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NUTRITION AND INFANT FEEDING
IN PAKISTAN
RECOMMENDATIONS FOR
A USAID CHILD SURVIVAL PROJECT

A Report Prepared By PRITECH Consultant:
TINA G. SANGHVI

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NUTRITION AND INFANT FEEDING IN PAKISTAN
Recommendations for a USAID Child Survival Project

SUMMARY

Despite impressive gains in food production, food availability, and other economic development indicators, extensive growth failure in young children due to malnutrition (low weight for age is estimated at around 60 percent), remains a problem in Pakistan. Malnutrition increases the risk of mortality. Up to 275,000 of the total deaths from diarrhea, measles, and acute respiratory infections are attributable to growth failure alone. The inability of families to sustain adequate growth in children under five appears to be largely a function of inappropriate infant feeding practices, preventable maternal factors, and frequent bouts of diarrhea. Data on food consumption indicate that due to inequities in purchasing power, around 20 percent of all households may not be able to afford sufficient food to fulfill caloric requirements.

A review of the pertinent literature, site visits, and discussions with experts in Pakistan led to the following conclusions:

1. Key to breaking the vicious cycle of malnutrition and infection in Pakistan, is access to mothers, particularly, first time mothers and mothers of infants under 12 months. They need to master the skills of life saving techniques especially full and exclusive breastfeeding for the first four to six months, ORT, preparation and feeding of semi-solids starting around 6 months, and seeking adequate prenatal care and the complete series of immunizations including tetanus toxoid. The current policy and program framework within health or any other sector falls far short of achieving any meaningful coverage with education, training or health services for this critical target group
2. Strengths and resources that can facilitate the development of an effective set of nutrition activities include: a large body of information that clearly identifies key intervention

points such as deleterious infant feeding behaviours; vast human resources including a highly respected medical community; a successful EPI program; widespread belief in the Yunani system of medicine that emphasizes diet in the healing process; substantial mass media coverage; innovative pilot nutrition activities (such as by Dr. Jalil's group in the Lahore area, Dr. Zafrullah Gill's group in Sialkot, the Aga Khan Foundation; Prof. Mushtaq Khan's group in Islamabad, and others); and donor agencies -- USAID and UNICEF - committed to supporting nutrition.

3. Support for a separate, vertical, nutrition program or infrastructure is not advisable at present. Existing delivery systems with the maximum potential for reaching mothers and providing basic health services especially in rural areas should receive priority. The national control of diarrheal diseases program under NIH at the federal level would be the most logical delivery system for channelling nutrition activities. Leading teaching hospitals have a key role to play in program and policy formulation and medical education.

4. The nutrition component with greatest potential impact in the early phases of the new USAID Child Survival Project, is the incorporation of nutrition counselling accompanied by growth monitoring in ORT education and case management. It should focus on establishment of full and exclusive breastfeeding, appropriate weaning, and dietary management of diarrhea including frequent weighing. Specific modules need to be developed and adapted in each of the provinces. Widespread dissemination of nutrition counselling in the provincial health services is vital and should begin with training, education materials, and equipment for all proposed CDD training sites (see Northrup, 1987 for details on CDD training). Inclusion of non-governmental health providers (such as PVOs, TBAs, private practitioners) and support for community-based, pilot, child weighing/counselling efforts are important elements that should also receive priority.

5. The problem of extensive bottlefeeding in Pakistan is complex and will need a comprehensive approach that includes

in-service and pre-service training of health providers in lactation management; formative research on constraints in exclusive breastfeeding; extensive use of print and broadcast media; sensitization and information exchange aimed at updating OB/GYN and pediatric authorities on recent advances in the relationships of breastfeeding, maternal health and child survival.

6. Endemic goiter is a micronutrient deficiency closely associated with child health and survival in Pakistan. There is a strong rationale for supporting a national program in this area. USAID and UNICEF collaboration could make a significant contribution to child survival.

7. Other important nutrition issues include iron deficiency anemia, maternal malnutrition and low birth weight, and vitamin A deficiency. These areas have urgent research and program needs that should be addressed as soon as feasible.

I. BACKGROUND

A.I.D. has been providing assistance for nutrition activities in Pakistan since the 1960s. Examples include food aid under P.L. 480 Title II through PVOs and the World Food Program, technical assistance such as the design and analyses of national household food expenditure surveys and nutritional status assessment of vulnerable groups, food rationing and food policy analyses, feasibility of food technologies such as iron fortification and low-cost extrusion cooking, and most recently, extensive support for the national diarrheal diseases control program.

During the course of developing a comprehensive USAID program in 1986-1987 to support GOP's national child survival initiatives, it became apparent that malnutrition in young children is a significant associated cause of infant and young child mortality, and progress in attaining sustained mortality reductions will depend heavily upon the successful implementation of nutrition interventions. Recent assessments of the nutrition situation show that mortality and growth failure in children remain excessive despite major gains in food production and other development indicators (Jalil, 1985; Lambert and Shah, 1986). Improved nutrition engenders immunity against a wide spectrum of childhood diseases that include ARI (acute respiratory infections) and helps limit the course of life threatening illnesses such as diarrhea and measles. Unless adequate growth and nutrition are maintained in the under two age group, it will be hard to sustain significant reductions in mortality levels.

A.I.D.'s worldwide Child Survival Strategy (1985) also emphasizes the critical role played by maternal and young child nutrition and calls for the strengthening of nutrition components such as improving infant feeding practices, growth monitoring, improving the health and diets of women of reproductive age, and child spacing along with ORT and immunization programs.

Recognizing the importance of adequate nutrition and household food security for stability and sustained economic

growth, the Agency's global plan of action (Blueprint for Development, 1985) directs attention to nutrition concerns in two major sectors. In agriculture, rural development and nutrition (ARDN) it calls for increases in food consumption in conjunction with increases in incomes of the poor - shifting the emphasis away from food production and sectoral growth per se. Minimum standards are set at 90 percent of the population consuming UN recommended caloric levels in each A.I.D.-assisted country. (Estimates for Pakistan range from 70 to 80 percent). For Health and Child Survival, the plan sets minimum standards for each A.I.D.-assisted country at:

- percentage of children under five with chronic and acute growth failure under 20 percent, with estimates for Pakistan around 17 percent acute and 30-50 percent chronic (Micronutrient Survey, 1977 and Mansehra Survey 1984);

- 1-4 mortality less than 10 per 1000 births, estimated for Pakistan at around 16 (World Bank, 1987);

- infant mortality rates under 100, estimated at around 115 for Pakistan (World Bank, 1987).

II. SIGNIFICANCE FOR CHILD SURVIVAL

The most relevant implication of not addressing nutritional issues in the near future in Pakistan, is the inefficiencies it will engender for the new child survival initiatives that have recently been launched at considerable budgetary and administrative cost for both GOP and donors. See Table 1 for estimates of mortality attributable to child malnutrition in Pakistan. (The broader developmental impacts of malnutrition such as on productivity, immunity, educability, and physical capacity are covered in detail in the A.I.D. Nutrition Policy Paper and the UN literature.)

Table 1: Nutritional Components of Infant and Child Mortality in Pakistan by Some Major Causes of Death.

Causes of Mortality	Total	Excess Due to Growth Failure
Diarrhea	313,000	200,000
Acute Respiratory Infection	80,000	50,000
Measles	36,000	25,000

Sources: Adapted from Rohde and Northrup, 1985. UNICEF estimates of the main causes of mortality. Nutritional status estimates based on the 1976-77 Micronutrient Survey of Pakistan and 1982 Nutrition Survey by Asfaq A. Khan.

A. Growth Failure and Diarrheal Deaths.

While the incidence of diarrhea may (James, 1972; Delgado, 1983; Tomkins, 1981) or may not (Black, 1984) increase in the presence of growth failure in children, diarrhea lasts longer and is more severe in malnourished children. Rohde and Northrup (1985) estimate that malnutrition is the major underlying cause of death from diarrhea, accounting for about 2.7 million deaths in developing countries annually. The other 2.3 million diarrheal deaths can be managed readily with effective ORT. Applying the same relative risk levels (Kielman and McCord, 1978) for deaths from malnutrition, the estimates for Pakistan are shown below.

Table 2: Nutritional Status and Diarrheal Mortality

	Adequate >80 %	Mild 70-79 %	Moderate 60-69 %	Severe <60 %
Growth Failure % (Pakistan, 1977 and regional studies)	43	25	17	15
Relative risk of Death (Kielman and McCord, 1978)	1	2	4	8
Diarrhea Deaths Thousands (1984)	48.0	55.8	75.8	133.8
Excess Diarrhea Deaths from Malnutrition	0	27.9	56.9	117.1

Source: Adapted from Rohde and Northrup, 1985.

Of the total 313,400 estimated diarrheal deaths in Pakistan, about 201,900 are estimated to be due to growth failure. A national ORT program could prevent deaths from severe dehydration in a significant number of children, a larger number of deaths could be spared through maintenance of growth which begins to falter before 6 months of age. In order to accomplish this, mothers will need to be taught preventive nutrition interventions (aimed at preservation of full, un-supplemented breastfeeding and adequate semi-solid supplementation starting at age 6 months) and rapid recuperation of weight loss through special feeding following each successive episode of illness in the under two's.

B. Infant Feeding Practices and Rates of Diarrheal Diseases.

The U.S. Task Force on the Assessment of the Scientific Evidence Relating to Infant-Feeding Practices and Infant Health (Pediatrics, 1984) concluded that gastroenteritis rates are consistently lower in breastfed infants compared with bottlefed infants. In Costa Rica, infants who were exclusively bottlefed in the first six months of life contracted diarrhea at 4 times the rate of partially breastfed infants and almost 7 times the rate of exclusively breastfed infants (Mata, 1982). Recent data indicate that Pakistan is experiencing a rapid increase in the incidence of bottlefeeding in young infants in all regions; diarrheal disease admissions to hospitals are increasingly associated with bottlefeeding. Khan et al (1985) report that over half the infants under 3 months who were admitted to hospital for diarrhea were bottlefed from birth; another 30 percent were bottlefed plus breastfed by 3 months of age. The World Health Organization estimates that breastfeeding promotion programs could help reduce the incidence of diarrhea by 8 to 20 percent and reduce deaths from diarrhea from 24-27 percent.

Even full and exclusive breastfeeding is not sufficient to fulfill the growth requirements of infants after about 6 months of age. The timely introduction of hygienically prepared semi-solids that are high in energy density and protein quality are essential for warding off diarrhea. Studies on the etiology of diarrheal diseases in Africa and Asia clearly implicate poor quality weaning foods (generally consisting of liquids and gruels heavily contaminated with fecal bacteria and of low nutritional value) far more than contaminated water in the causation of diarrhea (Nutrition Reviews, 1982). There is evidence that poorly prepared weaning foods and delayed introduction of solids in the diets of Pakistani infants are widespread. Teaching mothers how to prepare sanitary and nutrient dense weaning foods from locally available resources, and feeding children sufficient quantities by 6 months of age can increase the impact of ORT programs.

C. Measles Case Fatality and Child Malnutrition.

Adequately fed children can cope successfully with measles, but when the prevalence of malnutrition is high, as many as half of the children who contract measles have been known to die from it. Based on the estimated mortality risk levels associated with growth failure as shown in Table 2 above, it appears that of the total 35,500 deaths from measles in Pakistan, 22,900 are directly linked to growth failure.

D. Acute Respiratory Infection Linked to Malnutrition in Children.

The impact of ARI is intensified by malnutrition. In Costa Rica, children with severe protein-calorie malnutrition were found to be 19 times more likely to develop severe pneumonia than normal children. In the Philippines, as shown in Figure 1, mortality among children hospitalized with acute respiratory infection was far higher for malnourished children than for children with adequate growth.

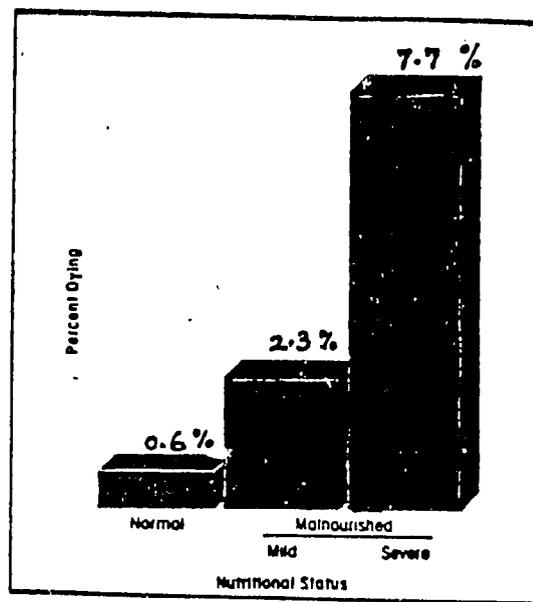


Figure 1: Growth Failure and Mortality from Acute Respiratory Infection.

Of the total estimated 80,000 deaths from Acute Respiratory Infections, over 50,000 are estimated to be attributable to growth failure in children based on calculations shown in table 2 above.

Vitamin A is a critical factor in preserving immune function in the lining of the lungs and digestive tract. In Indonesia, children with ocular symptoms of vitamin A deficiency experienced twice the rate of respiratory infection and four times the death rate of children without these symptoms. More recent evidence indicates that even subclinical vitamin A deficiency (low serum retinol levels) may predispose to infection and mortality. Xerophthalmia (eye changes due to vitamin A deficiency) is not considered a significant public health problem in Pakistan, however, in some population groups, subclinical deficiency may be an important factor.

III. NATURE AND MAGNITUDE OF MALNUTRITION

Significant numbers are affected by some form of malnutrition in Pakistan, as seen in Table 3. Protein-calorie malnutrition (PCM) is by far the most serious nutritional disorder in terms of its effects on individuals, households, communities, and national development on one hand, and the large size of the population affected on the other. Two characteristics of PCM are commonly used to describe the magnitude of the problem: the proportion of households that cannot afford to obtain enough food (energy measured as calorie intake) to satisfy their estimated food/nutritional needs, and the prevalence of growth failure in children under five or under three years of age. The availability of food at the household level represents "food security" and a lower risk of malnutrition. Intra-family food distribution, energy expenditure, infant feeding practices during periods of illness and good health, child spacing, and the incidence and severity of diseases will determine whether all or some individuals become malnourished. Pregnant women and young children are most susceptible to malnutrition. The prevalence of growth

failure in children is a sensitive, quantifiable, and objective indicator of both - the adequacy of household food availability and other causal factors - and is often used to monitor the nutritional status of population groups.

Table 3: Nature and Implications of Malnutrition in Pakistan.

<u>Type of Malnutrition</u>	<u>Population</u>	<u>Significance</u>	<u>Causal Factors</u>	<u>Interventions</u>
1. Protein Calorie Malnutrition:				
---General Population	20-30 %	Low productivity, susceptibility to disease, social unrest, low educability.	Household food insecurity, incomes, prices, purchasing power.	Targetted income generation schemes, food coupon, rationing, ARDN projects targetted to raising incomes of the poor.
---Maternal Malnutrition	25-30 % Low Birth Weight.	Short life expectancy, low productivity, low birth weight, infant mortality, child malnutn.	Short birth intervals, household purchasing power for food, intra-household inequit. poor prenatal care.	Above plus contraceptive use, access to income and health care, food supplements.
---Children Under Five	60% (30%)	High 1-4 death rates, diarrhea/ARI/measles case fatality, low educability.	Weaning practices, frequent diarrhea/measles, low birth weight, bottlefeeding, household food availability.	Above plus effective nutrition counselling with growth monitoring, ORT, control of bottlefeeding.
2. Iron Deficiency Anemia	60 % pregnant women.	Pregnancy outcome, immunity, productivity.	Low levels of absorbable iron in local diets.	Iron fortification iron supplements/tablets distribution.
3. Endemic Goitre	7.35 million	Mental impairment, growth retardation, mortality.	Iodine-poor soils and food.	Salt iodination, iodized oil injection/oral.

Sources: Micronutrient Survey of Pakistan, 1976-77; regional surveys; UNICEF; WHO.

A. Growth Failure in Children.

Estimates of the prevalence of low weight for age for Pakistan shown below are derived from the prediction equation of Haaga, et al (1985) that permits current estimates to be made.

Table 4: Cross National Comparisons of Estimates for Wt./Age

Country	Year	% Children <80% wt./age
Pakistan	1985	62.8
Bangladesh	1975	91.3
India	1979	74.9
Nepal	1975	69.2
Sri Lanka	1980	53.6
Yemen	1979	60.6

Source: Haaga et al, 1985.

Table 5 shows the wide variations in levels of malnutrition between rural areas of Sind and Baluchistan versus urban Punjab and Sind, for example. There are important differences in economic development indicators, availability of services, ethnicity, language, infant feeding practices, and access to women in each area. Project activities should focus on areas of high malnutrition and interventions will need to be adapted in each major area. Recent national nutrition data could be valuable for planning activities and as a baseline for assessing nutritional impact of ORT and nutrition components; assistance should be provided for completing analyses of the existing data at NIH.

Table 5: Prevalence of Growth Failure in Pakistani Children.
(R = Rural, U = Urban)

Survey	Age	wt/age <75%	wt/ht <80%	ht/age <90%
Micro Nutrient Survey (1977)	0-59 months	<80%	56.7 (R = 16.98) (U = 15.87)	16.7 50.5
EMRO Collaborative Study (1980-81)	0-24 months	NWFP (R) 28.4 Baluch. (R) 51.0 Sind (R) 53.0 (U) 24.0 Punjab (R) 23.5 (U) 18.0 Mean 32.8		
Mansehra Nutrition Survey (1984)	0-60 months	NWFP	43.7	17.3 29.0
Sample: 1250				
Sample: 924				

o Peak Age of Growth Failure. Ideally, data should be disaggregated by monthly or trimesterly intervals to identify peaks. This can help focus attention on ages of highest risk. However, data were not readily available to conduct such an analysis. The Mansehra Nutrition Survey data could be disaggregated by 12 month intervals and show the following peaks:

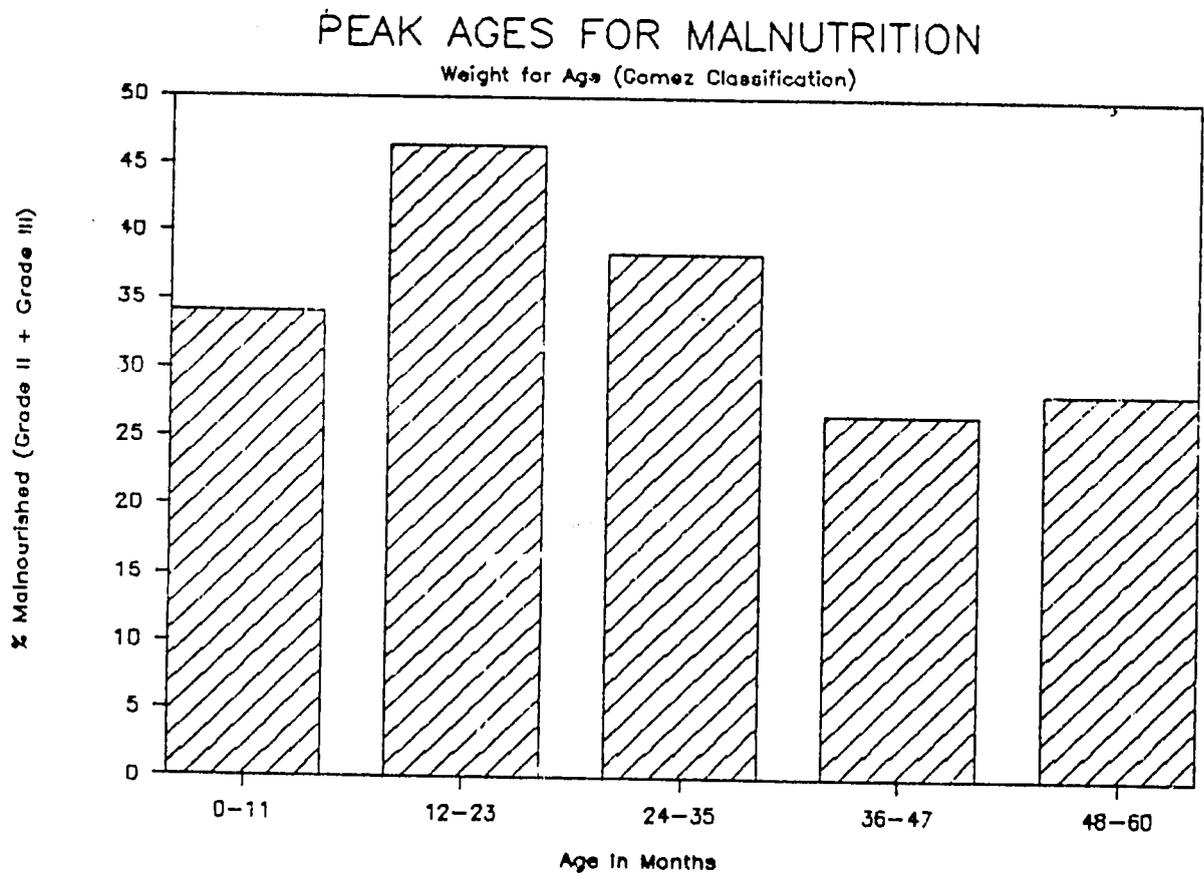


Figure 2: Mansehra Nutritional Status Data Disaggregated by Age (Lambert, 1984).

It is likely that disaggregating growth failure data by trimesters in the first 12 months would reveal the very early growth faltering reported anecdotally by pediatricians in Pakistan. This early growth failure most likely has its origins in maternal factors and infant feeding behaviors such as failure to establish full breastfeeding and early use of liquid feeds.

B. Infant Feeding Practices.

- Breastfeeding. Information available on the initiation of lactation suggests that there may be widespread problems in the establishment of full production of breastmilk. According to traditional beliefs, breastfeeding is not initiated until the third day. Bottlefeeding and prelacteal feeds with cup and spoon are the norm. Without benefit of full breastfeeding, infants are started on supplemental liquids probably triggered by the mother's (or other decision-maker's) perception that breastfeeding alone is insufficient. There is anecdotal evidence of diarrhea precipitated by contaminated feeds as early as the first or second month. There is also evidence to support a trend towards fewer children ever breast-fed, and shorter duration of exclusive or partial breastfeeding in Pakistan from national fertility and contraceptive prevalence surveys. Firstly, like other developing countries Pakistan is rapidly urbanizing, and urban-ness in Pakistan data is associated with short duration breastfeeding. Secondly, younger mothers are breastfeeding less and for shorter durations. Thirdly, higher maternal educational levels are associated with less breastfeeding. Each of these factors appears to exert an independent effect (Page, et al, 1982). The national fertility survey and contraceptive prevalence survey showed that the percentage of infants never breastfed increased from 1.5 percent in 1975 to 9.8 percent in 1983 (Khan and Qureshi, 1986). These trends are not uncommon in other countries. It appears that breastfeeding (initiation and duration) declines initially with urbanization and economic development, reaching a plateau, before a reversal of the decline (Haaga,

1985; Millman, 1986). Because countries such as Pakistan cannot afford to cope with the consequences (notably, increases in fertility and diarrheal diseases), the strategy for infant feeding must give priority to preventing any decline. A first step is understanding why the erosion of breastfeeding is taking place. Several studies report that mothers' reasons for early weaning frequently include "insufficient milk", a perception that has been successfully countered in other countries through lactation management and training of mothers and birth attendants.

- Too Early Introduction of Liquids. Breastfeeding unless exclusively practised in the first few months of life, fails to provide sufficient protection against the incidence of diarrheal diseases that are precipitated by the introduction of a heavy dose of contaminants through poorly prepared, stored, and fed liquids. Early liquid feeding is a double-edged sword because it arrests full production of breastmilk, depriving the infant of excellent quality nutrients and calories. Worldwide attention has therefore shifted to understanding and controlling the practice of premature liquid feeding in low income urban and rural communities. Bottlefeeding is an objective and easily verifiable (through observation of feeding and presence of bottles in the home, etc.) indicator for monitoring this deleterious behavior. Interviews with health providers at various levels indicated that feeding of water to infants under four months, often with bottles, is widely promoted especially during the hot season (rather than promoting increased fluid intake by mothers and more frequent breastfeeding). Also helping low income urban women suppress lactation completely at birth (using drugs like Parlodel) or promoting early use of milk feeds to "avoid problems when they have to go back to work " indicated a need for updating health practitioners regarding new knowledge on lactation, and a careful review and updating of infant feeding policies at health facilities.

In Pakistan, bottlefeeding in urban areas is being increasingly reported from all provinces, in the pediatric literature. The Karachi study (Khan and Lambert) found that half of the 252 infants interviewed at health facilities were bottlefed. Seventy-six percent of exclusively breastfed infants showed adequate weight for their age, compared to 64 percent of bottlefed infants. Over a fifth of the bottlefed infants were below 75 percent weight-for-age, compared to 8.5 percent in the breastfed group. (Note: The study was not designed to elucidate whether bottlefeeding was initiated because of perceived "insufficient milk", accounting for the high association between the two variables). The cost of purchasing adequate formula for a 3 month old infant is estimated at Rs. 215 per month. Sixteen percent reported bottlefeeding on their doctors' advice.

In the Micro Nutrient Survey of 1977, a sizeable 30 percent of mothers, both urban and rural, reported introducing milk feeds by one month, and 52 percent by six months. Most milk feeds consisted of animal milks (predominantly buffalo's, some cow's, and some goat's) and were reportedly diluted by salesmen or mothers. It is possible that early liquid feeding is a long-standing traditional practice in urban and rural communities, and should be carefully assessed during the design of a nationwide infant feeding education intervention. Khan and Qureshi (1986) report that in a nationally representative sample of 4602 women of reproductive age, 66 percent of all urban and 45 percent of all rural groups had initiated milk feeds by three months of age. Almost 30 percent of mothers who never breastfed gave "mother had no milk" as the reason, and 27 percent appear to report "mother had no milk" as the reason for introducing milk feeds. Hospital born infants (sample size of 916) from Faisalabad (Punjab) were studied over a one year period through monthly home interviews by Nagra and Gilani (1987). The sample was divided into three economic groups. The patterns of infant feeding for each of the groups are shown in Figures 3, 4, and 5 below. Note the very early increases in bottlefeeding and mixed feeding.

Figure 3: Infant Feeding Patterns: Low Income
Faisalabad, Punjab, Pakistan.

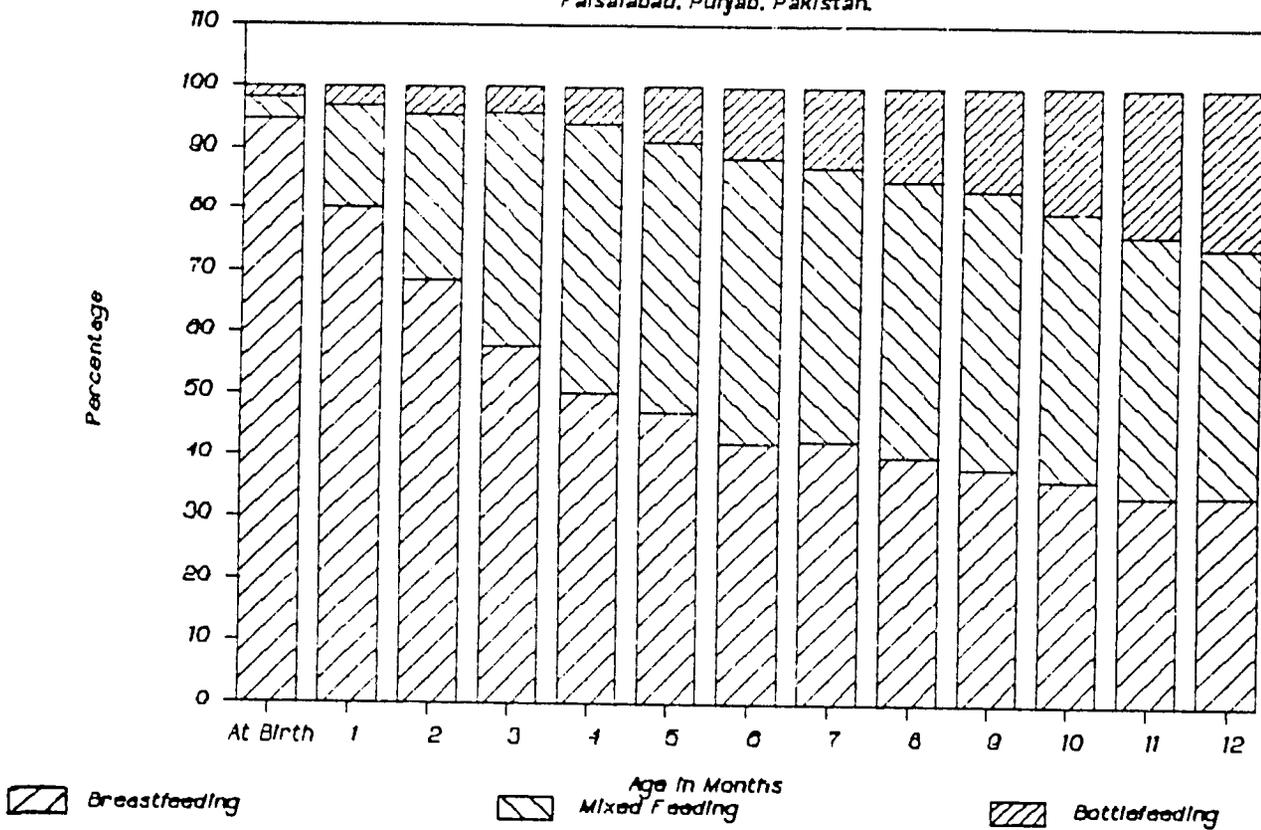


Figure 4: Infant Feeding Patterns: Middle Income
Faisalabad, Punjab, Pakistan.

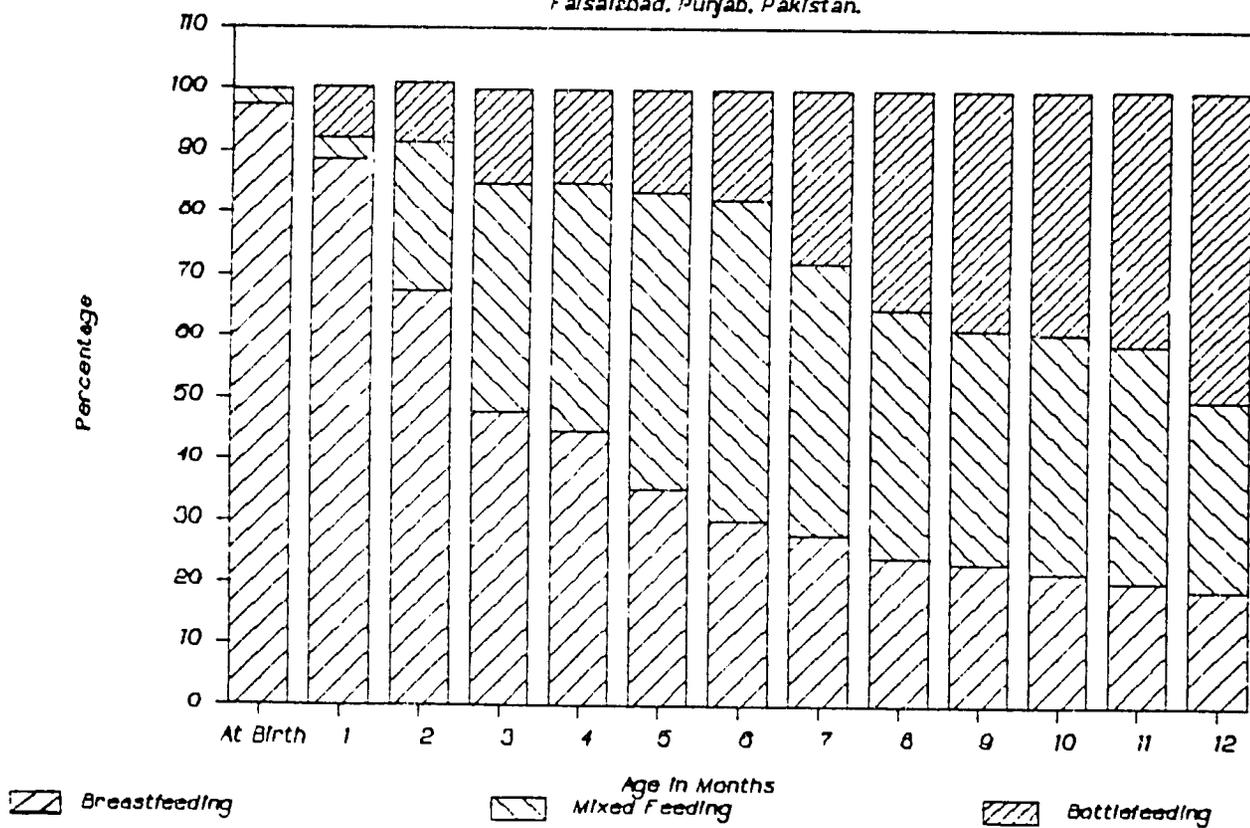
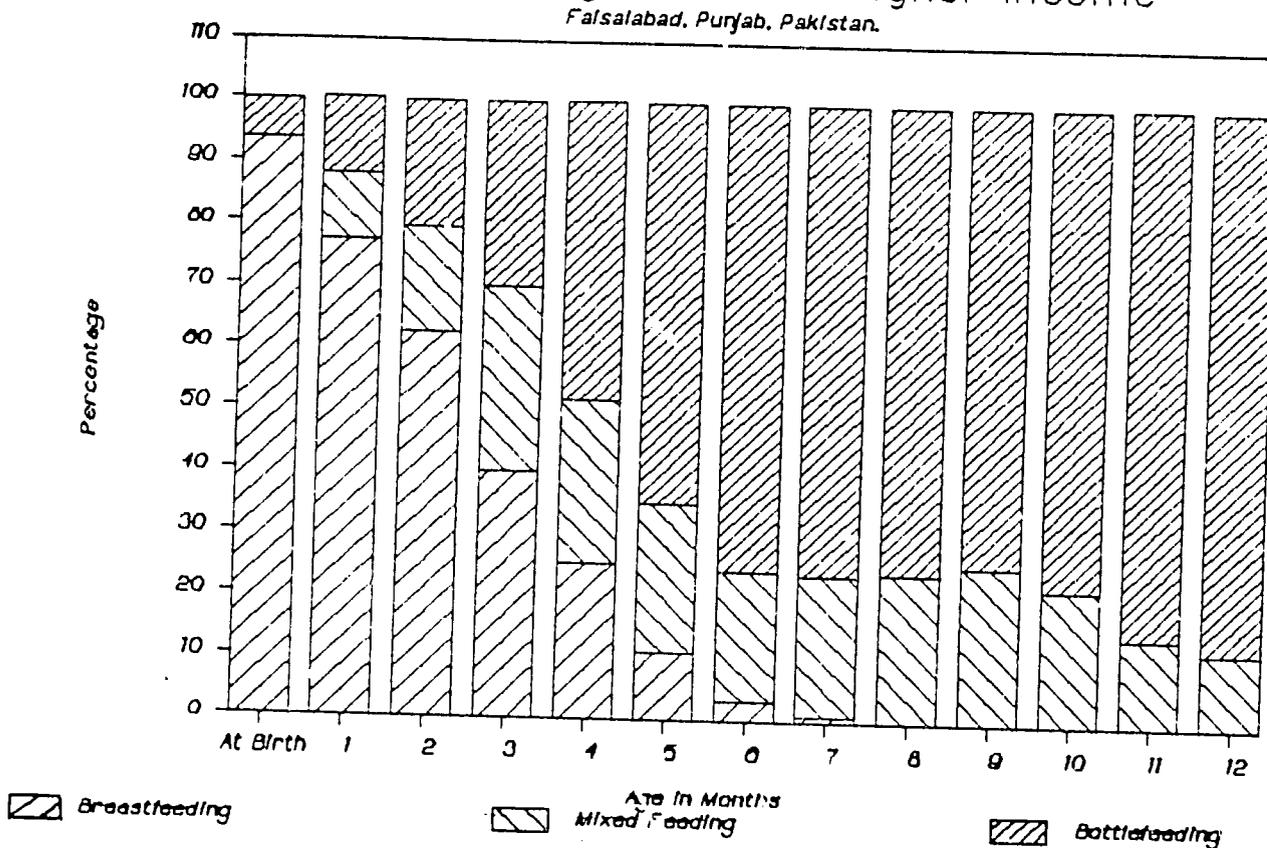


Figure 5: Infant Feeding Patterns: Higher Income



• Delayed Introduction of Semi-Solids. At least 75 percent of the infants (those who start out with adequate birth weights) can be cost-effectively maintained within acceptable growth channels, if full and exclusive breastfeeding is practised in the first four to six months, appropriate semi-solid supplements are introduced by six months of age, and ORT/extra feeding is done after each bout with diarrhea, along with the continuation of frequent breastfeeds. Liquids supplements do not contain the required caloric and protein densities. The Micro Nutrient Survey (1977) found that 53.4 percent of children had not been started on appropriate solid foods by the end of 11 months of age; and 19 percent by the end of 18 months. In the Mansehra study, nearly 30 percent were not given semi-solids by 12 months. Solids were introduced at an earlier age in the well-nourished groups. Nagra

and Gilani (1987), report a similar trend among hospital born infants in Faisalabad. See Figure 6 below. At the age of six months, 4 percent of infants were receiving solids, at twelve months, 43 percent. In a survey of low income households in NWFP, Hussain et al (1980) found that only 22 percent of infants received any solids by one year of age. Figure 7 shows the effect on weight gain of the addition of solid foods starting around six months of age.

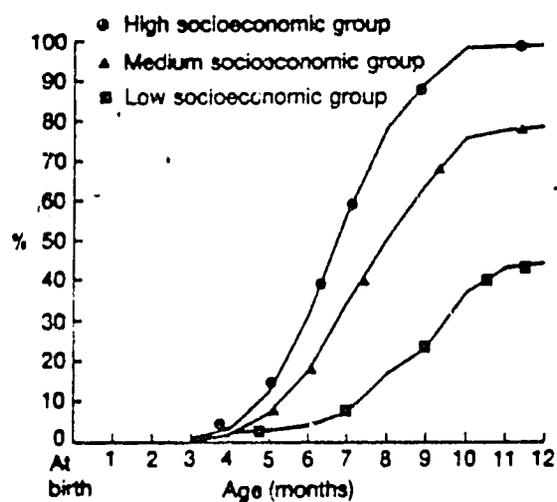


Figure 6: Introduction of Solids in the Diets of Infants in Faisalabad (Nagra and Gilani, 1987).

● Poor Quality of Weaning Foods. Even in the presence of adequate food resources at the household level, children under three tend to receive far less than requirements. In the Micro Nutrient Survey (1977), daily per capita intakes from 24-hour recall dietary surveys averaged 151 percent of minimum recommended levels, while children under three averaged only 75 percent of

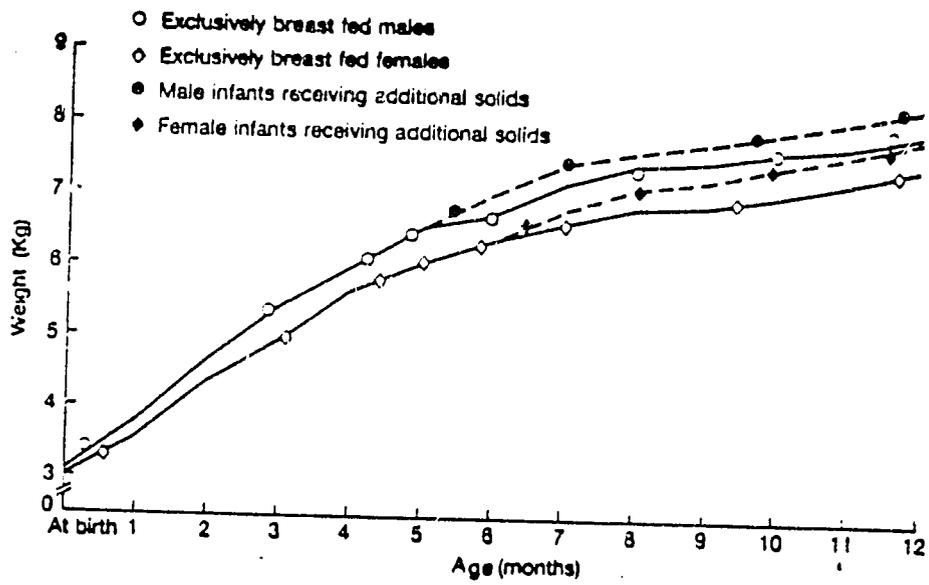


Figure 7 : Impact of Introducing Solids on Weight Gain in Infants (Nagra and Gilani, 1987).

recommended levels. Young infants cannot chew or swallow solid adult foods. Therefore semi-solid "transitional" foods need to be fed generally from 6 through 18 to 24 months of age. Weaning foods must achieve two different aspects of qualitative adequacy: caloric and protein densities that are high enough to meet requirements within bulk constraints of the small capacity of the infant's stomach, and free from contaminants. Nutritional counselling is an important intervention to consider for improving infant feeding practices in Pakistan. In the Micro Nutrient Survey, 70 percent of children under 12 months were reportedly consuming less than 1000 calories and below 20 g. protein per day; with 50 percent consuming inadequate energy and protein during age 1-2 years. Multimixes that combine protein sources for high protein quality (such as pulses with cereals and milk/yogurt with cereals) and addition of ghee (9 cal. per gram), oil (9 cal. per gram), and butter (7 cal. per gram) to increase caloric density, improve the nutritional quality of weaning foods. The Mansehra Nutrition Study (Lambert, 1984) found a significant correlation between the numbers of weaning foods and nutritional status. The Nagra and Gilani (1987) study noted the inappropriateness of weaning foods especially among their low socio-economic groups. Overdiluted milk feeds, piece of chappati in dry form or dipped in milk were commonly used.

No studies were found on the microbiological quality of weaning foods in Pakistan. Data from other developing countries indicate that fecally contaminated weaning foods are by far the greatest source of pathogens that cause gastroenteritis in infants and young children - more than poor quality drinking water. Reducing the holding time of foods after preparation, washing hands and feeding utensils, and thorough reheating prior to feeding leftovers are some behaviors that can improve the microbiological quality of weaning foods.

• Traditional Weaning Foods. A wide array of traditional weaning foods exists in all areas of Pakistan which can be used as the starting point for promoting effective weaning behaviors.

Mothers in the Micro Nutrient Survey (1977) reported the following as the first solids in the infants' diet most frequently: - Rice, roti, sweet biscuits, khichri, and dalia. Egg, choori (mashed chapati with sugar and ghee) and shero (in Sind) were also reported though less frequently. Rice was ranked the best first food by 30 percent of mothers. The EMRO collaborative study reports dalia, khichri, sago dana, firni, and banana as the most common weaning foods. The Mansehra study found that rice, firni, and banana were the most popular weaning foods. Mothers in the village with the best nourished children listed an average of 2.5 weaning foods, and those of the worst village, the fewest. The availability of a variety of protein and fat sources was associated with higher weaning age nutritional status. Khan and Bjorn (1979) have shown that nutritionally adequate home-prepared weaning foods are consumed in some areas. Nagra and Gilani (1987) have described the relationship of the socioeconomic level of the family with the nutritional adequacy of home-prepared weaning foods.

- Feeding Responses to Diarrhea. Children under two spend a considerable amount of time either suffering from diarrhea or recovering from it. If food intake is reduced or withdrawn, this can add up to a significant loss of caloric and nutrient deficiencies. Data on traditional practices is scattered. There is an urgent need to determine what the prevailing dietary responses to diarrhea are, and what the underlying motivations are in each of the provinces. Khan et al (1985) report that "in all children who presented with diarrhea there was partial or complete withdrawal of weaning food... Those who did continue some supplements, were fed overdiluted milk, tea, sharbat, etc." And "all weaning foods were stopped completely in most of the (diarrhea) patients often on the advice of the physician or other health worker." As in other countries, the erroneous "rest the gut" or withdrawing of food promoted by non-traditional health providers will need to be countered through extensive training in in-service workshops and via updated medical education.

Under the traditional Yunani system of medicine, diarrhea is considered a "hot" ailment, requiring "cold" foods to be consumed to balance the excess heat. This provides an opportunity to reinforce the importance of continued feeding in communities that use traditional practitioners for diarrhea treatment; nutrition education should promote foods considered "cold". In Project Poshak in India, rice, bananas, oil, and yogurt - all considered "cold" were promoted, to build on rather than conflict with prevailing beliefs. Anorexia may be a real barrier to sustaining food consumption during diarrhea; special motivational messages to help mothers overcome this problem will need to be developed (see examples in Manoff International reports, 1986,1987).

C. Maternal Health and Nutrition.

An estimated 20 to 30 percent of infants born in Pakistan suffer from growth failure during gestation. Infants born low birth weight tend to remain stunted and wasted, contribute heavily to mortality, and require costly rehabilitation. Two variables strongly associated with low birth weight in cross-national studies are maternal weight gain during pregnancy, and intra-uterine infections. Nutrition studies in Pakistan indicate that traditional beliefs supporting increased food consumption during pregnancy and lactation may help protect women from severe depletion, when adequate food is available at the household level. There are little data on energy expenditures or intra-uterine infections as causative factors in low birth weight incidence. Closely spaced births and severe anemia are important factors. Support for wider community-based distribution of contraceptives is essential.

• Strengthening the Screening, Referral, and Prenatal Care Components of Health Services. The low coverage with prenatal services including screening and referral of high risk pregnancies severely limits programming possibilities to improve maternal health. Tetanus toxoid coverage rates continue to be

far below acceptable levels even following an aggressive EPI program and is an indication of poor access to women of reproductive age. The systematic training of TBA's as conducted by groups such as Dr. Noor Mohammad Abbasi in the Sind and Dr. Altaf Bashir in Faisalabad may be an effective mechanism to reach more women of reproductive age with a basic package of prenatal services.

● Breastfeeding and Fertility. Breastfeeding can engender significant benefits for maternal health¹. It provides substantial protection from short birth intervals through suppression of ovarian activity (Rosa, 1975; WHO/NAS, 1982). In countries where birth rates are high and contraceptive use low, preventing any erosion in breastfeeding (initiation, duration, substitution with partial bottlefeeding) must be given high priority. Any reduction in the initiation or duration of breastfeeding will require a compensatory increase in contraceptive use if fertility rates are to be maintained. Using Bongaarts model for predicting fertility, it can be estimated that if breastfeeding declined sufficiently to reduce postpartum infertility from the current 9.5 months to 3.0 months, an increase in contraceptive use to 60 percent of all married women will be required (from the current 11.8 percent level) just to maintain the present fertility rates.

Breastfeeding currently provides far more protection from closely spaced births than all contraceptives combined. This is true for all developing countries (Rosa, 1975) and for Pakistan (Page, et al, 1986). The 1975 national fertility survey shows that an estimated 11 months of protection are provided by breastfeeding after each birth. Breastfeeding has a significant impact on total number of children born to mothers (parity) and

¹ Recent studies in Indonesia are showing that in developing countries where prenatal and obstetrical care is inadequate for the vast majority, breastfeeding may provide important benefits in preventing severe hemorrhage following birth. Sufficient oxytocin is released due to the sucking stimulus at birth to suppress blood flow, if the newborn is put to the breast immediately following delivery (Naylor, personal communication, 1987).

the intervals between offspring, in Pakistan. Younger and more educated women who breastfeed less and for shorter durations bear more children, and these children are closely spaced. Khan and Qureshi (1986) found that when breastfeeding duration was less than 6 months in a sample of 4602 women, the birth interval was 21.2 months compared with a birth interval of 44 months when breastfeeding was over 25 months. See Figure 8 below.

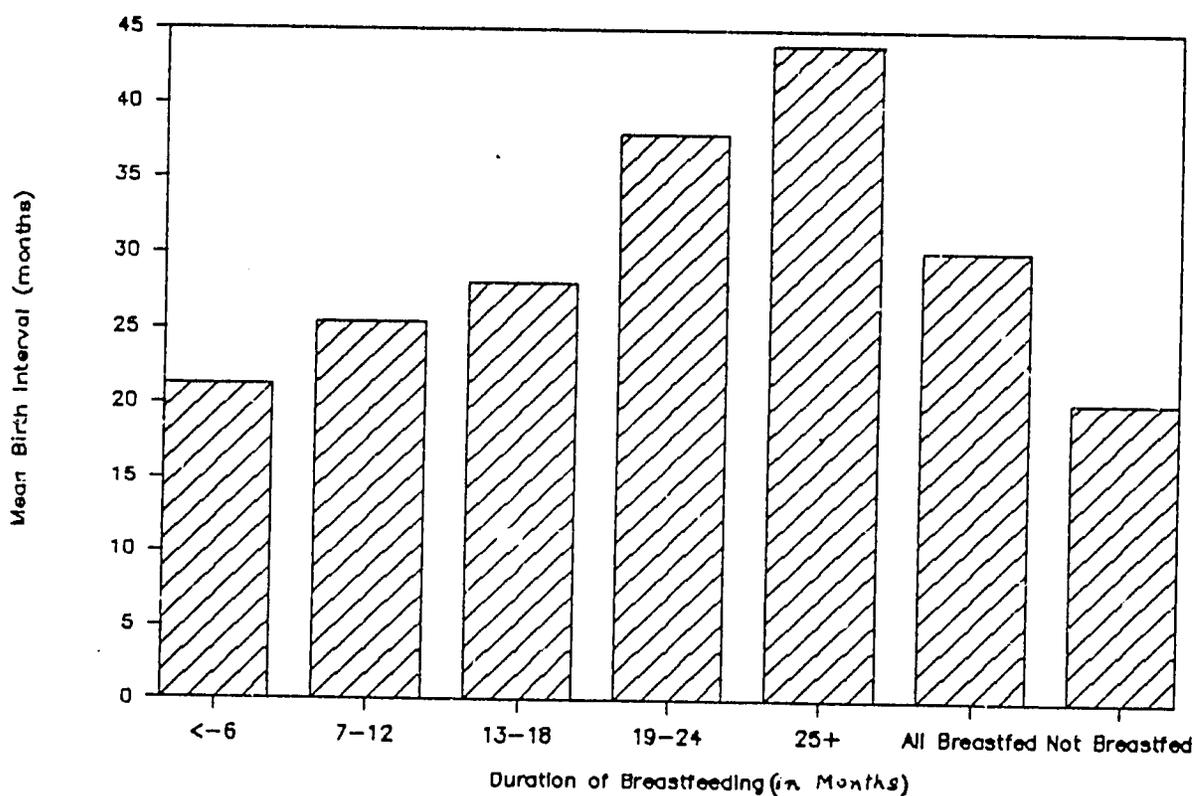


Figure 8: Breastfeeding Duration and Birth Intervals in Pakistan (Khan and Qureshi, 1983).

D. Micronutrient Deficiencies.

Recent technological advances (mainly in food fortification) in effectively controlling micronutrient deficiencies, coupled with the high toll of widespread anemia and goitre in large groups of the population, make the control of micronutrient deficiencies an important area for donor support as part of the child survival strategy.

- Endemic Goitre. An estimated 7.35 million individuals suffered from endemic goitre in 1983 in Pakistan (Mahmud, 1986). Of these, 3.72 are estimated to reside in NWFP (Swat, Chitral, Kohistan, Mansehra, and Dir districts); 2.04 in Azad Kashmir; 0.59 in the northern area; and one million scattered over the northern half of the country. The most important cause of endemic goitre is the consumption of iodine-poor diets based on foods grown in iodine-poor soils. These are found in mountainous areas and regions originating from crystalline igneous rock formations. The northern mountain ranges from Afghanistan southeast through Kashmir along the Karakoram range, including Gilgit and Chitral, constitute one of the most concentrated iodine-deficient geographical areas in the world.

Iodization of salt has been used for decades as the most effective intervention to control goitre. Communities with a high incidence that consume unprocessed salt, and cannot be reached with iodized salt require iodinated oil injections or oral iodinated oil. The nature and magnitude of endemic goitre in Pakistan requires a comprehensive approach that includes:- national policy initiatives regarding mandatory iodization of salt and price subsidies, monitoring and surveillance of the health aspects as well as of the salt processing and marketing industry, appropriate testing and use of iodinated oil injections and oral doses.

• Iron Deficiency Anemia. A majority of the population of Pakistan is estimated to suffer from iron deficiency anemia. Because of the nature of diets, high fertility rates, and prevalence of diseases that promote iron depletion, countries in South Asia have widespread anemia. Studies in Indonesia and Latin America have clearly documented the impacts of iron deficiency on loss of productivity, performance, immunity and deleterious impacts on birth outcomes. As shown below, age groups most affected worldwide include children under five and pregnant women.

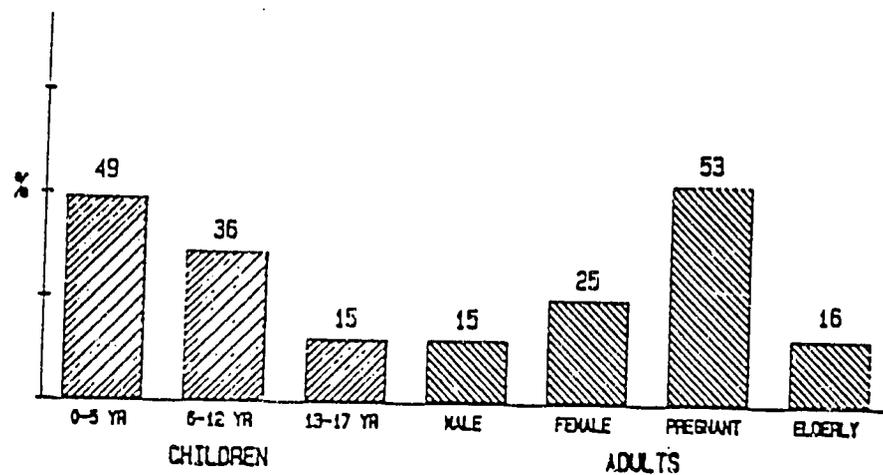


Figure 9: Prevalence of Anemia by Age - 1980 (Cook).

An important causal factor in anemia in Pakistan is the low biological availability of non-heme iron in local diets that are primarily from vegetable sources. The following figure illustrates the effects of naturally occurring enhancers and inhibitors in traditional diets. (Note: CaP refers to calcium phytate found in cereals, ASC ACID is ascorbic acid or vitamin C).

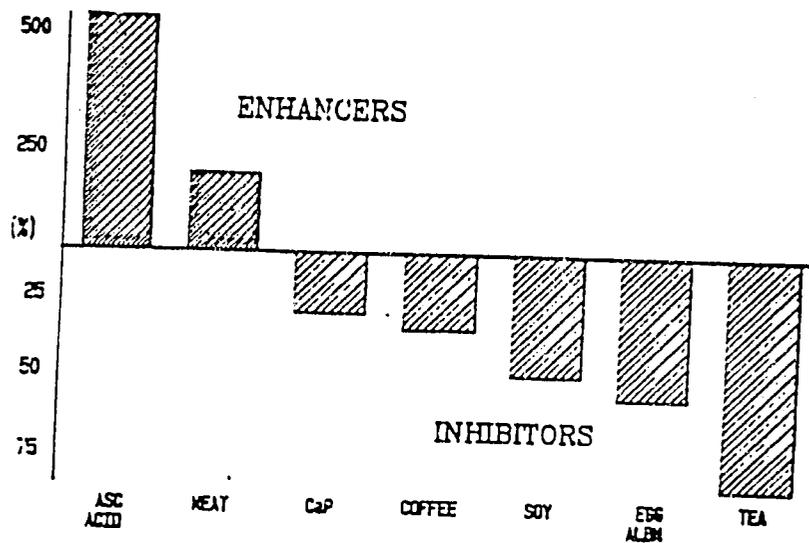


Figure 10: Naturally Occurring Enhancers and Inhibitors of Iron Absorption in Humans (Cook, 1980).

Foods of animal origin are generally not consumed in sufficient quantities by low income households to assure adequate intakes, especially by pregnant women and young children. Infants born to iron deficient mothers have smaller stores of iron. Iron-poor weaning foods and frequent episodes of illness eventually trigger the onset of anemia.

Recent experiences with iron fortification of commonly consumed foods, including wheat flour in Egypt and salt in India are promising. Much can also be accomplished through better diagnosis and management of severe anemia using iron-folate tablets distributed through health services.

- Vitamin A Deficiency. Not enough data are presently available on Vitamin A deficiency to designate it a major public

health problem Pakistan at this time. Past studies showed a low prevalence of ocular changes due to severe Vitamin A deficiency. However, there is new evidence from other countries that subclinical vitamin A deficiency can be a factor in infant and child mortality from diarrheal and respiratory disease. High priority should therefore be given to establishing whether low serum levels are widely prevalent in Pakistan.

E. Household Food Security.

Assuring the adequacy of food at the household level is a necessary though not sufficient condition to assure adequate childhood nutrition. Households that spend over 50 percent of their total expenditures for food and obtain marginally adequate or less than the estimated per capita requirements for calories are considered at risk of food insecurity. Mothers and children from these households are likely to be higher contributors to malnutrition levels, may not have discretionary resources (time, food, funds) to avail of social services/health facilities/education/training, and may be the least amenable to changing key feeding behaviors such as delayed or poor quality weaning foods, and higher intakes during recuperation from disease. The magnitude of food insecurity at the household level is determined by the availability or supply of food, and the ability of households to purchase or obtain food. Income and prices are major influences.

● Changes in Food Supplies. According to FAO Food Balance Sheets, daily calorie supply per capita increased dramatically in Pakistan as shown below.

Table 6: Daily Food (Calorie) Supply Per Capita.

Country/Group	1965	1985	% Increase
Pakistan	1747	2159	23.6
Nepal	1931	2034	5.3
India	2100	2189	4.2
Yemen	2002	2250	12.4
Egypt	2435	3263	34.0
Jordan	2282	2947	29.1
Low-Income Economies	1997	2073	3.8
Middle-Income Economies	2357	2731	15.9

Source: World Development Report, IBRD, 1987.

• Ability of Households to Purchase Food. Despite the gains made in food supplies, food expenditure patterns in the IFPRI-PIDE study of April-August 1986 conducted in five districts, one from each Province, reveal that a small but important group of households remains at risk of food insecurity. Household food insecurity did not appear to have been mitigated by the food rationing scheme and was terminated in early 1987 (Alderman et al, 1987). An estimated 20 percent of households appear to be at risk of inadequate food at the household level, representing a cut-off point of about Rs.200 per capita per month in total expenditures. Below this level, over 50 percent of total expenditures go to food and intakes average below the estimated per capita requirement of 2044 calories per day. The Micro Nutrient Survey (1977) found that 21.2 percent of households consumed less

than recommended caloric levels.

Table 7: Food Expenditures by Per Capita Income Group.

Rupees	<100	100 to <150	150 to <250	250 to <400	>400
Percent of Sample	1	6	25	26	42
Budget Share to all Food Items %	56	58	54	47	34
Calories per capita per day	1286	1635	1934	2353	2852

Source: IFPRI-PIDE Study cited in Alderman et al, 10/87.

● Targetting the Food Rationing Program. Maintaining low prices of selected staple foods consumed by high risk (poor) households is a widely used instrument to prevent large scale household food insecurity. Such programs can be costly and inefficient if most of the benefits do not reach the poorest households. Alderman et al (1987) estimate that in the wheat flour rationing program, the leakage of benefits to the not-so-needy was around 60 percent, and the urban poor received roughly 19 percent of the total outlay. Improving the effectiveness of targetting is recommended through selectively targetting poorer neighborhoods (geographic targetting).

IV. MAJOR CONSTRAINTS

The foundations of the country's most important nutritional problem i.e. widespread and severe growth failure in infants and young children, are laid well before the completion of the first year of life. To have an impact, key behaviors and skills must be learned and practised during the period spanning pregnancy through 6 months postpartum. These include: prenatal care, initiation of lactation at birth, ORT, immunizations, weaning, child spacing. Large numbers of mothers, especially mothers of young infants and first time mothers, must be reached and sustained support provided.

A. Inaccessibility of Women.

There is no existing infrastructure, public or private, through which women can be reached consistently and on a large scale. Around 80 percent of births in urban low income women (Ibrahim et al, JPMC, Karachi, 1984), and 99 percent in rural areas occur at home, with the help of traditional birth attendants. There are presently no extensive linkages between the public sector health services and TBA's.

B. Counterparts for Implementation of Nutrition Activities Not Identified.

While a large community of highly qualified experts in nutrition exists in Pakistan, there have been few opportunities to develop the needed infrastructure and experience for implementing nationwide nutrition activities.

C. Inappropriate Policies Affecting Infant Feeding Practices.

Policies and practices promoted through the health sector - both public and private - have helped endorse inappropriate infant feeding such as bottlefeeding.

D. Insufficient and Outdated Nutrition Content of Medical Education.

The quality and quantity of nutrition training given to medical and nursing personnel are not commensurate with the magnitude and severity of the nutrition problem in Pakistan. The cost-effectiveness of health sector activities could be greatly improved through strengthening nutrition knowledge and skills.

E. Community Level Organizations not Readily Identifiable.

Experience in developing countries has shown that improving the nutritional status of a population requires motivational forces and sustained action at the community level. Organizations such as mothers' groups, preschool/day-care centers, agricultural cooperatives, youth organizations, literacy programs, etc. can be used to "piggy back" activities such as nutrition education, growth monitoring, and village health clinics that depend on community rapport and followup for success.

V. OBJECTIVES AND FOCUS OF STRATEGY

The strategy is based on the following conclusions:

- Support for a separate, vertical, nutrition program or infrastructure is not advisable at present. Existing delivery systems with the maximum potential for reaching mothers and providing synergistic health services (such as ORT and immunizations) especially in rural areas should receive priority. The national control of diarrheal diseases program under NIH at the federal level would be the most logical delivery system for channelling nutrition activities. Leading teaching hospitals have a key role to play in program and policy formulation and medical education.

- Available information clearly identifies that modification of harmful infant feeding practices should be given high priority in the child survival program. These include inadequate

establishment of lactation and early liquid feeding, quality and timing of semi-solids, feeding during and following diarrhea. Interventions will need to be designed with careful formative research on existing practices and motivations.

- The technology with greatest potential for improving child nutrition in this context is nutrition counselling. A key entry point for this activity is weighing and counselling provided to each mother who brings her child for diarrhea treatment. The specifics need to be refined and adapted in each of the provinces. Its widespread dissemination should begin with training, education materials, and equipment for all proposed CDD training sites (see Northrup, 1987 for details on CDD training). Inclusion of non-governmental health providers (such as PVOs, TBAs, private practitioners) and support for innovative, community-based, child weighing efforts are important elements that should receive priority.

- The problem of extensive bottlefeeding in Pakistan is complex and will need a comprehensive approach that covers in-service and pre-service training of health providers in lactation management; formative research on constraints in exclusive breastfeeding; extensive use of print and broadcast media; sensitization and information exchange aimed at updating OB/GYN and pediatric authorities on recent advances in the relationships of breastfeeding and maternal health and child survival.

- Endemic goiter is a micronutrient deficiency closely associated with child health and survival in Pakistan. There is a strong rationale for supporting a national program in this area. USAID and UNICEF collaboration could make a significant contribution to child survival.

- Other important nutrition issues include iron deficiency anemia, maternal malnutrition and low birth weight, and vitamin A deficiency. These areas have urgent research and program needs that should be addressed as soon as feasible.

A. Objectives.

- To improve infant feeding practices, in particular, help establish full and exclusive breastfeeding, control bottlefeeding, improve dietary management of diarrhea, and improve quality of weaning foods including their timely introduction, in order to enhance child survival.
- To strengthen the nutrition components of medical education.
- To build governmental and NGO institutional capacity in implementation of nutrition programs that effectively reach high risk groups.

The primary delivery system for nutrition activities should be the national control of diarrheal diseases (ORT) program. Nutrition activities will need to be built into various components of the ORT program including training, case management, mass media and social marketing, and others.

B. Plan of Action.

Consistent with the plan for developing the ORT program, the nutrition component should begin with reinforcing key ORT training sites with nutrition counselling modules. This will involve updating of growth charts, identification of appropriate scales, and design of messages and training materials. Nutrition counselling messages will need to undergo careful field testing and adaptation in each province eventually. As the mass media, medical education, and monitoring/information systems elements of the overall ORT program are developed, appropriate nutrition components will need to be identified and integrated. The first two to three years of the project are expected to be taken up with procurement of a suitable technical assistance contractor and local coordinating teams and counterpart institutions (NGOs/medical schools) at the provincial level; review of growth charts and scales; and training key personnel at ORT training sites nationwide. The second phase would focus on finalizing

nutrition counselling messages, expanded training, development of mass media materials and campaigns, and monitoring activities.

A.I.D. experience in other countries has shown the effectiveness of working through leading teaching hospitals in the area of lactation management to effect changes in bottlefeeding trends. The procurement mechanism for lactation management training is already set up under an ST/N grant with the WELLSTART group in San Diego. This activity could be started up relatively simply and quickly through a mission buy-in during the first year of the project. The WELLSTART group has provided this type of assistance to USAID- and ST/N-nominated teams in 10 countries, and has the infrastructure in place to handle U.S. and in-country follow up assistance, with minimal USAID management burden. Reinforcement of this key intervention aimed at breast-feeding/bottlefeeding issues with mass media, medical education, and in-country sensitization workshops will be needed in the later years of the project, and could be integrated with the work on ORT and nutrition counselling.

C. Interventions.

C.1. CONTROL OF BOTTLEFEEDING AND LACTATION MANAGEMENT.

Phase I: Developing Expertise in Leading Teaching Hospitals.

1. Select 6-8 teams consisting of :

- the senior OB/GYN responsible for maternity wards in the hospital and active in medical education;
- the senior pediatrician from the same hospital responsible for pediatric ward practices and involved in medical education;
- a senior member of the nursing staff in charge of maternity wards and authorized to provide in-service training to other nursing staff.

2. Draft a training plan for covering staff from other hospitals in the province that deliver a significant number of infants, and obtain needed authorizations to conduct this training upon the return of the teams from

- San Diego. (Details of curriculum and training materials are generally developed by the teams in San Diego).
3. Training in San Diego at the WELLSTART facilities. Visit lactation management activities in Indonesia en route to or from San Diego; contact WELLSTART alumni in Indonesia through Dr. Naylor to organize this visit.
 4. Initiate the first of a series of seminars and workshops on infant feeding in conjunction with conferences of pediatricians, OB/GYN, MCH, Pakistan medical Society, and others. The forthcoming visit by Dr. and Mrs. Jelliffe is an excellent opportunity to start this activity.

Phase II: Implementation of Followup Activities Developed in San Diego including Training of Staff from Other Hospitals.

1. Institute changes in hospital routines and training activities in the home facilities of teams trained in San Diego.
2. Complete training of staff from other hospitals in the province.
3. Continue seminars/conferences on new developments in infant feeding highlighting research and programs from Pakistan and internationally.

Phase III: Followup I.A. by WELLSTART Faculty and Mass Media Training Materials for National Coverage.

1. Followup technical assistance and seminars by Dr. Audrey Naylor and staff.
2. Training modules for pre-service and in-service training of OB/GYN, pediatricians, nursing staff developed and disseminated on lactation management and infant feeding. These would include videotapes, slides, print materials and hands-on clinical, and community-level training.
3. Mass media campaign designed and conducted at frequent intervals emphasizing the dangers of bottlefeeding, using messages developed on the basis of formative research

regarding infant feeding, in each province.

4. Continuation of seminars/workshops on infant feeding/- nutrition for health professionals including for staff of private hospitals and clinics.

C.2. IMPROVING GROWTH PERFORMANCE THROUGH NUTRITION COUNSELLING.

Phase I: ORI Training Sites Equipped with Growth Monitoring and Nutrition Counselling Modules.

1. Procurement of technical assistance contractor, establishment of local coordinating teams at provincial level, and the identification of counterpart institutions that will undertake the development and testing of province-specific nutrition counselling strategies and will provide training to key personnel of provincial health department personnel.
2. Procurement of scales and simplification of growth charts for use in all facilities identified as key ORI training sites. Problems with the existing charts include:
 - The divisions on the vertical axis do not go below 500 grams, therefore smaller monthly increments, typical of children under three are hard to plot, interpret, and show to mothers.
 - The chart contains three growth channels that are identified as I, II, III, representing degrees of malnutrition, which has been found to be a confusing and inadequate parameter for nutrition counselling. The series of channels needs to be reviewed for appropriateness as guides for assessing changes in the velocity of growth, and degrees of malnutrition dropped, to make the chart more effective in identifying growth faltering at its earliest stages and well before nutritional status declines to moderate and severe degrees of malnutrition.

- The 0-2 or 0-3 year age range has been found to be the largest group of children who can be effectively monitored and counselled for growth, given the resource constraints generally encountered in health programs. Data on Pakistan clearly identifies the younger age groups starting in the first 3 months of life as those at highest risk and therefore in need of frequent monitoring. The existing chart goes up to five years and should be focussed to the under 2 or 3 year age group.
- Feeding, ORT, and child spacing messages on the charts need to be strengthened, adapted to local practices and terminologies in each province. Recording of immunizations needs to be improved.

Note: UNICEF has reportedly printed 100,000 copies of a revised chart for an extended field test. USAID will need to coordinate with UNICEF and explore the possibility of UNICEF providing the 4 million charts estimated to be required for a nationwide program, once the field testing and adaptation is completed.

3. Development of instructional materials and training of nutrition counsellors at ORT corners and other fixed facilities that provide diarrhea treatment.

Phase II: Development of Weaning Practices Improvement Messages for Each Province.

1. Assessment of current breastfeeding and weaning practices using a combination of market research, anthropological, and nutrition assessment techniques. This will help identify behaviors most critical for diarrheal disease control and growth promotion, as well as the motivational factors underlying infant feeding practices.
2. Behaviour change strategy formulated based upon prioritization of issues identified in the assessment by

- nutrition authorities. Interventions that are feasible for mothers and for program implementers identified, and a creative strategy developed by communications specialists. Materials designed, pretested, and produced.
3. Implementation and monitoring of the campaign. This will involve training of various implementing staff, supervision and support to enable implementation on schedule.
 4. Evaluation of the campaign and feedback to implementing agencies for revision and improved effectiveness.

Phase III: Dissemination of Weaning Practices and Nutrition Counselling Strategies/Modules through the Health Services.

1. Development of a plan for integrating the nutrition modules into provincial health services nationwide.
2. Training materials and training provided to key personnel. Scales, charts, education materials provided to all participating facilities.
3. Nutrition messages developed and tested in Phase II above, incorporated into mass media.
4. Establish an information clearinghouse on local and international publications. Publish local version of "Mothers and Children" newsletter to provide continuity for health professionals and nutrition program implementers.

VI. ILLUSTRATIVE SCHEDULE OF ACTIVITIES

Activities	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
I. LACTATION MANAGEMENT						
-Selection and training of teams in San Diego	X					
-Followup activities:						
-Changes in hospital practices	X					
-Training other teams	X	X				
-Mass Media Campaigns		X	X	X	X	X
-Seminars/workshops	X	X	X	X	X	X
II. NUTRITION COUNSELLING						
A. ORT Training Sites.						
-Procure T.A., identify provincial teams and counterparts	X					
-Simplify growth chart, procure scales	X					
-Develop instructional materials and provide training	X	X				
B. Messages Development.						
-Assessments		X				
-Strategy formulation		X				
-Implementation			X	X		
-Evaluation				X		
C. Nationwide Dissemination.						
				X	X	X

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