CARE AND

NUTRITION

CONCEPTS AND MEASUREMENT

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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Library of Congress Cataloging-in-Publication Data

Engle, Patrice L.
Care and nutrition : concepts and measurement / Patrice L. Engle, Purnima Menon, Lawrence Haddad.
p. cm. — (Occasional paper)
Includes bibliographical references.
ISBN 0-89629-334-3
1. Child care—Developing countries—Evaluation. 2. Child development—Developing countries—Evaluation. 3. Children—Developing countries—Nutrition. 4. Children—Health and hygiene—Developing countries. 5. Nutrition policy—Developing countries. I. Menon, Purnima. II. Haddad, Lawrence James. III. Title. IV. Series: Occasional papers (International Food Policy Research Institute)

HQ778.7.D43E54 1997 97-13984
362.1'982'00091724—dc21 CIP

Contents

Tables

Illustrations

Foreword

In the past 10 years the view has been firmly established that the eradication of child undernutrition depends on three factors: household and individual food security, access to health services and a healthy environment, and the adequate provision of behaviors that have the collective label of "care." These care behaviors—mostly but not exclusively provided by women—are exhibited in many domains, including food preparation and food storage, breast-feeding and the feeding of very young children, rest and diet for pregnant and lactating mothers, hygiene practices, diagnosis and health-seeking behavior for young children, and the psychosocial stimulation of children.

The goal of IFPRI's Food Consumption and Nutrition Division is to contribute to the reduction of food insecurity and malnutrition through the conduct of policy research and outreach on food access and nutrition issues in the developing world. As is well known, individual and household food security is a necessary but not sufficient condition for overcoming child malnutrition: access to a range of complementary nonfood resources is also crucial. IFPRI has long recognized this as evidenced by its work on the determinants of nutrition status and in the area of intrahousehold access to and control of resources. The first body of work confirms that when increases in household income are translated into improved food security, they are not automatically translated into improved access to health care, clean water, and more time for child care. The second body of work highlights the key role of women in the provision of household food security and good child nutrition.

Care is perhaps the most amorphous of the three factors underlying good child nutrition. If it is to be more explicitly incorporated into food and nutrition policy research, care needs to be measured in a concrete way. In this paper, a development psychologist, a nutritionist, and an economist review new developments in the conceptual evolution of care behaviors and identify indicators of resources for care and for selected care behaviors.

As an analytical construct, care is still new to many outside the immediate field of nutrition. They might ask, what is care and why is it important? For those in the field, care is problematic from the measurement point of view, particularly since the concept of care is rapidly evolving. They might ask, how are dimensions of care monitored for programmatic and analytical purposes? The goal of this paper is to provide an effective introduction to care for the former group and a useful summary of attempts to develop care indicators for the latter group.

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Acknowledgments

The authors would like to thank the participants of two seminars hosted by IFPRI's Food Consumption and Nutrition Division for their useful comments and suggestions on earlier versions of this paper, and the insight offered by Ed Frongillo of Cornell University. All remaining errors are ours.

Summary

The concept of "care" as a determinant of child nutrition is still new to many outside the nutrition field. Moreover, for those in the field, how to measure care is problematic because caregiver responses and practices vary substantially from one culture to another. This paper is intended to provide an effective introduction to the care issue for the former group and to offer a useful summary of attempts to find strategies for measuring care for the latter group.

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 links between food availability, care practices, and nutrition of the child are well established but hard to measure. The significance of care has best been articulated in the framework developed by the United Nations Children's Fund (UNICEF 1990). This paper extends the UNICEF model in two directions. It defines resources needed by the caregiver and specific care practices, and it presents an argument that the child's own characteristics play a role in the kind of care that he or she receives. That is, the way that the child and the caregiver interact can affect the health and nutritional status of the child.

The resources that a caregiver draws on in giving care include education, knowledge, and beliefs; physical health and nutritional status; mental health and self-confidence; autonomy and control of resources; reasonable workload and availability of time; and family and community social support. Seeing that the caregiver has the resources needed is providing care for the caregiver.

Several studies indicate that more educated women tend to commit more time and effort to child care than less educated women. They are also more likely to seek help if a child is sick and to participate in community health and nutrition programs.

Large numbers of women in developing countries are chronically ill or undernourished. For example, 60 percent of women in South Asia have iron deficiency anemia. How does this affect their ability to care for their children? Studies in developed countries show that depression and stress affect the ability of mothers to interact with their children and can lead to failure of the child to thrive. Little research has been done in this area in developing countries, however.

Who controls household resources may also affect the nutrition of children. When women control household income, for example, they may direct larger amounts of food to children. How much time women have to devote to child care and how much other work they have to do are also factors influencing child outcomes. Whether a mother's work for income adversely or positively affects her child's nutrition depends on many other factors, especially the adequacy of alternate caregivers. The level of family and community support may be a deciding factor in this issue.

This paper discusses in detail two of the least studied care practices: complementary feeding and psychosocial care. (The other recognized care practices are care for women, breast-feeding, food preparation, hygiene, and home health practices.) Feeding practices that can affect a child's nutritional status include adaptation of feeding to the child's abilities (offering finger foods, for example); responsiveness of the caregiver to the child's cues (perhaps offering additional or different foods); and selection of an appropriate feeding context (deciding where, when, and with whom the child eats, for example).

Psychosocial care is the provision of affection and attention to the child and responsiveness to the child's cues. It includes physical, visual, and verbal interactions. The specific ways that affection is shown and patterns of interaction with children depend on cultural norms and cultural goals for children, but the underlying purpose of these interactions is consistent across cultures.

This paper also discusses measurement of care and suggests appropriate tools for measuring resources for care and the two care practices, based on a summary of recent literature. More research is required on the causal linkages between care and child nutrition, and that research will depend on further development of measurements of care.

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). Care is manifest in six types of activities practiced by caregivers (typically women)[1]: (1) care for women, such as providing appropriate rest time or increased food intake during pregnancy; (2) breast-feeding and feeding of young children; (3) psychosocial stimulation of children and support for their development; (4) food preparation and food storage practices; (5) hygiene practices; and (6) care for children during illness, including diagnosis of illness and adoption of health-seeking practices (home health practices) (Engle, Lhotska, and Armstrong 1997). Whether this care is provided 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, as well as family economic resources. It also depends on whether provision of care receives support at community, regional, national, and international levels, although these topics will not be specifically addressed here.

Although many researchers over the past 30 years have emphasized the importance of behavioral factors for adequate child growth under conditions of poverty and food constraint (Sims, Paolucci, and Morris 1972), the linkages between food availability, caregiving practices, 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 practices. Chapter 2 reviews the evolution of the original UNICEF conceptual model; Chapter 3 considers the constructs and measurement of care resources; and Chapter 4 looks at care practices. Chapter 5 concludes with suggestions for further research.

[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) illustrates, in many cultures, siblings (primarily females) begin to be major caregivers when children are beyond one or two years of age. Women's time spent on direct child care has been found to decline precipitously as a child moves from breast-feeding and infancy 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 spent on 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

Developments in Conceptualizing Care

UNICEF's (1990) original conceptual model of child survival, growth, and development, which identifies the role of care, is presented in Figure 1. In this model, care, household food security, and a healthy environment are the three underlying factors that determine the nutrient intake and health of children, and, in turn, their survival, growth, and development. "Care" refers to practices performed by caregivers that affect nutrient intake, health, and the cognitive and psychosocial development of the child.[2]

This model of care can be expanded in two directions. First, it should emphasize that effective care practices require time and other resources, and second, it should underscore that the child's behavior or characteristics play a role in determining care.

The Extended UNICEF Model of Care

In order to perform care practices, the caregiver needs sufficient education, time, and support. The provision of these resources by family or society can be considered care for the caregiver. In Figure 2, the UNICEF model is adapted to incorporate care to the caregiver. Six major categories of resources that caregivers need can be identified from the literature: (1) education, knowledge, and beliefs; (2) health and good nutritional status; (3) mental health, lack of stress, and self-confidence; (4) autonomy, control of resources, and control of intrahousehold allocation; (5) reasonable workloads and adequate time available; and (6) social support from family members and the community. These six are the human, economic, and organizational resources identified in the UNICEF model, defined at family and community levels (Jonsson 1995).

Education, knowledge, and beliefs represent the capacity of the caregivers to provide appropriate care. The physical and mental health (including self-confidence and lack of stress and depression) of the caregiver represent individual 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.

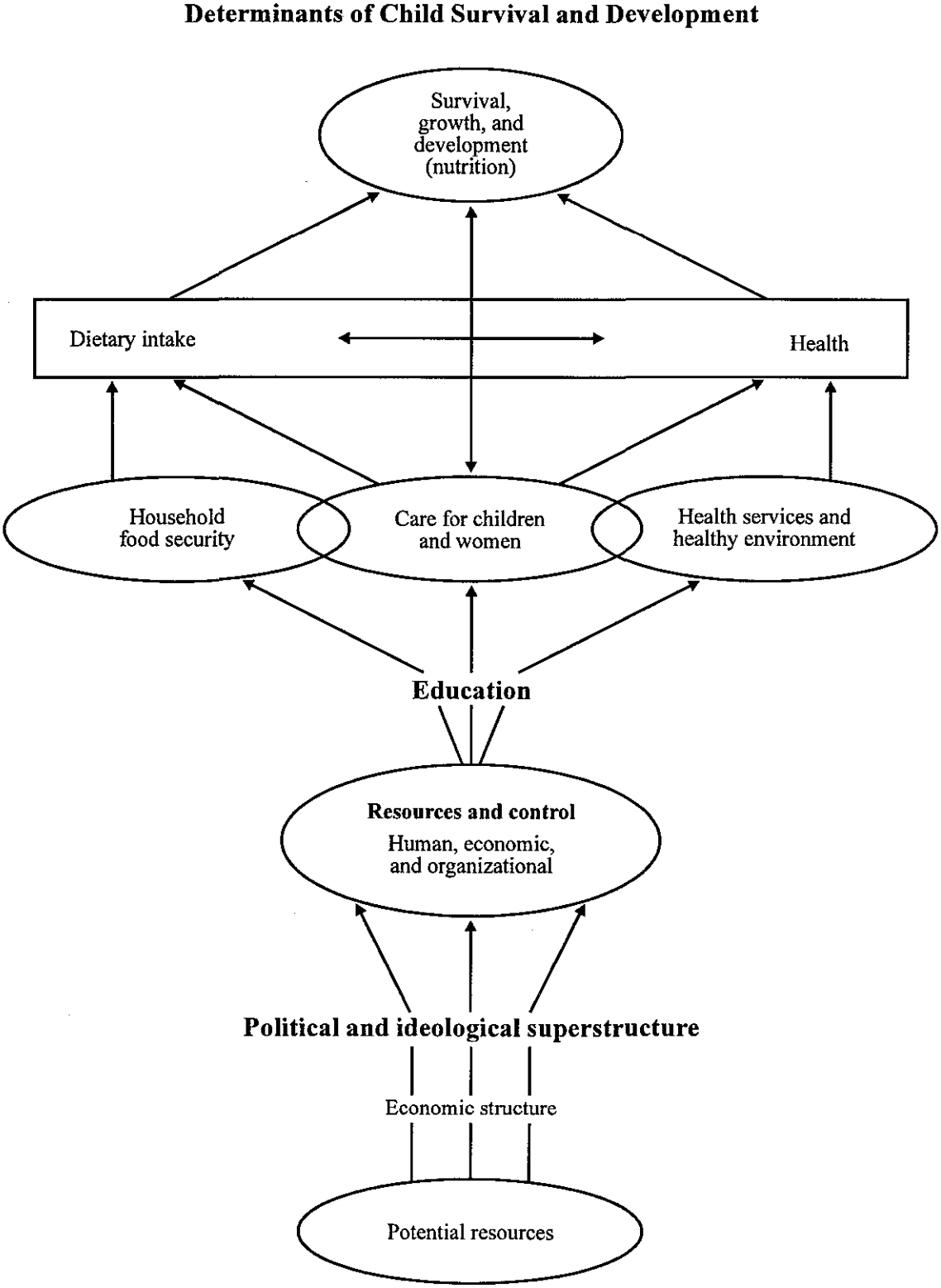
The Transactional Model of Care

The extended UNICEF model of child care is a useful framework for assessing the capacity and ability of the caregiver and family to provide care. However, a model of child care should assess not only the caregiver's behavior, but also the behavior of the child and the characteristics of the child's environment. 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 determining the care that they receive (see, for example, Bell 1971). Differences between children, such as endowed

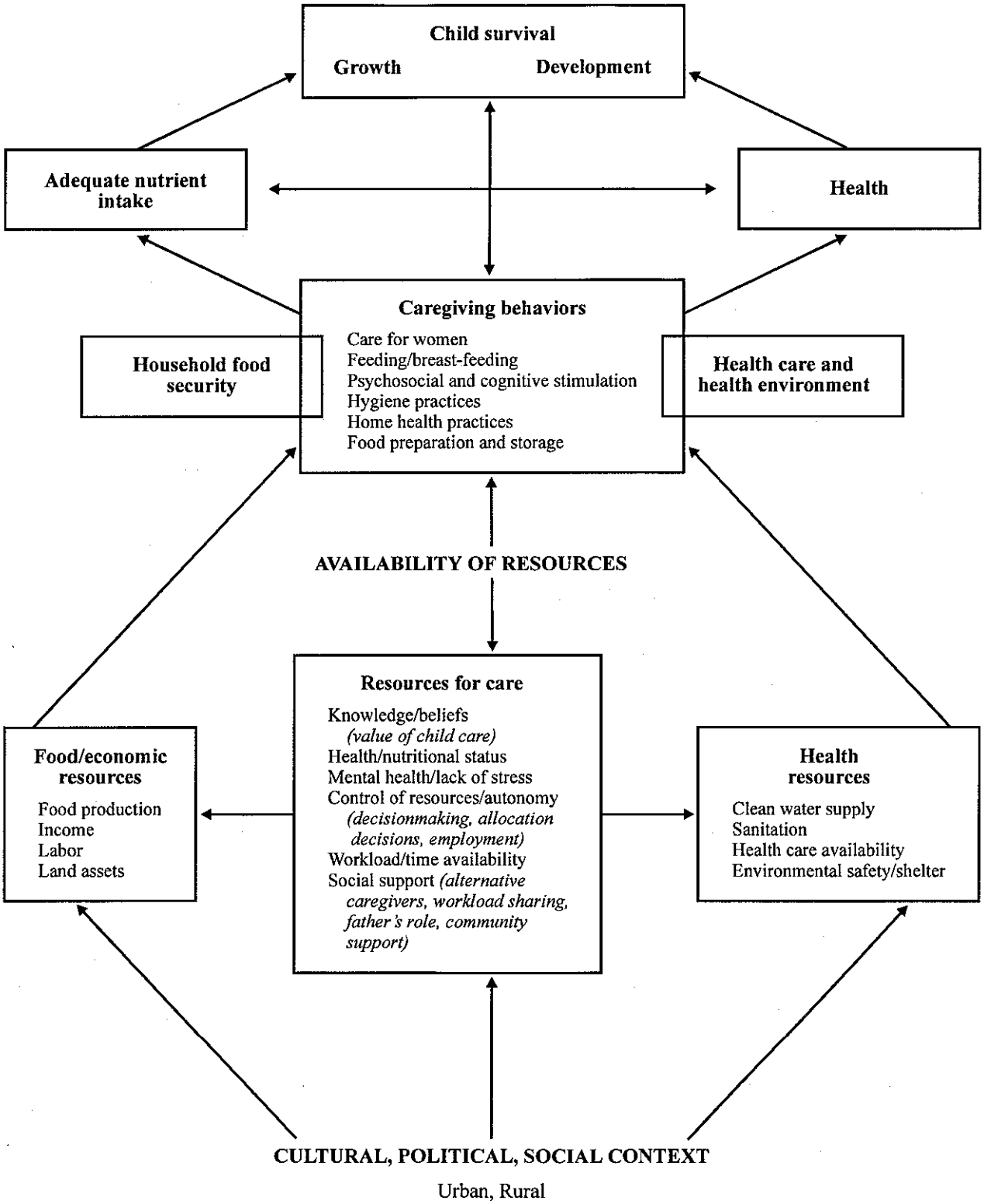
[2]Care differs from caring capacity because "capacity" refers to a potential to provide care, but it may not indicate whether the care is provided. If, the caregiver has many constraints to care, she may not be able to put her capacity into practice. A second commonly used term that seems to overlap with care is "infant and young child feeding practices." However, feeding practices, which are usually assessed by interviewing the mother, 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 four months of age and forget the small bites offered to a curious child at three 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 four 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 practices consistent with belief, but not necessarily an accurate reflection of day-to-day practices. Both practices and behavior are important to evaluate, but the difference between them should be recognized.

Figure 1—The UNICEF conceptual model



Source: UNICEF 1990.

Figure 2—The extended model of care



healthiness, perceived vulnerability, perceived weight, and even physical attractiveness, affect the practices of their caregivers.[3] The transactional model of care argues that the results or effects of a child's 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 (or caregivers). This *affective*, or emotional, relationship is a unique and life-long bond between two humans, called an attachment (Ainsworth et al. 1978). Problems in this emotional relationship can contribute to child malnutrition or ill health or may result in attachment problems. For example, Valenzuela (1990) found that in Chile, children who were undernourished were far less likely to be securely attached to a caregiver, though this association could not be interpreted as causality.

The 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). Attachments have been divided into those that are secure (about two-thirds) and those characterized by ambivalence and the child's avoidance of the caregiver in middle-class samples (Ainsworth et al. 1978). Attachment can be assessed in a standardized situation and has been measured in many different cultures, although there are some questions about the validity of the measurement of attachment across cultures (Becker and Becker 1994).

A critical aspect of quality of care seems to be responsiveness to the child's cues, verbalizations, signals, and so forth (see, for example, Bronstein 1991). Responsiveness 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. Not acceding to inappropriate demands by active and well-nourished children is an important part of a caregiver's responsiveness. Usually, a positive emotional (affective) relationship between caregiver and child will be reflected in warm and responsive caregiving practices. However, the lethargic or unresponsive child will have a harder time stimulating a caregiver's responsiveness.

The extended UNICEF model can be adapted to include the relationship between child and caregiver (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 caregivers and child and the resulting care practices 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.

Arrows 1 through 4 represent well-known linkages. Arrow 1 links growth and cognitive development. This relationship has been demonstrated in numerous studies, including three of the Collaborative Research Support Program (CRSP) Nutrition studies, funded by the U.S. Agency for International Development (USAID) (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 (Pollitt et al. 1993; Engle et al. 1993), although increasing interest in micronutrient deficiencies may again lead to a brain model for explaining these effects. Lozoff, Jimenez, and Wolf (1991) offer one example.

Arrow 2 suggests that the caregiver-child relationship is important for the child's cognitive and psychosocial development. Many psychological studies support this linkage.[4] Arrow 3, the link between dietary intake and growth, is well known, as is Arrow 4, the link between morbidity and slower growth.

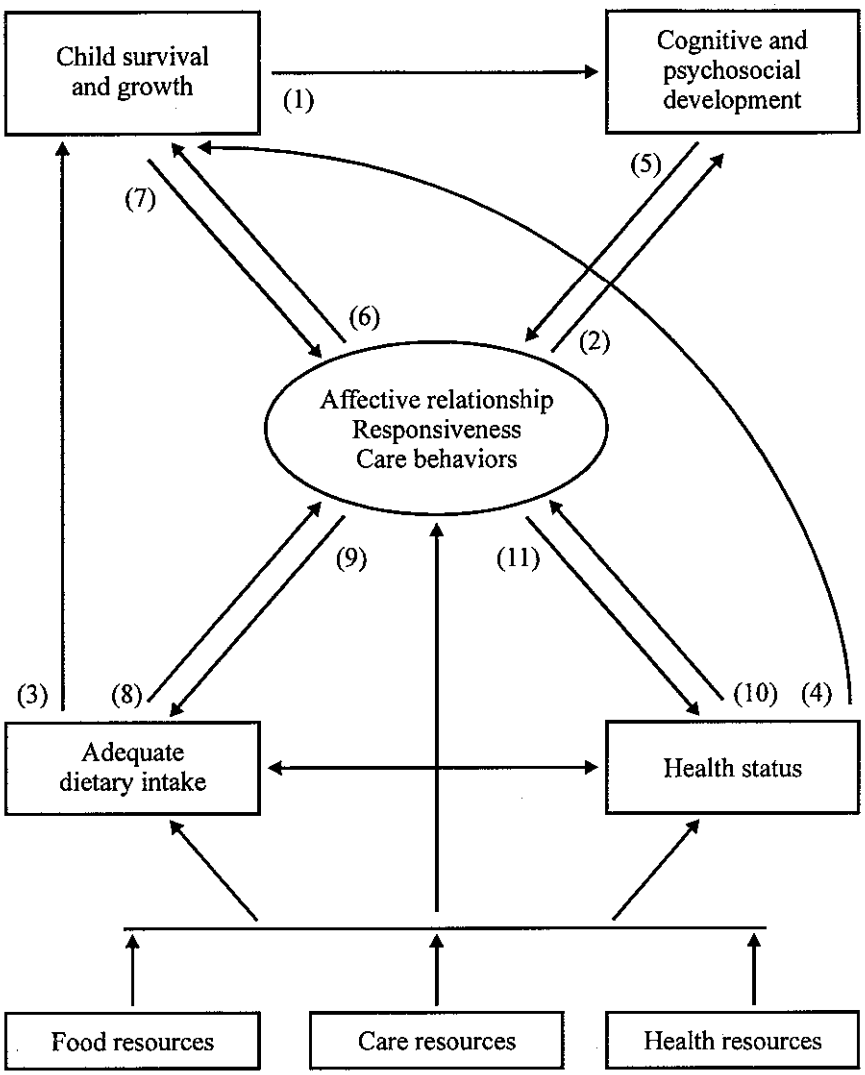
Arrows 5 through 11 represent the effects of interaction between the child and the caregiver. Arrow 5 suggests that a child who has a higher level of cognitive development will be better able to build a positive affective relationship with the caregiver. Although fewer data exist to support this linkage, recent findings from the Nutrition 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 improve-

[3]See Engle and Riccuiti 1995 for a summary of this argument.

[4]See, for example, Rutter 1990; see Engle, Castle, and Menon 1996 for a summary.

Figure 3—The transactional model of care



ment in growth and cognitive development of children when they were assigned to a particular caregiver who routinely provided care and stimulation (Dennis 1973). More recently, a series of studies by Field and colleagues with preterm infants indicate 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, which has also been illustrated with rat pups, may occur as a result of stimulating the growth hormone (Schanberg and Field 1988). Although the variable manipulated in this case was not attachment, touching and stroking of infants is usually a component of a positive and responsive relationship.

Arrow 7 suggests that the child's growth may be associated with the affective relationship and, therefore, may affect the care received. Some data suggest that better nourished, larger children may receive more care (Arya 1989), 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, larger children than with smaller children (Allen et al. 1992). In addition, the lack of responsiveness of low-birth-weight children has been associated with poorer feeding practices 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 feeding problems (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 interactions between parent and child among the NOFFT group (Black et al. 1994). The causality is difficult to untangle, although one study did find a 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 proposes 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 ingest less food than well-nourished children (Black et al. 1994; Heffer and Kelley 1994).

Arrow 10 indicates that the health of the child may influence the nature of the affective relationship, leading to either 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 the health status of the child by affecting health care treatment and the health care sought (Arrow 11). Although direct evidence for this relationship is lacking, differences in health-seeking behavior by gender of the child frequently reported in the Indian subcontinent may be examples of caregiver preference influencing health care treatment. That is, treatment is more likely to be sought for boys than for girls in that region. However, without further evidence, it is impossible to determine whether the reduction in 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 this context to enhance child survival, growth, and development.

3

Resources for Care

As research in a particular domain increases, there is a natural progression from an initial definition of relevant constructs[5] to the development of valid and appropriate measurement tools and finally to the determination of indicators of risk. For example, with respect to children's nutritional status, researchers now largely agree on the relevant constructs (such as growth), measurement tools (anthropometric measurements), and risk indicators (–2 standard deviation height-for-age on NCHS norms) (UN ACC/SCN 1989). After considerable debate, most investigators accept that these indicators apply across cultural and ecological contexts. A similar process must occur for care. Constructs have to be agreed upon, measurement tools identified and tested, and appropriate indicators of risk and benefit determined. Although there has been considerable progress in industrialized countries in defining constructs and measurement tools relating to cognitive and motor development in children, similar progress has not been made in developing countries, and there has been much less attention given to the effects of these caring practices on children's nutritional status in any setting.

Cultural variation is likely to be a more important consideration in developing indicators for care practices than for nutritional status. First, cultural differences in caregiving practices and resources are often substantial. In one society, conversation-like interaction with infants is assumed to be essential for their cognitive development, whereas, in others, talking directly to an infant who cannot yet say any words is seen as of no value. For example, one study found that Kenyan Gusii mothers were as likely to hold, touch, or carry a nine-month-old infant as a three-month-old, whereas American mothers were more likely to verbally stimulate a nine-month-old than a three-month-old (Richman, Miller, and LeVine 1992). Second, care behaviors are likely to be determined by the society's perception of their goals for children. In some societies, obedience, loyalty, and hard work are valued in children, whereas, in others, verbal assertiveness and independence are valued (Nsamenang 1992). Third, even though there may be good agreement on the constructs that are important, such as active feeding behaviors, and even the measurement tools, finding indicators that are not dependent on the context may be difficult. For example, active feeding of young children may be important where food is of poor quality and anorexia in children is common, whereas it may be irrelevant where there is high-quality food and little anorexia. Thus it will probably be necessary to examine the definition of constructs, measurement techniques, and indicators of risk and benefit as three separate processes. Developing measures 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 (for example, a greeting) but that the ways that these functions are expressed will differ by culture (wave, verbal, gaze, touching, and so forth). For example, Freedman (1979) asked 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 infants' response was to wave their arms and legs. The Native American women, on the other hand, used looking and gazing to

[5]A construct is "a concept used in a particular theoretical manner that ties together a number of observations." It cannot be observed directly but, like gravity or evolution, is indirectly inferred from data (Ray 1997, 22).

attract their infants' attention, and the infants 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, the functional equivalence of the two practices (vocalization and gaze) would be missed. The universalist approach is generally accepted as the most adequate and is attempted here.

A second principle guiding cross-cultural psychologists is that individual differences within a culture may be as important as between-culture differences. In fact, several cross-cultural studies suggest that within-culture differences in many of these practices 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 recognized in defining care practices, but the possible functional equivalence of practices should also be evaluated. As indicators and assessment strategies are developed, they must focus on the function that the practice is intended to achieve within the cultural context.

There are many different techniques that can be used to measure the constructs of care or constraints to care. Some of these constructs can be measured fairly easily, such as whether the caregiver washes hands with soap and water prior to food preparation, whereas others are harder to assess and analyze, such as the quality of responsiveness of the caregiver to the child. Similarly, some of the constraints to care have well-defined constructs, such as the nutritional status of the caregiver, whereas others are more difficult to define, such as the caregiver's self-esteem. Many of these care practices and constraints (for example, maternal responsiveness or child attachment) have proved amenable to quantitative analysis in the United States and Canada, but the validity of the measures has not been assessed in other cultural contexts. Given the universalist perspective, one should search for the functional equivalent of that practice in each cultural context. Qualitative methods will be useful for this phase of the process.

A second approach to defining the appropriate constructs, measurement tools, and indicators is to assume that there are a variety of possibly adaptive child-rearing methods and a much smaller range of inappropriate methods. Therefore, the research endeavor becomes one of identifying instances of inappropriate or possibly harmful practices or of debilitating constraints to care. In all cases, it will be essential to evaluate and respect the current cultural adaptations for care.

Various measurement tools have been developed and employed to assess care. These include questionnaires or interviews asking parents or caregivers to describe their care practices and their children's typical behaviors and daily activities; qualitative rating scales with behaviorally defined scale points to assess broadly stated characteristics of care; systematic observations of the caregiver and the child in their natural setting (not in a laboratory); experimental procedures followed by observation of the child's and caregiver's responses and coding of the frequency of particular practices to construct a summary score of different items; and detailed observational coding of ongoing sequences of caregiver-child interaction, aimed at characterizing relevant features of the relationship of the pair.

Some of these strategies for assessing the quality of care in the research studies require extensive observations and technical methodologies. Therefore, they are not feasible for practical use in the field. However, some of these approaches to the measurement of care may be adapted for practical field use in assessing breakdowns in or threats to care. The relevance of these constructs and 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. 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 the development of measures 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.

It must be noted that the quality of a construct, measurement tool, or indicator will increase as more investigators and program planners use and refine them. For example, because of extensive work on measuring daily dietary intake, there are useful techniques for measurement, even though the construct of "daily intake" is complex. Similarly, the measurement of cognitive ability has received an enormous amount of attention, and numerous valid measurement tools exist. When more time is given to the assessment and analysis of care practices or behaviors, there is every reason to expect that valid measures can be developed and that indicators will eventually be defined.

The remainder of this chapter is a discussion of suggested constructs and measures of care: both quantitative, relatively well recognized, and objective measures and those that are either of a qualitative nature, more difficult to collect, less well understood, or more specific to the culture. In some cases, the construct is

defined, but the measure is not yet available. The six categories of resources for care identified earlier are examined in detail.

Caregiver Education, Knowledge, and Beliefs

Effects of Maternal Education on Child Care

Maternal education is associated with the level of care provided. Three examples of caring practices are considered here: breast-feeding, health care seeking, and interacting with the child. The pathways through which maternal education affects caregiving practices are also 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 supportive 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 on breast-feeding tend to predominate. In Brazil, for example, maternal educational levels have been 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 intensive care for their children (that is, less distraction while feeding, a cleaner feeding environment, and more frequent initiation of child feeding). In the same study, however, more education is also associated with less adequate feeding practices, such as termination of feeding by the mother more often than by the child, a larger number of bottle feeds per day, and fewer breast-feeds per day.

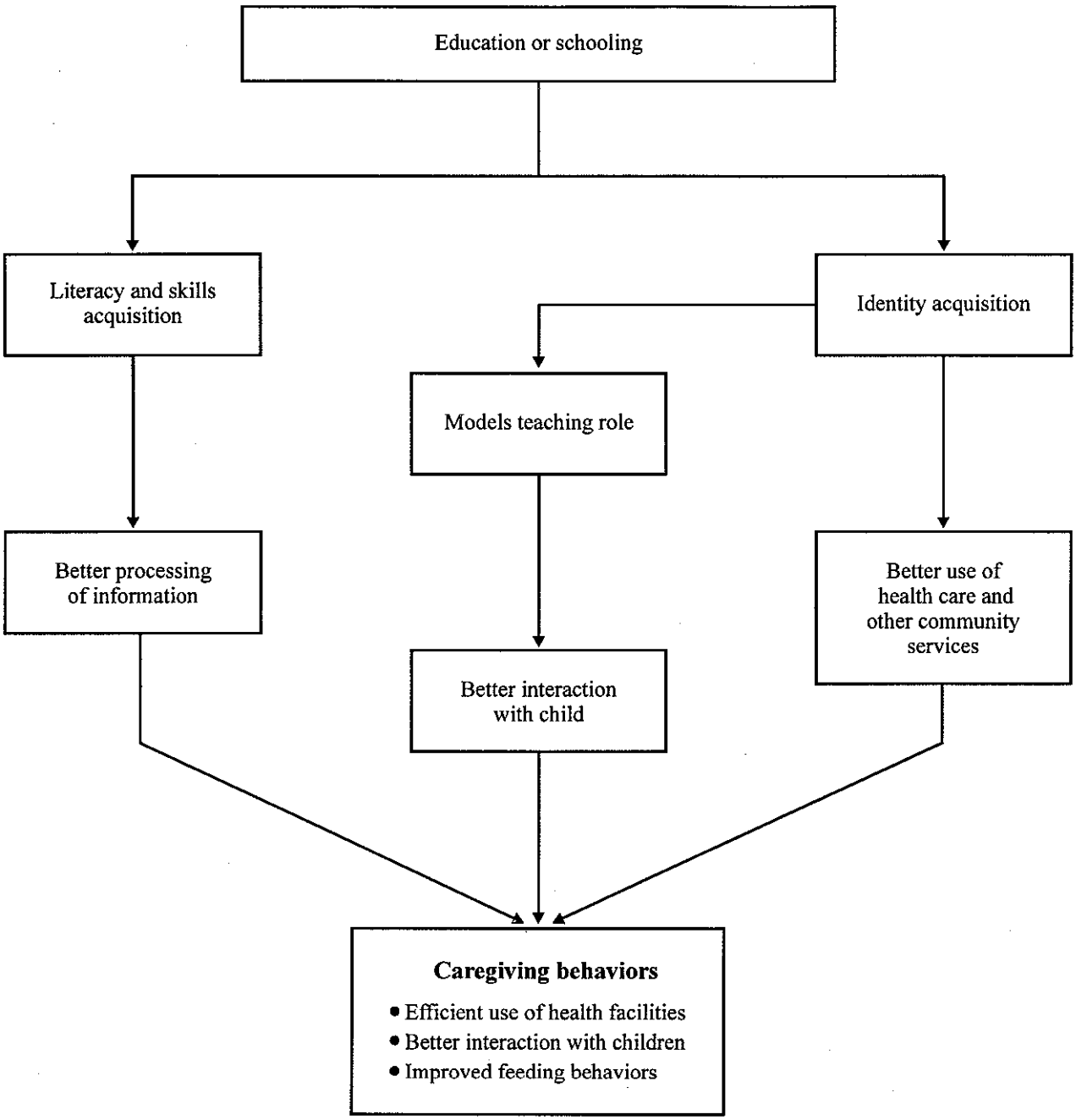
Home Health Practices. Another caring behavior associated with child health and nutrition is the family's home health practices, both preventive health care (immunization, antenatal care for the mother, and so forth) and seeking health care in the event of morbidity. The effects of education on health-care-seeking practices are well documented; it is becoming increasingly evident that maternal education affects a child's health and nutritional status through its effect on the mother's health-care-seeking practices. Better-educated women are more likely to use 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 toward child care among educated women (LeVine et al. 1991; Richman, Miller, and LeVine 1992). In Cuernavaca, Mexico, LeVine et al. (1991) found that mothers who had attended school longer adopted a style of interaction with their infants that was stimulating to infant development, rather than the nurturing style adopted by mothers with fewer years of education. Better-educated women are more vocal with their infants even though their infants are likely to grow up to be more vocal themselves and therefore to require more attention as toddlers (Richman et al. 1988). Richman, Miller, and LeVine (1992) find that better-educated Mexican mothers are more likely to feed their children when they cry. The better-educated mothers are more likely to modify their responsive practices to the age of their infants than less-educated women do. For example, when their children are 10 months old, less-educated women continue to hold them frequently, whereas better-educated women are more likely to interact conversationally at this age.

The pathways through which maternal education affects caregiving practices are (1) the ability to process information, (2) the ability to acquire skills, and (3) the ability to model behavior (Figure 4).

Processing of Information. According to Thomas, Strauss, and Henriques (1990) and Barrera (1990), it is predominantly because an educated woman is more knowledgeable that she is better able to use health care facilities, keep her environment cleaner, and thereby benefit her children. Barrera (1990) proposes that maternal education affects child health by "affecting the productivity of inputs . . . and lowering the costs of

Figure 4—Pathways of interaction of education with caregiving



information." These sources suggest that one of the likely channels through which maternal education affects child height is by improving the woman's ability to acquire new knowledge and process it appropriately. Information processing, measured by reading newspapers, listening to the radio, watching television, and retaining the information, differs from traditional measures of schooling because it reflects the current capacities of the woman, rather than her history. Thus it may be a better indicator of her current abilities to care for her children. These measures explain almost all of the impact of maternal education on child health, but the exact type of "information" that brought about this effect is not identified (Thomas et al. 1990).

Following similar reasoning, Tucker and Sanjur (1988) use "maternal differentiation" rather than maternal education in their analysis of correlates of child nutrition in Panama. Maternal differentiation is a composite variable that incorporates not only years of education, but also current nutrition knowledge, frequency of reading, and a measure of household productivity. Thus, this measure includes evidence of use and retention of information, which they feel is theoretically more coherent than merely using years of schooling. "Maternal differentiation" is positively associated with children's dietary intake and anthropometric status in their study.

The Acquisition of Skills. Skills acquisition, or learning material from school, is one way for women to build a knowledge base to guide behavior and learn patterns of practices that are useful for participating in modern bureaucracies (Joshi 1994; LeVine et al. 1991). With this knowledge, it is hypothesized that these women can make better use of health care services, interact effectively with doctors and nurses (Joshi 1994), and comply better with treatment recommendations (Ware 1984). The primary skill learned in school is literacy. Joshi's (1994) finding that the association between maternal schooling and health care utilization behavior (talking to a doctor) loses significance when controlled for literacy suggests that the effect of schooling on child health may primarily stem from becoming literate, rather than from the more often elaborated notion of becoming an "information processor."

Identity Acquisition. The third suggestion is that women change and take on a different sense of self or identity when they become schooled. The theory of "identity acquisition" proposes that it is not literacy alone that determines the practices 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 helps women identify with the role of a teacher as well as that of a student (LeVine et al. 1991). This role change makes them more amenable to new information and also more interactive and stimulating in their child care practices.

Using data from Nepal, Joshi (1994) finds that the caregiving behavior of keeping a child clean is more affected by maternal identity as a schooled person than by the skill of literacy. Maternal identity is assessed using maternal appearance and posture as proxy measures; women who are more erect and assertive are judged to have a "schooled" identity. Making sure that a child is clean when taken to a doctor, the caring behavior, is significantly associated with years of schooling when controlled for literacy but not when controlled for identity. Therefore, Joshi suggests that the association of maternal years of schooling with child cleanliness is mediated through identity, not literacy.

Clearly, the use of education as a measure of care is complex, even though some studies reported here demonstrate that the quality of care given is enhanced by education of the mother. The measures of education used in the literature include literacy status (literate or illiterate), the level of education completed (primary, secondary, and so forth), and the number of years of education, as well as measures 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 measures of education for care are developed. Identifying practices of educated women and how they differ could also help develop cultural-specific measures for the processes through which education affects care. (The measures developed by Joshi [1994] are good examples of this approach.) For suggested constructs and measures, see Table 1.

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. They can be invaluable, however, from the point of view of assessing the sociocultural causes of and reactions to malnutrition, infant feeding practices 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

Table 1—Education of caregiver

Construct	Measurement tools	Comment
Years of schooling	Self-report, school records, existing data	Number of years that makes a difference varies by context
Literate or 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, professionals	Will depend on the setting

nuances in beliefs among cultures that are gleaned primarily through qualitative and anthropological studies. The care resource measures that are expected to emerge from this discussion are beliefs about breast-feeding, infant feeding, and infant growth.

Breast-Feeding Initiation. Cultural beliefs appear to be important in determining both the initiation of breast-feeding and its termination. 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 weaning onto an adult diet are another pregnancy (or the desire for another child), perceived breast-milk insufficiency, certain developmental milestones achieved by the child, or a combination of these reasons (Harrison et al. 1993; Almedom 1991a, 1991b; Cominsky, Mhloyi, and Ewbank 1993; Martines, Ashworth, and Kirkwood 1989; and others). Perceived breast-milk insufficiency is the most commonly reported reason and the perception of insufficiency is often based on the crying of the infant. One study reports that for some, the father made the decision to terminate breast-feeding, possibly because of the belief within that culture that breast-feeding mothers should not have intercourse (Harrison et al. 1993, in Egypt). This study also observed that the quality of breast milk is perceived to change with the age of the child, and this affects the choice of a wet nurse (a mother with an older infant is not allowed to nurse the younger infant of another woman).

In Egypt, the timing of the weaning is important to minimize the risk of exposure to the "evil eye" by ensuring no contact with a menstruating woman or a newly wed woman at the time of complete weaning (Harrison et al. 1993). In Ethiopia, the timing of weaning depends on the season, with the preferable season for weaning being the winter (related to the abundance of barley in the winter (Almedom 1991b).

Maternal Characteristics and Breast-Feeding. In Egypt, breast-feeding is associated with responsibility and maturity in a woman, and very young mothers are not expected to breast-feed (Harrison et al. 1993). The same study reports that the psychological state of the mother is considered important to successful breast-feeding. The breast milk of mothers who are sad or emotionally disturbed is believed to cause diarrhea in their children. In some cultures, the diet of a mother is believed to be important when she is breast-feeding; if the infant falls ill, the mother is given special foods or drinks so that the breast-fed infant will 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. Often, the mother is blamed for an infant's illness and may even be treated for it (Reissland and Burghart 1988).

Complementary Feeding. The fear of "spirits" that can disturb the child pervades a number of care-related practices in Indonesia; effort is 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), he or she 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 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, the child is not pressed to eat if he or she appears upset; "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 7 months, because the child is believed to be helpless from birth until 7 months (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 and 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) report that the period between 13 and 18 months may be the most crucial.

Beliefs about appropriate time of initiation of complementary feeding also varies 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 calmer and sleep more, which will help the mother carry on with her work. In Egypt, Harrison et al. (1993) report that mothers believe that supplementation (after 40 days of full breast-feeding) is necessary to promote growth and "fatness." Mixed feeding is also said to help the mother by reducing the time she needs to spend in breast-feeding the child. The belief that breast-feeding is time-consuming is widespread: in Honduras, mothers believe that exclusive breast-feeding takes longer than supplemental feeding, even though observational studies show that breast-feeding and food preparation and serving take the same amount of time as exclusive breast-feeding for 4- to 6-month-old children (Cohen, Haddix, et al. 1995).

Finally, many food taboos for young children may limit the types of foods that can be offered (Van Esterik 1989). In Iran, the introduction of a variety of foods is often delayed, based on the perception that young children cannot digest the foods that are available to the family (for example, beans) or that some foods cause stammering and delayed speech (eggs) and impair the intellect if introduced before 18 months of age (cheese) (Rabiee and Geissler 1992). This implies that children may not receive adequate amounts of protein- and micronutrient-rich foods until they are 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. Events 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 is old enough to consume an adult diet (Harrison et al. 1993). A second factor is the child's appetite as perceived by the mother. Caregivers often see a child's good appetite as an indicator of health (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, finds that mothers tend to believe that children should control the amount of food they ingest and that the child's hunger or apparent interest in food should determine the amount of food provided to the child (Dettwyler 1986, 1987). Where levels of anorexia among children are high, this belief can lead to undernutrition. Engle et al. (1995) find variations in these beliefs among 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 offers of 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) report that a mother's perception that her infant is small increases the likelihood of her not breast-feeding, even when she intended to do so before the birth of the infant. Conversely, the perception that the infant is doing well increases the likelihood that breast-feeding will continue (Adair, Popkin, and Guilkey 1993). A study in rural Senegal finds that small and thin infants are preferentially fed millet-gruel in addition to breast milk, because their mothers perceive the need to feed them something in addition to breast milk (Simondon and Simondon 1995). Among Peruvian women, Piwoz et al. (1994) report that the strongest

indicator of change in feeding practices is low weight in gain infants.

Beliefs about Illness and Malnutrition. Beliefs about illness and practices adopted during illness can have implications for children's health and nutrition. Some information about existing beliefs, in addition to the more easily available information on the use of health care facilities, may 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 could precipitate malnutrition or aggravate existing situations (for example, some kinds of diarrhea and upper respiratory tract infections). In Pakistan, Mull (1991) reports that mothers seldom associate protein-energy malnutrition (called marasmus) with consumption of too little food; it is often linked to the influence of spirits or a "bad" person on a child. Similar findings are reported in East Africa, India, Nepal, and Tanzania, where protein-energy malnutrition is 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 called the "medicalization of hunger" in shantytowns in northeast Brazil; mothers believe 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 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 measures, 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 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-

Table 2—Knowledge, attitudes, and beliefs of caregiver

Construct	Measurement tools	Comment
Beliefs and knowledge about initiation of breast-feeding, colostrum	Surveys, qualitative measures; varies by culture	May vary both between and within cultural groups; may need an individual and a normative measure
Beliefs about termination of breast-feeding	Surveys, qualitative measures; varies by culture	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 feeding decisions or cultural beliefs about personality or "personness" of the child
Beliefs about maternal characteristics in relation to breast-feeding	Surveys, qualitative measures; varies by culture	Psychological state, maturity, and diet and health of mother may affect beliefs about her ability to breast-feed
Beliefs about relationship between food and malnutrition	Surveys, qualitative measures; varies by culture	Some illnesses are perceived as part of the developmental process (types of diarrhea, upper respiratory tract infections). Caregivers may not associate protein-energy malnutrition with food but believe it to result from spiritual or evil influences, ill-effects of breast-feeding during pregnancy, or adultery; protein-energy malnutrition is often seen as a stigma on the child and is deeply feared.

Saharan Africa over the past decade (UN ACC/SCN 1992). Stunting and low body mass index (BMI) are common in developing countries. Low BMI (less than 18.5), also known as chronic energy deficiency, has been found in 40 percent of women in samples from South and Southeast Asia and in 20 percent in Sub-Saharan Africa (UN ACC/SCN 1992).

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

Direct Link

Research on the direct linkage between nutritional status and caregiving 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 studies indicate that anemic women in Egypt are less active caregivers than non-anemic women (Rahmanifar et al. 1992). In Egypt, McCullough et al. (1990) found an association between low levels of vitamin B_6 in mothers and failure to respond adequately to infant vocalizations, as well as less effective maternal responses in cases of infant distress.

Chronic energy deficiency, measured using BMI, may affect productivity negatively 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 her children. The Food and Agriculture Organization of the United Nations/World Health Organization/United Nations University (FAO/WHO/UNU 1985) Joint Consultation on Energy and Protein Requirements estimated the energy cost of child care activities as 2.2 × basal metabolic rate (BMR), which falls into the category of moderate physical activity. According to Torun et al. (1989), marginally malnourished individuals tend 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). Because women with low BMI are less economically productive[6] (Ferro-Luzzi et al. 1992), one could expect that they would spend more time in their homes and therefore on child care. There is, however, very little literature assessing 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) shows that during a temporary food shortage (a famine), mothers held and cared for their children significantly less than before the shortage. The increased need to procure food resulted in increased 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), on farms (Vijayalakshmi, Kupputhai, and Uma-Maheshwari 1987), and in cotton mills in China (Li et al. 1994). Although these patterns suggest that women's health status may affect caregiving, more research must be done before conclusive statements can be made about the effects of nutrient deficiencies on engagement in child care activities or responsiveness to children.

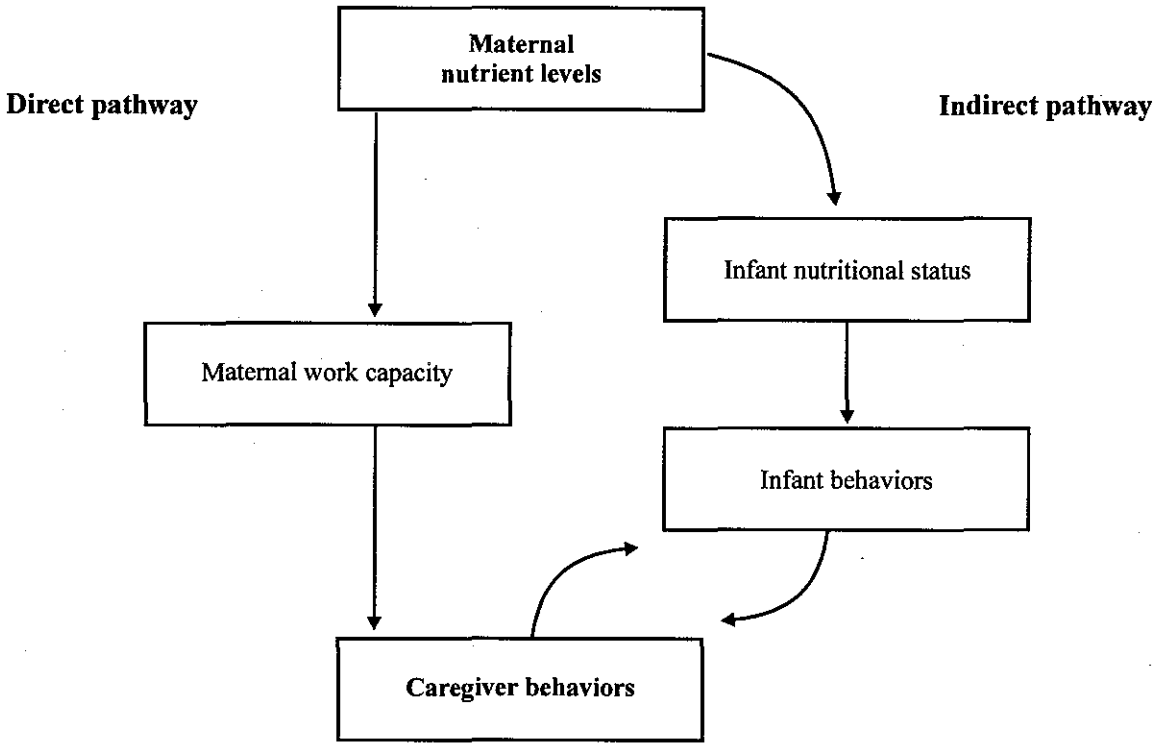
Indirect Linkages

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

Findings from the Egypt Nutrition CRSP (Kirksey et al. 1994) indicate that maternal intakes of energy and protein from animal sources, iron, and zinc are positively associated with neonatal "habituation" behaviors

[6]Shetty and James (1994) cite unpublished FAO data provided in a personal communication by P. J. Françoise in 1990.

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



(a measure of early information processing). Rahmanifar et al. (1992) report that maternal diet during lactation, especially lower intakes of animal source foods and certain B vitamins, are associated with infant drowsiness, and infant drowsiness is negatively associated with caregiver vocalization. Similar findings from the Mexico Nutrition CRSP (Allen et al. 1992) indicate that maternal weight and dietary factors are more strongly associated with infant behavioral variables, especially habituation, than are sociocultural factors.

One must be wary of attributing causality to these relationships for two reasons. First, as Burger, Haas, and Habicht (1993) note, the existence of a statistically significant association between the nutrient deficiency and the behavioral outcome may not imply causality, since socioeconomic status and other factors can affect both behavioral and nutritional outcomes. Most of the data reported here on the relationship between nutrient deficiencies and caregiving behaviors have come from the Nutrition CRSPs, and intervention studies will be needed to demonstrate a causal relationship. Some of the CRSP studies of behavior 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 practices does not preclude the existence of similar relationships with other nutrients.

Second, it is unclear what the direction of the relationship might be. Numerous reports suggest that child behavior changes with poorer nutritional status and that these behaviors may mean that children are less able to elicit caregiving, as discussed earlier. Malnutrition has been associated with apathy, lower energy, delays in verbal development, and delays in motor development, all of which can reduce the child's ability to solicit care.

Other maternal attributes that can be expected to affect caregiving activities are morbidity and reproductive

health (for example, the number of children previously born [parity], interpregnancy interval, and reproductive status). The effects of maternal morbidity on caregiving in developing-country situations have not been studied in detail, but illness could 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, forces them to reallocate a number of tasks, including child care, to other family members (Neumann, Bwibo, and Sigman 1992, 17). The groups requiring the most assistance and task reallocation are found to be, in descending order, pregnant women, adult males, and nonpregnant women. A study on the effects of schistosomiasis infections on women's time allocation patterns shows 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 was the definition of "child care" clear.

Women between the ages of 15 and 49 in developing countries spend a significant proportion of their lives in a state of pregnancy or lactation, or both, and the stresses of these periods may 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 children of mothers who have had many children in The Gambia have poorer early growth, as well as lower rates of catch-up growth in height, than children of mothers with few children (Prentice, Cole, and Whitehead 1987). Miller (1994) finds that the combination of a high birth order and short interval between pregnancies holds the greatest risk of bearing a child with low birth weight. Short intervals between pregnancies are also associated with increased risk of premature births and 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 shows 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 measures, see Table 3.

Mental Health, Self-Confidence, and Lack of Stress

In the United States, a large literature links maternal depression with poor caregiving and problematic outcomes for children (Rutter 1990). This issue is summarized in more detail in Engle and Ricciuti (1995). Depression probably also plays a major role in poor caregiving in many developing countries as well. However, despite reports of high levels of anxiety and depression among women in developing countries,[7] studies linking these psychological factors with child care have not been done. A report on a slum improvement project in Bangladesh suggests 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 (for example, the Beck Depression Inventory) and the questions are fairly straightforward, the possibility of adapting the instrument exists. An 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 it is one of the characteristics of high-risk mothers in the United States. Stress may also be linked with

[7]See, for example, Chakraborty 1990 on Calcutta.

Table 3—Physical health and nutritional status of caregiver

Construct	Measurement tools	Comment
Body Mass Index (BMI) (weight/height^2)	Requires careful anthropometry	Usually, BMI less than 18.5 is considered an indicator of risk.
Iron deficiency anemia	Various measures, such as hemoglobin, hematocrit	Usually, hemoglobin less than 12 grams per deciliter is condered a risk factor.
Other micronutrients	Biochemical assay	B_{12} in plasma vitamins, B_6 in breast milk (proxy deficiencies for serum levels); not clear that these are key; should evaluate a variety of vitamins.
Reproductive health	Number of children borne, birth spacing, age at first birth, pregnancy complications	Data may be available from the Demographic and Health Survey or census surveys.
Morbidity	Type, frequency, severity of morbidity	Self-report, physician's records
Domestic violence	May require qualitative methods to obtain; low rates likely from surveys	Definitions may or may not include emotional abuse.

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, a report of the woman's physical problems in a recent period (Weisner and Abbott 1977). Items selected reflect psychosomatic difficulties, such as headaches, feeling tired, inability to eat, or sweating palms. Scores on the Health Opinion Survey are 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 periurban mothers (Engle 1989b).

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 has 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. This measure of stress may be easier to adapt across cultures than the symptom checklist because the life events are by definition specific to a cultural setting.

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 with social norms) has a long history, and numerous measurements have been developed (see, for example, Coopersmith 1981). These measurements are 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 adapting the scale to other cultures 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 than the United States. Even if overall self-esteem could be measured in another culture, the scale might not measure the kinds of changes in women that are often observed in "empowerment" programs. The apparent increase in confidence often noted may be due to factors other than an increase in overall "self-esteem." These changes may be due to increases in assertiveness, defined as the ability to ask for what one has the right to, which is often very low in traditional societies (Engle 1989b). 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 measures of these more specific abilities are much greater than finding a culture-free assessment of overall global self-esteem or self-rating. For suggested measures, see Table 4.

Caregiver Autonomy and Control of Resources

Autonomy and control of resources refers to the caregiver's ability to play a role in decisions made within the household and the community. A number of studies have addressed this issue. For the Côte d'Ivoire, Haddad and Hoddinott (1994), for example, suggest that mothers are more likely to allocate extra resources under their control to children than are fathers. And the higher the percent of income earned by women, the greater 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, income is automatically assumed to be the property of the husband (Nsamenang 1992). Women generally enjoy greater autonomy in female-headed households, and some studies show that in spite of lower incomes, children in these living situations do better than might be expected, probably because intrahousehold distribution practices favor children more in female-headed households than in households headed by men (Haddad 1992; Johnson and Rogers 1993; Onyango, Tucker, and Eisemon 1994; Kennedy and Peters 1992; and others).

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 rather the mother's access to these resources (Engle, Castle, and Menon 1996). For suggested measures, see Table 5.

Caregiver Workload and Time Availability

Women's time commitments have been recognized as a zero-sum game; no new activities (including new caring practices) can be incorporated into their lives unless other activities are replaced or performed more efficiently in less time (McGuire and Popkin 1990a, 1990b). In addition to activities related to chil drearing, women are typically engaged in other time-intensive domestic activities such as water carrying and fuelwood gathering, and nondomestic production activities, such as agricultural work, informal labor, and for-

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

Construct	Measurement tools	Comment
Depression	Could adapt existing instruments, such as Beck Depression Inventory	Requires careful adaptation
Stress	Could adapt instruments such as Life Event Changes, Symptom Checklist	Requires careful adaptation
Self-confidence	Could be adapted from other instruments; includes multiple definitions because it has not yet been clearly defined	Needs further development
Perceived self-efficacy	Adapted locally as a list of tasks relevant to caregiving. Woman is asked to rate her expectation that she is able to perform that task.	Shows promise of being adaptable across cultures

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

Construct	Measurement tools	Comment
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 absence of male partner)	Term generates much confusion; better to use several definitions
Income earner	Self-report (including 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
Access to resources	Caregiver's perception of access to family income, family land, inheritance laws and customs	May use societal measures as well

mal labor market activities.[8] Improved collection of data on time use indicates that women 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 (see, for example, Leslie 1989). A few recent studies have found significant negative associations of work for earnings with 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 were likely to be significantly malnourished, regardless of who the alternate caregiver was. The women did not have control of their earnings. Rabiee and Geissler (1992) report 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 practices (for example, disposal of child wastes) suggest that their level of competence was much lower. 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, 1993, in Guatemala; LaMontagne, Engle, and Zeitlin 1996, in Nicaragua). In the Philippines, Blau, Guilkey, and Popkin's (1996) analyses with the Cebu data set underline the importance of well-paid work; children whose mothers work in higher-paying occupations have equal or better growth rates, using a rigorous model. When the work was well

[8]Women's involvement in economic activities in the developing countries varies widely by region, from a high of 56 to 58 percent in eastern and central Asia, to 53 to 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, where most of the rural work tends to be agricultural and seasonal, but possibly requiring fewer hours per day. Women in Guatemala who reported doing agricultural work were working, on average, only an hour a day (Engle 1989a).

paid, when the income was in the hands of the mother, or when the child was more than one year old, the effects on either child nutrient intake or nutritional status were positive.

Some studies examine 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 should be defined in the local context. Informal work may not be as flexible as is often assumed; it may not be compatible with child care if there is much pressure to finish work by a certain time (Doan and Popkin 1993; Joakes 1989).

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

Important variables for examining the effects of the mother's time availability and workload on children are the coverage and quality of the alternate caregiving system, the age of the child and its characteristics, the woman's control of earned income, the wage rate and flexibility of the work, and the poverty of the household. Some of these variables are included in Table 6, but the remainder, as indicated in the last row, are in other tables. The use of time allocation as a measure of child care, probably the only widely used measure of child care to date, is discussed later. In this list, observed and recalled time are listed separately, as they have differing benefits and costs, an issue that will receive attention farther on.

Social Support Received by the Caregiver

The support provided to the primary caregiver can include explicit child care assistance or information 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 the availability of good quality food 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

Table 6—Workload and time availability of caregiver

Construct	Measurement tools	Comment
Observed time spent on work and 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 spent on work and child care	24-hour recall most common; should interview caregiver	Validity 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 without special effort	Important to examine control of income, alternate caregivers, and 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 of characteristics of alternate caregivers (for example, age, gender) and their availability; observation of quality of care	Also should assess instructions to alternative caregivers, amount of food preparation, and so forth

Table 7—Social support for caregiver

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

examined so far is the age of the alternate. Some studies suggest that care by a preteen caregiver is associated with lower nutritional status of the child under two 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 their children pass through the critical first year, in the Philippines, women in the lowest income groups with more than one preschool child are more likely to work than those with fewer preschool children (Doan and Popkin 1993). Presumably, they have a 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 (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 helped increase the amount of food consumed by children when mothers were unable to do so.[9]

Although there is some evidence that female-headed households provide better care for children, the overall trend toward an increasing number of female-headed households, a higher percentage of women in the labor force, and more older family members to care for raises concerns about the burden placed 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 in coming, with men still providing far less than an equal share of time in household chores and child care (United Nations 1995).

Fathers are particularly important as a source of emotional and informational support (Engle and Breaux 1994). There is some evidence that when they contribute a higher percentage of their incomes to family budgets, children are better nourished (Engle 1993, 1995). Their roles are particularly important where females are traditionally secluded, 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). One program, the Nutrition Communication Project in Mali, was successful in actively promoting male involvement in nutrition decisions by encouraging men to purchase liver for their pregnant wives (personal communication, E. Piwoz, 1996). Understanding father's attitudes and targeting fathers for education offers promise for nutrition education programs. For suggested measures, see Table 7.

[9]One example is the Iringa, Tanzania, program sponsored by UNICEF (1989).

4

Care Practices

Constructs and measurement tools are discussed for two dimensions of caring behavior: time spent (quantity of care), and the nature of the activities undertaken (quality of care), or some combination of the two dimensions. Since numerous studies have looked at quantity of time spent on child care, those studies will be summarized. Although caregiving cannot occur when the caregiver is absent, there is a great variation in the activities performed by caregivers when they are present and spending time on "child care." Since the quantitative measure of "time spent on child care" is more common and possibly easier to measure, it will be considered first.

Time Spent on Child Care

This section reviews the findings from various studies, examines the validity of nonobservational measures, and discusses the usefulness of time spent on child care as an indicator. In general, the studies conducted cannot be easily compared because they use different definitions of child care and different methods of data collection (direct observation, random spot observation, and various recall periods). It concludes that if time spent on child care is to be measured, direct observation is preferable, because it increases the chances of getting accurate measures of time allocation and allows the investigator to assess degrees of involvement and quality of child care at the same time.

Studies of Time Spent on Child Care

A number of studies have attempted direct measurement of time spent by the mother on child care, and these are summarized in Table 8. Five studies use observational data and seven are based on recall data. Time spent ranges from highs of more than 7.3 hours per day in the Philippines (Blau, Guilkey, and Popkin 1996) and 6.3 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 (for example, Cohen et al. 1995a) provides a standard with which 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, Haddix, et al. 1995; Gryboski 1996), one used a sampling of two-hour time blocks (Ricci et al. 1994), and two used spot observations (Paolisso and Regmi 1995; Baksh et al. 1994). The spot observations were translated into total time estimates by assuming that the percentage of time the activity was observed represents the percentage of time it will take during the day. For purposes of comparison in the table, all data are presented for units of a 12-hour day. Both total child care time and time spent breast-feeding are presented. The definition of child care in the study is also shown. Most studies evaluated direct child care activities, but two looked at child-focused 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 means in the other studies. Thus the definition of "child care time" can substantially affect estimates.

Cohen, Haddix, et al. (1995) observed that nonworking urban Honduran mothers of exclusively breast-fed 6-month-old infants spent about an hour breast-feeding out of every 12-hour day. 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 children's clothes, was approximately 4 hours per day whether a woman was caring for one or several children. 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

Table 8—Estimates of time spent on child care from observation and recall

Study	Sample	Method	Definition of child care	Age of child	Results for total child care time	Results for breast-feeding	Comment
Observation							
Cohen et al. 1995a 1995b	Honduras N = 139	Continuous observation; simultaneous activities counted separately	(1) All child-focused activities, including play and feeding (2) Play and feeding only	6 months	(1) Primipara EBF[a]: 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 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 onward, data are not on EBF
Paolisso 1994	Nepal N = 264 rural	Spot observation; only when care was primary activitiy	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[b]	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 percent of all child care time is in breast-feeding	High work demand; 84 percent of all care activities to children less than 18 months old
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 (0.4) 3.6 hours/12 hours (0.5)	32 minutes/12 hours (0.4) 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 percent 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	Comment
Recall							
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 pervious 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)[c]
	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)[c]
	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)[c]
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: 58 minutes/day Lactating: 148 minutes/day	Not given	Minutes/day breast-feeding = 16.6 (DHS)[c]
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	40 minutes/day 20 minutes/day 15 minutes/day	Varies by round; rounded averages presented

[a]EBF is exclusively breast-feeding.
[b]NPNL is nonpregnant/nonlactating.
[c]DHS is Demographic and Health Survey.

day at 12 months (Heinig et al. 1994); the 6-month-old children were not exclusively breast-fed.

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 periurban 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 the Kenya Collaborative Research Support Program (CRSP), a rural, agricultural sample in which women carried significant workloads, Baksh et al. (1994) report the equivalent of 2.95 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 1.3 hours per 12-hour day for children 12–15 months and 36 minutes per day for nonpregnant, nonlactating women. Eighty-four percent of all care activities were addressed to children 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 child care time by the mother only. 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, 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).

Time spent on child care estimated from recall is also shown in Table 8. The two Philippine samples show very different investments of time 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 (one from rural Kenya, two from Ghana, and one from the rural Philippines) in which child care time was disaggregated by lactation status, nonpregnant, nonlactating women reported spending between 36 and 52 minutes per day in child care. Lactating Kenyan women spent, on average, 27 more minutes a day on child care than nonlactating women, and lactating Ghanian women in one sample spent 15 minutes more than nonlactating women 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 on child care (for children aged 0–5 years) than nonlactating women. However, another analysis of the same data set (Engle and Bhattarai 1997) 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 a day in the first year, 20 minutes a day in the second, and 15 minutes a day in the third year (breast-fed children only, eliminating women who had another 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).[10] Therefore, the samples from Kenya and Ghana may include an older group of children who are probably spending much less time breast-feeding.

[10]The worldwide Demographic and Health Survey program is designed to collect data on fertility, family planning, and maternal and child health. The surveys are a collaborative effort of the governments of the countries surveyed and the Institute for Resource Development/Macro International, Inc., in the United States, and partially funded by USAID and UNICEF.

These data illustrate the importance of disaggregating time in child care by the age of the child.

Validity of Recall Methods for Time Allocation

A small number of studies have evaluated the accuracy of time use data (for example, 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 a different person interview the subject and compare the number of activities correctly recalled and the accuracy of the duration of recall (for example, Bernard et al. 1984).

Engle and Lumpkin (1992) found that among middle-class U.S. and Guatemalan mothers, 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 emerges from a study among rural indigenous Guatemalan women (Engle, Hurtado, and Ruel forthcoming). Given the importance of recalling the activity itself, factors that influence activities to be recalled need to be documented. Error rates vary significantly by type of activity. In general, memory is superior for events that are easily coded (for example, those that have a defined start or stop time) and for nonhabitual or highly salient or important events (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 spent in child care depends on how simultaneous activities are coded; some are coded as separate activities, resulting in a higher total time; others ignore 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 and to interview the respondents directly, since so much child care is shared. 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 the number of days that women spent in farm activities were far lower than the days that women thought they had spent.

Time Spent on Child Care as an Indicator of Care

If time spent on 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, time spent 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 nutritional status of the child and time spent on child care by the caregiver.

The summary of 10 studies in Table 8 does not lend strong support to the hypothesis that a quantitative measure of mother's time spent on child care has a significant association with child welfare. The studies address the issue of whether the amount of time spent on child care is associated with nutritional status or energy intake in children. Of the 10, 3 studies found that spending more time on child care was positively associated with children's anthropometric measures. Two studies are from the Philippines: Popkin (1980) reports that, using recall data, weight-for-age among children 1–35 months was marginally higher for children who received more care. Blau, Guilkey, and Popkin (1996) report that in the Cebu Philippines data set recalled child care time spent by different family members was significantly associated with increased weight of children 0–24 months. Increased mother's time was also associated with greater height. However, when fixed effects were controlled for, the only remaining associations with child weight were time spent by a nonfemale relative, and for child height, time spent by the mother.

Paolisso and Regmi (1995) find a marginally significant association of child care time spent by all family members with increased weight for children 6–36 months in Nepal. The study is unique in that it uses an estimate of observed total time spent on child care by all family members. Two studies using observational data (Gryboski 1996, in Indonesia; Ricci et al.

1994, in Egypt) find no association of total time spent by the mother on 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 breast-milk intake was greater when cared for by the mother. Ricci et al. (1994, 302) in Kenya find that in the period between 18 and 23 months of age, "maternal child caregiving behavior was critical" for energy intake (kilocalories per day). The significant measure of care was frequency of feeding, but not total time spent on child feeding (food preparation, serving food, and feeding).

Only the original Popkin study (1980) presents clear support for the importance of mother's time spent on child care for child nutritional status. The author also reports a significant negative association of child weight-for-age with care by a sibling; possibly the reason was that the sibling provided inadequate care.

This discussion leads to the conclusion that the amount of time spent on child care may not be useful in predicting whether a child's intake or its nutritional status will be adequate. As will be shown in the next section, research resources may be better invested in collecting information on specific measures of care.

Specific Care Practices

Whereas measures of the quantity of time spent on child care can only be related to child outcomes somewhat ambiguously, measures of quality of time, or of specific practices associated with good child care, are often associated with positive outcomes. For example, different ways of disposing of child wastes can affect incidence rates of diarrhea as can hygiene practices like boiling water prior to use (Cebu Study Team 1991). Positive patterns of interaction between caregiver and child and a nurturant home environment are significantly associated with later cognitive development of children in a variety of cultural and ethnic groups (see, for example, Bradley and Caldwell 1984; Bradley et al. 1989). Child growth has also been associated with observational measures of interaction between child and caregiver (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 measures of two caregiving activities—feeding and psychosocial care. The other care practices 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 Practices

Caregiver practices that could affect the child's nutrient intake include (1) adaptation of feeding to the child's characteristics, taking into consideration psychomotor capabilities (such as use of finger foods, spoon handling ability, ability to munch or chew) and appetite; (2) responsiveness of the caregiver to feeding situations, including encouraging the child to eat, offering additional foods, providing second helpings, stimulating eating through threats, timing of feeding, responding to poor appetite, and interacting positively with the child; and (3) appropriateness of the feeding situation, including the organization and regularity of feeding, supervision and protection of the child while eating, frequency of feeding, monitoring with whom the child eats, and elimination of distractions during eating.

Adaptation of Feeding to Child's Characteristics. Caregivers need to be sure that children are capable of self-feeding before expecting it of them. 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 seven months of age, the "gag reflex" moves to the posterior third of the tongue, permitting the child to ingest solids more easily (Milla 1991). The time it takes for a child to eat solid and viscous foods decreases with age, but not the time it takes to consume purées. The child's ability to hold a spoon, handle a cup, or grasp a piece of solid food also increases with age.

Poor appetite plays a major role in inadequate nutrient intake of children (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 (for example, zinc), illnesses such as fever (Neumann et al. 1994), diarrhea, malaria, measles, intestinal parasites, chronic malnutrition, sores in the mouth (perhaps 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. For suggested measures of feeding practices, see Tables 9 and 10.

Table 9—Feeding practices: Caregiver-child interactions

Construct	Measurement tools	Comment
Presence, absence of caregiver feeding practices	Observation of one or more eating episodes; can adapt existing scales (for example, the Nursing Child Assessment Feeding Scale) or develop list of behaviors related to caregiver responsiveness and the feeding environment	Caregiver feeding practices will depend on child behavior, which should be recorded. May compensate for child behavior problems.
Frequency of behaviors	Quantitative assessment of behaviors related to feeding, number of spoonfuls, number of touches	Must have careful training of observers
Overall affective quality of interaction	Rate child and caregiver separately on scales representing domains of behavior with 1–5 point scales	Distinguish failure to thrive from normal U.S. inner-city children
Caregiver behavior in a structured situation	Present a challenge to caregiver and observe what she does with the child, or ask her to report the results at a later date	More often used in qualitative research; could be a quantitative technique

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 (the child controls the feeding) (Dettwyler 1987; Bentley et al. 1991; Engle and Zeitlin 1996). At the other extreme are cultural patterns that support caregiver control of eating, characterized by forced feeding and 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 a poor appetite, extra encouragement may be necessary for adequate nutrient intake. Anorexic children are

Table 10—Feeding practices: Child variables

Construct	Measurement tools	Comment
Appetite and hunger	Observe whether food is completely eaten or interest level during eating	May depend on specific food or initial or subsequent contact with food
Adaptive food preferences	Observation of child's interest in standard foods; survey of caregiver's observations	Children who reject major food are more undernourished; high incidence of "picky eaters" in failure-to-thrive 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-feeding assessed by clinician	LBW associated with poorer suckling ability, oral/motor dysfunction fairly common in failure-to-thrive children

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 (Griffiths 1988).

Where feeding encouragement is normally 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 rather than an enhancement role. In other words, the caregiver may feed 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 "spoil" or inappropriately indulge 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 children with normally growing children have found differences in the feeding style of the two groups. In failure-to-thrive 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 with 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 (for example, 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 practices. For example, among U.S. African-American adolescent mothers, a videotape of positive feeding practices 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 measures, see Tables 9 and 10.

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 a time that the caregiver finds convenient. Children can be easily distracted, particularly if food is difficult to eat (for example, 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 and 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, and use of spoon, with mother's education (Guldan et al. 1993). The authors conclude 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.

Measurement Tools to Assess Care Behaviors and Practices in Feeding. Five types of observational measures have been used to examine child and parent behavior in feeding situations: (1) observations of time spent on feeding, (2) presence or absence of specific feeding practices, (3) quantitative assessments (frequency of specific feeding behaviors), (4) behav-

ioral 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 spent on feeding, discussed in a previous section, will not be considered here.

Observation of specific practices. The most commonly used assessment technique is to code the presence or absence of child or caregiver behaviors on a series of items (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 Nursing Child Assessment Feeding Scale (NCAFS) (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 infant 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 (25 items), the Crittendon (81 items), and the Chatoor (46 items) (MacPhee et al. 1993). The more items, the better the scale discriminates 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 practices that differed according to the mother's education, 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 earlier: (1) adaptation to the child's psychomotor skills (number of finger food feedings per hour, child less likely to feed self, percent of time using cup, percent of time using bottle), (2) "responsiveness of the feeder" (noticing when food was dropped, whether mother initiated the feeding, 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). Guldan et al. (1993, 925) conclude that more educated mothers adopted "more attentive feeding practices" and "more labor-intensive child care," 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, Nicaragua, and constructed a scale for active feeding behavior of the caregiver and child demand from a subset of the items. Whereas child demand was positively associated with nutritional status, active feeding was not; rather, active feeding was associated with a child's 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 (1996) study. For the child, the three-point scale was food refusal, food appetite, and food request. For the caregiver, the scale was no response, verbal encouragement, verbal pressure, and physical force. The scale illustrated that caregivers were more active feeders when the children were convalescing from diarrhea than when they were 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 (for example, 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 was able to differentiate between children who were growing well and those who were growing poorly.

Behavioral ratings. This technique rates the overall quality of the child-caregiver interaction. Black et al. (1994) have used it based on the coding scheme from the Parent Child Early Relation Assessment (PCERA) (Clark 1985). The technique of behavioral ratings is widely used for the assessment of child behavior (for example, the Behavior Rating Scale from the Bayley Scales for Infant Development) (Bayley 1993) in the United States and has been used in developing countries (Engle et al. 1996). A domain of behavior is defined (for example, "Parent reads child's cues and responds sensitively and appropriately"), it is carefully described in behavioral terms (for example, "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 he or she 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, different levels of the item are defined, and the coder has to decide which represents the overall behavior (for example, 1 is insensitive to child, oblivious, indifferent, or unresponsive to child's cues; consistently misreads or misinterprets child's cues; 5 is 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 know 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, a consulting corporation in Washington, D.C., 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. Dickin, Griffiths, and Pivoz (1996) explain the technique in great detail and the way it should be used. 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 (interacting rarely) in spite of being videotaped in a clinical 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 they 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 (for example, 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 of the behaviors, defining the categories operationally, and deciding on the appropriate setting in which 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 measures, see Tables 9 and 10.

Psychosocial Care

Psychosocial care refers to the provision of affection and warmth, responsiveness to the child, and the encouragement of autonomy and exploration. 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 (for example, showing affection) may be demonstrated differently from one culture to another, 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 through physical, visual, and verbal contact with children. However, the patterns of expression may vary by culture. Becker and Becker (1994, 192) warn that "any given indicator of maternal attachment as derived in one racial group may not necessarily be valid in other racial groups."

Measurement of Psychosocial Care. Three categories of measures of psychosocial care can be described: (1) direct measurement of child-caregiver interaction, (2) assessment of the home environment, and (3) assessment of the child's appearance.

Observations of child-caregiver interaction. Typically, the frequency of caregiver behaviors, child behaviors, and child-caregiver interaction patterns are coded (Rahmanifar et al. 1992). Behaviors most often assessed are verbalizations of child and caregiver and looking and touching, although these behaviors will vary with 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 the child, and then rate her behavior on a checklist (Barnard et al. 1989) or count the number of times an event occurs. Several studies suggest two child risk factors: a child is inactive ("doing nothing") a high percentage of the time, and a child is carried and held excessively after 18 months. High rates of holding and carrying of children beyond 18 months has been negatively associated with cognitive development and social interactions with other children (Wachs et al. 1991; Sigman et al. 1989), both because the holding and carrying restricts the opportunities for learning and because children who choose to be held tend to be lighter and are 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 Observation for Measurement of the Environment (HOME) scale. Using this scale in an interview with the caregiver, both the environment and incidence of positive effect between caregiver and child are rated (Bradley and Caldwell 1984). The HOME scale assesses both the emotional responsiveness of the caregiver and the characteristics of the environment that are supportive of autonomy and exploration by the child (including avoidance of punishment, provision of appropriate play materials or location, opportunities for variety in daily stimulation, and organization of the physical and temporal environment). It has been adapted and used in many countries and has had consistent positive associations with cognitive development in a variety of settings (Bradley and Caldwell 1984; Bradley et al. 1989), in addition to controlling for the effects of socioeconomic status.

Child appearance. Several studies have suggested that the appearance of a child, either rated 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 (or lack thereof). Having developed a checklist to rate child appearance, Allen et al. were able to distinguish "poor but clean and well cared for" children from "wealthier but unkempt" ones. They found highly significant associations between child appearance during the second and third years of life and cognitive development at 30 months. Using multiple regressions, these associations were significant even when controlling for socioeconomic status, nutrient intake of animal fats, and body length at 18 months, which would usually account for most of the variance in cognitive development. For suggested measures, see Tables 11 and 12.

Table 11—Psychosocial care: Child and caregiver interactions

Construct	Measurement tools	Comment
Caregiver-child interaction	Naturalistic observation of caregiver and child for a short period; code variables such as delay in responding, 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
Caregiver's understanding of developmental milestones	Assessment of caregiver's judgments about stages of development	May be linked to parental stimulation of cognitive development

Table 12—Psychosocial care: Child variables

Construct	Measurement tools	Comment
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 and mental 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

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 first steps in this process have received the most attention. This paper, however, is concerned with conceptual developments in the last stage of the process: how the various aspects of care of young children affect their nutrient intake and their nutritional status. As it becomes increasingly accepted that many activities in child care—feeding practices, food preparation and storage, hygiene, access to health care, and psychosocial stimulation—contribute to good nutrition for the child, ways to measure the adequacy of care must be developed. This report has reviewed the care model and the implications for measurement of resources for caregivers and of the care provided, with a special focus on feeding and psychosocial development.

In the past 10 years, much progress has been made in understanding the complex interactions of the biological and behavioral factors that determine nutritional status (Allen et al. 1992; Neumann, Bwibo, and Sigman 1992; Pollitt et al. 1993; Cebu Study Team 1991; Haddad, Hoddinott, and Alderman 1997). These studies and others like them have provided a clearer idea of the linkages between quality of nutrient intake, growth, patterns of interaction between child and caregiver, and cognitive development.

The UNICEF model of nutrition and care has been expanded in this paper to include consideration of the resources that caregivers require in order to provide effective caregiving. Further research is needed to clarify the effects of these resources, but some general observations can be made here, based on the review of the literature.

- *Education, knowledge, and beliefs.* Education of the mother is often associated with a greater commitment to care of the child. Educated women tend to provide better home health care and hygiene, and they are more likely to seek help when a child is ill. But, on the negative side, better-educated women in developing countries tend to terminate breast-feeding earlier.
- *Health and nutritional status of the caregiver.* Many women in developing countries are chronically ill or undernourished. Studies show that lack of iron decreases productivity, and 60 percent of women in South Asia have iron-deficiency anemia. Although a direct link between caregiver nutritional status and quality of care has not been studied extensively, patterns indicate that women care for their children less during periods of food shortages, perhaps because they must spend more time looking for food and because their energy levels are low.
- *Mental health, lack of stress, and self-confidence of the caregiver.* A large body of literature links maternal depression and stress with poor caregiving in the developed countries, but few studies to establish this connection have been done in developing countries. Measures of depression and stress should be developed that are tailored to the developing countries, since the methods that have been used may not be appropriate across cultures.
- *Autonomy, control of resources, and intrahousehold allocation.* Studies have shown that when women control household resources, they tend to allocate larger amounts of resources such as food to children than when men are in control. Working for income does not always mean that a woman has control of income.
- *Workload and time constraints.* According to the literature, women spend more time than men in all work activities. In addition to child care, women often must gather wood, carry water, prepare food, and do farmwork or other productive work. The effects on child nutrition are not straightforward: some studies suggest that when women work outside the home, even on their own farms, their children are more likely to be malnourished, especially if they do not control

income or if a child is under one year old. Other studies have found no negative effects from mothers' working, and some have found positive effects when mothers' work was well paid.

- *Social support received by the caregiver.* Provision of competent alternate child care is one important type of social support. Institutional care is seldom available in developing countries. The increased entry of women into the labor force without adequate child care support is cause for concern. Surprisingly little is known about alternate caregivers—who they are, their capacity for providing care, and how caregiving instructions are transmitted from the primary caregiver to the alternate. Provision of care to young children comes at a high cost if it means that older girls are kept out of school to act as alternate caregivers. The role of fathers as decisionmakers and as possible alternate caregivers has seldom received attention in developing-country studies and may be a potential that has been overlooked.

Interactions between Caregiver and Child

The UNICEF model of child care is a useful framework for assessing the capacity and ability of the caregiver to provide care. However, the model should not only assess the caregiver's behavior but also the behavior of the child and the environment in which the child is being raised. All three of these factors play a significant role in the eventual nutritional status of the child.

Responsiveness of the caregiver to the child's signals is a critical part of caregiving, and the unresponsive child may have a difficult time eliciting a response from the caregiver. Studies have shown that children who are larger and better nourished may receive more care than low-birth-weight children. Poorly nourished children may be more lethargic and may therefore not encourage caregivers to respond to them. The child who refuses food or is difficult to feed may discourage caregivers from persisting in feeding long enough for the child to consume an adequate amount of food. Inadequate interaction between caregiver and child often lies behind the problem of a child who fails to thrive. In sum, a positive relationship between caregiver and child may lead to increased dietary intake. It may also affect the health of the child.

Measuring Care

This paper seeks a progression from theoretical definitions (here called constructs) to the development of valid measurements to help determine the indicators of risk. For example, the construct for nutritional status is growth, a measurement tool is anthropometric measures of height and weight, and a risk indicator is –2 below the standard deviation for height-for-age.

Time spent on child care alone is not an adequate indicator of care. Time estimates should be complemented by measurements of the quality of child care. Quality determinations are not easy to make, however, because cultural differences in care practices and resources are immense. Some constraints to care are easy to measure and others are difficult. For example, it is easy to determine the nutritional status of a caregiver but hard to measure the caregiver's self-esteem. It may be easier to identify inappropriate or even harmful practices in different cultures than to catalog all of the positive ways of interacting.

Measurement tools for assessing care include questionnaires or interviews, qualitative feeding scales, systematic observations in the care setting, experimental procedures followed by observation, and detailed coding of ongoing sequences of interactions. A behavior that may appear strange to an outsider may be the norm in a particular culture; therefore, it is important to compare a caregiver with others in his or her own culture.

Methods for evaluating feeding behaviors of caregivers and children quantitatively and qualitatively might include observation of a feeding session and rating of behavior based on a list of items, or rating of the overall quality of interaction between the caregiver and child. They might entail observation of frequency of feeding over a period of time. Or a new food or feeding practice might be introduced, and observers may note how the caregiver and child handle the situation.

In measuring the psychosocial elements of care provision, it is crucial to keep in mind that affection and responsiveness can be shown through physical, visual, and verbal contact: the patterns of expression vary from one culture to another.

There is not enough evidence at this point to suggest specific indicators that should be used for risk assessment, particularly across cultures and contexts. Much work needs to be done to clarify these measures and to develop a body of research on caregivers' resources in a wide range of cultures. Studies on maternal education and beliefs and mothers' use of time in developing countries are plentiful. Little has been done,

however, on the effects of mothers' nutritional status on the nutrition of the child, nor on the effects of mothers' self-esteem and confidence, stress, and possible depression on child care, although these factors are probably significant constraints to care provision. The potential for improving the provision of care through more research and intervention in these two areas seems promising.

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