.71). This indicates that in proportion to their population, less households were visited in these areas as compared with the urban areas and the necessary adjustment is required in the analysis for national results.

The next table indicates the number of children under five years who were examined in each area, compared with the number of households selected in the sample. The derived ratio, child/household in the last column, is a reflection of the average number of young children sampled in each household, which is approximately 1.1 for the nation, with little variation between cities, urban and rural areas. In one instance (Quetta) the ratio is quite low (0.2) which suggests that young children were missed in the sample.

Table 3-4 RATIO OF CHILDREN 6-60 MONTHS WITH BODY MEASURES -BY HOUSEHOLD

AREA	HOUSEHOLDS		CHILDREN 6-60M		RATIO
	NUMBER	%TOTAL	MEASURED	%TOTAL	CHILD/HH
--SR CITIES--					
SIND CITIES	832	10.0	837	9.2	1.01
PUNJAB CITIES	994	11.9	1130	12.4	1.14
PESHAWAR(NWFP)	108	1.3	178	2.0	1.65
QUETTA (BALU)	120	1.4	26	0.3	0.22
TOTAL CITIES	**2054**	**24.6**	**2171**	**23.9**	**1.01**
----URBAN----					
SIND URBAN *	390	4.7	370	4.1	0.95
PUNJAB URBAN *	890	10.7	1056	11.6	1.19
NWFP URBAN *	252	3.0	310	3.4	1.23
BALUCHISTAN URB *	165	2.0	271	3.0	1.64
TOTAL URBAN	**3771**	**45.2**	**4178**	**46.0**	**1.11**
----RURAL----					
SIND RURAL	858	10.3	791	8.7	0.92
PUNJAB RURAL	2808	33.7	3076	33.9	1.1
NWFP RURAL	559	6.7	719	7.9	1.29
BALUCH RURAL	338	4.1	310	3.4	0.92
TOTAL RURAL	**4563**	**54.8**	**4896**	**53.9**	**1.07**
GRAND TOTAL	**8334**	**100.0**	**9074**	**100.0**	**1.09**
AZAD K. - RURAL	360		36		1.49
AZAD K. - URBAN	40		61		1.53

3.5 METHODOLOGY.

The nutrition survey work was started on a multi-centric basis, i.e. all the provinces provided the survey teams at divisional level. Team members were regular employees of the Health Department seconded for the field work. Each team comprised of the following.

Lady Doctor	- 1
L.H.V.(Lady Health Visitor)	- 2
Technicians	- 2
Supporting staff	- 1
Driver	- 1

The teams at the Provincial/Divisional level were given 6 days training of which half were in the field, and their methods and findings were standardized. A supervisor was appointed full time for each team. In addition sporadic visits were made by Senior NIH Nutrition Division personnel throughout the country.

A triphasic (three dimensional) approach, (i.e. Anthropometric and Clinical, Dietary and Biochemical) was chosen, broadly based on the methods used in the 1965-66 survey with important modifications, such as focusing on at-risk groups in the population.

3.5.1. Household Survey

The households to be included in the survey in particular clusters were selected randomly using the random start and the interval indicated by the Statistical Bureau. In case a particular household was closed or there was refusal the next household was surveyed without change in the sampling interval.

For each of the sample households a proforma/questionnaire include was filled in by the trained LHV. They interviewed an appropriate adult member of the household for general information, and mothers of the particular children for the more specific details, such as feeding practice etc.

Information obtained included the following:

1. Household composition with age, sex and relationship of the members of the family with head of the family.
2. Occupation
3. Educational level.
4. MCH services, ante-natal and post natal care of family members of the household.
5. Child feeding practice and dietary habits during pregnancy and lactating.
6. Management of diarrhoea.

3.5.2 Dietary Survey

A dietary survey of food intake for individuals was done by weighing food just prior to eating. It included all pregnant/lactating mothers and pre-school children and 25% of the

remaining population.

A 24 hours actual dietary intake weighing of cooked foods method were adopted, ie. the food intake at breakfast, lunch, dinner and in between were weighed and recorded on the dietary proforma. Cooked food samples from 10% of the sample households were taken for the analysis of different nutrients to develop a cooked food table, which have been used in part for the present survey. The dietary intake was later converted into nutrient intake by using the nutrient value of cooked dishes.

3.5.3 Clinical Survey

A qualified Physician in each team did the clinical examination. The physicians of all the teams from the particular division were given two days training in the field. Their findings were standardized to minimize personal error.

Each individual (100%) of the sample population underwent abbreviated medical examination using standard clinical proforma. Both positive and negative signs were recorded (e.g pale conjunctiva for anaemia, angular stomatitis for riboflavin deficiency, thyroid enlargement, caries teeth, oedema and muscular wasting) and noted for different nutritional deficiencies.

3.5.4. Anthropometric Examination

Height and weight were recorded for all the individuals (100%) of the sample population. This was done by the trained LHV. The weight was recorded in Kg, and bath room scales were used, which were to be checked and standardized daily. Length/height was measured in centimetres using the measuring tape.

In case of children under 5 years of age, mid-upper arm circumferences were recorded in centimetres in addition to the weight and height.

3.5.5. Biochemical Survey

Blood and urine samples were collected for the biochemical analysis and stool for parasites. Blood samples were to be collected from 25% of the general population and 100% of the pregnant and lactating mothers, and the pre-school children.

It was initially planned to have 5ml blood from the target population. This could not be achieved however, as there was much resistance from both pregnant/lactating mothers and the pre-school children. In the cases where there was resistance to venipuncture, blood from finger prick was obtained, after proper aseptic measures, and at least three micro-capillaries were obtained. In motivated people, 5ml of venous blood was collected.

Haemoglobin estimation was done on the spot by using a Sahli Haemoglobinometer and the reading were recorded on the

clinical form of the particular individual. The blood was transported in a thermos to the nearest BHU/RHC or Hospital or any Laboratory for the separation of the serum. The separation of the serum was generally done in the evenings (i.e. within 48 hours of the collection of the blood) and the serum later was stored in the refrigerator and transported to N.I.H. Islamabad for analysis. Some of the samples were later found to be unsuitable.

Urine samples were to be collected from 25% of the general population and 100% of the pregnant/lactating mothers.

To assess the parasitic infestations in the community, stool samples from 10% of the sample population were collected. Tincture merthiolate was used as prescribed. The samples so collected were analyzed at National Institute of Health for the parasitic load etc.

The percent of subjects to be sampled according to each survey component is summarized in Table 3-5.

Table 3-5: OUTLINE OF SAMPLES AND SUB-SAMPLES

SUBJECTS SAMPLED	SURVEY COMPONENT				
	I.	II.	III.	IV.	V.
SUBJECTS FOR SAMPLE	ANTHROPOMETRY/ CLINICAL	FOOD INTAKE	FEEDING PRACTICES	BLOOD/ URINE	STOOL
AT RISK(1)	100% (14,000)	100% (14,000)	100% (6,000)	100% 14,000)	25% (3,500)
REMAINDER(2)	100% (40,000)	25% (10,000)	- -	25% (10,000)	5% (2,000)
TOTALS	54,000	24,000	6,000	24,000	5,500

(1) AT RISK: Children under 5 years, pregnant/lactating women
(2) REMAINDER: Children 6-17 years, other adults
Figures are approximate.

3.6 CLASSIFICATION OF NUTRITIONAL STATUS USING ANTHROPOMETRY

Anthropometry is an objective quantifiable method to assess the extent and severity of protein-energy malnutrition in young children. Weight and stature (i.e. length or height) are particularly sensitive to reflect adverse nutrition resulting from diarrhoea, infections and poor diet.

In cross-sectional surveys, the frequency or prevalence of low weight (in relation to age) in the young child population indicates the level of general Protein-energy malnutrition (PEM). The frequency of low height indicates the level of chronic, long-

term nutritional problems. Like other indicators, such as young child mortality, it reflects to some extent the level of development of the total population. The frequency of low weight (in relation to height) is more suggestive of recent acute problems and when more severe, corresponds to clinical wasting in the young child. However, most PEM is not readily visualized and can only be identified by anthropometry.

Anthropometric indicators in relation to nutritional status

Because during growth, height and weight vary with age, and weight varies with height, indicators have been developed to standardize results for children of different ages and height. Reference values for all these indicators have recently been developed by WHO, using data from national surveys done in the USA during the 1970's. Results are similar to those from other industrialized countries and the best nourished groups of children in developing countries.

The major indicators are summarized as follows:

INDICATOR	TERMINOLOGY (IF LOW RESULT)	TYPE OF MALNUTRITION
WEIGHT-FOR-AGE	UNDERWEIGHT-FOR-AGE	GENERAL MALNUTRITION
HEIGHT-FOR-AGE	STUNTING	CHRONIC MALNUTRITION
WEIGHT-FOR-HEIGHT	WASTING	ACUTE MALNUTRITION

Weight-for-age

Weight-for-age is a useful and time-honoured method of assessing underweight children, for example in the interpretation of growth charts. Two classification systems are commonly used. One is by WHO. Where underweight corresponds to under 80% of reference weight-for-age and severe underweight under 60% of reference. The other is called the "Gomez" - where Grade 2 underweight is 60 to 75% of reference and Grade 3 below 60%. As the level of PEM will depend on the classification used, care must be taken to be consistent across comparisons. Generally the WHO classification has been followed, but results are also presented with the Gomez classification.

Height-for-age and weight-for-height

The major disadvantage of weight-for-age is that it does not distinguish between acute and chronic PEM. A low height-for-age value reflects chronic PEM (also termed stunting) and a low weight-for-height reflects acute PEM (or wasting).

By convention, under 90% of the value of reference height-for-age is considered indicative of chronic PEM and under 80% of reference weight-for-height of acute PEM. Such divisions reflect to some extent, the association of PEM with morbidity and mortality in young children and correspond to the 3rd percentile or -2 standard deviations of reference population distribution.

In cross-sectional studies, like this survey, height is a more stable measure to make long-term comparisons as compared with weight. The latter fluctuates more depending on seasonal variations and short term influences (e.g. biological variability).

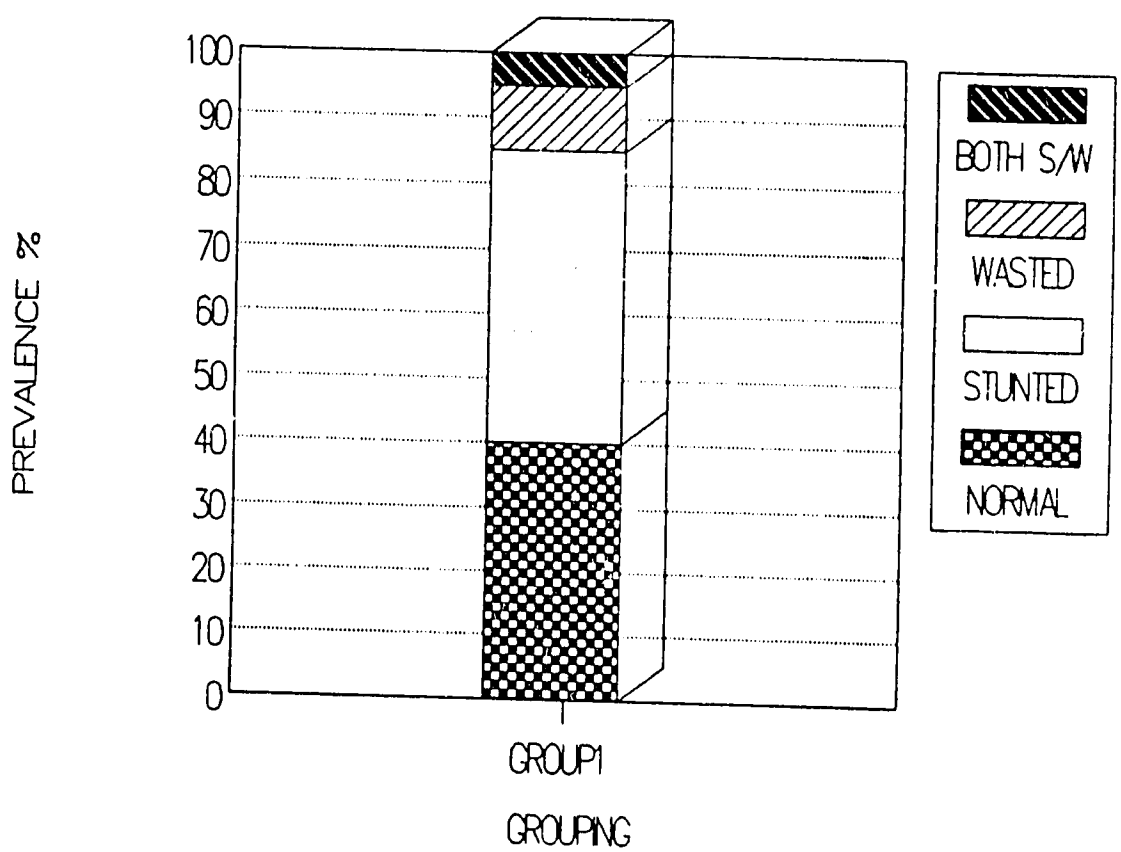
Waterlow classification

A cross tabulation has been developed by Waterlow to indicate whether a subject has acute or chronic PEM or a combination of both. Because many of the tables and graphs in this report use this method of presentation, a brief description for interpreting results is given here. A more detailed account is in the Annex - Interpretation of tables and graphs.

Thus a "normal" child has no PEM - neither acute (wasting) nor chronic (stunting). In the bar charts presented in this report, the prevalence (or percent frequency) of "normal" children in the population is indicated by the stippled lower part of the bar. The size of this lower part can be readily compared across adjoining bars to assess comparative similarities or differences in the population groups described.

PREVALENCE STUNTING AND WASTING

EXPLANATION WITH EXAMPLE (1)



At the other extreme, the uppermost and darkest slice of the bar indicates the extent of children with both acute (wasting) and chronic (stunting) PEM. This represents the group with the highest priority in need. Again, ready comparison can be made across adjacent bars. The second uppermost slice shows the extent of children with acute PEM, but not chronic. These children also have a high priority in need, but are less likely to reflect the underlying long term associations with malnutrition (such as poverty). In combination with the dark upper slice, the total level of acute PEM in the population can be identified.

The central pale slice is for stunting. Usually it is not necessary to take into account those stunted and wasted (Both S/W) as this is relatively small compared with stunting alone.

Arm circumference-for-age

Arm circumference-for-age is also estimated in this study. Although somewhat correlated with weight-for-age in young children, it measures a different aspect of nutritional status (arm muscle and fat). Its value in this survey is primarily to establish baseline estimates for the nation, so that other studies or programs (e.g. screening) using arm circumference have a basis of local reference. This method is extremely convenient (only a tape measure is required) and may be considered when weighing is not possible. By convention, under 80% of reference arm circumference-for-age indicates "arm wasting" or thinness.

Precise age-independent measures

Errors in age determination are likely to distort the results for indicators relying on precise age, such as weight-for age and height-for-age. On the other hand, weight-for-height and arm circumference-for-age (whose reference values are relatively constant from 1 to 5 years) are much less likely to be affected by these errors. Hence results for these indicators may be more reliable than those relying on precise age.

4. RESULTS

4.1 CHILDREN UNDER 5

4.1.1 Anthropometry of Children under Five Years:

Altogether 9866 children aged from 7 to 60 months and 1366 up to 6 months of age were examined for anthropometry. Initial editing and analysis separated these two age groups because more relative measurement variation was anticipated in the very young children. In addition, children from Azad Kashmir were analysed separately, as they did not belong to the national weighted sample.

Some of the children were excluded from the analysis, because of suspect errors. Many of the obvious errors were those of indicating pounds instead of kilograms. Almost one half of these errors occurred in a major city. Other reasons for errors included those of age determination, incorrect weights or heights for various reasons and in a few cases, indicating inches instead of centimetres for height. A number of children (usually below six months or over 4 years) could not have their weight-for-height determined because their heights were too low or too high for the reference heights.

The proportions of the total sample of children excluded from various parts of the analysis were:

Weight-for-age	:	3.1%
Height-for-age	:	3.4%
Weight-for-height	:	6.0%
Arm circumference	:	1.2%
Haemoglobin	:	0.6%

The total number of subjects where one or more exclusions occurred, was 6.5%. Age errors accounted for just under 1% of exclusions.

Editing was conducted thoroughly for three areas - Urban Sind (where most weight errors occurred), Urban Punjab and Azad Kashmir. Results for these, and close examination of distributions of raw results and their combinations for each area studied (corresponding to separate groups of teams) gave a clearer indication of measures to be excluded. A separate account on editing will be available on request, from the Nutrition Division, NIH.

4.1.2 Age and Sex Distribution

Comparison of age distribution with the census data was not possible as the census does not classify children under five years into separate age groups. However, the sample age distribution was similar to that anticipated from demographic expectations. An exception was under-reporting of children aged 60 months, accountable primarily in NWFP, where these children were apparently misreported and grouped in the 5-6 year age group instead.

Table 4-1: AGE DISTRIBUTION OF SAMPLE

AGE RANGES (months)	PERCENTAGE
0- 6	11.8
7-12	12.7
13-24	21.2
25-36	22.1
37-48	19.7
49-60	12.4
SAMPLE SIZE	11285 (including Azad Kashmir)

The percentage results for this table, like all presented (unless indicated otherwise) are weighted to adjust for different sampling ratios (see section 3.4). However, the actual total (not weighted) sample size is included.

There was a distinct clumping of ages to the nearest multiple of 12 months (i.e. year) or 6 months, from 18 months onwards. This would influence the precision of anthropometric indicators related to age (height-for-age and weight for age). Any bias would be related to any systematic direction of age clumping. This was not found, for example, when checking dates of birth to re-estimate age.

The sex distribution shows a slight excess of males over females (52 to 48%), which is consistent with other reports for this age group.

4.1.3 : Prevalence of General Malnutrition (low weight-for-age)

More than half the young children in Pakistan are underweight-for-age (as defined by WHO criteria) at a level which corresponds to "general" malnutrition or PEM. Approximately 10% are severely underweight.

Table 4-1b : PREVALENCE OF GENERAL MALNUTRITION

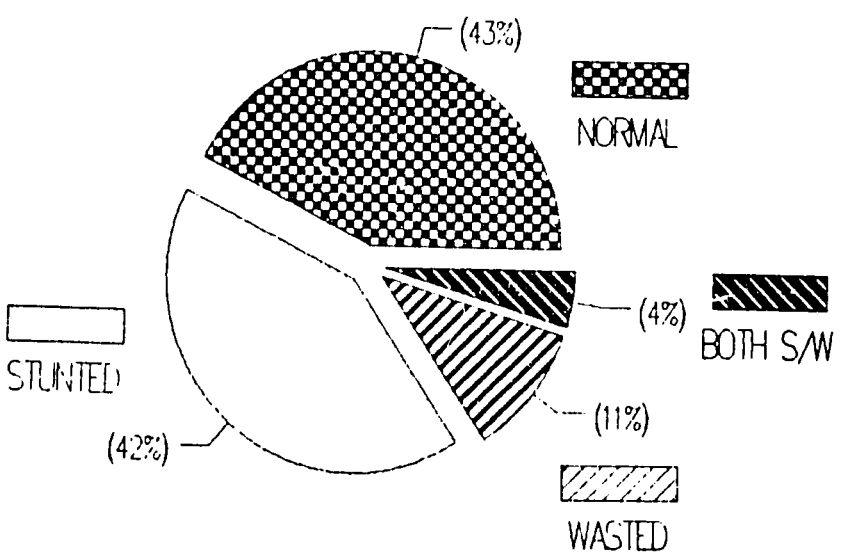
LOW WEIGHT-FOR-AGE	(UNDER 80%)	51.5%
VERY LOW WEIGHT-FOR-AGE	(UNDER 60%)	9.8%

4.1.4 Prevalence of Wasting and Stunting:

Approximately 43% of the young child population is normally nourished - i.e. no chronic nor acute undernutrition, as defined according to the reference values for height and weight, (see section 3.6). Of those with Protein-energy malnutrition (PEM), most are stunted or chronically malnourished. This is an indication of long term problems related to poverty and under-development within the population. Approximately 15% are wasted or acutely malnourished and require urgent remedial care in terms of diarrhoea, infections and poor food habits.

Figure 4.1

PREVALENCE STUNTING AND WASTING
PAKISTAN 1985-1987



Comparison of the current Survey's results with those of 1977 indicates there is little if any change over the last ten years. Similar reference data for the two surveys were used (Harvard for 1977 and the more recent WHO reference for this survey).

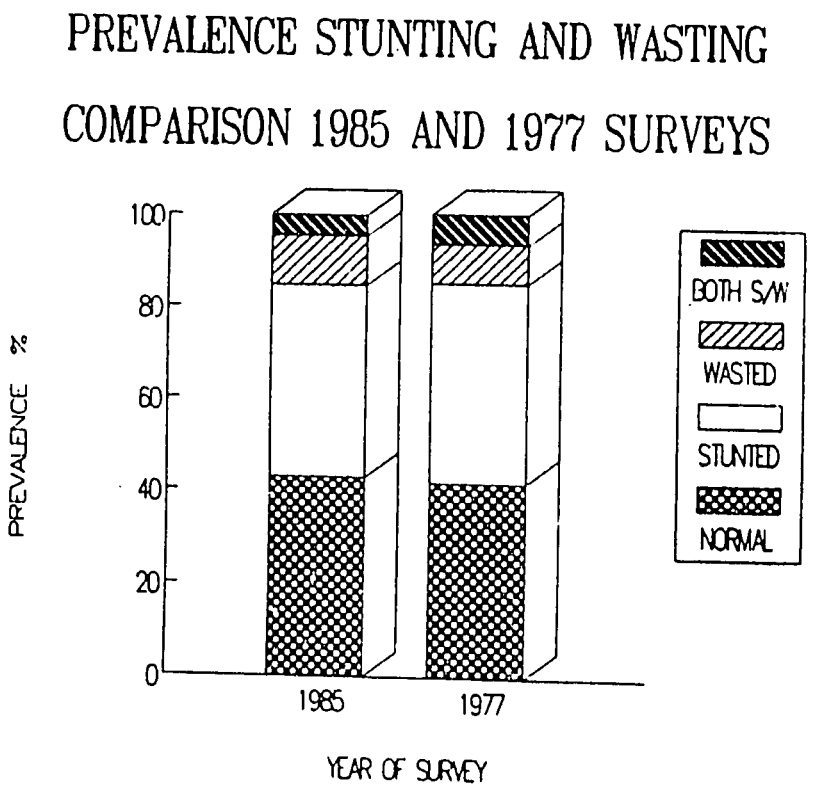
Table 4-2: COMPARISON OF PREVALENCE OF MALNUTRITION NATIONAL NUTRITION SURVEYS CURRENT (1985) AND PREVIOUS (1977)

	1985	1977
NORMAL	42.9	41.8
STUNTED	41.8	43.3
WASTED	10.8	8.6
BOTH STUNTED/WASTED	4.5	7.2
Sample size	9080	496

	Height-for-age	Weight-for-Height
NORMAL	90% and over	80% and over
STUNTED ("MILD").....	Less than 90%	80% and over
WASTED ("MODERATE").....	90% and over	Less than 80%
BOTH STUNTED and WASTED ("SEVERE").....	Less than 90%	Less than 80%

Percentages relate to that of the WHO reference median values and approximiate to -2 standard deviationes of the refrence distribution.

Figure 4.2


PREVALENCE STUNTING AND WASTING
COMPARISON 1985 AND 1977 SURVEYS
PREVALENCE %
100
80
60
40
20
0
1985
1977
YEAR OF SURVEY
BOTH S/W
WASTED
STUNTED
NORMAL

Comparison of weight and height with prior survey

The mean weights show perhaps some increase over the past ten years, whereas the mean heights are essentially the same. It is probable that certain segments of the population are becoming heavier for their age (and better nourished), but the disadvantaged group are remaining the same. Statistical comparisons are not possible because there was no estimate given for standard deviations in the 1977 survey.

Table 4-2b: COMPARISON OF WEIGHTS AND HEIGHTS
1977 AND 1986 NATIONAL NUTRITION SURVEYS

AGE RANGE (MONTHS)	WEIGHT - AVERAGE - 1977	WEIGHT - AVERAGE - 1986	WEIGHT Std Dev. 1986	HEIGHT - AVERAGE - 1977	HEIGHT - AVERAGE - 1986	HEIGHT Std Dev. 1986	SAMPLE SIZE
0		3.3	0.6		48.6	5.8	117
1		3.7	0.9		51.3	5.3	133
2		4.4	1.1		53.6	6.2	200
3	5.0	4.8	1.2	56.2	57.1	6.0	254
4		5.5	1.4		58.6	6.1	155
5		5.8	1.2		60.3	5.3	141
6		6.2	1.4		61.7	6.4	237
7-11	6.3	7.1	1.5	63.9	65.1	6.5	695
12-17	7.5	8.0	1.8	68.0	69.3	6.7	834
18-23	8.6	9.0	1.9	72.9	73.8	7.1	750
24-29	9.4	9.8	2.0	75.4	77.3	7.9	1180
30-35	10.6	10.7	2.0	82.7	82.4	8.2	475
36-47	11.3	11.4	2.2	89.8	85.5	8.9	1886
48-59	13.3	13.0	2.5	93.0	92.5	9.2	1873
60		14.9	2.8		100.1	10.5	1009
SAMPLE SIZE	498	10350		498			10298

Note : Single value only in 1977 for age group 0-6 months
Std Dev. : Standard deviation

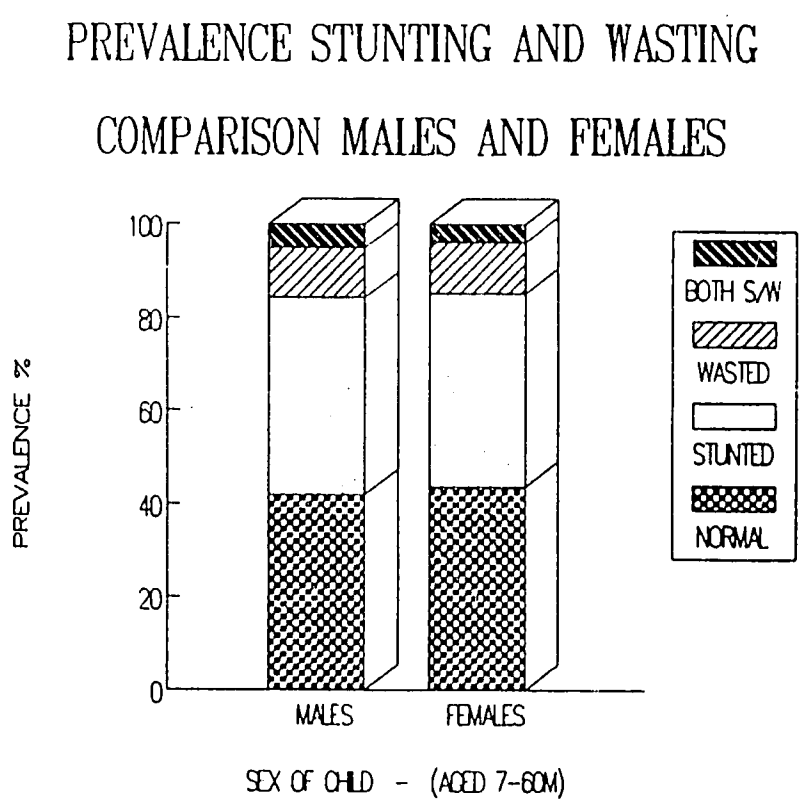
4.1.5 Sex Differences

There was no apparent difference between sexes. This was a consistent finding for all areas of the country and suggests there is no differential in the end results for nutritional care for each sex.

Table 4-3: MALNUTRITION PREVALENCE BY SEX
(NATIONAL SAMPLE)

	MALES	FEMALES
NORMAL	42.1	43.7
STUNTED	42.2	41.4
WASTED	10.6	11.0
BOTH S/W	5.1	3.9
Number	3814	4206

Figure 4.3



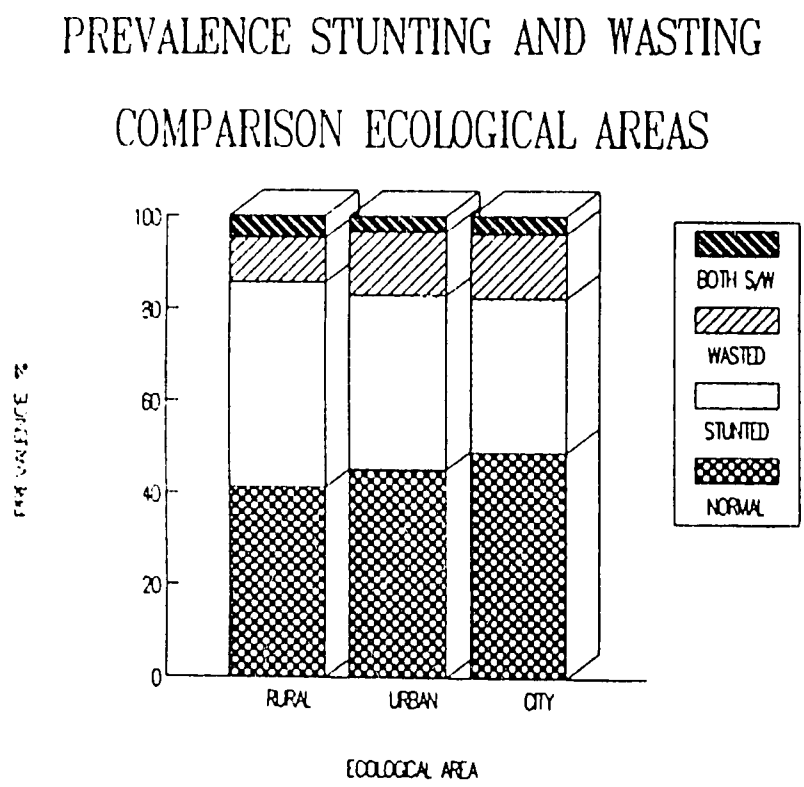
4.1.6 Urban /Rural Areas

There is apparently less chronic undernutrition in urban areas of the country, particularly cities. However the level of acute undernutrition appears greater in the urban areas. The reasons for this are not known, but could be related to feeding habits, particularly those which compromise breast feeding and place more reliance on purchasing food for young children.

Table 4-4: MALNUTRITION PREVALENCE BY URBAN/RURAL AREA
(NATIONAL SAMPLE)

	RURAL	URBAN	CITY
NORMAL	41.2	45.0	48.8
STUNTED	44.4	37.8	33.4
WASTED	9.6	13.6	13.7
BOTH S/W	4.8	3.5	4.0
Number	3527	1782	1984

Figure 4.4

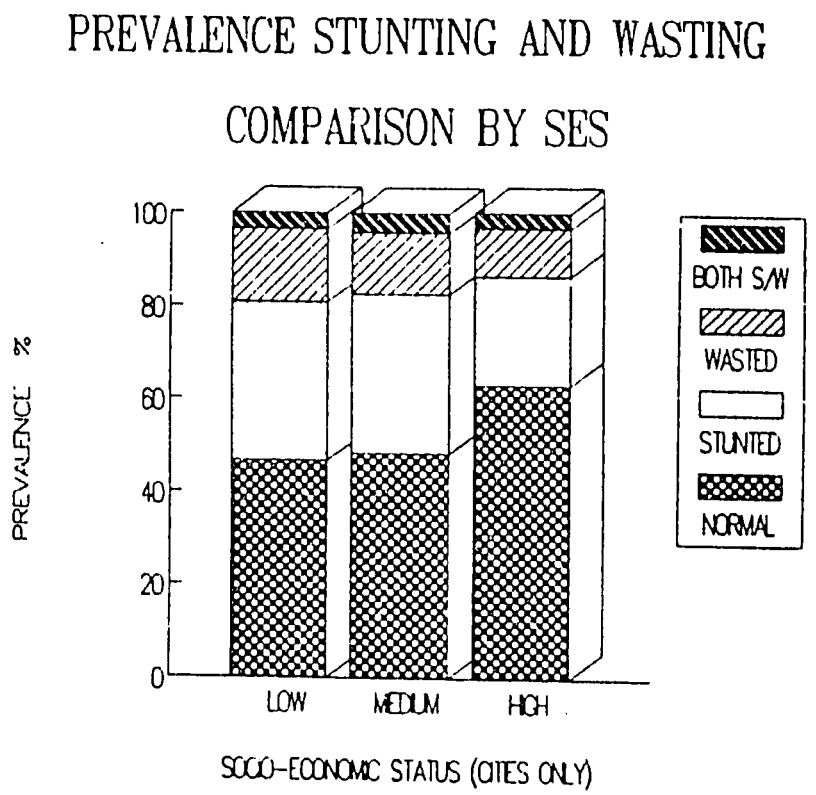


Social class within cities was based on census areal demarcation, rather than survey indicators for status. Results show there is no difference in malnutrition rates between low and medium social class areas. On the other hand, those children from areas with higher social and economic status have less PEM, both of the acute and chronic variety. This is usually a consistent finding in surveys of this type.

Table 4-5: **MALNUTRITION PREVALENCE BY SOCIO-ECONOMIC STATUS**
(NATIONAL SAMPLE)

	LOW	MEDIUM	HIGH
NORMAL	46.8	48.2	62.9
STUNTED	34.0	34.2	23.5
WASTED	15.7	13.2	10.3
BOTH S/W	3.5	4.3	3.3
Number	354	794	83 --low sample size

Figure 4.5



4.1.7 Age

The most critical age group for the highest prevalence of wasting appears in the first year of life, including the first six months of life. There is a reduction of wasting as age increases.

Some, but not all of the results for high prevalence in infants may be related to measurement imprecision (rounding of kg for weight). However, this rounding is less likely to influence weight-for-height than for example weight and height for age. Simulations added 0.5 kg to every subject aged up to six months (assuming at worst, each child had been weighed 0.5 kg lower than the actual weight) and re-analysis done. The simulated prevalence of wasting resulted in a reduction of only 2%-3%, retaining the relatively very high rates for infants.

The prevalence of normal children is however, greatest in the first six months of life. This is partly explained by the fact that stunting is a chronic, cumulative condition and the youngest children have not had time to reach this state. The low rate of stunting in these young children is also reflected in the low prevalence of both stunted and wasted (1.6%) -**Table 4-6.**

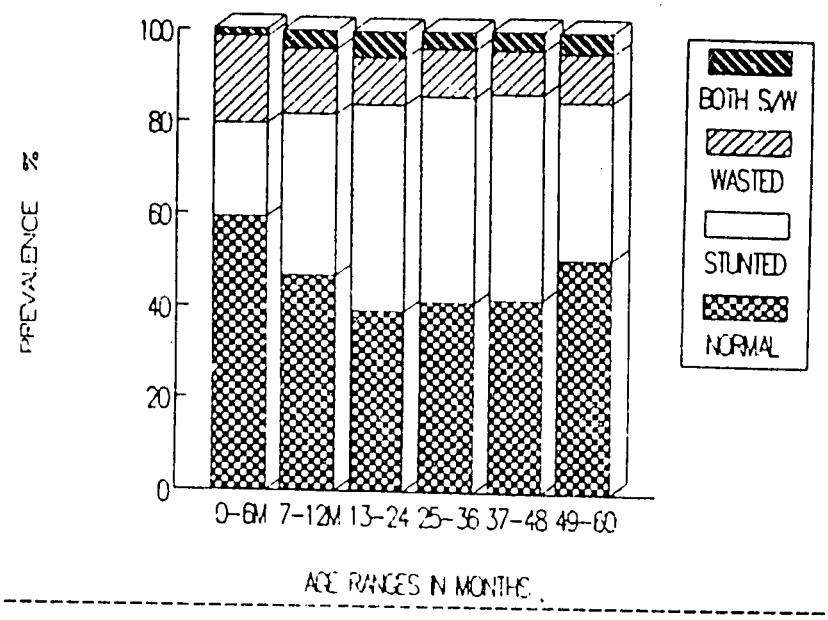
The decrease in the prevalence of normal children (and increase in stunting) begins in the 7-12 and 13-24 months age ranges, at periods where chronic malnutrition becomes more evident.

Table 4-6: MALNUTRITION PREVALENCE BY AGE
(NATIONAL SAMPLE)

	AGE RANGES, IN MONTHS					
	0-6M	7-12M	13-24	25-36	37-48	49-60
NORMAL	59.4	46.8	39.1	41.2	41.8	50.7
STUNTED	20.2	34.9	44.8	44.4	44.5	33.9
WASTED	19.1	14.3	10.2	10.6	9.6	10.6
BOTH S/W	1.6	4.0	5.8	3.8	4.2	4.8
Number	902	1086	1918	2039	1893	1086

Figure 4.6 PREVALENCE STUNTING AND WASTING

COMPARISON BY AGE



It is useful to examine the indicators separately. Figure 4.7 shows the initial high acute malnutrition prevalence during the first year of life is maintained up to 60 months. Stunting (chronic malnutrition) and underweight in general increases with age.

Figure 4.7

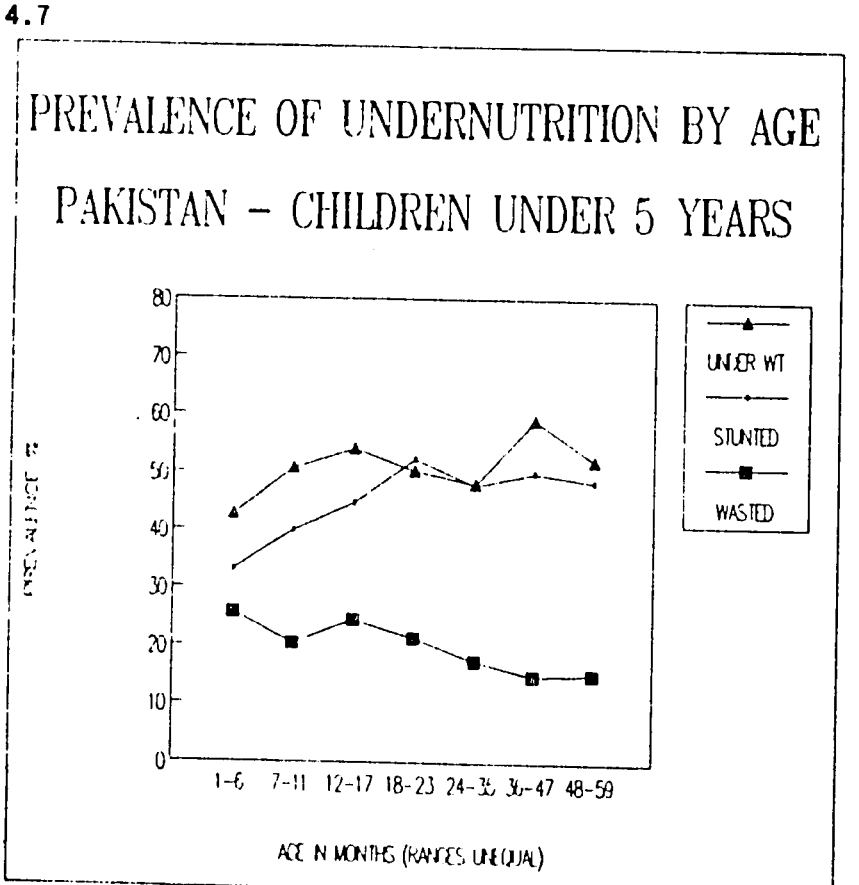


Table 4-7: MALNUTRITION BY AGE

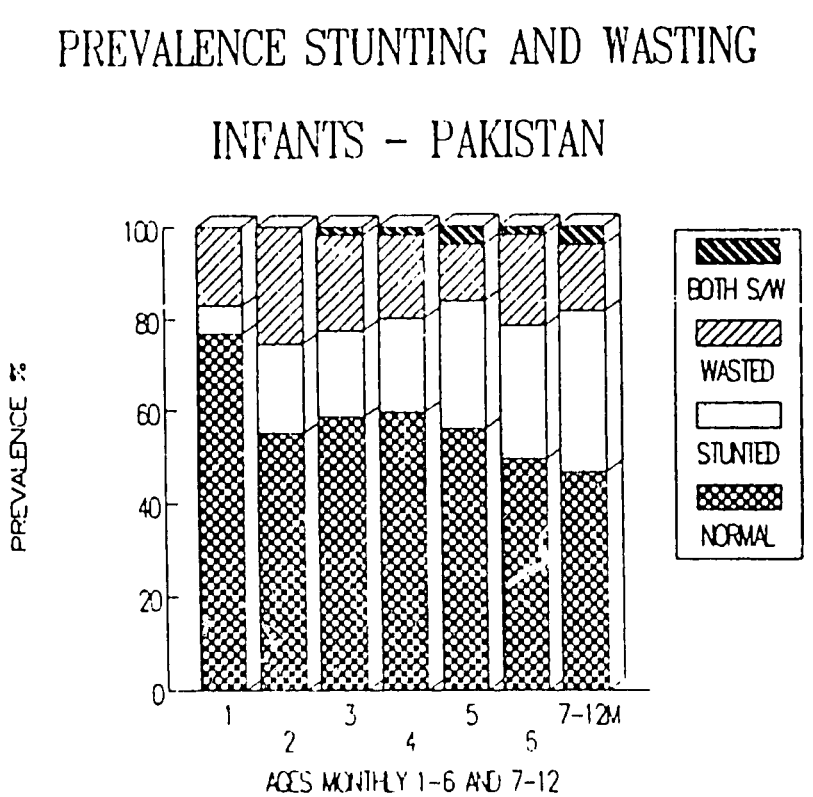
AGE RANGE (MONTHS)	ACUTE*	CHRONIC*	UNDERWEIGHT*
0-3	21.4	29.6	36.5
4-6	20.7	34.5	43.4
7-9	19.2	38.5	48.8
10-12	20.4	44.5	55.2
13-18	18.6	49.7	50.2
19-24	15.9	51.9	43.7
25-35	16.3	41.4	56.2
36-47	14.1	49.9	59.1
48-59	14.4	48.5	52.1
60	15.5	39.4	41.4

* ACUTE - LOW WEIGHT-FOR-HEIGHT (UNDER 80% OF REFERENCE VALUE)
* CHRONIC - LOW HEIGHT-FOR-AGE (UNDER 90% REFERENCE VALUE)
* UNDERWEIGHT - LOW WEIGHT-FOR-AGE (UNDER 80% OF REFERENCE VALUE)

Infants

Analysis of wasting by each month (from 1 to 6 months) shows a high prevalence throughout, peaking at two months of age. The prevalence of normal children also drops at two months (to 55%), gradually reducing after that.

Figure 4.8



When each indicator is considered separately, the gradual increase of underweight and stunting with age during infancy is illustrated and the generally constant level of wasting. Lower rates of wasting as compared with the other indicators are to be expected in cross-sectional surveys, because acute conditions are less likely to be found as compared with the more chronic ones.

Figure 4.9

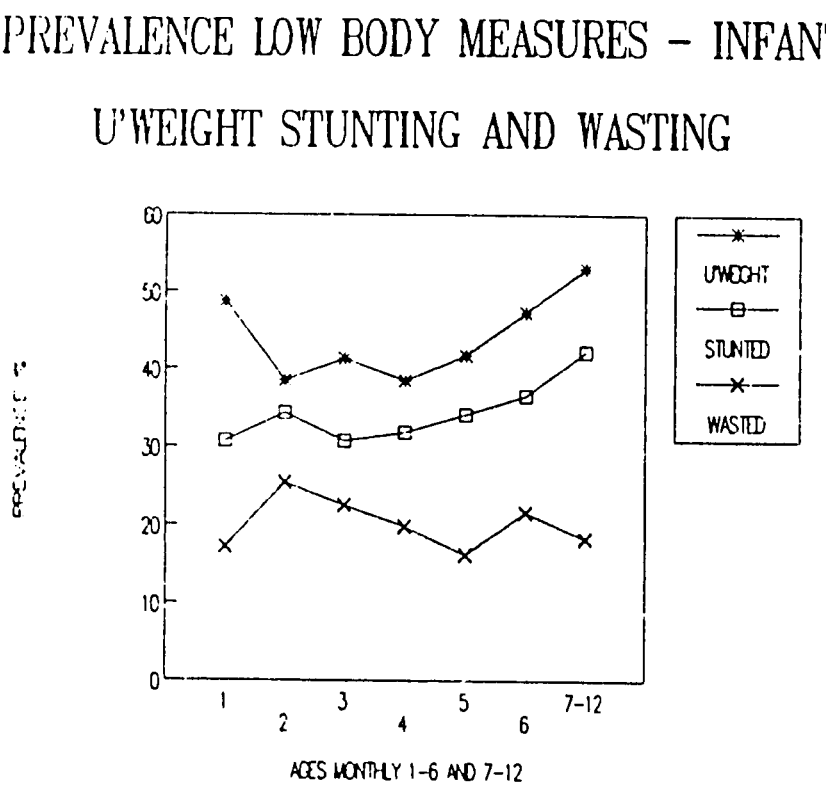
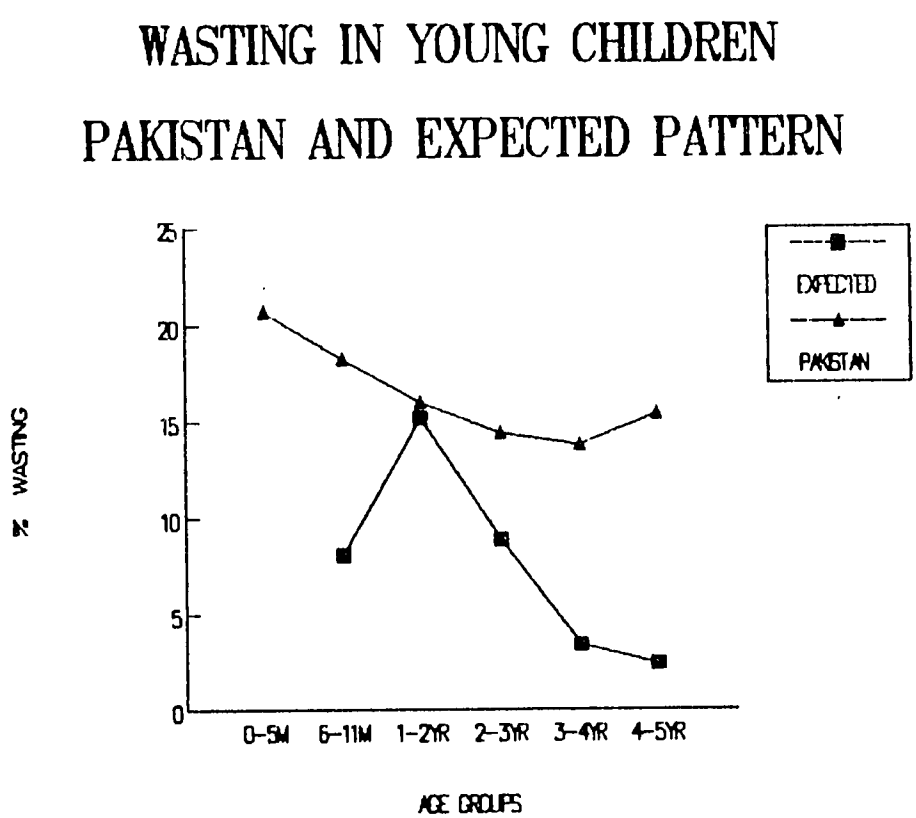


Figure 4.10



It is not only the high level of wasting in infants which causes particular concern, but also the pattern with age. It appears that the expected low prevalence of wasting early in life, which peaks in the second year and reduces there after does not occur in Pakistan. Instead unusually high levels of wasting commence in this country at a very early age.

If this higher prevalence of wasting in young infants is indeed true, it would suggest a serious compromise of adequate breast feeding as well as the presence of diarrhoeas and acute infections relatively early in life. Such a poor start for young children would make them prone to further relapses in the future (see Section 2.2.2). This confirms the suspected immediate vulnerability of the very young children in Pakistan.

4.1.8 Gomez Classification

This classification uses weight-for-age to estimate degrees of underweight. "Normal" children are over 90% reference weight-for-age, Grade 1 malnutrition between 75 and 89%, Grade 2 between 60 and 74%, and Grade 3 below 60% weight-for-age. Hence Grade 3 children are the most severely malnourished in this classification. They are usually very small for their age although some may be of normal height, but very thin. Weight-for-age does not distinguish between stunted and wasted children.

For Pakistan children aged 7-60 months, the distribution is indicated in the following table:

Table 4-8: GOMEZ CLASSIFICATION
(NATIONAL SAMPLE)

	Prevalence percent
Normal	22.1
Grade 1	38.9
Grade 2	29.3
Grade 3	9.8
Sample size	8752

In this system, the percentage of "normal" children is relatively low. Others prefer to use the WHO classification. In this case the percentage of "normal" children (over 80% reference weight-for-age) is higher - 48.6%.

4.1.9 Malnutrition Prevalence By Province

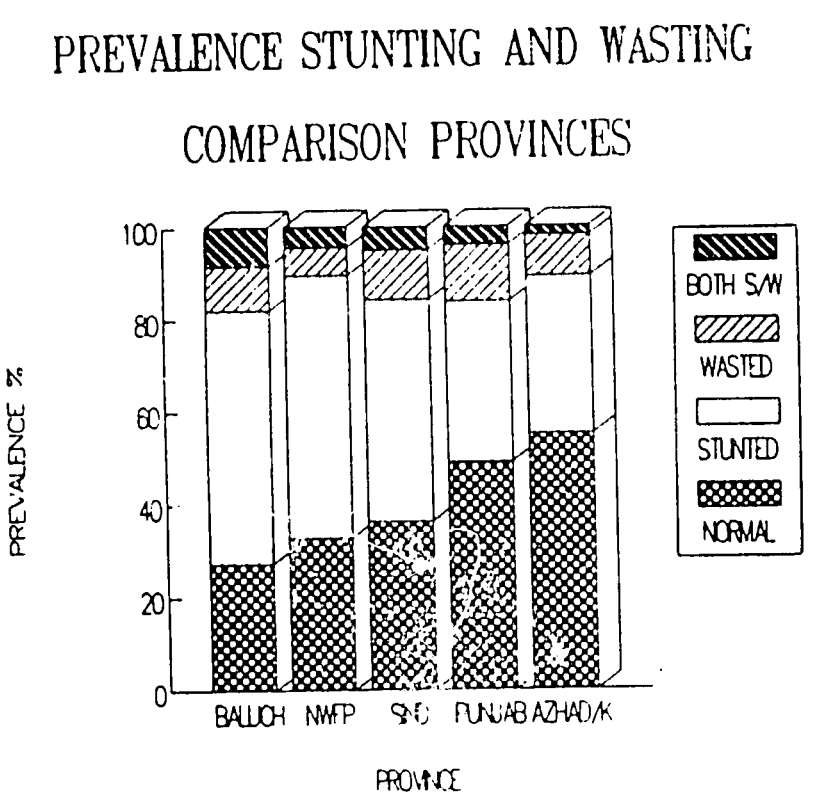
In the following table it is useful to consider the variation that occurs about the nation. Baluchistan has relatively few normally nourished young children - with a relatively high prevalence of stunted and wasted children. There follows a gradient through provinces with Punjab and Azad Kashmir having the highest prevalence of normal children (even this is only 50-60%).

Wasting varies from 10 to 20% prevalence according to province.

Table 4-9: MALNUTRITION PREVALENCE BY PROVINCE

	BALUCHISTAN	NWFP	SIND	PUNJAB	AZAD K.
NORMAL	27.2	32.7	36.3	49.2	55.2
STUNTED	54.8	56.9	47.9	34.5	33.9
WASTED	9.5	6.0	10.8	12.2	8.9
BOTH S/W	8.6	4.5	5.0	4.1	2.0
Number	342	1331	1619	4732	813

Figure 4.11



4.1.10 Anaemia

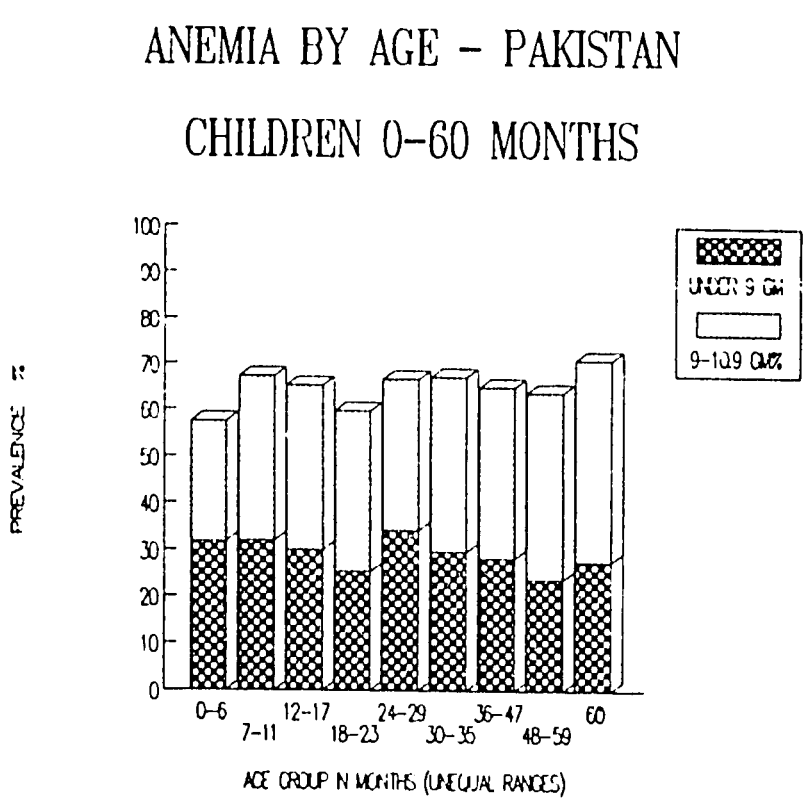
The prevalence of anaemia in children 7-60 months is 65.3% based on haemoglobin of under 11 Gm%, based on WHO criteria. The various grades of haemoglobin in Gm% are shown in the table.

Table 4-10: ANAEMIA PREVALENCE (NATIONAL SAMPLE)

Haemoglobin Gm% ranges	Prevalences	Cumulative
5-6.9	5.2	5.2
7-8.9	23.0	28.2
9-9.9	20.8	49.0
10-10.9	16.2	65.2
11-11.9	12.7	77.9
12-16.9	22.1	100.0
	100.0	
Sample size	6086	

More severe grades of anaemia (e.g. under 9 Gm%) occurred in 28.2% of children. Clearly, anaemia is a problem of large dimensions, as has been demonstrated elsewhere. It is related primarily to iron deficiency, which can be improved through diet or remedied through the regular use of oral iron. It also commonly occurs in pregnant and lactating women.

Figure 4.12



Anaemia in young children occurs equally among both sexes, between rural, urban and city groups, at all levels of socio-economic status within cities and for all age groups under five years. Provincial estimates of anaemia do vary (See Table 4-11). Some of this variation may be due to methodologic reasons. The Sahli method of determination for anaemia is relatively imprecise and bias could occur during the estimations. However, to some extent, the clinical findings for anaemia (pale conjunctiva) may complement the laboratory estimations.

4.1.11 Clinical Signs

The percent prevalence of positive clinical signs is presented in Tables 4-10 a,b,c and d. Pale conjunctiva (which reflects anaemia) is common and is more likely to detect the severer grades of anaemia. However it is a difficult sign to standardize and may give inaccurate results. All other positive clinical findings are relatively rare. This includes angular scars (for some of the Vitamin B deficiencies), spongy bleeding (Vitamin C), Bitot's spots (Vitamin A) and edema (Kwashiorkor- a severe form of protein-energy malnutrition). Eye signs for the serious sequellae of Vitamin A deficiency, such as corneal xerosis and xerophthalmia were quite rare, suggesting that this deficiency is not a clinical public health problem. However, milder features (e.g. night blindness) were not investigated.

Table 4-10a:PERCENT PREVALENCE OF CLINICAL LESIONS CHILDREN UNDER FIVE

CLINICAL SIGN	TOTAL PAKISTAN
PALE CONJUNCTIVA	21.9
ANGULAR SCAR	1.5
CARRIES TEETH	3.5
SPONGY BLEEDING	0.5
EDEMA	0.2
MUSCULAR WASTING	2.1
THYROID ENLARGEMENT	0.0
BITOTS SPOTS	0.2
Sample size	10406

Table 4-10b: BY SEX

CLINICAL SIGN	TOTAL PAKISTAN BOYS	GIRLS
PALE CONJUNCTIVA	23.1	21.3
ANGULAR SCAR	1.6	1.3
CARRIES TEETH	3.7	3.3
SPONGY BLEEDING	0.4	0.7
EDEMA	0.2	0.2
MUSCULAR WASTING	2.3	1.9
THYROID ENLARGEMENT	0.1	0.0
BITOTS SPOTS	0.2	0.2
Sample size	5381	5026

Table 4-10c: RURAL/URBAN

CLINICAL SIGN	TOTAL PAKISTAN RURAL	URBAN
PALE CONJUNCTIVA	22.6	21.2
ANGULAR SCAR	1.5	1.5
CARRIES TEETH	3.8	3.2
SPONGY BLEEDING	0.7	0.3
EDEMA	0.0	0.4
MUSCULAR WASTING	1.8	2.5
THYROID ENLARGEMENT	0.0	0.1
BITOTS SPOTS	0.3	0.1
Sample size	5684	4722

Table 4-10d: BY PROVINCE

PERCENT PREVALENCE OF CLINICAL SIGNS - BY PROVINCE

	PUNJAB	SIND	NWFP	BALUCHISTAN
PALE CONJUNCTIVA	30.7	4.5	12.5	23.0
ANGULAR SCAR	1.7	0.6	1.6	2.9
CARRIES TEETH	4.1	1.5	4.1	4.2
SPONGY BLEEDING	0.4	0.5	1.2	0.1
EDEMA	0.0	0.7	0.1	0.4
MUSCULAR WASTING	1.5	3.2	3.2	2.2
THYROID ENLARGEMENT	0.0	0.1	0.0	0.0
BITOTS SPOTS	0.3	0.1	0.0	0.4
Sample size	6013	2303	1394	696

The presence of iodine deficiency in young children is not generally reflected by goitre (thyroid enlargement) but by clinical signs of cretinism and more indirectly of mental deficiency. These were not investigated. Apparently, apart from conjunctival pallor, most deficiencies as detected clinically are rare.

The prevalence of conjunctival pallor varies greatly between provinces. Hence it is of interest to compare this variation with that of anaemia as done by haemoglobin levels.

Table 4-11: COMPARISON OF CLINICAL SIGN and HAEMOGLOBIN BY PROVINCE.

Condition	Province			
	Punjab	Sind	NWFP	Baluch
Pale conjunctiva	30.7	4.5	12.5	23.0
Anaemia - Haemoglobin				
under 11 Gm%	82.7	72.7	19.9	37.2
under 9 Gm%	36.2	36.6	5.1	9.6

There is a consistency in the results for Punjab: those for Sind however, appear inconsistent between clinical and laboratory i.e. low prevalence of pale conjunctiva and high prevalence of anaemia, which could be due to observational error.

4.2 FEEDING HABITS

Questions on feeding habits were directed to the mother of a child under five years. Most related to "the most recently born" child. Hence the accuracy of recall would depend on the current age of that child. All data were manually analysed, hence cross-relationships with other variables, such as age, educational level, etc could not be analysed. It was also unclear in the analysis which particular child in the family this question referred to.

4.2.1 Breast and Bottle Feeding

In spite of considerable methodological difficulties, the results for breast feeding in the survey tend to confirm the trends shown by previous studies, with a small, but growing proportion of mothers (5%) never breast feeding, and three quarters (76%) breast feeding without the bottle for some part of the child's life. Thus substantial numbers of mothers are using bottle-feeding, with all its concommitant threats to child health.

The question on breast feeding was directed to the most recently born child "How do you feed your child" , with three possible answers : Breast feeding, breast and bottle or bottle. This excluded replies when other foods, milk or fluids were given with breast feeding. In addition, manual analysis did not include the age of the child, although it is assumed most children were aged up to 24 months, which covers a period for most children breastfeeding.

Table 4-12: HOW DO YOU FEED YOUR CHILD?

	PAKISTAN	RURAL	URBAN
BREAST FEEDING	76.9	80.6	72.2
BREAST and BOTTLE	17.8	14.6	21.9
BOTTLE	5.3	4.8	5.9
Number of responses	6143	3428	2715

It appears that bottle feeding occurs quite commonly with breast feeding, particularly in urban areas (22%) but also in rural (15%). Exclusive bottle feeding is about 5%, occurring equally in urban and rural areas.

Bottle feeding has been shown as a potent cause of malnutrition and poor health in young children, particularly infants. Mothers often dilute the milk with water, which is often infected and causes diarrhoea. In addition, mothers are too poor or uneducated or both to keep the bottles clean.

4.2.2 Duration of Breast Feeding

The question to the mother was "How long did you breastfeed your most recently born child?" . Answers were given in months, although these were probably often rounded to the nearest 6 or 12 months. According to the analysis, approximately 20% of the mothers did not reply to this question; either because they did not know or because they were still breastfeeding. However, most of the mothers currently breastfeeding did reply to this question.

Table 4-13: HOW LONG DID YOU BREAST FEED YOUR MOST RECENTLY BORN CHILD?

	PAKISTAN	RURAL	URBAN
0-6MONTHS	22.9	21.1	25.5
6-12MONTHS	20.0	20.0	20.1
12-18MONTHS	19.4	20.6	17.8
18-24MONTHS	34.8	35.1	34.4
24 and ABOVE	2.8	3.2	2.2
Number of responses	5026	2927	2099

Results cannot be interpreted properly and should be investigated in the food intake section, in order to determine the precise child, including the age and the breast feeding status.

4.2.3 Reasons for Stopping Breast Feeding

The question "Why did you stop breast feeding your most recently born baby" was answered by 4325 mothers (about 70% of all mothers interviewed). The non-respondents apparently included those mothers who were still breasfeeding their first child. Responses were close-ended and did not allow for other replies.

Table 4-14: WHY DID YOU STOP BREAST FEEDING?

	PAKISTAN	RURAL	URBAN
CHILD BIG	34.5	36.1	32.4
PREGNANCY	34.3	34.4	34.1
MILK DRIED UP	19.3	19.0	19.7
CHILD STOPPED ITSELF	4.6	4.4	4.9
MOTHER SICK	4.2	3.3	5.3
CHILD SICK	2.3	2.0	2.6
MOTHER WORKING	0.8	0.7	0.9
Number of responses	4325	2410	1915

The commonest reply was pregnancy (34%) or the child was "too big" (34%) or milk dried up (19%). Other reasons given were relatively rare.

The results do not indicate the reasons for reducing breast feeding and/or introducing other milk or bottle feeding, especially at an early age.

4.2.4 Decisions on Children's Foods

Apart from the mother, the mother-in-law was the key person who decided on the baby's foods. In this close-ended question there was no space for others (such as the mother's mother). However, health and religious officials have little say in the choice of foods. Who decides on bottle feeding was not investigated.

Table 4-15: WHO DECIDED WHAT FOOD THE BABY SHOULD EAT?

	PAKISTAN	RURAL	URBAN
MOTHER	76.0	77.5	74.0
MOTHER IN LAW	19.5	18.4	20.9
LHV/DOCTOR	2.8	2.3	3.6
MULLAH/HAKIM	1.7	1.8	1.5
Number of responses	4758	2659	2099

4.2.5 Foods for the First Time

This question considered a list of specific foods in turn and when each was first introduced. Percentages as to timing of each food is more appropriate in the analysis, rather than percentages of all foods in each age group. The latter would relate more to enquiry about the first food (of all foods) given to the child, which was not asked.

Table 4-16: INTRODUCTION OF VARIOUS FOODS AT DIFFERENCE AGE GROUPS

FOOD	AGE GROUPS 0-6	7-12	13-18	18m+	PERCENT OF RESPONSES
ROTI	14.3	62.4	13.0	10.3	67.3
DALIA	31.2	54.6	7.9	6.3	47.9
RICE	19.4	47.8	28.0	4.8	81.1
KHEER	32.9	52.6	9.2	5.3	45.0
HALWA	29.7	53.5	11.7	5.1	35.0
CHOORI	22.5	54.7	13.4	9.4	23.8
EGG	48.8	42.3	6.0	3.0	6.7
BANANA	31.3	44.1	23.2	1.3	7.8
TEA	30.4	43.4	22.4	3.7	6.7
PROCESSED FOOD	76.3	17.1	5.3	1.3	2.5
BISCUIT	27.6	55.6	15.5	1.2	9.8
FRUIT	50.0	35.0	9.8	5.2	5.8
CURRY	12.5	62.5	0.0	25.0	0.1
VEGETABLE(SOUP)	95.0	0.0	0.0	5.0	0.7
MILK	44.8	38.2	8.1	8.9	60.0
RUSK	42.6	57.4	0.0	0.0	0.8
TOTAL	28.4	50.6	14.4	6.6	---

SAMPLE: 6000 Mothers.

For example, roti was most commonly introduced (62% of all roti) between 7-12 months. In addition, roti was mentioned as a food given to the child in 67.3% of responses. Although certain foods were given early, they may not comprise an important percent of all foods. Thus, processed food given usually (76.3%) at 0-6 months but only given 2.5% overall.

4.2.6 Feeding During Diarrhoea

These two multiple answer questions investigated the foods mothers increase or decrease for their child, when he/she has diarrhoea. Results indicate that several fluids (milk, tea) and foods (kitchri, dalia, kheer and rusk in urban areas) but no single oustanding one, are reportedly increased when the child has diarrhoea. On the other hand, roti is commonly reduced (especially in urban areas) during diarrhoea.

Table 4-17a WHEN BABY HAD DIARRHOEA WHAT DID YOU DO ABOUT HIS FEEDING?

	PAKISTAN	RURAL	URBAN
STOP MILK	10.8	10.9	10.8
INCREASE INTERVAL	22.6	22.7	22.6
ADD EXTRA WATER	13.2	11.8	15.0
REDUCE SOLIDS	19.2	20.0	18.2
GIVE ORS	34.1	34.7	33.3
Number of responses	6056	3408	2648

Table 4-17b: WHEN BABY HAD DIARRHOEA WHAT FOOD DO YOU GIVE MORE?

	PAKISTAN	RURAL	URBAN
DALIA	19.2	19.7	18.4
KHEER	10.6	11.1	9.8
MILK	13.1	12.5	14.0
TEA	13.3	12.8	14.0
SOGODANA	1.2	1.1	1.3
RUSK	9.1	4.0	16.4
KITCHRI	20.7	23.5	16.6
BOILED RICE	0.7	1.0	0.2
NO FOODS	12.2	14.3	9.2
Number of responses	5560	3285	2275

Table 4-17c: WHEN BABY HAS DIARRHOEA WHAT FOOD DO YOU GIVE LESS?

	PAKISTAN	RURAL	URBAN
DALIA	15.9	16.4	15.2
KHEER	4.5	3.8	5.4
KITCHRI	6.6	6.1	7.3
RUSK	1.3	1.7	0.7
MILK	4.2	4.1	4.2
TEA	3.9	5.8	1.4
EGG	3.6	4.6	2.2
ROTI	31.7	27.3	37.9
FATTY THINGS	14.6	14.8	14.2
CHATNI	0.3	0.4	0.1
MEAT	2.5	2.7	2.4
NO ANSWER	10.9	12.3	8.8
Number of responses	3934	2281	1653

4.2.7 Response to Illness

The question "Where do you take your baby when he/she is sick?" gave different responses between urban and rural areas. Although most urban babies (80%) are taken to a medical doctor, in rural areas, the Village Mullah or Hakim are equally as important as doctors. In both areas, LHV's comprise a small (4-8%) group for treatment.

Table 4-18: WHERE DO YOU TAKE YOUR BABY WHEN HE IS SICK?

	PAKISTAN	RURAL	URBAN
V.MULLAH	10.7	16.7	4.6
HAKIM	15.3	23.7	6.6
LADY HEALTH VISITOR	6.4	8.6	4.1
HOMEOPATHY	4.6	4.4	4.8
MEDICAL DOCTOR	63.0	46.5	79.3
Number of responses	5102	2578	2524

4.2.8 Foods During Pregnancy

Enquiry about foods avoided or reduced and those eaten more during pregnancy allowed multiple answers from each respondent. Hence it is unclear about the relative contribution of replies to the total results. With this proviso in mind, it appears that approximately 1/2 of the mothers reportedly do not change their feeding habits during pregnancy (these are not necessarily the same mothers). In general, avoidance or reduction of a single specific food appears relatively uncommon during pregnancy, although either beef, mutton or egg comprise a key group of foods.

Table 4-19a: WHICH FOOD DO YOU REDUCE OR AVOID DURING PREGNANCY?

	PAKISTAN	RURAL	URBAN
BEEF	15.2	13.8	17.2
MUTTON	9.8	7.4	12.9
EGG	8.5	9.5	7.2
SOUR THINGS	4.8	4.8	4.9
M.MATTE	3.7	3.6	3.9
NOTHING	57.8	60.9	53.8
Number of responses	4941	2813	2128

Table 4-19b: WHICH FOOD DO YOU EAT MORE DURING PREGNANCY?

	PAKISTAN	RURAL	URBAN
SOUR THINGS	25.6	30.9	17.6
CHATNI	13.7	15.0	11.7
M.MATTE	9.4	11.5	6.4
EGG	0.5	0.7	0.2
LASSI	0.5	0.0	1.1
NOTHING	50.1	41.7	62.5
Number of responses	5686	3404	2282

Both chatni (11-15%) and sour things (17-31%) appear key foods eaten more, altough their added nutrient value may not be great.

4.2.9 Frequency of Bathing

In rural areas, about half the babies are reportedly bathed only once a week or less often. In urban areas, the percentage in this group is less (37%) but still quite high.

Table 4-20: HOW OFTEN DO YOU GIVE YOUR BABY A BATH?

	PAKISTAN	RURAL	URBAN
ONLY DURING WARM WEATHER	4.9	6.6	2.5
LESS OFTEN THAN WEEKLY	9.9	10.9	8.4
WEEKLY	30.8	34.2	26.4
TWO TO FIVE TIMES A WEEK	22.5	22.7	22.2
DAILY OR MORE OFTEN	32.0	25.6	40.5
Number of responses	5766	3308	2458

4.3 PREGNANT AND LACTATING MOTHERS

A total of 1060 pregnant and 2688 lactating mothers were examined in the Pakistan sample. In addition, 75 pregnant and 261 lactating mothers were seen in Azad Kashmir.

The average numbers per household by selected stratum varied. It is probably more related to differing criteria and identification of these mothers. For example in some areas, mother in early pregancy may have been missed. In addition, lactating mothers would include those who were partially breast feeding their child, often in the child's second year of life.

Overall, the estimated average percentage of pregnant mothers was 1.89% and of lactating mothers 4.91% of the total sample population.

4.3.1 Age Distribution

Table 4-21: PREGNANT AND LACTATING MOTHERS: BY AGE

AGE GROUP	PERCENTAGE
15-19	4.5
20-24	21.1
25-29	30.6
30-34	20.0
35-39	14.5
40-44	6.5
45-50	2.7
SAMPLE SIZE	4085

The age distribution indicates that a small but significant proportion of P/L mothers (5%) are quite young (under 20 years). Similar distributions were found in urban/rural areas and by province.

4.3.2 Education Level

In the total sample, 78.2% of P/L mothers had no education, 3.5% were literate without schooling, 7.3% had primary, 4.3% middle and 5.6% secondary education or above. In addition, 1.0% had madressa type of education.

Table 4-22: PREGNANT AND LACTATING MOTHERS: AGE AND NO EDUCATION

AGE GROUP	PERCENTAGE NO EDUCATION
15-19	77.7
20-24	70.0
25-29	74.5
30-34	81.2
35-39	85.5
40-44	90.9
45-50	91.9
	78.2
SAMPLE SIZE	4085

Younger mothers were more likely to be educated, except for those under 20 years, who were equal to the national average. As pregnant mothers were more likely to be younger, results for body measures which compare pregnant with lactating mothers may be influenced by age/education.

There was a marked urban/rural difference - 60% of urban mothers were uneducated compared with 90% in rural areas. Marked variations also occurred across provinces (75% to 90% uneducated).

4.3.3 Body Measurements

Specific extreme at-risk groups for mothers, in terms of low birth weight and/or obstetric complications have been suggested as those under 40 Kg (6 stone 4 lb) and/or under 145 cm (4'10") in height (WFPHA 1983). In Pakistan, by these criteria 6% of P/L mothers are grossly underweight and 6% of mothers are very short.

If these at-risk groups are extended to under 45 Kg (7 stone) and under 150 cm (5'0") the prevalences for each extend to approximately 25%.

Uneducated mothers had a higher prevalence of underweight (25% vs. 20%) and under-height (25% vs. 19%) as compared with those with primary or higher education.

The weight of a mother in relationship with that expected for a given height has been used as an estimate of under-nutrition (if low) and over-nutrition (if high). Several methods for expressing this relationship have been proposed. One is the "Body Mass Index" (BMI) which is calculated as WEIGHT/(HEIGHT*HEIGHT), where weight is in Kg and height in metres. In industrialized countries, this index is relatively unaffected by age. Over a value of 23 for males and 25 for females is suggestive of obesity. However, the significance of low values, e.g. under 18, is unclear (apart from perhaps in neonates).

Another index, compares the weight of the adult with a reference population for the same height, as is done for children. Data collected in 1959, by the Society of Actuaries (in terms of mortality risk and health insurance) has been referenced in "The Assessment of the Nutritional Status in the Community" - D.B.Jelliffe, 1966. Below 85% of the reference averages for this group (with average frame sizes) could be considered as a lower limit with a higher risk of undernutrition. This 85% level corresponds very closely with a Body Mass Index of 19 and an upper limit of 110% with a BMI of 24 (correlation coefficients over 0.9). Because of this high correlation, only one (Body Mass Index) of the two indices will be used in this analysis. A special advantage of this choice is that reference data for weights according to height have no information on heights below 140 cm, an important though small group in this study. Hence, results for weight-for-height are expressed as Body Mass Index.

Table 4-23: PREGNANT AND LACTATING MOTHERS: BODY MASS INDEX.

BMI	PERCENTAGE
14-16	6.6
17-19	27.6
20-22	36.7
23-25	18.0
26-28	8.1
29-33	3.0

According to the criteria for underweight, it would appear that 34.2% of P/L mothers are in this group, including 6.6% who might be considered "more severely" underweight. This index is more important, however, in comparing different population groups within the sample rather than defining the significance of "underweight" prevalence according to this method, which is unclear.

A higher prevalence of low BMI ("underweight-for-height") occurs among non-educated women (35% vs 26%), lactating women (36% vs 26%) and rural as compared with urban areas (35% vs 30%). These results might be explained by education levels. There are no clear differences by age, although older women (35-50 years) show a higher prevalence of high BMI than younger ones. In conclusion, the interpretation of adult underweight-for-height is unclear and requires further investigation.

4.3.4 Anaemia

Anaemia (as defined by a haemoglobin of under 11 Gm%) was found in 45.2% of P/L mothers; more severe grades (i.e. under 9 Gm%) in 9.6%.

Table 4-24: PREGNANT AND LACTATING MOTHERS: ANAEMIA

GRADES OF HAEMOGLOBIN IN GM%	PREVALENCE
12-16.9	33.1
11-11.9	21.7
10-10.9	20.0
9- 9.9	15.6
7- 8.9	8.7
5- 6.9	0.9
SAMPLE SIZE	3295

A striking result was the increasing prevalence of anaemia according to age - from low of 35% in mothers aged 15-19 years to a high of 66% in mothers over 45 years of age.

Table 4-25: PREGNANT AND LACTATING MOTHERS
PREVALENCE OF ANAEMIA BY AGE

AGE GROUP	PERCENTAGE WITH ANAEMIA
15-19	35.2
20-24	39.4
25-29	42.4
30-34	48.6
35-39	51.3
40-44	50.7
45-50	65.8
SAMPLE SIZE	3270

There was no difference in anaemia prevalence between pregnant and lactating women, between levels of educational status nor between urban and rural areas.

Clearly anaemia in women (as in young children) is a public health problem of very large dimensions, and deserves the highest priority for improvement.

4.3.5 Clinical Signs

The high prevalence of anaemia is supported by that of positive clinical signs of pale conjunctiva, found in 36.5% of all P/L women examined. This was found equally in pregnant as compared with lactating women and in urban vs. rural areas. In each group there was a higher prevalence in rural as compared with urban areas (29.6 vs 16.2%).

Table 4-26: PREGNANT AND LACTATING MOTHERS:

PERCENT PREVALENCE OF CLINICAL LESIONS

PALE CONJUNCTIVA	36.5
ANGULAR STOMATITIS	3.1
CARIES TEETH	29.6
SPONGY BLEEDING	9.9
OEDEMA	0.4
MUSCULAR WASTING	0.6
THYROID ENLARGEMENT	0.1
SAMPLE SIZE	3625

Another striking result is the high prevalence of dental caries (29.6%). Spongy bleeding is probably related to pyorrhoea, which suggests that oral problems are common.

The low prevalence of thyroid enlargement could be related to the sample (which might miss "pockets" of high prevalence areas) or to reporting only the more severe grades of thyroid enlargement. Clearly goitre has been demonstrated as a problem in Northern mountainous regions of Pakistan.

4.4 STOOL PARASITES

Stools from 2438 subjects of all age and biological groups were examined for parasites. The prevalence of ancylostomiasis (hookworm) was very low (1.2%). Thus hookworm is unlikely to be an important cause of anaemia in Pakistan. Giardia Lambia was uncommon (6.5%), but in subjects with heavy loads, it may contribute to malabsorption. By the same token, ascaris (5.8%) in certain circumstances may be a factor in poor nutrition, particularly in young children.

Table 4-27: STOOL PARASITES BY AREA

STOOL PARASITES

PARASITE	AREA		TOTAL
	URBAN	RURAL	
Ancylostoma	0.4	2.3	1.2
Entamoeba Histolytica	0.7	1.3	0.9
Entamoeba Coli	7.8	12.3	9.8
Giardia Lambia	6.8	6.1	6.5
Hyn. Nana	4.5	4.1	4.3
Ascaris Lumbricoides	5.4	6.2	5.8
Trichuris	1.4	0.7	1.1
E.V.	0.1	0.5	0.2
Taenia saginata	0.3	0.1	0.2
Others	0.5	1.0	0.7
TOTAL EXAMINED	1346	1092	2438

Table 4-28: STOOL PARASITE BY SEX

STOOL PARASITES

PARASITE	SEX	
	MALES	FEMALES
Ancylostoma	0.7	1.8
Entamoeba Histolytica	0.9	1.0
Entamoeba Coli	10.1	9.5
Giardia Lambia	7.0	6.1
Hyn. Nana	3.6	5.1
Ascaris Lumbricoides	6.6	4.9
Trichuris	0.8	1.4
E.V.	0.2	0.3
Taenia saginata	0.3	0.1
Others	0.9	0.6
TOTAL EXAMINED	1249	1189

Table 4-29: STOOL PARASITE BY PROVINCE.

STOOL PARASITES	PROVINCE				URBAN/RURAL			
	PUNJAB		SIND		NWFP		BALUCHISTAN	
PARASITE	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL
Ancylostoma	1.1	5.2	0.0	0.0	0.0	1.7	0.0	0.0
Entamoeba Histolytica	1.1	1.3	0.6	0.0	0.0	1.7	0.5	1.6
Entamoeba Coli	7.8	7.8	3.5	10.0	23.1	21.5	8.4	9.9
Giardia Lambia	5.3	5.2	7.1	0.6	7.7	7.5	9.4	9.5
Hyn. Nana	1.7	1.3	4.5	0.6	10.5	6.1	7.3	8.3
Ascaris Lumbricoides	5.7	3.1	3.9	1.9	16.1	15.0	1.0	3.6
Trichuris	0.4	0.3	3.2	1.3	0.0	1.7	0.0	0.0
E.V.	0.0	0.5	0.2	1.3	0.0	0.3	0.0	0.0
Taenia saginata	0.2	0.3	0.2	0.0	1.4	0.0	0.0	0.0
Others	0.0	0.0	0.7	0.6	1.4	3.1	0.5	0.4
TOTAL EXAMINED	475	386	537	160	143	293	191	252

There were marginal differences between rural and urban areas. For some reason, parasitic infestation tended to be greater in NWFP Province as compared with the others.

The analysis did not take into account the ages of the subjects, hence interpretation is incomplete.

4.5 FOOD INTAKE.

Food intake was a key component of the survey. Survey members were present in the household during the food preparation periods, in order to weigh each food and record how much would be eaten by each family member. The record included both the type of food (e.g. paratha) and its components (e.g. wheat flour, ghee).

The analysis considers three major areas:

1. Qualitative - which foods or combinations of foods are eaten
2. Amounts of foods eaten
3. Nutrient intake - calories, protein and iron.

Sample sizes

The selection of subjects for food intake measurement was as follows. For every household visited, all "at-risk" group members (pregnant/lactating women, children under five years of age) were assessed and for every fourth household, all members were assessed. For editing, entry and analysis, a total of 8483 subjects (representing 37% of all available subjects) were selected for the national sample and a further 1888 from Azad Kashmir and Northern Areas.

The sample distributions according to rural, urban and city as well as biological and age groups are listed in TABLE 5-1.

Table 5-1 : SAMPLE DISTRIBUTIONS FOR FOOD INTAKE STUDY

	BIOLOGICAL GROUP								
AREA	ADULT MALE	ADULT FEMALE	PREG-NANT	LACT-ATING	BOY 6-15Y	GIRL 6-15Y	BOY 0-5Y	GIRL 0-5Y	TOTAL
RURAL	512	452	252	513	269	250	752	694	3694
URBAN	290	305	62	145	178	163	271	230	1644
CITY	507	436	138	299	234	226	661	644	3145
TOTAL	1309	1193	452	957	681	639	1683	1566	8483
AZAD K.	157	174	40	154	120	114	288	268	1315
NORTHERN	85.	126	24	82	52	65	69	70	573

	------ AGE GROUPS IN MONTHS ------						--- IN YEARS ---			
AREA	1-5	6-11	12-17	18-23	24-35	36-60	6-9Y	20-49Y	50+Y	TOTAL
URBAN	38	56	42	29	99	236	159	566	146	1371
RURAL	144	148	144	115	247	642	254	1353	223	3270
CITY	104	152	114	109	233	592	242	1034	178	2758
TOTAL	286	356	300	253	579	1470	655	2953	547	7399
AZAD K.	36	57	45	49	101	267	126	405	53	1139

Further information, e.g. by province as well a description of weighting, is presented in Annex 2. Weighting was done according to sex and age group, as well as for the geographic location of each subject, as guided by the population distribution for the nation.

4.5.1. Qualitative Food Intake

This indicates which foods were eaten during the day of observation and weighing. Foods were classified individually (e.g. wheat) and in combination (as in food groups, such as cereals). Results were derived from the food intake information which assessed the total day's intake, rather than individual meals. Analysis was simplified in that ANY amount of intake for a particular food was positive and no intake was negative. Hence for each food, there are only two possible results.

Because it is not necessary to know the amounts of foods eaten there are no errors for actual intakes as for example might occur in the quantitative study. However, under-reporting is still possible because of the difficulty of probing for certain foods, such as weaning foods, oils, green leafy vegetables and fruits. In a cross sectional survey the timing of the examinations must be taken into account; e.g. with regards to seasonally-related food intake. Since the study continued throughout the year, however, such timings would probably not affect the overall results greatly.

Variables

Variables have been "grouped", as done for the food intake section (e.g. "milk" includes milk and milk products, such as lassi, but not bottle milk; wheat includes weaning foods, roti, biscuits and paratha) - TABLE 5-2.

Table 5-2 : VARIABLE GROUPINGS

CEREAL	Wheat (roti,paratha,weaning foods,rusk, biscuits)
	Rice, corn
MILK	Cow, buffalo, commercial (excluding bottle)
	Milk products - lassi, yogurt
ROOTS	Potatoes, other root vegetables
PULSES	Pulses, gram
MEAT	Beef, mutton, poultry
EGG	
FISH	
OILS	Ghee, other vegetable and animal oils
VEGETABLES	All vegetables except dark green leafy, roots
FRUIT	Any
TEA	
BREAST MILK	
BOTTLE MILK	

Presentation of Results

Results throughout are based on the percentage of subjects who ate the particular food (or food group) listed according to the sample population group. Thus an answer of 100 indicates that everyone ate that food, while 0 indicates no one ate the food.

A sense of how commonly a food is eaten by the group described might be considered as follows:

90% +	-	almost all ate the food
60-89%	-	most (commonly eaten)
40-59%	-	approximately half
10-39%	-	less than half
under 10%	-	few ate the food

Geographic areas are described as follows:

1. Pakistan : total national sample
2. Area: rural, urban, city - as defined by the census.
3. Provinces: Punjab, Sind, NWFP and Baluchistan
4. Additional areas: Lahore, Karachi, Azad Jammu Kashmir and Northern areas.

Lahore and Karachi are also presented separately because food intake was under-estimated in these areas. The method did not include food eaten OUTSIDE THE HOUSEHOLD. This would occur relatively frequently in these two major cities and would more likely affect adults, (particularly at work) and less commonly on social occasions. With regards to small children, the purchase of commercial weaning foods may have been more likely in Lahore and Karachi as compared with the rest of the country.

For the above reasons these cities are not included in the results for their respective provinces Punjab (Lahore) and Sind (Karachi). However they are included on the national description to provide completeness of presentation. Accordingly the results for Pakistan will be a slight underestimate as Lahore and Karachi account for some 10% of the total population. Lahore and Karachi are included in the city area for the whole country. As they comprise about half the city population, results for these two cities will strongly influence this description.

These underestimates are more likely to affect quantitative results (amount of foods and nutrients) rather than qualitative. One assumes the same types of foods (e.g meat, vegetables) are eaten outside the household as within and on a particular day usually only one of the three meals are eaten outside.

Table Formats

The tables have three basic formats. The first ("Biological Group") includes the whole sample, spanning from adults to young children. It indicates in each broad group the percentage of subjects which ate the particular food listed. This allows comparisons between groups and sexes.

The other two formats for presentation focus attention on young children. Added information includes breast & bottle feeding and taking of any food apart from milk. The first of these considers relatively broad age ranges and includes results for older groups for comparative purposes. The second fine tunes age groups between 1-24 months, and pays particular attention to infants. However, these data can only be presented at the National Level, where the sample sizes are consistent with more stable results.

In the tables all results are shown as percentages, except for sample size. The percentage results have been estimated by weighting according to sex and age group, as well as the geographic location of each subject to defined by the census in the national sample (see appendix - for details). The sample size on the other hand reflects the actual number of subjects.

Adult male profile for Pakistan [TABLE 5-3] and {Figure 5.1}.

Table 5-3: PERCENTAGE OF SUBJECTS EATING FOOD
ADULT MALES - PAKISTAN

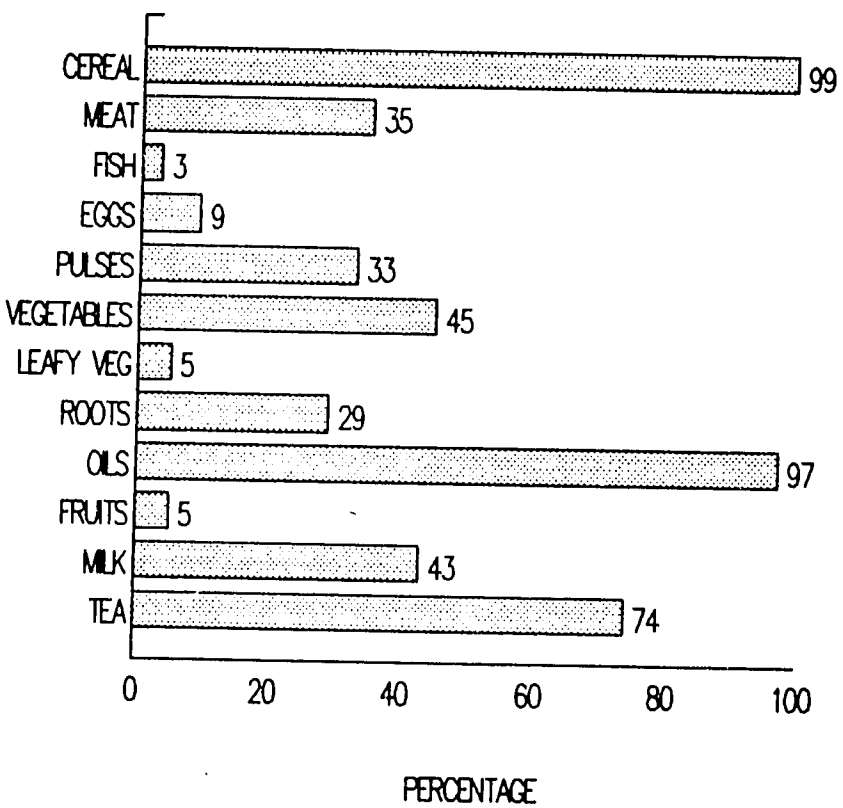
FOOD TYPE	ADULT MALE	
CEREAL	99%*	..... This % sign is excluded
MILK	43%	from further tables
ROOTS	29%	
PULSES	33%	
MEAT	35%	
EGG	9%	
FISH	3%	
OILS	97%	
VEGETABLES	45%	
LEAFY VEG	5%	
FRUITS	5%	
TEA	74%	
SAMPLE SIZE	1309	.....Total number observed eating foods

*Thus 99% of adult males in Pakistan had a cereal on the day of observation.

Figure 5.1

PERCENT OF SUBJECTS EATING FOODS

PAKISTAN - ADULT MALES



For adult males, almost all had taken a cereal and oil, (usually with a vegetable or meat). Most had drunk tea on the day of examination. Between one third and a half of adult males had consumed meat, pulses vegetables and/or milk. Only a small minority consumed eggs (9%), fish (3%), and any fruit (5%).

The distributions for urban/rural areas are listed in TABLE 5-4. In Rural areas milk is much more frequently drunk and meat less commonly eaten as compared with urban and city areas.

Table 5-4 : QUALITATIVE DIET
PERCENTAGE OF ADULT MALES EATING EACH FOOD

	ADULT MALE		
AREA	URBAN	RURAL	CITY
CEREAL	99	99	99
MILK	38	59	27
ROOTS	31	38	17
PULSES	33	33	32
MEAT	36	24	46
EGG	11	6	13
FISH	4	4	2
OILS	98	96	97
VEGETABLES	49	39	51
LEAFY VEG	4	7	2
FRUITS	5	2	9
TEA	82	64	83
SAMPLE SIZE	290	512	507

With regards to provinces [TABLE 5-5] a much greater percentage of adult males drink milk in Punjab & Sind as compared with the rest of the country; however, meat is eaten by fewer subjects in these provinces (excluding Lahore and Karachi). Fish was more often eaten in Baluchistan (14%). Tea was universally drunk in NWFP and Baluchistan and by fewer in Punjab (71%) and Sind (43%). There was much variation in the percentage of subjects eating vegetables. Throughout the country eggs and fruit were rarely consumed.

[Text changed - previous wording suggested frequency of intake by individvals rather than % eating foods]

Table 5-5 : PERCENTAGE OF ADULT MALES EATING EACH FOOD COMPARISON OF PROVINCES AND ADDED AREAS

FOOD TYPE	PROVINCE						
	PUNJAB	SIND	NWFP	BALUCH'N	AZADK	LAHORE	KARACHI
CEREAL	98	99	99	98	100	99	100
MILK	57	72	17	27	14	40	2
ROOTS	14	54	42	36	6	5	9
PULSES	30	41	25	32	38	32	43
MEAT	27	24	43	41	50	42	46
EGG	10	8	5	8	14	12	20
FISH	1	2	0	14	1	2	2
OILS	98	100	97	89	100	97	100
VEGETABLES	64	29	30	27	75	63	70
LEAFY VEG	5	10	6	3	5	0	0
FRUIT	6	2	6	2	5	10	9
TEA	71	43	97	96	90	72	98
SAMPLE SIZE	310	341	198	171	157	241	46

Adult female vs. male comparisons [TABLE 5-6]

Throughout the country, there were no major differences in the percentage of adult males vs. females consuming particular foods.

Table 5-6 : PERCENTAGE OF SUBJECTS EATING FOOD ADULT - MALES VS. FEMALES

FOOD TYPE	ADULT MALE	ADULT FEMALE
CEREAL	99	99
MILK	43	42
ROOTS	29	30
PULSES	33	30
MEAT	35	37
EGG	9	10
FISH	3	3
OILS	97	97
VEGETABLES	45	44
LEAFY VEG	5	6
FRUITS	5	7
TEA	74	77
SAMPLE SIZE	1309	1192

Comparison of child with adult profile - [TABLE 5-7].{Figure 5.2}

When the children aged 12-17 months are compared with the adult profile just presented major differences in the percentage of subjects eating most foods are apparent. For example, 61% of these children ate any cereal as compared with 99% of adults; 34% of children ate added oil compared with 97% of adults. Similar major differences occurred with meat, pulses, vegetables and roots. These results reflect a critical finding in this survey. YOUNG CHILDREN IN THIS COUNTRY ARE SIMPLY NOT EATING FOODS THAT ARE AVAILABLE TO THEM. A direct indicator of availability is that adults from the same sample eat these foods.

Table 5-7 : **PERCENTAGE OF SUBJECTS EATING EACH FOOD ADULT MALE VS. CHILD AGED 12-17 MONTHS**

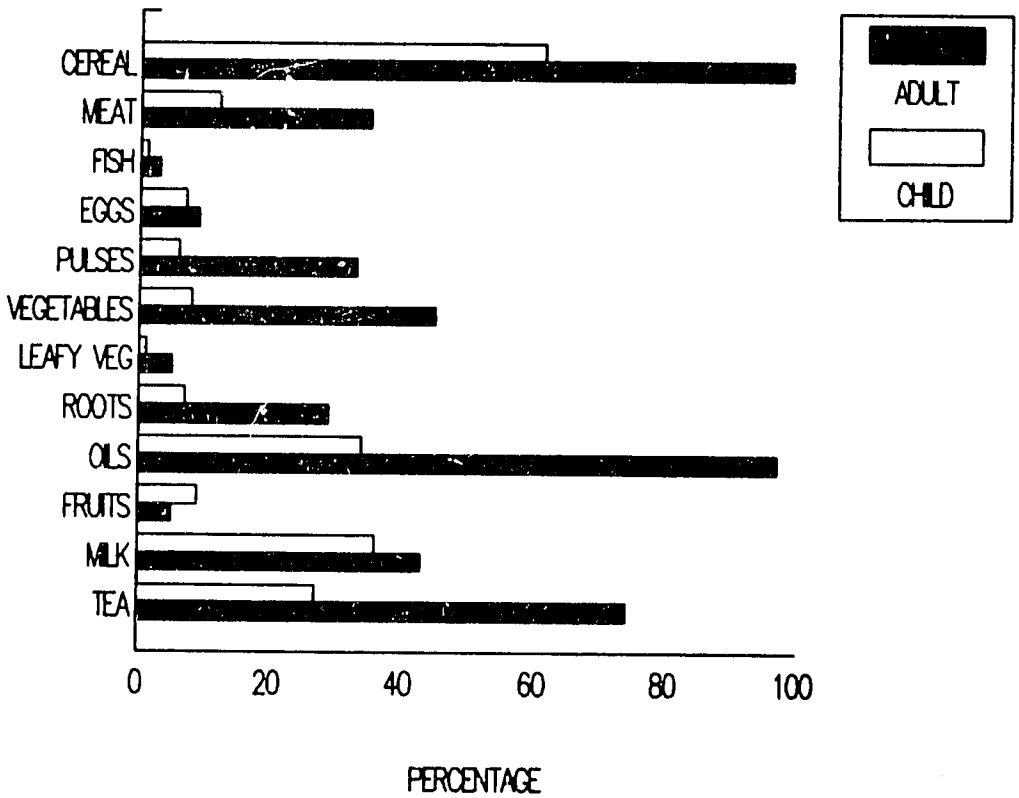
FOOD TYPE	ADULT MALE	CHILD AGED 12-17 MTHS
CEREAL	99	61
MILK	43	36
ROOTS	29	12
PULSES	33	7
MEAT	35	1
EGG	9	7
FISH	3	1
OILS	97	34
VEGETABLES	45	8
LEAFY VEG	5	1
FRUITS	5	9
TEA	74	27
SAMPLE SIZE	1309	300

Results pertaining to this problem will be presented according to precise age, and area of the country. Although some variation occurs the pattern is fairly consistant throughout.

Figure 5.2

COMPARISON OF SUBJECTS EATING FOODS

PAKISTAN - CHILD VS ADULT



Pregnant/Lactating vs. adult female comparisons [TABLE 5-8]

The only suggestion of any difference between these groups in terms of the percentage of subjects eating foods of different types relates to meat and oils. In the country in general there is no apparent major restriction in the types of foods eaten by pregnant/lactating women as compared with other adult females.

Table 5-8 : PERCENTAGE OF SUBJECTS EATING EACH FOOD ADULT FEMALES VS.PREGNANT/LACTATING

FOOD TYPE	ADULT FEMALE	PREGNANT	LACTATING
CEREAL	99	99	99
MILK	42	48	40
ROOTS	30	23	23
PULSES	30	26	30
MEAT	37	31	32
EGG	10	7	9
FISH	3	3	4
OILS	97	91	92
VEGETABLES	44	47	41
LEAFY VEG	6	4	4
FRUITS	7	8	6
TEA	77	78	80
SAMPLE SIZE	1192	452	957

Schoolboy vs. schoolgirl comparisons [TABLE 5-9]

There was little if any difference between these groups. A major problem in this age group is the influence of school attendance on food intake sources, often modified by a late lunch on the child's return home from school.

Table 5-9 : PERCENTAGE OF SUBJECTS EATING EACH FOOD BOYS VS. GIRLS

	6-15 YEAR OLDS	
FOOD TYPE	BOYS	GIRLS
CEREAL	99	99
MILK	44	43
ROOTS	27	26
PULSES	31	29
MEAT	39	35
EGG	12	12
FISH	4	5
OILS	96	96
VEGETABLES	43	44
LEAFY VEG	7	7
FRUITS	6	7
TEA	69	73
SAMPLE SIZE	681	639

4.5.2 Young Children

Percent of young children eating any food [TABLE 5-10] {Fig 5.3}

The most striking result is that only one third (32%) of children aged 7-9 months reportedly at any food (apart from breast and bottle milk) on day of the study. By age 10-12 months 56% were eating some food. Even by 12-17 months only 50-70% of all children ate any food (depending on the province: TABLE 5-11. Fig. 5.4). These results compare unfavourably with other countries. [For example in both Liberia and Cameroon (in the mid 1970's) about 25% of children aged 7-9 months and about 15% aged 10-12 months had no food (apart from breast/bottle).]

Table 5-10 : PERCENT OF CHILDREN EATING ANY FOOD - PAKISTAN

	AGE GROUPS IN MONTHS							
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24
ANY FOOD	2	14	32	55	66	85	88	94

Figure 5.3

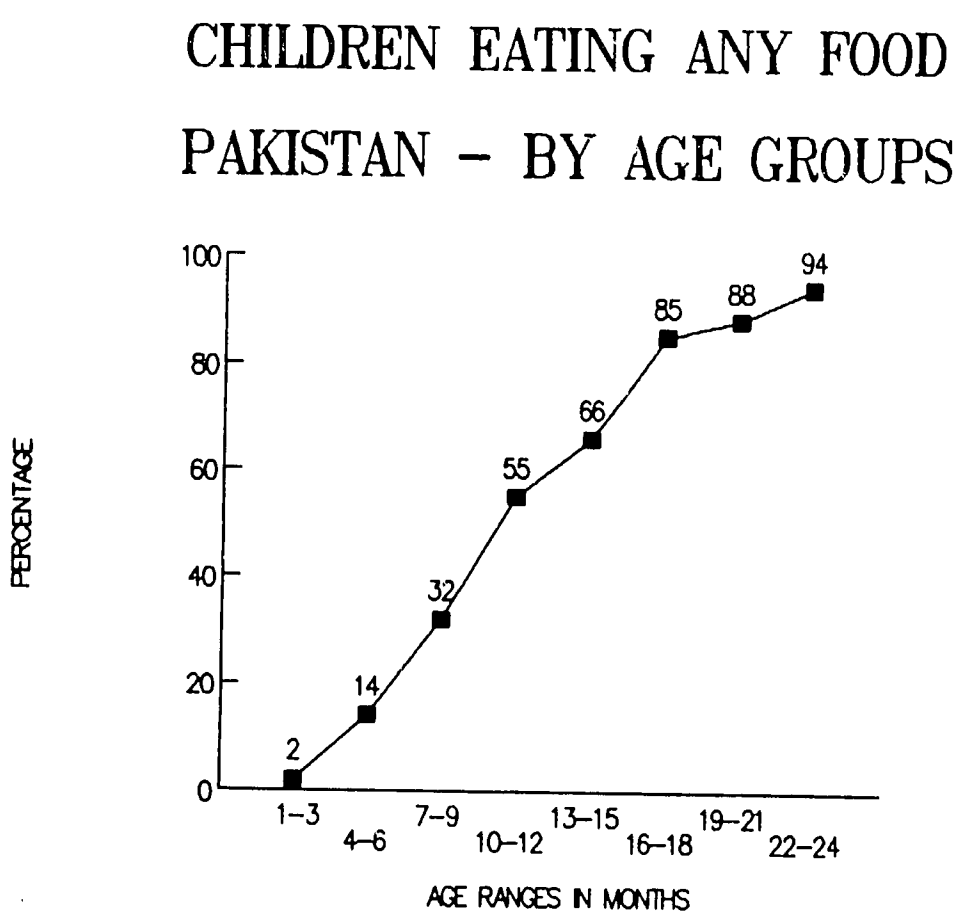
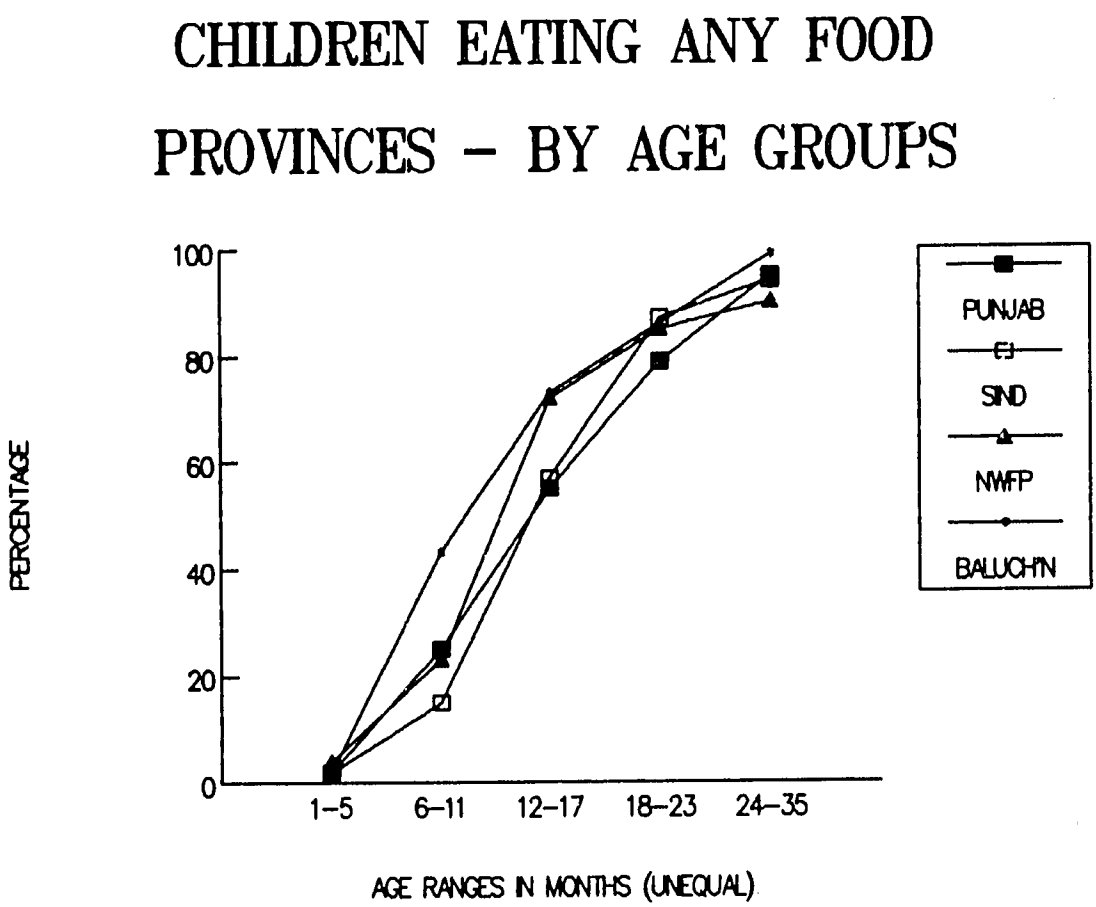


Table 5-11 : PERCENT OF CHILDREN EATING ANY FOOD BY PROVINCE

	AGE GROUPS IN MONTHS				
	1-5	6-11	12-17	18-23	24-35
PUNJAB	2	25	55	79	95
SIND	2	15	57	87	94
NWFP	4	23	72	85	90
BALUCHISTAN	2	43	73	86	99
AZAD KASHMIR	8	44	82	94	98

Figure 5.4



In general the percentage of children eating any food was lower in rural as compared with urban and city areas.[TABLE 5-12] {Figure 5.5}.

Table 5-12 : PERCENT OF CHILDREN EATING ANY FOOD BY URBAN/RURAL

	AGE GROUPS IN MONTHS					
	1-3	4-6	7-9	10-12	13-18	19-24
RURAL	1	9	25	45	77	95
URBAN	0	11	39	57	87	89
CITY	3	23	35	70	76	92

Figure 5.5

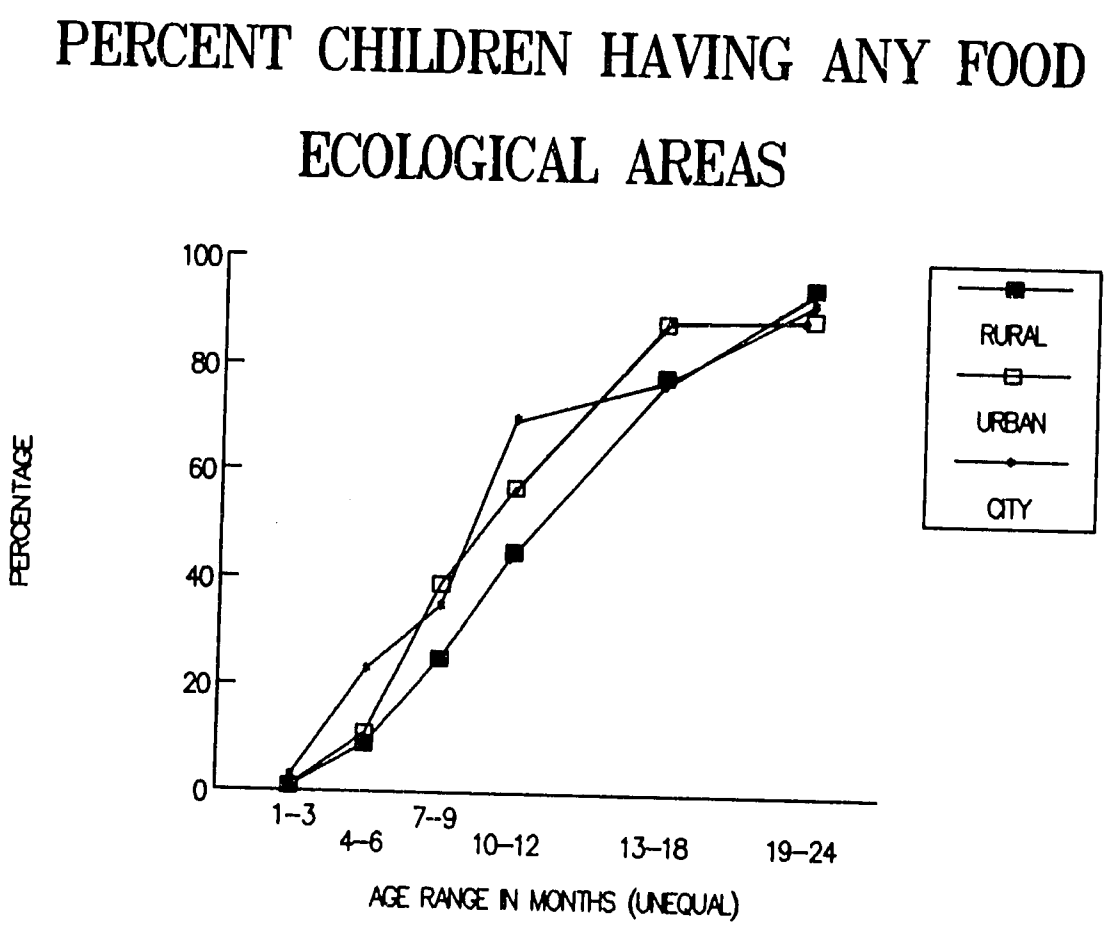


TABLE 5-13 and Figure 5.6 for the whole country illustrate this problem according to individual foods (e.g. cereals, meat pulses and vegetables) comparing young children with 6-9 year olds and adults aged 20-49 years. There is a clear "lag period" up to 23 months of age, where the percent of children eating each food is often far below an index of availability (i.e. adults). This index, which is marked as single points on the far right column of each graph represents the percentage of adults who ate the food. For example cereals were eaten by 100% of adults whereas the other foods were eaten less commonly. In all cases most children do not eat the available food until well into their second year of life. So that the "index of availability" for each cereals is 100%. Each of the other foods were eaten by approximately 40% of adults, hence the index for these foods is far less than that for cereals.

Table 5-13 : PERCENT OF SUBJECTS EATING EACH FOOD BY AGE GROUPS

PAKISTAN

	------- AGE GROUPS IN MONTHS ------						- IN YEARS -	
FOOD TYPE	1-5	6-11	12-17	18-23	24-35	36-60	6-9YR	20-49Y
CEREAL	3	28	61	83	93	98	99	99
MEAT	1	4	12	23	24	31	36	35
PULSES	1	1	6	14	16	27	29	32
VEGETABLES	1	3	8	19	30	39	42	44

It would appear that most children do not eat the types of family food available to them (i.e. eaten by adults in the same households) until well into their second year of life, far too late for adequate nutrition.

The results for rural, urban and city areas for the percentage of young children eating these foods is similar to that of the whole country, although in rural areas the percentage is less; that is there is more delay for eating onset [TABLE 5-14 and Figures 5.7 to 5.9 on pages 16 and 17].

Table 5-14: PERCENTAGE OF SUBJECTS EATING FOODS COMPARISON BETWEEN AGE GROUPS - URBAN/RURAL AREAS

	------- AGE GROUPS IN MONTHS ------						-- IN YEARS --	
-- URBAN --	1-5	6-11	12-17	18-23	24-35	36-60	6-9YR	20-49YR
CEREAL	0	35	67	79	91	98	97	99
MEAT	0	6	18	35	31	35	39	38
PULSES	0	0	6	12	16	25	26	30
VEGETABLES	0	4	8	27	34	41	39	48
-- RURAL --								
CEREAL	3	19	54	82	96	99	99	98
MEAT	0	4	7	11	9	20	26	24
PULSES	1	1	4	14	14	29	30	33
VEGETABLES	1	2	7	6	22	31	40	35
-- CITY ---								
CEREAL	6	33	68	85	92	97	99	99
MEAT	3	5	15	33	35	43	46	46
PULSES	2	1	7	15	20	28	32	33
VEGETABLES	2	4	6	40	36	46	45	51

In the case of provinces the pattern is again quite similar. Hence the problem exists throughout the whole of the nation [TABLE 5-15 and Figures 5.10 to 5.16 on pages 18 to 21].

Table 5-15: PERCENTAGE OF SUBJECTS EATING FOODS COMPARISON BETWEEN AGE GROUPS - PROVINCES AND ADDED AREAS

	------- AGE GROUPS IN MONTHS ------						-- IN YEARS --	
	1-5	6-11	12-17	18-23	24-35	36-60	6-9YR	20-49YR
-- PUNJAB --								
CEREAL	2	19	46	71	91	96	98	98
MEAT	0	2	2	4	7	22	25	29
PULSES	0	0	5	11	17	26	31	30
VEGETABLES	2	1	4	7	37	55	63	60
--- SIND ---								
CEREAL	2	15	56	85	94	99	100	100
MEAT	0	0	9	22	16	19	21	24
PULSES	0	0	0	11	14	28	38	39
VEGETABLES	0	0	4	4	22	22	24	26
--- NWFP ---								
CEREAL	3	19	69	83	88	98	98	100
MEAT	0	11	20	31	38	44	44	41
PULSES	2	0	11	21	16	21	29	24
VEGETABLES	0	6	7	20	15	26	32	32
-BALUCHISTAN-								
CEREAL	2	43	73	86	99	98	99	98
MEAT	0	6	17	24	36	44	47	42
PULSES	2	3	2	11	17	34	15	30
VEGETABLES	0	2	11	15	23	20	20	26
-- LAHORE --								
CEREAL	7	32	55	86	94	97	98	98
MEAT	5	0	13	26	23	35	39	41
PULSES	2	1	11	19	16	29	27	33
VEGETABLES	3	3	11	42	41	60	60	64
-- KARACHI -								
CEREAL	*	59	*	97	95	100	100	99
MEAT	*	14	*	44	42	57	59	50
PULSES	*	0	*	8	26	19	28	37
VEGETABLES	*	10	*	44	55	49	59	63
-- AZAD K --								
CEREAL	6	40	78	88	96	98	99	100
MEAT	0	2	13	25	26	42	47	47
PULSES	0	5	7	21	38	36	44	44
VEGETABLES	3	0	7	26	45	58	61	68

* insufficient sample size.

Figure 5.6

PERCENT OF SUBJECTS EATING FOODS
COMPARISON BY AGE - PAKISTAN

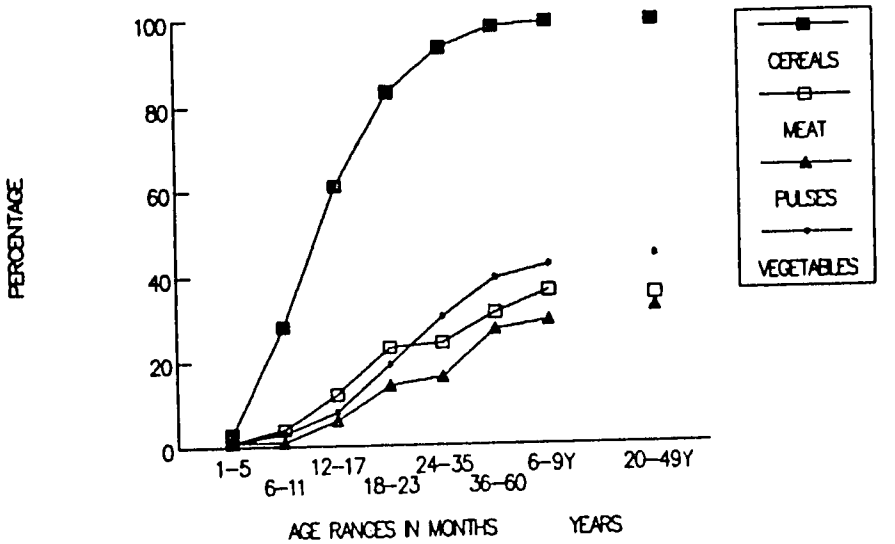


Fig. 5.7

COMPARISON BY AGE - URBAN AREAS

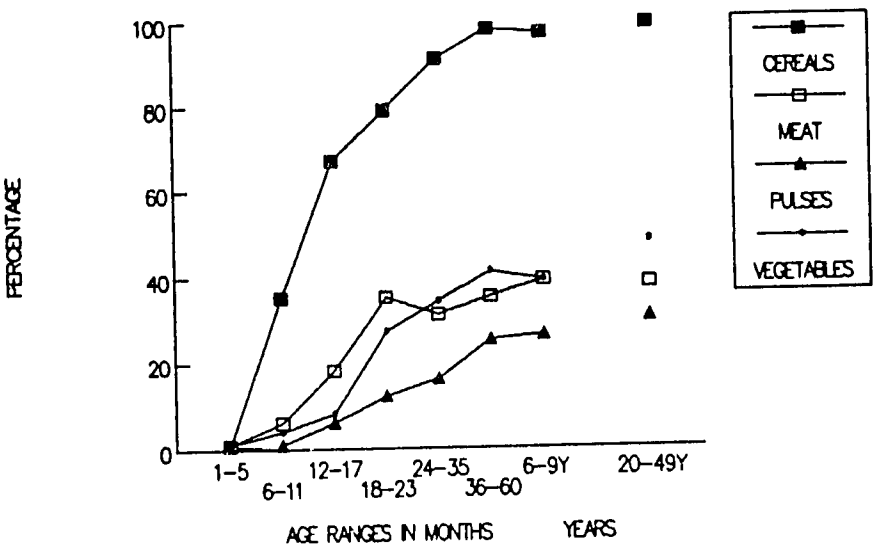


Figure 5.8

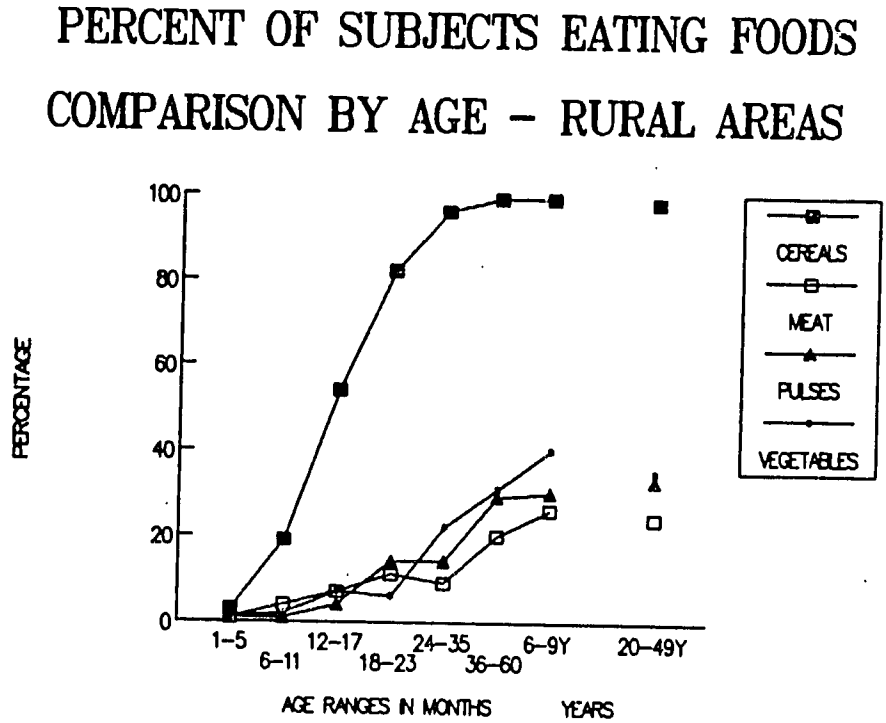


Figure 5.9

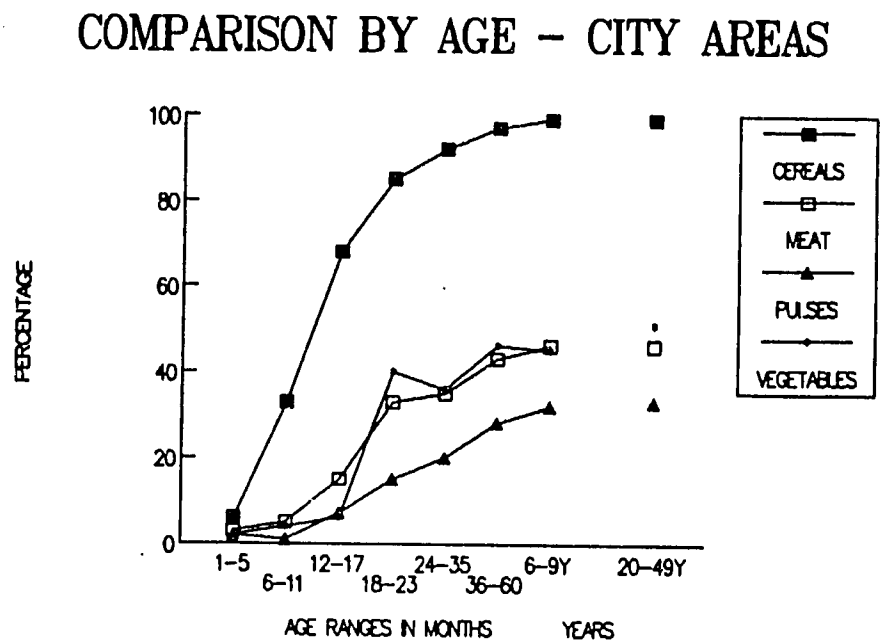


Figure 5.10

PERCENT OF SUBJECTS EATING FOODS

COMPARISON BY AGE - PUNJAB

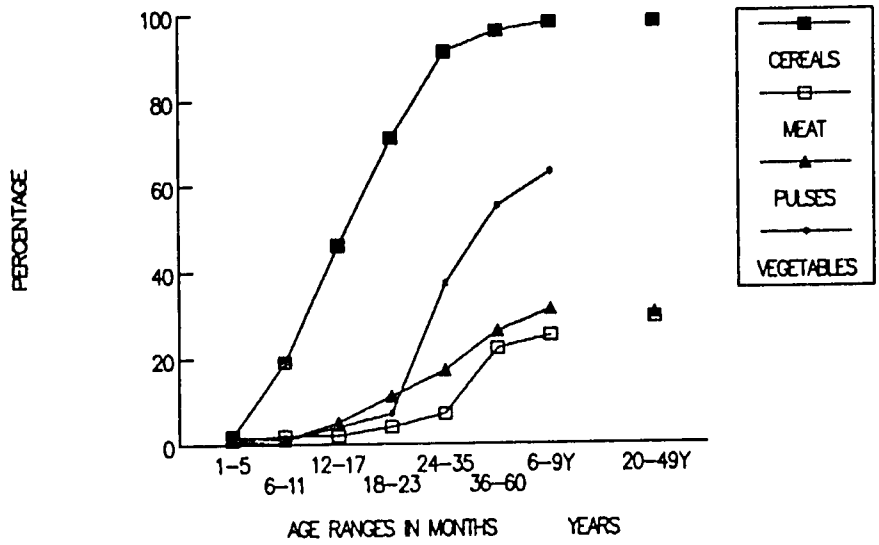


Figure 5.11

COMPARISON BY AGE - SIND

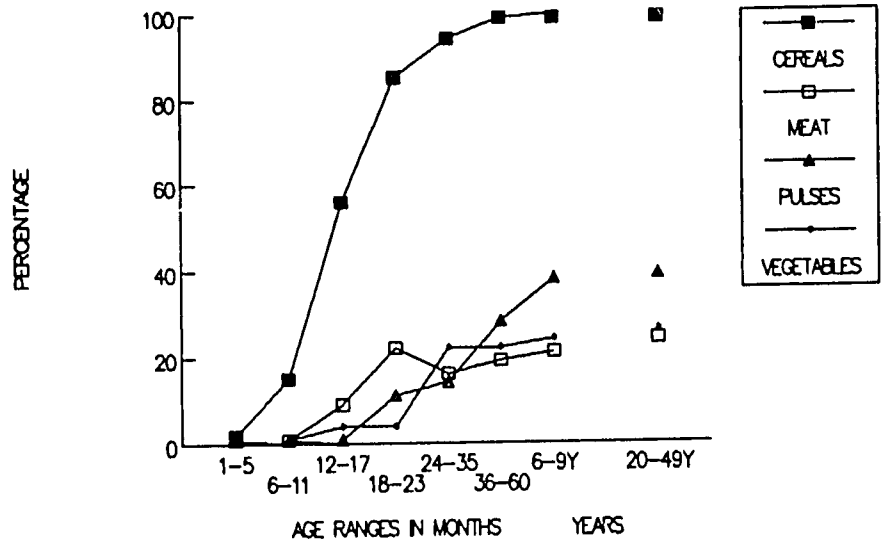


Figure 5.12

PERCENT OF SUBJECTS EATING FOODS

COMPARISON BY AGE - NWFP

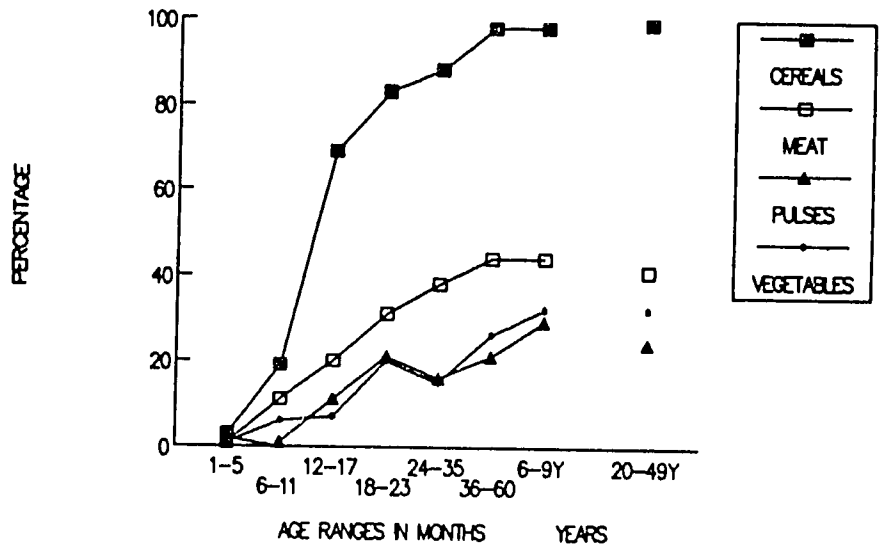


Figure 5.13

COMPARISON BY AGE - BALUCHISTAN

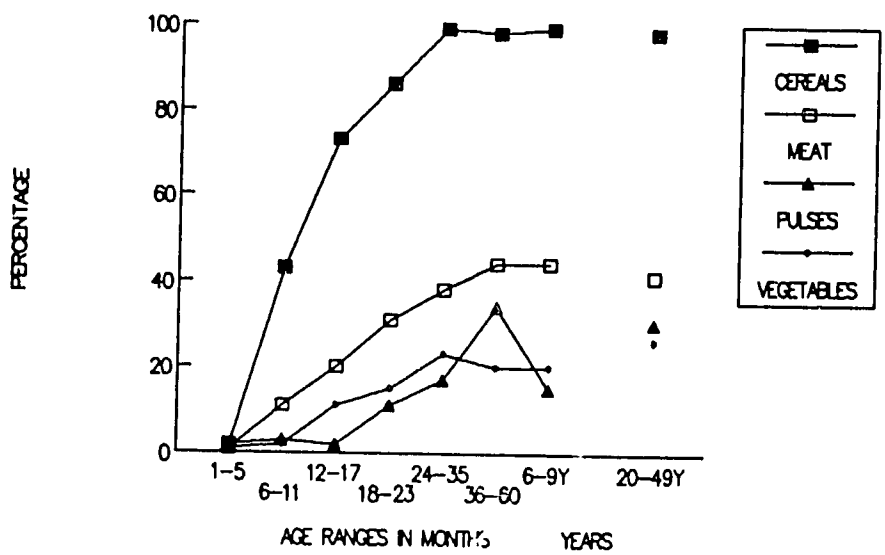


Figure 5.14

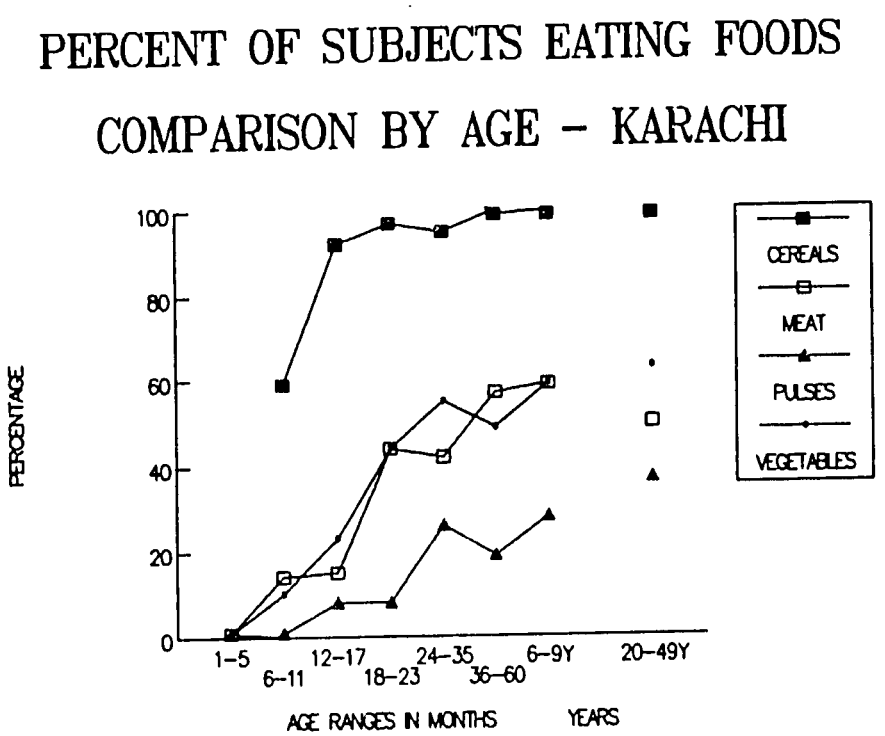


Figure 5.15

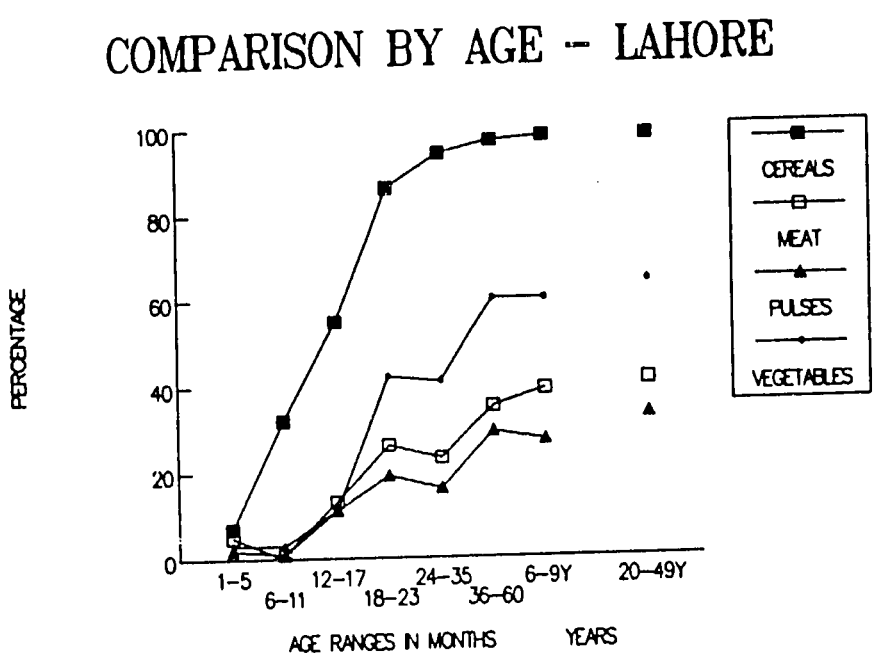
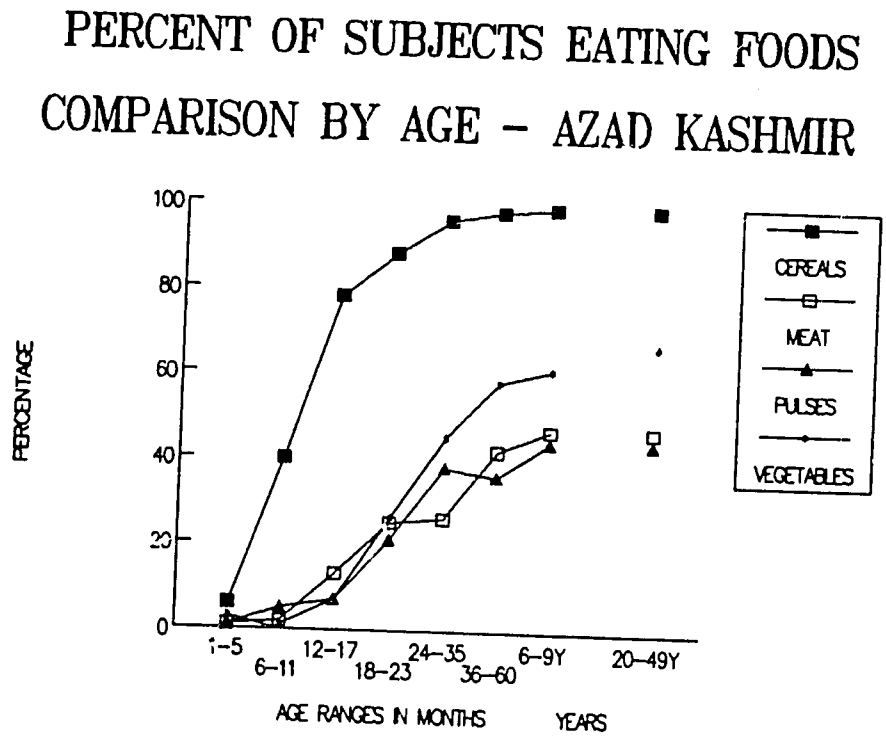


Figure 5.16


PERCENT OF SUBJECTS EATING FOODS
COMPARISON BY AGE - AZAD KASHMIR
PERCENTAGE
100
80
60
40
20
0
1-5
6-11
12-17
18-23
24-35
36-60
6-9Y
20-49Y
AGE RANGES IN MONTHS
YEARS
CEREALS
MEAT
PULSES
VEGETABLES

The addition of added food must begin by six months of age, where demands are greater to resist the deleterious effects of diarrhoea and infections. **CLEARLY THIS IS NOT OCCURRING** in most children in Pakistan and is a major cause of malnutrition and perhaps mortality. The addition of foods "usually available" in the household to children aged 6 months onwards would be a key factor in alleviating the situation. That these foods are universally (e.g. wheat) or commonly (e.g. rice, pulses) available is reflected in the adult diets.

It should be noted that these data are derived from a combination of two groups of household-

1. all members assessed (subsample)
2. only at-risk subjects assessed (children under 5 years of age and pregnant/lactating mothers).

One assumes that relatively little difference in the results between the two groups according to the types of food eaten by individual members of the same biological group.

Apart from the diet observation and weighing of foods, a question was asked to the mother about when specific foods (e.g roti, dalia, etc) had first been given to the child. The results from this recall suggested that the percentage of young children eating foods was much higher than that found in the observation part of the study. However a more comparative method for assessing the results of the recall question is to determine at what age FOR THE PARTICULAR CHILD any food was first given. A sample of these results indicated that for rural areas up proximately 25% of mothers reported that their child did not receive any food until at least 12 months of age.

A major difference in the two methods (recall vs observation with weighing) apart from possible recall bias in the former is that a child may be given food at a particular age (e.g 6 months) for a special reason but this may not necessarily be given daily or on most days. Thus during the observation of food prepared for 24 hours it is quite likely that the preparation of a special or weaning food for the young child may not have occur on that particular day.

In some instances food apart from breast milk and bottle milk may have been eaten by the child and not recorded in this survey. This may occur for example when the mother has prepared food for a child having diarrhoea at a time other than the period of examination by the survey teams. In the same way, special weaning foods may be purchased or be locally available. Interestingly these foods were found to be relatively uncommon in this survey, perhaps in part, due to methodology.

4.5.3 Breast And Bottle Feeding

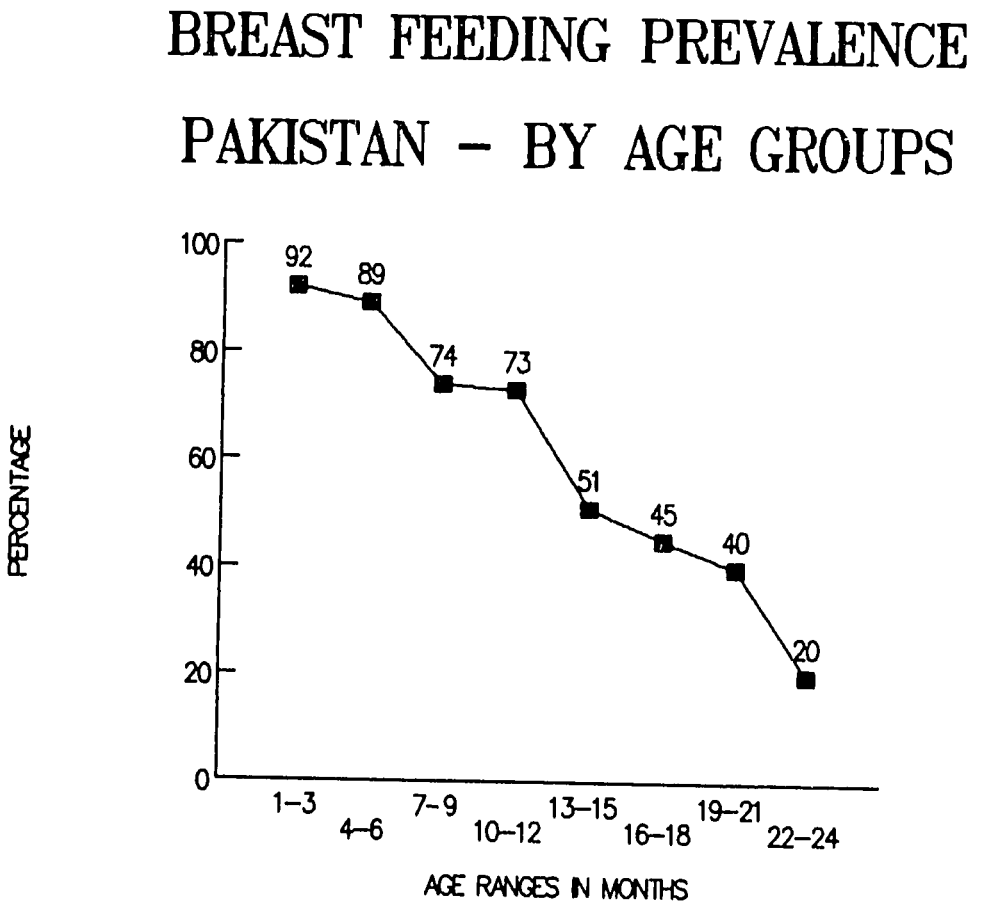
Breast Feeding

In general, about 90% of the children are breast fed during the first few months of life, and about 80% from 6-11 months of age. The average duration of breast feeding appeared to be about 18 months of age. By 24 months approximately 20% of children are still being breast fed [TABLE 5-16] and [Figure 5.17].

Table 5-16 : PERCENT OF CHILDREN BREAST FEEDING PAKISTAN

	AGE GROUPS IN MONTHS							
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24
BREAST	92	89	74	73	51	45	40	20

Figure 5.17

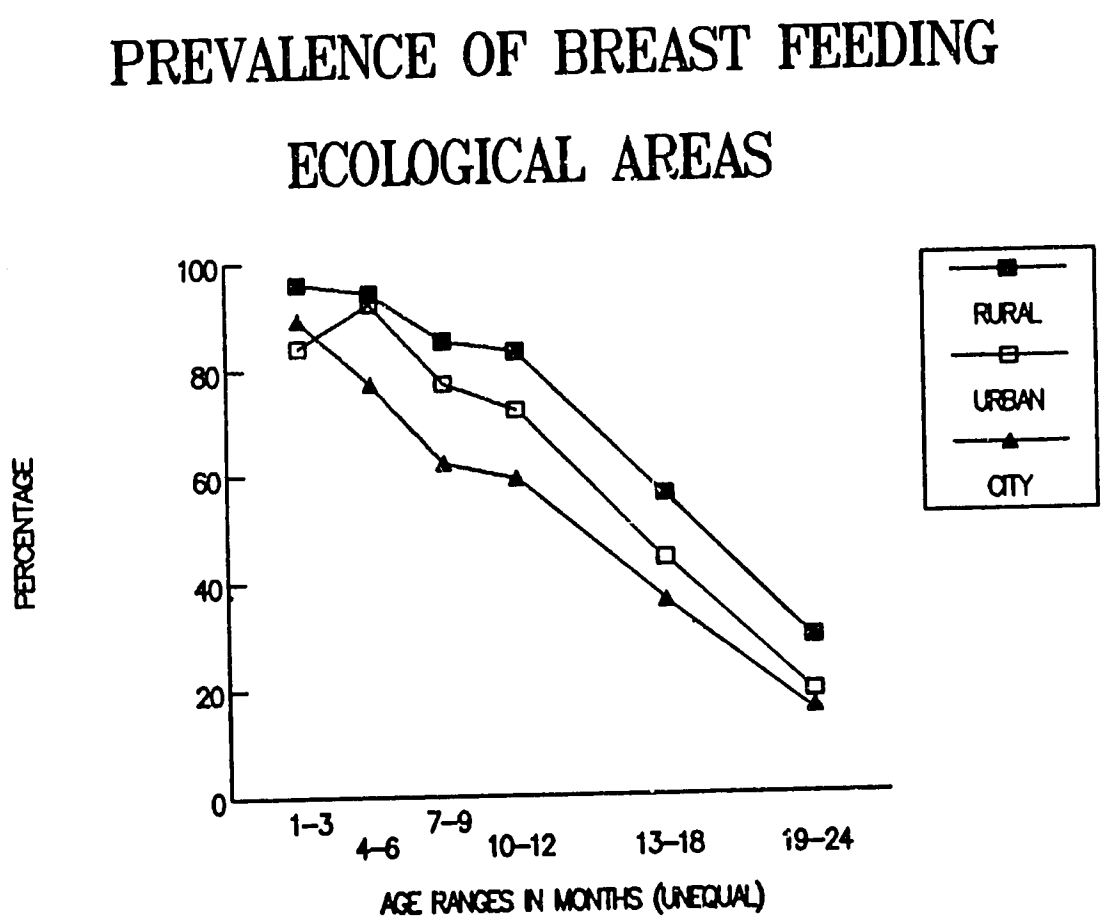


As expected the prevalence of breast feeding is highest in rural areas and least in the cities [TABLE 5-17 and Figure 5.18]

Table 5-17 : PERCENT OF CHILDREN BREAST FEEDING BY URBAN/RURAL

	AGE GROUPS IN MONTHS					
	1-3	4-6	7-9	10-12	13-18	19-24
RURAL	96	94	85	83	51	57
CITY	89	77	62	59	38	16
URBAN	84	92	77	72	45	18

Figure 5.18

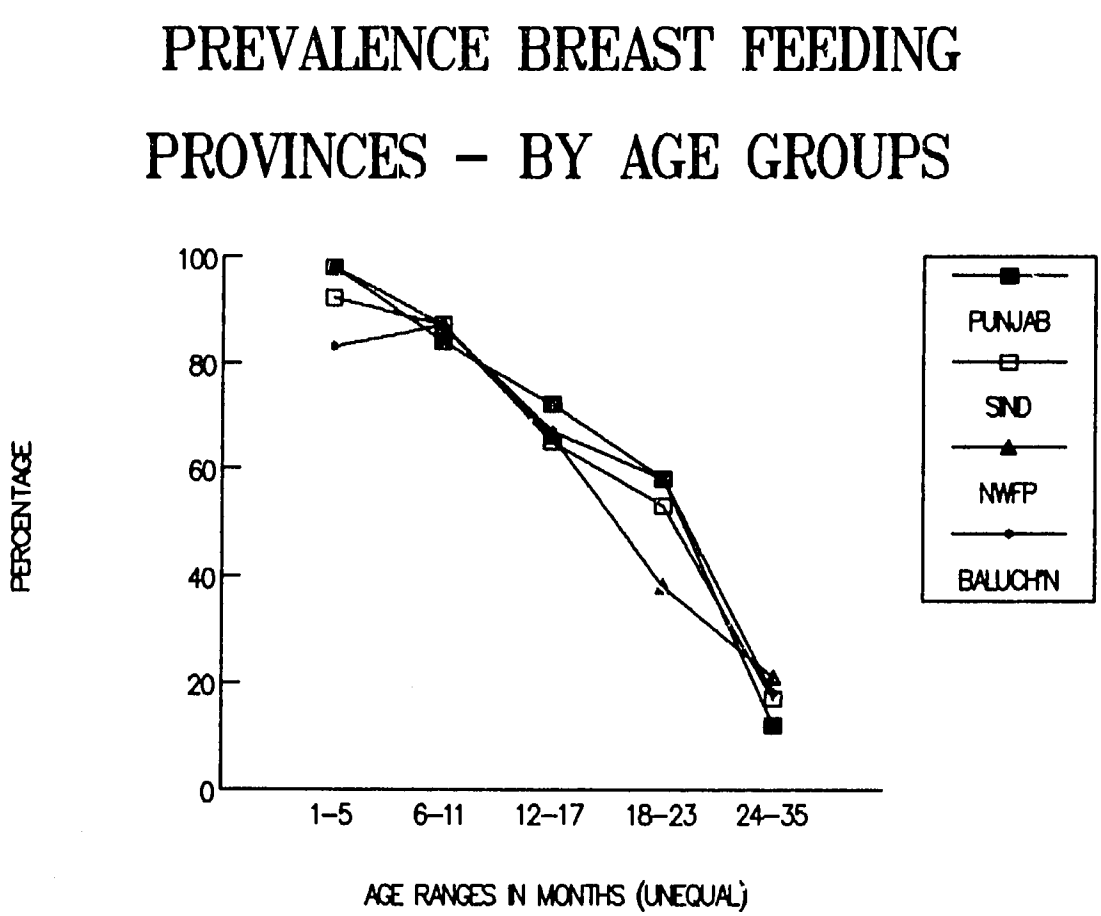


There is little difference in breast feeding prevalence across provinces and Azad Kashmir [TABLES 5-18, Fig. 5.19].

Table 5-18 : PERCENT OF CHILDREN BREAST FEEDING BY PROVINCE

	AGE GROUPS IN MONTHS				
	1-5	6-11	12-17	18-23	24-35
PUNJAB	98	84	72	58	12
SIND	92	87	65	53	17
NWFP	98	87	66	38	21
BALUCHISTAN	83	87	67	58	18
AZAD KASHMIR	89	81	56	25	4

Figure 5.19



It is clear that breast feeding is almost universally practiced throughout the country at least early in the child's life. However the quality of breast feeding is another matter. In this regard the survey did not directly investigate this problem. An indirect measure was frequency of breast feeding. However the way in which this information was collected was not the same across teams. For example in some provinces,the maximum frequency was five times during the day and in others at least fifteen. An informal review of results indicated that many mothers breast fed their young child much less frequently than others in the same province. This tended to occur for example when the child also had the bottle or when given milk from some other source.

Bottle Feeding

The prevalence of bottle feeding is approximately 13% from 1-3 months, rises to a peak of 24% at 7-9 months, then continues to just under 20% during most of the second year of life [TABLE 5-21] {Figure 5.20}.

Table 5-21 : PERCENT OF CHILDREN BOTTLE FEEDING
PAKISTAN

	AGE GROUPS IN MONTHS							
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24
BOTTLE	13	18	24	18	18	9	18	5

Bottle feeding is far less common in rural areas as compared with urban and city localities. Whereas the prevalence of bottle feeding in urbanized areas is 15-20% at 1-3 months of age, in rural areas it is 5-10% at that age. In Lahore the prevalence of bottle feeding is 44% for all children aged 6-11 months. The peak for bottle feeding at 7-9 months is consistent for all areas, both rural and urban [Table 5-22] {Figure 5.21}.

Table 5-22 : PERCENT OF CHILDREN BOTTLE FEEDING
BY URBAN/RURAL

	AGE GROUPS IN MONTHS					
	1-3	4-6	7-9	10-12	13-18	19-24
RURAL	8	14	17	11	5	4
URBAN	18	21	29	21	11	6
CITY	17	21	29	27	18	11

Figure 5.20

Figure 5.20

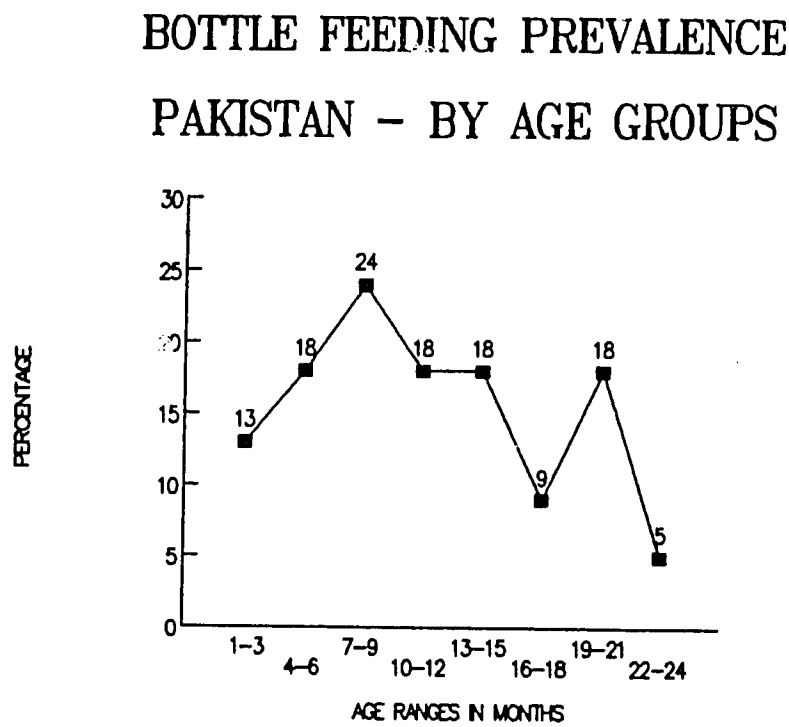
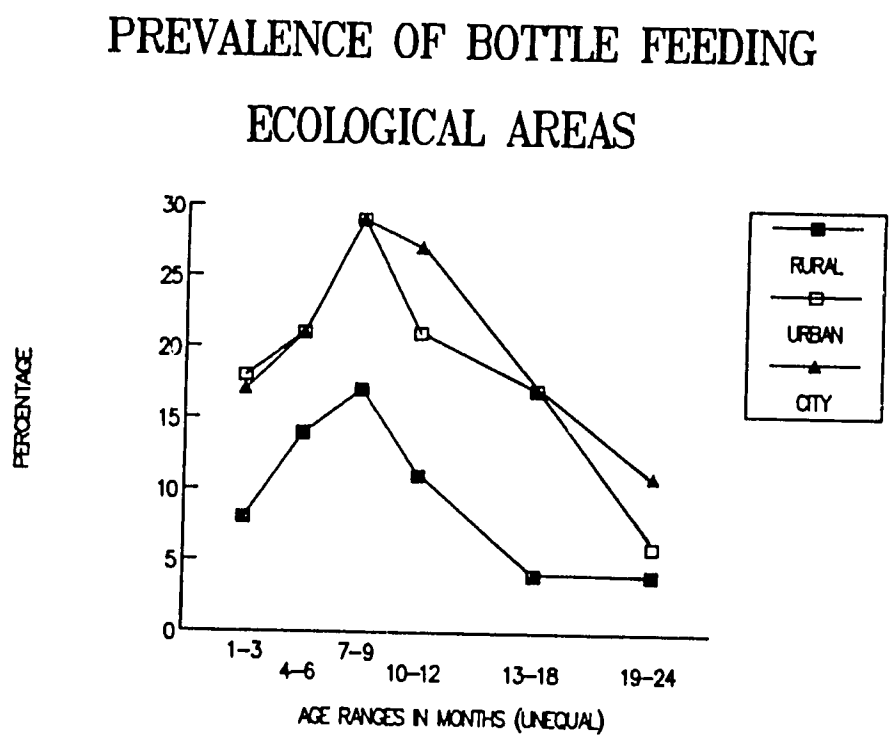


Figure 5.21

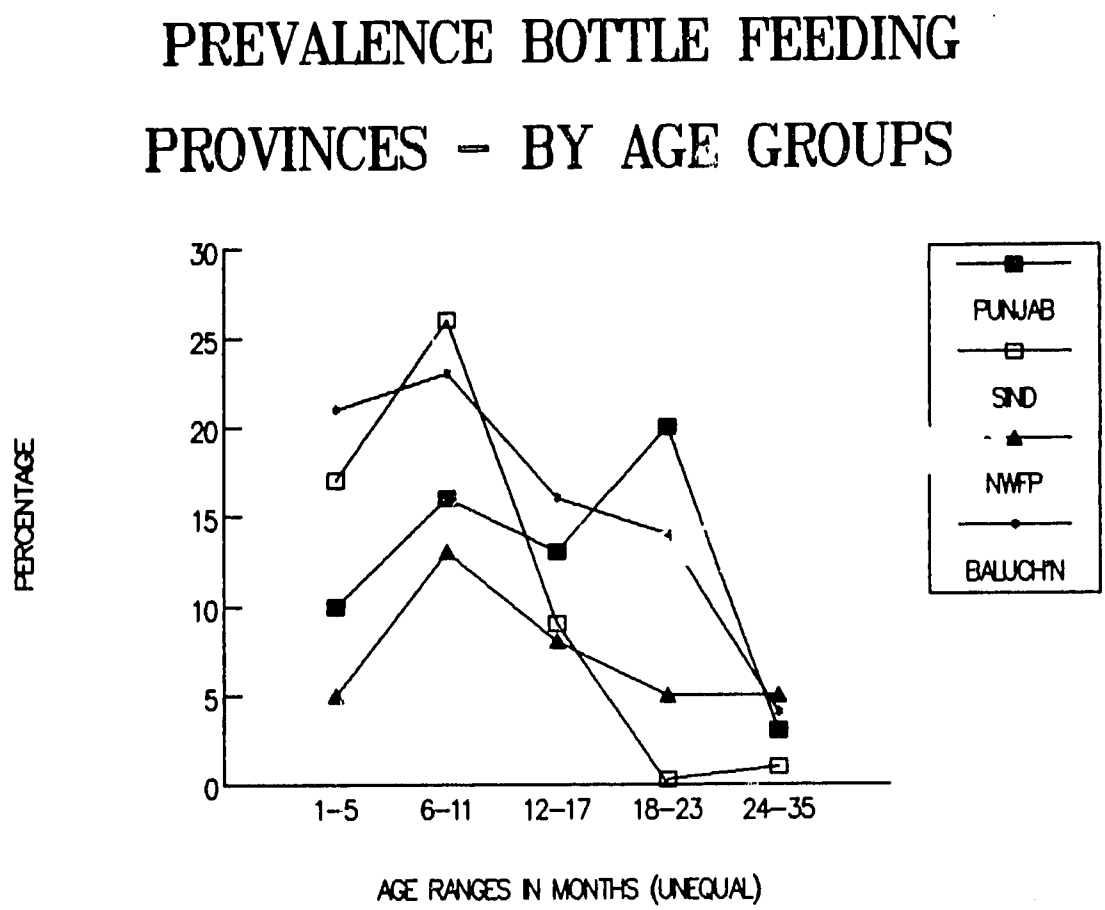


The prevalence of bottle feeding varies greatly across provinces, and is not necessarily influenced by urban rural differences. For example, bottle feeding is relatively common in Baluchistan during the first year of life. The pattern of bottle feeding prevalence by age tends to reflect that of Pakistan as a whole: a peak at 6-11 months of age gradually reducing thereafter. [TABLE 5-23, Figure 5.22]. Bottle feeding prevalence in Azad Kashmir tends to be less than the other provinces.

Table 5-23 : PERCENT OF CHILDREN BOTTLE FEEDING BY PROVINCE

	AGE GROUPS IN MONTHS				
	1-5	6-11	12-17	18-23	24-35
PUNJAB	10	16	13	20	3
SIND	17	26	9	0	1
NWFP	5	13	8	5	5
BALUCHISTAN	21	23	16	14	4
AZAD KASHMIR	9	11	11	4	0

Figure 5.22



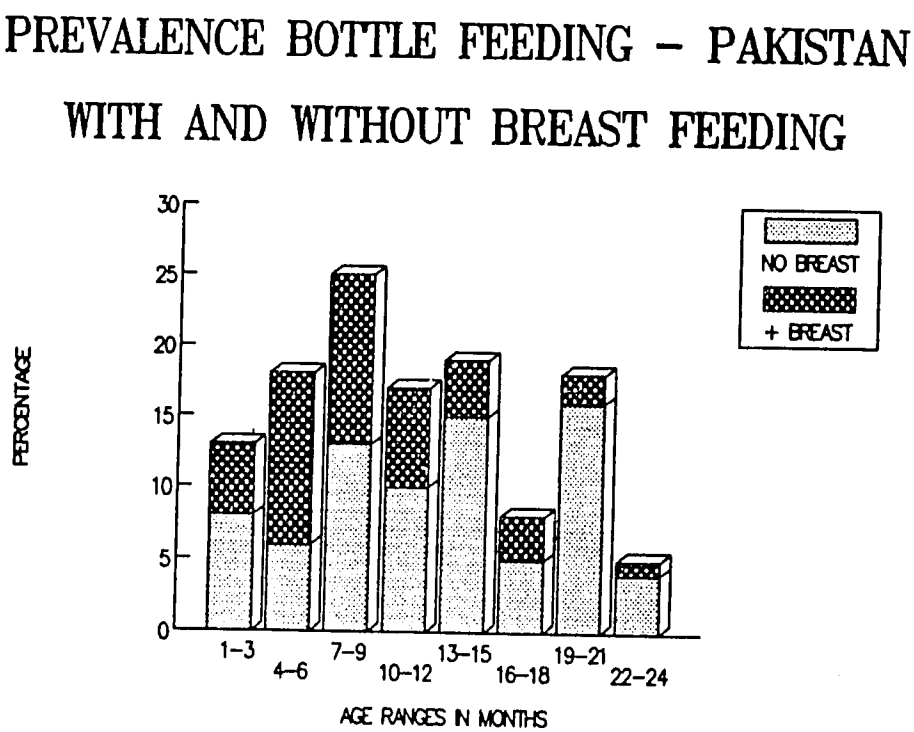
Breast with Bottle Feeding

It appears that breast and bottle feeding occurs together with the same child, particularly from 4-9 months of age (12%) [TABLE 5-24, Figure 5.23].

Table 5-24 : PREVALENCE OF BREAST WITH BOTTLE FEEDING PAKISTAN

	AGE GROUPS IN MONTHS							
	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24
BREAST/BOTTLE	5	12	12	7	4	3	2	1
BREAST/NO BOT	86	77	62	66	48	41	38	19
BOT/NO BREAST	8	6	13	10	15	5	16	4

Figure 5.23



4.5.4 Intake of Foods

Amounts of food eaten are expressed in grams per day. To derive the average per capita intake the results are weighted across all subjects observed, according to their relative proportion in the total population (see Annex 2).

For Pakistan the survey found that the average intake of cereals per caput was just over 500 grams per day. As expected most of this (over 85%) was wheat, usually in the form of roti. The results for other foods are presented in TABLE 5-25.

Table 5-25 : AMOUNTS OF FOODS EATEN (GRAMS/DAY) - PAKISTAN

FOOD GROUPS	TOTAL*
TOTAL CEREALS	502
WHEAT	439
RICE	61
PULSES	43
OILS	33
EGGS	7
FISH	6
MEAT	39
ROOTS	40
LEAFY VEGS	10
VEGETABLES	81
FRUIT	8
MILK	161
TEA	150
SUGAR	39

* Does not include Azad Kashmir and Northern Areas.

It is interesting to compare these results with the Planning Division food balance sheet for 1985-86. In general the amounts for the survey are somewhat higher. This is not unexpected as the food balance estimates per capita availability based on food production and deduction for the whole country. In addition, some allowance must be made for the moisture content of certain foods, such as pulses. The results for the household expenditure study in 1979 is also less in general than the current survey but somewhat greater than the 1985-86 food balance sheet.

Comparisons between urban/rural Areas

The average intake of cereals and milk appears much greater in rural as compared with urban and city areas. On the other hand much less meat appears to be eaten in the rural areas. [TABLE 5-26]. This table includes Karachi and Lahore, hence amounts are under estimates for cities.

Table 5-26 : AMOUNTS OF FOODS EATEN (GRAMS/DAY) - AREAS

	-ECOLOGICAL AREAS-		
FOOD GROUPS	RURAL	URBAN	CITY*
TOTAL CEREALS	570	534	404
WHEAT	488	466	370
RICE	82	68	34
PULSES	42	42	44
OILS	29	36	36
EGGS	5	7	9
FISH	8	11	2
MEAT	26	42	53
ROOTS	49	40	30
LEAFY VEGS	14	16	3
VEGETABLES	80	77	83
FRUIT	4	7	13
MILK	257	114	75
TEA	148	140	158
SUGAR	48	32	31

* Includes Karachi and Lahore

Comparison between the Provinces [TABLE 5-27, page 83-85]

The higher intakes of cereal in rural vs urban areas appears to occur in all provinces apart from Punjab. The results for Lahore and Karachi are most likely underestimates because food eaten outside the household was not included nor known. This would also tend to reduce the estimate for cities in Punjab and Sind as well as for the total country. Cereal intake in Azad Kashmir is similar to the provinces. Intake in the Northern Areas is extremely high, reaching almost 900 grams per capita per day.

The results for wheat intake reflect that of cereals. For rice, the highest per capita intake is in Sind, followed by Azad Kashmir.

In general, the intake of pulses ranges from about 35-45 grams per day. A notable exception is Baluchistan where the pulse intake is lower. Based on the method of estimation for oils see (Annex 5) it would appear that the lowest intake for oils also occurs in Baluchistan. This is a reflection on the combined intake of pulses, vegetables and meat. For example, in Northern Areas the consumption of oils appears to be relatively high, assuming that they add the same proportion of oil to their meat, curry, pulses and vegetables as do the people in the rest of the country.

The average consumption of meat in city areas is consistently higher in most provinces as compared with urban or rural. Meat consumption is particularly high in Peshawar and Sind cities, including Karachi. Meat consumption appears strikingly low in rural Sind.

The consumption of fish is quite low throughout the country apart from rural and urban Baluchistan.

The intake of roots, including potatoes is extremely high in the Northern Areas. The reporting for dark green leafy vegetables intake was inconsistent. At times, the reporting of vegetables did not distinguish between the types, with particular reference to dark green leafy and other vegetables. With regards to other vegetables, higher intakes occurred in Punjab and least in Baluchistan. Fruit consumption was low in most areas of the country.

The consumption of milk was very high in rural Sind, and to a lesser extent rural Punjab. For food amounts, as pertains to this section, the total volume of lassi has been included in the estimation of milk and would contribute greatly to this high figure. On the other hand, for Nutrient Analysis, a dilution factor for lassi has been taken into account. The consumption of tea varies greatly throughout the country, ranging from Northern Areas (22 cc per day average) to rural NWFP (at over 400 cc daily on average). Estimates for sugar have been based on the amount of tea and milk drunk (sugar added to milk 10% and to tea 15% on average).

Table 5.27 : AMOUNTS OF FOODS EATEN (GRAMS/DAY) BY RURAL/URBAN AREAS AND PROVINCES

-FOOD-	---------AREA----------				-FOOD-	---------AREA----------			
CEREALS	RURAL	URBAN	CITY	TOTAL	MEAT	RURAL	URBAN	CITY	TOTAL
TOTAL	570	534	404	502	TOTAL	26	42	53	39
---	---	---	---	---	---	---	---	---	---
PUNJAB	496	544	440	498	PUNJAB	27	25	43	30
SIND	650	611	471	624	SIND	8	49	89	26
NWFP	550	497	476	522	NWFP	38	69	118	72
BAL'STAN	559	458	383	492	BAL'STAN	45	33	46	42
LAHORE			363	363	LAHORE			29	29
KARACHI			415	414	KARACHI			56	56
AZAD K.				492	AZAD K.				35
NORTHERN				893	NORTHERN				50

WHEAT	RURAL	URBAN	CITY	TOTAL	EGGS	RURAL	URBAN	CITY	TOTAL
TOTAL	488	466	370	439	TOTAL	5	7	9	7
---	---	---	---	---	---	---	---	---	---
PUNJAB	473	492	407	466	PUNJAB	5	7	9	6
SIND	481	467	424	471	SIND	1	12	10	4
NWFP	532	494	447	495	NWFP	4	1	8	5
BAL'STAN	467	417	370	432	BAL'STAN	15.	5	20	13
LAHORE			335	335	LAHORE			6	6
KARACHI			345	345	KARACHI			12	12
AZAD K.				385	AZAD K.				10
NORTHERN				874	NORTHERN				1

RICE	RURAL	URBAN	CITY	TOTAL	FISH	RURAL	URBAN	CITY	TOTAL
TOTAL	82	68	34	61	TOTAL	8	11	2	6
---	---	---	---	---	---	---	---	---	---
PUNJAB	23	51	33	32	PUNJAB	1	0	0	1
SIND	169	144	47	152	SIND	2	14	5	5
NWFP	18	2	29	19	NWFP	0	0	0	0
BAL'STAN	92	41	13	60	BAL'STAN	44	30	0	31
LAHORE			28	28	LAHORE			3	3
KARACHI			70	70	KARACHI			5	5
AZAD K.				107	AZAD K.				1
NORTHERN				19	NORTHERN				0

Table 5.27 (continued) : AMOUNTS OF FOODS EATEN (GRAMS/DAY) BY RURAL/URBAN AREAS AND PROVINCES

-FOOD-	---------AREA----------				-FOOD-	---------AREA----------			
PULSES	RURAL	URBAN	CITY	TOTAL	ROOTS	RURAL	URBAN	CITY	TOTAL
TOTAL	42	42	44	43	TOTAL	49	40	30	40
PUNJAB	38	36	57	41	PUNJAB	27	23	30	27
SIND	37	63	96	49	SIND	52	45	37	52
NWFP	64	57	42	55	NWFP	94	92	75	94
BAL'STAN	35	13	29	26	BAL'STAN	40	15	92	27
LAHORE			39	39	LAHORE			16	16
KARACHI			45	45	KARACHI			12	12
AZAD K.				34	AZAD K.				9
NORTHERN				39	NORTHERN				280

OILS	RURAL	URBAN	CITY	TOTAL	LEAFY VEG	RURAL	URBAN	CITY	TOTAL
TOTAL	29	36	36	33	TOTAL	14	16	3	10
PUNJAB	37	37	37	37	PUNJAB	12	13	1	10
SIND	20	39	47	27	SIND	20	17	0	17
NWFP	43	55	59	51	NWFP	16	37	8	17
BAL'STAN	17	17	18	17	BAL'STAN	3	1	11	4
LAHORE			28	28	LAHORE			1	1
KARACHI			39	39	KARACHI			3	3
AZAD K.				29	AZAD K.				5
NORTHERN				75	NORTHERN				8

FRUIT	RURAL	URBAN	CITY	TOTAL	VEGETABLE	RURAL	URBAN	CITY	TOTAL
TOTAL	4	7	13	8	TOTAL	80	77	83	81
PUNJAB	10	7	21	11	PUNJAB	123	123	87	116
SIND	1	9	2	3	SIND	55	51	21	51
NWFP	2	8	12	7	NWFP	110	71	55	83
BAL'STAN	1	3	8	2	BAL'STAN	10	54	15	25
LAHORE			17	17	LAHORE			101	
KARACHI			5	5	KARACHI			112	
AZAD K.				7	AZAD K.				72
NORTHERN				0	NORTHERN				150

Table 5.27 (continued) : AMOUNTS OF FOODS EATEN (GRAMS/DAY) BY RURAL/URBAN AREAS AND PROVINCES

-FOOD-	---------AREA----------			
MILK	RURAL	URBAN	CITY	TOTAL
TOTAL	257	114	75	161
PUNJAB	273	171	113	221
SIND	416	117	38	305
NWFP	100	51	55	73
BAL'STAN	73	86	35	69
LAHORE			92	92
KARACHI			47	47
AZAD K.				42
NORTHERN				4

-FOOD-	---------AREA----------			
SUGAR	RURAL	URBAN	CITY	TOTAL
TOTAL	48	32	31	39
PUNJAB	47	40	31	43
SIND	47	19	28	38
NWFP	71	54	56	62
BAL'STAN	25	22	11	21
LAHORE			27	27
KARACHI			30	30
AZAD K.				17
NORTHERN				4

TEA	RURAL	URBAN	CITY	TOTAL
TOTAL	148	140	158	150
PUNJAB	132	155	133	138
SIND	37	51	160	51
NWFP	404	323	335	364
BAL'STAN	118	90	53	96
LAHORE			117	117
KARACHI			171	171
AZAD K.				86
NORTHERN				22

4.5.5 Contribution of foods to nutrients

It is useful to determine the percentage that each food or group contributes to the total amount of nutrients, (such as calories, protein iron). This has been estimated for Pakistan, Urban/Rural Areas, Provinces, major cities, Azad Kashmir and Northern Areas.

The amount of each food eaten is multiplied by the specific nutrient value for that food. The percentage contribution is determined by dividing the specific food contribution by the total amount of the nutrient for all foods.

TABLE 5-28 shows the amount of foods eaten; TABLE 5-29 shows the amount of nutrient each food contributes; and TABLE 5-30 the percentage contribution of the total. For example, the 502 gram of cereal for Pakistan contains 1310 calories. The total amount of calories for Pakistan is 2180. Hence the contribution for cereals to total calories is 1310/2180 and the percentage contribution is this ratio expressed as a percentage, i.e. 60%. Figures 5.24 to 5.32 are a series of pie diagrams which illustrate the situation.

Throughout the country cereals are by far the most important contributor to calories, protein and iron. The percent contribution of cereals ranges from 53% (NWFP) to 69% (Baluchistan) for calories; from 58% (Karachi) to 73% (Northern Areas) for protein; and 69% (Karachi) to 80% (Sind, Azad Kashmir) for iron.

For calories, oils are the next most important contributor for calories ranging from 7% to 18% depending on the areas.

For protein the contribution of animal products is higher in urban and city areas, as well as in NWFP and Baluchistan. In general, pulses and vegetables together contribute some 8 to 18%. The quality and digestibility of protein, which is higher for animal products, milk and pulses, should be taken into account when assessing these results.

For iron, although cereals dominate in their contribution, pulses, vegetables and animal products are also important. Due to the incompleteness of results for dark green leafy vegetables, a factor of some 3-5% should be taken into account for this food. The absorption of iron, which is greatest for animal foods, must be considered for proper interpretation.

Table 5.28 : AMOUNTS OF FOODS IN GRAMS EATEN DAILY

	****** AREAS WITHIN PAKISTAN ******											
	NATIONAL	ECOLOGICAL AREAS			------- PROVINCES			----- MAJOR CITIES			AZAD & NORTH	
FOOD TYPE	PAKISTAN	RURAL	URBAN	CITY	PUNJAB	SIND	NWFP	BALUC	LAHORE	KARAC	AZADK	NORTH
CEREAL	502	570	534	404	498	624	522	492	363	414	492	893
ANIMAL	52	39	60	64	37	35	77	85	38	73	46	51
MILK	98	139	79	63	139	153	60	44	74	43	34	4
PULSES	43	42	42	44	41	49	55	26	39	45	34	39
VEGETABLES	131	143	133	116	153	120	184	56	118	127	86	438
FRUIT	8	4	7	13	11	3	7	3	17	5	7	0
SUGAR	39	48	32	31	43	38	62	21	27	30	17	4
OILS	33	29	36	36	37	27	51	17	28	39	29	75

Table 5.29 : AMOUNT OF NUTRIENT EATEN DAILY ACCORDING TO FOOD

-CALORIES-	NATIONAL	ECOLOGICAL AREAS			------- PROVINCES			----- MAJOR CITIES			AZAD & NORTH	
	PAKISTAN	RURAL	URBAN	CITY	PUNJAB	SIND	NWFP	BALUC	LAHORE	KARAC	AZADK	NORTH
CEREAL	1310	1488	1394	1054	1300	1629	1362	1284	947	1081	1284	2331
ANIMAL	125	94	144	154	89	84	185	204	91	175	110	122
MILK	115	163	92	74	163	179	70	51	87	50	40	5
PULSES	73	71	71	75	70	83	91	44	66	77	58	86
VEGETABLES	111	122	113	99	130	102	156	48	100	108	73	372
FRUIT	5	3	5	8	7	2	5	2	11	3	5	0
SUGAR	150	185	123	119	166	146	239	81	104	116	65	15
OILS	290	255	317	317	326	238	449	150	246	343	255	660
TOTAL	2180	2379	2259	1900	2249	2463	2559	1864	1653	1952	1890	3572

-PROTEIN-	NATIONAL	ECOLOGICAL AREAS			------- PROVINCES			----- MAJOR CITIES			AZAD & NORTH	
	PAKISTAN	RURAL	URBAN	CITY	PUNJAB	SIND	NWFP	BALUC	LAHORE	KARAC	AZADK	NORTH
CEREAL	40	46	43	32	40	50	42	39	29	33	39	71
ANIMAL	9	7	11	11	6	6	13	15	7	13	8	9
MILK	4	6	3	3	6	7	3	2	3	2	1	0
PULSES	5	5	5	5	5	6	7	3	5	5	4	5
VEGETABLES	4	4	4	3	5	4	6	2	4	4	3	13
TOTAL	63	68	66	55	62	72	70	61	47	57	56	98

-IRON-	NATIONAL	ECOLOGICAL AREAS			------- PROVINCES			----- MAJOR CITIES			AZAD & NORTH	
	PAKISTAN	RURAL	URBAN	CITY	PUNJAB	SIND	NWFP	BALUC	LAHORE	KARAC	AZADK	NORTH
CEREAL	16	18	17	13	15	19	16	15	11	13	15	28
ANIMAL	1	1	2	2	1	1	2	2	1	2	1	1
MILK	0	0	0	0	0	0	0	0	0	0	0	0
PULSES	2	1	1	2	1	2	2	1	1	2	1	1
VEGETABLES	2	2	2	2	2	2	3	1	2	2	1	7
TOTAL	21	23	22	18	21	24	23	19	16	18	19	37

* Dark green leafy vegetables would contribute an added 1-2 mgm.

Table 5.30 : PERCENT CONTRIBUTION OF EACH FOOD TO TOTAL NUTRIENT

-CALORIES-

****** AREAS WITHIN PAKISTAN ******

FOOD TYPE	NATIONAL PAKISTAN	ECOLOGICAL AREAS RURAL	URBAN	CITY	PROVINCES PUNJAB	SIND	NWFP	BALUC	MAJOR CITIES LAHORE	KARAC	AZAD & AZADK	NORTH NORTH
CEREAL	60	63	62	56	58	66	53	69	57	55	68	65
ANIMAL	6	4	6	8	4	3	7	11	6	9	6	3
MILK	5	7	4	4	7	7	3	3	5	3	2	0
PULSES	3	3	3	4	3	3	4	2	4	4	3	2
VEGETABLES	5	5	5	5	6	4	6	3	6	6	4	10
SUGAR	7	8	5	6	7	6	9	4	6	6	3	0
OILS	13	11	14	17	14	10	18	8	15	18	13	18
	100	100	100	100	100	100	100	100	100	100	100	100

-PROTEIN-

****** AREAS WITHIN PAKISTAN ******

FOOD TYPE	NATIONAL PAKISTAN	ECOLOGICAL AREAS RURAL	URBAN	CITY	PROVINCES PUNJAB	SIND	NWFP	BALUC	MAJOR CITIES LAHORE	KARAC	AZAD & AZADK	NORTH NORTH
CEREAL	64	67	65	59	64	69	60	65	62	58	71	73
ANIMAL	15	10	16	20	10	8	19	24	14	22	14	9
MILK	7	9	5	5	10	9	4	3	7	3	3	0
PULSES	8	7	8	10	8	8	9	5	10	9	7	5
VEGETABLES	6	6	6	6	7	5	8	3	8	7	5	13
	100	100	100	100	100	100	100	100	100	100	100	100

-IRON-

****** AREAS WITHIN PAKISTAN ******

FOOD TYPE	NATIONAL PAKISTAN	ECOLOGICAL AREAS RUR.	URBAN	CITY	PROVINCES PUNJAB	SIND	NWFP	BALUC	MAJOR CITIES LAHORE	KARAC	AZAD & AZADK	NORTH NORTH
CEREAL	75	78	76	70	75	80	70	78	72	69	80	75
ANIMAL	7	5	6	10	5	4	9	12	7	11	7	4
MILK	1	1	1	1	1	1	1	0	1	0	0	0
PULSES	7	6	7	9	7	7	8	5	9	9	6	4
VEGETABLES	9	9	9	10	11	7	12	4	11	10	7	18
	100	100	100	100	100	100	100	100	100	100	100	100

* Dark green leafy vegetables would contribute an added 3-5%

PIE GRAPHS

Figures 5.24 to 5.32 include a series of pie graphs to illustrate the percentage contributions by nutrient and area of the country. Their order is as follows:

Figure 5.24	Nutrients	Pakistan
Figure 5.25	Nutrients	Azad Kashmir
Figure 5.26	Nutrients	Northern Area
Figure 5.27	Calories	Ecological (rural, urban, city)
Figure 5.28	Protein	Ecological (rural, urban, city)
Figure 5.29	Iron	Ecological (rural, urban, city)
Figure 5.30	Calories	Provinces
Figure 5.31	Protein	Provinces
Figure 5.32	Cals/protein	Lahore, Karachi

CONSUMPTION OF NUTRIENTS FROM FOOD GROUPS - PAKISTAN

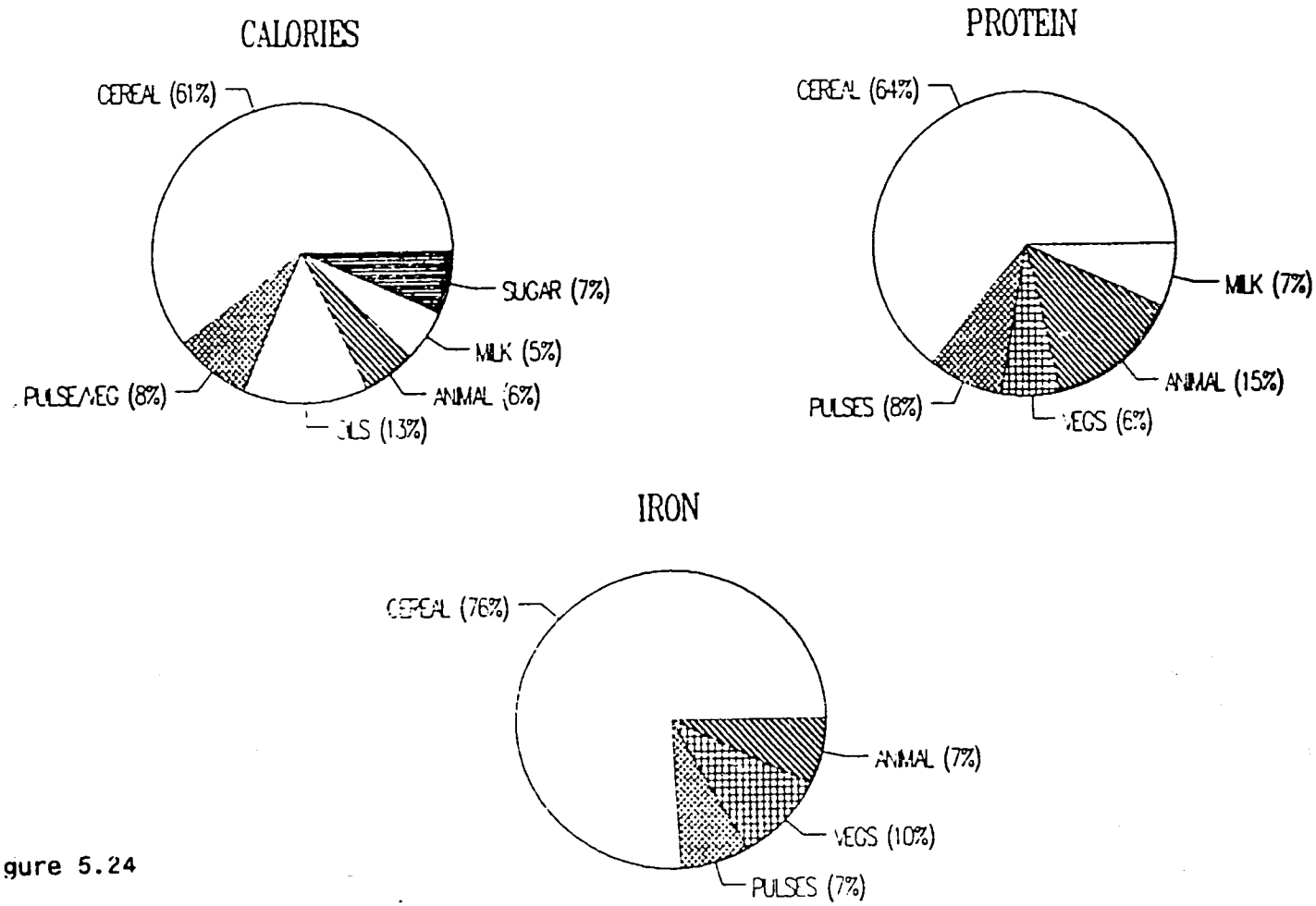


Figure 5.24

PERCENT CONSUMPTION OF NUTRIENTS FROM FOOD GROUPS - AZAD KASHMIR

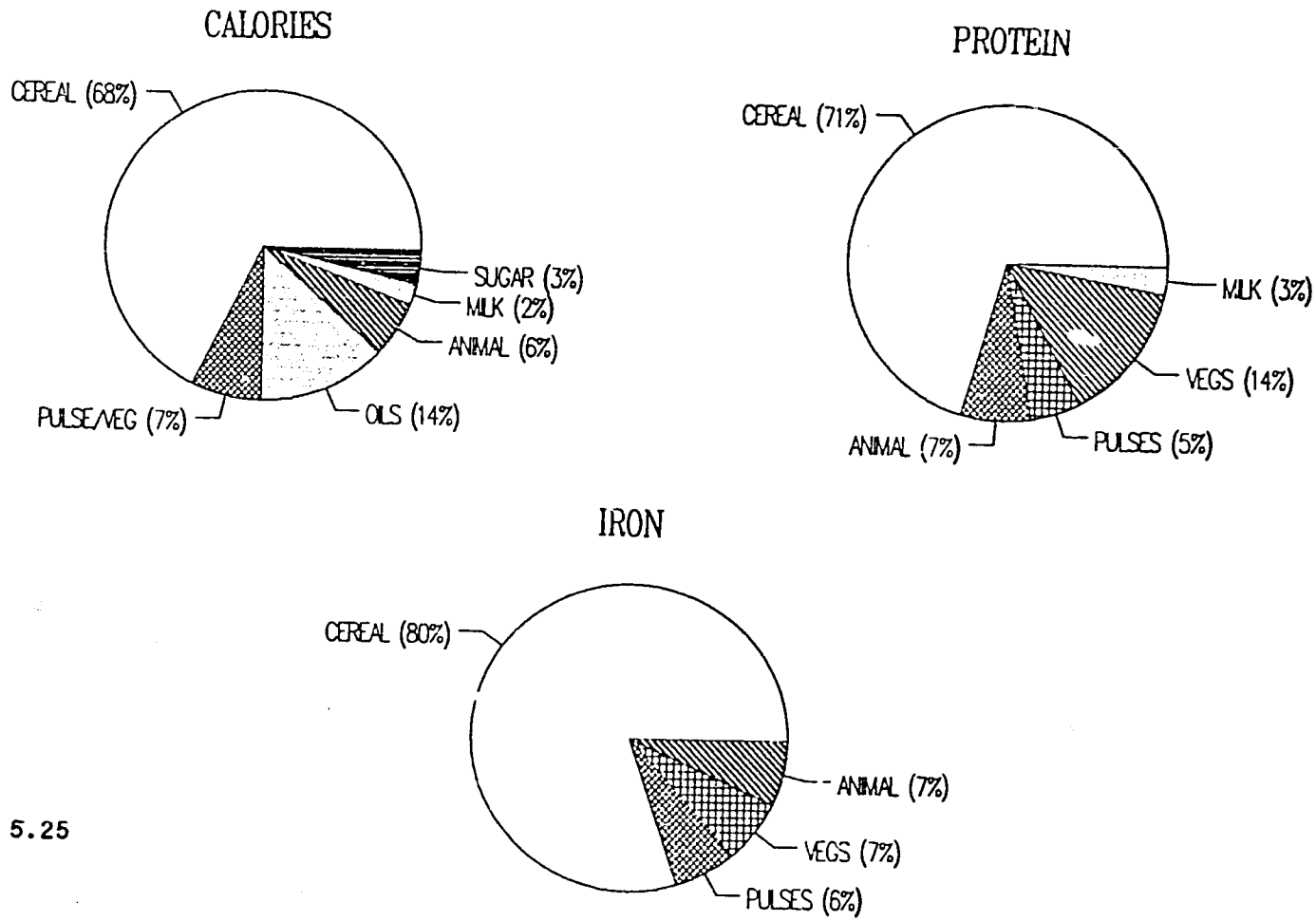


Figure 5.25

PERCENT CONSUMPTION OF NUTRIENTS FROM FOOD GROUPS - NORTHERN AREAS

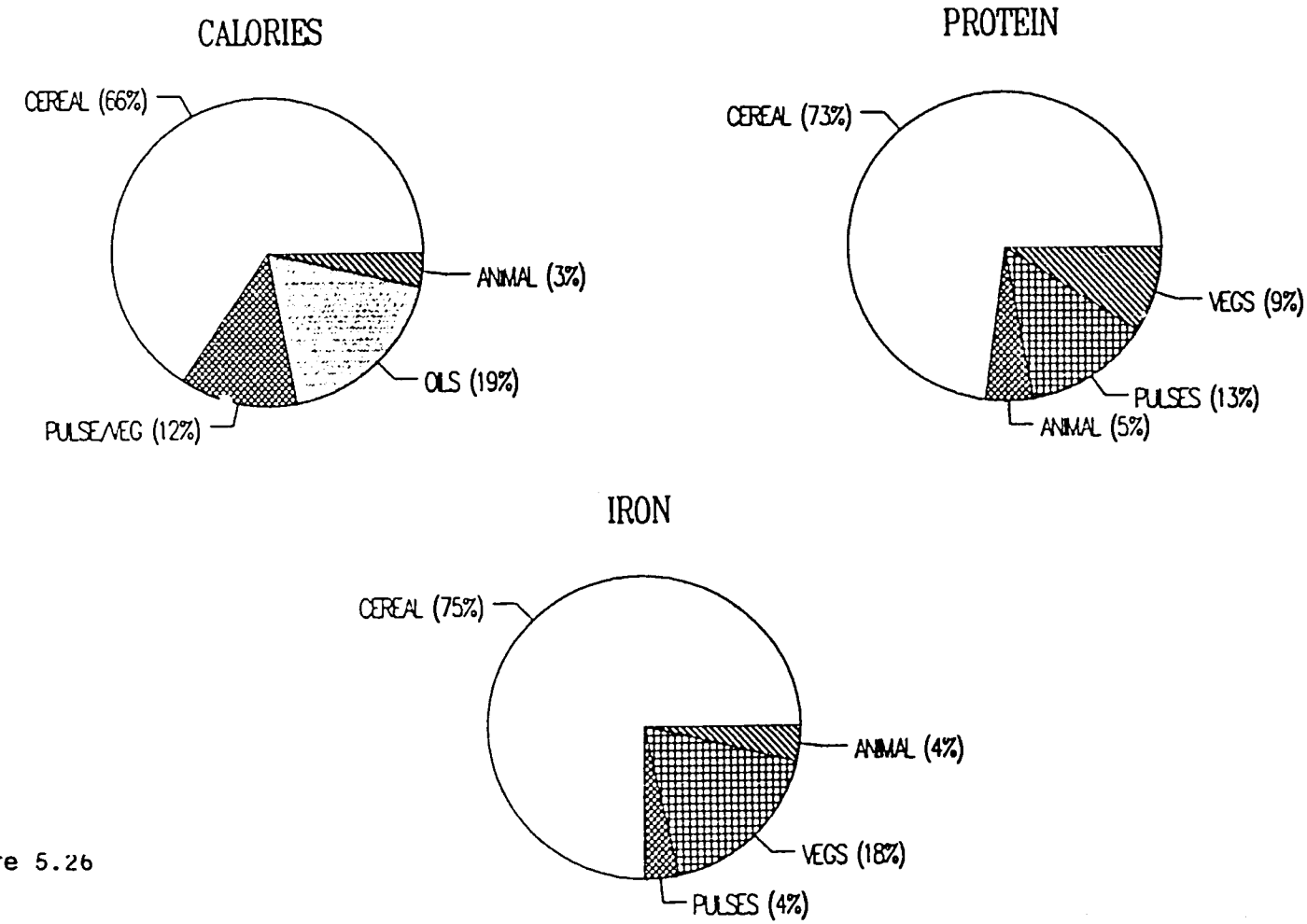


Figure 5.26

PERCENT CONSUMPTION OF CALORIES FROM FOOD GROUPS - ECOLOGICAL AREAS

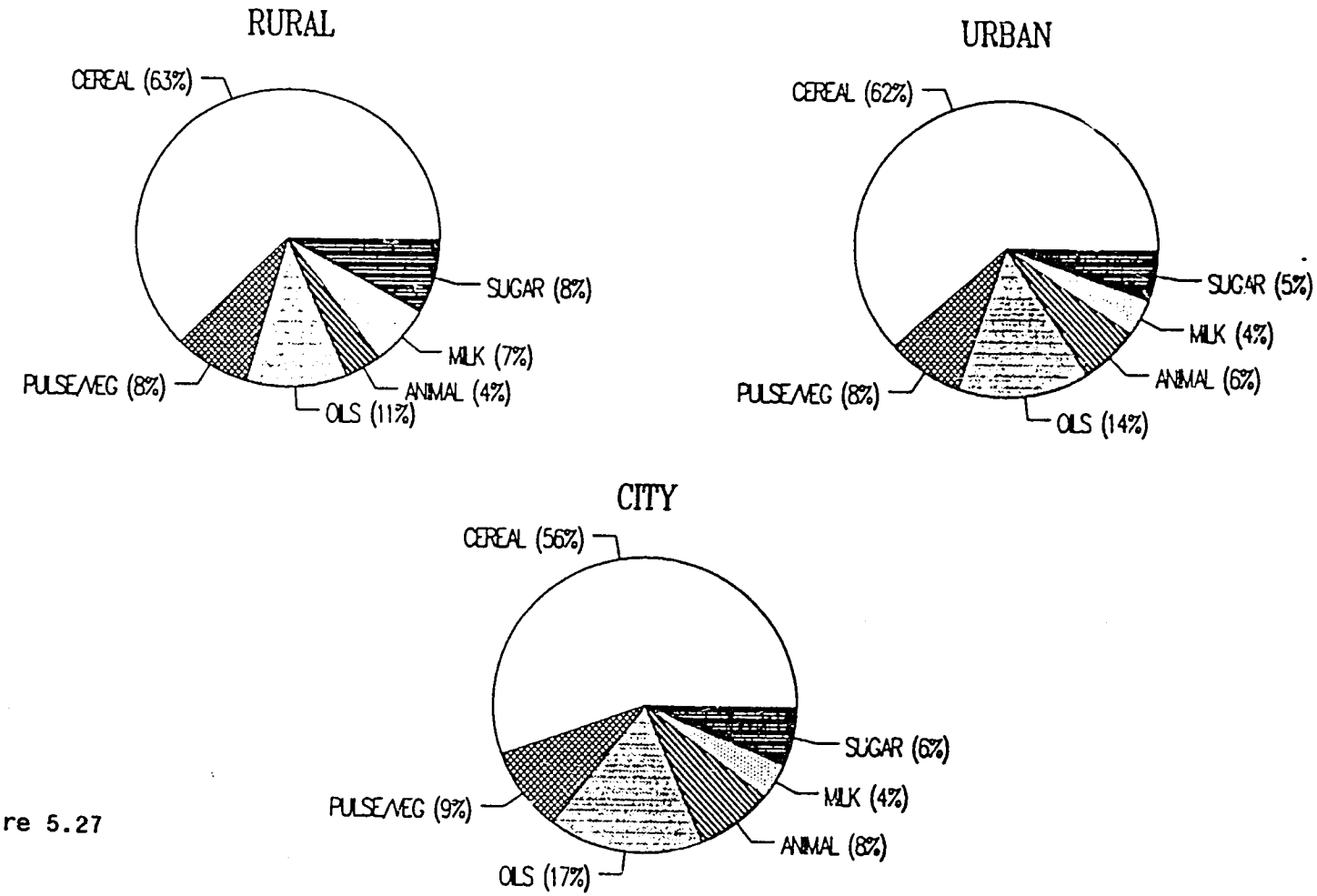


Figure 5.27

PERCENT CONSUMPTION OF PROTEIN FROM FOOD GROUPS - ECOLOGICAL AREAS

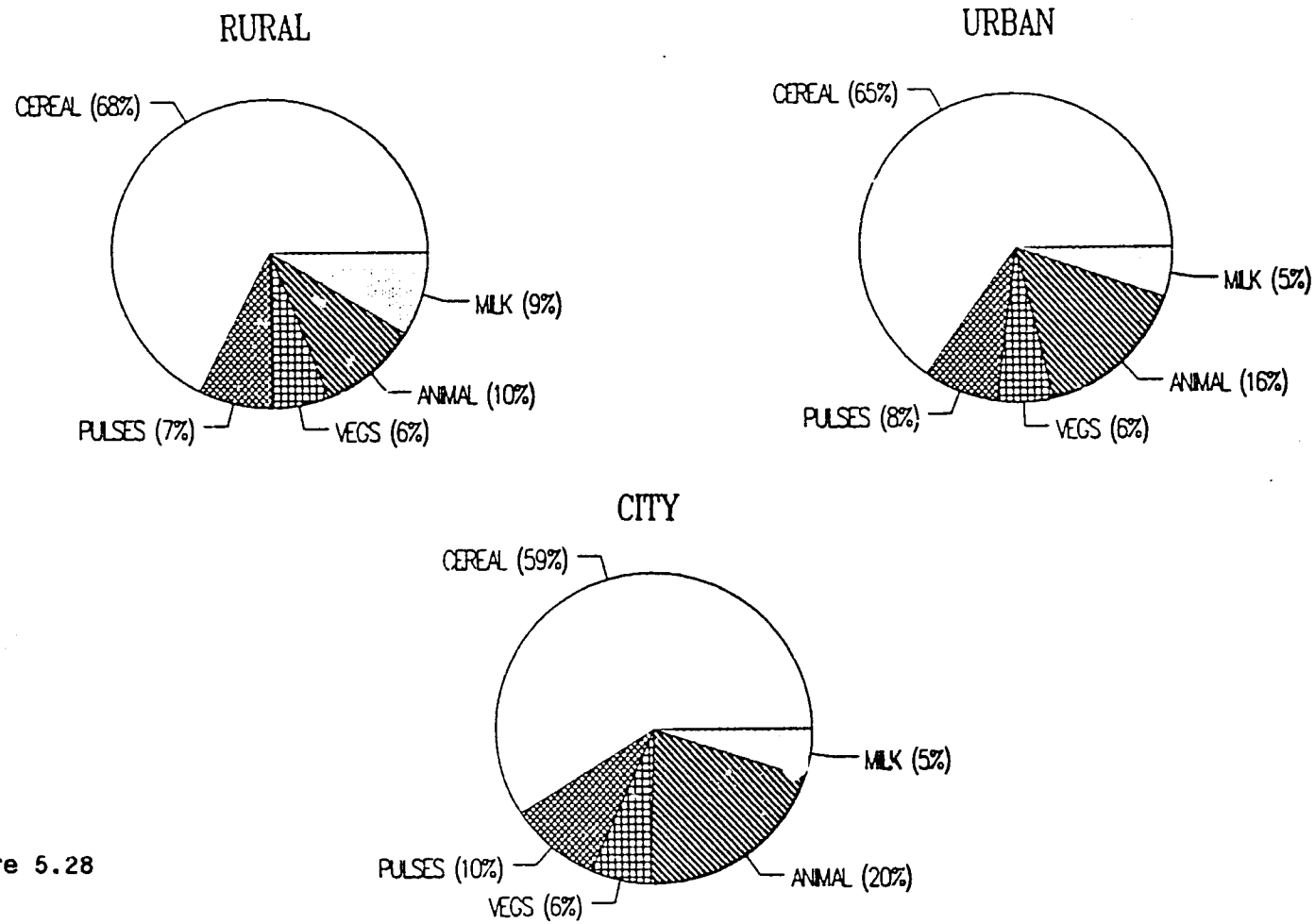


Figure 5.28

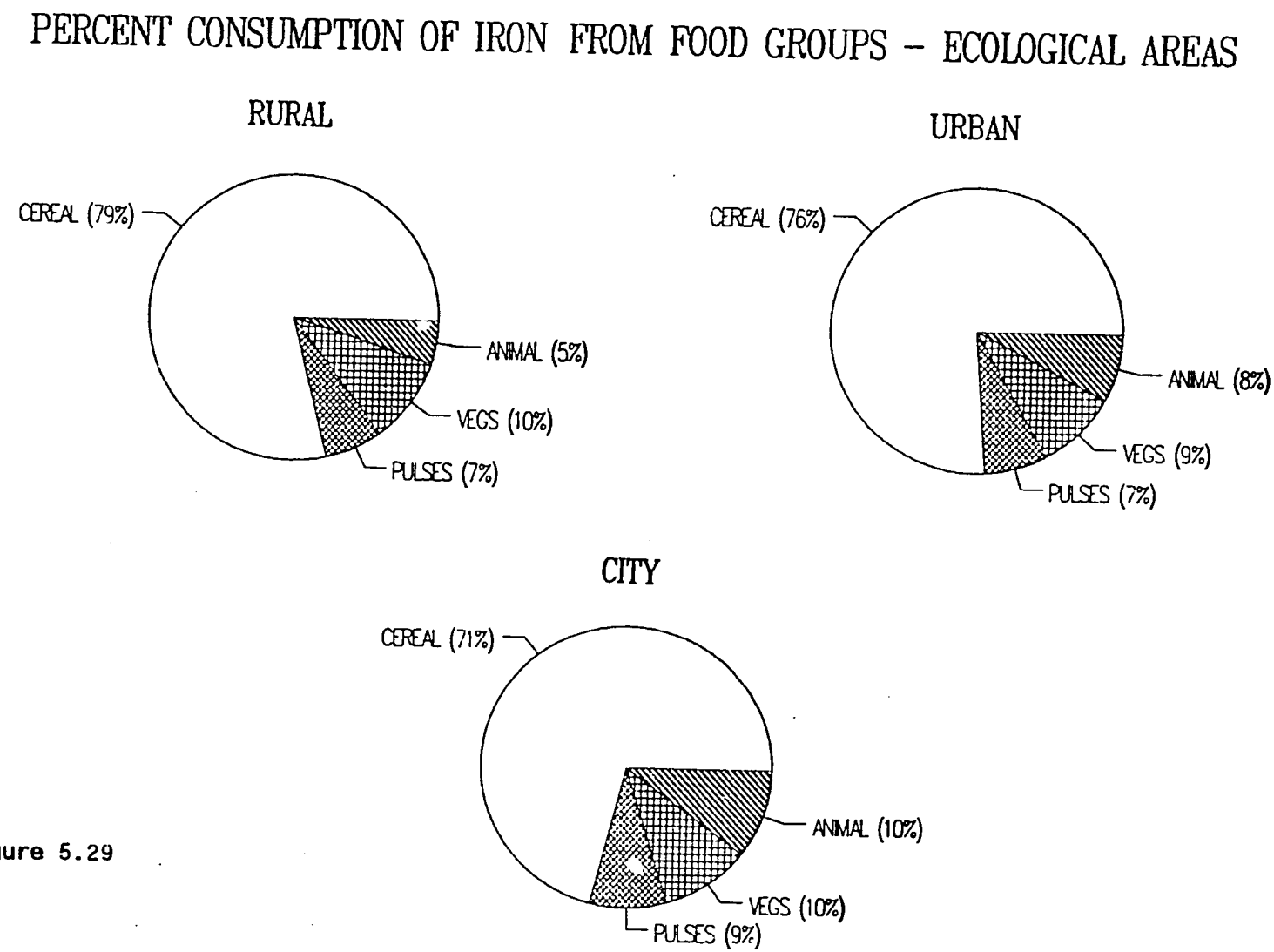

PERCENT CONSUMPTION OF IRON FROM FOOD GROUPS - ECOLOGICAL AREAS
RURAL
CEREAL (79%)
ANIMAL (5%)
VEGS (10%)
PULSES (7%)
URBAN
CEREAL (76%)
ANIMAL (8%)
VEGS (9%)
PULSES (7%)
CITY
CEREAL (71%)
ANIMAL (10%)
VEGS (10%)
PULSES (9%)

Figure 5.29

PERCENT CONSUMPTION OF CALORIES FROM FOOD GROUPS - PROVINCES

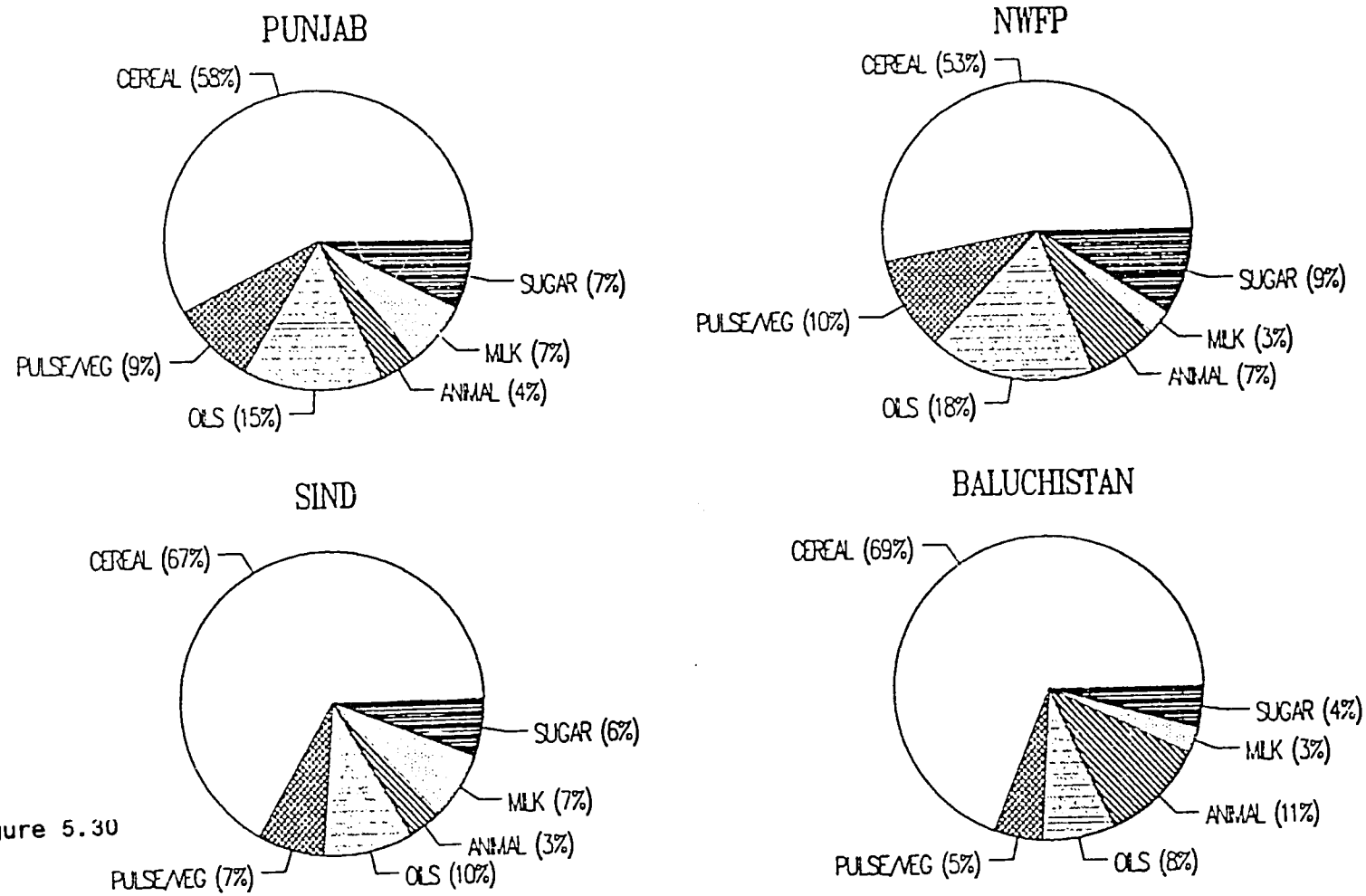


Figure 5.30

PERCENT CONSUMPTION OF PROTEIN FROM FOOD GROUPS - PROVINCES

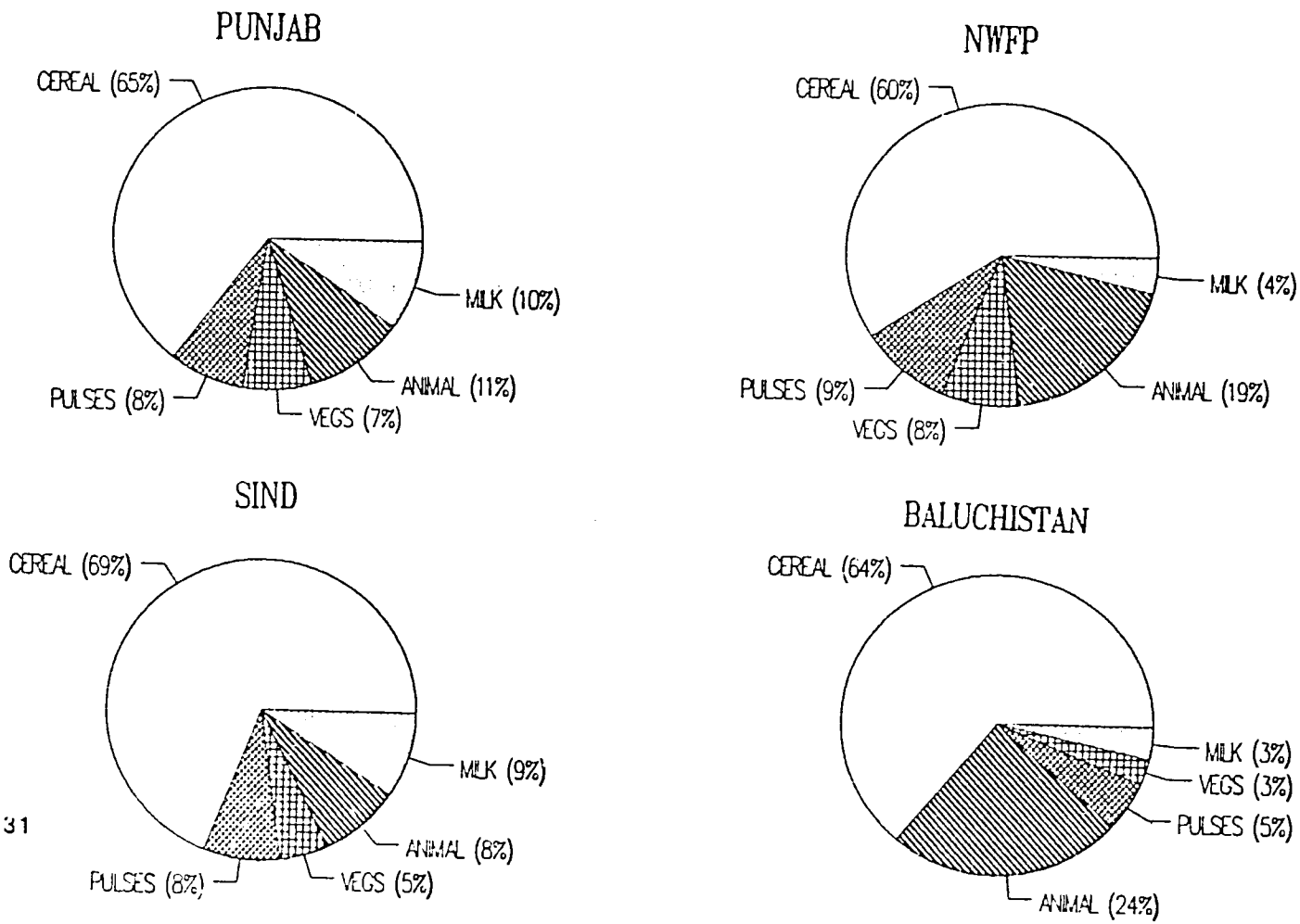
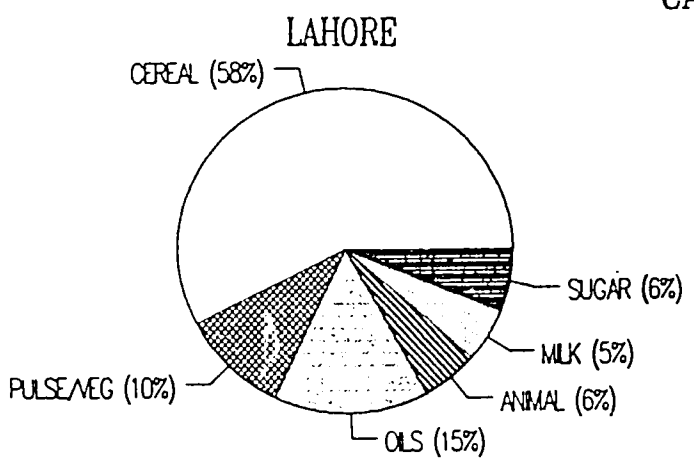
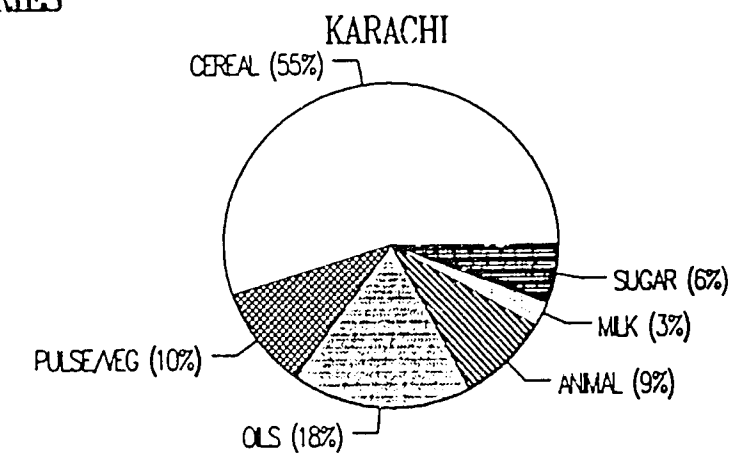


Figure 5.31

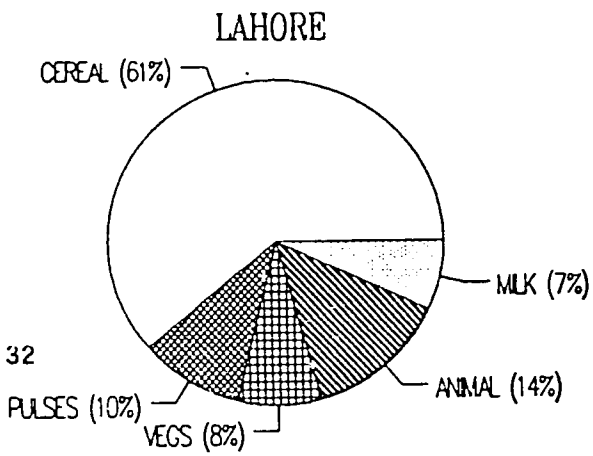
PERCENT CONSUMPTION OF NUTRIENTS FROM FOOD GROUPS - LAHORE/KARACHI

CALORIES





PROTEIN



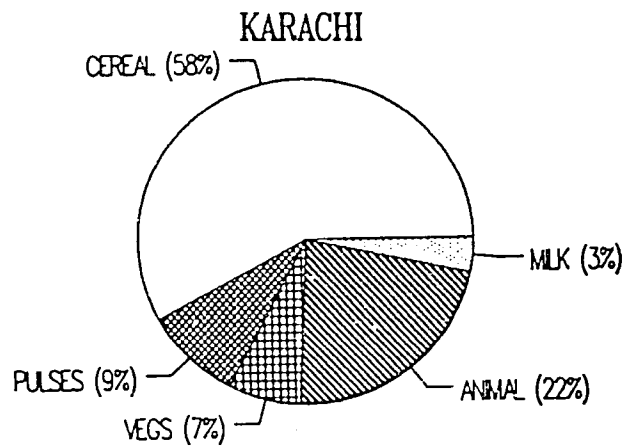


Figure 5.32

4.5.6 Nutrient Intake

The nutrient intake, already summarized in the previous section for each area of the country, is now presented in more detail for different biological and age groups.

For Pakistan, the results for each group and nutrient are presented as follows:

- Average Intake
- Recommended Intake for the nutrient, according to group
- Average percent of recommended intake
- The percent below 70% of recommended.

The recommended intake is based on the 1972 adaptation for Pakistan from the UN Food and Agricultural Organization (FAO). For calories this intake is higher in adult males as compared with females, and higher in pregnant/lactating women as compared with adult females. Activity patterns for individuals will greatly influence caloric requirements; these were not taken into account in the survey. Another problem is that lactating women vary greatly in requirements depending on the completeness of lactation. For example, a woman who breastfeeds an infant incompletely or an older child intermittently, requires less calories than a woman fully breastfeeding a young infant.

The differential requirements for protein in adults has a similar pattern to that of calories. It should be noted however, that the digestibility and quality of protein has not been taken into account during this analysis.

With regards to iron, there is a very large differential between males and females, due to the added requirements of females because of menstruation and the further demands of pregnancy and lactation.

Average Percent of Recommended Intake

This equals the average intake for the population group divided by the group's recommended intake, expressed as a percentage. If an individual has a nutrient intake which is 100% of the recommended, this a satisfactory result. However, if a population group has an average nutrient intake of 100% of recommended, the results for individuals within that population will vary about this average. Such an average (if similar to the median value) indicates that approximately half the individuals in that group are below recommended and half above it. Thus one would expect in a well nourished population that the average of percent recommended should be very much higher than 100%, to allow for the distribution.

Percent Below 70% Recommended

In general, an individual whose intake is much below recommended (e.g. under 70%) might be considered to be malnourished. In a population group the percentage below this level gives a crude indication of the prevalence of malnutrition. Caloric and/or protein deficiency is an indicator of Protein Energy Malnutrition. A low iron intake results in Iron Deficiency Anemia.

Results

The major problems appear to be as follows:

1. Caloric deficiency : almost universal and particularly in the at-risk : children under five and pregnant/lactating women

2. Protein deficiency : primarily in pregnant/lactating women

3. Iron deficiency : at-risk groups, with very high levels.

The relative importance is illustrated in Figures 5.33 and 5.34. The prevalence of calorie deficiency in young children appears consistently higher than that of protein deficiency. Iron deficiency reaches the highest levels in at-risk groups.

Figure 5.33

PERCENT BELOW 70% OF RECOMMENDED NUTRIENTS - CHILDREN 0-5 YEARS

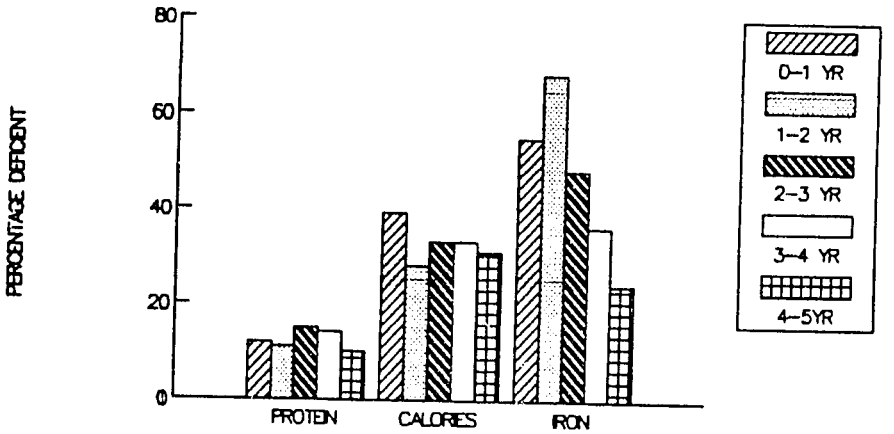
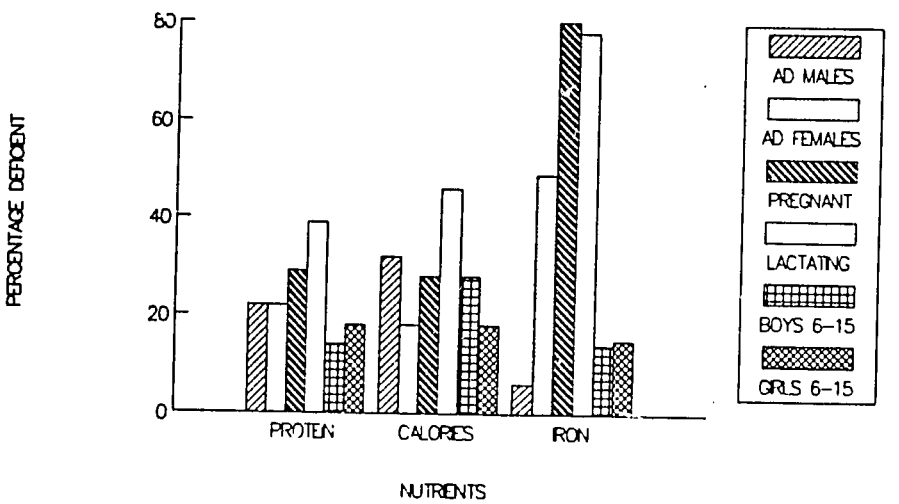


Figure 5.34

PERCENT BELOW 70% OF RECOMMENDED NUTRIENTS - BIOLOGICAL GROUPS



Calories

Most groups have an average percent recommended intake ranging from 74-90%. This is lowest in lactating women. In addition the highest prevalence of "caloric deficiency (below 70% of recommended) occurs in lactating women (46%).

Protein

With regard to protein intakes the average percent recommended intake for most groups is well above 100%, although adult males and females are close to 100%. On the other hand pregnant and lactating women have much lower average percentage of recommended intake (84-90%). As a consequence 29-39% in these groups have "protein deficiency" (below 70% of recommended protein intake).

Table 5-31 : CALORIE INTAKE - PAKISTAN

BIOLOGICAL GROUP	AVERAGE INTAKE	RECOMMENDED INTAKE	AVERAGE % OF RECOMMENDED	PERCENT UNDER 70% RECOMMENDED
ADULT MALE	2522	2900	87	32
ADULT FEMALE	2257	2100	107	18
PREGNANT	2165	2500	87	28
LACTATING	2298	3100	74	46
BOYS 6-15 YRS	1910	2200	87	28
GIRLS 6-15 YRS	1814	2100	86	18
BOYS 0-5 YRS	1166	1300	90	34
GIRLS 0-5 YRS	1169	1300	90	30
PRE-SCHOOL				
12-23 MONTHS	1023	1000	102	28
24-35 MONTHS	1069	1200	89	33
36-47 MONTHS	1172	1300	90	33
48-60 MONTHS	1314	1500	88	31

Table 5-32 : PROTEIN INTAKE - PAKISTAN

BIOLOGICAL GROUP	AVERAGE INTAKE	RECOMMENDED INTAKE	AVERAGE % OF RECOMMENDED	PERCENT UNDER 70% RECOMMENDED
ADULT MALE	73	72	101	22
ADULT FEMALE	64	61	105	22
PREGNANT	62	70	89	29
LACTATING	69	82	84	39
BOYS 6-15 YRS	55	45	122	14
GIRLS 6-15 YRS	53	45	118	18
BOYS 0-5 YRS	33	24	138	12
GIRLS 0-5 YRS	33	24	138	13
PRE-SCHOOL				
12-23 MONTHS	29	17	171	11
24-35 MONTHS	29	22	132	15
36-47 MONTHS	34	24	142	14
48-60 MONTHS	37	26	142	10

Iron

The most striking differences between groups occurs in iron intakes. Although the actual average intake of iron is similar between adult males and females, the much greater requirement of the latter (particularly in pregnant/lactating women) results in extremely large differences in the average percentage of recommended intake and the percent "iron deficient" (below 70% of recommended). Hence approximately 80% of pregnant/lactating women and 50% of other adult females are "iron deficient". This result is consistent with the high prevalence of anaemia (35-65%, depending on age) in these same population groups as found on this survey. In addition high prevalences of iron deficiency are also seen in young children, particularly those under 3 years.

Table 5-33 : IRON INTAKE - PAKISTAN

BIOLOGICAL GROUP	AVERAGE INTAKE	RECOMMENDED INTAKE	AVERAGE % OF RECOM-MENDED	PERCENT UNDER 70% RECOMMENDED
ADULT MALE	20	9	222	6
ADULT FEMALE	18	28	64	49
PREGNANT	17	33	52	84
LACTATING	18	33	55	78
BOYS 6-15 YRS	15	16	94	14
GIRLS 6-15 YRS	14	21	67	15
BOYS 0-5 YRS	7.9	10	79	36
GIRLS 0-5 YRS	8.1	10	81	37
PRE-SCHOOL				
12-23 MONTHS	5.1	10	51	68
24-35 MONTHS	6.8	10	68	48
36-47 MONTHS	8.5	10	85	36
48-60 MONTHS	9.8	10	98	24

Urban and Rural Areas

In general there are no major consistent differences in the results for urban and rural areas, pertaining to calorie, protein and iron intakes [Table 5-34].

Table 5-34 : URBAN-RURAL COMPARISONS OF NUTRIENT INTAKE

CALORIES

	AVE. % OF RECOMMENDED		PERCENT BELOW 70%	
	RURAL	URBAN	RURAL	URBAN
ADULT MALE	96	91	26	33
ADULT FEMALE	121	114	11	15
PREGNANT	89	96	25	18
LACTATING	77	82	45	35
BOY 6-15 YRS	104	92	17	31
GIRL 6-15 YRS	92	92	29	38
BOY 0-5 YRS	97	90	30	23
GIRL 0-5 YRS	99	91	26	27
12-23 MTHS	101	114	35	31
24-35 MTHS	95	85	31	25
36-47 MTHS	100	90	27	20
48-60 MTHS	95	88	26	26

PROTEIN

	AVE. % OF RECOMMENDED		PERCENT BELOW 70%	
	RURAL	URBAN	RURAL	URBAN
ADULT MALE	107	103	15	24
ADULT FEMALE	113	108	16	21
PREGNANT	91	100	30	15
LACTATING	83	92	38	29
BOY 6-15 YRS	140	130	7	16
GIRL 6-15 YRS	127	129	12	21
BOY 0-5 YRS	154	145	8	12
GIRL 0-5 YRS	155	153	10	13
12-23 MTHS	163	213	25	17
24-35 MTHS	140	128	18	13
36-47 MTHS	156	140	12	7
48-60 MTHS	155	151	8	6

IRON

	AVE. % OF RECOMMENDED		PERCENT BELOW 70%	
	RURAL	URBAN	RURAL	URBAN
ADULT MALE	228	224	4	3
ADULT FEMALE	102	101	42	44
PREGNANT	52	58	83	79
LACTATING	57	62	76	68
BOY 6-15 YRS	138	128	6	14
GIRL 6-15 YRS	126	127	10	21
BOY 0-5 YRS	93	85	30	23
GIRL 0-5 YRS	92	92	32	31
12-23 MTHS	56	68	63	50
24-35 MTHS	74	72	47	39
36-47 MTHS	98	88	28	28
48-60 MTHS	106	107	19	15

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MEKRAN DIVISION

1. Dr. Taj Mohammad Balooch, M.O. Turbat.
2. Miss Shaista Khanum, L.H.V. Gwadur.
3. Miss Nussarat Bhatti,L.H.V. Turbat.
4. Miss Razia Sultana, L.H.V. Turbat.
5. Mr. Shah Bux Lab. Assist. Gwadur.
6. A Laboratory Assistant from Civil Hospital, Turbat.

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1. Dr. Abdul Qadeer, M.O. Civil Hospita, Sibbi.
2. Miss Irshad Begum, L.H.V. Bhag.
3. Miss Mumtaz Akhtar, L.H.V. Ghafai Villge.
4. Miss Nighat Khalil, L.H.V. Harnai.
5. Mr. Siraj Uddin Shah, Lab Assistatn, Kphlu.
6. Mr. Imam Bux, Lady Assistant Sibbi.

ANNEX 1

EXPLANATIONS OF GRAPHS SHOWING PREVALENCE OF UNDERNUTRITION.

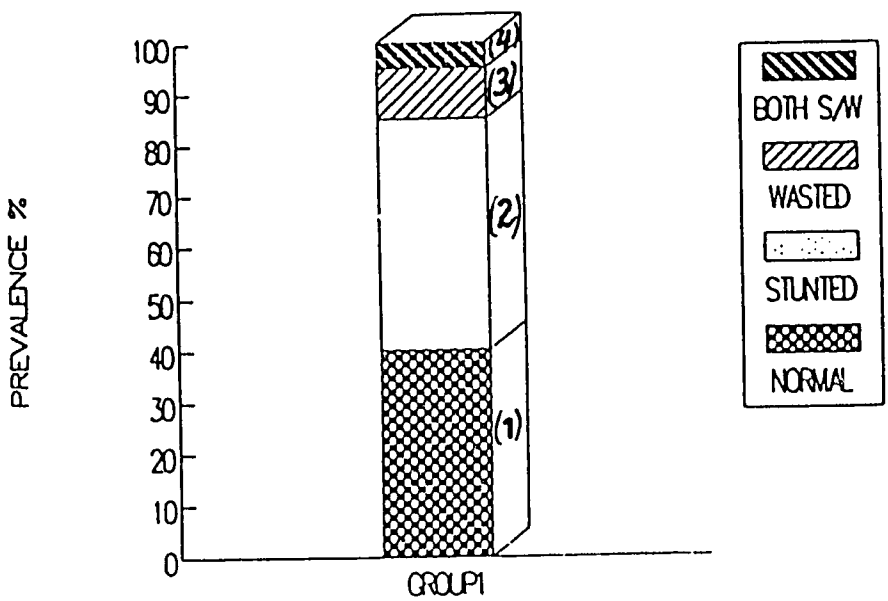
Prevalence stunting and wasting - example (1)

The stacked bar figure represents the four possible results based on the combination of two anthropometric indices : height-for-age (stunting) and weight-for-height (wasting). The results for this example are as follows:

		Stunted	Wasted	Normal	Total
Normal	(1)	-	-	40%	40%
Stunted (only)	(2)	45%	-	-	45%
Wasted (only)	(3)	-	10%	-	10%
Stunted/Wasted	(4)	5%	5%	-	5%
Totals		50% (2)+(4)	15% (3)+(4)	40% (1)	100%

PREVALENCE STUNTING AND WASTING

EXPLANATION WITH EXAMPLE (1)



Because the stacked bar cumulates to 100%, the individual components can be visualised as a proportion of this total as well as compared with each other. In this example, the prevalence of normal children is less than half the total; thus most children are malnourished (stunted or wasted or a combination of these). Of the malnourished, most (45% of the

total) are stunted (only), the remainder (3 and 4) are wasted. Of the wasted, the topmost component of the stacked bar (4) are both stunted and wasted. This is usually the smallest, but is the most important, according to Waterlow, as it comprises those children with a combination of the two types of malnutrition. Because of this combination the complete totals for stunting and wasting are higher than that contained in their separate components on the figure (see totals). In practice, however, stunting and wasting (4) is usually relatively small compared with the stunted alone (2).

In assessing the bar, it is usually convenient to follow this procedure, starting from the lowest component and working upwards:

Group (1) Normals - a general summary of the total not "at-risk"
Group (2) Stunted - an estimate of "chronic undernutrition"
Groups (3)+(4) Wasted - an estimate of "acute undernutrition"
Group (4) Stunted and wasted - an estimate of those at highest risk

Prevalence stunting and wasting - example (2)

Applying this procedure, five groups (or separate stacked bars) can be compared according to their bar structure.

Normals : Group 1 has the least number (prevalence %) of normal children - about 25%. There is an increase of normals from group 1 to group 5, where the number is almost 60%. Clearly group 1 is the worst nourished overall, and group 5 the best.

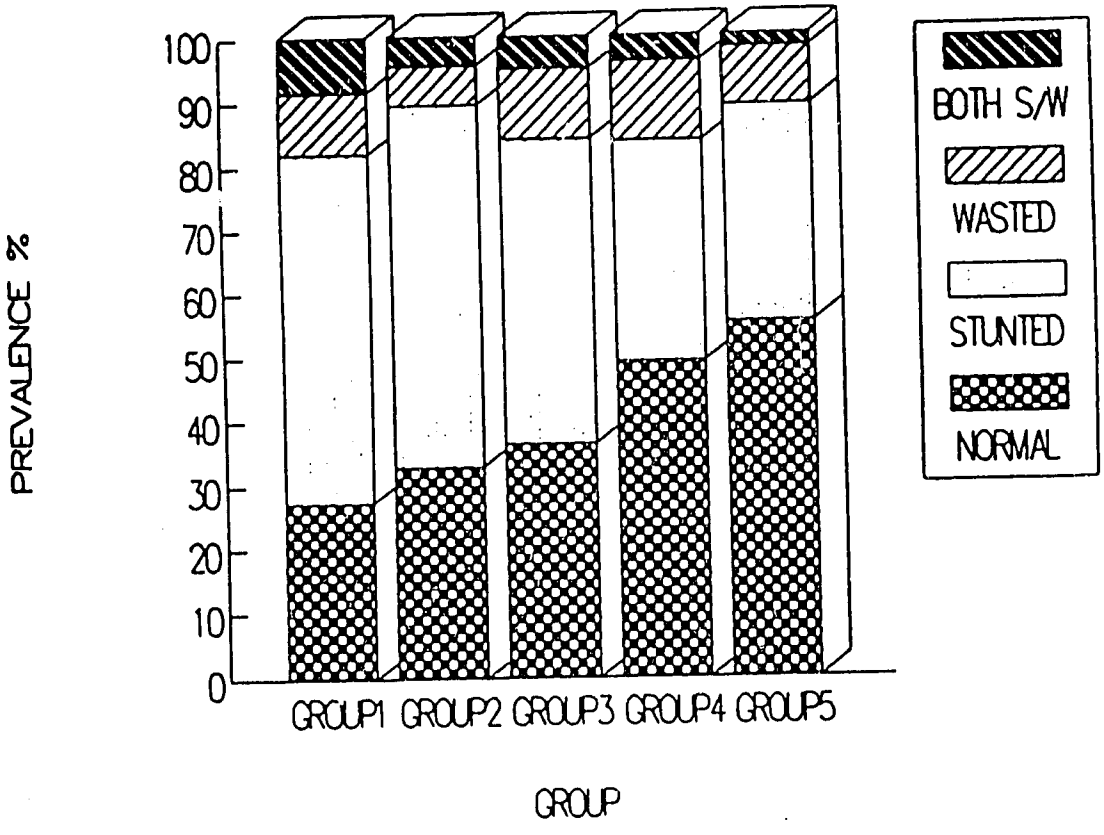
Stunted : The differences in the numbers for normals is explained by those for stunting. There is a narrowing of the band for stunted children from group 1 (the highest) to group 5 (the lowest).

Wasted : Unlike stunting, the bands for wasting (uppermost two components of the bars) do not show a consistent decrease from group 1 to group 5. Groups 3 and 4 for example are similar to group 1. This suggests that the problem of wasting (or "acute malnutrition") is similar in these three groups.

Wasted and stunted : There is a decrease in prevalence in this "high-risk" category from Group 1 to Group 5. In this example it reflects the same differences as for stunting alone. This is not surprising, as these children are also stunted (as well as wasted).

PREVALENCE STUNTING AND WASTING

EXAMPLE (2) - COMPARISONS



Action based on interpretation

According to Waterlow, the highest priority (? urgency) for nutrition-related action should be targeted to those populations which have the greatest proportion of children with both stunting and wasting, followed by those with wasting alone. The situation with stunted (alone) populations is less clear. The evolution of stunting is more chronic than that of wasting and is possibly more reflective of general "causes" of undernutrition such as social and economic status, education, etc. However, this does not diminish the need for addressing the problem.

The interpretation of stunting must take into account, that it is cumulative in nature. Hence it is usually more common in older children, often as a result of prior episodes of undernutrition. It will reflect the situation in 1985-6 and a few years prior to this.

The prevalence of wasting in a cross-sectional survey is often not easy to interpret. Being a relatively uncommon event, the sampling precision of the estimate is less certain than that of stunting, which is more common. In addition it is more sensitive to the timing of the survey. For example, wasting prevalence may vary according to the time of the year for the study if seasonal variation occurs. The major field work duration for this survey extended throughout the year of 1985, so that national estimates should not be greatly affected for that year, although comparison of different areas of the country (e.g. by province) might be affected, if the seasonal effect was at different times by area.

In ongoing programmes, weight-for-age is the usual population indicator (e.g. as derived from growth charts), hence stunting and wasting prevalence cannot be determined.

Prevalence Undernutrition : Comparisons of measures - Example 2A

In this figure, the prevalences of underweight (low weight-for-age), stunting (low height-for-age) and wasting (low weight-for-height) are compared for the same groups (1 to 5) shown in the prior example. Stunting and wasting prevalences on this graph are considered separately, in that they do not include the stunted/wasted combination nor normals. The same trends as interpreted in the prior graph are apparent (e.g. the reduction of stunting prevalence from Group 1 to Group 5).

Underweight prevalence comparisons across groups show a general trend similar to those of stunting, but the reduction is not as sharp and group 3 has the highest prevalence. The underweight prevalence is modified by both stunting AND wasting. In addition, direct comparisons between the indicators can be difficult, because of differences (albeit small) in numbers measured. For example, weight-for-height was not estimated on children who were shorter than 50 cm (no reference information) or taller than 112 cm (an upper limit for those aged below 5 years). The Waterlow classification (combination of stunting and wasting) excludes these children.

This account has been detailed because many of the graphs present the combinations of stunting and wasting, and others the separate indicators. It is important to appreciate their advantages and limitations in order to clarify interpretations.

ANNEX 2

WEIGHTING FOR THE FOOD INTAKE STUDY

The food intake study included two major groups : all households with at-risk subjects (under 5 years and pregnant/lactating) and a 1:4 subsample of households for all subjects. In additions, data entry was possible for 37% of all available subjects. Hence, it is necessary to weight in order to derive a single estimate representing the total population (as was done for nutrients and amounts of food. This controls for subjects of different ages and biological groups whose total sample size was not in proportion to their population distribution.

Weighting was also required to control for sample sizes within areas (provinces with rural/urban and city) in terms of population proportionality.

These two weighting factors were combined in order to derive a suitable estimate for each subject and stratum (area described).

The following table indicates the population distribution by groups used to derive the weighting estimates.

POPULATION DISTRIBUTION (DERIVED FROM CENSUS DATA) FOR GROUPS EXPECTED DISTRIBUTION

MALE	31.0	
FEMALE	18.8	
PREGNANT	3.2	
LACTATING	5.3	
PRESCH BOY	6.3 *	ADJUSTED TO EXCLUDE BREASTFED CHILDREN
PRESCH GIRL	6.4 *	
BOY 6-15	15.6	
GIRL 6-15	13.3	
TOTAL	100.0	

Within each province and area (urban, rural, city), the expected distribution for each biological group - as indicated in the preceding table - was compared with that of the sample ("actual'). For example, the expected % of adult males in urban punjab was 31.1% (based on the census), whereas that for the sample was 14.8%. Because the sample included relatively less adult males in this area, weighting is required to restore this to population proportionality. The weighting needed is expected/actual; i.e. 31.1/14.8 = 2.10. Weighting estimates were derived for all provinces, areas and groups in this way.

WEIGHTING BY SUBJECT GROUPS FOR EACH PROVINCE AND AREA

PROVINCE AND GROUPS	---- % DISTRIBUTION BY GROUP ----				WEIGHTING NEEDED		
	---------ACTUAL--------			EXPECTED			
	URBAN	RURAL	CITIES*	------	URBAN	RURAL	CITY
	(1)	(2)	(3)	(4)	(4/1)	(4/2)	(4/3)
PUNJAB							
MALE	14.8	15.0	15.4	31.1	2.10	2.07	2.02
FEMALE	16.7	14.3	18.4	18.8	1.13	1.31	1.02
PREGNANT	3.7	3.8	5.0	3.2	0.86	0.84	0.64
LACTATING	9.3	12.0	10.1	5.3	0.57	0.44	0.52
PRESCH BOY	18.1	17.9	21.2	6.3	0.35	0.35	0.30
PRESCH GIRL	14.4	18.6	17.3	6.4	0.44	0.34	0.37
BOY 6-15	10.4	9.2	7.5	15.6	1.50	1.70	2.08
GIRL 6-15	12.6	9.3	5.0	13.3	1.06	1.43	2.66
	100.0	100.0	100.0	100.0	1.00	1.00	1.00
SAMPLE SIZE	492	1196	358				

PROVINCE AND GROUPS	---- % DISTRIBUTION BY GROUP ----				WEIGHTING NEEDED		
	---------ACTUAL--------			EXPECTED			
	URBAN	RURAL	CITIES*	------	URBAN	RURAL	CITY
	(1)	(2)	(3)	(4)	(4/1)	(4/2)	(4/3)
LAHORE			CITY				CITY
MALE			16.3	31.1			1.91
FEMALE			13.0	18.8			1.45
PREGNANT			4.1	3.2			0.78
LACTATING			8.5	5.3			0.62
PRESCH BOY			20.8	6.3			0.30
PRESCH GIRL			20.2	6.4			0.32
BOY 6-15			8.7	15.6			1.79
GIRL 6-15			8.4	13.3			1.58
			100.0	100.0			1.00
SAMPLE SIZE			1478				

PROVINCE AND GROUPS	---- % DISTRIBUTION BY GROUP ---- ---------ACTUAL--------			EXPECTED	WEIGHTING NEEDED		
	URBAN (1)	RURAL (2)	CITIES* (3)	------ (4)	URBAN (4/1)	RURAL (4/2)	CITY (4/3)
NWFP							
MALE	11.0	12.8	15.2	31.1	2.83	2.43	2.05
FEMALE	9.0	7.8	10.1	18.8	2.09	2.41	1.86
PREGNANT	7.0	4.7	6.3	3.2	0.46	0.68	0.51
LACTATING	14.7	17.9	11.4	5.3	0.36	0.30	0.46
PRESCH BOY	24.3	23.8	23.9	6.3	0.26	0.26	0.26
PRESCH GIRL	18.3	21.8	21.3	6.4	0.35	0.29	0.30
BOY 6-15	8.0	6.2	5.9	15.6	1.95	2.52	2.64
GIRL 6-15	7.7	4.7	5.9	13.3	1.73	2.83	2.25
	100.0	100.0	100.0	100.0	1.00	1.00	1.00
SAMPLE SIZE	300	680	507				
BALUCHISTAN							
MALE	14.0	12.6	17.8	31.1	2.22	2.47	1.75
FEMALE	15.3	12.7	9.5	18.8	1.23	1.48	1.98
PREGNANT	5.0	5.4	2.5	3.2	0.64	0.59	1.28
LACTATING	10.3	13.1	13.7	5.3	0.51	0.40	0.39
PRESCH BOY	21.9	24.8	17.4	6.3	0.29	0.25	0.36
PRESCH GIRL	18.7	19.1	21.2	6.4	0.34	0.34	0.30
BOY 6-15	9.0	7.0	7.5	15.6	1.73	2.23	2.08
GIRL 6-15	5.8	5.4	10.4	13.3	2.29	2.46	1.28
	100.0	100.0	100.0	100.0	1.00	1.00	1.00
SAMPLE SIZE	379	597	241				

PROVINCE AND GROUPS	---- % DISTRIBUTION BY GROUP ---- ---------ACTUAL--------			EXPECTED	WEIGHTING NEEDED		
	URBAN (1)	RURAL (2)	CITIES* (3)	------ (4)	URBAN (4/1)	RURAL (4/2)	CITY (4/3)
SIND							
MALE	27.1	14.0	27.2	31.1	1.15	2.22	1.14
FEMALE	29.0	12.3	17.7	18.8	0.65	1.53	1.06
PREGNANT	0.8	11.8	2.5	3.2	4.00	0.27	1.28
LACTATING	3.4	14.0	7.6	5.3	1.56	0.38	0.70
PRESCH BOY	5.3	18.5	10.8	6.3	1.19	0.34	0.58
PRESCH GIRL	7.2	17.1	17.7	6.4	0.89	0.37	0.36
BOY 6-15	15.4	6.2	10.8	15.6	1.01	2.52	1.44
GIRL 6-15	11.8	6.1	5.7	13.3	1.13	2.18	2.33
	100.0	100.0	100.0	100.0	1.00	1.00	1.00
SAMPLE SIZE	473	1225	158				
KARACHI							
MALE			11.9	31.1			2.62
FEMALE			18.8	18.8			1.00
PREGNANT			4.7	3.2			0.68
LACTATING			8.6	5.3			0.61
PRESCH BOY			24.0	6.3			0.26
PRESCH GIRL			24.0	6.4			0.27
BOY 6-15			3.2	15.6			4.86
GIRL 6-15			4.9	13.3			2.69
			100.0	100.0			1.00
SAMPLE SIZE			403				

The above weighting estimates are suitable for controlling for population proportionality within areas (e.g. by province and urban, rural and city. This was used for example for the section on the amounts of foods eaten. However, for national estimates, further weighting is required between Provinces. This is based on comparing the estimated sample for each province/area compared with the actual sample taken for the survey analysis.

WEIGHTING ESTIMATES BY PROVINCE AND AREA - FOOD INTAKE

PROVINCE	AREA	SAMPLE SIZE (1)	SAMPLE PERCENT (2)	POPULATION PERCENT (3)	WEIGHTING FACTOR (4)
PUNJAB	URBAN	492	5.8	8.1	1.39
	RURAL	1196	14.1	41.6	2.95
	CITIES *	358	4.2	4.4	1.04
Lahore		1478	17.4	3.6	0.21
BALUCHISTAN	URBAN	379	4.5	0.5	0.11
	RURAL	597	7.0	4.4	0.62
	CITIES	241	2.8	0.4	0.14
SIND	URBAN	473	5.6	2.8	0.50
	RURAL	1225	14.4	13.4	0.93
	CITIES **	158	1.9	0.9	0.48
Karachi		403	4.7	6.4	1.35
NWFP	URBAN	300	3.5	1.3	0.37
	RURAL	680	8.0	11.5	1.44
	CITIES	507	6.0	0.7	0.12
TOTAL	URBAN	1644	19.4	12.7	0.66
	RURAL	3698	43.6	70.9	1.63
	CITIES	1264	14.9	6.4	0.43
	Lahore	1478	17.4	3.6	0.21
	Karachi	403	4.7	6.4	1.35
	TOTAL	8487	100.0	100	1.00

* Excluding Lahore (2) = % by sample [(1)*100/8487]
** Excluding Karachi (3) = % by census
(4) = census % / sample % i.e. (3)/(2)

The added weighting is detailed for each area in the following tables. The "area" weight is applied for each biological group in turn. For example, 2.10 is the weighting required for adult males in the Punjab urban area as indicated in the first table. However, Punjab urban, in terms of the total population of Pakistan was under-sampled (weighting factor 1.39). Hence this factor must be combined with each of the Punjab urban biological groups. For adult males, this results in a combined weighting of 2.10*1.39 = 2.92; for females the result is 1.13*1.39 = 1.56, etc.

The following tables indicate the weighting estimates by biological group and area combined.

PROVINCE -GROUPS	WEIGHTING NEEDED BY SEX/AGE GROUP			WEIGHT AGES		
PUNJAB	**URBAN**	**RURAL**	**CITY**	**URBAN**	**RURAL**	**CITY**
MALE	2.10	2.07	2.02	2.92	6.12	2.10
FEMALE	1.13	1.31	1.02	1.56	3.88	1.06
PREGNANT	0.86	0.84	0.64	1.20	2.48	0.67
LACTATING	0.57	0.44	0.52	0.79	1.30	0.55
PRESCH BOY	0.35	0.35	0.30	0.48	1.04	0.31
PRESCH GIRL	0.44	0.34	0.37	0.62	1.02	0.38
BOY 6-15	1.50	1.70	2.08	2.08	5.00	2.16
GIRL 6-15	1.06	1.43	2.66	1.47	4.22	2.77
WEIGHT	**1.00**	**1.00**	**1.00**	**1.39**	**2.95**	**1.04**

LAHORE	**URBAN**	**RURAL**	**CITY**	**URBAN**	**RURAL**	**CITY**
MALE			1.91			0.40
FEMALE			1.45			0.30
PREGNANT			0.78			0.16
LACTATING			0.62			0.13
PRESCH BOY			0.30			0.06
PRESCH GIRL			0.32			0.07
BOY 6-15			1.79			0.38
GIRL 6-15			1.58			0.30
WEIGHT			**1.00**			**0.21**

NWFP	**URBAN**	**RURAL**	**CITY**	**URBAN**	**RURAL**	**CITY**
MALE	2.83	2.43	2.05	1.05	3.47	0.25
FEMALE	2.09	2.41	1.86	0.77	3.45	0.22
PREGNANT	0.46	0.68	0.51	0.17	0.97	0.06
LACTATING	0.36	0.30	0.46	0.13	0.42	0.06
PRESCH BOY	0.26	0.26	0.26	0.10	0.38	0.03
PRESCH GIRL	0.35	0.29	0.30	0.13	0.42	0.04
BOY 6-15	1.95	2.52	2.64	0.72	3.60	0.32
GIRL 6-15	1.73	2.83	2.25	0.64	4.05	0.27
WEIGHT	**1.00**	**1.00**	**1.00**	**0.37**	**1.43**	**0.12**

PROVINCE -GROUPS	WEIGHTING NEEDED BY SEX/AGE GROUP			WEIGHT AGES		
BALUCHISTAN	**URBAN**	**RURAL**	**CITY**	**URBAN**	**RURAL**	**CITY**
MALE	2.22	2.47	1.75	0.24	1.53	0.24
FEMALE	1.23	1.48	1.98	0.14	0.92	0.28
PREGNANT	0.64	0.59	1.28	0.07	0.37	0.18
LACTATING	0.51	0.40	0.39	0.06	0.25	0.05
PRESCH BOY	0.29	0.25	0.36	0.03	0.16	0.05
PRESCH GIRL	0.34	0.34	0.30	0.04	0.21	0.04
BOY 6-15	1.73	2.23	2.08	0.19	1.38	0.29
GIRL 6-15	2.29	2.46	1.28	0.25	1.53	0.18
WEIGHT	**1.00**	**1.00**	**1.00**	**0.11**	**0.62**	**0.14**

PROVINCE -GROUPS	WEIGHTING NEEDED BY SEX/AGE GROUP			WEIGHT AGES		
SIND	**URBAN**	**RURAL**	**CITY**	**URBAN**	**RURAL**	**CITY**
MALE	1.15	2.22	1.14	0.57	2.04	0.55
FEMALE	0.65	1.53	1.06	0.32	1.41	0.51
PREGNANT	4.00	0.27	1.28	2.00	0.25	0.61
LACTATING	1.56	0.28	0.70	0.78	0.35	0.33
PRESCH BOY	1.19	0.34	0.58	0.59	0.31	0.28
PRESCH GIRL	0.89	0.37	0.36	0.44	0.34	0.17
BOY 6-15	1.01	2.52	1.44	0.51	2.31	0.69
GIRL 6-15	1.13	2.18	2.33	0.56	2.01	1.12
WEIGHT	**1.00**	**1.00**	**1.00**	**0.50**	**0.92**	**0.48**

KARACHI		
MALE	2.62	2.62
FEMALE	1.00	1.00
PREGNANT	0.68	0.68
LACTATING	0.61	0.61
PRESCH BOY	0.26	0.26
PRESCH GIRL	0.27	0.27
BOY 6-15	14.86	4.86
GIRL 6-15	2.69	2.69
WEIGHT	**1.47**	**1.47**

ANNEX 3

Meal Patterns

This account is presented to complement the results and interpretation of the food intake section of the survey.

Meal patterns do vary between the four provinces of the country, but the major differences occur between the urban and rural areas. This is attributed to differences in a diversity of cultural patterns, food availability and influence of the commercial sector. Wheat is the main staple cereal of the country. This is consumed as wheat flour, out of which Roti /chappati, paratha nan are made. Roti/Chappati is cooked without oil, while paratha is cooked with oil, and may also have oil added to it during the meal. Other cereals like rice or maize are also eaten. Rice is usually boiled, but is also cooked with meat/vegetables (peas and potatoes). Kitchri (rice cooked with oil and pulses) is usually served to children. Za-da (Rice fried with fat and sugar) is used as a sweet dish usually taken on ceremonial and ritual occasions.

Roti/chappati, paratha and rice are generally consumed with a variety of dishes known as curry, which are made either of pulses, vegetables (single or mixed) or meat.

In general, most people prefer the curry cooked with large amounts of oil, though in higher socio-economic groups this trend is gradually declining. In rural areas home made animal fat is prefered over hydrogenated fat, (banaspati). Banaspati ghee is widely used among the urban segments of the population. However the use of liquid oil is also increasing. During winter, raw vegetables are more largely consumed both in urban and rural areas, as compared to summer.

Animal foods are goat, sheep, cow and buffalo. The use of cow/buffalo meat is more common among the poorer segments of the population, perhaps usually eaten only once or twice weekly. Mutton is predominantly eaten in NWFP and Baluchistan whereas in Sind beef (both cow and baffalo) is prefered and in Punjab often goat meat. Beside this, sea food/fish etc. is popular is Karachi and to some extent in Lahore and other cities, as well as in Baluchistan.

Three meals a day is the common practice among the population (i.e. Breakfast, Lunch and Dinner). The breakfast in taken early in the day, usually at homes.

SOME TYPICAL MEAL PATTERNS DURING THE DAY

	RURAL	URBAN
Breakfast	Tea, lassi roti, paratha, ghee left-over curry	Tea paratha, roti, ghee jams, jelly, etc
Lunch	Roti, curry pickles chatani etc	Roti, Rice, curry, salad chatani, sweet dish
Dinner	Roti/Rice curry	Roti/Rice curry sweet dish

In the province of Punjab the cities of Lahore and Gujarawala are famous for street eating; people belonging to every walk of life often prefer breakfast, lunch or dinner outside their homes. Almost the same is true for Karachi and to a lesser extext Peshawar.

Meal consumption patterns are effected to some extent by seasonal changes. In summer people invariably prefer more milk/milk products, like yogurt, lassi, ice cream (kulfi) etc. In addition the consumption of soft drinks also increases. These include commercial or home-made drinks. In winter there people eat relatively more meat, fish, egg and milk based sweet dishes, such as halwa. There are major seasonal variations in fruit consumption.

In between meals, people in urban areas often take light refreshments consisting of tea with samosa, biscuit or nimko. There is however no concept of snacks in rural areas, except in summer where people do take chilled lassi or home made lemon drinks (shakanjbeen).

The children of rural areas generally consume the family meals, whereas children in urban area in addition to family meals may have soft drinks, sweets, ice creams etc., when affordable, more frequently in between meals.

ANNEX 4

FOOD COMPOSITIONS USED TO ESTIMATE NUTRIENTS

It is difficult to determine the most appropriate nutrient values for the commonest foods, in terms of actual moisture content, method of preparation and specific type of food. The following table is not ideal, but attempts to take the above factors into account.

There were three major sources:

1. Results from samples taken during the survey. This was possible for individual foods (roti, paratha, rice).

2. Data from Punjab in the 1960's and from the Ministry of Planning, Islamabad.

3. Data from "standard" tables (e.g. Middle East, 1970; FAO, 1972).

Clearly there is much variation in the tables and a lack of specificity in the type of food eaten (e.g. meat, fish, vegetable, etc.) and the degree of moisture. The amounts of calories, protein and particularly fat in each are at best an approximation. The degree of milk dilution is unknown, as are the quantities of breast milk.

On the other hand, comparative results (e.g. between provinces and age/sex groups) are relatively reliable, as one assumes the composition table values will apply to all these groups in general. An exception may be in the case of milk and bottle feeding (dilution problems) which are commonly taken by children.

For nutrient intake and food amount estimations breast fed children have been excluded, as it was not possible to estimate the amount of breast milk. On the other hand, these children were included in the qualitative diet section.

The following table indicates the values used.

NUTRIENT VALUES USED IN THE SURVEY (per 100 gm of food)

FOOD	VAR	SOURCE	MOIST	PROT	FAT	CHO	IRON	CAL
BOTTLE(MILK)	F7	PUNJ		4.3	8.8	5	0.2	117
WEANING	F9	TAB	10	6.0	0.6	83	0.9	373
MILK	F11	PUNJ		4.3	8.8	5	0.2	117
MILK PRD	F12	PUNJ		4.3	8.8	5	0.2	117
RUSK-ROTI	F13	SAMP	34	8.0	0.9	55	2.2	261
BISC-PARATA	F14	SAMP		8.0	6.2	47	3.1	277
RICE-KITCH	F15	SAMP	53	5.2	9.4	29	3.3	223
CORN, ETC	F15A	PLAN		8.0			2.2	240
PULSE	F16	SAMP	20	12.0	0.5	30	3.5	170
EGG	F17	TAB		12.8	11.5	1	2.7	162
FISH	F18	TAB	73	20.0	0.8	0	1.5	93
MEAT med. fat	F19	TAB	62	18.7	18.2		2.6	240
VEG	F35	TAB	85	3	0.7	6	4	85
POTATO	F36	TAB		2	0.1	19	0.8	78
DGLVegs	F27	TAB	85	3	0.7	6	4	85
OTHER ROOTS	F30	TAB	65	1	0.4	33	1.4	138
FRUITS	F26	PUNJ		0.8	0.3	14	0.7	65

VAR : Variable ID in survey analysis

SOURCE : PUNJ - Table from Punjab
PLAN - Table from Ministry of Planning - NWFP data
TAB - FAO and other sources
SAMP - From food samples taken on the survey.

MOIST Moisture content
PROT Protein content
CAL Calories

ANNEX 5

NOTES ON THE FOOD INTAKE STUDY

EDITING

Editing was focused on inconsistencies in the data -e.g. for age and biological status, duplication of foods, breast or bottle feeding at inappropriate ages, single digits for much higher expected values for food amounts etc. Another major approach was to identify cases at the 90-95th centile or above and 5-10th centile or below for nutrient values (e.g. calories according to age). Often such results were most common in certain sampled areas. This approach sensitised us to apply a dilution factor for lassi.

It is difficult to assess distributions as results encompass all ages. However, two major factors can be assessed - unusually high results for each food and preference for specific quantities. The former suggests possible errors, the latter provides some insight in the methods of estimation.

i. High values

One might consider that over 900 gm (i.e. 2 lbs) of a particular food to be "high" for a staple food such as wheat and over 450 gm (i.e. 1 lb) for other foods such as meat or fish.

In general, this did not occur in more than 1% of the sample. However, in Sind rusk-roti ocuurred at or over 900 gm in 4% of cases. The extremely high values of roti for the northern areas were probably consistent with known patterns of eating.

ii. Preferences

Observers were meant to weigh the amounts of food presented to each family member. At times, rather than weighing the individual amounts, a fraction of the total amount may have been estimated. Thus if 500 gm of cooked rice was available equally among three members, an estimate of 167 gm for each may have been done. Individual food amounts may also have been estimated by a knowledge of the "average" weight for a common food entity (e.g. a roti or paratha). This technique has been used elsewhere (e.g. in Guatemala) and may have been done in the prior Pakistan survey of 1977. At that time semi-quantitative methods were being tried (e.g. by Debbie Gilbert, an investigator on that survey) under the auspicies of the National Academy of Sciences, USA, chaired by Doris Calloway and of which I was a member of the working group.

The point is that rather than weighing the foods, it is possible some investigators estimated the weight. Evidence for this would be suggested in the data, if there was preference for "approximate" amounts - e.g. 300, 450, 600 gm. This would occur usually at multiples of 50 or 100 gm. The alternative possibility is that weighing occurred, but the results from the scale rounded to the nearest 50 to 100 gm. Scales were in fact calibrated to the nearest 10 gm. This evidence is diluted by the fact that amounts for foods were entered as the total for the day, rather than at each individual serving.

The evidence for such preferences (to the nearest 50 or 100 gm) was obvious for almost all foods for each province, although most marked in Sind. Exceptions were in tea (often to the nearest 30 ml - estimates in ounces) egg, curries and at times, vegetables for Baluchistan and some of these for NWFP and Punjab. It is possible that some observers did not display such preferences. However, as there was no code to identify observers, this could not be investigated.

The implications of these findings affect both precision and accuracy and may be more important for larger food amounts, where such preferences were more evident. For most foods, imprecision is not likely to cause great problems, apart from perhaps younger children, where smaller total amounts will be more affected by a +/- 25 or +/- 50 gm estimate. For roti, for example this would involve no more than 150 calories or 4 grams of protein. We do not know the direction of this imprecision (up or down).

Accuracy is another matter and relates more to the way in which estimates were made (fractions, crude estimates without weighing, etc). With regards to fractions, at least the total quantity of food for the family has been weighed. For crude estimates, the absence of weighing now depends on the perception of each observer for "average" amounts and the visual or verbal information which occurred during the household visit. One assumes all households were visited in order to derive other survey information, collect samples (blood, stools, urine, food) and do body measurements. If some observers were not present during all phases of food preparation or at meals during the whole day, some estimate would be required for food amounts.

OILS

It was often not possible to distinguish between added oil and oil preared with the foods (e.g. paratha) and oils in curries. An estimate of oil was thus derived depending on the amount of curry, vegetables, pulses and meat eaten by each subject. This appeared to correlate well when compared with subjects having a known amount of oil in their diet.

SUGAR

Sugar was estimated, based on the amount of milk and tea drunk (10% in milk and 15% in tea). It is probably that the totals for sugar were underestimates, as other sources of sugar were generally not reported.

MILK

It was not possible to determine the dilution factor of milk. A factor of 1:4 was applied to lassi . No factor was applied to regular milk or bottle milk. For this reason, the nutrients from milk may be over-estimated (especially for young children with regards to protein). The total amount of milk drunk does not take into account this dilution.

ANNEX 6 BIOCHEMICAL SURVEY

Biochemical measurement of nutrients in the living system and their excretion in term of waste products (metabolic end products) or in form of nutrient excretion provide useful information about the nutritional status of individual/population of the past, both in term of health or deficiency status of the individual. In fact biochemical parameters provide accurate and early information before a deficiency precipitates into the clinical sign/symptoms. In other words it serve as an early warning system.

Role of Thiamine and Riboflavin.

Thiamine

Co-enzyme in energy metabolism, in its co-enzyme form (TPP) catalyzes the production of acetyl co-enzyme A,the link between carbohydrate, fat and protein metabolism.

Riboflavin

Co-enzyme in energy metabolism and its co-enzyme form FMN and FAD, acts as the prosthetic group in various enzyme systems chiefly concerned with hydrogen transport. Thus involved in fundamental metabolic processes.

Biochemical Sampling.

Refer Section 3.5.5.

Methodology

Fluorescent spectrophotometric technique was used to estimate urinary vitamin excretion.

Results:

The excretion level of thiamine and riboflavin are expressed per gram of creatinine. Mean levels for thiamine and riboflavin are interpretated according to guide lines suggested by the ICNND Manual for Nutrition Surveys. (Table 1).

Percent distribution of urinary excretion of Thiamine and Riboflavin in adult/children

Percent distribution of thiamine and riboflavin excretion in children (0-15 years) and adults (16+ years) is shown in Table 2, 3.

1.85 percent of children are deficient, whereas; 20.64 percent of children have low thiamine excretion level. The percent distribution for acceptable and high excretion levels for thiamine are almost the same. 0.71 percent children are deficient whereas 12.83 percent children have low riboflavin excretion level. Rest of the children are above the acceptable excretion level of riboflavin.

0.87 percent of adults are deficient, whereas 5.36 percent of adults have low thiamine excretion level. Rest of the adults are above the acceptable excretion level of thiamine. 0.25 percent adults are deficient whereas 0.86 percent adults have low riboflavin excretion level. Rest of the adults are above the acceptable excretion level of riboflavin.

The overall percentage distribution of thiamine and riboflavin is shown in histogram (Figure 1, 2).

Mean Thiamine and Riboflavin excretion level in adults (Rural/Urban)

Mean excretion levels for deficient and low are about 18 and 50 microgram per gram creatinine respectively. No significant difference in mean excretion level of thiamine and ribloflavin among urban and rural areas of population was observed. Same is true when data was considered according to Sex of the population studied (Table 4, 5 and Figure 3 - 6).

The data received further support from the dietary intake (Table 5-26). It appears from the table that difference in the amount of food eaten g/day is not significantly different among Rural and Urban area. It may be mentioned that malnutrition equally effects both sexes in all age groups and there is slight difference in the prevalence of malnutrition among rural and urban areas of the country. The population surveyed indicate that nutritional status for thiamine and riboflavin is satisfactory among adults. However, 20.64 percent and 12.80 percent children do have low excretion level of thiamine and riboflavin respectively.

Table 1 Suggested guide to interpretation of urinary vitamin excretion

	Deficient	Low	Acceptable	High
Thiamine ug/g creatinine				
Age (years)				
1-3	<120	120-175	176-600	>600
4-6	<85	85-120	121-400	>400
7-9	<70	70-180	181-350	>350
10-12	<60	60-180	181-300	>300
13-15	<50	50-150	151-250	>250
Adult 16+	<27	27-65	66-129	>130
Riboflavin ug/g creatinine				
Age (years)				
1-3	<150	150-499	500-900	>900
4-6	<100	100-299	300-600	>600
7-9	<85	85-269	270-500	>500
10-15	<70	70-199	200-400	>400
Adult 16+	<27	27-79	80-269	>270

Table 2 PERCENTAGE DISTRIBUTION OF THIAMINE LEVELS

AGE	Deficient	Low	Acceptable	High	Total No of sample
CHILDREN	1.85	20.64	39.8	37.69	
	(35)	(390)	(752)	(712)	1889
ADULT	0.87	5.36	14.7	79.07	
	(27)	(166)	(456)	(2453)	3102

* Figures in parentheses indicates no of samples

Table 6-3 PERCENTAGE DISTRIBUTION OF RIBOFLAVIN LEVELS

AGE	Deficient	Low	Acceptable	High	Total No of sample
CHILDREN	0.71	12.83	20.46	65.99	
	(13)	(234)	(373)	(1203)	1823
ADULT	0.25	0.86	12.06	86.83	
	(8)	(27)	(376)	(2706)	3117

* Figures in parentheses indicates no of samples

PERCENT DISTRIBUTION OF THIAMINE LEVEL

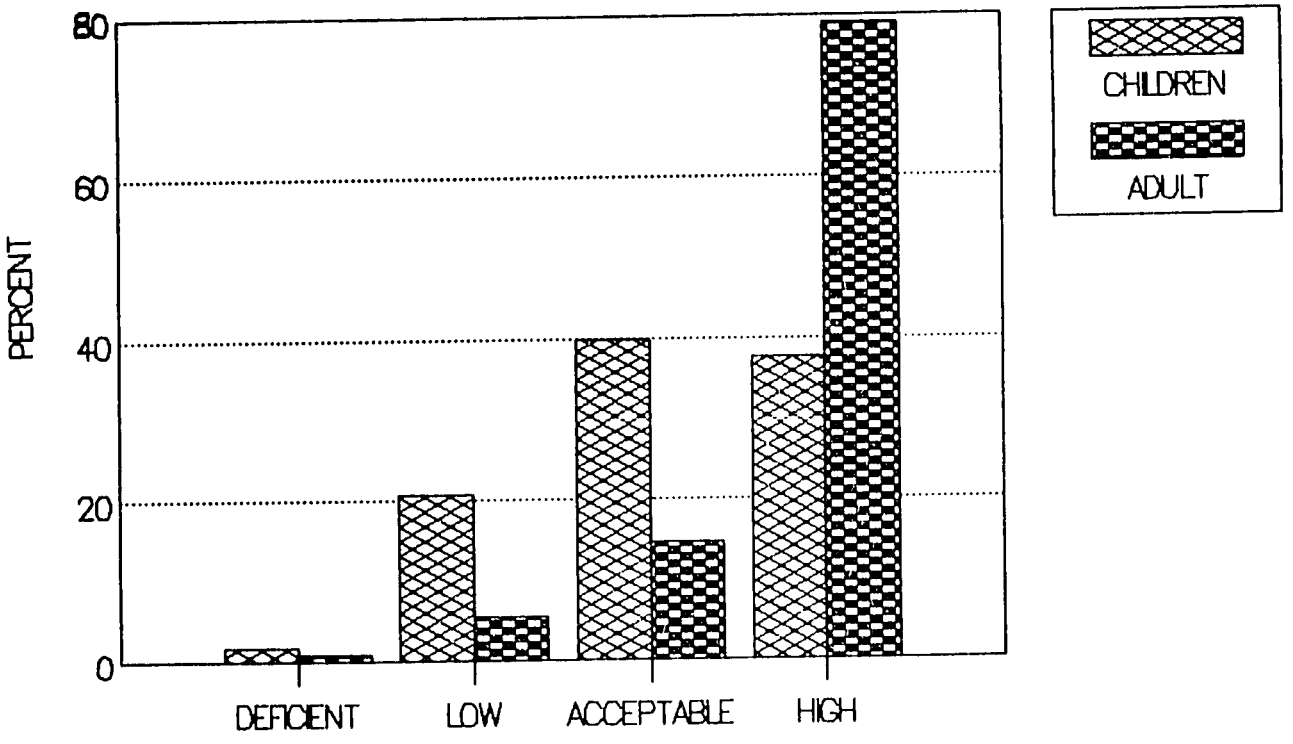


Figure 1

PERCENT DISTRIBUTION OF RIBOFLAVIN LEVEL

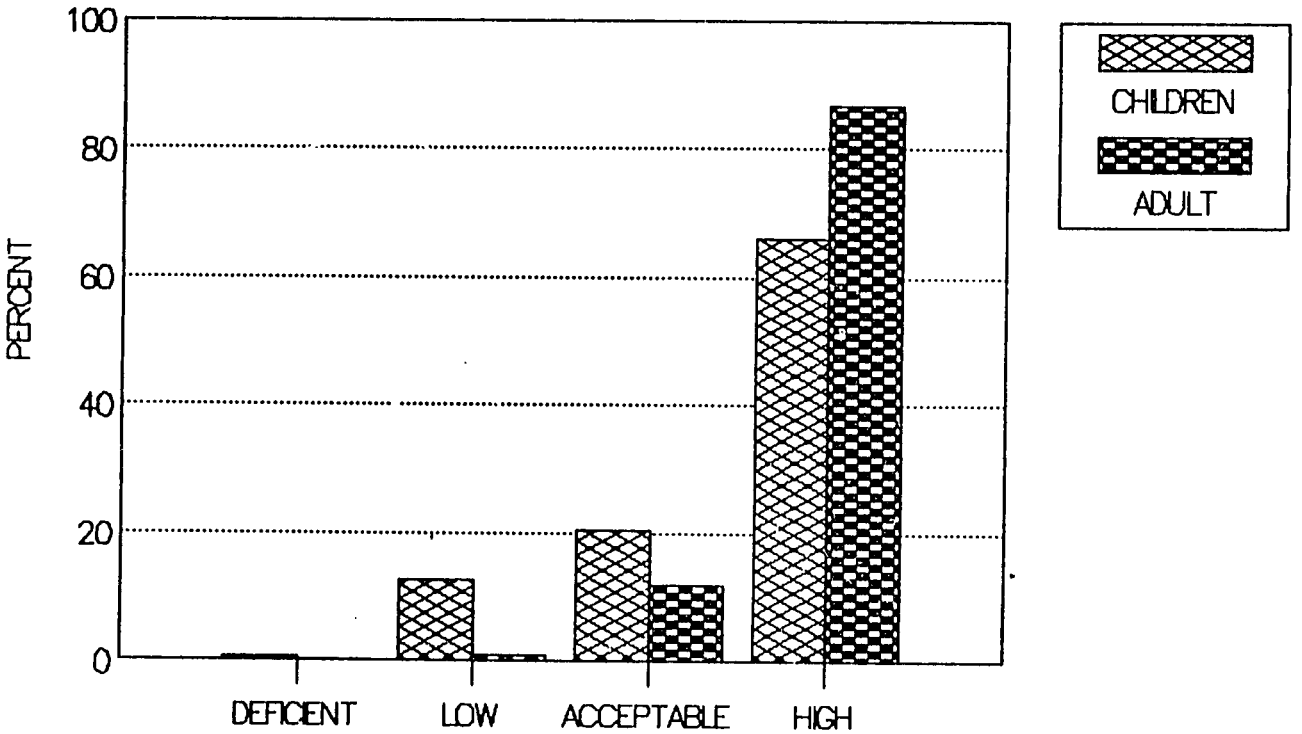


Figure 2

Table 4 MEAN LEVELS OF URINARY THIAMINE MEASURED IN ug/g CREATININE AGE/SEX OF PERSON

Age years	URBAN Deficient	Low	Acceptable	High	No of Sample	RURAL Deficient	Low	Acceptable	High	No of Sample
FEMALE										
0-3	70.8	144.8	327.8	760.5	153	66.4	149.4	350.7	705.2	87
4-6	56.9	107.3	235.5	601.2	136	57.2	120.0	240.8	669.3	88
7-9	47.0	125.6	283.2	515.1	64	35.3	137.1	258.7	608.9	65
10-12	35.0	107.6	232.6	461.1	78	40.0	119.1	235.7	537.3	85
13-15	33.5	102.7	199.4	470.9	65	23.6	116.6	198.4	501.8	78
Adult 16+	18.0	50.4	98.9	371.1	932	17.7	48.3	101.4	400.0	965
MALE										
0-3	66.1	148.7	352.8	738.9	134	78.6	144.0	355.5	822.7	90
4-6	60.7	108.7	252.8	642.5	138	49.6	97.7	233.0	618.5	98
7-9	44.5	123.7	278.2	628.1	93	46.1	128.3	260.9	604.0	102
10-12	54.0	124.6	241.1	493.2	85	35.0	126.5	238.3	568.8	110
13-15	37.2	114.4	193.2	509.5	53	39.0	100.1	203.3	500.4	74
Adult 16+	19.2	50.8	99.9	380.3	478	18.4	48.2	101.4	393.2	727

Table 5 MEAN LEVELS OF URINARY RIBOFLAVIN MEASURED IN ug/g CREATININE AGE/SEX OF PERSON

Age years	URBAN Deficient	Low	Acceptable	High	No of Sample	RURAL Deficient	Low	Acceptable	High	No of Sample
FEMALE										
0-3	97.7	356.7	680.2	1472.5	144	80.0	308.7	669.8	1448.1	78
4-6	-	258.3	442.6	1285.4	127	62.0	192.2	443.7	1128.9	89
7-9	-	191.3	443.4	1231.8	61	-	178.0	402.3	1117.6	72
10-15	21.0	152.0	313.1	943.4	137	61.0	147.0	312.0	987.2	173
Adult 16+	18.0	56.9	192.6	910.8	924	11.5	48.3	188.0	895.8	981
MALE										
0-3	123.0	358.0	624.6	1495.0	123	107.0	320.9	695.9	1286.9	82
4-6	41.0	241.9	450.3	1168.8	136	-	200.4	484.6	1219.7	100
7-9	-	181.4	413.0	1201.8	90	41.5	126.8	382.3	1174.7	102
10-15	-	163.9	299.0	903.0	131	-	161.4	392.0	989.3	179
Adult 16+	22.0	68.0	195.2	864.9	465	19.5	59.5	201.6	920.5	747

MEAN LEVELS OF URINARY THIAMINE (B1)

ADULTS URBAN AREA

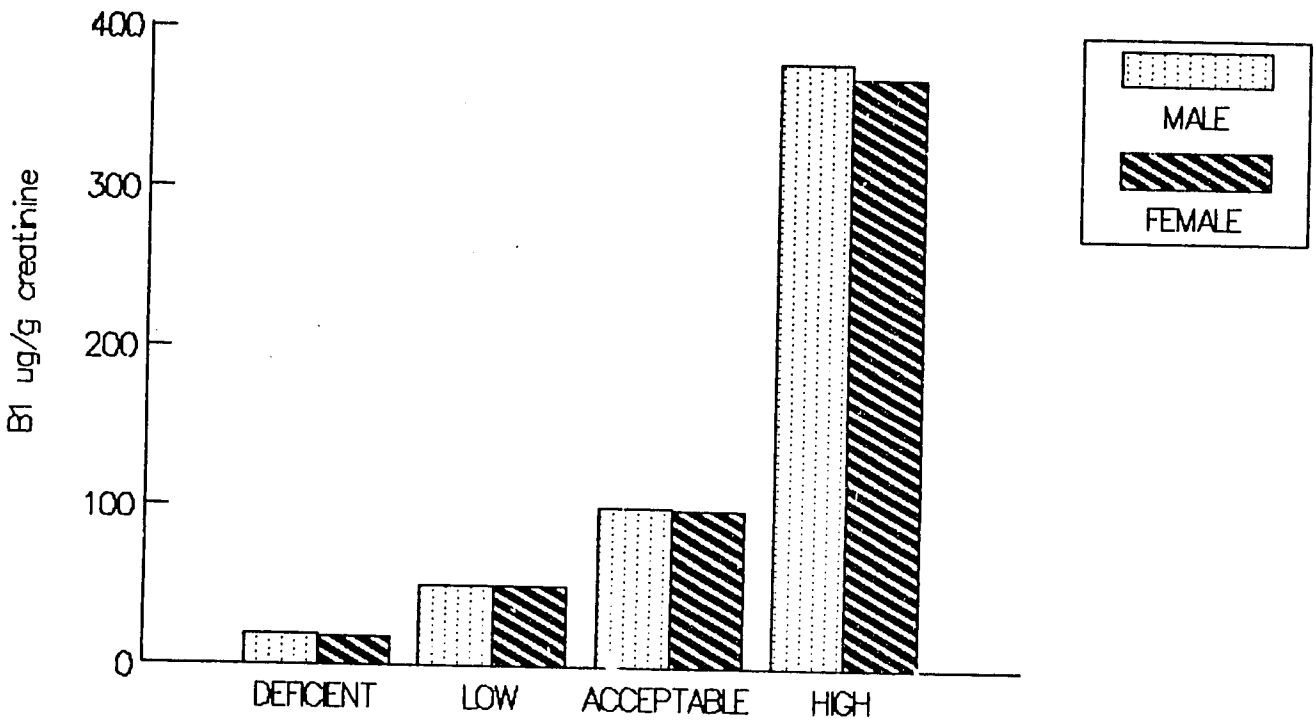


Figure 3

MEAN LEVELS OF URINARY THIAMINE (B1)

ADULTS RURAL AREA

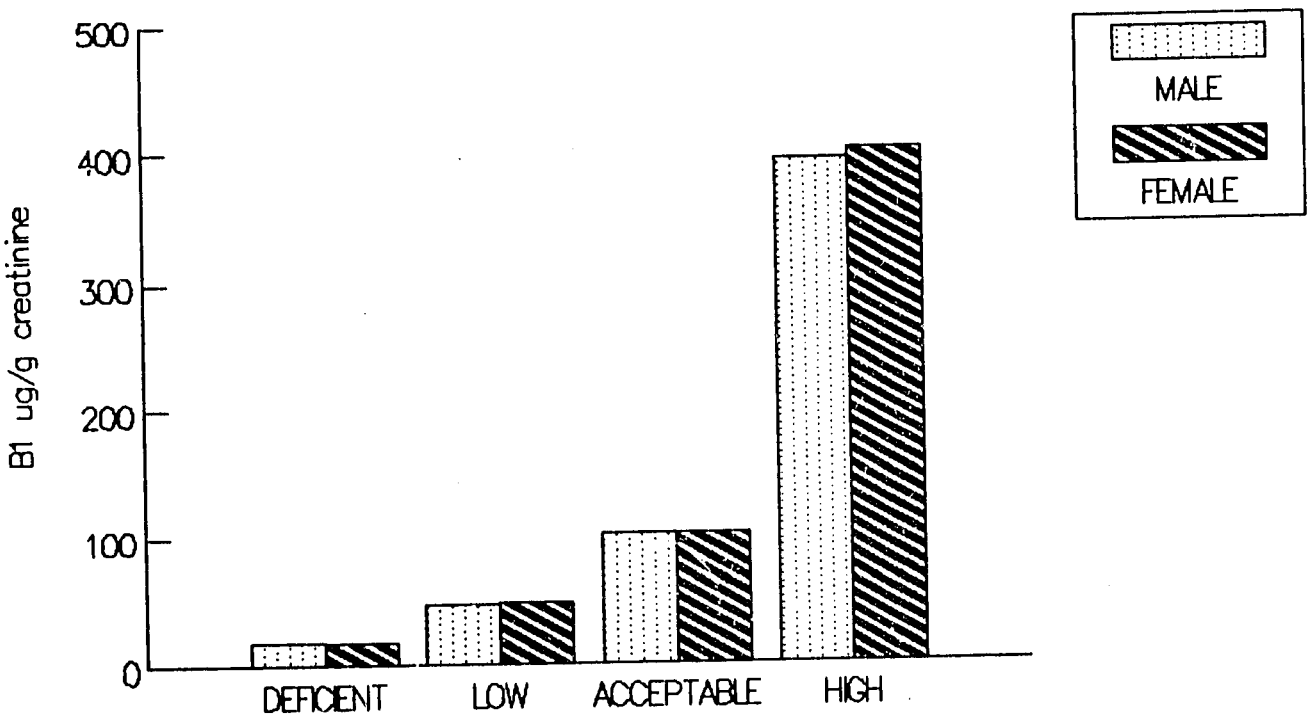


Figure 4

MEAN LEVELS OF URINARY RIBOFLAVIN (B2)

ADULTS URBAN AREA

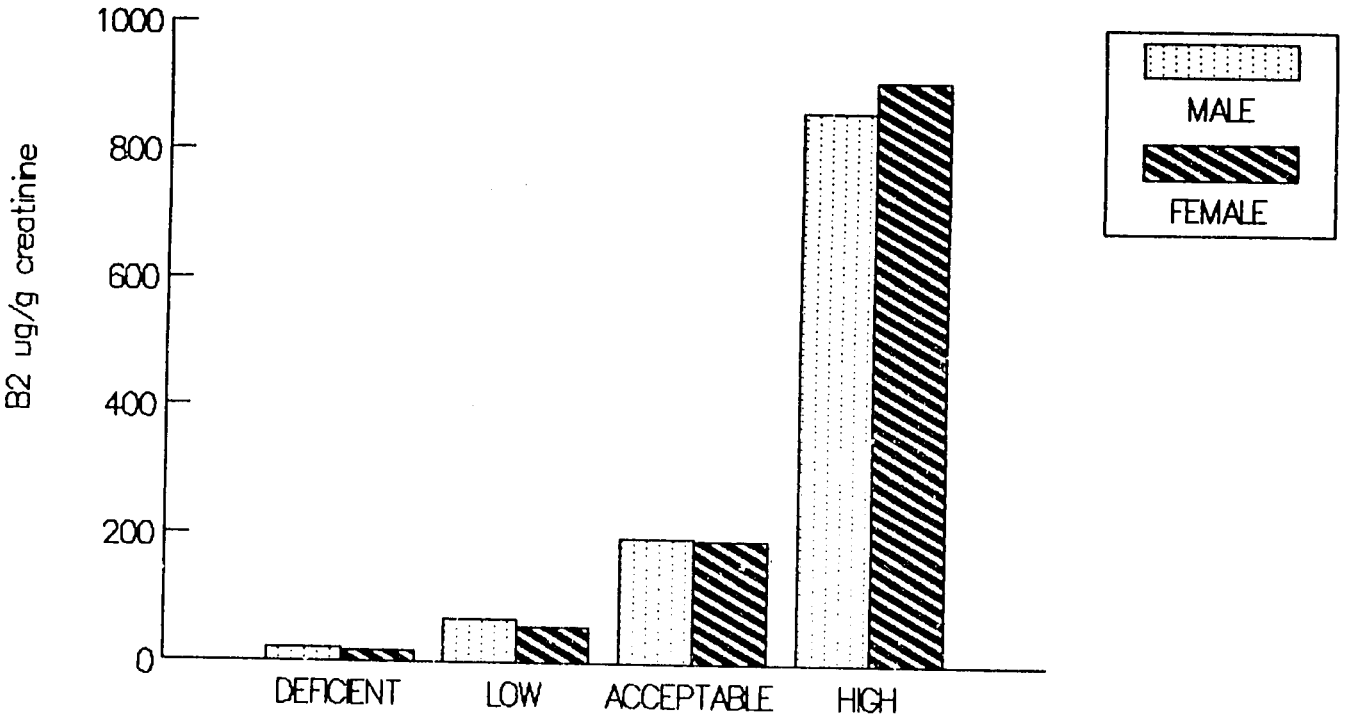


Figure 5

MEAN LEVELS OF URINARY RIBOFLAVIN (B2)

ADULTS RURAL AREA

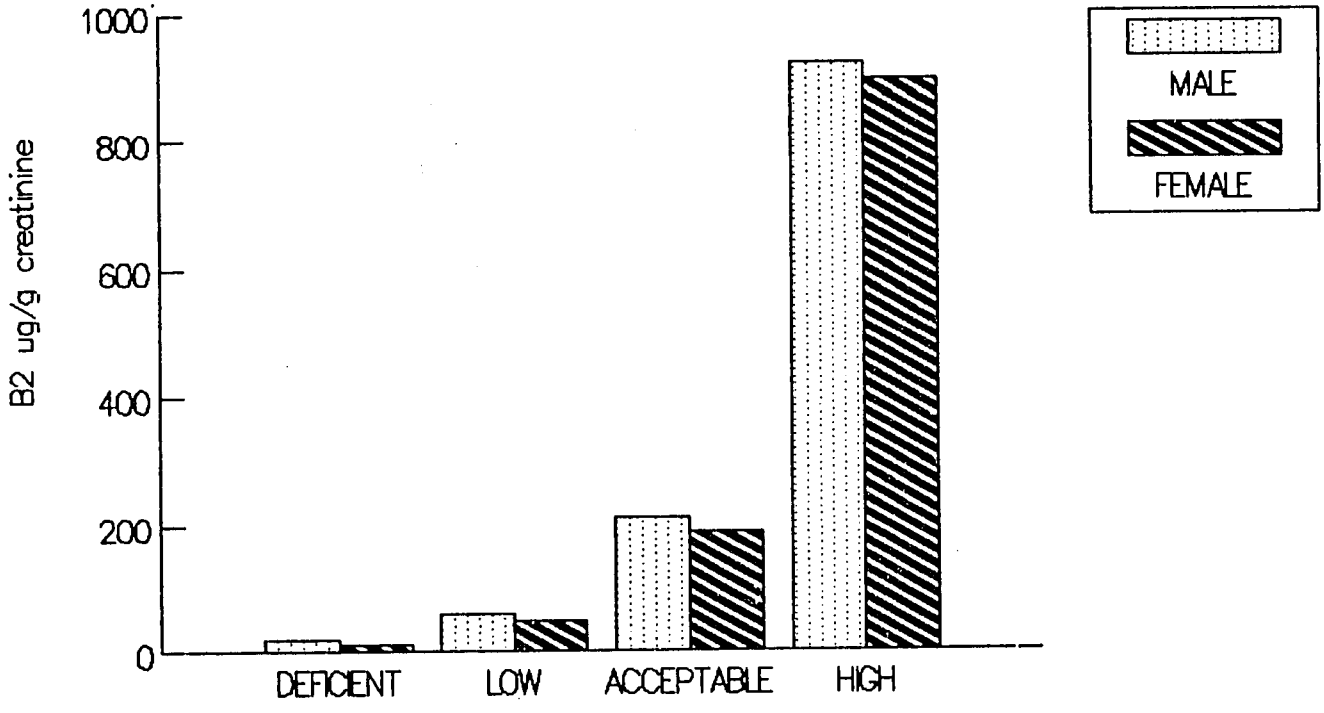


Figure 6

ANNEX 7

Edited base data, weights, heights, arm circumference and haemoglobin levels by age and sex (children under 5)

Table 1

WEIGHT IN KG. - MEAN AND STANDARD DEVIATIONS BY SEX

AGE (MTH)	FEMALES MEAN	S.D.	SIZE	MALES MEAN	S.D.	SIZE	TOTAL MEAN	S.D.	SIZE
0	3.3	0.5	49	3.2	0.6	60	3.3	0.6	109
1	3.6	0.8	64	3.8	1.1	71	3.7	0.9	136
2	4.4	1.1	96	4.4	1.1	95	4.4	1.1	191
3	4.7	1.1	126	4.9	1.2	128	4.8	1.2	254
4	5.3	1.4	76	5.8	1.3	74	5.5	1.4	149
5	5.7	1.3	73	5.9	1.2	73	5.8	1.2	146
6	6.1	1.5	132	6.2	1.2	110	6.2	1.4	242
9	6.9	1.4	321	7.2	1.6	383	7.1	1.5	704
15	7.7	1.8	391	8.2	1.8	475	8.0	1.8	866
21	8.8	1.8	398	9.2	1.9	378	9.0	1.9	776
27	9.7	1.9	562	9.8	2.0	643	9.8	2.0	1206
33	10.4	1.7	200	10.9	2.2	273	10.7	2.0	474
42	11.3	2.2	969	11.6	2.3	928	11.4	2.2	1897
54	12.9	2.5	901	13.2	2.4	971	13.0	2.5	1872
60	14.6	2.7	460	14.9	2.9	556	14.9	2.8	1016

Table 2

LENGTH IN CM. - MEAN AND STANDARD DEVIATIONS BY SEX

AGE (MTH)	FEMALES MEAN	S.D.	SIZE	MALES MEAN	S.D.	SIZE	TOTAL MEAN	S.D.	SIZE
0	48.5	4.2	54	48.8	7.0	63	48.6	5.8	117
1	51.3	5.7	67	51.2	4.9	66	51.3	5.3	133
2	53.9	5.8	103	53.3	6.6	97	53.6	6.2	200
3	56.9	6.0	128	57.2	6.0	126	57.1	6.0	254
4	58.1	5.7	80	59.2	6.6	75	58.6	6.1	155
5	59.5	4.9	70	61.1	5.6	72	60.3	5.3	141
6	61.9	6.2	127	61.6	6.5	111	61.7	6.4	237
9	64.7	6.3	321	65.5	6.7	374	65.1	6.5	695
15	68.6	6.6	376	69.9	6.7	458	69.3	6.7	834
21	72.9	7.2	380	74.5	7.0	370	73.8	7.1	750
27	76.9	7.6	552	77.7	8.1	628	77.3	7.9	1180
33	81.3	8.3	205	83.0	8.0	270	82.4	8.2	475
42	84.9	8.8	962	85.9	9.0	924	85.5	8.9	1886
54	92.0	9.4	899	93.0	9.1	974	92.5	9.2	1873
60	100.6	10.5	459	99.6	10.4	550	100.1	10.5	1009

Table 3

ARM CIRCUMFERENCE IN CM. - MEAN AND STANDARD DEVIATIONS BY SEX

AGE (MTH)	FEMALES MEAN	S.D.	SIZE	MALES MEAN	S.D.	SIZE	TOTAL MEAN	S.D.	SIZE
0	10.1	1.2	41	10.3	1.4	49	10.2	1.3	90
1	10.7	1.2	56	10.9	1.3	64	10.8	1.3	120
2	11.8	1.2	90	11.6	1.4	85	11.7	1.3	175
3	11.9	1.5	102	12.0	1.4	106	12.0	1.5	208
4	12.7	1.5	67	12.4	1.4	65	12.5	1.4	132
5	12.9	1.6	66	12.7	1.6	63	12.8	1.6	129
6	12.8	1.3	113	12.6	1.6	103	12.7	1.5	215
9	13.2	1.4	290	13.1	1.5	338	13.2	1.5	628
15	13.2	1.5	343	13.7	1.4	429	13.5	1.5	772
21	13.7	1.4	357	13.8	1.4	347	13.8	1.4	704
27	14.0	1.4	487	14.1	1.4	571	14.0	1.4	1058
33	14.2	1.4	184	14.3	1.4	239	14.3	1.4	423
42	14.6	1.4	879	14.5	1.4	810	14.5	1.4	1689
54	14.9	1.4	790	14.9	1.3	830	14.9	1.3	1620
60	15.2	1.3	236	15.3	1.3	292	15.2	1.3	528

Table 4

HAEMOGLOBIN IN GM%. - MEAN AND STANDARD DEVIATIONS BY SEX

AGE (MTH)	FEMALES MEAN	S.D.	SIZE	MALES MEAN	S.D.	SIZE	TOTAL MEAN	S.D.	SIZE
0	10.3	2.9	27	10.5	2.5	26	10.4	2.7	52
1	9.9	2.2	32	10.2	2.0	33	10.0	2.2	65
2	10.7	2.3	58	10.2	2.8	53	10.6	2.7	111
3	9.5	2.3	74	9.5	2.5	67	9.5	2.5	141
4	9.9	2.6	47	10.4	2.4	43	10.1	2.6	90
5	10.2	2.1	53	10.8	2.3	48	10.6	2.2	101
6	9.8	2.3	84	9.7	2.3	78	9.9	2.3	162
9	10.0	1.9	207	9.6	2.1	251	9.8	2.0	458
15	9.9	2.2	277	9.9	2.2	333	9.9	2.2	610
21	10.2	2.0	280	10.1	2.3	269	10.2	2.1	549
27	9.6	2.0	397	10.0	2.2	453	9.8	2.1	850
33	9.6	1.9	149	10.0	2.0	188	9.9	2.0	337
42	10.0	2.0	682	10.1	2.1	671	10.0	2.0	1353
54	10.0	1.9	630	10.3	2.0	705	10.2	2.0	1335
60	9.6	1.7	259	9.8	1.7	328	9.7	1.7	587

ANNEX 8

SAMPLE DESIGN FOR NATIONAL NUTRITION SURVEY DEVELOPED BY FEDERAL BUREAU OF STATISTICS KARACHI

URBAN AREAS

DIST	NAME OF CITY/TOWN	PROCESS CODE	SAMPLING INTERVAL	RANDOM START
PUNJAB				
RAWALPINDI CITY		LOW INCOME GROUP		
		1151002	33	14
		1151004	23	8
		MIDDLE INCOME GROUP		
		1152001	21	9
		1152005	24	10
		1152009	10	8
		1152012	21	9
		1152014	12	7
		HIGH INCOME GROUP		
		1153002	30	12
RAWALPINDI DISTT.				
		1102003	35	18
		1102010	45	23
GUJRANWALA CITY		LOW INCOME GROUP		
		1171001	14	10
		1171003	18	7
		1171005	12	9
		MIDDLE INCOME GROUP		
		1172001	20	7
		1172003	24	9
		1172005	20	10
		1172006	27	10
		HIGH INCOME GROUP		
		1173001	16	6
GUJRANWALA DISTT.				
		1113002	27	16
		1113005	26	12
		1113017	16	9
FAISALABAD CITY		LOW INCOME GROUP		
		1141001	17	10
		1141003	14	9
		1141004	20	7
		1141006	16	8

	1141008	14	5
	MIDDLE INCOME GROUP		
	1142002	20	6
	1142003	16	9
	1142004	19	10
	1142006	14	8
	HIGH INCOME GROUP		
	1143001	16	7
FAISALABAD DISTT.			
	1116003	6	3
	1116004	14	5
LAHORE CITY			
	LOW INCOME GROUP		
	1131002	9	5
	1131004	12	8
	1131006	11	9
	MIDDLE INCOME GROUP		
	1132001	13	7
	1132002	14	9
	1132004	17	12
	1132005	13	7
	1132007	15	11
	1132008	20	9
	1132010	14	11
	1132011	15	9
	1132013	14	10
	1132014	18	8
	1132016	19	14
	1132019	16	9
	1132021	20	14
	1132022	16	9
	1132024	14	8
	1132025	17	11
	1132027	10	9
	1132028	15	7
	1132030	13	10
	1132031	8	5
	1132033	15	8
	1132017	14	5
	1132034	11	6
	1132035	19	8
	1132037	14	9
	1132038	16	6
	1132040	16	4
	1132041	17	10
	HIGH INCOME GROUP		
	1133002	24	9
	1133004	20	10

LAHORE DISTT.			
	1109001	23	5
	1109004	27	11
SIALKOT DISTT.	1115003	14	8
	1115007	10	6
	1115012	20	12
	1115018	14	9
LEIAH DISTT.	1123001	19	9
	1123002	17	8
MUZAFFARGARH DISTT.			
	1124002	19	8
	1124006	19	11
JHANG DISTT.	1118002	14	5
	1118005	12	7
	1118009	15	7
OKARA DISTT.	1112006	19	8
	1112008	16	6
SHAIKUPURA DISTT.	1111008	13	5
	1111013	14	9
SARGODHA DISTT.	1105002	12	5
	1105003	17	10
	1105004	22	6
	1105005	17	3
KHUSHAB DISTT.	1107003	13	4
	1107004	12	7
MIANWALA DISTT.	1106001	13	3
	1106002	15	5
BHAKKAR DISTT.	1108001	20	3
	1108002	16	11
ISLAMABAD DISTT.	1104002	34	19
	1104006	25	17
	1104010	24	11
	1104014	25	3
ATTOCK DISTT.	1101003	7	4
	1101006	6	1
JHELUM DISTT.	1103004	30	11
	1103012	28	12
BHAWALPUR DISTT	1126002	24	11
	1126004	18	7
	1126007	22	10
BHAWALNAGAR DISTT.	1127002	25	10
	1127003	21	11

	1127005	30	13
RAHEEM YAR KHAN DISTT.	1128002	36	12
	1128004	27	10
	1128014	20	6
GUJRAT DISTT.	1114003	17	10
	1114006	16	9
	1114009	20	12
MULTAN CITY			
	LOW INCOME GROUP		
	1161001	28	9
	1161002	14	5
	MIDDLE INCOME GROUP		
	1162001	23	8
	1162003	9	6
	1162006	14	9
	1162007	14	10
	1162002	12	6
	HIGH INCOME GROUP		
	1163001	14	9
MULTAN DISTT.	1119001	16	6
	1119002	16	5
	1119003	18	7
VEHARI DISTT.	1120002	15	6
	1120006	16	6
SAHIWAL DISTT.	1121001	16	6
	1121009	13	4
TOBA TEK SING DISTT.	1117001	13	4
	1117005	17	5
KASUR DISTT.	1110001	18	4
	1110002	20	5
D.G. KHAN DISTT.	1122001	24	3
	1122005	16	3
RAJAN PUR DISTT.	1125001	28	11
	1125002	19	7

NWFP

PESHAWAR CITY

	LOW INCOME GROUP		
	3121001	22	8
	MIDDLE INCOME GROUP		
	3122002	34	14
	3122004	15	5
	3122006	37	16
	3122008	22	17
	3122010	32	14
	3122012	13	5
	3122014	11	9
	3122016	28	8
	3122018	17	6
	3122020	27	12
	3122022	15	5
	3122024	17	6
	3122026	27	17
	HIGH INCOME GROUP		
	3123001	13	5
PESHAWAR DISTT.			
Charsadda	3106005	13	5
Akora Khattack	3106011	14	9
Nowshera	3106017	14	6
ABBOTTABAD DISTT.			
Abbottabad	3104001	13	3
Have Lian	3104005	44	19
Have Lain	3104009	17	6
Nawan Shahr	3104013	20	8
SWAT DISTT.			
Mingora	3102001	25	14
Mingora	3102002	16	10
D.I.KKHAN DISTT.			
D.I.Khan	3109001	20	8
Kulachi	3109003	27	15
BANNU DISTT.			
Bannu	3110002	19	11
Bannu	3110003	15	9
MARDAN DISTT.			
Mradan	3105002	14	5
Takht Bai	3105012	9	6
KARAK DISTT.			
Karak	3108001	27	16
Karak	3108002	32	17

MANSEHRA DISTT.			
Mansehra	3103001	27	11
Mansehra	3103002	62	33
KOHAT DISTT.			
Kohat	3107002	19	11
Thall	3107006	18	7
BALUCHISTAN			
QUETTA DIVN.			
Pishin	4101001	14	5
Loralai	4101004	25	11
Zhob	4101007	25	10
KALAT DIVN.			
Khuzdar	4103001	22	8
Kalat	4103005	20	6
Uthal	4103015	23	10
SIBI DIVN.			
Sibi	4102001	9	2
Jhat put	4102005	13	5
Sibi	4102007	8	2
MEKRAN DIVN.			
Turbat	4104001	15	5
Gawadar	4104003	21	7
QUETTA CITY			
	LOW INCOME GROUP		
	4111001	21	7
	MIDDLE INCOME GROUP		
	4112003	30	14
	4112006	19	8
	4112009	14	9
	4112012	27	10
	4112015	22	9
	4112018	31	14
	HIGH INCOME GROUP		
	4113001	19	9
SIND			
KARACHI CITY			
	LOW INCOME GROUP		
	2181001	14	9
	2181004	17	12
	2181008	13	11
	2181012	13	9
	2181015	19	11
	2181019	12	8

2181023	13	9
2181026	14	8
2181031	20	10
2181035	16	8
2181039	12	6
2181042	15	10
2181046	19	11
2181047	20	9
2181051	15	7
2181055	12	6
2181058	17	10
2181061	18	7
2181063	18	11
2181066	20	12
2181069	17	7
2181071	18	9
2181073	20	6
2181076	18	9
2181082	14	10

MIDDLE INCOME GROUP

2182001	10	5
2182004	17	13
2182008	16	11
2182011	20	9
2182015	21	16
2182019	16	8
2182023	18	11
2182026	15	11
2182029	18	9
2182033	13	7
2182035	14	10
2182038	19	15
2182041	15	7
2182046	12	5
2182050	19	13
2182054	12	6
2182057	11	5
2182060	16	9
2182064	11	8
2182067	17	9
2182070	15	8
2182073	14	10
2182076	17	7
2182077	20	12
2182080	12	6
2182084	16	11
2182087	16	10

HIGH INCOME GROUP

2183001	18	6
2183004	16	6
2183008	18	9
2183011	13	10

HYDERABAD CITY			
	LOW INCOME GROUP		
	2191001	25	10
	2191002	22	5
	MIDDLE INCOME GROUP		
	2192001	23	9
	2192002	18	5
	2192003	13	7
	2192004	15	11
	2192005	21	9
	HIGH INCOME GROUP		
	2193001	18	11
HYDERABAD DISTT.			
	2109001	12	4
	2109002	13	5
	2109003	16	6
LARKANA DISTT.			
Kamber	2106001	18	6
Larkana M.C.	2106002	23	8
BADIN DISTT.			
Badin	2110001	16	6
Badin	2110002	17	5
THATTA DISTT.			
Gharo	2113001	14	1
Thatta	2113002	12	7
SANGHAR DISTT.			
Shah Dad Pur	2111001	16	6
Sanghar	2111006	15	1
THERPARKAR DISTT.			
Mir Pur Khas	2112001	17	4
Digri	2112006	19	8
DADU DISTT.			
DAdu	2108001	25	10
Mehar	2108004	20	7
SHIKAR PUR			
Shikar pur	2104001	35	15
Khan pur	2104002	27	14
NAWAB SHAH DISTT.			
Mehrab pur	2107001	14	6
Naushero Feroze	2107002	13	4
SUKKUR DISTT.			
Rohri	2105001	10	6
Sukkur	2105003	16	7

Sukkur	2105004	32	13
Ghotki	2105005	27	10
JACOBABAD DISTT.			
Sacobabad	2102001	24	10
Kandh Kot	2102002	21	8
KHAIR PUR DISTT.			
Khair Pur	2103001	21	8
Setharja	2103003	22	10

ANNEX 9

SAMPLE DESIGN FOR NATIONAL NUTRITION SURVEY DEVELOPED
BY FEDERAL BUREAU OF STATISTICS KARACHI
RURAL AREAS

DIST NAME OF MOUZAS/ DEHS/VILLAGES	TEHSIL/ TALUKA	PROCESS CODE	SAMPL INTERVAL	RANDOM START
LAHORE				
Rora Nepal Bagan	Lahore	1209001	43	17
Mare	Lahore	1209002	15	5
kahna Kohna	Lahore	1209004	48	24
Bho Patian	Lahore	1209005	41	30
Thatta Khurd	Lahore	1209007	14	7
OKARA				
Khole Murid Wala	Depal Pur	1212001	21	11
Fateh Singh 44/Sp	Depal Pur	1212002	18	6
Jandran Kalan	Depal Pur	1212003	17	3
Jhujha Kalan	Depal Pur	1212004	36	13
Gogera	Okara	1212005	70	16
Baran Pur	Okara	1212006	32	12
Tatar	Okara	1212007	18	7
Lashari	Okara	1212008	60	30
KASUR				
Gandhi Utar Chak17	Chunian	1210001	46	18
Rakh Mandike Kalan	Chunian	1210002	60	35
Maujoki	Chunian	1210003	182	124
Jamsher Khurd	Chunian	1210004	23	16
Thing Jattan	Chunian	1210005	124	54
Bhila Hithar	Kasur	1210006	48	19
Singh Sabib Wala	Kasur	1210007	13	11
Mamman Wala	Kasur	1210008	16	8
Mastik Ke	Kasur	1210009	6	6
SHEIKHUPURA				
Moman pura	Ferozwala	1201055	33	15
Fatowala	Ferozwala	1201056	41	26
Mandian Wala	Ferozwala	1201057	32	21
Nanu Dogar	Ferozwala	1201058	30	16
Masoo	Nankana Sahib	1201059	31	20
Here	Nankana Sahib	1201062	15	16
Chak No.461G.B	Nankana Sahib	1201063	20	15
Takhloo Wala TaraGah	Nankana Sahib	1201064	11	6
Khangah Dogran	Sheikhupura	1201065	37	16
Thatta Ali	Sheikhupura	1201066	32	7
Kharian Wala	Sheikhupura	1201072	111	102
Bheni Par	Ferozwala	1201037	13	11
Daher	Ferozwala	1201038	8	7
Kangal Kasuwala	Ferozwala	1201039	27	14
Lunda	Sheikhupura	1201043	14	13
RAWALPINDI				
Dulmi Tuma	Gujar Khan	1202001	9	4
Pind Bainso	Kahuta	1202002	31	15
Panjar	Kahuta	1202003	18	9
Ghel	Muree	1202006	46	25
Gurah	Muree	1202007	11	6
Raika Maira	Rawalpindi	1202009	30	16
Garhi Afghanan	Rawalpindi	1202010	42	20

Usman Khattar	Rawalpindi	1202011	139	19
ATTOCK				
Sadhrial	Fateh Jang	1201003	15	4
Baghtal	Talagang	1201007	43	28
JHELUM				
Chak Baqir Shah	Chakwal	1203001	46	29
Lakhwal	chakwal	1203002	17	12
Domeli	Jhelum	1203006	122	53
Khurd	Jhelum	1203007	53	29
Dandot	Pind Dadan khan	1203009	90	30
ISLAMABAD				
Hummak	Islamabad	1204001	65	24
Jagyot	Islamabad	1204002	45	21
GUJRANWALA				
Kot Jai Singh	Gujranwala	1213001	22	13
Kot Shahan	Gujranwala	1213002	36	6
Kamoke	Gujranwala	1213003	149	61
Mari Bhindran	Gujranwala	1213004	36	14
KOt Amar Singh	Gujranwala	1213005	8	6
Hinduana	Haffzabad	1213009	79	20
Walle Ke	Haffzabad	1213010	12	5
Nur pur	Wazir Abad	1213013	11	8
Said Nager	Wazir Abad	1213014	63	15
Bhagat Garh	Wazir Abad	1213015	9	4
Chaura	Wazir Abad	1213016	22	9
Punjgarain	Wazir Abad	1213017	5	4
GUJRAT				
Mueenuddin pur	Gujrat	1214020	57	23
Shahpur	Gujrat	1214021	8	5
Khunar	Kharian	1214023	12	9
Lohsar	Kharian	1214024	2	3
Mamdana	Phalia	1214026	37	19
Chak Raib	Phalia	1214027	25	14
Miana Gondal	Phalia	1214028	164	98
Chak No.003	Phalia	1214029	19	15
Kadhanwala	Phalia	1214030	144	96
SIALKOT				
Mandran Wala	Daska	1215001	79	36
Asmail Awan	Daska	1215002	19	11
Joya	Pasrur	1215007	10	7
Amal Solahrian	Pasrur	1215008	5	5
Mahal Tukra	Pasrur	1215009	4	4
Malak pur	Shakargarh	1215012	8	5
Aziz pur	Shakargarh	1215013	9	7
Hamral	Shakargarh	1215014	14	9
chhajwal	Shakargarh	1215015	6	5
Nadala	Sialkot	1215019	5	5
Hail Bajwan	Sialkot	1215020	19	13
SARGODHA				
chak No.22/NB	Bhalwal	1205001	28	15
Thathi Noor	Bhalwal	1205002	43	23
Chak No.11/NL	Bhalwal	1205003	18	9
Chak No. 21/S.B	Bhalwal	1205004	42	21
Miana Hazara	Bhalwal	1205005	31	18
Chak No. 25/S.B	Sargodha	1205008	29	13
Chak No. 89/S.B	Sargodha	1205009	29	19
Chak No. 44/N.B	Sargodha	1205010	19	12

Chak No. 90/N.B	Sargodha	1205011	33	16
Dharema	Sargodha	1205012	106	18
Chak No. 133/N.B	Sargodha	1205013	25	14
Sajoka	Shahpur	1205015	28	17
MIANWALI				
Kacha Kamar Mushani	Isakhel	1206002	26	15
Dherem Aid Ali Shah	Mianwali	1206003	20	11
Dheeba	Mianwali	1206004	90	46
Hazara Shumali	Mianwali	1206005	37	25
BHAKKAR				
Chak No. 71/ML	Bhakkar	1208001	10	6
Heto No. 1	Bhakkar	1208002	56	33
Kallur Kot Daggar	Bhakkar	1208003	68	39
Chak No. 059/T-D-A.	Bhakkar	1208004	15	15
KHUSHAB				
Chak No 44/MB	Khushab	1207001	23	13
Aino	Khushab	1207002	58	9
Dhammak	Khushab	1207003	32	11
Jabba	Khushab	1207004	32	5
Katha Masral	Khushab	1207005	40	19
FAISALABAD				
Chak 145/RB Wardpur	Faisalabad	1216001	18	13
Chak 186/RB Chokah	Faisalabad	1216002	89	7
Chak 201/RB tara Garh	Faisalabad	1216003	76	25
Chak 198/RB Munianwala	Faisalabad	1216004	49	26
Chak 215/RB Bajla	Faisalabad	1216005	96	34
Chak 071/JB Nagoke Sarle	Faisalabad	1216006	67	40
Chak 084/GB Fauj pur	Faisalabad	1216007	21	11
Chak 065/GB Mukand pur	Jaranwala	1216010	46	17
Chak 104/GB Sumra	Jaranwala	1216012	43	23
Chak 229/RB Almana	Jaranwala	1216013	90	43
Chak 198/GB Ahdi	Summundri	1216015	29	18
Chak 509/GB Kanjanwali	Summundri	1216016	104	19
Chak 046/GB Sakheera	Summundri	1216017	35	23
Chak 142/GB Gariwal	Summundri	1216018	27	11
JHANG				
Harse Sheikh	Chiniot	1218001	52	7
Rajoa	Chiniot	1218002	111	28
Lalian	Chiniot	1218003	73	6
Thatta Chandi kalan	Chiniot	1218004	17	3
Kabili	Jhang	1218009	21	12
Lang Shumali	Jhang	1218010	11	4
Dhir Khan	Jhang	1218011	6	5
Kot Dewan	Jhang	1218012	35	13
Obhan Wala	Shorkot	1218016	3	3
TOBA TAK SINGH				
Chak 723/GB	Toba Tak Singh	1217001	8	5
Chak 742/GB	Toba Tak Singh	1217002	18	1
Chak 321/GB	Toba Tak Singh	1217003	19	16
Chak 092/GB	Gojrra	1217011	25	11
Plot 54/1-2	Kamalia	1217013	37	35
MULTAN				
Chak No. 015/D.H	Kabirwala	1219001	13	5
Chak No. 114/10-R	Khanewal	1219004	38	16
Chak No. 175/10-r	Khanewal	1219005	9	3
Chak No. 050/15-L	Khanewal	1219006	20	11
Mochi Wali	Lodhran	1219010	15	10

Chak NO. 355/W.B	Lodhran	1219011	39	25
Kahror	Lodhran	1219012	36	18
Kagni	Lodhran	1219013	17	11
Nasir-uddin Wahin	Lodhran	1219014	57	15
Chak No. 002/K.M.R	Multan	1219024	19	9
Chak NO. 006/T	Multan	1219025	15	10
Chak No. 015/MR	Multan	1219026	14	7
Buch	Multan	1219027	37	11
Punjahi	Shujabad	1219030	98	45
VEHARI				
Chak NO 259/EB	Birewala	1220001	46	22
Chak NO 197/E.B	Birewala	1220002	26	18
ChakNO 035/K.B	Birewala	1220003	20	12
Bland pur	Mailsi	1220004	46	25
Chak NO 158/W.B	Mailsi	1220007	23	14
Chak NO 146/W.B	Mailsi	1220008	10	7
Qadar Wala	Vehari	1220009	55	27
Chak NO 058/W.B	Vehari	1220010	23	13
SAHIWAL				
Chak NO 052/12-L	Chichawatni	1221001	29	15
Chak NO 008/11-L	Chichawatni	1221002	61	30
Chak NO 168/9-L	Chichawatni	1221003	57	21
Chak NO 025/14-L	Chichawatni	1221004	28	16
Chak NO 022/S-P	Pakpattan	1221009	23	13
Chak NO040/S-P	Pakpattan	1221008	32	17
Chak NO 003/10-L	Sahiwal	1221013	41	21
Tukra NO 015	Sahiwal	1221014	24	9
Dodh Saho	Sahiwal	1221015	30	16
Chak NO 047/5-L	Sahiwal	1221016	27	12
RAJAN PUR				
dAJAL Jampur	Jampur	1225001	81	33
Basti Khawja Rajanpur	Jampur	1225003	24	15
D.G.KHAN				
Chak Dodara D.G.Khan	D.G Khan	1222001	84	23
Chhal Chahan D.G.Khan	D.G Khan	1222002	63	9
Bhanbhan Thunsa	Thunsa	1222005	19	19
Ashrat Taunsa	Thunsa	1222006	10	7
LEIAH				
Chak NO 377/T.D.A. Leiah	Leiah	1223001	7	5
Chak NO 445/T.D.A Leiah	Leiah	1223002	5	4
Chak NO 220/T.D.A Leiah	Leiah	1223003	5	3
Sargani thal Leiah	Leiah	1223004	35	20
MUZAFFAR GARH				
Ali Wali Alipur	Alipur	1224001	85	45
Mail Manjeeth Alipur	Alipur	1224002	23	11
Ghal Wan Alipur	Alipur	1224003	93	33
Mahboob Wala Muzaffar Gar	Muzaffar Garh	1224008	15	5
Qalandar Wala Muzaffar G	Muzaffar Garh	1224009	86	48
Ghail pur Muzaffar Garh	Muzaffar Garh	1224010	32	19
Ahmad Muhana Muzaffar Gar	Muzaffar Garh	1224014	47	23
Thatha Chandaran Alipur	Ali pur	1224015	34	14
Chan Wa'a Kot Addu	Kot Addu	1224018	51	34
Sadiwahan Muzaffar Garh	Muzaffar Garh	1224024	40	24
RAHEEM YAR KHAN				
Chak NO 033/P Khan pur	Khanpur	1228001	14	5
Chak NO045/P Khan pur	Khanpur	1228002	22	11
Jajja Abbassin Khan pur	Khanpur	1228003	60	16

Banah Roya Liaquat pur	Liaquatpur	1228006	21	13
Gabole Liaquat pur	Liaquatpur	1228007	20	14
Unranu Liaquat pur	Liaquatpur	1228008	24	12
Chak N0096/P R.Y.Khan	R.Y.Khan	1228010	5	5
Piran Bhuta Sadiqabad	Sadiqabad	1228012	25	14
Kot Sanjar Khan Sadiqabad	Sadiqabad	1228013	24	14
BHAWALPUR				
Hyderpur	Ahmadpur East	1226001	20	11
Chang	Ahmadpur East	1226002	45	25
Kachi Shakrani	Ahmadpur East	1226003	33	13
Bakhri	Ahmadpur East	1226004	33	11
Chak No. 064/DB	Bahawalpur	1226009	2	2
Chak No. 019/RB	Bahawalpur	12260010	4	4
Chak No. 013/Ford	Hasilpur	1226011	28	23
Chak No. 086/Fateh	Hasilpur	1226012	15	10
BAHAWALNAGAR.				
Rehmantughera	Bhawal Nagar	1227001	9	5
Lakhmir Dhudi	Bhawal Nagar	1227002	18	13
Noor sar	Bhawal Nagar	1227003	41	33
Takhat Mahalotar	Bhawal Nagar	1227004	33	31
Mohammad azim	Chishtian	1227007	63	43
Chak No. 309/H.R	Fortabbas	1227008	5	3
Chak No. 085/5-R	Haroonabad	1227011	12	8
Chak Sarwardin	Mindinabad	1227012	4	2

BALUCHISTAN

CHAGAI				
Chagai	Dalbandin	4201001	20	8
LORALAI				
Baizawar	Duki/sinjawi	4201003	8	2
Palyani	Duki/sinjawi	4201004	16	5
Tojai	Bori	4201005	3	1
PISHIN				
Badwah	Gulistan	4201008	41	18
ZHOB				
Batuzai	Upperzhob	4201009	26	11
Babuchina	Loiband	4201010	21	9
QUETTA				
Aziz Khan	Quetta	4201037	19	7
KACHHI				
Jilal Khan	Bhag	4202010	6	2
KOHLU AGENCY				
Gazi Gal Bore	Sui	4202013	13	4
NISIRABAD				
Dhandha	Nisirabad	4202014	30	12
Pinhar	Tamboo	4202016	17	7
SIBI				
Zindra	Zirat	4202017	58	24
Luni	Sibi	4202018	16	6
GAWDUR				
Peshkan	Gawadar	4201001	66	33
PANJGUR				
Washbood	Panjgur	4204002	145	74
TURBAT				
Tarandan	Mand	4204003	3	1

Koshk	Bulada	4204005	31	15
KALAT				
Johan	Johan	4203001	25	12
Nureedzai	Kalat	4203002	1	1
Aander	Surab	4203003	6	1
Babri	Mastung	4203004	14	8
KHARAN				
Zore Abad	Kharan	4203005	4	4
KHUZDAR				
Podina	Khuzdar	4203007	2	1
Kudah	Nal	4203009	32	13
LASBELA				
Dan	Sonmiani Winder	42030011	17	11

NWFP

Peshawar				
Boobak	Charsadda	3206001	31	12
Chindro Dag	Charsadda	3206002	32	14
Aman Garh	Noushera	3206004	64	29
Mashu Gaggar	Peshawar	3206006	108	47
Dag Ismail Khel	Noushera	3206005	125	34
Sufaid Sang	APeshawar	3206008	106	39
Agra	Charsadda	3206009	51	25
Hisara Baani Miana	Charsadda	3206010	37	17
Qaidabad	Charsadda	3206011	70	32
Zaiakat Kaka Sahib	Noushera	3206012	102	70
Mardan				
Said Abad	Mardan	3205001	40	17
Hoti	Mardan	3205002	72	32
Husai	Mardan	3205003	15	5
Chak Mardan	Mardan	3205004	81	38
Surkhabi	Mardan	3205005	13	4
Jal Bai	Sawabi	3205006	127	69
Kunda	Sawabi	3205007	84	32
MANSEHR				
Biari	Batagram	3203001	44	19
Geedrai	Batagram	3203002	61	28
mera	Batagram	3203003	75	25
Koshgram	Batagram	3203004	16	5
KARAK				
Balbali	karak	3208001	3	2
Ali Khel	Karak	3208002	9	1
KOHAT				
Darsamand	Hangu	3207003	123	69
Kamar Dhand	Kohat	3207006	23	7
SWAT				
Takhta	Besham	3202001	26	11
Balalai	Martung	3202002	20	8
Moor pandai	Behrain	3202004	6	1
Adam Jaba	Charbagh	3202005	2	2
Chuprial	Matta	3202008	65	29
Zora	Kabal	3202007	8	2
DIR				

Srokili	Baranwal	3201001	6	1
Sattal	Dir	3201002	6	4
BANNU				
Fatima Khel	Bannu	3210001	84	22
Mashar	Bannu	3210002	14	5
D.I. KHAN				
Gara Haji	D.I.Khan	3209002	4	3
Kurar	D.I.Khan	3209004	13	2
ABBOTTABAD				
Keri Sarafali	Abbottabad	3204001	27	10
Malach	Abbottabad	3204002	56	24
langra	Abbottabad	3204003	82	30
Serian Daharam	Abbottabad	3204004	27	12
Majohan	Abbottabad	3204005	34	14
Panda Thana	Abbottabad	3204006	11	4

SIND

SUKKUR				
Sutiaro Chak No.1	Mirpur Mithelo	2205005	30	14
Machalo	Mirpur Mithelo	2205006	9	1
Thatho Malhan	Ghotki	2205008	21	9
Patni	Tohri	2205012	43	19
Chak Kazi Badal	Ghotki	2205002	6	1
Dil Murad Gabol	Mirpur Mithelo	2205003	25	10
JACOBABAD				
Wassay	Garhi Khairo	2202001	31	14
Mehrab pur	Jacobabad	2202002	20	8
LARKANA				
Bakarani	Kokri	2206001	59	22
Jiand Jatoi	Larkana	2206004	17	7
Partro	Ratodero	2206006	15	6
NAWABSHAH				
Ladho Bhisharah	Kandaro	2207001	10	3
Talhi	Moro	2207003	28	11
Bhiria Chak-122	Naushahro	2207005	52	19
Abji	Naushahro	2207006	96	31
Pano Usman	Naushahro	2207008	31	12
036 Nasrat	Nawabshah	2207009	10	4
013-Mari	Sakrand	2207010	10	32
Kingo	Sakrand	2207011	36	15
SHIKARPUR				
Fazal Josh	Garhi Yasin	2204001	17	8
Redho	Khan pur	2204002	24	9
KHAIRPUR				
Ripri	Gambat	2203001	22	8
Saeedi Lawer	Gambat	2203002	27	11
Kotlo	Kot Kiji	2203005	19	5
KARACHI				
[illegible]ore	Karachi East	2201004	73	22
Mangopir	Karachi East	2201005	91	41
Shah Murid	Karachi East	2201006	48	19
HYDERABAD				
Khanoth	Hala	2209001	32	12

Ghaubpir	Hala	2209002	21	7
Gad Ali	Hala	2209003	172	73
Fatepur	Hala	2209005	84	39
Sari	Hyderabad C	2209006	24	10
Missan	Tando Allahyar	2209007	69	34
Hotki	Tando Allahyar	2209009	60	30
Mareji	Tando Allahyar	2209001	40	17
Abad	Tando Mohd.k	2209011	29	13
Sadri	Hala	2209013	51	23
DADU				
Dhoro Damario	Dadu	2208002	15	7
Sakro	Johi	2208003	26	10
Shah Hassan	Johi	2208004	40	19
Lakha	Kotri	2208006	42	17
Dubi	Kotri	2208007	17	8
Gahi Charo	Johi	2208010	7	1
Tori	Johi	2208011	31	14
Fussia	Khairpur	2208013	19	7
THARPARKAR				
Deh 147	Digri	2212003	28	22
Deh 199	Digri	2212004	15	2
Dohar	Diplo	2212005	12	3
Deh 250	Mirpur Khas	2212006	29	13
Deh 100	Mirpur Khas	2212007	12	8
Sadhuri Thar	Umar Kot	2212011	14	5
SANGHAR				
Dhilyar Abdul Hadi	Khipro	2211001	20	8
Samarjo	Khipro	2211002	12	4
Eochna	Sanghar	2211003	24	9
Gul MOhd. Leghari	Shahdadpur	2211004	41	27
Barachri Rayoti & Jagir	Shahdadpur	2211005	66	29
Bitoor	Sinjhoro	2211006	28	11
THATTA				
Bhugro	Ghorabari	2213001	15	7
Kajhri	Mirpur Sakro	2213005	9	3
Kohistan 7/I	Thatta	2213006	344	89
BADIN				
Fano Bakar	Badin	2210001	10	2
Sehta	Badin	2210002	16	5
Siarai	Badin	2210003	19	8
Bakho Khudi	Badin	2210004	14	4
Kakejani	Golarchi	2210006	22	9
Haji Karam Ali	Matli	2210010	22	8