

DISCUSSION PAPER NO. 24

**CHILD CARE PRACTICES ASSOCIATED WITH POSITIVE AND
NEGATIVE NUTRITIONAL OUTCOMES FOR CHILDREN IN
BANGLADESH: A DESCRIPTIVE ANALYSIS**

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ABSTRACT

Children are the most vulnerable among the malnourished population of Bangladesh. Child and maternal care practices are now being considered as important complements to increasing household income or targeted food interventions to address child growth needs. In Bangladesh, as elsewhere, many children, even in poor households, do well nutritionally, whereas others do not. This study attempts to identify characteristics of the existing child and the maternal care environment that could be used as a basis for designing policies and programs to improve the nutritional status of children.

For the present study, all children between 6-18 months of age were selected from a nutrition survey of a cross section of 741 households conducted by the IFPRI Bangladesh Food Policy Project in February-March 1992. Households of 111 children thus were revisited in May-June 1993 to obtain, retrospectively, information from mothers or alternative primary caregivers about selected child care practices and related indicators. Information was obtained on feeding practices of infants and mothers, indicators of psychosocial care, and health and hygiene practices. In this study, information on child care practices obtained together with information from the original nutrition survey on maternal and child nutrition, individual food consumption, and household demographic and socioeconomic status was used.

Children who exhibited the best growth status, holding age and income level constant, compared to the others in the same environmental setting, are identified as positive deviants. Those with the worst growth are categorized as negative deviants. Children falling in-between positive and negative deviants are labeled as median growers. Even though an increase in income was found to be associated with improving child nutrition, on average, this association was not very evident at the two tails of the nutrition status distribution, with household income of negative deviant children higher than for both the positive deviants and median growth children, implying a limited access or allocation of household income by mothers in these households, and the relevance of non-income factors. Also, in the sample as a whole, gender differences in child nutrition were not found to be very significant. There was, however, unmistakable evidence of differential treatment of children by gender. There were three times as many male children in the positive deviants group as compared with female children. Even though there were an equal number of male and female children in the negative deviants group, there is evidence of differential child mortality by gender, with evidence of large numbers of "missing" female children in this group, who were, on average, only one year old.

A selection of caring practices and indicators were identified for infant feeding, complementary feeding, maternal diet and health, psychosocial care, and health and hygiene practices. Descriptive and multivariate analyses were conducted to identify key caring practices and indicators associated with well and poorly growing children. The analysis supports earlier work that indicates that determinants of child nutrition are not exactly the same for different groups of children, even in the same population. Two key factors that were important across the board were hygiene practices and mothers' access to knowledge (listening to radio programs on child health and nutrition). Important factors contributing to negative deviance were found to be an early introduction of complementary food (before four months), restricting maternal diet for longer periods after the child's birth, and the absence of specially prepared food items in the child's diet. Care factors of the caretaker were also found to be important: a mother's expression of "satisfaction with her family life," which was used as one of the indicators of psychosocial care, was found to be statistically significant.

Many local practices were identified that programs and policies could support and build upon to facilitate the participation and empowerment of local communities, families, women, and men in Bangladesh for better child nutrition.

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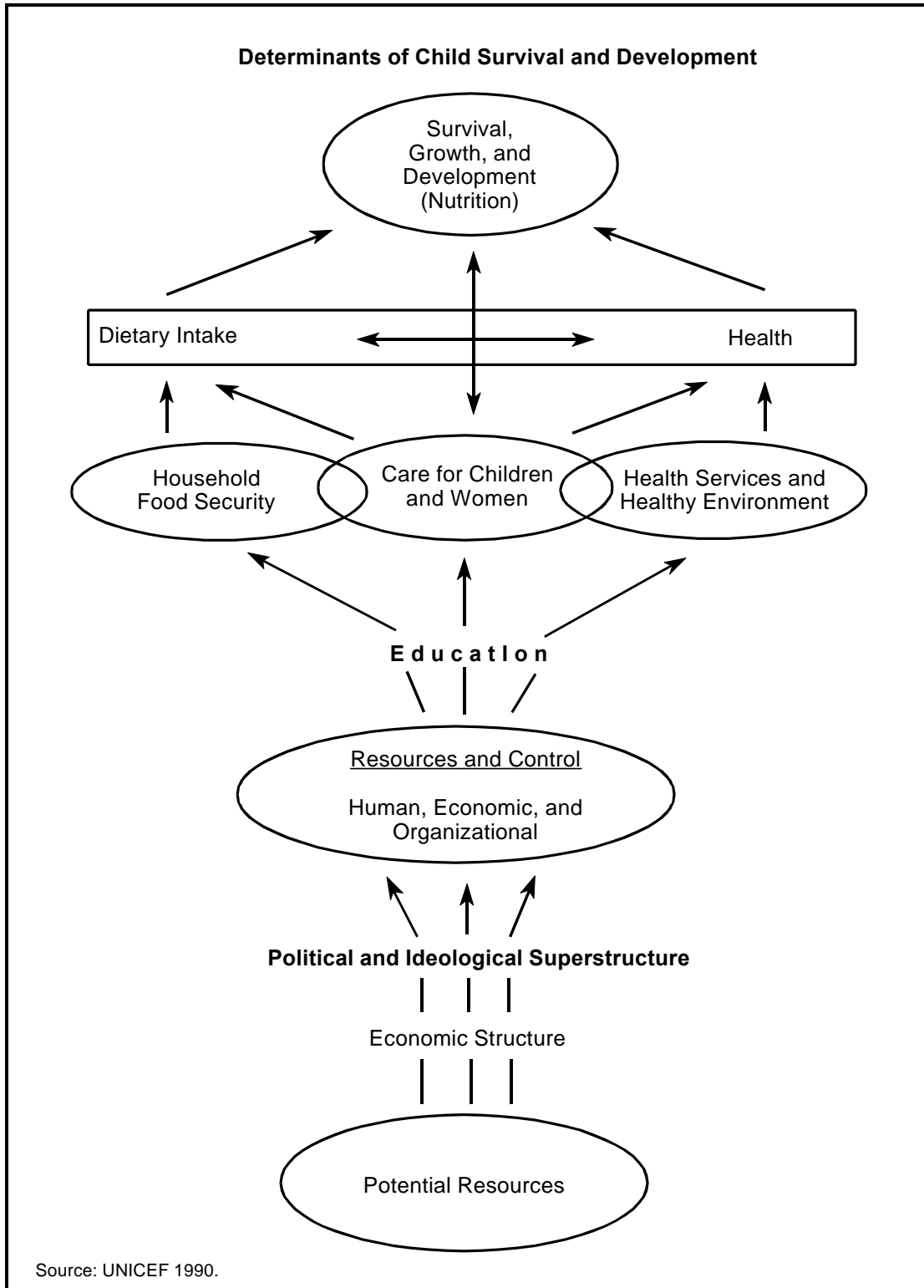
1. INTRODUCTION

It is widely acknowledged that socioeconomic development is necessary for improvement in the poverty situation in developing countries such as Bangladesh. Malnutrition is frequently seen in families in poverty. The extent of malnutrition in Bangladesh has been extremely high, but there is evidence of some decline in preschool malnutrition since 1975 (UN/ACC/SCN 1993). Children of this age group have been identified as the most vulnerable among the malnourished population of the country. In 1989/90, around 47.3 percent of preschool-age children were suffering from second-degree malnourishment and 6.8 percent were categorized in the third degree or severe malnutrition (BBS 1991).

Household-level interventions that raise household income can have a positive impact on child nutrition, especially if they are well-targeted to needy households. This approach alone, however, is not sufficient to rapidly improve child nutrition to meet the goals set by, for example, the International Summit for Children in 1990 or the International Conference on Nutrition in 1992. Both at the aggregate national level and at the household level, income improvement shows a small, though steady, improvement in children's nutritional status. The absolute level of nutritional improvement depends on the extent to which income gains can be translated into dietary, health, and child care benefits. These are three essential ingredients to good nutrition of children (Figure 1). Improving household income may lead to better food consumption, health, and sanitation, as well as child care. However, both the rate at which child nutrition improves, and the variations in child nutrition explained by income-related factors are small.

Child care capacity depends, to some extent, on both food availability in the household and access of the household to health services. It is, however, largely a function of practices and behaviors, which are not necessarily a function of resources.

Figure 1—The original conceptual model of child development



What are some of the crucial caring practices that are beneficial to child growth and survival, and what is the role of public policies in promoting them? Conceptually, nutritionists have used the term "positive deviance" to reflect adaptive responses for satisfactory child growth under harsh economic circumstances, such as food scarcity (Zeitlin, Ghassemi, and Mansour 1990). Conversely, "negative deviance" represents the failure of children to grow satisfactorily, even under good economic conditions. Recent work has refocused attention on these situations in identifying local practices that are conducive to good child nutrition and may be used in national nutrition programs as an adjunct to poverty alleviation efforts.

In this study, positive deviance, negative deviance, and median growth are defined in the context of observed growth patterns in Bangladeshi rural areas, thus eliminating the need for reference to "adequate" or "inadequate" growth based on international child growth standards. An internal reference identifies both better and worse performers nutritionally, based on local patterns of growth.

The objectives of the study are:

1. To identify local child care behaviors that are already practiced in local communities that are conducive to positive children growth and can be promoted, as well as behaviors and indicators that can be targeted to reach or prevent the deterioration in child nutrition; and
2. To document the extent to which child and maternal care indicators assist in explaining the variations in child nutrition in rural communities.

2. CONCEPTUAL FRAMEWORK

THE ROLE OF CARE IN CHILD NUTRITION OUTCOMES

Child malnutrition results from a complex set of factors, which are poorly understood. An adequate dietary intake and absence of disease have long been accepted as the direct determinants of adequate nutrition and child growth. However, the complex synergistic relationship of food intake and disease patterns in childhood, and weak linkages of these to commonly used measures of household-level resource access, such as household income and food availability, has led to increased attention beyond income-based approaches in reducing childhood malnutrition. Caregiving behaviors that underlie and create the environment within which children are raised are increasingly seen as central to child nutrition outcomes, and policy attention to them has been recommended by the International Conference on Nutrition (ICN 1992).

Child care is a complex set of behaviors that range from child feeding practices, to responses that promote a safe and healthy environment for the child and provide adequate health care, to psychosocial interactions and emotional support.¹ In UNICEF's conceptual model for child nutrition, the care behaviors for both the child and mother are included as underlying factors to the two direct determinants of child nutrition *and* also directly impact on child growth (Engle 1992). In this formulation, caregiving behaviors that are adopted in the household *together* with the household's access to food and health services contribute to child nutrition (Figure 1). In the household production of child nutrition, it is generally postulated that a combination of household resource access, skills, and knowledge are combined inputs in the process. In the caregiving formulation, specific care behaviors could be seen as a dimension of "skills and knowledge" that is applied by households in the production of child nutrition.

¹ A recent paper by Engle, Menon, and Haddad (1996) gives a comprehensive review of the role and measurement of child care in relation to its nutritional impact.

CAREGIVING BEHAVIOR AS A FACTOR IN NUTRITION DEVIANCE

It is generally observed that there is a wide dispersion of child nutrition outcomes in households with similar levels of disposable income and resource access (UN/ACC/SCN 1992). To some extent, factoring in intrahousehold income control improves its association with child nutrition outcomes, a large part of the variance can be attributed to differences in child care practices. Frequently, even resource-poor households demonstrate successful child growth, and rich households show failure in child growth.

In order to derive such culturally endogenous, yet successful, behaviors that may be of relevance for nutrition interventions, the concept of “nutritional positive deviance” was introduced by Wishak and Van der Vynckt in 1976. In much of the nutrition literature since then, positive deviance has referred to children who grow and develop well, even in poor households (Zeitlin et al. 1990). Such children provide examples of successful child care behavior and supporting systems within the household and community that may provide guidance in designing programmes in these communities. Shekar, Habicht, and Latham (1992) have sharpened the definition, referring to positive deviants as children who consistently grow much bigger and faster than the 'norm' for that population. They also showed that positive and negative deviance are not necessarily mirror images of each other, and their determinants may be different.

Since the objective of nutrition interventions is as much to promote good child nutrition as to prevent child malnutrition, it is useful to examine care behaviors that are associated with both positive as well as negative nutrition deviance. The objectives of intervention programs would then be twofold—to discourage behaviors that are associated with negative deviance, and to promote behaviors that are associated with positive deviance.

CHARACTERISTICS OF CARE BEHAVIORS

Care behaviors that generate nutritional outcomes are a part of the totality of child-rearing objectives. Physical care of the child is embedded inside a wider range of household objectives, including socialization, education and maturation, survival of kinship units, instilling religious values, etc., all of which are objectives of child-caring practices. Child care is generally a codified system of beliefs and practices that evolve over time as formulas that optimize the probability of accomplishment of the parents' multiple long- and short-term goals (Zeitlin 1994). Therefore, it may be expected that child care norms and customs may not be responsive to short-term single objectives such as improved weight gain. However, if these objectives and successful practices are effectively promoted, it could lead to their widespread adoption and incorporation into cultural norms. This may be difficult, as it often requires both large-scale national commitment and promotion, as well as education to tailor new practices to individual variations and needs. Practices associated with nutrition deviance, on the other hand, are those that are already practiced and can be identified as successful or unsuccessful in promoting child growth and development. These could be effectively used in small-scale programs as well as in large-scale, social marketing programs.

Care behaviors may be grouped according to the earlier conceptual framework into (1) child feeding behaviors, (2) child health and hygiene-related behaviors, (3) characteristics of psychosocial interactions/care of the child, and (4) characteristics of maternal care and social support systems. All these types of care behaviors have an effect on child nutritional outcomes by affecting nutritional intake and disease incidence.

Child care needs change with the age and developmental stage of the child. Maternal health and nutrition during pregnancy and lactation, as well as breast-feeding practices, are central care indicators during infancy. The consequences of failing to establish breast-feeding are long-lasting for children in impoverished conditions. Mother-infant contact in the first hours of life may have positive consequences for breast-feeding and maternal caregiving. The time between the introduction of supplementary feeding,

sometime during the first year of life, to the period when the child is fully weaned to the adult diet is the most vulnerable period of the young life. Rates of malnutrition peak between one and two years of age. Weaning practices, and care of both child and mother's well-being during this period, are key determinants of child nutrition in a population.

THE ENDOGENEITY OF CHILD CARE

The majority of all caregiving behaviors occur in interpersonal interactions. Psychosocial factors can therefore influence the quality of physical care—such as in the timeliness and care taken during child feeding, health-seeking behavior, and sensitivity to child's needs in general. However, just as crucial may be its direct effect on child growth and development. There is ample evidence suggesting that improving the quality of psychosocial care and interaction increases the child's mental ability of malnourished children more than would be possible with nutrient supplementation alone. In addition, there is also a beneficial effect on physical growth and development of children by improving the quality of psychosocial care and interactions (Chavez et al. 1971). Engle (1995) has emphasized the "transactional" model of child care in which care is as much an effect as a determinant of child's nutritional status.

Current evidence suggests that psychosocial care and child development interaction (or feedback loop) starts early in the child's life. Barring exceptional circumstances where the child is poorly developed at birth, the psychosocial factors may take the lead in starting the cycle of cause and effect that is observed. If this is so, then it may be useful to take a step back and identify the factors that *influence* the quality of psychosocial care, or possible constraints to it. Engle, Menon, and Haddad (1996) identify the major categories of factors and resources in care as (1) caregiver knowledge, education, and beliefs; (2) health and nutritional status of caregiver; (3) mental health, lack of stress, and self confidence of caregiver; (4) caregiver's autonomy and control of resources; (5) workload and time constraints of the caregiver; and (6) social support received from

family and community. These underlying factors may be relevant from a policy and program perspective in identifying at-risk characteristics in which dietary interventions alone may not suffice, and quality of child care may need to be addressed.

FACTORS INFLUENCING CARE BEHAVIORS AND PROSPECTS FOR INTERVENTIONS

What is the significance of this model of child nutrition for programs and policies? Can specific types of behaviors be isolated from the complex mix of ongoing child-related care decisions that are made within households for program intervention? Even if they can be identified, can care behaviors be changed, and if so, how? Much of child care behaviors and practices are endogenous to cultures, and even to households and individuals. Cultures and ethnic groups often have prescribed behaviors that are based on local knowledge systems and are practiced and taught to successive generations. Individuals, both males and females, learn these practices from their observations or are specifically instructed in them by their peers and elders.

Along the lines of the conceptual framework in Figure 1, caregiver responses and their adequacy are also closely related to the biological needs of the growing child, on the one hand, and the pressure and competition for resources faced by the families, on the other. Choices that are being made in this context are mediated by both knowledge as well as by intergenerational resource transfer options and considerations that are being used by the family.

A useful strategy that has been proposed by UNICEF and can be applied to local child care practices to promote child nutrition includes three types of activities: protection, support, and promotion. Protection involves identification and elimination of harmful practices or trends: support and promotion involve identification and reinforcement of good practices. All three activities are aimed at both various levels—the caregiver, the family, the community, and wider national/international levels. Such a strategy can be developed with the use of factors identified with negative and positive nutrition deviance undertaken in this study.

3. CHILD CARE PRACTICES IN BANGLADESH

There has been little systematic investigation of child care behaviors. Much of the available information is from small case studies and is primarily geared to dietary beliefs and practices. Hundreds of such studies have been conducted in communities around the globe and, together, they give an indication of the wide range of local practices that people/communities are engaged in. However, these studies generally provide central tendencies with respect to care behaviors without differentiating between beneficial and harmful practices. Such differentiation is necessary so that health and nutrition education messages can be usefully framed. A large-scale, six-country study of food habits conducted by CARE is one of the few studies with a national-level representative sampling, and which also attempted to distinguish between beneficial and harmful dietary practices (Vermury 1981). Conducted in Bangladesh, as well as in Peru, Colombia, Guatemala, Tunisia, and Jordan, the results from this study largely formed the basis for identifying the range of nutrition and health practices that have been examined in the present study.

DIETARY RESTRICTIONS

Eating norms that restrict the food intake of mothers during pregnancy and lactation have been found to be widespread in Bangladesh. Nearly 70 percent of women reported a reduction in their "normal" consumption level during pregnancy (Vermury 1981). The same study also reported postpartum food restrictions—with 75 percent of women withholding food for eight hours after delivery and other restrictions in dietary staple and animal foods thereafter. In addition, during child or maternal illness, one-third of lactating women restricted their overall food intake, and another one-third cut back on some components of the diet.

BREAST-FEEDING

Breast-feeding is the norm after birth in Bangladesh. However, feeding often does not begin until the second or even third day after birth (Vermury 1981). During this period, honey or sugar water is fed to the infant, on a fingertip, cloth, or nipple. This practice can delay the start of the sucking process and also contaminants and introduce infections at an early age. Withholding the breast also decreases the consumption of colostrum, which is beneficial to the child. In some cases, it has been suggested that it could also lead to "nonorganic failure to thrive," which is secondary to a feeding skill disorder that is neurophysical in origin. Cessation or restriction of breast-feeding during the illness of the child is also practiced by many mothers. This deprives the infant of his/her nutrient needs, and may also initiate reduction in breast milk.

Zeitlin (1994) reported that "quality of breast-feeding behavior, e.g., stopping work activities to concentrate on breast-feeding" was important for child nutritional outcome in Bangladesh. She also reported that thinner mothers were observed working more and also had smaller babies that required a longer time to breast-feed. The author found that the mother's termination of breast-feeding to manage other activities was negative for child nutrition.

COMPLEMENTARY INFANT FEEDING

Generally, complementary foods are not introduced to infants before four months, with the average age about seven months (Vermury 1981). However, nearly 30 percent of mothers reported introducing other dietary items before three months. This early introduction is generally not recommended prior to four months of age, and increases the risk of infections. However, beyond the age of six months, the child's need for supplementary foods increases rapidly. Limiting foods to the child beyond this age can precipitate nutritional deficiencies. As food needs grow, so does the need for hygiene and sanitation to protect against food-borne infections. Food beliefs that restrict foods in the child's diet may be harmful if other foods are not specially obtained or prepared for the

child. Nearly half the mothers in Bangladesh were reported to believe that all meat and fish were harmful to children under two years of age. This study also found that food regulations are much more often directed at these children than at older preschool children, 3-5 years of age. Dietary restrictions are also widespread in Bangladesh during common childhood illnesses, such as diarrhea and fevers.

HYGIENE

Cleanliness of the child, mother, and surroundings have been observed to be significantly correlated with child nutritional status and morbidity (Zeitlin 1994). In Bangladesh, ground cleanliness was associated with morbidity at ages when children were crawling. The author points to a complex set of connections to which the effects of cleanliness may be attributed—organizational and management skills of mother, her morale, as well as the direct physical effects of an unsanitary environment on child health. Other important hygiene-related factors in Bangladesh have been found to be cultural: toilet training habits, hand washing and food cleanliness, and access to modern health care.

4. DATA SOURCES AND METHODOLOGY

DATA SOURCES

In this study, the analysis of positive and negative deviance in child nutrition is based on cross-section data collected in the International Food Policy Research Institute (IFPRI) Food Policy Project household nutrition survey (February-March 1992), and a supplementary child care module conducted on a subsample in May-June 1993. The IFPRI household nutrition survey covered a cross-section of 741 households comprising 4,402 individuals in eight villages, two in each of the four administrative divisions of Bangladesh. In this respect, the study covered all major regions of the country. This survey was designed to collect household demographic and socioeconomic information,

individual anthropometric measurements for all household members, and individual food consumption based on a three-day food weighing method. The household nutrition survey data was used to select the subsample for the present study. The subsample consisted of all children who were between six and eighteen months at the time of the household nutrition survey.

The supplementary child care module was based on retrospective interviews of the mother (or primary caretaker if the mother was not the primary caretaker of the child) and was designed to collect information on specific child rearing and related practices as they pertained to the sample child. Care was taken to frame questions to avoid eliciting a "we usually do" type of response. Interviews were supplemented by a standardized observation for four hours in each household, during which trained enumerators recorded time allocation of the primary caretaker, and each child care activity performed during that time. This survey was conducted for each of the children 6-18 months of age at the time of the household nutrition survey. Enumerators were not informed of the subject's nutrition deviance status. The results of the child care module are based on (1) interview only, (2) interview plus observation, or (3) observation only. This survey was conducted in 1993, and all the households identified who had not relocated were covered. This component covered 110 households and 111 children.

Basic information for the subsample, such as household income, child and maternal anthropometric status, and child's nutrient intake was obtained from the Household Nutrition Survey (Table 1). It should be noted that the Supplementary Child Care Module was conducted about 15 months after the basic survey, and all these questions were obtained retrospectively. In addition to feeding practices of the infant and mother, other components of care practices, such as health/sanitation knowledge and practices, as well as parental, family, and social support characteristics, were also obtained. The mother or principal caretaker was the respondent for all these questions. All the enumerators had a high degree of rapport and familiarity with these households

Table 1 Source of data

Household Nutrition Survey	Supplementary Child Care Module
• Socioeconomic status	• Social support system
• Demographic characteristics	• Maternal-paternal networking
• Anthropometry	• Caretaker's characteristics, exposure, status, knowledge, and attitude
• Supplementary food	• Breast-feeding and dietary practices
• Curative health care practices	• Hygiene and sanitation

and had previously visited them for three rounds of household survey over the past year. This is expected to improve the accuracy of responses obtained.

IDENTIFICATION OF POSITIVE AND NEGATIVE NUTRITION DEVIANCE

Positive and negative deviance in child nutrition has been defined as growth that is above or below the "norm" of a population (Shekar, Habicht, and Latham 1992). This norm has been defined in various ways, and is primarily based on anthropometric growth compared to acceptable standards. Zeitlin, Ghassemi, and Mansour (1990) reviewed about 30 studies, comparing well-nourished and malnourished children, and summarized 10 of the most detailed. These studies used anthropometric differences in growth status, clinical signs of malnutrition alone or in combination with anthropometrics. All controlled for age of child, as a key criteria. Of the remaining two studies, one used rapid or poor recovery after hospital treatment of malnutrition, and the second looked at mothers who had experienced preschool deaths compared with those that had not. All the studies compared children of a similar age group. None of the ten studies controlled for socioeconomic differences. A methodological innovation of this study was to identify outliers in child growth after controlling for child's age and household income, as positive

or negative nutrition deviants. As in Shekar, Habicht, and Latham (1992), the comparisons were based on within-sample variations in child growth outcomes.

A prediction of the population regression line for child growth status, at age X , and income level Z , was drawn for the sample of children 6-18 months of age:

$$Y_i = \alpha + \beta_1 X_i + \beta_2 Z_i + \epsilon_i,$$

where

- Y = child's actual weight;
- α = constant;
- X = child's age;
- Z = per capita household expenditure (proxy for income);
- ϵ = normally distributed error term; and
- β_1, β_2 = coefficients.

Outliers from this predicted population regression line were children with

$$Y - \hat{Y} > |\bar{s}_{\hat{Y}}|.$$

In other words, if the child's observed growth was (1) greater than, or (2) less than its predicted weight (\hat{Y}), plus or minus an estimate of the normally distributed error term, ϵ , he/she was classified as (1) a positive deviant, or (2) a negative deviant.

Among 111 children aged 6 to 18 months, 15 (13.51 percent of the total sample) were positive deviants, 17 (15.32 percent of the total sample) were negative deviants, and the rest (71.17 percent) were median growers. The supplementary child care study of 1993 was carried out for all these children.

DESCRIPTIVE ANALYSIS

In the descriptive analysis, child care practices from the time of birth were compared for the three groups of children—positive, median, and negative deviants. Child care characteristics were grouped into the following types:

1. Infant feeding practices,
2. Complementary child feeding practices,
3. Maternal diet, health, and nutrition,
4. Indicators of psychosocial care, and
5. Hygiene and health care knowledge and practices.

IDENTIFICATION OF KEY INDEPENDENT CHILD CARE VARIABLES BY PRINCIPAL COMPONENTS ANALYSIS

As a statistical tool, principal component analysis is best regarded as an exploratory instrument to enable us to see what is the effective number of dimensions, and to detect linear relationships among combinations of variables.

Each category of care behavior, e.g., infant feeding practices, consists of many individual actions. In the descriptive analysis, care practices that were different (statistically significant) between the three groups of children—median growers, negative and positive deviants—were identified. In order to examine the relationships among each of these groups of care behaviors, and to identify variables that were independent of others in the group, a Principal Component analysis was conducted. Within a data set with p numeric variables with n observations, p principal components can be computed. Principal components are transformed new variables such that

$$\xi = ax,$$

where a is a matrix of coefficients or eigenvectors, and is a linear combination of the original variables. The main characteristics of the eigenvectors are that they are

orthogonal, so that the principal components are independent, and represent jointly perpendicular directions through the space of the original variables. The corresponding variables ξ are its *latent vectors or principal components*. In the process, it transforms a set of correlated variables into a set of uncorrelated variables.

The resulting ξ s are of diminishing magnitude, and the size of the *latent roots* thus gives a test of the rank of the dispersion matrix. It can be shown that ξ_1 has the property of possessing the greatest variance of any linear function of the x s. ξ_2 will have the greatest variance among linear functions orthogonal to (uncorrelated with) ξ_1 and so on.

Since the ξ 's are linear combinations of x 's, as variables, they are sometimes difficult to interpret from an operational (or an identifiable factor) perspective. Of greater interest is the identity of the combination of variables that together comprise each of the significant principal components. This information, derived from the Varimax rotation, is performed on the principal components. The varimax rotations of the most significant principal components were used to identify the primary variables that are associated with each of them. Only those variables thus identified from each group of care behaviors, and which were statistically significant in the descriptive analysis, were selected for the multivariate analysis.

MULTIVARIATE ANALYSIS

In the multivariate analysis, two sets of Probit analyses are conducted. If P_p is the probability of a child being a positive nutrition deviant, P_n is the probability of a child being a negative nutrition deviant, and P_m is the probability that the child is a median child, then the factors associated with $P_p \neq P_m$ and $P_n \neq P_m$ are explored. All the variables were included in this analysis that (1) were significant in differentiating between nutrition deviance groups in the tabular analysis, and (2) were identified as independent from other variables in that group of care variables in principal components analysis.

It should be noted that this analysis is intended to be illustrative, as correction for endogeneity of care behaviors to child nutrition has not been made.

5. RESULTS²

OVERALL SAMPLE CHARACTERISTICS

Some characteristics of households and children in the sample, by their distribution into the three groups—which are labeled as positive deviance, median, and negative deviance in children's nutritional status, are shown in Table 2. It is noteworthy that there is no linear association of income with the two tail ends of the children's nutritional status; that is, the best nourished children are not necessarily from the best-off households in terms of household income, and the worst-off are not from the poorest households. In fact, contrary to the expected result, the negative deviant children are from households with a *significantly* higher income than those of the median group of children—76 percent of these children were from households with higher than median per capita income. Children in the positive deviance group, even though they had household income higher than that of the median group (not statistically significant), had lower household income than that of the negative deviant children, by nearly 25 percent. This suggests that though household income overall does have a linear relationship with child nutritional status, it is a weak one between the median and better-growing children and is nonexistent between the median and worst-growing children. This observation is a confirmation that non-income factors, including the care-related ones that are explored in this report, are important.

Household demographic characteristics are fairly similar between the three groups of children, with a slightly higher proportion of male members in the positive deviant group. When only children are considered, there is a significantly lower

² Note that the comparisons made in the analysis are based on small and unbalanced sample sizes—positive deviants (N=15); negative deviants (N=17); medium growers (N=79). Hence, the results presented are only suggestive and should be interpreted with caution. The main purpose of presenting these results is not so much to make a definite statement about which care practices are particularly important for Bangladesh, but rather to suggest a method to approach the issue and to propose indicators to be investigated in future research.

Table 2 Demographic and other characteristics of the households and children

Practices	Positive Deviance	Median	Negative Deviance	All
Per capita monthly expenditure (Taka)	310.6	260.1 ^a	411.1	290
Child's sex				
Male (percent)	73.3	57	47.1	57.7
Female (percent)	26.7	43	52.9	42.3
Birth order	2.9	4	3.5	3.8
Child's age (years)	1.01	0.99	1.02	1.00
Child's weight-for-age (Z-score)	-1.03 ^{bc}	-2.6 ^a	-3.8	-2.6
Child's height-for-age (Z-score)	-1.8 ^{bc}	-2.8 ^a	-3.8	-2.8
Child's weight-for-height (Z-score)	0.2 ^{bc}	-0.85	-1.4	-0.8
Household size	6.6	6.3	7.1	6.5
Number of males in household	3.9	3.2	3.6	3.3
Number of females in household	2.7	3.1	3.5	3.1
Number of children in household	1.5	1.7	1.9	1.7

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between negative deviance and median growth.

^b Comparison between positive and negative deviance.

^c Comparison between positive deviance and median growth.

number of females in the positive deviant group. Even in the sample overall, there is a higher proportion of male children compared to female children—there are nearly 30 percent fewer girl children in this under-18-month-old sample of children. This difference in the gender composition by the age of 18 months suggests that the differential mortality for girls begins at a very early age. These differences are only partially reflected in dietary and nutritional status measures in a cross-sectional sample. The ability of boys to get better nutrition also appears to be demonstrated in the gender composition of the positive deviant group, where they are three times more prevalent than are female children. In the median group, both sexes are roughly proportional to their

share in the population of children and in the negative deviant group, both sexes are equally represented.

The average age of children who are the focus of this study is about one year for all three groups. Differences in their nutritional status are consistent with the classification of the groups. The positive deviant group has low weight- and height-for-age, but has normal weight-for-height, according to international standards. A slowing in linear growth is evident even in this group by age one, as compared to internationally accepted norms.

INFANT FEEDING PRACTICES

Breast-Feeding and Weaning

It is generally believed that colostrum is usually not given to children in rural Bangladesh. Quite contrary to this belief, we found that 84.7 percent of the children in the survey received colostrum. More of the positive deviant children (93.3 percent) received colostrum compared to median growers (84.8 percent) and negative deviants (76.5 percent) (Table 3). Although the overall percentage of children receiving colostrum is quite high (84.7 percent), not many children received colostrum the day they were born. Only about 47 percent of children received colostrum on their first day of life, with the differences between groups not significantly different. However, the time elapsing between birth of the child and the start of breast-feeding was shortest in the positive deviant children (22 hours) and longest in the negative deviant children (35 hours). These differences, though not statistically significant in the present sample, do point to the potential expansion and strengthening of breast-feeding to commence at birth.

Prolonged breast-feeding is the general practice in rural Bangladesh. Only extreme situations (for example, serious illness/death of mother, or lack of breast milk) might induce the introduction of weaning food at an early age. These situations were

Table 3 Infant feeding practices

Practices	Positive Deviance	Median	Negative Deviance	All
Colostrum given	93.3	84.8	76.5	84.7
Colostrum given on first day of life	53.3	44.3	52.9	46.8
Gap between birth and first breast-feeding started (hours)	21.9	32.1	34.9	31.1
Weaning started before the child was 4 months old	13.3 ^a	32.9 ^c	64.7	35.1
Breast-feeding continued until breasts are emptied	46.7 ^a	25.3	5.9	25.2
Mother interrupts breast-feeding session	73.3	82.3	88.2	82.0
Breast-feeding avoided during mother's and child's illness	40.0	19.0	35.3	24.3

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between positive and negative deviance.

^b Comparison between positive deviance and median growth.

^c Comparison between negative deviance and median growth.

more common, especially in families with negative deviants, and to some extent, in families with median growers. It was found that for 64.7 percent of negative deviants and 32.9 percent of median growers, complementary feeding began before they were 4 months old. Among positive deviant children, only 13.3 percent were not exclusively breast-fed until 4 months of age. Here, the difference between positive and negative deviance is statistically significant. The difference between negative deviants and median growers is also statistically significant.

A common practice among mothers in rural Bangladesh is to interrupt breast-feeding sessions (82 percent) for various reasons, and this pattern was found in all three groups. Though most women continued feeding after the interruption, only 25 percent reported full breast-feeding. Mothers of positive deviants were nearly nine times more likely to breast-feed until the milk was fully used up as compared to negative deviants, and nearly twice as likely to continue as compared to the median group. These differences were statistically significant. In the negative deviance group, only one

mother reported this. In contrast, 46.7 percent of mothers in positive deviance continued breast-feeding until the breasts were emptied, with the median group in-between at 25.3 percent. These differences between ability to breast-feed fully are likely to be a function of work burdens on the mother, or a home environment in which breast-feeding time is not recognized as a priority by the mother or other household members.

An infant feeding practice, generally considered nutritional detrimental for children, is the avoidance of breast-feeding during the illness of mother or child. This practice was not as widespread as expected, with slightly less than one-fourth of the mothers withholding breast milk during either their own, or the child's illness. The differences in this practice between the three groups was not statistically significant. A more detailed look at this information showed that instances for which mothers reported avoiding breast-feeding were, overwhelmingly, in cases of diarrhea—87 percent of cases were during the child's illness, and 62 percent during the mother's illness. Also, it was twice as likely that the child's illness contributed to this, rather than the mother's illness.

Results of Principal Components analysis for this group of variables showed that the main linear components of total factor variance in nutrition deviance were

1. colostrum given (0,1),
2. colostrum given on the first day of birth; interval (hours) between birth and first breast-feed,
3. complementary feeding started before 4 months,
4. breast-feeding is avoided during the illness of mother or child, and
5. breast-feeding is continued until milk is finished.

Complementary Feeding Practices

Though, initially (the first four to six months of life), exclusive breast-feeding is preferable for child health, subsequent to that supplementary feeding practices become important. Diet diversity, frequency and quantities fed, and care in food preparation are

some of the factors that are important in supplementary feeding. Table 4 shows the results of the comparison between the groups for some of these practices.

The number of food items eaten in the family, but withheld from the child, was highest in negative deviance and lowest among median growers. Other things being equal, this suggests that the number of complementary foods given and diet diversity is higher in the positive and median growth children, and lower in the negative deviance group. During illness of the child, the number of foods that are reported to be withheld are higher, but not significantly different, between the groups, suggesting that including more foods during the normal course of events may be more important for child growth than periodic restrictions of some complementary foods during bouts of illness.

A similar observation is made with regard to whether a child received priority in eating freshly cooked food. Children who receive priority in receiving food from the family pot over the normal course are more likely to be in the positive deviant group, whereas priority in eating only during periods of food scarcity occurs in all groups equally.

This kind of regular care in child feeding is also reflected in whether or not mothers reported especially preparing food for the young child. No families with negative deviant children reported specially preparing or processing food for their children. In contrast, about 27 percent of families with positive deviant children and 23 percent of families with median growers especially prepared food for their children. The difference between positive and negative deviance, and between negative deviance and median growth, are statistically significant.

Table 4 Complementary child-feeding practices

Practices	Positive Deviance	Median	Negative Deviance	All
Number of food items eaten in the family but withheld from child	0.13	0.04	0.59	0.14
Number of food items withheld from the child during illness	2.7	2.9	2.9	2.9
Child has priority in eating freshly cooked food (percent)	86.7	78.5	64.7	77.5
Child has priority in eating when food is scarce (percent)	86.7	88.6	88.2	88.3
Child's food is especially prepared (percent)	26.7 ^a	22.8 ^a	0.0	19.8
Child's daily calorie intake (kilocalories)	387.6	296.4	199.4	293.9
Child's daily protein intake (grams)	9.9	7.3	5.1	7.3
Child's daily iron intake (milligrams)	5.3 ^a	4.1	2.2	3.98
Child's daily vitamin A intake (µgs.)	511.1	458.7	235.2	431.5

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between positive and negative deviance.

^b Comparison between positive deviance and median growth.

^c Comparison between negative deviance and median growth.

Table 4 also shows some quantitative differences between the quantity and composition of supplementary food given to the three groups of children. Items that are found to be statistically different between the groups are vegetables, foods from animal sources, and iron intakes. However, for all the items reported, positive deviant children have the *highest* intakes of supplementary foods, and negative deviant children have the *lowest* intakes in each case. A more detailed examination of the reported information showed that a higher proportion of positive deviant children were given vegetables, foods from animal origin, pulses, fruits, and sweets, compared to children in other groups, with the differences in percentages of children given vegetables and foods of animal origin being statistically significant between positive and negative deviants.

Nutrient intakes of positive deviant children far exceeded the intakes of the other two groups of children. The intakes of positive deviant children were almost twice as

much as that of the negative deviant children. The difference between the two groups in iron intake is statistically significant. The above results clearly show that both quantitatively and qualitatively, the positive deviant children are better fed. Caring practices associated with this are indicated to be an ongoing pattern of attention to the child's diet by including more items from the family pot, regularly giving the child priority in feeding at mealtimes, and a special preparation of food items for the child.

Results of Principal Component analysis showed that for this group of variables, the main linear components explaining variations in nutrition deviance were the

1. protein, caloric, and iron content of complementary food given,
2. child has priority in eating fresh food,
3. number of family food items withheld from the child, and
4. number of family food items withheld from the child during his/her illness.

MATERNAL DIET, NUTRITION, AND PHYSIOLOGICAL STATUS

During breast-feeding, maternal nutritional status has a direct relevance to the start the child receives in its early growth. In addition to the direct biological links between maternal and child nutrition during pregnancy and lactation, maternal health and nutritional status are also likely to influence women's caring capacity. In this section, we look at some characteristics of maternal dietary practices during lactation and some indicators of maternal nutritional and health status.

Maternal Diet During Lactation

In many traditional societies, women's diets during pregnancy and lactation may be restricted to permissible foods that are either avoided or recommended. This often leads to imbalanced or inadequate diets, especially if other prescribed foods that *are* recommended in these cultures are not available or affordable. Ninety-five percent of mothers in this study reported that they practiced dietary restrictions during lactation. On

average, the period for which mothers followed restricted diets after delivery was a little over a month. It was longest (about 81 days) in the negative deviance group. The period was shortest in the positive deviance group (about 9 days). Mothers of median growers followed a restricted diet for about 29 days after delivery. The difference between negative deviance and median group, in the duration for which maternal diets are restricted after delivery, is statistically significant.

As these restrictions involve both items that are avoided as well as items that are favored, the net effect is not always predictable, as often the favored foods, if available, could offset any negative effect resulting from food avoidance. An enquiry into which foods were avoided and favored elicited an almost equal number of responses to both. A more detailed examination showed that in the negative deviance group, relatively more foods were listed as avoided, while in the positive deviance, the share of foods listed as favored was larger. Though these differences were not significant statistically, they point to a somewhat greater emphasis on food avoidance by mothers during lactation in the negative deviance, and just the opposite emphasis on foods that were favored in the positive deviance group.

A common practice also observed is to restrict mother's diet during child's illness. Overall, 82 percent of mothers reported this practice. The positive deviance group had a significantly lower prevalence of this practice, with 67 percent reporting restricted diets during child's illness. This is consistent with a pattern of a lower emphasis on dietary restrictions for the mother in the group with better child nutrition.

Maternal Physiological Status

Factors associated with maternal nutrition that influence child nutrition and health are (1) women's reproductive history, including birth spacing, and (2) their height, weight, health status, and other physiological characteristics. These factors interact in determining one of the most important conditions of child growth and well-being birth weight. Clinically low birth weight children are most at risk of retarded growth and early

childhood mortality, and are generally the result of poor physiological status of the mother. In this section, some indicators of these characteristics are examined for mothers of the three groups of children.

Table 5 shows some characteristics of mothers reproductive and physiological status in the three groups of children. Longer birth spacing, an important factor in maternal health, is seen to be a factor in child growth, but only when the *next* sibling is delayed. The interval between the child's and the *previous* pregnancy does not appear to be associated with the younger child's growth outcome clearly, indicating that it is the displacement effect rather than the pregnancy interval per se that is largely responsible. For the sample of mothers, on average, by the age of about 26 years, they have given birth four times, and one of the children has not survived infancy. The differences in fertility was not significantly different between the three groups.

One-fourth of the mothers self-reported they were sick often or very often. The average Body Mass Index (BMI) is about 18, indicative of chronic energy deficiency, which reflects *both* low fat and lean tissue (muscle) content of the body (Norgan 1990). Though differences in BMI between the groups was not statistically significant, mothers of negative deviant children have the lowest BMIs compared to the median and positive deviant groups. Most striking are differences in low birth weight for the three groups of children. None of the positive deviant children were of low birth weight, compared to nearly one-fourth of the negative deviant group. These differences are statistically significant.

Table 5 Maternal diet, nutrition, and health status

Practices	Positive Deviance	Median	Negative Deviance	All
Maternal Dietary				
Lactating mother follows restricted diet (percent)	86.7	96.2	94.1	94.6
Number of days mother follows restricted diet after delivery	9.3	28.9	80.8	34.1
Lactating mother follows restricted diet during child's illness (percent)	66.7	84.8	82.4	82.0
Maternal nutrition/physiological status				
Months between previous pregnancy and pregnancy with this child	22.5 ^a	31.2	27.9	29.9
Months between birth of this child and next pregnancy	24.7 ^b	19.5	16.8	20.03
Number of pregnancies of the mother	2.9	4.2	3.8	4.00
Number of mother's children dead	0.8	0.96	1.00	0.95
Mother's age (years)	23.7	27	25.6	26.4
Mother often sick (percent)	33.3	22.8	23.6	24.3
Mother's BMI	18.2	18	17.6	17.9
Mother's weight (kilograms)	41.8	40.5	39.0	40.5
Mother's height (meters)	1.51	1.50	1.48	1.50
Low birth weight child (percent)	0.0 ^b	8.9	23.5	9.9

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between positive deviance and median growth.

^b Comparison between positive and negative deviance.

^c Comparison between negative deviance and median growth.

Results of the Principal Component analysis show the following linear components from the two groups of characteristics (maternal diet during lactation and maternal physiological status) to be associated with variance in nutrition deviance. For the group of variables on maternal diet during lactation there were two principal components whose main factors were

1. the number of days that diet is restricted after childbirth, and
2. lactating mother restricting the diet when the child is ill.

For the group of maternal physiological status variables, the principal components were comprised of the following main factors:

1. maternal BMI; maternal weight,
2. number of children who died,
3. maternal height,
4. mother's age, and
5. mother often sick.

HYGIENE AND HEALTH CARE PRACTICES

Diarrheal disease is directly related to the quality of water and sanitation services, as well as behaviors that are embodied in various sanitation and hygiene practices. Thus, occurrence of diarrhea can be treated as an indicator of hygiene and sanitation conditions. Results in Table 6 show that, overall, 48 percent of children had diarrhea during the previous two-week period. This is an extremely high rate of disease prevalence, especially given that nearly all households reported using tubewells (hand pumps) as a drinking water source. Possible contamination of water being drawn from tubewells as well as other practices in handling food and water are likely factors

Table 6 Other caretaking behaviors/practices (health)

Practices	Positive Deviance	Median	Negative Deviance	All
Child suffered from diarrhea within two weeks prior to interview (percent)	26.7	48.1	58.8	46.8
Not taken for treatment (percent)	0.0	13.9	5.9	10.8
Treated in modern health care system (percent)	40.0	19.0	23.5	22.5
Treated in traditional health care system (percent)	13.3	17.7	17.6	17.1
Treated in both traditional/modern health care system (percent)	13.3	17.7	23.5	18.0

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 .

in explaining the high incidence of diarrheal disease. A total of 58.8 percent in the negative deviance group had suffered from diarrhea within two weeks before the interview. Disease prevalence was significantly lower in the positive deviance group, with 26.7 percent reporting diarrhea during that period. Quality of water available alone does not appear to explain the different rates of diarrheal disease in the groups, pointing to the importance of health-related practices in determining outcomes.

There were some differences in how medical treatment was sought during diarrhea. Children in the positive group are likely to be taken for treatment whenever they are sick, and are also more likely to be taken to a modern health clinic. A total of 60 percent of positive deviants were treated by certified doctors, while only 33.3 percent of negative deviants were taken to them for treatment. All positive deviant children were treated, whenever they fell ill. In contrast, not all the sick children among negative deviants and median growers were taken for treatment.

Results indicate that there is a greater emphasis by the mother on training of children in families with positive deviant children, compared to the other two groups. Three sets of questions were asked of mothers or primary caretakers regarding hygiene and sanitation practices: knowledge, actual practices, and, finally, if a child was being trained in those practices. The results are shown on Tables 7, 8, and 9. As regards hygiene and sanitation knowledge, there was no difference between the groups, with over 95 percent of mothers in each group indicating they had the requisite knowledge. Some differences emerged on whether mothers actually followed what they knew, with the highest rate (70 percent) for mothers in the positive deviance group and the lowest (60 percent) in the negative deviance group. These differences were statistically significant for two of the eight hygiene practices. The differences were widest when asked whether these practices were being taught to the children, with 50 percent of mothers in the positive deviance group reporting in the affirmative compared with only 28 percent in the negative deviance group.

On the basis of responses on eight hygiene practices, scores were given for each of the following: mother's hygiene knowledge, mother's hygiene practices, and mother's training of a child in hygiene practices. These three composite variables were used in the multivariate analysis.

QUALITY OF PSYCHOSOCIAL CARE

Factors that influence the psychosocial environment include beliefs and knowledge, maternal health and nutritional status, as well as family and parental characteristics, such as mental health, stress, self confidence of the caregiver, autonomy and control of resources by the mother, mother's workload and time availability, and the extent of social support available to the mother (Engle, Menon, and Haddad 1996). Characteristics of the child-rearing environment can be identified in terms of maternal characteristics, characteristics of parental relationship, and extent of

Table 7 Mother's hygiene knowledge

Mother's Knowledge of Hygienic Practices	Positive Deviance	Median	Negative Deviance
Wash hands before eating	100	100	100
Wash raw fruits and vegetables before eating	100 ^a	82 ^c	71
Keep nails short	93	100	100
Wash hands after defaecating	100	99	94
Keep away from human excrement	93	98	100
Keep away from animal excrement	93	94	100
Do not eat food picked off the ground	100	98	100
Do not eat food touched by animals or birds	93	99	100

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between positive and negative deviance.

^b Comparison between positive deviance and median growth.

^c Comparison between negative deviance and median growth.

Table 8 Mother's hygiene practices

Actual Mother's Reported Hygienic Practices	Positive Deviance	Median	Negative Deviance
Wash hands before eating	86	94	81
Wash raw fruits and vegetables before eating	47 ^a	33 ^c	7
Keeps nails short	86	82	75
Washes hands after defaecating	71	63	80
Keep away from human excrement	79	60	63
Keep away from animal excrement	53 ^a	35 ^c	12
Does not eat food picked off the ground	53	39	29
Does not eat food touched by animals or birds	86	71	88

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between positive and negative deviance.

^b Comparison between positive deviance and median growth.

^c Comparison between negative deviance and median growth.

Table 9 Mother's training of child in hygiene practices

Mother Trains Child in these Hygienic Practices	Positive Deviance	Median	Negative Deviance
Wash hands before eating	50	60	40
Wash raw fruits and vegetables before eating	14 ^a	26 ^c	8
Keep nails short	60	61	36
Wash hands after defaecating	55	49	25
Keep away from human excrement	50	51	33
Keep away from animal excrement	42	25	13
Do not eat food picked off the ground	39	26	6
Do not eat food touched by animals or birds	82 ^a	60	38

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between positive and negative deviance.

^b Comparison between positive deviance and median growth.

^c Comparison between negative deviance and median growth.

social support. This section describes these observations for the three groups of children. All the observations were based on interviews by the mother or primary caregiver (if other than the mother).

Quality as well as the extent of interactions between the caretaker and the child is known to promote growth and development of the child (Cravioto and Delicardie 1976; Engle, La Montagne, and Zeitlin 1990). This is partly through better responsiveness to the child's needs. In different positive deviance studies, affection and attentiveness were found to be strongly linked to growth of children. Programs attempting to improve child caretaking must note that mothers are not the sole caretakers for children, and, in many cases, may not even be the primary caretakers tending to children during the major part of the day. In the present study, nearly 40 percent of children were found to be primarily tended by either their paternal grandmother or a sister.

While the importance of caretaker-child interaction in promoting growth of children has been recognized, there is also a synergistic relationship between healthy

children and the quality of interaction they elicit (Chavez, Martinez, and Yachine 1975). This reverse effect may be more pronounced when the child is being cared for by someone other than the mother. In this study, when negative deviant children were being cared for by their mothers, the amount of child care was greater (reflected by a greater amount of time spent with the child) than the other two groups. However, when the children were being watched and cared for by another family member, the negative deviant children received 20 percent less attention than the other two groups.

Maternal Characteristics

A wide range of maternal characteristics are related to child nutritional status. While most of the literature on these aspects relates to maternal nutrition and diet, the nutrition deviance literature has also shown relationships between child growth and maternal psychosocial well-being. Maternal characteristics such as mental health and self confidence can be linked to child nutrition through the quality of care she can provide. Zeitlin's synthesis of positive deviance research shows that mothers that were rated as "happy" had the best nourished children in both Bangladesh and Mexico. Though socioeconomic variables were correlated to whether or not mothers were "happy," this was highly correlated to child growth. It is expected that both physical care of mothers and their emotional well-being will be factors. In addition, social networks both as a source of information and support to the mother are expected to be beneficial in her caretaking ability.

Women in Bangladesh are restricted in their movement and spend little time away from their own homes. An important source of exposure to the outside world and to information is the radio; 80 percent of mothers in positive deviance group reported listening to radio programs related to nutrition and child care (Table 10).

Table 10 Maternal characteristics

Practices	Positive Deviance	Median	Negative Deviance	All
Mother listens to radio programs on nutrition and child care (percent)	80.0 ^{a,b}	51.9 ^c	23.5	51.4
Mother overworked (percent)	13.3	16.5 ^c	41.2	19.8
Mothers working outside home (percent)	29.9	15.2	17.6	16.2
Mothers' role has no role in decisionmaking (percent)	13.3	26.6	23.5	24.3
Mother satisfied with her family life (percent)	33.3 ^a	20.3	5.9	19.8
Mother's number of visits to friends/relatives outside village last year	5.9	4.5	2.7	4.4
Mother's number of visits to health care centers last year	2.1	2.8	4.3	2.95
Number of children mother has to look after	2.4	2.4	2.5	2.4
Mother's years of education	1.7	1.4 ^c	3.3	1.7

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between positive and negative deviance.

^b Comparison between positive deviance and median growth.

^c Comparison between negative deviance and median growth.

Only about 24 percent of mothers of negative deviants reported doing so. The differences were statistically significant. Social networks outside the village were higher for mothers of the positive deviants. Mothers of positive deviants reported visiting friends and relatives outside the village in the past year about six times, twice as frequently as those of the negative deviants. Visits to the health care center were less frequent among primary caretakers of positive deviants than that of the negative deviants. More frequent visits to medical centers by primary caretakers of negative deviants could be explained by the higher prevalence rate of illness in these children.

Based on time allocation observations made by investigators, the mother or primary caretaker appeared "overworked" or hassled and not able to spend time with the child in nearly one-half of the negative deviance cases, as compared with only 13 percent of cases in the positive deviance group. In the median group, about one-fourth of mothers

appeared overworked. In contrast, more than one-fourth of mothers of positive deviants reported to be "very satisfied" with their family life, whereas this was reported in only 6 percent of cases in the negative deviance group. Differences in both of these sets of observations were found to be statistically significant.

As noted in an earlier section, negative deviants had a significantly higher income than the median group, and higher than the positive deviance group. Differences in years of education of the mother parallel these income differences found between the groups. The average education in the negative deviance group was 2.3 years (35 percent of this group had five years or more, while the rest had no schooling), and it was less than one in both the other two groups (in the positive deviance group, only 13 percent had five years of schooling, while 80 percent had none). It is likely that given the low level of schooling available, any impact of this on child health and nutrition status is indiscernible.

Results of the Principal Component analysis for this group showed that the main factors in the linear components accounting for variance in nutrition deviance were

1. the number of children to look after,
2. visits by the mother outside the village,
3. visits by the mother to a health center,
4. mother satisfied with family life,
5. mother listens to radio programs, and
6. mother overworked; has no role in decisions.

Parental Relationship and Social Support

Studies of nutritional deviance generally show that the quality of the parental relationship has an important bearing on the mother's ability to care for her children. The home and family environment is an especially important part of women's life in Bangladesh, since they are surrounded by it all the time. Several indicators of the quality of father's support of mother and child were taken and are shown on Table 11. Overall,

the negative deviance group tended to be slightly lower on the scale of parents' physical and psychological closeness. Nearly one-fifth of children in the negative deviance group had fathers that did not reside with the family. Even, though, in the majority of cases, they were away for employment reasons, it is possible that resources available to the mother are lower under these circumstances, despite higher per capita expenditures in these households.

Consistent with other reports from Bangladesh, nearly one-half of the mothers reported having adopted family planning. The proportion of adopters was 60 percent

Table 11 Parental relationship and social support

Practices	Positive Deviance	Median	Negative Deviance	All
Mother adopted family planning (percent)	60.0	48.1	35.3	47.7
Parents do not live together (percent)	6.7	7.6	17.6	9.0
Parents care for each other (percent)	26.7	15.2	5.9	15.3
Parents are in extremely bad relation (percent)	0.0	1.3	5.9	1.8
Dissatisfied: unwanted child	6.7	16.5	23.5	16.2
Household head loves the child (percent)	100.0	100.0	94.1	99.1
Parents divorced (percent)	0.0	0.0 ^c	5.9	0.9
Family helped by relatives and neighbors (percent)	86.7	74.7	76.5	76.6
Mother never attended school (percent)	80.0	88.6 ^c	64.7	83.8
Father never attended school (percent)	66.7	64.6	47.1	62.2
Father's years of education	2.2	1.5 ^c	3.6	1.9

Source: International Food Policy Research Institute, Bangladesh Food Policy Project Surveys, 1992-1993.

Notes: Statistically significant at ≤ 0.05 for:

^a Comparison between positive and negative deviance.

^b Comparison between positive deviance and median growth.

^c Comparison between negative deviance and median growth.

in the positive deviance group and 35 percent in the negative deviance group. Parallel to this result, more than one-fifth of the negative deviant children were reported to be somewhat or largely unwanted children. Adoption of family planning is, however, not a

factor in explaining the child's wantedness by the mother. In fact, 60 percent of the cases in which the mother considered the child to be unwanted to some degree were those who *had* adopted family planning. This suggests that methods available for family planning may not be as effective as desired by the women. When parents choose to limit their families, then problems with the effectiveness of methods could lead to more unwanted births than otherwise. This is a dilemma that professionals in the family planning field may need to pay more attention to.

Most families (about 77 percent) reported some degree of support from relatives and neighbors when food or clothing was scarce or in child care. In the positive deviance group, this was slightly higher—at about 87 percent.

Results of the Principal Component analysis for this set of variables showed that the main factors in the linear components explaining variance in nutrition deviance were

1. parents divorced; head doesn't love child,
2. mother never attended school; father never attended school; father's years of education,
3. parents have bad relations; child unwanted, and
4. parents have good relations.

Regression Results

In this part of the analysis, caring practices, which were identified from the previous analysis as (1) distinguishing between the groups of well-nourished, poorly nourished, and median children based on group comparisons, and (2) found to be independent of other closely related practices based on the principal components, are added to a child nutrition production function. A probit model was used to identify the most significant explanatory variables in outcomes that were either extremely positive (as in the case of positive deviance) or were extremely adverse (as in the case of negative deviance). The analytical approach and results of this analysis are presented below. It should be pointed out that as endogeneity of many child care behaviors to child nutrition

has not been corrected for in this analysis, the results are illustrative and should not be taken as definitive.

PROBIT ANALYSIS

In the multivariate analysis, we explored which explanatory variables in the expanded child care model were significant in predicting the occurrence of positive and negative deviance. For this part of the analysis, we ran two sets of probit equations where

$$\frac{\text{Probability (Positive Deviance, Negative Deviance)}}{\text{Probability (Median Growth)}} = f(X_i, \beta),$$

with X_i representing the variables in the expanded model.

Results of the probit analysis (Table 12) showed that for the positive deviant children, the most important factors were the amount of complementary food given, gender of the child (male children were significantly more likely to be positive deviant), and mother's access to radio programs on child care and nutrition. Other factors that were marginally significant were a lower prevalence of diarrhea, hygiene practices score, and family food items withheld. For the negative deviant children, three variables that were nearly perfectly correlated with this group—and thus likely to be very strongly associated with negative deviance—were not processed by probit analysis, and had to be dropped from the specification. This is a potential weakness of

Table 12 Probit regression results

Independent Variable	Description	1 = Positive		1 = Negative	
		<u>Positive vs. Median</u> Coefficient	t-Statistic	<u>Negative vs. Median</u> Coefficient	t-Statistic
Constant		-26.55	-1.665**	-325.65	-1.47
CAL	Dietary calories (kcal/day)	0.00315	2.536*	-0.0047	-1.443
AGE2	Age of child	-1/563	-0.109	641.63	1.574
AGESQ	Age squared	1.1752	0.188	-282.77	-1.552
SEX2	Sex (male = 1)	2.0415	2.215**	-1.2585	-1.423
BRTHSL	Birth order	-0.08595	-0.285	0.39413	0.983
DIAR	Diarrhea (days past 2 weeks)	-1.4545	-1.716*	-0.09849	-0.12
VITG	Vitamin A supplement	-0.47218	-0.46	0.23069	0.253
HTM	Mother's height (M)	12.656	1.653*	-24.772	-2.13**
EDM	Mother's education (years)	-0.06959	-0.338	0.55776	1.698*
EDF	Father's education (years)	0.1522	1.247	-0.10431	-0.608
WN4S	Weaning before 4 months (Yes = 1)	-0.6626	-0.811	2.6199	2.218**
EMPB	Breast-fed fully (Yes = 1)	0.96338	1.404	-1.6788	-1.258
FAVD	Food withheld (Yes = 1)	1.4554	1.615*		
TST1	Food especially prepared (Yes = 1)	0.38454	0.447		
UPTO	Mother's diet restricted (*) days after delivery	0.002256	0.334	0.00738	1.713**
MDTCH1	Restricted diet (Yes = 1)	-0.8209	-1.164	-1.3068	-1.322
AGEMR	Mother's age (years)	0.045738	0.386	-0.25587	-1.226
LBWT	Mother's weight (kilograms)	-4.0428	-0.101		
SAT	Mother satisfied with family life	-0.13356	-0.138	-2.3674	-1.456
RAD	Mother listens to radio (Yes = 1)	1.8471	2.053**	-1.847	-1.907
MOD	Treatment in modern health (Yes = 1)	1.3034	1.373	0.095402	0.101
SCORHYGK	Hygiene knowledge score	0.12596	0.181	1.4959	1.464
SCORHYGP	Hygiene practice score	0.3646	1.621*	-0.37326	-1.866**
SCORHYGT	Hygiene training score	-0.13992	-1.15	-0.06226	-0.397
log likelihood			-19.3		-15.3
chi square			39.8		58.5
n			92		95

* Significant at .10 level.

** Significant at .05 level.

probit analysis, in that variables with a perfect or close to perfect association with one of the groups are actually rejected from probit analysis. These three factors were a high degree of restriction in giving complementary foods to the child that were present in the family food supply, absence of specially prepared foods for the child, and low birth weight. After dropping these variables, the caring practices that influenced negative deviance outcomes were found to be an early introduction of complementary feeding (before four months), a longer duration for restriction of maternal diet after delivery, lower maternal height, lower access to radio programs on child care and nutrition, and a low score on hygiene and sanitation practices reported.

6. CONCLUSIONS

In this paper, we have analyzed some characteristics and caring practices and environments for children in Bangladesh who were performing better or worse than expected at their level of household income. Though increasing income is associated with better child nutrition, at the two tail ends of the child nutrition distribution, income does not appear to be a major factor. The worst nutrition was not in the poorest households and the best nutrition was not in the most well-off. The group of negative deviant children were from households with significantly higher income than the median group of children. This is in contrast to results from TamilNadu, India, where a lower wealth status was found to be associated with negative deviance (Shekar, Habicht, and Latham 1992). In rural Bangladesh, the role of caring capacity of the mother and non-income resources from the extended family and community appear to be greater. This is possibly due to the generally low economic status of women within households and their limited access to income opportunities, especially in better-off rural households. This could also explain why male children are three times more likely to be positive deviants as compared to girl children—as mothers may be more readily able to access household income and non-income resources for male children than for female children.

Inclusion of child care and related maternal caring capacity indicators doubled the predictive capacity of the nutrition production function for all the nutritional outcome indicators used (weight, and Z-scores for weight-for-age, height-for-age, and weight-for-height). This was by no means an exhaustive study of caring practices, and much of the information was obtained retrospectively, albeit carefully. There was no opportunity to do detailed and systematic observations on interactions related to feeding, hygiene, etc., that could have added more specific examples of behaviors that are strongly associated with positive or negative child nutrition outcomes. However, the purpose of this paper is not to provide an exhaustive set of good caring practices to recommend to policymakers for implementation. Rather, it is to provide a rationale and approach for nutrition programs to identify some key local practices that are extremely favorable (or detrimental) for child nutrition outcomes. These locally derived solutions can be built upon to enlarge the recognition of child caring that is based on empowerment and participation of local communities, including women.

Though several specific care practices emerged that could be used to differentiate between the three levels of nutritional outcome (positive, median, and negative), the small sample sizes, and the inherent difficulties in measuring and relating care behaviors to outcomes need to be used as caveats in the interpretation of the results. Some infant feeding practices that were found favorable for nutrition outcomes, and could be built upon were the earlier start of feeding colostrum upon the birth of the child, delay in start of breast milk complements until after four months, and complete breast-feeding at each feed. Once complementary feeding is begun, care behaviors that were associated with positive nutrition deviance were—giving priority to feeding the child at or before mealtimes, including as many items from the family food pot as possible in child's diet to ensure dietary diversity and child's interest in eating food (appetite), and preparing food items especially for the child. Reducing the duration of dietary restrictions for mother's diet after child birth and during child's illness when mother is breast-feeding were also found to be favorable. Dietary restrictions are generally applied both in terms of foods to

be avoided as well as foods to be favored. In practice, however, it is more likely that if any of the "to be avoided" foods is present in the home, the mother will have to restrict consumption, while, often, the "to be favored" foods may need to be purchased and not be accessible to the mother. Thus, while these local sources of knowledge about foods should not be dismissed lightly, the practical realities may mean that in the less than ideal application of traditional knowledge, the net effect is actually detrimental.

Care of the caregiver is emphasized a great deal in the child care literature (Engle, Menon, and Haddad 1996; Engle and Ricciuti 1995; Van Esterik 1995; Winkvist 1995). This is a key ingredient in determining the quality of psychosocial care received by the infant, and thereby the child's growth pattern. Overall, the mother's satisfaction of her family life, her ability to access the world of information from radio programs, and her ability to get good prenatal care (and avoid low birth weight) were found to be among the key maternal care indicators for child nutrition outcomes. It is also possible to see a difference between the role of education versus knowledge. Years of schooling of the mother, which, on average, was up to the second grade, was not found to be a factor in child nutrition outcomes. On the other hand, her access to radio programs on child care and nutrition (but not limited to these alone) was a significant factor throughout the analysis.

From a program and policy perspective, the care of caregiver dimension is critical in child care-enhancing efforts. Building on existing favorable practices, resources, and capacities in a way that is empowering and enabling for mothers, fathers, families, and communities can serve to draw attention and support to this need. This has to be a cornerstone to building a strategy for ensuring good nutrition status. A feasible approach that can be used, with the help of some relatively simple methods shown here for the identification of good caregivers, caring practices, and environments, could enable program development at national and local levels to protect, support, and promote good caring practices and good caregivers that exist in societies.

APPENDIX

CASE STUDIES

These case studies were written by the Principal Field Investigator, Ruchira Naved, and show a glimpse of the real people behind the figures and snapshots of their lives.

CASE STUDY 1

In Comilla, we visited a rich family with a severely malnourished child, named Saddam. He is 28 months old.³ He looks much smaller for his age. He is very weak. His legs are excessively thin. He has a big head and a big tummy. He has just begun to walk, but he is not yet steady on his legs. His skull has not yet hardened. He has not yet learned to speak. His eight-month-old brother also looks much like him.

When we entered the house, Saddam was sitting on the ground, wearing a soiled shirt, holding a stick. The house was dirty and untidy with uncleanly, stinking beds. It was apparent from Saddam's looks that he is not bathed regularly.

In contrast with most children, Saddam did not show any interest in strangers. The child was not mobile. Though he could crawl well, he preferred not to move around. Once or twice, he cried to climb on his mother's lap.

Saddam's mother, Kohinoor, is a very beautiful young woman, but with a forlorn look in her eyes. She is rather lethargic. She looked very tired and anaemic. Her appearance instantly gave the impression of something being seriously wrong with her. Like her son, she was quite indifferent to our presence in the house.

Kohinoor virtually had no time for Saddam. She had to pay more attention to the younger child. In fact, she did not have much time for the younger one either. She just

³ It should be noted that the follow-up study to obtain retrospective information on child care and feeding practices was conducted about a year after the initial nutrition survey. As a result, children's age when these case studies were recorded are higher than the 18-month cutoff at the time of selection of the sample.

breast-fed the child once during our stay in the house and went about her household chores, leaving her children unattended.

Kohinoor was very busy with postharvest operations of crops. Peanut plants were brought in from the field on the previous day. When we came to the house, peanut plants were being dried in the yard. The weather was unpredictable. It showered twice during our stay in the house. Consequently, Kohinoor had to run about to bring in the peanut plants and to lay them out again when the rain was over. She had to clean the plants, and separate the nuts from the plants.

Though the family is relatively rich, nobody was hired to help Kohinoor. When I asked why nobody was hired to assist her, Kohinoor just smiled resignedly. Hearing my question, her two sister-in-laws stared at me and then laughed out loud, as if the question of hiring someone to assist is absurd.

We watched Kohinoor serve breakfast, wash dishes, cook for family members and guests. Whenever she sat down for a moment to catch her breath, she was sharply rebuked by her mother-in-law. While she was busy, the younger child cried until he was completely worn out and fell asleep. Clearly, Kohinoor was overworked. She just did not have time and energy to provide proper care for her children.

Saddam sat down for breakfast with his father, Abdul Mannan, in the morning. Mannan told us that Saddam has a good appetite and usually eats a lot. It seemed to us that an intestinal worm made the child eat so much. Saddam and his father ate rice with prawn and vegetable curry. Then, they had rice with milk and banana.

Kohinoor, however, had rice only with mashed coriander. When asked, she told that she was on a special diet, as her breast-fed child was ill. She added that most of the time, at least one of her children was ill. So, she had been on such a restricted diet ever since she became a mother. By asking her questions, we found out that she herself does not believe in benefits of such diet. On the contrary, she feels that the diet restriction is quite harmful for her as well as for her children's health. Yet, she cannot go against the social norms and beliefs.

When Saddam finished his breakfast, he began to eat peanuts. He ate the muddy peanuts with his dirty hands. Nobody bothered to wash the peanuts for him or stop him from eating them. His mouth was smeared with mud. He looked quite a sight, but nobody paid any attention to him.

After a while, Mannan took Saddam to a nearby house to have a chat with his neighbors. He sat in the yard talking to other men. Saddam was sitting on his father's lap. Eventually, he was lulled to sleep. His father sat there for some time. Then he brought the child home. He laid him down on the dirty bed, putting an even dirtier pillow beneath his head. Saddam slept uneasily, moaning from time to time. He was still asleep when we left the house three hours later.

From the open-ended interviews and discussions with the parents and some other relatives, we gathered that Saddam is one of the twins. Both of them were low-birth-weight children. Mother's breast milk was insufficient for the two of them. So, from the fifth day, Saddam was bottle-fed sweet water, powdered rice, and powdered milk. When Saddam was nine months old, his twin brother died. Two months after, Kohinoor conceived again. So, by the 19th month, Saddam had to be completely weaned in spite of his poor health.

Saddam is almost always suffering from some disease. It is not difficult to figure out by his appearance how ill he is. He weighed only 7 kilograms. In spite of his illness, the child was never taken to the hospital. Only village quacks, fakirs, and kabirajs treated him.

Conservativeness of the family is responsible for the lack of proper treatment of the child. Saddam's father, grandfather, and uncles do not believe in most of the things that are modern and scientific. They do not let the women adopt family planning. They even consider listening to radio to be sinful. Only on rare occasions do they allow the women to go out, only to visit their relatives. Women are never allowed to go to public places.

So, even if Saddam's father could overcome the family's and his own reservations against a modern health care system, he will not take his child to a hospital, because the

mother is not allowed to go along to take care of the child. Thus, it was more convenient for Mannan to call in fakirs and kabirajs than to take Saddam to a doctor.

CASE STUDY 2

In Chilmari, we visited a well-off family with a negative deviant girl child, Shathi, who was the only child born to her parents after seven years of their marriage. Shahana, Shathi's mother, told us that Shathi was a long cherished baby. It was quite puzzling to us why she would be a negative deviant. Observation and interview revealed that lack of knowledge of prenatal care of mother, child care techniques, and hygiene is responsible for the child's poor health.

Shathi is a low-birth-weight child. We found out that her mother fasted during the month of Ramadan while she was carrying Shathi. Shahana was completely unaware of the consequences. Moreover, she suffered from acute blood dysentery during the last three months of her pregnancy. She was very sick indeed. Everybody in the neighborhood thought neither the child nor the mother would survive. Luckily, they both survived, but Shathi had a real bad start. She was a sickly newborn. She is still underweight. She is 22 months old and weighs only 7.5 kilograms. Shahana complained that Shathi is sick most of the time. During her sickness, she had no appetite. At the time of our visit, however, Shathi was not sick.

Everybody in the household loves the child very much. Shathi is usually taken to doctors when she is ill. The family members do not seem to understand that the highly unhygienic environment of the house, and lack of knowledge about proper child care make Shathi suffer from frequent episodes of diarrhea and cold.

Like most of the rich farmers, this family lives in a well-built, tin-roofed house, with a big yard with it. The house is poorly kept. The bedroom is very dirty and untidy, with unclean beds. Though adult family members wore clean clothes, they seemed not to be conscious at all of the uncleanliness of their house and their children. The house was

not cleaned once during our stay. Dishes, plates, and glasses used in the family are dirty as well. The pitcher, used for storing drinking water, was not covered.

Most of the time during our observation, Shathi was wandering in the yard. She was frequently sucking her dirty fingers. Time to time, she picked up filth from the ground and put it into her mouth. We even saw her chew a crawling insect! Nobody seemed to be concerned about what she was doing in the yard.

It was the lean season. Breakfast was over. Shahana was having her leisure. She did not pay much attention to the child.

That morning, Shathi's grandmother fed her some rice with a curry of fish and potato. At noon, her mother fed her rice with some fried leafy vegetables. In between, she had green mango. She was nursed by her mother twice during the 4-hour observation period.

We noticed that Shahana did not wash her hands before feeding Shathi her rice meal. Several times during the meal, Shathi ate, using her dirty hands. Nobody stopped her from doing that.

Salam, Shathi's father, is very fond of his daughter. He played with the child, caressed her, and bounced her to make her laugh. Time to time, Shathi came to her mother and climbed on her lap.

Nira told me this was something quite new to her. On two previous visits, she had never seen such close, intimate interactions between the child and her parents. During those visits, the parents were very busy with agricultural activities and household work. Shahana had to cook all day for the whole family and the hired labor. The number of hired laborers was usually around 10 to 12 during the peak season and the family itself consists of 11 members. She was overburdened with work. At those times, the child rarely saw her parents.

CASE STUDY 3

Bappi is one of our positive deviant children living in Kurigram. He is very restless and a bit unruly. His family is not poor. The house is very neat and clean. The parents and the child were cleanly dressed. Bappi's mother, Shiuly, is intelligent. She is very attentive, full of love and care for the child. The parents have patience for the naughty, overactive child. We observed that they tried never to leave him unattended.

We were quite surprised to see that the child ate an omelette from a plate with a spoon. Cookies are his regular snacks. A number of times, he had cookies. During our observation, he ate some fried wheat grains as well. The father, Abu Bakar, told us that he often gives him vitamin C tablets. Bappi does not have the habit of putting dirty things in his mouth, as most children do.

Unlike most of the mothers in rural areas, Shiuly did not follow restricted diet after delivery. Shiuly told us that she never stopped breast-feeding the child, as others sometimes do when children have diarrhea. No food eaten in the family is withheld from the child.

Shiuly always tries to keep the house clean. We found out that she uses soda for washing bed covers, quilts, and other clothes.

Once during the observation, Shiuly caught Bappi digging the ground with a hoe taken from a neighboring household. She took away the hoe immediately, returned it to her neighbors, and asked them to keep such dangerous things out of the reach of young children.

Bappi is the only child of his parents and they take much care of the child. When Shiuly is busy in the kitchen, Abu Bakar looks after the boy. The child has a good time with his father. We saw him play with his father's umbrella, torch, and watch. Abu Bakar actively participated in the games his son proposed. While playing, he was telling the child what he should and should not do. He showed Bappi pictures from a book and Bappi urged him to read him from the book, as Abu Bakar usually does.

Shiuly told us that TDH (Terre Des Hommes) is the source of her knowledge on child care and hygiene. She often visits the Mother and Child Care Center of TDH. She had some training on basics of child care and nutrition in the center. Though the parents have only one child, they have already adopted family planning. The parents seemed to be quite happy with their family life.

CASE STUDY 4

Another of our positive deviant children from Kurigram belongs to a poor rickshaw puller's family. The child's name is Raju. Their house is strikingly neat and clean. There are two rooms in the house. One is used by Raju's parents as a bedroom. The other one serves multipurposes. It is used as the kitchen, and it is also the grandmother's bedroom. Goats are kept in the same room at night. The room looked so nice that we could hardly believe that merely an hour ago breakfast was being prepared there. There was no trace or smell of goats sleeping there at night.

Raju is a nice, intelligent child. He is one of those children who can easily elicit affection.

Raju is fed frequently. He was breast-fed three times during our stay in the house. He had three meals. The first two meals he had at his own house. Those were rice meals with a curry of amaranths leaves. He had his third meal in one of his grandfathers' house, a cousin of Raju's own grandfather, who died long ago. Everybody in the grandfather's family loves Raju. The grandfather is quite well-off. He gives good food and toys to Raju. Raju is very much attached to his grandfather's family. The grandfather and grandmother gladly fulfill Raju's demands. They enjoyed feeding the child various foods and buying him clothes and toys.

The day we visited the family, Raju had his lunch in his grandfather's house. He was served rice with beef curry, vegetable curry, and lentil soup. Raju seemed to relish the food.

Raju's mother, Aziza, is lively, intelligent, and full of energy. His own grandmother, Jhol, is calm and quiet, caring, and hard working, with a strong sense of responsibility for the family. Raju's father is the only son she has. She struggled a lot to bring up her son. She cares for her young daughter-in-law and loves her grandson very much. Whenever there is not enough food in the family, she finds herself some kind of work and has her meals outside. She does not want to make the family share the scanty food with her. She often brings in cash or food to help the family.

Jhol is a very active woman. She was either gathering firewood or taking care of her goats, or cleaning the house and bathing Raju, or doing some other household work. She considered her daughter-in-law to be too young and tried to protect her against any kind of hardship. She made such sacrifices so that this mother had enough time and energy for her child. The village people praised the grandmother a lot.

Though very young, Aziza is quite intelligent. Raju is her only child, but she has already adopted family planning. She thinks that they are too poor to have another child. So, she has decided to take preventive measures. Nobody in the family opposed her.

Preventive health care practices in the family are quite modern. Raju rarely got sick, but whenever sick, he is taken immediately to Mother and Child Care Center of TDH (Terre Des Hommes). These visits provide good exposure and knowledge on nutrition and child care for both the mother and the grandmother.

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