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**THE CONSTRAINTS TO GOOD CHILD CARE PRACTICES IN
ACCRA: IMPLICATIONS FOR PROGRAMS**

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ABSTRACT

Life in urban areas presents special challenges for maternal child care practices. Data from a representative survey of households with children less than 3 years of age in Accra were used to test a number of hypothesized constraints to child care, including various maternal (education, employment, marital status, age, health, ethnic group, migration status) and household-level factors (income, calorie availability, quality of housing and asset ownership, availability of services, household size, and crowding). An age-specific child care index was created using recall data on maternal child feeding practices and use of preventive health services. A hygiene index was created from spot check observations of proxies of hygiene behaviors. Multivariate analyses showed that maternal schooling was the most consistent constraint to both the care and the hygiene index. None of the household-level characteristics were associated with the care index, but better housing quality and access to garbage collection services were associated with better hygiene. Female head of household and larger family size were associated with poorer hygiene. The programmatic implications of these findings for nutrition education and behavior change interventions in Accra are discussed. The focus is on using the information to target the right practices to be modified as well as the main constraints to their adoption.

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1. INTRODUCTION

In Africa about one-third of the population lives in urban areas, and this percentage is expected to increase to over one-half by the year 2033. The population of Accra, Ghana's capital, is increasing faster than anywhere else in the country (Ghana-MLG 1992). Commensurate with increasing urbanization is an increase in urban poverty and a decline in urban living standards, which stands in contrast to a general decrease in the level of poverty nationwide (World Bank 1995). Between 1987 and 1993, the absolute number of poor households and undernourished children in urban areas of Ghana has increased and is accounting for a growing share of the overall poverty and malnutrition burden in this country (Haddad, Ruel, and Garrett 1999). Registered unemployment increased by 20 percent from 1987 to 1993 and those otherwise unable to find employment continued to crowd into marginal self-employment (mostly petty trade) in the city's informal sector (ISSER 1995). At the same time, women continue to be heavily involved in work outside the home, especially in the low paying occupational categories of petty trading and street food vending (Levin et al. 1999).

The conditions of urban poverty, most importantly the high proportion of women working away from home, the dependence on cash income, and the deteriorating environmental conditions, pose special challenges to the care of children. The nutrition, growth, and development of infants and young children depend not only on sufficient food, but also on adequate health services and appropriate care behaviors (UNICEF 1990). A household's capacity to provide care depends on the availability of resources (or

the absence of constraints) within the household and wider community that can foster the translation of knowledge into appropriate care practices such as breast-feeding and complementary feeding, use of health care services, and good hygiene. Engle and Lhotska (1999) describe various maternal and household resources for care and group them into three main categories: human, economic, and organizational. The present paper addresses the first two categories of care resources:

1. human resources, particularly the caregivers' characteristics such as health, nutrition, education, employment characteristics, and time constraints; and
2. household economic resources, including household income, calorie availability, demographics, availability of water, hygiene and sanitation services, and availability of child care substitutes.

The main purpose of this research was to examine specifically within the context of an urban African center (Accra) which of the maternal and household characteristics constituted more severe constraints to the provision of good child care. The care practices studied included child feeding, use of preventive health services, and hygiene. We have shown previously that these care practices were strong determinants of child nutritional status in this population, particularly among children from poorer families and children whose mothers had less than secondary schooling (Ruel et al. 1999). A crucial question then, addressed here, is what are the main constraints to optimal child-care

practices in this population. Answers to this question will aid the design of interventions so that they can target both the right practices to be modified as well as the main constraints to their adoption.

2. MATERIALS AND METHODS

SOURCE OF DATA

The data are from a representative survey of households with children 3 years or younger in Accra, Ghana. The overall objective of the study was to understand the nature of urban poverty and the relationships between urban poverty, food insecurity, and malnutrition in a major urban center in Africa. The study combined qualitative and quantitative methods. Most of the data presented here draw from the quantitative survey carried out between January and March 1997. Information on the design and major findings of the overall study are available elsewhere (Maxwell et al. 2000).

SURVEY SAMPLING STRATEGY AND DATA COLLECTION METHODOLOGY

The basic sampling units for the survey were households with children under 3 years old. A two-stage sampling strategy was adopted, with "numeration areas" mapped out by the Ghana Statistical Service as the primary sampling units. Sample size calculations were made on the basis of +/- 3 percent precision in prevalence estimates of low anthropometric status, and to detect statistically significant differences of 0.5 Z-scores between groups with 90 percent power. The required sample size was 36

households in each of 16 enumeration areas, for a total of 576 households. The achieved sample size was 556 households distributed among 16 enumeration areas.

The survey included the following questionnaire modules: household roster, employment and self-employment, adaptive strategies, credit, transfers and other income, urban agriculture, livestock and fishing, food habits and coping strategies, meals roster, household consumption and expenditure, maternal sociodemographic and employment characteristics, child feeding practices, care and use of preventive health services, child morbidity, a hygiene spot check, and maternal and child anthropometry. All modules were based on an interview (self-reporting), except anthropometry (measurements were taken) and the hygiene spot check, which was done by observation. Additional information on the study methodology is available elsewhere (Accra Study Team 1998).

All households gave their verbal consent to participate after the study objectives and methodology were read to them. Ethical clearance was obtained from the Health Research Unit of the Ministry of Health.

VARIABLES USED AND INDEX CREATION

The variables examined as potential constraints to caregiving at the primary caregiver level include age, schooling, migration status, ethnic group, civil status, current employment, use of alternative child care, maternal health, and body mass index (weight in kilograms/height in meters squared). Maternal health was assessed using a visual analogue scale, whereby mothers were asked to draw a line, on a scale of 0 to 100, which

represents their assessment of their own health status in comparison with other women their age. (Visual analogue [VA] scales have been used successfully for appetite ranking in Latin America and in developed countries [Stratton et al. 1998].)

The household-level constraints to care that were examined were household size; crowding (number of rooms/person); household income (the proxy for which was household consumption expenditure for food and nonfood items); food budget share (percentage of household expenditure spent on food); household-level calorie availability per adult equivalent (derived from the food consumption expenditure module—adult equivalent units were based on standards for the United Kingdom [Gibson 1990]); type of dwelling, availability of water, sanitation and garbage disposal services, and ownership of assets.

Expenditure quintiles were computed from the expenditure variable and were used for the bivariate analyses. The same was done for mothers' health visual analogue results.

Three indices were created: a care index, a hygiene index, and a quality of housing and asset index. The methodology used to derive these indices is summarized below.

Care Index

A care index was created using data on child feeding practices and on the use of preventive health care services. The list of variables used to create the index is presented in Table 1, as well as the scoring system used to grade each question. The index was

created only for children 4 months or older ($n = 512$) because only two variables were available to construct the index for infants below this age. These two variables are the first ones presented in Table 1 (whether the mother reported having used prelacteal feeds before initiating breast-feeding, and whether the mother reported currently breast-feeding the child). Because the number of variables for this age group was so small, and because there was very little variability in breast-feeding (98 percent of children in this age group were breast-feeding), this age group was excluded from further analysis of caregiving practices.

The general scoring system for the care index was to allocate a score of -1 for a bad practice and a score of 0 for a good practice (Table 1). When a practice was particularly good, such as using fortified cereals for complementary feeding, a score of 1 was given. Practices were considered good or bad based on current child feeding recommendations (WHO 1995) and on available scientific evidence about their benefits or risks. For example, breast-feeding between 4 and 9 months of age was given a score of 1 because it is a recommended practice and it is known to have a protective effect on children's health. Conversely, not breast-feeding was graded -1 (potentially harmful for the child). For older children in the 9-18 months group, however, not breast-feeding was given a score of 0 because it is not clear whether not breast-feeding at this age really has a negative effect on children's health and growth (scientific evidence on this issue is controversial [Brown, Creed-Kanashiro, and Dewey 1995]). Similarly, breast-feeding after 18 months of age was not included in the index because the scientific evidence of

additional benefits from continued breast-feeding after this age is not consistent. For age-censored practices such as immunizations for DPT and measles, which are expected to occur when the child reaches a specific age, the variables were included in the index only for the age group following the recommended age for receiving this immunization. The index was created for each age group by adding up the scores obtained for the different practices. The maximum possible score was 2 and the minimum was -11 for each age group. The mean and standard deviation were -2.49 and 1.49, respectively, for the overall sample.

Hygiene Index

Hygiene behavior was measured using a “spot check” approach, whereby fieldworkers are trained to observe and grade a list of predetermined hygiene-related aspects of the caregiver, index child, house, and compound where the caregivers live. This method is generally used in cross-sectional surveys that do not allow for carrying out day-long observations in the homes. These spot-check observations usually serve as proxies for good or bad behaviors (such as whether the mother’s hands are dirty or clean), rather than providing information on the behaviors themselves (whether the mother washes her hands or not). The list of aspects observed in this study is presented in Table 2. Fieldworkers were carefully trained and standardized in making subjective, yet consistent, judgments about all the aspects to be observed.

The hygiene index was constructed using all variables that had fewer than 50 missing or non-observed data (seven variables—see Table 2), and for which there was

sufficient variability in the data (the variable “presence of human feces in compound” was excluded from the index because up to 98 percent of the sample had a positive behavior; hence, the variable did not discriminate). Each positive behavior received a value of 1, and a negative behavior, a value of 0. Thus, the index was the sum of six variables, and scores ranged from 0 and 6. Based on the frequency distribution of the index, we created three categories of hygiene practices: bad scores (0-3), average scores (4-5), and good scores (6).

Quality of Housing and Assets Index

This index was created using principal components analysis. First, a “possession” index was created by scoring households on ownership of four assets: refrigerator, electric stove, tape deck, and television set (owned = 1; not own = 0). Then, factor analysis was used to derive one factor that would summarize variables related to the quality of housing (construction material for roof, walls, and floor), the possession index, the source of drinking water, and the availability of sanitary facilities and garbage disposal. The principal components factor extraction method was used. Loadings smaller than 0.5 were excluded from the initial model. The final model had five variables (floor, walls, water source, possession index, and sanitary facilities), and explained 46 percent of the total variance in the constituent variables.

ANALYTICAL METHODOLOGY

Means and standard deviations are reported for continuous variables and frequency distributions for categorical variables. The statistical significance of differences between groups was tested by ANOVA for continuous variables and the Chi-square test for categorical variables. Principal components analysis was used to create the quality of housing and asset index as described earlier. Multivariate analysis using ordinary least squares (OLS) regression was used to test which of the hypothesized maternal and household characteristics were associated with care practices (using the care index scores as the dependent variable), when controlling for other factors. A number of the explanatory variables are potentially endogenous; i.e., they may be correlated with the error term of the regression model, which would bias the OLS regression coefficients. One can avoid this potential problem by using only exogenous explanatory variables or by using instrumental variables regression techniques such as two-stage, least-squares regression. The first strategy was rejected because the authors were interested in the association of their selected explanatory variables with their care index. The second was rejected due to the difficulty of identifying the large number of instruments necessary to generate the unbiased instrumental variables needed to estimate the potentially endogenous variables. Future research in this area is needed.

For the hygiene index, which had six categories and was not normally distributed, maximum-likelihood, ordered-probit estimation was used (Stata 1997). For both multivariate approaches, all covariates were tested for nonlinearity in their association

with the outcomes and none was found. For categorical variables, joint F-tests were used to test the statistical significance of differences between categories. Full models and parsimonious models (derived by backward elimination) are presented.

The probability level considered statistically significant was < 0.05 for all analyses and the statistical programs used were SPSS, version 8, and Stata, version 6.

The data presented in this manuscript are based on a final sample size of 475 for the care index and 468 for the hygiene index (as a result of exclusion of 44 children 0-4 months old [see description of care index], and of some missing values in the variables included in the respective indices).

3. RESULTS

CARE AND HYGIENE PRACTICES

The second column of Table 1 presents basic descriptive statistics for the child feeding and use of preventive health services variables included in the care index. Approximately half of the sample of 4-36 months old children was being breast-fed at the time of the survey. Although breast-feeding is almost universal in this population, very little exclusive breast-feeding was observed. Up to 33 percent of mothers reported using prelacteal feeds before full breast-feeding was established, and an extensive use of water, infant formula, and other liquids during the first four months was reported. Even solid foods were given to more than half of the children before they had reached 4 months of

age. The most popular complementary food for infants is *koko*, a traditional, thin porridge of low energy and low nutrient density, which is prepared from fermented maize dough. Sixty percent of the mothers reported using it as opposed to other fortified products, even the locally formulated cereal-legume mixture called *Weanimix*. The median age of inclusion of complementary foods in the children's diet was 5.2 months, earlier than the recommended 6 months. The median age of inclusion of family food was 9.2 months and the median duration of breast-feeding was 18.2 months (median ages were adjusted for truncated data by survival analysis) (results not shown).

Children were usually fed by their primary caregivers (66 percent of the cases), while 28 percent fed themselves and 6 percent were fed by an alternate caregiver. When asked what they did when their child refused to eat, but among those who did, 14 percent of them reported trying to force their child to eat, 25 percent coaxed or played with their children, 16 percent changed the food, 20 percent did not do anything, and 24 percent claimed that they did not have this problem. Helping feed and stimulate the child during meals is recognized as an important component of psychosocial care, which has been associated with improved nutrient intake and growth (Bentley, Black, and Hurtado 1995).

Immunization rates were high (> 85 percent), as is typical of urban areas in developing countries (Ruel et al. 1998). Growth monitoring, on the other hand, was attended only by 63 percent of children in the previous month.

Hygiene practices, as measured by the spot-check observations, show that for all 11 aspects observed, at least 50 percent (and often 70 percent or more) had good hygiene

scores (Table 2). This suggests that families achieved a relatively good level of hygiene, in spite of the generally precarious conditions in which they lived.

CARE RESOURCES

Maternal sociodemographic and employment characteristics are presented in Table 3. Women in our sample were relatively young, the majority being between 20 and 35 years of age, mainly because of our sampling criteria that excluded households that did not have a child 3 years or younger. In terms of nutritional status, the majority were in the normal body mass index (BMI) range, but as much as 25 percent were either overweight or obese ($BMI \geq 27$). Only 6 percent of the women were underweight ($BMI < 18.5 \text{ kg/m}^2$). The majority of mothers (63 percent) have had some form of basic education, 26 percent have high school or higher education, and 12 percent have no schooling at all. Migration status and ethnic origin generally show a fair split between indigenes and migrants, although those who have resided in Accra since birth (i.e., both indigenes and migrants born in Accra) are in the majority. A large proportion of women in our sample are married, but up to 35 percent are heads of household. Most mothers reported receiving some financial support from the father of their child.

More than half of the mothers (58 percent) were working full-time, while 30 percent were not working (Table 4) at the time of the survey. Of those working, 49 percent were selling in the markets or on the streets, 34 percent were working from home, and only 17 percent were in salaried employment as office, factory, or shop workers;

almost all worked at least four hours and more than half worked eight hours or more. Up to 56 percent of mothers worked and looked after their child at the same time, and only a third used alternate child care. Of these, 28 percent used a day-care service, and 61 percent used single-person alternate care. Although the majority of alternate caregivers were older than 15 years of age, still as much as 15 percent of them were between 6 and 15 years of age.

Household-level care resources are presented in Table 5. The statistics generally reflect a low socioeconomic status and poor living conditions. The majority of households live in rooms (90 percent) rather than houses or apartments. More than half of the households buy drinking water from vendors (54 percent), use public latrines (54 percent), and use public dumping bins for waste disposal (67 percent). In terms of ownership of assets, only a few households own a car (8 percent). Ownership of television, tape deck, radio, and refrigerator is common in spite of the generally precarious living conditions. Median household size is five persons, and families have approximately one-third of a room available per person. Median expenditure per capita per year is equivalent to \$394 and household-level calorie availability is 2,585 kilocalories per adult equivalent unit. Households spend 55 percent of their resources on food, an indication of limited resources.

ASSOCIATION BETWEEN CARE RESOURCES AND CARE AND HYGIENE PRACTICES

Table 6 summarizes the results of the bivariate analysis of the association between selected care resources on the one hand, and the care and hygiene index, respectively, on

the other. Only maternal education showed a significant positive association with both the care and the hygiene index. As expected, mothers with more education had a higher care index score and a higher percentage of them had six good hygiene practices. Other maternal characteristics tested (but not presented because they were not associated with either of the indices) include BMI, migration status, and civil status. At the household level, none of the characteristics studied were associated with the care index. For the hygiene index, however, the household quality of housing and asset index, the expenditure quintile, and the availability of services such as household garbage collection, flush toilets, and water piped inside the house were all significantly and positively associated with better hygiene. In addition, women working in shops, factories, or offices were more likely to have six good hygiene practices than women working at home or in the markets or the streets. Many of these bivariate associations are likely to be confounded by socioeconomic factors; thus, multivariate models were used to address this problem.

Ordinary least-squares regression was carried out to model the determinants of the care index. All maternal and household characteristics hypothesized to be potential constraints to child feeding practices and use of health services were included in the regression model (Table 7; full model A). The results confirm that none of the household characteristics was associated with the care index scores and that maternal health and years of schooling were main determinants, as found in the bivariate analyses. Age of the

child was the only other statistically significant variable in the model (Table 7; parsimonious model B).

For the hygiene index, ordered probit models were used and the results are presented in Table 7 (Full model C). Only maternal schooling, female head-of-householdship, and the quality of housing and asset index were associated with hygiene in this model. The parsimonious model obtained through backward elimination (Table 7; model D), however, shows slightly different results. Age of the child was negatively associated with hygiene as were female head-of-householdship and household size. Maternal education was a strong positive determinant of good hygiene and the quality of housing, and the asset index was also positively associated with hygiene. The type of garbage disposal was significant in the model, with household collection having a positive effect on hygiene compared to public dumping bins or burning and burying, both of which were negatively associated with hygiene.

The lack of association between maternal working patterns and child caregiving practices was somewhat unexpected, considering the young age of our sample of children. To understand this finding, we did additional exploratory analysis of the characteristics of mothers' employment by age of their child. The results, presented in Figure 1, indicate a strong association between children's age and mothers' employment patterns and use of child-care alternatives. For instance, mothers of young infants (0-4 months of age) are much less likely to work (23 percent compared to 76.5 percent of mothers of children 18 months and older), are less likely to work full-time, and are more

likely to take their child to work with them if they do work (100 percent among the 0-4 months old group compared to 46 percent among the oldest age group). Child-care substitutes use was much more popular among mothers of older children (53 percent compared to 9 percent of mothers of young infants) (not shown). Even the type of substitute child care selected varied by child age: the use of multiple caretakers and day-care centers increased gradually with child age, from 0 percent among mothers of young infants to 47 percent of mothers of the oldest child age group (not shown). These findings suggest that mothers understand the need to and are able to modify their working patterns and use of child-care substitute gradually as their child gets older, probably as a strategy to respond to the age-specific caring needs of their young children.

5. DISCUSSION

MAIN FINDINGS

This study confirms that in Accra, maternal education is a crucial asset for good caregiving practices related to child feeding, the use of preventive health services, and good hygiene. Limited household resources such as poor housing quality, few assets, and limited access to water, sanitation, and garbage collection services, on the other hand, are constraints only for hygiene practices. These and other household-level characteristics such as income and food availability do not appear to limit mothers' ability to feed their children appropriately or to take them for immunization or growth monitoring. Thus, child feeding practices and use of health services appear to be more dependent on

mothers' education—and probably knowledge—than on household resources. The “obese mother-malnourished child” phenomenon commonly observed in this sample supports this hypothesis and suggests that inequitable use of resources rather than outright poverty or absolute lack of resources are main constraints to adequate nutrition among preschoolers in Accra (Maxwell et al. 2000).

Maternal education has been consistently shown to be critically important for child health, nutrition, and survival (Caldwell and McDonald 1982; Cleland and van Ginneken 1988; Alderman 1990; Cebu Study Team 1991). Although the precise mechanisms by which maternal education affects child outcomes are not fully understood, evidence from various countries indicates that knowledge and practices are key pathways. These findings from Accra show that keeping income and other child, maternal, and household characteristics constant, maternal education is strongly and positively associated with better child-care practices. Good care practices, in turn, have a large positive effect on children's nutritional status (Ruel et al. 1999), particularly among children from poorer families and among children whose mothers have less than secondary schooling. Thus, in this population, maternal education does act largely through improved care practices. The fact that good care practices did not make any difference among children of mothers with secondary schooling or higher, however, indicates that other mechanisms are also involved (Ruel et al. 1999).

Household income did not appear to be a major constraint to good child-care practices among the age group studied (0-36 months), which is not surprising,

considering that at least up to 6 months of age, adopting the recommended practice of exclusive breast-feeding is less expensive than buying baby bottles and breast milk substitutes. In Ghana the cost of feeding infant formula in 1997 was estimated to be almost five times the cost of providing the additional maternal diet needed to produce the equivalent amount of breast milk through lactation (PROFILES estimates; J. Ross, Academy for Educational Development, personal communication). These estimates do not even take into account the time cost of buying and preparing the substitutes, the fuel to boil the water, the time and water to clean the bottles, and even more important, the time and cost needed to handle the health consequences of using substitutes. So these estimates grossly underestimate the real cost of using breast milk substitutes. Even after 6 months of age, when special foods have to be purchased, the proportion of the family budget that is needed to provide the child with an adequate diet is likely to be relatively small, and thus one would not expect household income to be a major limiting factor to providing an adequate diet to children at this age. What seems to be of utmost importance for the choices that mothers make regarding child feeding in this population is the level of education.

Relative to hygiene, as could be expected, better quality of housing, assets, and greater access to garbage disposal facilities all contribute to improved hygiene. Household income, availability of water, and sanitation were statistically significant determinants of hygiene in bivariate analyses, but their significance was lost in multivariate models when other household factors were controlled for. The multivariate

analysis does confirm, however, that household socioeconomic factors and access to basic services all contribute to facilitate maintenance of a clean environment. Families where women are heads of household and larger size families had poorer hygiene. Women heads of households are likely to have more severe time constraints if they have to work to generate income. Larger family size, especially if due to a larger proportion are young children, increases the burden of maintaining good hygiene. Finally, as documented in other environments, maternal education, even when controlling for socioeconomic factors, was a strong determinant of good hygiene practices (Gorter et al. 1998).

The specific issue of maternal work was not the main focus of the present study and will be explored in future analyses of the data. Our preliminary findings, however, show that maternal employment is not a major constraint to child care or hygiene practices, apparently because mothers modify their work patterns to attend to their young infant's special caring needs. These adaptive strategies, by which mothers stop working, or work fewer hours, or even take their infant to work if they do work, may be successful in protecting their infant, but may seriously jeopardize their ability to generate income for their family. In the informal work environment characteristic of our Accra sample, women have to create their own unpaid maternity leave. The qualitative work carried out as part of the overall study also highlights the acute trade-offs that mothers face between their productive and reproductive roles, especially around the time of birth. Mothers in focus groups and qualitative case studies clearly indicated that the two major factors that

determine when they return to their income-generating activities after delivery are how rested they feel, and the imperative to earn income (Maxwell et al. 2000). Programs and policies are urgently needed for women working in the informal sector to assist them during the early postnatal period, to relieve some of the burden of their dual role of income earner and principal caretaker. Some countries are currently experimenting with subsidized community day-care center programs, particularly in Latin America, but these programs often limit enrollment of young infants because of their need for intense care during the first year.

PROGRAMMATIC IMPLICATIONS

This study has identified two main elements that should be considered in the design of programs and interventions to improve caregiving practices in Accra, especially with regard to feeding practices. First, it has highlighted which specific feeding practices are deficient and detrimental for children's growth in this population; and second, it has identified the main constraints to the adoption of optimal feeding practices. This section reviews and builds on these findings, and discusses ways to address both the problems and constraints to child feeding in Accra. It also suggests potential vehicles for effective delivery of interventions to improve care in this setting.

Our study identified various child feeding practices during the first year that could be improved. First, use of prelacteal feeds and complementary liquids and foods during the first four months of life is widespread, although breast-feeding is the norm. Second,

most mothers use nonfortified, traditional complementary foods, and up to 10 percent introduce family foods directly into the child's diet without using any type of transitional foods. Finally, a large proportion of children are not helped or encouraged to eat, even those who refuse to eat. These non-optimal feeding practices, when combined into a care index, were found to be strong determinants of poor nutritional status in this sample of children 4-36 months of age (Ruel et al. 1999). The prevalence of stunting among children whose mothers were in the lowest care practices tercile was more than three times higher than among children whose mothers were in the highest care terciles (7 percent stunting prevalence compared to 24 percent). Thus, efforts to relieve the constraints to the adoption of optimal child feeding practices are likely to have a significant effect on child nutritional status in this population.

The main constraints to child care that were identified include maternal health and education. However, because of the unspecific nature of our health measure (the visual analogue scale), this information could not be used to address the constraints to care. While mothers with better health tend to have better care practices, this study did not determine which types of health problems are particularly detrimental for mothers' ability to provide good care. Indeed, the visual analogue scale may actually be more informative of mothers' self-esteem than of their health status.

Maternal education is thus the obvious constraint identified in this study, which is amenable to change in the long term and for which nutrition education is available as a short-term alternative. Promotion of girls' schooling needs to be high on the priority list

of policymakers in Accra, especially because it will have long-term benefits that go far beyond the effect on child care. In our study, maternal schooling was associated with a range of positive outcomes in addition to good care practices, namely higher household income, food availability, diet quality, better paid employment, and lower child malnutrition and morbidity (Maxwell et al. 2000). Education of girls is a long-term strategy; but fortunately, some of the benefits of maternal schooling can be simulated by effective nutrition education and behavior change strategies (Caulfield, Huffman, and Piwoz 1999). The success of these interventions depends largely on a clear understanding of which practices need to be modified and what are the main constraints to adoption of the recommended practices. The findings of our study constitute a first step in this direction.

Another key aspect to the success of nutrition education efforts is timeliness. Mothers need to receive education before the child is born in order to ensure that they will be motivated to initiate breast-feeding at birth, avoid prelacteal feeds during the first few weeks, and maintain exclusive breast-feeding for four to six months. In Accra, attendance at prenatal clinics was extremely high (97 percent), even in the first trimester of pregnancy (44 percent) (Maxwell et al. 2000). Thus prenatal clinics could be used as a vehicle to establish a first contact with mothers and start discussing issues related to child feeding and care. Childhood immunization was also high as is common in urban areas, and the education strategy should build on this contact with the health services as well as to strengthen the messages about early infant feeding. The DPT immunizations, which

require three visits during the first three months of the child's life, could be an excellent opportunity to promote continued exclusive breast-feeding and to establish a support system for mothers who experience difficulties with breast-feeding. Additional contacts with the mother should be planned so that mothers could be trained on the use of complementary foods before the child reaches 6 months of age. Measles immunization, which is due at 9 months of age, could be yet another opportunity to strengthen mothers' knowledge about appropriate complementary feeding practices at the end of the first year.

Finally, an additional key question is, who should be the target of the education and behavior change strategy? In Accra, mothers largely take on the responsibility for child care, especially in the first year of their child's life. After that, however, substitute caretakers gradually start taking a more important role in feeding and caring for children, and education strategies should consider ways to reach them as well. Additional information is needed on who the substitute caretakers are and where and how they can be reached. It is known, however, that many of them are older siblings, grandmothers, and other female relatives, which again highlights the importance of girls' schooling. It also suggests that specific nutrition training at school could be useful for young girls who are currently taking care of their younger siblings, but even more important, it would prepare them for their future role as mothers and grandmothers. Recent experience with nutrition education and behavior change programs targeted to schoolgirls show promising results (see Smitasiri and Dhanamitta 1999, in Thailand), but no evidence is available yet

of the long-term impact of these programs on adult women's nutrition knowledge and practices.

The potential for nutrition education and behavior change interventions to have a major impact on reducing childhood malnutrition in Accra is great. This is because not only are care practices and maternal education key determinants of nutrition in this population, but also because socioeconomic factors are not such overwhelming constraints. Evidence shows that in contexts where resources are too limited, maternal education and knowledge are just not enough (Reed, Habicht, and Niameogo 1996; Bairagi 1980; Doan 1988; Ruel et al. 1992). In these circumstances, nutrition education and behavior change interventions must be accompanied by poverty reduction strategies in order to achieve an impact on child outcomes (Ruel et al. 1992). This is not to say that income generation and poverty reduction activities are not also needed in Accra, but rather that the success of nutrition education and behavior change strategies in this context is not contingent on the synergism between the two approaches.

TABLES

Table 1—Practices and scoring system used, by age group, to create the care index (child feeding and use of preventive health care services; n = 512)

Practices included in the index	Results	Scores allocated to different practices, by age group (month)		
		4-8.9	9-17.9	≥ 18
Breast-feeding and feeding practices				
Prelacteal feeds used	Yes: 33%	Yes:-1 No: 0	Yes:-1 No: 0	Yes:-1 No: 0
Still breast-feeding	Yes: 51%	No =-1 Yes = 1	No = 0 Yes = 1	
Water: gave to child (0-4 months)	Yes: 69%	Yes:-1 No: 0	Yes:-1 No: 0	Yes:-1 No: 0
Sugar-based liquids: gave to child (0-4 months)	Yes: 26%	Yes:-1 No: 0	Yes:-1 No: 0	Yes:-1 No: 0
Infant formula: gave to child (0-4 months)	Yes: 32%	Yes:-1 No: 0	Yes:-1 No: 0	Yes:-1 No: 0
Cow milk: gave to child (0-4 months)	Yes: 17%	Yes:-1 No: 0	Yes:-1 No: 0	Yes:-1 No: 0
Solid foods: gave to child (0-4 months)	Yes = 58%	Yes:-1 No: 0	Yes:-1 No: 0	Yes:-1 No: 0
First food offered to child	Cereals (<i>koko</i>): 60%	0	0	0
	Fortified cereals: 30%	+1	+1	+1
	No special weaning food: 10%	-1	-1	-1
Does anyone help the child eat?	No = 28%		No: -1 Yes: 0	No: -1 Yes: 0
What does caregiver do when child refuses to eat?	Nothing (child left alone): 21%	-1	-1	-1
	Other (coax, play with, force, change food, not a problem): 79%	0	0	0
Preventive health care services use				
Growth monitoring (past month)	Yes: 63%	No: -1 Yes: 0	No: -1 Yes: 0	No: -1 Yes: 0
DPT immunization (> 3 months)	Yes: 91%	No: -1 Yes: 0		
Measles immunization (> 9 months)	Yes: 85%		No: -1 Yes: 0	No: -1 Yes: 0

Table 2—Hygiene behaviors observed and used in hygiene index (n=512)

Observation	Households with good hygiene		Number of missing/ not observed
	Number	Percent	
Mother clean ^a	353	69.6	5
Index child clean ^a	348	69.3	10
Diaper clean ^a	342	68.8	15
Compound swept ^a	247	49.5	13
No poultry feces ^a	337	69.8	29
No stagnant water ^a	446	89.6	14
No human feces	475	97.5	25
No unwashed utensils	262	69.3	134
Drinking water covered	94	68.6	370
House swept	201	77.9	254

^a Variables used in the construction of the index.

Table 3—Maternal sociodemographic characteristics (n = 512)

Characteristics	Frequency	Percent
Age		
< 20 years old	18	3.5
20-35 years old	395	77.8
36-45 years old	76	15.0
>45 years old	19	3.7
Body mass index		
< 18.5 (kg/m ²) (underweight)	29	5.7
≥ 27 (overweight/obese)	130	25.4
Education		
None	60	11.7
Some primary	116	22.7
Some middle school or Islamic	90	17.6
Finished middle school	114	22.3
Some secondary school	132	25.8
Migration status		
Indigenous	159	31.1
Not indigenous, but born in Accra	140	27.3
Migrant	213	41.6
Ethnic origin		
Ga, Adangbe	183	35.7
Ashanti, Fanti, other Akan	148	28.9
Ewe	117	22.9
Other	64	12.5
Marital status		
Single (cohabiting)	35	6.8
Single (not cohabiting)	48	9.4
Married (only wife)	341	66.5
Married (senior wife or other)	53	10.4
Separated, divorced, widowed	35	6.8
Female head of household		
Receives financial support from father	180	35.2
	395	77.3

Table 4—Maternal employment characteristics (n = 512)

Characteristics	Frequency	Percent
Current employment		
Not working	153	29.9
Working part-time	50	9.8
Working full-time	298	58.2
Unemployed (looking for work)	11	2.1
Place of employment		
Home	120	34.5
Market/streets	170	48.9
Factory/office/shop	58	16.7
For those who worked (n = 348):		
Usual hours worked		
Zero	6	1.7
0.5 - 3.5 hours	19	5.5
4 - 7.5 hours	132	38.2
≥8 hours	188	54.5
Child care use (n=348)		
Primary caregiver works and also looks after child	194	55.7
Primary caregiver uses child-care alternatives (n = 165):		
Single person	100	60.6
Multiple persons	18	10.9
Crèche	47	28.5
Age of alternate caretaker (n = 103)		
6 - 15 years old	15	14.6
16 - 49 years old	49	47.6
≥50 years old	39	37.9

Table 5—Household-level care resources (n = 512)

Characteristics	Frequency	Percent
Type of dwelling		
Room(s)	459	89.8
Apartment	19	3.7
House	33	6.5
Source of drinking water		
Vendor/well	276	55.0
Piped outside	187	37.3
Piped inside	39	7.8
Toilet facilities		
None (open space)	83	16.2
Public latrine	277	54.1
Private latrine	103	20.1
Flush toilet	49	9.5
Waste disposal		
Gutter/empty lots/other	73	14.3
Bury/burn on compound	38	7.4
Public dumping bin	341	66.6
Household collection	60	11.7
Ownership		
Car	39	7.6
Refrigerator	183	35.7
Gas or electric stove	102	19.9
Kerosene stove	121	23.7
Television	258	50.4
Tape deck	292	57.1
Radio	243	47.6
Medians [lower – upper quartiles]		
Expenditure per capita per year (cedis) ^a	768,670	[529,075 - 1,210,440]
Calorie availability per adult equivalent unit (calories)	2,585	[1,883 – 3,393]
Household size (individuals)	5	[3 – 6]
Crowding (number of rooms/person)	0.33	[0.25 – 0.50]
Food budget share (% budget spent on food)	55%	[44% - 66%]

^a Exchange rate during the survey was 1,950 cedis for US\$1.

Table 6—Association between selected care resources and care practices scores

Care resource	Care index (n=475)			Hygiene index (n=468)			
	Number	Mean score	Standard Deviation	Number	Percent with 0-3 good practices	Percent with 4-5 good practices	Percent with 6 good practices
Maternal health							
Lowest quartile	117	-2.82*	(1.86)	123	35.0	39.8	25.2
2 nd quartile	125	-2.46	(1.85)	119	27.7	38.7	33.6
3 rd quartile	112	-2.46	(1.77)	110	28.2	39.1	32.7
Highest quartile	118	-2.18	(2.10)	114	36.0	34.2	29.8
Maternal education							
None	53	-3.00*	(1.71)	57	45.6*	24.6	29.8
P1 to M4	297	-2.56	(1.88)	293	33.8	42.0	24.2
≥S1	125	-2.08	(1.98)	118	20.3	34.7	44.9
Ethnic group							
Ga/Adangbe	166	-2.42	(2.07)	164	38.4	33.5	28.0
Ashanti/Fanti/Akan	140	-2.73	(1.95)	132	22.0	42.4	35.6
Ewe	113	-2.35	(1.78)	112	35.7	40.2	24.1
Others	56	-2.34	(1.49)	60	28.3	36.7	35.0
Employment status							
Does not work	143	-2.17	(1.88)	143	28.0	35.0	37.1
Works part-time	48	-2.50	(1.81)	49	26.5	34.7	38.8
Works full-time	274	-2.63	(1.90)	267	34.5	40.8	24.7
Looking for work	10	-3.10	(2.56)	9	44.4	22.2	33.3
Workplace							
Home	109	-2.60	(1.75)	113	33.6*	41.6	24.8
Markets/streets	159	-2.65	(1.90)	153	41.2	36.6	22.2
Shop/factory/office	54	-2.50	(2.11)	50	8.0	46.0	46.0
Cares for child all the time							
Yes	294	-2.43	(1.88)	299	31.1	38.8	30.1
No	176	-2.64	(1.93)	165	32.7	37.0	30.3
Takes child to work							
Yes	179	-2.65	(1.86)	182	32.4	42.9	24.7
No	134	-2.56	(1.91)	134	34.3	35.8	29.9
Type of child care alternative							
Single	110	-2.50	(1.83)	104	35.6	36.5	27.9
Multiple	20	-2.20	(2.09)	18	55.6	27.8	16.7
Crèche	50	-2.92	(2.16)	46	19.6	39.1	41.3
Number of hours usually work							
0	117	-2.20	(1.89)	114	26.3	42.1	31.6
½-3 ½ hours	20	-2.75	(2.10)	19	47.4	36.8	15.8
4-7 ½ hours	131	-2.37	(1.79)	133	30.1	42.9	27.1
8 hours	179	-2.82	(1.94)	174	34.5	35.1	30.5
Quality of housing and asset index (quintiles)							
Lowest	97	-2.59	(1.83)	99	44.1 ^a	35.4	20.2
2 nd	91	-2.34	(2.05)	87	35.6	42.5	21.8
3 rd	91	-2.41	(1.69)	88	37.5	39.8	22.7
4 th	93	-2.58	(1.84)	93	25.8	36.6	37.6
Highest	91	-2.41	(2.05)	90	11.1	37.8	51.1

(continued)

Table 6 (continued)

Care resource	Care index (n = 475)			Hygiene index (n = 468)			
	Number	Mean Score	Standard Deviation	Number	Percent with 0-3 good practices	Percent with 4-5 good practices	Percent with 6 good practices
Expenditure (quintiles)							
1	95	-2.62	(1.85)	95	45.3*	35.8	18.9
2	93	-2.53	(1.93)	91	40.7	31.9	27.5
3	94	-2.68	(1.80)	90	30.0	43.3	26.7
4	99	-2.35	(1.91)	95	29.5	38.9	31.6
5	93	-2.27	(2.05)	95	14.7	38.9	46.3
Waste disposal							
Gutter/empty lots	66	-2.79	(1.74)	72	27.8*	41.7	30.6
Bury/burn	36	-2.61	(1.81)	34	38.2	38.2	23.5
Public bins	320	-2.36	(1.91)	305	35.4	37.7	26.9
Household collection	53	-2.79	(2.09)	57	14.0	35.1	50.9
Toilet facilities							
Open space	80	-2.33	(1.99)	77	36.4*	39.0	24.7
Public latrines	251	-2.58	(1.93)	253	38.7	33.6	27.7
Private latrine	99	-2.47	(1.76)	93	23.7	49.5	26.9
Flush toilet	45	-2.24	(1.94)	45	2.2	37.8	60.0
Water source							
Vendor	258	-2.41	(1.92)	251	34.7*	43.0	22.3
Piped outside house	175	-2.64	(1.82)	173	32.4	30.6	37.0
Piped inside house	32	-2.00	(1.95)	35	2.9	40.0	57.1

^a p < 0.05 (results of ANOVA for care index; and of Chi-square test for hygiene index).

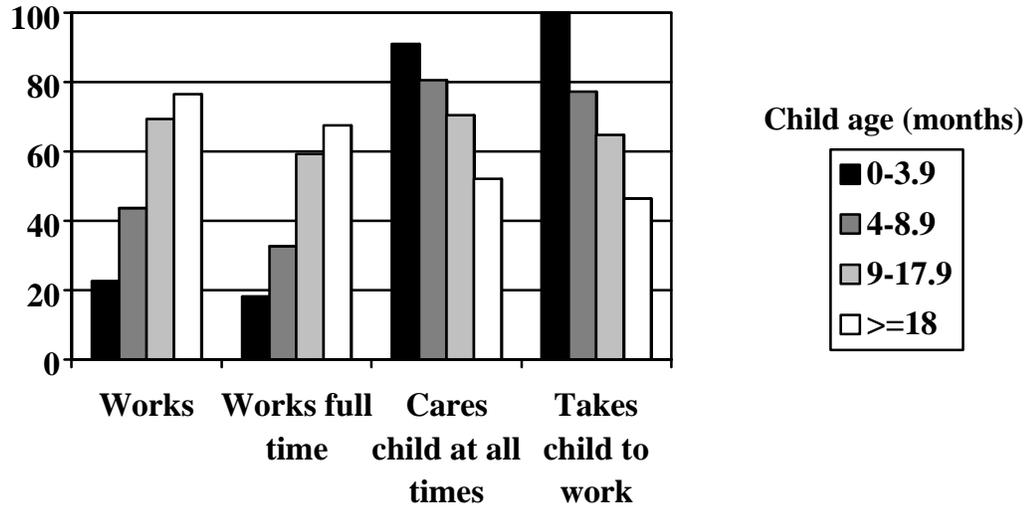
Table 7—Determinants of care and hygiene behaviors scores (results of multivariate analysis)

Variable	Care index ^a				Hygiene index ^a			
	Full model		Parsimonious Model		Full model		Parsimonious Model	
	Coefficient	T-test	Coefficient	T-test	Coefficient	Z-test	Coefficient	Z-test
Constant	-4.32	-2.03*	-2.41	-6.36*				
Age of child (months)	-0.06	-6.93*	-0.07	-8.63*	-0.01	-1.55	-0.01	-2.06*
Sex of the child	0.06	0.36			-0.04	-0.37		
Age of caregiver (years)	-0.01	-0.41			-0.00	-0.70		
Body mass index of caregiver	-0.00	-0.24			-0.01	-1.08		
Health of caregiver (Visual Analogue scale)	0.01	2.81*	0.01	2.83*	0.00	0.09		
Education of caregiver (years of schooling)	0.04	2.47*	0.04	2.95*	0.02	2.13*	0.02	2.08*
Ethnic group (dummy: 1=if Ashanti, Fanti, other Akan) ^b	-0.29	-1.29			0.06	0.43		
Ethnic group (dummy: 1=if Ewe) ^b	0.11	0.44			0.08	0.52		
Ethnic group (dummy: 1=if other and not Ga nor Adangbe) ^b	0.23	0.76			0.22	1.26		
Receives financial help from father	0.32	1.36			0.20	1.51		
Female head of household	-0.38	-1.76			-0.50	-3.97	-0.49	-4.70*
Caregiver works full-time	-0.02	-0.84			-0.00	-0.09		
Per capita income	0.00	-1.12			0.00	0.27		
Log of calories per adult equivalent units	0.29	1.10			0.15	0.89		
Household size	-0.01	0.19			-0.04	-1.58	-0.06	02.75*
Crowding (rooms/person)	0.08	0.93			-0.01	-1.06		
Food share (% total budget spent on food)	-1.24	-1.64			-0.35	-0.76		
Quality of housing and asset score (factor scores)	-0.08	-0.34			0.32	2.33	0.26	4.36*
Toilet facilities (dummy: 1=if public latrine) ^c	-0.17	-0.57			-0.12	-0.67		
(dummy: 1=if private latrine) ^c	-0.10	-0.27			-0.16	-0.67		
(dummy: 1=if flush toilet) ^c	0.03	0.05			-0.10	-0.28		
Waste disposal (dummy: 1=if bury, burn on compound) ^d	0.42	1.02			-0.30	-1.25	-0.32	-1.47
(dummy: 1=if public dumping bin) ^d	0.62	2.16			-0.28	-1.68	-0.43	-3.05*
(dummy: 1=if household collection) ^d	0.10	0.25			0.17	0.73	0.07	0.32
Water source (dummy: 1=if piped outside house) ^e	-0.17	-0.73			-0.14	-0.96		
(dummy: 1=if piped inside house) ^e	0.15	0.25			0.02	0.04		
Adjusted R-square (pseudo R-square for ordered probit model)	0.15		0.16		0.07		0.06	
Root mean square error	1.73		1.74					
F test (LR Chi-square for ordered probit)	4.02		32.13		107.50		102.14	
N	436		475		460		468	

* Statistically significant ($p < 0.05$).^a OLS was used for modeling the care index. Maximum likelihood ordered probit estimation was used for the hygiene index.^b Reference category for ethnic group: Ga or Adangbe.^c Reference category for toilet facilities: none (open space).^d Reference category for waste disposal: gutter, empty lots.^e Reference category for water source: vendor or well.

FIGURE

Figure 1—Maternal work patterns and use of child care, by age of the child^a



^a Values on the Y axis are percentage of mothers who have different work and child care patterns, and columns represent different child age groups (in months). All differences between groups are statistically significant (ANOVA; $p < 0.05$).

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