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**CARE AND NUTRITION: CONCEPTS AND MEASUREMENT**

Patrice L. Engle, Purnima Menon, and Lawrence Haddad

**Food Consumption and Nutrition Division**

**International Food Policy Research Institute**

**1200 Seventeenth Street, N.W.**

**Washington, D.C. 20036-3006 U.S.A.**

**(202) 862-5600**

**Fax: (202) 467-4439**

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## **ABSTRACT**

The concept of "care" as an analytical construct is still new to many outside the nutrition field. Moreover, for those in the field, care is problematic from the measurement point of view. Our hope is that this paper provides an effective introduction to care for the former group, and a useful summary for the latter group of attempts to develop care indicators.

Care is the provision in the household and the community of time, attention and support to meet the physical, mental, and social needs of the growing child and other household members. The significance of care has been best articulated in the UNICEF framework. This paper extends the model presented by UNICEF by defining resources for care and specific care behaviors, and presenting an argument for the importance of child characteristics in determining the level of care received. Resources for care are defined as caregiver education, knowledge and beliefs, caregiver physical health and nutritional status, caregiver mental health and self-confidence, autonomy and control of resources, workload and time availability, and family and community social support. Care behaviors discussed here are two of the six proposed: feeding and psychosocial care. This paper also proposes an orientation to the measurement of care, and provides suggestions for indicators for care resources and the two care behaviors, based on a summary of recent literature. Finally, the paper argues for greater attention to research on the causal linkages between care and child nutrition.

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## **1. INTRODUCTION**

Care is the provision in the household and the community of time, attention and support to meet the physical, mental, and social needs of the growing child and other household members (ICN 1992). This provision of time, attention, and support is manifest in certain types of behaviors exhibited by caregivers (typically women<sup>1</sup>): (1) care for pregnant and lactating women, such as providing appropriate rest time or increased food intake; (2) breast-feeding and feeding of very young children; (3) psychosocial stimulation of children and support for their development; (4) food preparation and food storage behaviors; (5) hygiene behaviors; and (6) care for children during illness, including diagnosis of illness and health-seeking behaviors (Engle 1992). Provision of these behaviors depends on the availability of the resources for care at the household level: education and knowledge, health of the caregiver, time, autonomy, and social support.

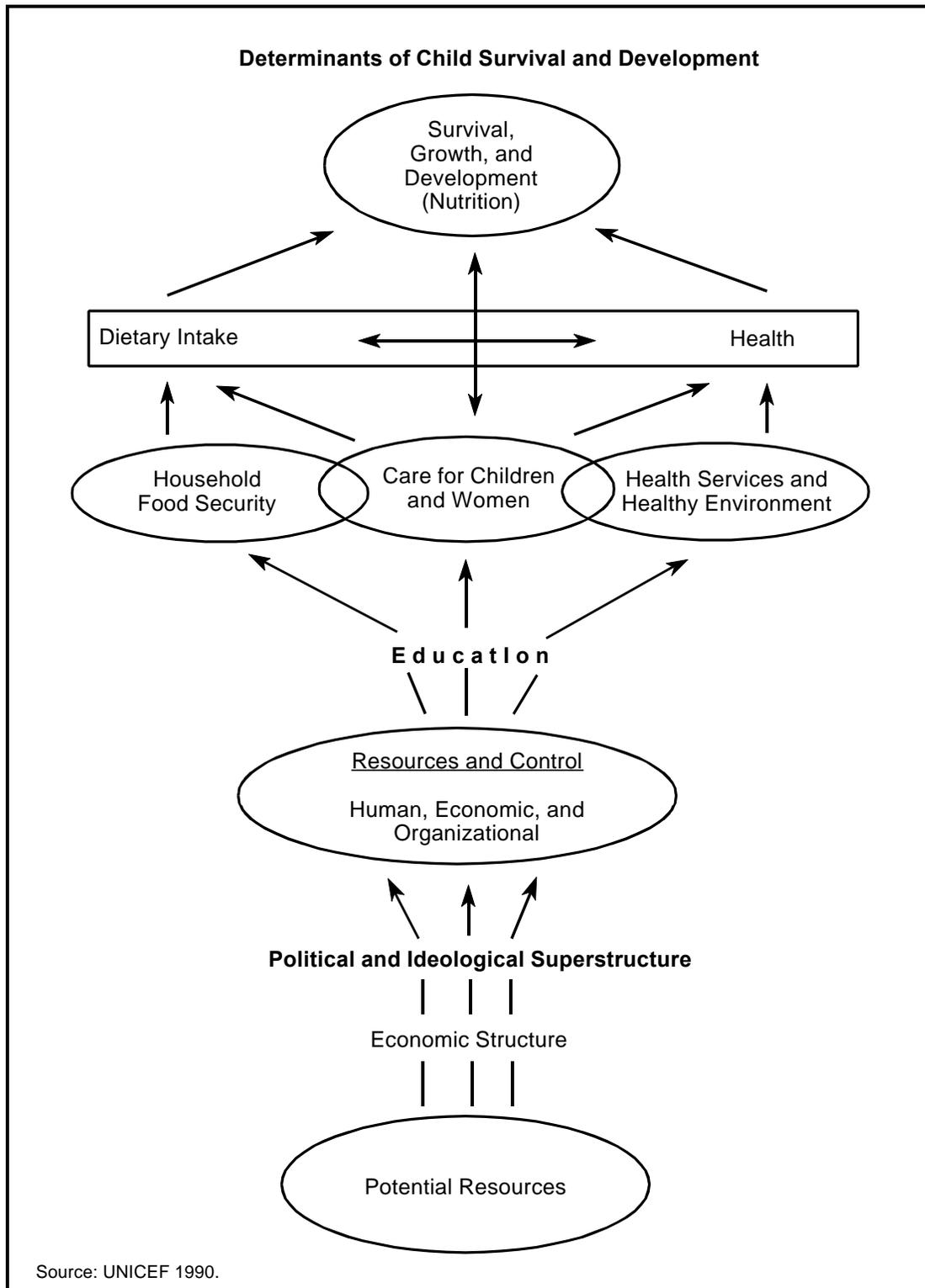
Although many researchers over the past 30 years have emphasized the importance of behavioral factors for adequate child growth in conditions of poverty and food constraints (Sims, Paolucci, and Morris 1972), the linkages between food availability, caregiving behaviors, and child nutrition are now being recognized at a policy level (ICN 1992). The conceptual model underlying the role of care in child nutrition has been applied more frequently over the past 10 years (UNICEF 1990).

This paper will review new conceptual developments and the implications for the measurement and monitoring of care resources and care behaviors. Section 2 reviews the evolution of the original care conceptual model. Sections 3 and 4 review the development of indicators for care resources and care behaviors, respectively. Section 5 concludes with suggestions for further research.

## **2. DEVELOPMENTS IN CONCEPTUALIZING CARE**

Figure 1 presents the original conceptual model of child development, which identifies the role of care (UNICEF 1990). Care, household food security, and a healthy environment are the three underlying factors determining child nutrient intake and health,

**Figure 1 The original conceptual model of child development**



and, in turn, child survival, growth, and development. "Care" refers to behaviors performed by caregivers that affect nutrient intake, health, and the cognitive and psychosocial development of the child.<sup>2</sup>

This model of care can be expanded in two areas. First, it needs to emphasize that effective care provision requires time and other resources, and second, it should underscore the role of the child in determining care provision.

#### THE EXTENDED UNICEF MODEL OF CARE

In order for care behaviors to be exhibited, the caregiver needs sufficient education, time, and support. The provision of these resources can be considered care for the caregiver. Figure 2 presents an adaptation of the UNICEF model that incorporates care to the caregiver. Six major categories of resources for care can be identified from the literature. These include (1) education, knowledge, and beliefs; (2) health and nutritional status of the caregiver; (3) mental health, lack of stress, and self-confidence of the caregiver; (4) autonomy, control of resources, and intrahousehold allocation; (5) workload and time constraints; and (6) social support from family members and community. These aspects are the human and organizational resources identified in the UNICEF model (Jonsson 1995).

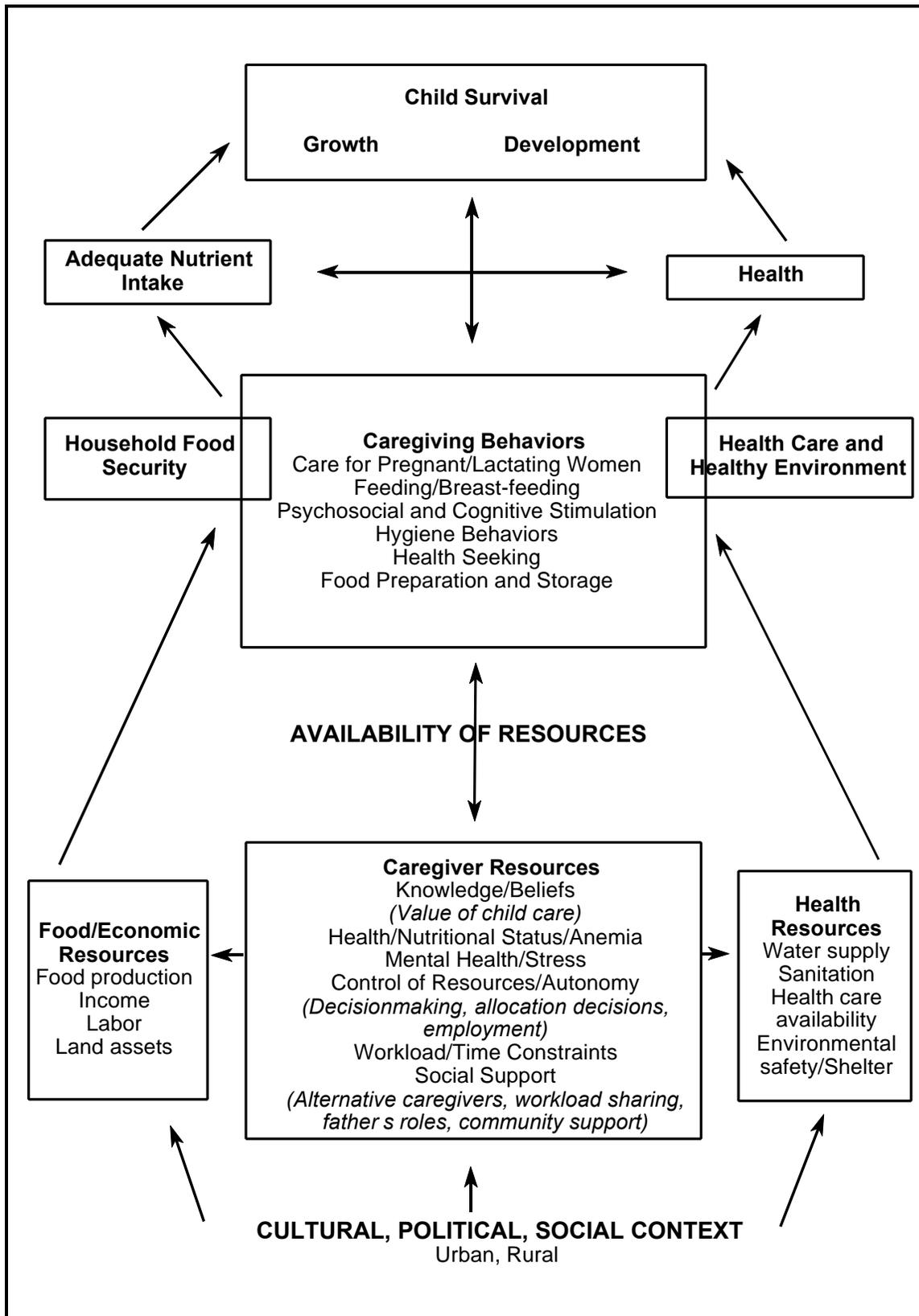
Education, knowledge, and beliefs represent the capacity of the caregiver to provide appropriate care. The physical and mental health (self-confidence, and lack of stress and depression) of the caregiver represent individual-level factors that facilitate the translation of capacity to behavior. Finally, autonomy, workload, and social support are facilitating conditions in the family and community. Some of these resource categories have been investigated extensively, whereas others have been investigated primarily in developed countries, or await further investigation.

#### THE TRANSACTIONAL MODEL OF CARE

The extended UNICEF model of child care is a useful framework for assessing the capacity and ability of the caregiver to provide care behaviors. However, a model of child care should include not only an assessment of the caregiver's behavior, but also the behavior of the child, and the characteristics of the environmental context. All three of these factors play a significant role in the eventual nutritional status of the child (Black et al. 1994).

For the past 25 years, psychologists have documented the significant role that children play in the care that they receive (e.g., Bell 1971). Differences between children, such as endowed healthiness, perceived vulnerability, perceived weight, and

**Figure 2 The extended model of care**



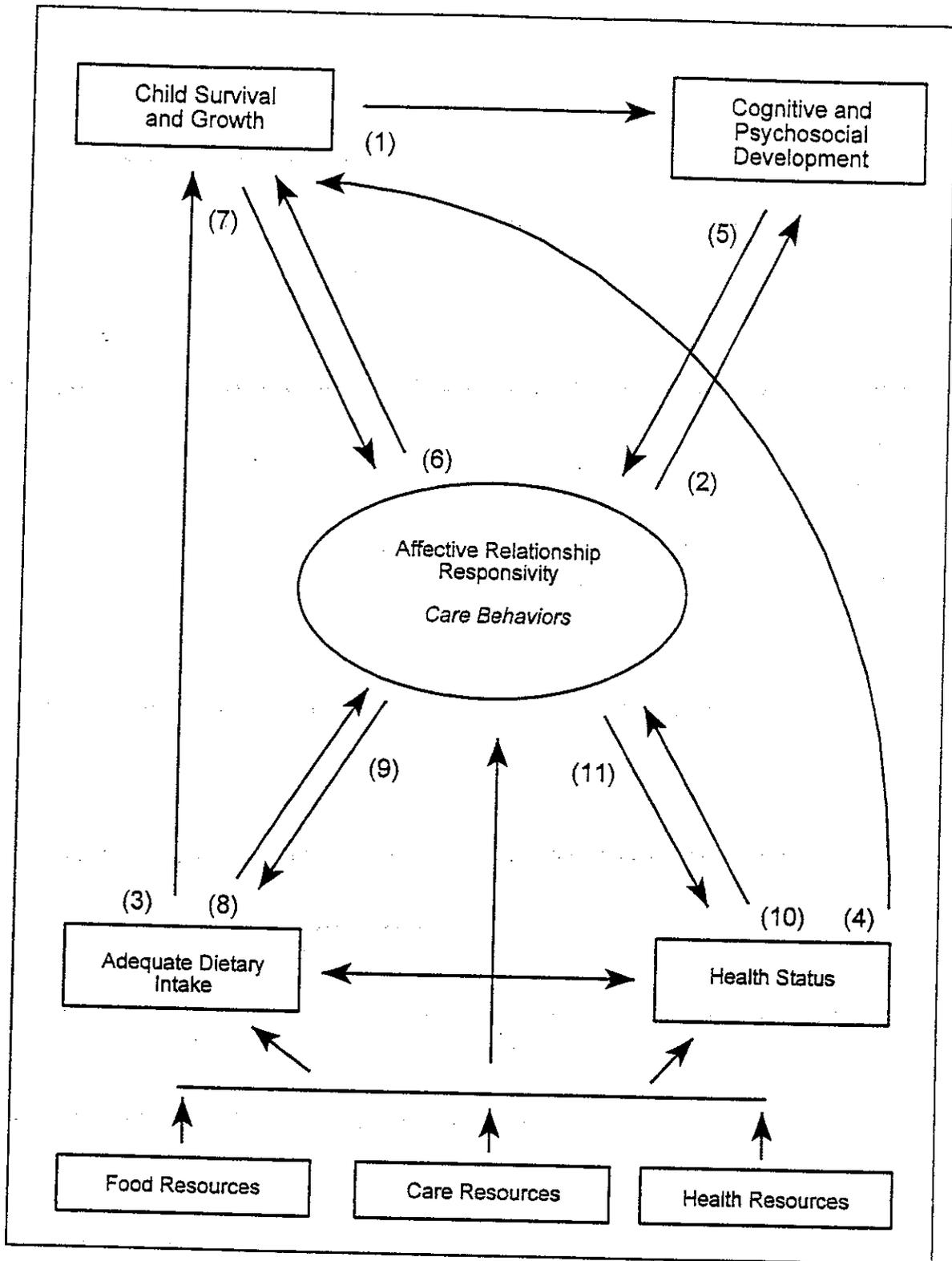
even physical attractiveness, affect the behaviors of their caregivers (see Engle and Ricciuti [1995] for a summary). The transactional model of care argues that the results or effects of child endowments are a function of a long series of mutual interactions, or transactions, between the developing child and the caregiver, and that these interactions are constantly changing with the changing developmental status of the child (Sameroff 1989). At the heart of the process is the relationship between the child and the caregiver(s). This *affective*, or emotional relationship, is a unique and life-long bond between two humans, called an attachment (Ainsworth et al. 1978).

Healthy development of a child has been found to depend on the development of a secure attachment or a close bond with at least one caregiver during infancy from whom the child received abundant positive attention (Werner 1993). An extensive literature has differentiated attachments into those which are secure (about two-thirds) and those characterized by insecurity and avoidance of the caregiver in middle-class samples (Ainsworth et al. 1978). Attachment can be assessed in a standardized situation and the measure has been used in many different cultures, although there are some questions about the validity of the measurement of attachment across cultures (Becker and Becker 1994). Children's nutritional status also has relevance for attachment; Valenzuela (1990) in Chile found that children who were undernourished were far less likely to be securely attached, though no causality was established.

A critical aspect of quality of care seems to be responsiveness to the child's cues, verbalizations, signals, etc. (e.g., Bronstein 1991). Responsivity does not mean that the caregiver always gives the child what is requested, but that the caregiver's response takes the child's needs and developmental level into account. Among active and well-nourished children, not acceding to inappropriate demands is an important part of responsiveness. Usually, a positive emotional (affective) relationship between caregiver and child will be reflected in warm and responsive caregiving behaviors. However, the lethargic or unresponsive child will have a harder time stimulating responsiveness.

The extended UNICEF model can be adapted to include the relationship between child and caregiver(s), as shown in Figure 3. This figure expands the central part of the UNICEF model relating care, nutrient intake, health, and child growth and cognitive development. Eleven specific arrows have been drawn to illustrate the various ways in which the affective relationship between caregiver and child, and the resulting care behaviors, can influence the child's growth, cognitive and psychosocial development, dietary intake, and health status, and how child growth and development may influence care and the affective relationship. Each arrow is described briefly.

Figure 3—The transactional model of care



Arrows 1 through 4 represent well-known linkages. Arrow 1 links growth and cognitive development. This relationship has been demonstrated in numerous studies, including all three Nutrition Collaborative Research Support Program (CRSP) studies (Kirksey et al. 1992; Allen et al. 1992; Neumann, Bwibo, and Sigman 1992), although the reasons for the linkages are not entirely known. The initial hypothesis of a linkage between energy and protein intake and brain growth has not received unequivocal support (see Pollitt et al. 1993; Engle et al. 1993b), although increasing interest in micronutrient deficiencies may again lead us to a brain model for explaining these effects (e.g., Lozoff, Jimenez, and Wolf 1991).

Arrow 2 suggests that the caregiver-child relationship is important for the child's cognitive and psychosocial development. An extensive literature in psychology supports this linkage (e.g., Rutter 1990, see Engle, Castle, and Menon [1996] for a summary). Arrow 3, linking dietary intake to growth, is well known, as is Arrow 4, linking morbidity to slower growth.

Arrows 5 through 11 represent interaction effects between the child and the caregiver. Arrow 5 suggests that a child who has a higher level of cognitive development will be more able to build a positive affective relationship with the caregiver. Although much less data exist to support this linkage, recent findings from the CRSP studies illustrate the associations between child vocalizations and type of interaction with the caregiver (Chavez et al. 1987; Sigman et al. 1989).

Arrow 6 suggests that the nature of the affective relationship with the caregiver can influence child growth. Early studies of infants raised in orphanages with no consistent caregiver found significant improvements in growth and cognitive development of children who were assigned to a particular caregiver who routinely provided care and higher levels of stimulation (Dennis 1973). More recently, a series of studies by Field and colleagues with pre-term infants have indicated that firm massage on a daily basis will result in increased weight gain even without additional foods (Field 1992, 1993; Field et al. 1986). This effect may occur through stimulating the growth hormone, and has also been illustrated with rat pups (Schanberg and Field 1988). Although the variable manipulated in this case was not attachment, touching and stroking infants is usually a component of a positive and responsive relationship.

Arrow 7 suggests that the child's growth may have an association with the affective relationship and, therefore, on care received. Some data suggest that better nourished larger children may receive more care (Arya 1989, in India), and that under some conditions, a poorly nourished child may be assumed to have no will to live and be allowed to die (Scheper-Hughes 1992). A study in Mexico found that mothers interacted more with better

nourished and larger children compared to smaller children (Allen et al. 1992). In addition, the lack of responsivity of low birth-weight children has been associated with poorer feeding behaviors by mothers (Barnard et al. 1989).

Arrow 8 suggests that the amount that a child eats can play a role in the relationship of the caregiver to the child. Caregivers may be particularly troubled by a child who refuses to eat; feeding difficulties are one of the most common behavioral disturbances of young children reported to pediatricians in industrialized countries (Sanders et al. 1993). In the United States, 24 percent of two-year-olds and 19 percent of three-year-olds were reported by parents as having problems with feeding (Beautrais, Fergusson, and Shannon 1982). A number of studies have compared children with non-organic failure to thrive (NOFTT) with normally growing children; many such studies have observed inadequate parent/child interactions among the former group (Black et al. 1994). The causality is difficult to untangle, although one study did find higher incidence of oral-motor difficulties in NOFTT children, suggesting that the child's feeding problems may precipitate poor child/caregiver interactions (Mathisen et al. 1989). The much higher rate of NOFTT among low birth-weight children (Kelleher et al. 1993) also suggests that a child's poor growth may contribute to a problematic caregiver-child relationship or to failure-to-thrive.

Arrow 9 posits that a positive affective relationship leads to increased dietary intake. In the failure to thrive, literature observational studies suggest that mothers of NOFTT children in affluent societies tend to be less attentive to their children and interact and verbalize less, and their children have shorter feeding episodes and intake less food (Black et al. 1994; Heffer and Kelley 1994) than well-nourished children.

Arrow 10 indicates that the health of the child may influence the nature of the affective relationship, either through an increase in attention and caring from the caregiver or, at some point, a reduction in investment if the child is perceived as having little chance of survival (Scheper-Hughes 1992; Cassidy 1987).

Finally, the quality of the relationship of the caregiver to the child may influence health status of the child through health care treatment and seeking of health care (Arrow 11). Although direct evidence for this relationship is lacking, the gender differentials in health-seeking behavior frequently reported in the Indian Subcontinent may be examples of caregiver preference influencing health care treatment. However, without further evidence, it is impossible to determine whether the lower health care seeking is a function of the quality of the relationship or of maternal and family strategies of investment in child care (Alderman and Gertler 1996).

These arrows illustrate the central role of the affective context of caregiving but much remains to be learned about strategies for changing behavior to enhance child survival, growth, and development.

### 3. MEASUREMENT OF CARE

Indicators of nutritional status may provide a direct measure of the underlying condition of interest or serve as proxy for other factors (UN ACC/SCN 1989). They can be divided into those that measure outcomes (such as child weight-for-age), processes or intervening variables (such as the number of times the child was taken to the health clinic), and inputs (such as the number of health clinics in an area). This approach has emerged after many years of work on developing indicators for nutritional status. In the case of care, however, the issues of measurement remain to be addressed adequately and the various indicators need to be identified before they are developed at this level.

Cultural differences in caregiving behaviors and resources are often substantial. For example, maternal interaction with children may also vary from culture to culture, as demonstrated by Richman, Miller, and LeVine (1992). They observed that Gusii mothers had a more nurturant attitude towards caregiving at all observed points in time, while American mothers have a more verbal and stimulative attitude towards interaction with their older children. Developing indicators of care that can be used in different settings is not an easy task. One possible solution may emerge from cross-cultural psychology.

Cross-cultural psychologists suggest that there are three theories about cultural differences: (1) total cultural relativity (every culture has such different functions that one cannot make any judgments across cultures); (2) absolutism (every culture has the same functions, and the same judgments can be made in every culture, thus culture should not be included in analysis); and (3) universalism (Berry et al. 1992). The latter approach suggests that all cultures share similar functions (e.g., a greeting) but that the ways that these functions are expressed will differ by culture (wave, verbal, gaze, touching, etc.). For example, Freedman (1979) reported asking Native American and Euro-American women to attract the attention of their infants. The Euro-American women tended to vocalize, some almost continuously, and the infant's response was to wave its arms and legs. The Native American women, on the other hand, used looking and gazing to attract the infant's attention, and the infant returned the gaze. Thus the function of getting children's attention is probably universal, but the appropriate way to do so may vary by culture. If one simply observed caregiver verbalization, one would have missed the functional equivalence of the two behaviors (vocalization and gaze).

Several cross-cultural studies suggest that within-culture differences in many of these behaviors are larger than the between-culture differences, and that what appear initially to be unique and exotic differences between cultures are more similar when better understood (Berry et al. 1992). The existence of important differences both within and between cultures needs to be understood and recognized in defining care behaviors, but the functional equivalence of behaviors should also be recognized. Development of indicators and assessment strategies must include adaptation of functions to the particular context.

For some of the constraints to care, relatively straightforward indicators exist, such as body mass index (BMI) for women's health status, whereas for others, measures are less well-developed and need to be adapted to the particular cultural context (e.g., stress). Similarly, some care behaviors are relatively well accepted (e.g., hand-washing with soap and water by the caregiver prior to food preparation) and measurable, whereas others are harder to assess (e.g., quality of responsiveness of the caregiver to the child). Although in each case the variable can be assessed, the cost of doing so might be prohibitive. For some behaviors, cultural variability will be more important than for others. For instance, for psychosocial care, the range of possible adaptive child-rearing methods is likely to be wide, although there may be a set of inappropriate behaviors that could be improved with the reduction of constraints to care.

Various quantitative methods have been developed and employed successfully to assess relevant features of psychosocial care. These include questionnaires or interviews asking parents or caregivers to describe their care practices and/or their children's typical experiences; "qualitative" rating scales with behaviorally defined scale points to assess broadly stated characteristics of care, following observations in naturalistic or experimental settings; systematic observations of the caregiver and the child in the natural setting, focusing on particular behaviors whose frequencies are reflected in summary scores; and detailed observational coding of ongoing sequences of caregiver-child interaction, aimed at characterizing relevant features of the dyadic relationship.

Many of these strategies for assessing the quality of care in the various research studies require extensive observations and technical methodologies. For the most part, therefore, they are not feasible for practical use in the field as screening procedures. However, some of these approaches to the measurement of care have been, or may be, adapted for practical field use in assessing breakdowns in, or threats to, psychosocial care. The relevance of these measures in different cultures should always be of concern to investigators. It is important in all such approaches to develop indicators that have meaning and validity across a variety of cultures, although this is a daunting task. A behavior that may appear to be maladaptive to an outside observer may be the norm within a particular

culture. Therefore, it is essential to approach indicators with a healthy skepticism, and to attempt to use a within-culture yardstick—to compare a caregiver with others within her or his own cultural group.

For the discussion in this section, the suggested indicators include both quantitative, relatively well recognized, and straightforward measures, and those which are either of a qualitative nature, more difficult to collect, less well understood, or more specific to the culture. The major categories of resources for care identified earlier will be examined in detail to identify the potential indicators that emerge from them: (1) caregiver education, knowledge, and beliefs; (2) health and nutritional status of the caregiver; (3) mental health, lack of stress, and self-confidence of the caregiver; (4) the caregiver's autonomy and control of resources; (5) workload and time constraints of the caregiver; and (6) social support received by the caregiver from family members and the community.

## CAREGIVER EDUCATION, KNOWLEDGE, AND BELIEFS

### *Effects of Maternal Education on Child Care*

Maternal education is associated with the level of provision of caring behaviors. Three such examples of caring behaviors are summarized below: breast-feeding, health seeking behaviors, and the level of child-caregiver interactions. The pathways through which maternal education affects care provision behaviors are then discussed.

*Feeding Practices.* The relationship between maternal education and breast-feeding practices is complex. Education increases both the ability to earn income and the ability to appreciate the importance of caregiving. The former tends to mitigate against breast-feeding, particularly in urban areas, as the caregiver's opportunity cost of time increases. The latter tends to promote caregiving, particularly in supporting workplace environments. For example, in Israel, mothers with the lowest and highest levels of education engage in long-term breast-feeding (Ever-Hadani et al. 1994; Mansbach, Greenbaum, and Sulkes 1991). In developing countries, however, the negative effects of breast-feeding tend to predominate. In Brazil, for example, maternal educational levels were strongly correlated with earlier *termination* of breast-feeding (Giugliani et al. 1992). DaVanzo and Starbird (1991) have reported a negative relationship between level of maternal education and breast-feeding duration in Malaysia. In the Philippines, an increase in maternal education by one year is associated with a 36-percent decrease in the probability of exclusive breast-feeding for a six-month-old infant (Cebu Study Team 1991).

Maternal education is associated not only with the quantity of breast-feeding (duration, frequency), but also the quality of feeding. Guldan et al. (1993) in a study conducted in rural Bangladesh found that maternal education is associated with variables that reflect more intense care for their children, i.e., less distraction while feeding, a cleaner feeding environment, and more initiation of child feeding. In the same study, however, more education was associated with less adequate feeding behaviors, such as termination of feeding by the mother more often than by the child, a larger number of bottle feeds per hour, and a fewer number of breast-feeds per hour.

*Health-Seeking Behaviors.* Another caring behavior associated with child health and nutrition is the family's health-seeking behaviors, both preventive health care (immunization, antenatal care for the mother, etc.) as well as health seeking behaviors in the event of morbidity. The effects of education on health care seeking behaviors are well documented; it is becoming increasingly evident that maternal education affects a child's health/nutritional status through its effect on her health care seeking behaviors. Better educated women are more likely to utilize available health care and community service facilities than women with no education (Joshi 1994; Caldwell 1986; Barrera 1990; Cebu Study Team 1991; Thomas, Strauss, and Henriques 1991).

*Child-Caregiver Interactions.* Observational studies of mother-child interactions of educated and uneducated women have revealed patterns of behavior that reflect a more committed attitude towards child care among educated women (LeVine et al. 1991; Richman, Miller, and LeVine 1992). LeVine et al. (1991) found in Cuernavaca that mothers who had attended school longer had adopted a style of interaction with their infants that was stimulating to infant development, rather than a nurturing style that was adopted by mothers with fewer years of education. More educated women were more vocal towards their infants in spite of the fact that infants who grew up to be more vocal themselves would require more attention as toddlers (Richman et al. 1988). Richman, Miller, and LeVine (1992) find that Mexican mothers with more education are more likely to feed their crying children. The educated mothers were seen to modify their responsive behaviors in relation to the age of the infant, with less educated women continuing to hold their children even with increasing age (10 months); and more educated women displaying more conversational interaction at this age.

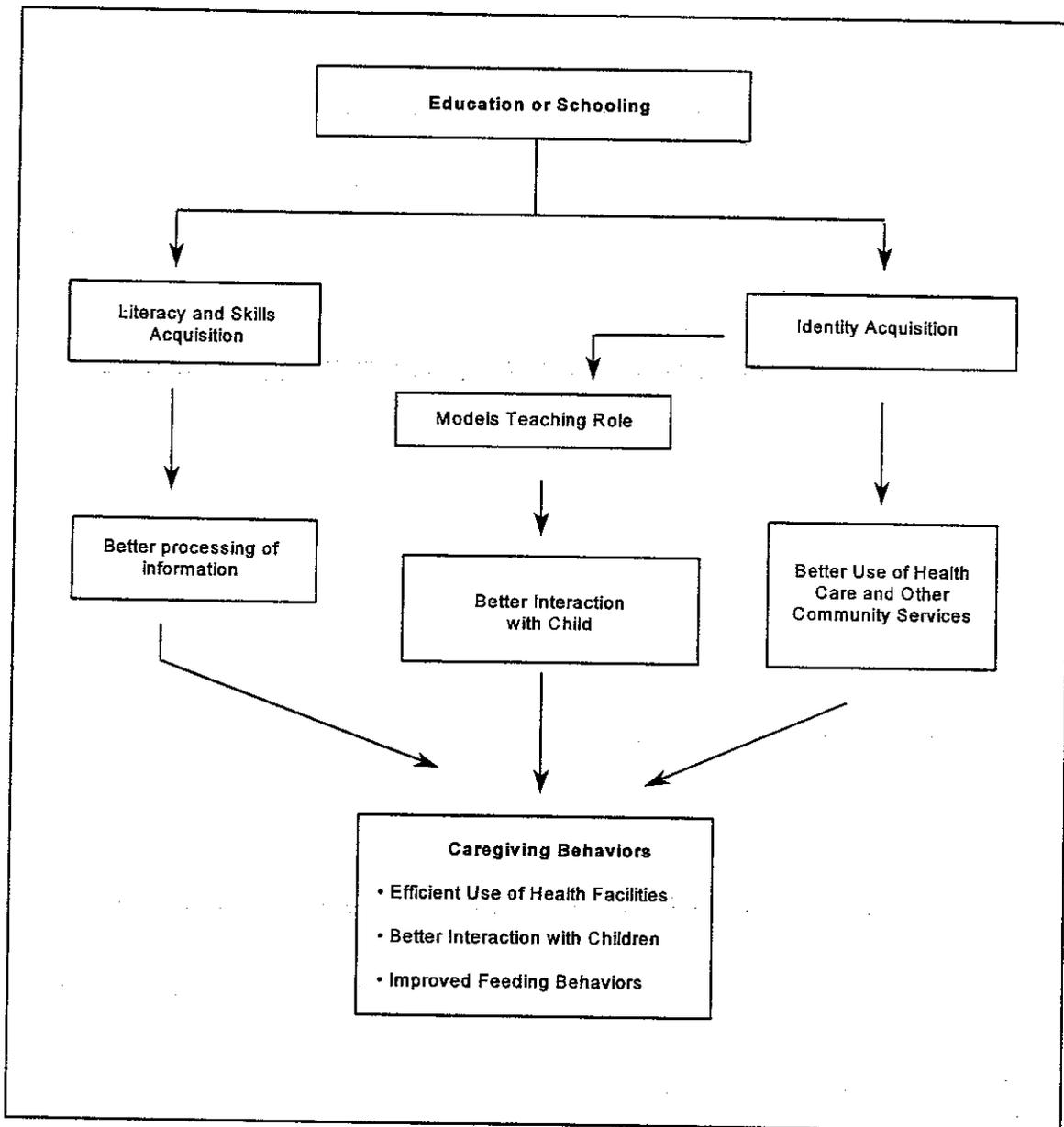
The pathways through which maternal education affects care provision behaviors are thought to be (1) the ability to process information, (2) the ability to acquire skills, and (3) the ability to model behavior (see Figure 4).

*Processing of Information.* Thomas, Strauss, and Henriques (1991) and Barrera (1990) have reported that it is predominantly through the better knowledge that an educated woman might have that she is able to utilize health care facilities better, keep her environment cleaner, and thereby benefit her children. They suggest that one of the likely channels through which maternal education affects child height is by improving her acquisition and processing of information (measured as reading newspapers, listening to the radio, and watching television). These indicators explained almost all of the impact of maternal education on child health, but the exact type of “information” that brought about this effect was not identified. To get at this latter issue, Tucker and Sanjur (1988) use the concept of maternal differentiation, a composite variable that incorporates years of education, nutrition knowledge, frequency of reading, and a measure of household productivity. This concept includes evidence of use and retention of information, which they feel is theoretically more coherent than merely using years of schooling as an indicator of maternal character. “Maternal differentiation” has been found to be positively associated with children’s dietary intake and anthropometric status. Barrera (1990) proposes that maternal education affects child health by "affecting the productivity of inputs...and lowering the costs of information."

*The Acquisition of Skills.* Skills acquisition is proposed to be a process through which acquired literacy and language skills make it easier for educated women to build a knowledge base that could guide behavior, as well as learn patterns of behaviors that are useful for participating in modern bureaucracies (Joshi 1994; LeVine et al. 1991). This would allow better utilization of health care services and interactions with doctors and nurses (Joshi 1994), as well as better compliance with treatment recommendations (Ware 1984). The finding that the association between maternal schooling and health care utilization behavior (talking to a doctor) *loses significance* when controlled for *literacy* suggests the important role of skills (Joshi 1994; LeVine et al. 1991).

*Identity Acquisition.* The theory of "identity acquisition" proposes that it is not literacy alone that determines the behaviors of educated women. This hypothesis assumes that schooling leads to behavior change through imitation of people in the "modern sector" (Joshi 1994). Another aspect of this theory is that schooling makes women identify with

Figure 4—Pathways of interaction of education with caregiving



the role of a teacher as well as that of a student (LeVine et al. 1991). This makes them more amenable to new information and also more interactive in their child care behaviors.

Joshi (1994) shows that specific caregiving behaviors are affected in different ways by the variables of literacy, skills, and identity. Maternal identity was assessed using maternal appearance and posture as proxy indicators. Keeping a child clean, a caring behavior, was significantly associated with *schooling* when controlled for *literacy*, but not when controlled for *identity*, suggesting that this behavior was mediated through identity.

Clearly, the use of education as an indicator of care is complex, even though some studies reported here demonstrate an enhancement in the quality of caregiving by educated mothers. The indicators of education used in the literature include literacy status (literate/illiterate), the level of education completed (primary, secondary, etc.), and the number of years of education, as well as indicators of the skills gained from schooling—the ability to read and comprehend written passages, listen and comprehend, and the ability to use decontextualized language. More testing of the various hypotheses of the pathways of interaction of education and child care may be needed before additional cultural-specific behavioral indicators of education for care are developed. Identifying different behaviors of educated women could also help to develop cultural-specific indicators for the processes through which education affects care (the indicators developed by Joshi [1994] are good examples of this approach).

For suggested indicators, see Table 1.

**Table 1 Education of caregiver**

Indicator	Data Sources of Measurement Issues	Comments
Years of schooling	Self-report, school records, existing data	
Literate/illiterate	Self-report, simple test, or existing data	May be approximated by more than three years of schooling
Skills acquisition	Testing of functional use of language, information processing	May need to be adapted to the cultural setting
Identity acquisition	Observation of teaching role taken by mother with respect to child, other professionals	Will depend on the setting

### *Caregiver Knowledge and Beliefs*

Available data on cultural beliefs related to caregiving at different stages in the life of an infant are often qualitative, rather than quantitative, in their approach. However, they can be invaluable from the point of view of assessing the sociocultural causes of, and reactions to, malnutrition; infant feeding behaviors that are unique to certain cultures; and beliefs and practices relating to lactation, before embarking on a large-scale survey. The purpose of this section, therefore, is to illustrate the nuances in beliefs among cultures that are gleaned primarily through qualitative and anthropological studies. The care resource indicators that are expected to emerge from this discussion are the beliefs with respect to breast-feeding, infant feeding, and infant growth.

*Breast-Feeding Initiation.* Cultural beliefs appear to be important in determining the initiation of breast-feeding as well as the termination of breast-feeding. Both of these practices are closely associated with the growth and development of young infants. In a number of developing societies, breast-feeding is a universal practice, which is initiated soon after birth (Harrison et al. 1993; Cominsky, Mhloyi, and Ewbank 1993; Almedom 1991a, 1991b). In other cultures, particularly in the Indian subcontinent and parts of Southeast Asia, there is a strong belief that colostrum is highly undesirable and prelacteal feeds of sweetened water, goat's milk, or diluted cow's milk are commonly given in the first two-to-three days postpartum (Reissland and Burghart 1988; Blanchet 1984; McDonald 1987; McGilvray 1982, cited in Reissland and Burghart 1988).

*Cessation of Breast-Feeding and the Timing of Weaning.* In a number of studies, the common reasons for cessation of breast-feeding and for weaning onto an adult diet were another pregnancy (or the desire for another child), perceived breast-milk insufficiency, and/or certain developmental milestones achieved by the child (Harrison et al. 1993; Almedom 1991a, 1991b; Cominsky, Mhloyi, and Ewbank 1993; Martines, Ashworth, and Kirkwood 1989; and others). Perceived breast-milk insufficiency was the most commonly reported reason and the perception of insufficiency was often based on the crying of the infant. One study has reported that for some, breast-feeding was terminated by the fathers' decision, possibly because of the belief within that culture that breast-feeding mothers should not have intercourse (Harrison et al. 1993, in Egypt). Another observation from this study was that the quality of breast milk was perceived to change with the age of the child and this affected the choice of a wet nurse (a mother with an older infant was not allowed to nurse the younger infant of another woman).

In Egypt, the timing of the weaning was important from the point of view of minimizing the risk of exposure to the "evil eye" by ensuring no contact with a menstruating woman, a newly-wed woman, etc., at the time of complete weaning (Harrison et al. 1993). In Ethiopia, the timing of weaning was seen to depend on the season, with the preferable season for weaning being in the winter (related to the availability/abundance of barley in the winter (Almedom 1991).

*Maternal Characteristics and Breast-Feeding.* In Egypt, breast-feeding is reported to be associated with responsibility and maturity in a woman, and very young mothers were not expected to breast-feed (Harrison et al. 1993). In the same study, it was reported that the psychological state of the mother was considered important to successful breast-feeding. The breast milk of mothers who were sad or emotionally disturbed was believed to cause diarrhea in their children (also a hot/cold humoral theory). It has been reported that the diet of a mother was believed to be important when she was breast-feeding and in cases where the infant fell ill, the mother was given special foods or drinks so that the breast-fed infant would benefit from it (Harrison et al. 1993; Gryboski 1996). The belief that the quality of breast milk is a determinant of the child's health is seen in a number of cultures and often it is the mother who is blamed for an infant's illness, and even treated for it (e.g., Reissland and Burghart 1988).

*Complementary Feeding.* The fear of "spirits," which could disturb the child, is seen to pervade a number of care-related behaviors in Indonesia; care seems to be taken to keep the child calm during the first few months of life, but once the child is able to sit (an important developmental milestone in Indonesia), it is considered to be less vulnerable to spirits (Gryboski 1996). The importance of the child's emotional state and contentedness and perception of "emotional maturity" is evident in Gryboski's study (1996) in Indonesia, where sibling caregivers are taught to yield to the infant's demands so that the infant is not upset until the child is in late infancy. For instance, infants are fed to induce sleep and calmness in early life, but as the child develops, he/she is not pressed to eat if he/she appears upset and "consent feeding" is the norm rather than force feeding as in the preceding months (Launer and Habicht 1989). The child's ability to control feeding is believed to come into play after the age of 7 months, as the child is believed to be helpless from birth until 7 months of age (Gryboski 1996; Launer and Habicht 1989).

Beliefs regarding complementary feeding have implications for child nutrition since the age at which children are reported to be most vulnerable to growth-faltering is the period between 6 - 18 months, which is the period of transition between breast milk and an adult

diet. The transition period varies by culture; in Bangladesh, Zeitlin and Ahmed (1995) have reported that the period between 13-18 months may be the most crucial.

Beliefs about appropriate time of initiation of complementary feeding is seen to vary across cultures, with the earliest incidence of complementary feeding seen in Indonesia (Kardjati 1996; Launer and Habicht 1989), where rice and mashed bananas are introduced in the first week of life. The belief that supports this practice is that children who are fed a meal will be more calm and sleepy, and this would help the mother carry on with her work. In Egypt, Harrison et al. (1993) have reported that mothers believed that supplementation (after 40 days of full breast-feeding) was necessary to promote growth and "fatness." Mixed feeding was also said to help the mother by reducing the time she would need to breast-feed the child. The belief that breast-feeding is time-consuming is widespread; Cohen et al. (1995a), in Honduras, report that mothers believed that exclusive breast-feeding (EBF) would take longer even though observational studies showed that breast-feeding and food preparation and serving took the same amount of time as EBF for 4-to-6 months old children.

Finally, many food taboos for young children may limit the types of foods that can be offered (Van Esterik 1989). Rabiee and Geissler (1992) have reported that in Iran, the introduction of a variety of foods was often delayed, based on the perception that young children could not digest foods that were available to the family (e.g., beans) or that some foods would cause stammering and delayed speech and impair the intellect if introduced before 18 months of age (eggs and cheese, respectively). This implies that children may not have received adequate amounts of protein- and micronutrient-rich foods until they were 18 months of age.

*Characteristics of the Child that Affect Decisions about Feeding.* Many beliefs about the termination of breast-feeding depend on characteristics of the child and the child's developmental level. Examples related to the initiation and completion of the weaning process include the eruption of teeth (Almedom 1991a, 1991b; Harrison et al. 1993), the onset of walking, and a perception that the child was old enough to consume an adult diet (Harrison et al. 1993). A second factor affecting beliefs is the child's appetite as perceived by the mother. The recognition of the child's appetite as an indicator of ill-health is seen in many studies (Bentley et al. 1991; Bentley, Black, and Hurtado 1995).

Beliefs about caregiver control of feeding can influence child intake. Dettwyler, in a series of reports from Mali, found that mothers tended to believe that children should control the amount of food ingested, and that the child's hunger or apparent interest in food should determine the amount of food provided to the child (Dettwyler 1986, 1987). In the presence of high levels of anorexia among children, this belief can lead to undernutrition. Engle et al.

(1995) found variations in these beliefs between mothers within a single culture; mothers who felt that a child who refuses food should be encouraged to eat more had better nourished children than those who felt that a child's refusal should not trigger additional food.

Perceptions about the child's state of health have also been reported to influence decisions about breast-feeding, particularly duration of breast-feeding. Adair and Popkin (1996) have reported that a mother's perception that her infant was small increased the likelihood of her not breast-feeding, even when she had the intent to do so before the birth of the infant. Conversely, it has also been observed that the perception that the infant was doing well increased the likelihood that breast-feeding would be continued (Adair, Popkin, and Guilkey 1993). Simondon and Simondon (1995), in a study in rural Senegal, have reported that small and thin infants were preferentially fed millet-gruel in addition to breast milk, because their mothers perceived the need to feed them something in addition to breast milk. Among Peruvian women, Piwoz et al. (1994) report that the strongest indicator of change in feeding practices was a low weight gain among infants.

*Beliefs about Illness and Malnutrition.* Beliefs about and behaviors during illness could have implications for child health and nutrition and some information about existing beliefs, in addition to the more easily available information on the use of health care facilities, could prove invaluable in the planning process in these areas. For example, certain illnesses are seen to be a part of the normal development of the child (Gryboski 1996, in Indonesia; Cominsky, Mhloyi, and Ewbank 1993, in Zimbabwe). Some of these illnesses are those that could precipitate malnutrition or aggravate existing situations (e.g., some kinds of diarrhea, upper respiratory tract infections, etc.). In Pakistan, Mull (1991) reports that mothers seldom associate marasmus with consumption of less food; it is more often linked to the influence of spirits or a "bad" person on a child. Similar findings are reported in East Africa, India, Nepal, and Tanganyika, where protein-energy malnutrition was often seen as a result of adultery, breast-feeding while pregnant, or an evil spirit (Gerlach 1964; Morley, Rohde, and Williams 1983; Tanner 1959; Reissland and Burghart 1988). Scheper-Hughes (1992) describes a process of the "medicalization of hunger" in shantytowns in northeast Brazil; mothers believed that the symptoms of nutrient deficiencies should be treated with medicine, not food. Mull (1991) is especially concerned with the belief that having a marasmic child is considered a stigma and, therefore, the illness may not even be reported in many cases. Relying on reported data about morbidity prevalence in settings such as these could well yield underestimated figures.

For suggested indicators, see Table 2.

## PHYSICAL HEALTH AND NUTRITIONAL STATUS OF THE CAREGIVER

Figures on the current nutritional situation of women in the developing world indicate that iron deficiency anemia is widespread among pregnant and nonpregnant

**Table 2 Knowledge and beliefs of a caregiver**

Indicator	Data Sources of Measurement Issues	Comments
Beliefs and knowledge about initiation of breast-feeding, colostrum	Survey, qualitative (focus groups)	May vary both between and within cultural groups; may need both an individual and normative measure
Beliefs about termination of breast-feeding	Survey, qualitative (focus groups)	May vary both between and within cultural groups; may depend on developmental milestones, opinion of other family members, appearance of other children
Beliefs about complementary feeding: timing, types, control of intake	Surveys, qualitative measures; varies by culture	Child's physical and emotional state may play a major role in decision, or cultural beliefs about "personness" of the child
Beliefs about maternal characteristics in relation to breast-feeding	Surveys, qualitative measures, varies by culture	Examples are psychological state of mother, maturity of mother, diet and health of mother
Beliefs about relationship between food and malnutrition	Surveys, qualitative measures; depends on culture	Some illnesses are perceived as part of developmental process (types of diarrhea, upper respiratory tract infections). Protein-energy malnutrition (PEM) may not be associated with food but believed to result from spiritual/evil influences, ill-effects of breast-feeding during pregnancy, or adultery; PEM often considered a stigma and is deeply feared.

women in developing countries, with the highest rates in South Asia (over 60 percent), using a cutoff of blood levels of hemoglobin less than 12 grams per deciliter. These rates have increased in South Asia and Sub-Saharan Africa over the past decade (UN ACC/SCN 1992). Stunting and low body mass index (BMI) are common in developing countries. Low BMI (<18.5), also known as chronic energy deficiency, has been found in 40 percent of women in samples from South and Southeast Asia, and 20 percent in Sub-Saharan Africa (UN ACC/SCN 1992).

The linkage between indicators of caregiver nutritional status and caregiving has rarely been studied; Winkvist (1995) has been one of the first authors to address this issue in detail. There could be two possible pathways (see Figure 5): (1) a direct link between nutritional status and caregiving capacity and behaviors through maternal energy levels, and (2) an indirect link whereby the biological consequences of malnutrition for the pregnant and lactating woman could affect child characteristics, both physical and behavioral, which would, in turn, affect caregiving behaviors.

#### *Direct Link*

Research on the direct linkage is limited. Most findings reported here are from the Nutrition CRSP projects conducted in Kenya (Neumann, Bwibo, and Sigman 1992) and Egypt (Kirksey et al. 1992). Using very small samples, data from the CRSP found less active caregiving among anemic women in Egypt than nonanemic women (Rahmanifar et al. 1992). In Egypt, McCullough et al. (1990) found a negative association between maternal B<sub>6</sub> nutriture and responsiveness to infant vocalizations, as well as less effective maternal responses in cases of infant distress.

Chronic energy deficiency, measured using body mass index, has been proposed to have effects on productivity by modifying physical activity patterns (Shetty and James 1994). The nutritional status of the mother is also expected to affect her ability to care for children. The Food and Agriculture Organization of the United Nation/World Health Organization/United Nations University (FAO/WHO/UNU) Joint Consultation on Energy and Protein Requirements (1985) has estimated the energy cost of child care activities as 2.2 x basal metabolic rate (BMR), which falls into the category of moderate physical activity. Torun et al. (1989) have found that marginally malnourished individuals tended to become more sedentary at the expense of social interactions and discretionary activities. Child care could be classified as “discretionary activity,” which is described as “additional activity outside working hours, the energy requirement to cover which should not be regarded as dispensable as it contributes to the physical and intellectual well-being of the individual, household, or group” (FAO/WHO/UNU 1985). Though women with

**Figure 5 Possible pathways of interaction of maternal health and caregiving**

low BMI are less economically productive (François 1990, cited in Shetty and James 1994; Ferro-Luzzi et al. 1992) and may be expected to spend more time in their homes and therefore on child care, there is very little literature on the assessment of the quality of child care performed with low reserves of energy. Energy expenditure studies among men have shown that increased dietary intakes result in more efficient salaried work, less time spent napping, and more physical activity after work (Torun 1989). Data from the Kenyan Nutrition CRSP (McDonald et al. 1994) show that in the event of a temporary food shortage (a famine), mothers held and cared for their children significantly less than before the shortage. Increased needs to procure food resulted in increased substitution of child care by siblings and other family members.

Productivity is also influenced by iron status (Yip 1994); supplementation with iron increased women's productivity on tea plantations (Bothwell and Charleton 1981; Edgerton and Gardner 1979; Levin et al. 1990), farms (Vijayalakshmi, Kupputhurai, and Uma-Maheshwari 1987), and in cotton mills in China (Li et al. 1994). Although these patterns might suggest that women's health status might affect caregiving, more research will be needed to make conclusive statements about the effects of nutrient deficiencies on the capacity to engage in child care activities.

### *Indirect Linkages*

The effect of maternal nutrition on pregnancy outcome, particularly birth weight, has been discussed extensively (Abrams 1991) and it is not dealt with here. However, infant behavior is a major component in establishing the affective relationship between mother and child and the effects of maternal nutrition on these behaviors will be examined.

Findings from the Egypt CRSP (Kirksey et al. 1994) have indicated that maternal intakes of energy and protein from animal sources, iron, and zinc were positively associated with neonatal "habituation" behaviors (a measure of early information processing). Rahmanifar et al. (1992) reported that maternal diet during lactation, especially lower intakes of animal source foods and certain B-vitamins, were associated with infant drowsiness; and infant drowsiness was negatively associated with caregiver vocalization. Similar findings from the Mexico CRSP (Allen et al. 1992) indicate that maternal weight and dietary factors were more strongly associated with infant behavioral variables, especially habituation behaviors, than were sociocultural factors.

However, we must be wary of attributing causality to these relationships. Burger, Haas, and Habicht (1993) have proposed that although a number of studies demonstrate links between nutrient deficiencies and behavioral outcomes, it must be recognized that even the existence of a statistically significant association between the nutrient deficiency and the

behavioral outcome may not imply causality, since the socioeconomic status and other factors could affect both behavioral and nutritional outcomes. Studies of the existence of a relationship between nutrient deficiencies and caregiving behaviors have been conducted predominantly as part of the Nutrition CRSPs, and intervention studies will be needed to demonstrate a causal relationship. Also, the CRSP studies were conducted using small samples, and were limited to biochemical assessments of a few nutrients. The existence of relationships between deficiencies of these specific nutrients and caregiving behaviors does not preclude the existence of similar relationships with other nutrients.

Other maternal attributes that could be expected to affect caregiving activities are morbidity and reproductive health (e.g., parity, interpregnancy interval, reproductive status). The effects of maternal morbidity on caregiving in developing country situations have not been studied in detail, but it could be expected to exert its effects through the first pathway (direct effects) by influencing maternal nutrient levels and energy reserves. Data from the Kenya CRSP indicate that illness among women, particularly pregnant women, forced them to reallocate a number of tasks, including child care, to another family member (Neumann, Bwibo, and Sigman 1992, 17). They also found that the groups requiring the most assistance and/or task reallocation were, in descending order, pregnant women, adult males, and nonpregnant women. A study on the effects of schistosomiasis infections on women's time allocation patterns showed that physical activity was considerably reduced among infected women, as was activity related to personal care (Parker 1992). The study shows no effects on child care time, but there are no data on the age groups of the children, nor is the definition of "child care" clear.

Women between the ages of 15 to 49 spend a significant proportion of their lives in a state of pregnancy and lactation, or both, and the stresses of these periods are expected to lead to a considerable depletion of maternal nutrient levels (Merchant et al. 1989; McGuire and Popkin 1989). Data are not available on the effects of these factors on caregiving per se, but it has been reported that children of multiparous mothers in The Gambia had poorer early growth, as well as lower rates of catch-up growth in height, than children of mothers of low parity (Prentice, Cole, and Whitehead 1987). Miller (1994) has found that the combination of a high birth order and short interpregnancy interval held the most risk for low birth weight. Short interpregnancy intervals are also associated with increased risk of pre-term low birth weight (Mavalankar, Gray, and Trivedi 1992). The case for improving maternal health and nutrition is stronger than ever before, based on both existing evidence of the effects of maternal health on birth outcomes and emerging evidence of their effect on infant behavior and caregiving.

Finally, the extent of violence toward women in their homes is beginning to be recognized. Despite the underreporting of domestic violence, a summary of 35 studies from a variety of countries show that

one-quarter to more than half of women report having been physically abused by a present or former partner. An even larger percentage have been subjected to ongoing emotional and psychological abuse, a form of violence that many battered women consider worse than physical abuse (Heise, Pitanguy, and Germain 1994, 4).

Violence toward children tends to occur in these same households, and data from the United States suggests that it is even more frequent than violence toward spouses (Finkelhor and Dziuba-Leatherman 1994). An atmosphere of psychological and physical violence may have devastating consequences for children's nutritional status, but few investigators have examined the issue.

For suggested indicators, see Table 3.

#### MENTAL HEALTH, STRESS, AND SELF-CONFIDENCE

In the United States, a large literature links maternal depression with poor caregiving and problematic outcomes for children (e.g., Rutter 1990). This issue is summarized in much more detail in Engle and Ricciuti (1995). Depression probably plays a major role in poor caregiving in many developing countries. However, despite reports of high levels of anxiety and depression among women in developing countries (e.g., Chakraborty 1990, in Calcutta) studies linking these psychological factors with child caregiving have not been done. A report on the slum improvement project in Bangladesh suggested that "the social isolation of women, coupled with the lack of extended family networks in urban areas, is thought to have negative effects on the mental health of women, which, in turn, is likely to reduce the quality of child care, even when the mother is physically present" (UNICEF 1994, 9).

Depression in the United States has been measured by a number of instruments, few of which have been adapted outside of the United States. However, since the most common instruments rely on self-reports (e.g., Beck Depression Inventory) and the questions are fairly straightforward, the possibility of adapting the instrument exists. An

**Table 3 Physical health and nutritional status of a caregiver**

Indicator	Data Sources of Measurement Issues	Comments
Body mass index BMI (Weight/Height <sup>2</sup> )	Requires careful anthropometry	Usually, BMI < 18.5 is considered a risk factor
Iron deficiency anemia	Various indicators, such as hemoglobin, hematocrit	Usually, hemoglobin < 12 grams per deciliter is considered a risk factor
B <sub>12</sub> in plasma	Biochemical assay	
B <sub>6</sub> in breast milk (proxy for serum levels)	Biochemical assay	
Reproductive health	Parity, birth spacing, age at first birth, pregnancy complications	May be available from the Demographic and Health Survey or census surveys
Morbidity	Type, frequency, severity	Self-report, physicians records
Domestic violence	May require qualitative methods to obtain; low rates likely from surveys	Definitions may or may not include emotional abuse

anxiety and depression scale was used, for example, in the Egyptian Nutrition CRSP project (Kirksey et al. 1992).

Stress refers to a person's discomfort when exposed to difficult and uncontrollable circumstances, and is one of the characteristics of high risk mothers in the United States. Stress may also be linked with poorer caregiving. Although there are many measures of stress, one that might be adaptable to different cultural settings is a symptom checklist, such as the Health Opinion Survey (Weisner and Abbott 1977), a report of the woman's physical problems in a recent period. Items selected reflect psychosomatic difficulties, such as headaches, feeling tired, unable to eat, or sweating palms. Scores on the Health Opinion Survey have been found to be associated with sources of stress, such as inadequate family support among Kenyan market women (Weisner and Abbott 1977) and problems with the spouse for Guatemalan peri-urban mothers (Engle 1989a).

A commonly used measure of stress in the United States is the Life Events Change Scale, developed by Dohrenwend and Dohrenwend (1974) to measure the amount of change

that an individual experienced in a recent period. Changes, whether positive or negative, are assumed to increase stress, and they are ranked according to degree of intensity of the change. In the United States, the most dramatic change is death of a spouse, followed by separation from a spouse. Other events include moving to a new area and starting a new form of employment. The degree of intensity of the change can be established for any particular cultural setting, and items can be added or deleted. Other measures of stress may be much more difficult to adapt cross-culturally.

The level of confidence of the caregiver is often cited as a critical factor for complementary feeding, particularly for anorexic children, but this relationship has not been tested systematically. Program experience suggests that it plays a major role (Gibbons and Griffiths 1984; Griffiths 1988). Even though increased self-confidence is frequently noted as an outcome of a project, systematic measurement of this concept has eluded investigators.

In industrialized countries, the measurement of self-esteem (how one values oneself compared to social norms) has a long history, and numerous measurements have been developed (Coopersmith 1981). These measurements have been found to be associated with a number of outcomes, such as school performance, job success, and test scores, although relationships are not strong. However, their adaptation to a broader cultural context has been limited.

One of the difficulties in adaptation is that the basis for self-esteem probably differs by culture (Berry et al. 1992). Another problem is that all of the instruments require the individual to judge whether a number of items are "like me," and this process of judging may be unfamiliar in a less self-conscious society. A third problem is that the changes in women often observed in programs may be due to factors other than overall "self-esteem." These changes may be due to increases in assertiveness, the ability to ask for what one has the right to, which is often very low in traditional societies (Engle 1989a). Changes may also be a function of increases in perceived self-efficacy (Bandura 1984), conceptualized as one's ability to be successful in a particular situation (Engle and Davidson Hunt 1991). The possibilities of developing indicators of these more specific abilities are much greater than finding a culture-free assessment of overall global self-esteem or self-rating.

For suggested indicators, see Table 4.

## CAREGIVER AUTONOMY AND CONTROL OF RESOURCES

Autonomy and control of resources refers to the caregiver's ability to have a role in decisions made within the household and community. A number of studies have

**Table 4 Mental health, stress, and lack of self-confidence of caregiver**

Indicator	Data Sources of Measurement Issues	Comments
Depression	Could adapt existing instruments, such as Beck Depression Inventory	Requires careful adaptation
Stress	Could adapt instruments such as Life Event Event Changes, Symptom Checklist	Requires careful adaptation
Self-confidence	Could be adapted from other instruments, includes multiple definitions	Needs further development

suggested that mothers are more likely to allocate resources under their control to children than are fathers (e.g., Haddad and Hoddinott 1994), and that the higher percent of income earned by women increases their control over resources (Blumberg 1988; Engle 1991, 1993, in Guatemala). However, working for income does not automatically mean that women control their incomes; in many societies, the income is automatically assumed to be the property of the husband (e.g., Nsamenang 1992). Autonomy for women is generally higher in female-headed households, and some studies show that in spite of lower incomes, children in these living situations do better than might have been expected, most likely because intrahousehold distribution practices favored children more in female-headed households than in households headed by men (e.g., Haddad 1992; Johnson and Rogers 1993; Onyango, Tucker, and Eisemon 1994; Kennedy and Peters 1992.)

In many societies, mothers do not have the authority to make decisions regarding the care and feeding of their young children. These decisions may be made by the child's father or, in many cases, by a mother-in-law or older female in the husband's family. In Jordan, Doan, and Bisharat (1990) found that the most significant factor associated with child nutritional status was the degree of autonomy of the mother within the household, even controlling for the woman's age, education, and household size. Castle (1995) found that some of the most malnourished children in her Malian sample belonged to low status women in high-income households. She suggests that it may not be the level of household wealth that determines a mother's resources for child health, but the mother's access to these resources (Engle, Castle, and Menon, 1996).

For suggested indicators, see Table 5.

**Table 5 Autonomy and control of resources in the household by caregiver**

Indicator	Data Sources of Measurement Issues	Comments
Status of woman with respect to others in household	Demographic survey of woman's relationship to head female; qualitative data; self-report	Requires culturally appropriate specification
Household headship (female or male)	Self-report of headship (may depend on economic contribution, age, or kinship patterns, reasons for male partner absence)	Term generates much confusion; perhaps better to use several definitions
Income earner	Self-report (include informal labor), demographic data disaggregated by gender may exist	Income earner does not necessarily control income
Decisionmaking within household	Caregiver's evaluation of who makes decisions; survey data	Validity of this measure may be low; should interview various family members

#### CAREGIVER WORKLOAD AND TIME AVAILABILITY

Women's time commitments have been recognized as a zero-sum game; no new activities (including new caring behaviors) can be incorporated into their lives unless other activities are replaced (e.g., McGuire and Popkin 1990a; 1990b). In addition to activities related to child-rearing, women are typically engaged in other time-intensive activities relating to domestic production activities, such as water carrying and fuelwood gathering, and nondomestic production activities, such as agricultural work, informal labor, and formal labor market activities.<sup>3</sup> Improved collection of data on time use indicate that women continue to spend more time than men in all work activities, and that in three Asian countries, they spend significantly more time than men in domestic production activities (United Nations 1995; Brown and Haddad 1995).

The literature on the effects of women's employment on child nutritional status and health outcomes reveals that there is not a simple association between the two (e.g., Leslie 1989). A few recent studies have found significant negative associations of work for earnings and child nutritional status. In an evaluation of almost 2,000 rural mothers in India, Abbi et al. (1991) found that children of mothers who worked in agricultural labor on their own farms for 5 to 6 hours per day had significantly more malnourished children, regardless of who the alternate caregiver was. However, the women did not have control of their

earnings. Rabiee and Geissler (1992) reported significantly lower weight-for-age and higher incidence of diarrhea among Iranian children during the time of seasonal agricultural work, despite the relative wealth of the region. In this case, the caregivers were siblings from 8 to 13 years, and assessments of specific behaviors (e.g., disposal of child wastes) suggested their much lower competence. The most malnourished children were those who were given sedatives in order to keep them quiet while the mother was working. Gryboski (1996) also found negative effects of maternal work in children under a year.

Other studies have found either no negative effects of work (Wandel and Holmboe-Ottesen 1992a; 1992b) or positive effects of work on children (de Groote et al. 1994, in Mali; Brown, Yohannes, and Webb 1994, in Niger; Blau, Guilkey, and Popkin 1996, in the Philippines; Engle 1991 and 1993, in Guatemala; LaMontagne, Engle, and Zeitlin 1996, in Nicaragua). Blau, Guilkey, and Popkin's (1996) analyses with the Cebu, Philippines, data set underline the importance of well-paid work; children whose mothers worked in higher occupations appeared to have equal or better growth rates, using a rigorous model. Positive effects on either child nutrient intake or nutritional status were found when the work was well paid, when the income was in the hands of the mother, or when the child was over 1 year old.

Some studies have examined flexibility of work, closeness of work to home, and time-based work as measures of compatibility of work with child care. Compatibility is very important, but may need to be defined in the local context. For example, Doan and Popkin (1993) reported that informal work did not appear to be as flexible as often assumed, and was quite time consuming. Joekes (1989) has suggested that work at home may not be as compatible with child care as many assume if there is time pressure to finish work in a timely manner.

Clearly, however, the very young infants of women (1) from poor households, (2) who are engaged in time-intensive production activities, (3) have little control over income allocation, and (4) who do not have good alternate caregivers, are at risk of following low growth trajectories.

Variables that appear to be important in examining the roles of time availability and workload for children are (1) the coverage and quality of the alternate caregiving system, (2) child age and characteristics, (3) woman's control of earned income, (4) wage rate of work and flexibility of work, and (5) poverty of the household. Some are included in Table 6, but the remainder, as indicated in the last row, are in other tables. The use of

**Table 6 Workload and time availability of caregiver**

Indicator	Data Sources of Measurement Issues	Comments
Observed time in child care	Observed in sample of time, or continuously; define terms as including supervision or not	Observe all caregivers, age of child will be a critical factor
Recalled time in child care	24-hour recall most common; interview caregiver	Value of the measure may be quite limited; can improve measure with good interview techniques
Work characteristics: occupation, wage rate, security	Self-report, census data; often small-scale informal work is not counted	Important to examine control of income, alternate caregivers, level of assets of household
Flexibility of employment, compatibility with child care	Work location, time-based (wage) or not, transportation issues, how absenteeism due to child illness is handled	Informal work and piecework at home may not be flexible; depends on need for income, pressures for production
Quality of care during work time (mother or other caregiver)	Surveys, characteristics of alternate caregivers (e.g., age, gender) and their availability; observation of quality of care	Also assess instructions to alternative caregivers, amount of food preparation, etc.

time allocation as a measure of child care, probably the only widely used measure of child care to date, is discussed below.

#### SOCIAL SUPPORT RECEIVED BY THE CAREGIVER

The support provided to the primary caregiver can include explicit child care assistance, information provided to the caregiver, or emotional support provided to the caregiver.

One of the most important types of social support is alternate child care. The abilities of the caregiver to provide care may be particularly important for complementary feeding. Engle (1992) distinguishes between levels of care needed at various stages of development of the child. Care by anyone but the mother or a competent adult in the first year of life is associated with higher infant mortality; care needs in the second year of life are still very demanding, although the shortcomings of the caregiver can perhaps be ameliorated by good quality food availability and a healthy and safe environment. By the third year of life, many

children are capable of some degree of self care. Leslie's (1988) summary of findings suggests the possibility of negative outcomes for children of mothers who worked during the first year of life, but neutral or positive outcomes in later years of life.

The quality of alternate caregiving is rarely investigated. The only dimension of quality that has been examined so far is the age of the alternate. Some studies suggest that care by a pre-teen caregiver is associated with lower nutritional status of the child under 2 years, controlling for mother's education and socioeconomic status (Engle 1991; LaMontagne, Engle, and Zeitlin 1996). These effects are not unidirectional. Although women's work for earnings normally increases after her children pass through the critical first year, Doan and Popkin (1993) found that in the Philippines, women in the lowest income groups with more than one preschool child were more likely to work than those with fewer preschool children. Presumably, they had greater need to work regardless of the availability of alternate caregivers.

To date, the availability of institutional care for very young children is extremely limited in developing countries. However, a number of experimental attempts to provide this kind of care are under way, and some have been able to provide care for the youngest children (see Leonard and Landers 1992). The quality of these programs depends enormously on the quality of the support provided to the personnel (Young 1995). There are examples of community organizations that have played roles in increasing child feeding when mothers were unable to do so (e.g., UNICEF 1989 [The Iringa program]).

Although there are some cases of female-headed households providing better care for children, the overall trend toward an increasing number of female-headed households, an increasing percentage of women in the labor force, and the increased burden of older family members raises concerns for the burden on the primary caregivers—women (Bruce et al. 1995). Although men should be more involved with child care as women increase their time in the labor force, this change has been slow, with men still providing far less than an equal share of time in household chores and child care (United Nations 1995).

Fathers provide a particularly important source of emotional or informational support (see Engle and Breaux 1994). There is some evidence that when they contribute a higher percent of their incomes to family budgets, children are better nourished (Engle 1993; 1995). They may play particularly important roles when there is a tradition of female seclusion, as in Pakistan (Jahn and Aslam 1995). Their opinions about child caregiving can have significant effects on decisions about infant feeding, particularly breast-feeding (Scrimshaw et al. 1987). Yet little is known about fathers' beliefs and attitudes and the possibility of increasing their involvement in nutrition intervention programs.

For suggested indicators, see Table 7.

#### 4. INDICATORS OF CARE PROVISION

Indicators of care provision relate to two dimensions of caring behavior: time spent in those activities (quantity of care), the nature of the activities undertaken (quality of care), or some combination of the two dimensions.

##### TIME SPENT IN CHILD CARE

This section reviews the findings from various studies of time spent in child care, examines the validity of nonobservational measures of child care time, and discusses the usefulness of time in child care as an indicator. In general, the studies conducted are noncomparable due to different definitions of child care, and different methods of data collection (direct observation, random spot observation, and various recall periods). We

**Table 7 Social support for caregiver**

Indicator	Data Sources of Measurement Issues	Comments
Availability of alternate caregivers	Survey of caregiver when mother is working; dependency ratio; quality of alternate caregivers (e.g., age); survey of whether alternates are kept out of school for this purpose	Need more information on alternate caregiver quality; dependency ratio should focus on children under 3 years of age
Father's provision of emotional support	Surveys on father's role in decision-making; surveys and observations father's sharing of household and child care tasks; use qualitative methods to identify other providers of emotional or informational support	Observation is difficult; may use unobtrusive observations of father role; important to interview both men and women
Community support	Assessment of community institutions for child care-feeding programs, child care programs; qualitative, focus groups	Depends on local situation

conclude that time given to child care should be measured by direct observation, which, in addition to getting accurate measures of time allocation, allows the specific child care activities to be recorded.

### *Studies on Time Spent in Child Care*

A number of studies have attempted direct measurement of time spent by the mother in child care. Table 8 summarizes the estimates, definitions of child care used, and samples. Five studies use observational data and seven are based on recall data. These amounts range from a high of 7.34 hours per day in the Philippines (Blau, Guilkey, and Popkin 1996) and 6.33 hours per day in Indonesia (Gryboski 1996) to a low of 18 minutes per day in the care of others by lead females in Nepal (Paolisso and Regmi 1995; Paolisso 1994). The recent appearance of observational studies (e.g., Cohen et al. 1995a) provides us with a gold standard to evaluate the accuracy of estimates in recall studies. McGuire and Popkin (1990a; 1990b) presented a similar table for earlier studies, but did not analyze them according to the age of the child.

Of the observational studies, two used continuous observation for 12 hours (Cohen et al. 1995a; Gryboski 1996), one used a sampling of two-hour time blocks (Ricci et al. 1994) and two used spot observations (Paolisso and Regmi 1994; Baksh et al. 1994). The spot observations were translated into total time estimates by assuming that the percent of time the activity was observed represents the percent of time it will take during the day. For the presentation, all data are presented for units of a 12-hour day. Both total child care time, and time in breast-feeding, are presented. The definition is also shown. Most evaluated direct child care activities, but two looked at child-focussed activities, and two evaluated not only direct care, but also watching and child supervision. When supervision is included, daily means are almost five hours greater than the other studies. Thus the definition of "child care time" can substantially affect estimates.

Cohen et al. (1995a) observed that nonworking urban Honduran mothers of exclusively breast-fed six-month-old infants spent about an hour each 12 hours breast-feeding. When playing and holding the infant was included, time increased to 2.9 hours per day for primiparous women, and 2.6 hours per day for multiparous women. Total time in child-focused activities, including cleaning their clothes, was approximately 4 hours per day for primiparous and multiparous women. These times are lower than the 24-hour diaries of U.S. breast-feeding mothers, who reported 137 minutes per day of breast-feeding at 3 months, 98 minutes per day at 6 months, 81 minutes per day at 9 months, and 53 minutes per day at 12 months (Heinig et al. 1994); the 6-month-old children were not exclusively breast-fed.

**Table 8 Estimates of child care time from observation and recall: Observation**

Study	Sample	Method	Definition of Child Care	Age of Child	Results for Total Child Care Time	Results for Breast-Feeding	Comments
Cohen et al. 1995a 1995b	Honduras N=139	Continuous observation; simultaneous activities counted separately	1) All child-focused activities, including play and feed 2) play and feed only	6 months	1) primipara EBF <sup>a</sup> : 4.02 hours/12 hours; primipara mixed: 4.08 hours/12 hours; multipara EBF: 3.75 hours/12 hours; multipara mixed: 4.5 hours/12 hours 2) primipara: 2.9 hours/12 hours; multipara: 2.6 hours/12 hours	Primipara EBF at 4.4 months: 71 minutes/12 hours; primipara EBF at 6 months: 62 minutes/12 hours	Urban nonworking women
Heinig et al. 1994	United States N = 61	Well-kept time diaries	Breast-feeding only assessed	3 months 6 months 9 months 12 months	Not applicable	3 months: 137 minutes/24 hours; 6 months: 98 minutes/24 hours; 9 months: 81 minutes/24 hours; 12 months: 53 minutes/24 hours	From 6 months onwards, data is not on EBF
Paolisso 1994	Nepal N = 264 rural	Spot observation; only when care was primary activity	Hold, carry, breast-feed, wash, bathe, clean, give treatment	0-5 years	Adult female: 32 minutes/12 hours; lead female: 18 minutes/12 hours	16 minutes/12 hours if breast-feeding	Much shared child care; child care dropped after 1 year
Baksh et al. 1994	Kenya N = 169 rural	Spot observation; only when care was primary	Same	0-3 months 3-6 months 6-9 months 10-12 months 12-15 months NPNL <sup>b</sup>	2.85 hours/12 hours 2.59 hours/12 hours 2.30 hours/12 hours 2.02 hours/12 hours 1.33 hours/12 hours 0.60 hours/12 hours	16% of all child care time is in breast-feeding	High work demand; 84% of all care activities to children < 18 months
Ricci et al. 1994	Egypt N = 107 semi-urban	10 hours of continuous observation in 2-hour blocks	All child-focused: hold, socialize, supervise, feed, wash, illness,	18-23 months 24-29 months	3.8 hours/12 hours (.4) 3.6 hours/12 hours (.5)	32 minutes/12 hours (.4) 19 minutes/12 hours (1.5)	Times for mothers without other infant
Gryboski 1996	Indonesia N = 60 rural	18 days of records; 6 continuous observations, 12 recalls	Direct care plus supervision	3-35 months	6.3 hours/12 hours		Much shared care; 88% of days had shared care

(continued)

**Table 8 continued**

Study	Sample	Method	Definition of Child Care	Age of Child	Results for Total Child Care Time	Results for Breast-Feeding	Comments
Popkin 1980	Philippines N = 573 Laguna rural and semi-urban	Recall of specific activities over 1 week	None provided	1-71 months	Workers: 1.26 hours/day Nonworkers: 1.70 hours/day		Used predicted child care time of mother, siblings, father
Blau, Guilkey, and Popkin 1996	Philippines N = 2,876 rural and urban Cebu	Recall of hours per day previous day	Direct care plus watching	0-24 months	7.34 hours/day		Did not vary by child's age or mother's education
Brown and Haddad 1995	Kenya rural	Recall	None given		Nonlactating 36 minutes/day Lactating 63 minutes/day	27 minutes/day	Median length of breast-feeding = 22.5 (DHS) <sup>c</sup>
	Ghana Brong Ahafo N = 253	Recall	None given		Nonlactating 40 minutes/day Lactating 55.2 minutes/day	15 minutes/day	Median length of breast-feeding = 22.8 (DHS)
	Ghana Volta N = 278	Recall	None given		Nonlactating 52 minutes/day Lactating 50 minutes/day	-2 minutes/day	Median length of breast-feeding = 21.8 (DHS)
Bouis and Kennedy 1989	Philippines N = 448 rural	Recall of 24 hours of activity	Direct care: feed, breast- feed, play, bathe	0-5 years	Nonlactating minutes/day Lactating 148 minutes/day	Not given	Minutes/day breast-feeding = 16.6 (DHS)
Current analysis	Philippines N = 328 Bukidnon	Same	Same	0-1 years 1-2 years 2-3 years	About 2.5 hours/day About 1.5 hours/day About 50 minutes/day	About 40 min./day About 20 min./day About 15 min./day	Varies by round; rounded averages presented

<sup>a</sup> Exclusively breast-feeding.

<sup>b</sup> Nonpregnant/nonlactating.

<sup>c</sup> Demographic and Health Survey.

Ricci et al. (1994) report a mean of 3.8 hours in child-centered activities for children 18-23 months, and 3.6 hours per day for children 24-29 months in peri-urban Egypt. Breast-feeding time per day dropped with increasing age; for children 18-23 months still breast-feeding, 32 minutes per 12-hour day was spent, whereas for children 24-29 months, only 19 minutes per 12-hour day was spent breast-feeding. Mothers with a younger infant were not included in these analyses.

Observed care time drops dramatically after the first year or year and a half. In a rural, agricultural sample in which women have significant workloads (Kenya CRSP), Baksh et al. (1994) reported the equivalent of 2.85 hours per 12-hour day for all direct child care (holding, breast-feeding, health care, feeding, washing, dressing, and "other" activities) for children from birth through 3 months of age, which dropped to 1.33 hours per 12-hour day for children 12-15 months and 36 minutes per day for nonpregnant, nonlactating women. Eight-four percent of all care activities were addressed to children from 0-17 months, only 11 percent to children 18-59 months, and 4 percent to children 5 years and older. Only 16 percent of time, or 24 minutes per 12 hours, was spent breast-feeding across all breast-fed children (differences by age were not reported).

Depending on the setting, it will be necessary to estimate child care time by alternate caregivers as well, rather than only child care time by the mother. Gryboski (1996) in Indonesia observed care by nonmothers, even when mothers were present, on 88 percent of days. Paolisso and Regmi (1995) in Nepal reported 32 minutes per day in child care time for children 1-5 years by all females, and 18 minutes per day by the lead female (Paolisso 1994), using random spot observations. Only 42 percent of all child care activities observed were performed by the lead female; 25 percent were performed by a male in the household. These data are consistent with high rates of sibling care for children over one year of age among the Malian Fulani; weaned children under five years of age were in the presence of "their biological mothers (defined according to specific operational criteria) for only about 25 percent of their day. The rest of the time they spent with their older sisters, peers, or other members of the extended family or community" (Castle 1992).

Child care time estimated from recall is shown in Table 8. The two Philippine samples show very different investments in child care, but in the first, the publication did not specify how child care was defined, and in the second, "watched" was included as part of child care. Breast-feeding times were not disaggregated in either sample. In four samples (rural Kenya, two from Ghana, and one from rural Philippines) in which child care time was disaggregated by lactation status, nonpregnant, nonlactating women reported between 36 and 52 minutes per day in child care. Lactating Kenyan women spend, on average, 27 more minutes a day in child care than nonlactating women, and lactating Ghanaian women in one

sample spent 15 minutes more per day, and in the other sample, spent no additional time per day. These figures were derived from 24-hour recall, so they probably include night breast-feeding.

According to Bouis and Kennedy (1989), lactating Philippine women spend over an hour and a half more in child care (children aged 0-5 years) than nonlactating women. However, another analysis of the same data set (Engle and Bhattarai 1996) disaggregated child care and lactation times by the age of the child, and found lactation times more similar to the other studies—about 40 minutes in the first year, 20 minutes in the second, and 15 minutes in the third year (breast-fed children only, eliminating women who had an infant). If ages are not disaggregated, one cannot determine lactation times by subtracting the two estimates, since the children of nonlactating mothers are likely to be older. The low times in the African sample may also be due to extended breast-feeding (Demographic and Health Survey [DHS] estimates from 1993 for median duration of any breast-feeding are between 21 and 23 months, depending on the site). Therefore, the Kenya and Ghana samples may include an older group of children who are probably spending much less time breast-feeding. These data illustrate the importance of disaggregating time in child care by age of the child.

#### *Validity of Recall Methods for Time Allocation*

A small number of studies have evaluated the accuracy of time use data (e.g., Engle and Lumpkin 1992; Ricci et al. 1995; Piwoz et al. 1995; Engle, Hurtado, and Ruel 1996). The standard approach is to have one person observe activities and then have a different person interview the subject, and compare the number of activities correctly recalled and the accuracy of the duration of recall (e.g., Bernard et al. 1984).

Engle and Lumpkin (1992) found among middle-class U.S. and Guatemalan samples that it was more common for activities to be forgotten than for durations to be recalled inaccurately; in other words, the largest source of inaccuracy was forgetting the event completely rather than under- or overestimating the duration. A similar conclusion emerged from a study among rural indigenous Guatemalan women (Engle, Hurtado, and Ruel 1996). Given the importance of recalling the activity itself, factors that influence activities to be recalled need to be documented. Error rates appear to vary significantly by type of activity. In general, memory is superior for events that are easily coded (e.g., have a defined start or stop time) and nonhabitual or highly salient or important (Best 1989). Unfortunately, child care is a frequent, nonsalient activity and is therefore less likely to be encoded and less likely to be remembered. Not surprisingly, activities such as work are recalled with reasonable accuracy; however, recall accuracy for habitual, nonsalient activities like child care, is much lower (Engle and Lumpkin 1992; Ricci et al. 1995). In a pilot study to determine whether

recall could be used for the Kenya CRSP, Ricci et al. (1995) found that 83 percent of child care activities were not reported, and concluded that observations had to be used in the study. Instructions that facilitate recall have been found to increase the accuracy of recall (Engle and Lumpkin 1992).

A major difference in estimates of time in child care depends on how simultaneous activities are coded; some are coded as separate activities, resulting in a higher total time; others ignored the secondary activity. Much of child care time is a concurrent activity (watching or keeping an eye out) that is probably neither coded mentally by the caregiver nor assessed; on the other hand, it probably has an important protective role. When it is specifically included in the definition of child care, total time increases dramatically. Second, it is probably essential to assess all child care providers in the home, since so much child care is shared, and to interview the respondents directly. Another person reporting on someone's child care time may be highly inaccurate. For example, Immink et al. (1994) found that Guatemalan men's reports of women's days in farm activities were far lower than the days that women thought that they had spent.

#### *Time in Child Care Time as an Indicator of Care*

If time in child care is to be used as an indicator of care, it should be measured by direct observation, which, in addition to getting accurate measures of time allocation, allows the specific child care activities to be recorded. Should, however, the use of time in child care be used as an indicator of care provision? This question is raised because a number of studies do not find a significant association between energy intake or nutrition status of the child and time spent in child care by the caregiver.

A summary of ten studies (Table 8) does not lend strong support to the hypothesis that a quantitative measure of mother's child care time has a significant effect on child welfare. The studies addressed the issue of whether increased time in child care is associated with better child nutritional status or energy intake. Of the ten, three studies found significant positive effects of child care time on child anthropometric indicators. Two studies are from the Philippines; Popkin (1980) reported marginally significantly greater weight-for-age among children 1-35 months using recall data, and Blau, Guilkey, and Popkin (1996) reported significant associations of recalled child care time by different family members in the Cebu (Philippines) data set with weight for children 0-24 months, and mother's time with height. However, when fixed effects were controlled for, the only remaining associations with child weight were time by a nonfemale relative, and for child height, time by the mother.

Paolisso and Regmi (1995) found a marginally significant association of child care time by all family members on child weight for children 6-36 months in Nepal. The study was unique in using an estimate of observed total time in child care by all family members. Two studies using observational data (Gryboski 1996, Indonesia; Ricci et al. 1994, in Egypt) found no association of total time of the mother in child care and energy intake (kilocalories per day). In the former study, nonbreast-milk intake was greater when the child was cared for by someone other than the mother, although certainly breast-milk intake was greater when cared for by the mother. Ricci et al. (1994) in Kenya found that in the period between 18 and 23 months of age, "maternal child caregiving behavior was critical" for energy intake (kilocalories per day) (p. 302). The significant measure of care was frequency of feeding; but not total time in child feeding (food preparation, serving food, and feeding them).

Only the original Popkin study (1980) presents clear support for the importance of mother's time in child care. The author also reports a significant negative effect of time cared for by a sibling on child weight-for-age; possibly the mechanism here was an inadequate child caregiver.

This discussion leads us to conclude that time in child care may not be useful to predict child intake or nutritional status. As will be shown in the next section, collection of specific indicators of care may be a better investment of resources.

## SPECIFIC CARE BEHAVIORS

Whereas measures of the quantity of child care time have been somewhat ambiguously related to child outcomes, measures of quality of time, or of specific behaviors associated with good child care, have been more often associated with positive outcomes. For example, differences in ways of disposing of child wastes was found to be associated with lower rates of diarrhea (Cebu Study Team 1991), as were hygiene behaviors like boiling water prior to use (Cebu Study Team 1991). Positive caregiver/child interaction patterns and a nurturant home environment are significantly associated with later cognitive development of children in a variety of cultural ethnic groups (e.g., Bradley and Caldwell 1984; Bradley et al. 1989). Child growth has also been associated with observational measures of child-caregiver interaction (e.g., Barnard et al. 1989). Many investigators recommend that the quality of the home environment and the quality of the caregiver-child interaction must be assessed through observational means, even if the observation is brief (Heffer and Kelley 1994). This section discusses specific indicators of two caregiving activities—feeding and psychosocial care. The other care behaviors of breast-feeding, food preparation, hygiene, and health seeking and health care will not be discussed here, but these two will serve as models.

### *Feeding Behaviors*

Child and caregiver behaviors that could have associations with child nutrient intake can be categorized into (1) adaptation of feeding to the child's characteristics, including psychomotor capabilities (use of finger foods, spoon handling ability, ability to munch or chew) and appetite; (2) the caregiver's ability to feed responsively, including encouragement to eat, offering additional foods, providing second helpings, threats to stimulate eating, timing of feeding, response to poor appetite, and positive or aversive style of interacting; and (3) the feeding situation, including the organization and regularity of the feeding situation, whether the child is supervised and protected while eating, frequency of feeding, with whom the child eats, and distraction during eating events.

*Adaptation of Feeding to Child's Characteristics.* Caregivers need to be sure that children are capable of the self-feeding expected of them. However, children also have a drive for independence, and may eat more if they are allowed to use newly learned finger skills to pick up foods. A child's capacity to process food by suckling, sucking, munching, or chewing increases with age. For example, by 7 months of age, the "gag reflex" moves to the posterior third of the tongue, permitting the child to ingest solids more easily (Milla 1991, cited in Brown, Dewey, and Allen 1995). The duration of feeding decreases with age for solid and viscous foods, but not for purees. Children's abilities to hold a spoon, handle a cup, or grasp a piece of solid food also increase with age.

Poor child appetite plays a major role in inadequate nutrient intake (Piwoz et al. 1994; Bentley, Black, and Hurtado 1995). Factors that reduce a child's appetite may include a monotonous diet, lack of nutrients needed for appetite (e.g., zinc), illnesses such as fever (Neumann 1993), diarrhea, malaria, measles, intestinal parasites, chronic malnutrition, sores in the mouth (such as caused by teething), or anxiety (Dettwyler 1986; 1987). These problems are not unique to malnourished children; as noted earlier, 24 percent of parents in affluent societies report feeding difficulties with their two-year-old children. Thus the caregiver's ability to deal with child anorexia is significant for child intake.

Suggested indicators are lack of appetite and self-feeding—use of finger foods. See Tables 9 and 10.

**Table 9 Feeding behaviors: Caregiver/child interactions**

Indicator	Data Sources of Measurement Issues	Comments
Presence, absence of caregiver feeding behaviors	Observation of one or more eating episodes; can adapt existing scales (e.g., NCAFS) or develop list of behaviors related to (a) caregiver responsiveness; and (b) the feeding environment	Caregiver feeding behaviors will depend on child behavior, which should be recorded. May compensate for child behavior.
Quantitative assessments	Frequency of behaviors such as feeding, number of spoonfuls, number of touches	Must have careful training of observers, inter-rater reliability
Rating scales	Rate child and caregiver separately on scales representing domains of behavior with 1-5 point scales	Distinguished failure to thrive from normal U.S. inner-city children
Structured situation	Present a challenge to caregiver and observe what she does with the child, or return for a report	More often used in qualitative research; could be a quantitative technique

**Table 10 Feeding behaviors: Child variables**

Indicator	Data Sources of Measurement Issues	Comments
Appetite and hunger	Observed as whether food is completed or interest level during eating	May depend on specific food, or by initial or subsequent contact with food
Adaptive food preferences	Observation of child interest in standardized foods; survey of caregiver	Children who reject major food more undernourished; high incidence of "picky eaters" in FTT children
Child has characteristics preferred (or not) by parents	Use qualitative methods to identify variables—may be gender, parentage, physical attributes, birth order	These preferences are hard to assess directly; may use frequency of care as an indicator
Physical difficulties in self-feeding	Low birth weight (LBW); oral/motor dysfunction as diagnosed by physician; developmental delays in skills related to self-feed assessed by clinician	LBW associated with poorer suckling ability, oral/motor dysfunction fairly common in FTT children

*Caregiver's Ability to Feed Responsively.* Particularly with young children, feeding can be an active process; caregivers can encourage, cajole, offer more helpings, talk to children while eating, model eating behavior, and monitor how much the child eats. In many societies, caregivers are passive feeders, leaving the initiative to eat to children (child control of feeding) (Dettwyler 1987; Bentley et al. 1991; Engle and Zeitlin 1996). At the other extreme are cultural patterns which support caregiver control of eating, characterized by force feeding, continued and even intrusive pressure on children to eat (Brown et al. 1988; Launer and Habicht 1989). In this case, rather than providing an opportunity for interaction and educational enhancement, feeding can become a time of conflict with intrusive, but ineffective, caregiver strategies and high levels of child refusal.

Passive feeding may be due to lack of time and energy, or to beliefs that children should not be pressured to eat, that "the stomach knows its limits" (Bentley, Black, and Hurtado 1995). Although this belief may seem reasonable, if a child has anorexia or poor appetite, extra encouragement may be necessary for adequate nutrient intake. Anorexic children are difficult to feed. When anorexia is a problem, caregivers need to actively encourage food consumption. But this means having the time, knowledge, resources, self-confidence and support to encourage anorexic children to eat (Griffith 1988).

In situations in which feeding encouragement is relatively low, increased encouragement of eating has been observed when children are ill (Bentley et al. 1991) or refuse food (Engle and Zeitlin 1996). These findings suggest that active feeding may have a compensatory role rather than an enhancement role. In other words, the caregiver may be feeding more intensively if she perceives that the child is not eating. Caregiver understanding of and response to children's hunger cues may be critical for adequate food intake. For example, if caregivers perceive a child's tongue thrust, a typical mouthing response to new food sensations at a particular age, as a food refusal and cease to feed, a child will receive less food.

The person who is doing the feeding may influence the child's willingness to eat; often children will refuse food if the preferred caregiver is not present. Patience and understanding, plus recognizing the child's need to gain familiarity with the caregiver, will increase the chances of successful feeding. Caregiver beliefs about the appropriate level of demand for food by children can result in the shaping of children's behavior to reduce demand for food. If the caregiver feels that a child should learn not to ask for food, or that immediate responses to children's requests for food will represent "spoiling" or inappropriate indulgence of a child, particularly after infancy, the chances of the child achieving adequate intake are lowered, since child demand plays a large role in the amount of food ingested (Garcia, Kaiser, and Dewey 1990).

Studies comparing failure-to-thrive (FTT) children from normally growing children have found differences in the feeding style of the two groups. In FTT groups, an authoritarian disciplinary approach may override children's internal regulatory system for hunger, and there may be low maternal responsiveness and sensitivity to cues. This style may be combined with family isolation, and possibly difficult temperaments or subtle oral/motor feeding problems in the children, leading to a breakdown of the caregiver-child relationship (MacPhee et al. 1993; Black 1995). Interventions to modify these relationships through increasing family support have met with only modest success (e.g., Drotar et al. 1990), although one carefully executed experimental investigation showed significant effects on cognitive development, although not growth, among children when the intervention began prior to 12 months (Black et al. 1995). Strategies that use behavior modification, including shaping of parental behavior and presentation of positive role models, have resulted in changes in feeding behaviors. For example, among U.S. African American adolescent mothers, a videotape of positive feeding behaviors that was culturally appropriate and relied on social learning theory resulted in significant changes in the mother's attitude toward child feeding, and in observed maternal mealtime behavior, such as maternal communication, amount of verbalization, and quality of verbalization (Black and Teti 1996).

For suggested Indicators, see Tables 9 and 10.

*Caregiver Control of the Feeding Situation.* Children can be fed on a regular basis each day, sitting in a prescribed place with food easily accessible, or feeding can occur while children wander around, or at the time that the caregiver finds convenient. Children can be easily distracted, particularly if food is difficult to eat (e.g., soup with a spoon that is beyond the child's ability to handle) or not particularly tasty. If supervision of feeding is not adequate, other siblings or even animals may take advantage of a young child's vulnerability to take food away, or food may be spilled on the ground. Feeding from a common pot may reduce the chances of a younger child getting enough food, and may make it harder for a caregiver to be sure food has been allocated to the youngest child.

Studies in developing countries have found associations between specific feeding behaviors, such as location of feeding, organization of the feeding event, use of spoon, with mother's education (Guldan et al. 1993). The authors concluded that more educated mothers had more labor-intensive child care strategies, particularly in selecting a clean and protected location for feeding. Linkages with child nutritional status were not made.

Caregivers may not be aware of how much their children eat; one project found that when mothers paid more attention to the quantity children ate, they were surprised by the small amounts, and were willing to increase amounts fed (Dickin, Griffiths, and Piwoz

1996). When children are fed from a common pot, the amount eaten is not easy to determine. Having a separate bowl for each child can help the caregiver evaluate the quantities eaten.

Suggested indicators include a definition of the caregiver, caregiver encouragement, forcing, threats, modeling, etc. See Tables 9 and 10.

*Indicators of Care Provision in Feeding.* Five types of observational measures have been used to examine child and parent behavior in feeding situations: (1) observations of time in feeding, (2) presence or absence of specific feeding behaviors, (3) quantitative assessments (frequency of specific behaviors) of feeding behaviors, (4) behavioral ratings (to measure the quality of the caregiver-child interaction), and (5) structured situation challenge (the caregiver is presented with a new food and her reactions are observed). Recall of child or caregiver time in feeding was discussed in a previous section, and will not be discussed here.

*Observation of specific behaviors.* The most common assessment technique is to code the presence or absence of child or caregiver behaviors on a series of items that assess the presence or absence of a particular behavior (Barnard et al. 1989; MacPhee et al. 1993; Engle and Zeitlin 1996; Guldan et al. 1993). The most widely used instrument in clinical settings in the United States has been the NCAFS (Nursing Child Assessment Feeding Scale) Barnard et al. 1989), in which the observer watches a single instance of child feeding and rates the behavior according to carefully defined operational criteria on 76 items. The authors have defined a threshold (a score of 50 or less) which has been shown to distinguish high and low-risk infants' feeding behaviors (Farel et al. 1991). The scale is valid through 12 months of age. Use of the scale requires that the observer be trained to achieve a level of concordance with a previously certified trainer. Other scales from the United States include the MacPhee et al. (1993) (25 items), the Crittendon (81 items), and the Chatoor (46 items). The more items, the better the scale tends to discriminate between those with and without feeding difficulties.

In developing countries, a similar approach has been used. Guldan et al. (1993) in Bangladesh found a number of caregiver behaviors that differed by the mother's education level, adjusting for household education, wealth, child age, birth order, and gender. Variables associated with maternal education included some from each of the three categories defined above: (1) adaptation to the child's psychomotor skills (number of finger food feedings per hour, less likely to feed self, percent of time using cup, percent of time using bottle), (2) "responsivity of the feeder" (noticing when food was dropped, whether mother initiated the feed, caregiver less likely to be doing something else at the same time as

breast-feeding), and (3) the feeding situation (location, cleanliness, absence of distraction). The authors conclude that more educated mothers had "more attentive feeding practices" and "more labor-intensive child care" (p. 925). However, child behavior was not assessed.

The Guldan et al. (1993) study found frequency of feeding to be associated with maternal education. This variable has appeared to be associated with child anthropometric status in several studies. Frequency of feeding, observed during continuous observations, was associated with child nutritional status for children 18-23 months of age in Kenya (Ricci et al. (1994).

Engle and Zeitlin (1996) observed 37 different items per eating event in Managua, and constructed a scale for Active Feeding behavior of the caregiver and Child Demand from a subset of the items. Whereas child demand was associated with child nutritional status, active feeding was not; rather, active feeding was associated with child lack of interest in food, suggesting that caregivers in this situation may feed actively in response to child refusal.

Bentley et al. (1991) and Bentley et al. (1992) developed a scoring system to measure child and caregiver behaviors for each food rather than for each eating event. Rather than assessing the presence or absence of specific behaviors, they constructed a Guttman scale for child behaviors and for caregiver behaviors. The assumption behind a Guttman scale is that there is a logical order among dichotomously coded items, and that they tend to always appear in that order. Theoretically a scale based on a correct implicit ordering will be more predictive than a scale based on a simple sum, as in the Engle and Zeitlin study. For the child, the 3-point scale was food refusal, food appetite, and food request. For the caregiver, the scale was no response, verbally encourage, verbally pressure, and physically force. The scale illustrated that caregivers were more active feeders of children when they were convalescing from diarrhea than when healthy (Bentley et al. 1991).

*Quantitative assessments of feeding behaviors.* This approach counts the number of instances, rather than the presence or absence, of a behavior during a feeding episode (Polan and Ward 1994; Sanders et al. 1993; Klesges et al. 1986; Zeitlin, Houser, and Johnson 1989). If behaviors are relatively discrete, the number of instances of that behavior during a feeding episode, such as the number of times the mother touches the child, can be counted (Polan and Ward 1994). Sanders et al. (1993) rated the frequency of 14 parent and 17 child behaviors using the Mealtime Observation Schedule in Australia. For behaviors varying in duration, one can code whether or not the behavior is occurring after a fixed interval (e.g., every five minutes). Zeitlin, Houser, and Johnson (1989) coded the presence of active feeding behaviors and child feeding behaviors every five seconds for Mexican infants. In

each case, the measurement differentiated between well-growing and more poorly growing children.

*Behavioral ratings.* This technique rates the overall quality of the child-caregiver interaction. Black et al. (1994) have used this technique based on the coding scheme from the Parent Child Early Relation Assessment (PCERA) (Clark 1985). This technique is widely used for the assessment of child behavior (e.g., the Infant Behavior Record from the Bayley Scales for Infant Development) (Bayley 1993). A domain of behavior is defined (e.g., "Parent reads child's cues and responds sensitively and appropriately"), the domain is carefully described in behavioral terms (e.g., "This variable is composed of parent's ability to accurately observe the child's cues, to understand what the child needs and wants, and to demonstrate the capacity to respond appropriately") with some behavioral descriptions ("for example, if an infant squirms, or shows discomfort in the way s/he is held, a parent adjusts holding position; if an older infant tugs at mother's skirt, she responds to the need for attention by touching, holding, etc.") (Black et al. 1994). Finally, a dimension of levels (often five) is defined, and the coder has to decide which represents the overall behavior (e.g., 1: insensitive to child, oblivious, indifferent, or unresponsive to child's cues; consistently misreads or misinterprets child's cues; to 5= very empathic, characteristically reads child's cues and responds sensitively and appropriately).

In order to use the scale, coders must have experience with the codes and be aware of how to interpret them. Normally, they will be trained and must reach agreement with a previously trained coder before being able to rate these behaviors. If interactions are videotaped, coders should rate the child behavior separately from the caregiver's behavior (Black et al. 1995). Ratings from trained coders have been found to discriminate between children growing well and not growing well in the United States (Black et al. 1994). One of the reasons for using a rating system rather than predefined codes is that the caregiver's overall style, rather than specific behaviors, may be a better predictor of child outcomes. Black (personal communication) has compared the rating scale with a quantitative assessment of feeding behaviors and found no significant difference between the two; most of the variance in the quantitative measurement was captured by the rating scale.

*Structured situation challenge.* Under the rubric of "social marketing," the Manoff Group has employed a strategy of presenting the caregiver with a challenge, such as a new food, and observing the caregiver's behavior to assess acceptability and potential problems with the introduction. A recent volume explains in great detail the technique, and the way it should be used (Dickin, Griffiths, and Piwoz 1996). Although one could code each

observation systematically, the authors have used it in a more qualitative manner, assessing whether the innovation was acceptable and what kinds of problems appeared to arise in the situation. Validity of the method was not assessed.

These measurement techniques are, of course, prone to methodological problems. Does the caregiver being observed exhibit typical behavior? One can argue that even if the caregiver's behavior is altered, she is probably demonstrating her notion of ideal behavior, which can be revealing. For example, Black et al. (1994) found that 40 percent of mothers of children with failure to thrive were observed to neglect their children (interact rarely) in spite of being videotaped in a clinic setting, a behavior they might have felt was not ideal. There does appear to be evidence for the validity of these measures, since a number of studies have indicated that these brief measures can discriminate between children with feeding difficulties and normally growing children (Heffer and Kelley 1994). A second concern with these rather brief observations is their reliability over time (would the child and caregiver behave the same way on a different day?). Barnard et al. (1989) found consistencies in maternal feeding behaviors during the first year of life, but more research is needed in this area. A third concern is the generalizability of these behaviors to a different kind of behavior (e.g., is a caregiver who is responsive to the child during feeding also responsive to the child during play?). Black et al. (1995) found that there was more variability in maternal control in the play situation than the feeding situation, probably because feeding behaviors are more constrained, but maternal nurturance was similar in the two settings.

Other problems include deciding on which behaviors to code, establishing the reliability of coding the behaviors, defining the categories operationally, and deciding on the appropriate setting in order to evaluate the behavior. It is essential that observers be well trained and standardized in order for the assessment to have validity (meaning).

For suggested indicators, see Tables 9 and 10.

### *Psychosocial Care*

Psychosocial care refers to the provision of affection and warmth, responsiveness to the child, and encouragement of autonomy of learning. In this area, as in no other, is the importance of culture central. As noted earlier in the section on culture, a universalist perspective would suggest that the same function (e.g., showing affection) may be demonstrated differently by culture, and careful work with members of the cultural group is required to be sure that correct interpretations of behavior are made. For example, affection can be shown by physical, visual, and verbal contact with children. However, the patterns of expression may vary by culture. Becker and Becker (1994) warn that "any given indicator of

maternal attachment as derived in one racial group may not necessarily be valid in other racial groups" (p. 192).

*Indicators of Psychosocial Care.* Three categories of indicators of psychosocial care can be described: (1) direct measurements of child/caregiver interaction, (2) an assessment of the home environment, and (3) an assessment of the child's appearance.

*Observations of child/caregiver interaction.* Typically, indicators involve the frequency of caregiver behaviors, child behaviors, and child/caregiver interaction patterns are coded (see Rahmanifar et al. 1992). Behaviors most often assessed are verbalizations of child and caregiver, and looking and touching, although these behaviors will vary by the age of the child. A second technique is to present the caregiver with a task, such as asking her to play with a specific toy with her child, and then rate her behavior on a checklist (Barnard et al. 1989) or to count the number of times an event occurs. Several studies suggest two child risk factors: high percentages of time that a child is inactive ("doing nothing"), and excessive carrying and holding of a child after 18 months. High rates of holding and carrying children beyond 18 months of life has been found to be negatively associated with cognitive development and child social interactions (Wachs et al. 1991; Sigman et al. 1989), both because the holding and carrying restricts the opportunities for learning of the children, and because children who choose to be held tend to be lighter and more likely to be ill (Sigman et al. 1989).

*Assessment of the home environment.* The most commonly used global assessment of the living situation is the HOME scale. In an interview with the caregiver, both the environment and incidence of positive affect between caregiver and child are rated by the HOME scale (Bradley and Caldwell 1984). The HOME scale assesses both the emotional responsiveness of the caregiver and the characteristics of the environment supportive of autonomy and exploration (avoidance of punishment, provision of appropriate play materials or location, opportunities for variety in daily stimulation, and organization of physical and temporal environment) has been adapted and used in many countries, and has been shown to have consistent positive associations with cognitive development in a variety of settings (Bradley and Caldwell 1984; Bradley et al. 1989) apart from the effects of socioeconomic status.

*Child appearance.* Several studies have suggested that the appearance of a child rated either in a public place, such as the public health clinic (Joshi 1994) or rated over a number

of instances in the home (Allen et al. 1992) may be an indicator of care provision (or lack thereof). The latter group of researchers developed a checklist to rate child appearance, and were able to distinguish "poor but clean and well cared for" children from "wealthier but unkempt," and found highly significant associations between the indicator of child appearance during the second and third years of life and cognitive development at 30 months, which continued to be significant when controlling for SES, nutrient intake of animal fats, and length at 18 months.

For suggested indicators, see Tables 11 and 12.

## 5. CONCLUSIONS

Meeting the needs of the hungry, and addressing the problems of malnutrition, requires an understanding of each step in the process from seed in the ground to food in the mouth. The process includes the production of the seed, the process of growing the food, the harvesting, storage, and processing of the food, distribution through markets, arrival at the door of the household, distribution and usage within the household, and finally ingestion by family members, especially the hungriest and poorest in the family.

Attention has tended to be in the first steps of this process. This paper has reviewed conceptual developments related to the last stages of this process, the provision of care for improved nutrient intake, hygiene, food preparation and storage, health care access, and psychosocial stimulation of the child. We have reviewed developments in the care model and the implications for the measurement of care resources and care provision, with a special focus on feeding and psychosocial development.

In the last 10 years, much progress has been made in understanding the complex interaction of biological and behavioral factors that determine nutrition status (Allen et al. 1992; Kirksey et al. 1992; Neumann, Bwibo, and Sigman 1992; Pollitt et al. 1993; Cebu Study Team 1991; Haddad, Hoddinott, and Alderman 1996). These studies, and others

**Table 11 Psychosocial care: Child and caregiver interactions**

Indicator	Data Sources of Measurement Issues	Comments
Caregiver/child interaction	Naturalistic observation of caregiver and child for a short period; code variables such as delay to respond, type of response, and level of vocalization by caregiver and child	Depends on age of child and context; reliable and valid measures have been developed; key variables are time without interaction, "doing nothing"
Caregiver/child interaction rating scale	Rating of caregiver behavior in structured teaching or play situation	Allows valid measures in a brief time; limited if structured situation is too distinct from child's life
Overall rating of environment	HOME Scale (standardized rating scale)	Has been used in a variety of cultures; needs to be adapted to each setting carefully
Child appearance	Rating of appearance either in a public place, or over a period of visits	Need to be sure observers are reliable and can distinguish "poor but clean" from wealthier but unkempt
Caregiver's understanding of motor milestones	Assessment of caregiver's judgments about appropriate ages of development	May be linked to parental stimulation of cognitive development

**Table 12 Psychosocial care: Child variables**

Indicator	Data Sources of Measurement Issues	Comments
Alertness or drowsiness	Brazelton Assessment Scale for newborns; observations of child behavior	More caregiver interaction with more alert children
Verbalization	Count verbalizations during observation	Measurement depends on age of child
Rate of motor development	Test, observation	Earlier achievement of motor development associated with cognitive development
Physical health or disability status	Survey, observation, clinical observation	Depends on particular disability

like them, have provided a clearer idea of the linkages between quality of nutrient intake, growth, child/caregiver interaction patterns, and cognitive development.

Conceptually, the UNICEF model of nutrition and care can be expanded in two areas. First, it can acknowledge that effective care provision requires time and other resources, and second, it can allow the behavior of the child to interact with that of the caregiver to affect care provision. In order for care behaviors to be exhibited, the caregiver needs sufficient education, time, and support. The provision of these resources can be considered care for the caregiver. We presented an extension to the UNICEF model that incorporates care to the caregiver. Six major categories of resources for care can be identified from the literature. These include (1) education, knowledge, and beliefs, (2) health and nutritional status of the caregiver, (3) mental health, lack of stress, and self-confidence of the caregiver, (4) autonomy, control of resources, and intrahousehold allocation, (5) workload and time constraints, and (6) social support from family members and community.

The extended UNICEF model of child care is a useful framework for assessing the capacity and ability of the caregiver to provide care behaviors. However, a model of child care should include not only an assessment of the caregiver's behavior, but also the behavior of the child, and the characteristics of the environmental context. All three of these factors play a significant role in the eventual nutritional status of the child. We then presented a model of care that allows for these child-caregiver interactions.

A discussion of indicators to measure resources for all forms of care, and care provision in two specific areas—feeding and psychosocial stimulation—followed. Some of the resources have received considerable attention, for example, in the areas of maternal education and beliefs and maternal time use. Less is known about maternal nutritional status and maternal mental health and depression, although the latter two factors are probably significant constraints to care provision. The potential to improve the provision of care through more research and intervention in these two areas seems promising. On the other hand, the increased entry of women into the labor force without adequate child care support raises concern. We know surprisingly little about who alternate caregivers are, their capacity for providing care, and the nature of the transmission of caregiving instructions between primary caregiver and alternate. We speculate that one of the costs of caregiving to young children keeps older girls out of school. Lack of attention to the potential role of men in families in care, either through decisionmaking or through provision of at least some form of care, has eliminated a possible alternate source of care.

Two specific caregiving behaviors, psychosocial care and feeding behaviors, were discussed in depth, as was the estimate of time in child care by the primary caregiver. The other care behaviors of breast-feeding, food preparation, hygiene, and health seeking and

health care were not discussed here, because much more work has been done on these behaviors. With respect to child care time, the argument was made that, given the difficulties in measuring time through recall, and the need to account for all caregivers' time, these estimates should be complemented by measurements of the quality of child care time. A number of indicators were indicated for various dimensions of feeding and psychosocial stimulation.

The concept of "care" as an analytical construct is still new to many outside the nutrition field. Moreover, for those in the field, care is problematic from the measurement point of view. Our hope is that this paper has provided an effective introduction to care for the former group, and a useful summary for the latter group of attempts to develop care indicators.

## ENDNOTES

1. Throughout this paper, the term "caregiver" is used rather than "mother." Most of the time, the caregiver is the mother, but other females in the household also provide care. In virtually every culture, women are the primary providers of food, as well as the primary caregivers for children (Rogers and Youssef 1988, 33). It is usually women who shop, prepare, and distribute the food for family meals, and women who provide the basic nurturing and caregiving activities for children, such as feeding, cleaning, dressing, attending to illnesses, and keeping a watchful eye on the children's activities. As the classic paper by Weisner and Gallimore (1977) illustrated, in many cultures, siblings (primarily females) begin to be major caregivers when children are beyond one or two years of age. Women's time in direct child care has been found to decline precipitously as a child moves from breast-feeding and infancy status to walking, during the second year of life (Ho 1979; Cassidy 1987), although they may continue to supervise the care. When infants are ill, older female siblings may increase time in child care (Pitt and Rosenzweig 1990). When women are employed, care may be provided by others without supervision. Men also provide some care, although it tends to be holding and carrying rather than physical care (Engle and Breaux 1994). In Nepal, 25 percent of care for children 0-5 years was provided by adult males (Paolisso and Regmi 1995). In Pakistan, men traditionally shop for food and are more likely to carry and hold infants in public than are women (Jahn and Aslam 1995). Thus, it is necessary to broaden the focus beyond the mother in order to include all resources for care, whether provided by siblings, older relatives, the father, or institutions such as child care centers.
2. Care differs from caring capacity because "capacity" refers to a *potential* to provide care, but may not include whether or not the care is provided. However, if the caregiver has many constraints to care, she may not be able to put her capacity into practice. A second commonly used term that seems to overlap with care is "infant and young child feeding practices." However, feeding practices are usually assessed by interviewing the mother, and may reflect overall patterns of behavior rather than specific actions. What people actually do, on the other hand, may or may not be consistent with these general patterns of behavior. For example, a woman may state that she introduced complementary feeding to a child at 4 months of age, and forget the small bites offered to a curious child at 3 months, because they did not seem to be significant events, and were not encoded in her memory as foods offered. If she thinks that her overall decision was to introduce complementary food at 4 months, the small bites earlier may be inconsistent with her overall pattern, and therefore not

- remembered. Thus the reported infant feeding practice represents a simplification of behaviors consistent with belief, but not necessarily an accurate reflection of day-to-day behaviors. Both practices and behavior are important to evaluate, but the difference between them should be recognized.
3. Women's involvement in economic activities in the developing countries varies widely by region, from a high of 56-58 percent in eastern and central Asia, to 53-54 percent in Sub-Saharan Africa and southeastern Asia, 50 percent in the Caribbean and Oceania, about 30 percent in Latin America and western Asia, and 21 percent in northern Africa. Over the past two decades, men's economic activity rates have declined, whereas women's have increased substantially in all regions except Sub-Saharan Africa and eastern Asia, where they were already high (United Nations 1995). Work rates are higher for rural than for urban women in all parts of the world except for Latin America, but most of the rural work tends to be agricultural, more seasonal, and possibly fewer hours per day. Women in Guatemala who reported agricultural work were working, on average, only an hour a day (Engle 1989b).

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