FCND DISCUSSION PAPER NO. 19

FOOD SECURITY AND NUTRITION IMPLICATIONS OF INTRAHOUSEHOLD BIAS: A REVIEW OF LITERATURE

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September 1996

ABSTRACT

The success of development policy depends on the ability to successfully anticipate the response of individuals to changing incentives. Often, however, actual responses differ from anticipated responses. One important reason for this divergence is a poor understanding of how rights, responsibilities, and resources are allocated within institutions such as the household. The insights derived from intrahousehold research between the late 1970s and the mid-1980s on the determinants of food and nutritional status served as an important catalyst for the general development of the intrahousehold approach to development policy analysis. Despite serving as a building block for the wider study of intrahousehold resource allocation, there has not been an in-depth review of sex and gender differences in the food consumption and nutrition literature in the past 10 years. This paper seeks to fill this gap. In addition, the paper undertakes a review of the gender and poverty literature, because economic access to food is so fundamental to food security and nutrition. Why is this an important gap to fill? First, the availability of a series of new food consumption and nutrition studies from the past 10 years affords us an opportunity to get a clearer picture of where intrahousehold and sex differences in food and nutrition occur. Second, the availability of a number of intrahousehold studies from outside the food and nutrition community may have some important lessons for food and nutrition programming. Finally, a number of important measurement issues have emerged in the past 10 years and their importance can be illustrated well in a review of studies such as this. These three considerations, then, form the basis for formulating the objectives of the paper. Specifically, the paper aims to (1) critically review the existing literature and studies on the distribution of food and other proximate factors within the household (with an emphasis on boy-girl differences), (2) critically review the existing literature and studies in the areas of poverty and gender, gender and income earning, drawing out implications for food and nutrition programs, and (3) highlight some important methodological concerns related to poverty, income, and food consumption measurement.

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In December 1992, the International Conference on Nutrition (ICN) was held in Rome, Italy. The ICN was the culmination of more than two years of joint effort by the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO) to increase awareness of the extent and seriousness of nutrition- and diet-related problems, and to achieve consensus on future methods of dealing with them. The ICN was attended by more than 1,300 participants from 159 Member States and the European Community, as well as representatives of 15 organizations and bodies of the United Nations system, and over 150 other intergovernmental and nongovernmental organizations.

The ICN adopted the World Declaration and the Plan of Action for Nutrition (FAO/WHO 1992), which represents a vital step in the direction of a truly global commitment to action by countries and the international community alike.

The World Declaration emphasizes the unacceptability of malnutrition and the determination of all governments to eliminate hunger and substantially reduce malnutrition . The declaration points to poverty and lack of education (rooted in underdevelopment) as fundamental causes and identifies social, economic and gender disparities as well as wars, civil strife, droughts and other natural calamities as major contributors. It affirms the need for major universal policy change if malnutrition is to be radically reduced. The goals and strategies delineated in the World Declaration and the Plan of Action for Nutrition (see the box below) provide a framework and guidelines for countries to develop and strengthen their national plans of action to promote the nutritional well-being of their populations.

As a follow-up action to the World Declaration and Plan of Action for Nutrition, a collaborative work on the issues relating to intrahousehold resource allocation has been developed between WHO and the International Food Policy Research Institute (IFPRI). The importance of understanding the issues relating to resource distributions within households was addressed, in particular, in two strategy areas identified in the Plan of Action for Nutrition: improving household food security, and caring for the

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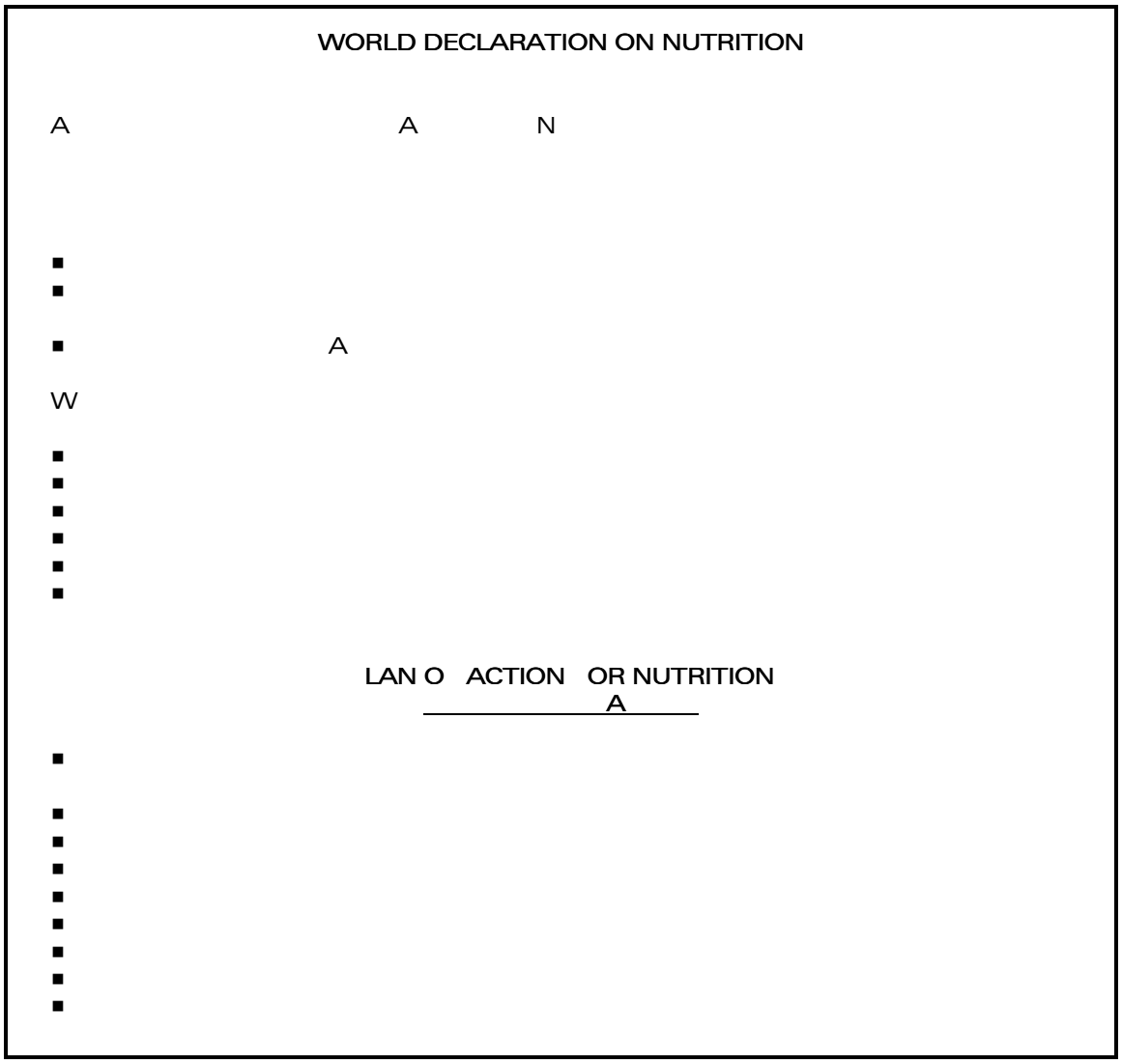

socioeconomically-deprived and nutritionally vulnerable. The present paper was developed as one component of this IFPRI/WHO collaboration on intrahousehold resource allocation. Meeting the health and nutrition needs of the family, particularly of mothers, infants, and young children, is fundamental to both IFPRI's and WHO's strategies to support nutrition activities in developing countries.

ACKNOWLEDGMENTS

The authors would like to acknowledge the useful and thoughtful comments made on earlier manuscripts by the following individuals: Alice Stewart Carloni (FAO), Patrice Engle (California Polytechnic State University), Cynthia Lloyd (Population Council), Richard Longhurst (Institute of Child Health, University of London), Beatrice Rogers (Tufts University), and Jay Willis and Lynn Brown (IFPRI). The usual disclaimers apply.

This work was supported by the World Health Organization (WHO), the International Food Policy Research Institute (IFPRI), and the United States Agency for International Development, Office for Women in Development, Contract No. FAO-0100-G-00-5020-00.

A revised version of this paper will be prepared as a joint WHO/IFPRI document to be published under WHO auspices.

1. INTRODUCTION

The success of development policy depends on the ability to successfully anticipate the response of individuals to changing incentives. Often, however, actual responses differ from anticipated responses. One important reason for this divergence is a poor understanding of how rights, responsibilities, and resources are allocated within institutions such as the household.

Nutrition and food consumption were among the first areas of inquiry into the extent of intrahousehold differences in resource allocation (Sen 1984). Studies in Bangladesh, India, and the Philippines alerted the wider development community to the potential for sex and age biases in nutrition and food intake.[1] The insights derived from intrahousehold research between the late 1970s and the mid-1980s on the determinants of food and nutritional status served as an important catalyst for the general development of the intrahousehold approach to development policy analysis. Today, intrahousehold analysis is being applied to a wider set of development issues, such as the protection of the environment, the design of public works schemes, the design of micronutrient interventions, preventing violence against women, the design of credit schemes for the poor, and the determinants of fertility, to mention but a few (IFPRI 1994; Rogers and Schlossman 1990).

Despite serving as a building block for the wider study of intrahousehold resource allocation, there has not been an in-depth review of sex and gender differences in the food consumption and nutrition literature in the past 10 years. This paper seeks to fill this gap. In addition, the paper undertakes a review of the gender and poverty literature, because economic access to food is so fundamental to food security and nutrition.

Why is this an important gap to fill? First, the availability of a series of new food consumption and nutrition studies from the past 10 years affords us an opportunity to get a clearer picture of where intrahousehold and sex differences in food and nutrition occur. Second, the availability of a number of intrahousehold studies from outside the food and nutrition community may have some important lessons for food and nutrition programming.

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[1] This information was, of course, not new to nutritional anthropologists. For example, the pro-male culture in parts of South Asia, and the consequences for nutrition, have been well-documented since the 1950s (see Miller [1981] for a synopsis).

Finally, a number of important measurement issues have emerged in the past 10 years and their importance can be illustrated well in a review of studies such as this.

These three considerations, then, form the basis for formulating the objectives of the paper. Specifically, the paper aims to (1) critically review the existing literature and studies on the distribution of food and other proximate factors within the household (with an emphasis on boy-girl differences), (2) critically review the existing literature and studies in the areas of poverty and gender, gender and income earning, drawing out implications for food and nutrition programs, and (3) highlight some important methodological concerns related to poverty, income, and food consumption measurement.

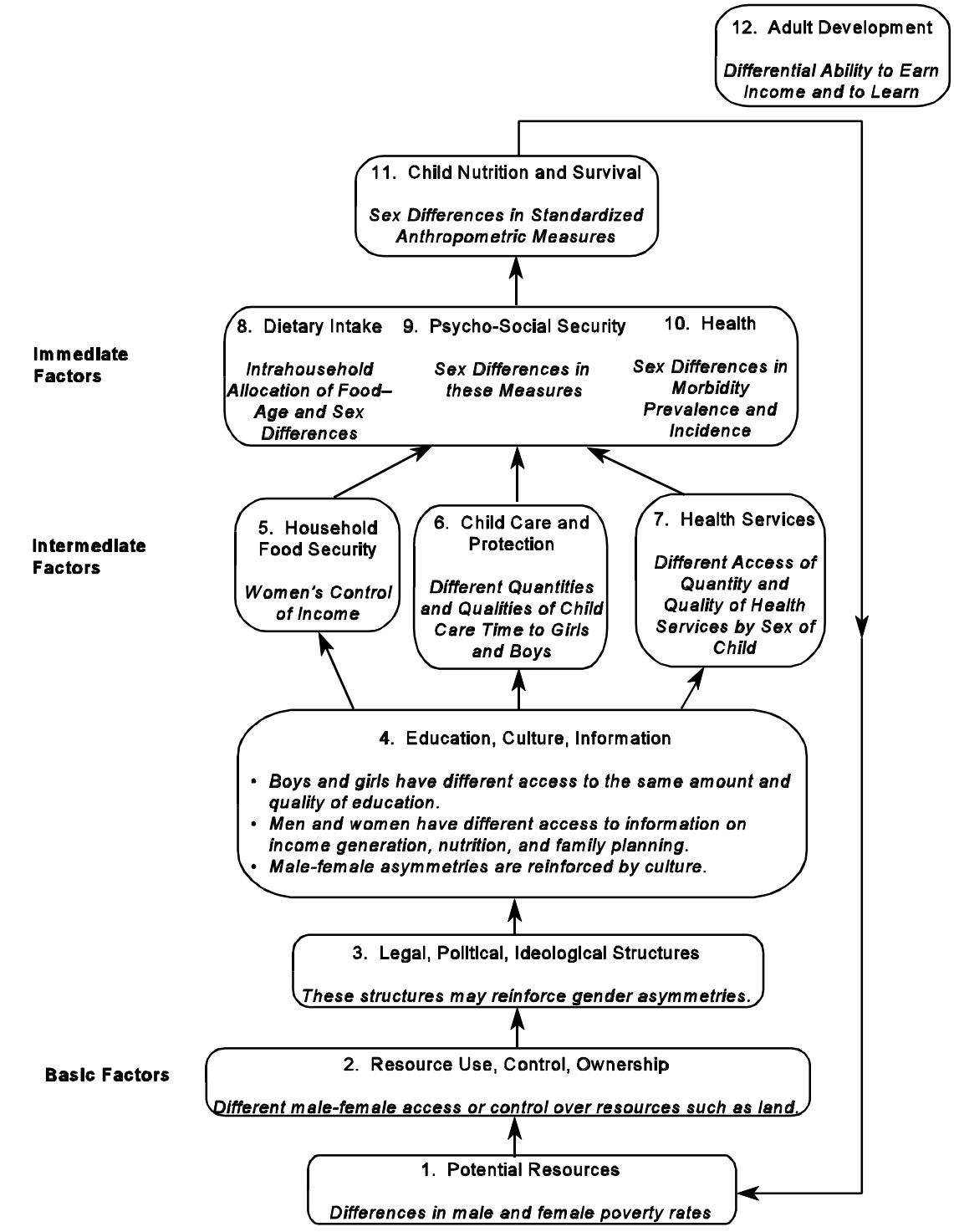
Chapter 2 presents a conceptual framework for a gendered analysis of the determinants of malnutrition so as to place the literature review of Chapters 3 and 4 in context. Chapter 3 reviews the literature on the direct and indirect evidence of sex differences in food and nonfood health input consumption and in nutrition outcomes. Chapter 4 reviews the literature on the factors underlying intrahousehold bias, specifically the relationship of poverty and gender (including a discussion of the poverty status of female-headed households). In the process of reviewing the literature, several methodological issues are discussed. Chapter 5 summarizes the conclusions of the literature review and draws out their implications for poverty, food, and nutrition programs and policies.

2. CONCEPTUAL FRAMEWORK

An intrahousehold/gender review of all the determinants of malnutrition is beyond the scope of this paper. It is important, however, to place the literatures this paper will review in a wider context. Using a standard conceptual framework for the determinants of malnutrition (ICN 1992) as a base, Figure 1 presents a gendered version of the framework of the determinants of nutrition status.

The conceptual framework begins with the basic factors underlying nutrition status. If women are overrepresented in poor households, this is a strike against nutrition. Poor women are likely to be poorly nourished and this has serious implications for the nutrition status of their yet-to-be-born children. Adult female undernutrition also constrains the ability of women to earn income, which tends to impair the nutrition status of their

Figure 1 A gendered conceptual framework of the determinants of nutrition outcomes



Adapted from FAO/WHO (1992).

existing children. Women with control over resources tend to have a large say in how the household allocates resources, and women are typically more likely to skew resources to the production of nutrition. If, however, the legal, political, and ideological structures in society do not reinforce women's rights to, say, own land, get access to credit and to family planning, then this control can be usurped. Education is crucial for income generation and behavior change. If girls do not receive the same educational opportunities as boys, this has important negative consequences for their total fertility rate, their labor force participation, and their ability to promote child welfare.

In terms of intermediate factors, women's control of income is a key promoter of household food security and nutrition. Women are more likely than men to spend extra income on nutrition inputs such as food. Child care time is a crucial input to nutrition. In the event of an income or health shock, do women and men reduce their care time to girls more than they do to boys? Will they require girls to miss school more often than boys by calling on their labor to substitute for their own? Are boys breast-fed more optimally than girls? When children get ill, do boys receive treatment before girls do? Do boys receive higher quality treatment than girls? The allocation of child care by sex of the child is an understudied area.

In terms of immediate factors, what is the evidence on intrahousehold food allocation? Are boys favored in terms of quantity and/or quality? Are there any boy-girl differences in the prevalence, incidence, and severity of specific illnesses?

The net effect of differences and asymmetries in the basic, intermediate, and immediate causes of child survival and nutrition are manifest in nutrition outcomes. Are there differences in boy-girl nutrition outcomes as measured by anthropometric indicators? Finally, differences in nutrition outcomes for young children will have implications for their cognitive development and for their labor capacity and productivity as adults, and thus nutritional status contributes to the stock of potential resources in terms of the quality of human resources.

This review will discuss 6 of the 12 boxes in Figure 1—potential resources (1), household food security (5), health services (7), the dietary intake of food (8), health (10), and child nutrition and survival (11).

3. INTRAHOUSEHOLD BIAS

A review of issues of income, household structure, food consumption, and nutrition must take account of some of the shortcomings and limitations of commonly used measurement methodologies. Consequently, each section of the literature review discusses relevant measurement issues prior to an assessment of the evidence presented. In all sections, the evidence is organized by region,[2] since prior reviews suggest that the nature of the evidence on intrahousehold differences is highly location-specific.

EVIDENCE ON CONSUMPTION

Intrahousehold bias in consumption can be measured directly in terms of the consumption of food and nonfoods by various household members. Alternatively, intrahousehold bias in consumption can be indirectly measured by observing the variation in the consumption of goods exclusively consumed by adults across different household structures. This section reviews both the direct and indirect evidence.

Food Distribution Within the Household

Apart from obvious concerns with equity, examining intrahousehold food distribution is relevant to the design of targeted interventions, that is, the choice between targeting at the household level or at the individual level. Appropriate targeting ensures not only cost-effectiveness, but also reduces the chance that the vulnerable groups are excluded from the intervention (Cornia and Stewart 1992; Haddad and Zeller 1996).

At the household level, Haddad and Kanbur (1990) demonstrate that the undernourishment rankings of various socioeconomic and geographic household groups can change when individual-level food consumption information is used instead of household-level information. For example, although individual-level data may indicate that individuals from certain households (for example, landless rural households) are an important food poverty group, a reliance on household-level data might imply that they are not an important group. This result comes about because patterns of intrahousehold inequality differ between different household groups. If inequality was similar in all groups, then food poverty rankings would be identical, whether or not individual-level data were used to target the transfer.

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[2] Regions are defined as Latin America, Sub-Saharan Africa, South Asia (India, Bangladesh, Nepal, and Pakistan), and Southeast Asia (the Philippines).

Programs that use individual-level data for targeting purposes often assume that the food allocation mechanism within a household can be short-circuited by targeting the individual directly. Suppose there is concern regarding the well-being of young girls in a particular rural area; specifically, there is a perception that they do not get enough food to eat. A possible policy response is to implement a school meal program where girls are recorded as being particularly undernourished. The success of this intervention, however, cannot be ascertained in the absence of information on the pattern of food allocation among household members. Households might respond to this program by reducing the amount of food girls receive at home (and increasing the amount of food consumed by other household members). Understanding the existing patterns of intrahousehold allocation of food is a necessary prerequisite for determining the effectiveness of such policy interventions (Haddad and Kanbur 1992; Alderman et al. 1995).

Conclusions drawn from the evidence on the distribution of food relative to requirements within the family are, however, sensitive to methods of assessing food intake and food requirements. Therefore, measurement issues are discussed before empirical evidence is presented.

Measurement of Food Intake. The basic choice for the collection of individual food intake is between repeated recalls of food consumed in the past 24 hours and food weighing of ingredients prior to consumption. Each method has its fair share of supporters and critics. The survey data collection problems associated with intrahousehold nutrient analyses are well-illustrated in Brown (1984) and in Harriss-White (1996).

Accurate measures of food intake are notoriously difficult to obtain due to meals eaten outside the home (how to assess their nutritional content); snacking behavior (Harbert and Scandizzo [1982] found that this type of food consumption is easy to omit, but when it is captured, it can have a large impact on measured nutrient intake, especially for children); modification of diet due to being observed; the uneven visual comparison between household utensil volumes and standard measures carried by the enumerators, especially when food is eaten from a common bowl; using an appropriate recall period (should the recall period be 24 hours or seven days?); and the number of repeated recalls (what is the optimal number in terms of accuracy, cost, and the ability of the analysis to attenuate random measurement error at individual and population levels?).

Measurement of Food Requirements. The accurate determination of individual energy and nutrient requirements is difficult. For energy, problems include those related to activity patterns, weight changes, and individual variation in basal metabolic rates, to name but a few

(Randolph et al. 1991; Kumar and Bhattarai 1993). The basic choice for time allocation data methodologies lies between random-spot observations (a large number of observations as to the activity of each household when visited by the interviewer), repeated 24-hour recalls of activities, and "typical day" activity profiles (Paolisso and Regmi 1992).

Additional requirement problems are highlighted when attempting to uncover inequalities in micronutrient availability. The difference between individual consumption and individual absorption can be due to a number of factors: combinations of vitamins and minerals (Gibson 1990, 76-77); antinutrients (for example, phytates, which block the absorption of iron); storage (for example, sunlight and infestation damage); processing (positive [for example, minerals added from utensils] and negative [for example, refining that removes nutritious components from the food]); and cooking (positive [for example, fermentation] and negative [for example, heat denaturing of proteins]). All of these factors may vary by individual (Gibson 1990).

Accounting for individual energy requirements affects the measurement of biases in food distribution, since food may be allocated to individuals who perform more strenuous tasks. Pitt, Rosenzweig and Hassan (1990) find that, in Bangladesh, the higher level and greater variance in calories consumed by men relative to women reflect their greater participation in more energy-intensive activities where productivity is sensitive to health status.

Evidence. Food allocation is the most studied dimension of intrahousehold inequality, and yet, outside of northern India and Bangladesh, evidence of pro-male biases in food consumption is scarce. The 43 studies summarized in Table 1 contain 103 male-female or adult-child comparisons. The majority of the studies (70 comparisons) do not adjust requirements for body weight or activity patterns. The remaining 33 comparisons are from studies that take activity patterns and body weight into account when determining requirements. When body weight and activity are not considered, of the 19 male-female preschooler comparisons, males are favored in 9 cases, females in 1 and neither sex in the remaining 9 cases. When studies adjust energy requirements for body weight and activity, of the 8 male-female preschooler comparisons, 2 are pro-male, none are pro-female, and 6 favor neither sex. In general, the adjustment for body weight and activity tends to support gender-neutrality of intrahousehold food distribution, although a slight pro-male bias persists.

Table 1 A summary of studies of food distribution relative to requirements within the household

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
1. Ahmad et al. 1977	Rural Bangladesh	Food intake	1,200 individuals	Male and female about same in kilocalories and protein in all age groups, although pregnant and lactating women had low percentage share of recommended daily allowances (RDAs). Younger children (4-9 years old) had low kilocalorie shares but high protein shares.
2. Pakistan 1978	Pakistan (nationally representative sample)	24-hour recall of food intake	1,236 households	The male head of household and a woman of childbearing age were asked separately about their individual food intakes. These data indicate that male head of households met 98 percent of their activity-unadjusted calorie requirements. The corresponding figure for women was 101 percent.
3. Evenson, Popkin, and King-Quizon 1980	The Philippines	Combination 24-hour food recall and record method	357 individuals	"At all age levels, male children have more adequate diets than female children, and . . . diets of adults are more adequate than those of children" (p. 306). These conclusions seem strong, based on the data presented. Protein consumption seems to be the only diet component in which boys are clearly favored. Overall "diet ratings" are marginally higher for males than females (encompassing energy, protein, and seven micronutrients) for preschooler and schooler groups. The male-female differences seem more marked for adolescents and adults, but these may be due to nutrient requirements that do not reflect activity levels, and are hence underestimated for males.
4. Chula, Karangka, and Onate 1980	Laguna, the Philippines	Food intake	Rural preschoolers (3-6 years old) in 58 households	No large differences by sibling order, although boys fare better (8 percent higher than RDAs for nine nutrients).
5. Aligaen and Florencio 1980	Manila, the Philippines	Food intake	100 urban households	Sex differences insignificant for calories but significant for protein. Adults fare best relative to RDAs, while adolescents are worst off.
6. Chen, Huq, and d'Souza 1981	Rural Bangladesh	Food intake	135 families	After corrections to calorie requirements using body weight and activity level, they found child calorie adequacy ratios to be significantly higher for boys compared to girls.
7. Carloni 1981	Primarily rural Bangladesh	Food intake	Review paper	Review of nutritional surveys in rural Bangladesh suggests that females tend to be at a disadvantage, relative to males, leading to higher rates of female undernutrition. Increasing the supply of food is not enough to ensure the equitable distribution of resources within the family—the perceived economic value of females must be increased in rural societies in Bangladesh.

Table 1 (continued)

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
8. Harbert and Scandizzo 1982	Chile	Method of collecting dietary intakes is not explained	400 households from the Metro-politan Zone	The distribution of nutrients across members of the household appears to be skewed in favor of adult males when the three main meals are measured. When, however, additional snacks are taken into account, the results show that food allocation to family members closely conforms to nutritional requirements, and tends to favor younger children.
9. Brown, Black, and Becker 1982	Bangladesh	Food intake		Cross-sectional study of Bangladesh data provides evidence that boys in the 0-4 age-group consume more food relative to their requirements than girls.
10. Fabella 1982	The Philippines	Food intake	100 households	Both female and male children get higher proportions of food, the higher the income of the family. Increased education of the mother results in girls being better-off than their male siblings.
11. Chaudry 1983	Rural Bangladesh	Food intake	1975-76 Rural Nutrition Survey	Fathers over 45 years old had the highest reported calorie adequacy; calorie adequacy of females was higher than for males in all age-groups, except 0-1 and 15-29 years. For families with over eight children, male calorie adequacy is significantly higher than females in the 3-30 year age groups.
12. Kennedy 1983	Mexico	Preschooler calorie intake		Children do not seem to be favored or disfavored in terms of the allocation of extra calories received by the household; "in Mexico, increased income is associated with an increased energy intake in the child only to the extent that the income is used to purchase additional family calories" (p. 29).
13. Cowan and Dhanoa 1983	Rural Punjab, India	Individual food con-sumption (based on home visits and two-day recalls)	911 index children (2-3 years old)	More than three times as many girls as boys from privileged families are malnourished. Twice as many girls as boys from underprivileged families were reported as undernourished.
14. Hassan and Ahmad 1984	Bangladesh	24-hour food weighing, weight-for-height, height-for-age	4,000 households	On an overall household level, it was found that just under 50 percent of the households in the study had intake levels below 80 percent of the recommended levels. "Socioeconomic factors such as landholding, income, and expenditure on food have a positive influence on energy adequacy . . . No regular relationship between anthropometry and household energy adequacy was immediately seen, probably because household adequacy did not ensure better nutrition for individual consumers. Unequal distribution within the family left many of the members malnourished" (p. 6).

(continued)

Table 1 (continued)

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
15. Abdullah and Wheeler 1985	Bangladesh	Three-day recalls of food intakes	53 households with >=1 preschooler	No evidence that women and older girls receive a lower share of household calories, based on calorie requirements that are adjusted for body size and activity levels. However, the authors conclude "young children do not receive the share of household food which theoretical calculations of the requirements would prescribe; and that young girls receive a lower share than young boys."
16. Basu et al. 1986	Nepal	One-day recall of dietary intakes as reported by wives/ mothers	Low-caste migrant tea laborers and a landed caste divided into high, medium, and low economic subgroups	Found mixed results for distribution of food, depending on the region studied—in some areas, there was no difference; in others, there was a bias towards either males or females.
17. Pettigrew 1986	Indian	Breast-feeding, weaning practices, and illness around weaning time (based on participant observation, home visits, and weighing of sample)	55 children from rich, average, and poor households (breakdown of how many kids belonged to each income class was not given)	Boys were fed first in all types of households, although girls were breast-fed longer. Note a comment that "the richest people have a great hatred for girls"—this is an observation by a village midwife on which Pettigrew does not comment. In weaning, supplementary milk is not willingly supplied to girls, though it is more likely to be provided for boys. The level of income and ownership of land are important variables associated with child health (laborer families contained five out of the six children suffering from 3rd degree malnutrition and only two out of 18 healthy children).
18. Levine 1987	Northwest Nepal	Child care measured by infant feeding	10 men and 10 women from three villages	Boys were given supplementary food sooner than girls, and mothers were more frequently concerned about the adequacy of their milk for boys.
19. Haaga and Mason 1987	Review	Various	Review	From their review, the authors do not see any generalizations emerging from empirical literature(for example, preschoolers are not always the losers in intrahousehold food allocation), although it seems that misallocation of food is most likely to be an important cause of malnutrition in South Asia.

(continued)

Table 1 (continued)

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
20. Behrman 1988a	India village-level studies data (VLS)	Nutrient intake from 24-hour recall	400 pairs of children < 15 years, from households with at least two kids	During the surplus season, nutrients are distributed among children within a household, regardless of individual endowments (unobserved health propensity). During the lean season, however, the measurement of "inequality aversion" is significantly reduced, rendering later-born and less well-endowed children more vulnerable when availability of nutrients is at lowest level. Standardized seasonal requirements satisfied do not differ significantly between boys and girls for calories, carotene, riboflavin, vitamin C, and calcium.
21. Behrman 1988b	India VLS	Nutrient intake from 24-hour recall at least two kids	Children < 13 years and from households with preferences—particularly (approximately 800 children)	A male child parental preference bias of 5 percent was found only during the lean season. ". . . for the lean season, when food is scarcest, the combination of limited inequality aversion and pro-male for the lowest ranked castes—may leave those children who are less well-endowed, especially if they are low-caste females, close to or even below the margin for survival" (p 52).
22. Senauer, Garcia, and Jacinto 1988	The Philippines (Pilot)	Food intake	140 households	Female wage rate has a positive and significant impact on children's and females' share of household calories and a negative impact on husbands' share of household calories. Male wage rate has positive and significant impact on male and female share of household calories, but a negative significant impact on children's calorie share. The allocation of food seems to favor adults. Husbands fare better than wives in terms of unadjusted protein and energy adequacy ratios.
23. Brahman, Sastry, and Rao 1988	India	Food intake	1,878 households in 10 states, 1975-1980	This study found no sex discrimination in the intrahousehold distribution of food. Any shortfalls in energy intake are attributed to ignorance on the part of the parents, and not to the intentional selection of a few household members. Literacy level of the adult women had a significantly positive influence on the energy consumption of the preschool children in a household.
24. Behrman and Deolalikar 1990	India VLS	Food intake		Little or no evidence from this data that gender discrimination exists, such as a lower average nutrient consumption level for females, or greater variance in female and male nutrient consumption levels. "Of course, to the extent that the general risk of malnutrition or starvation is greatest during times of food shortage . . . the relatively greater vulnerability of female members at these times could be characterized as gender discrimination" (p. 693). Also, nutrient intakes are subject to greater variability for females than for males.

(continued)

Table 1 (continued)

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
25. Pitt, Rosenzweig, and Hassan 1990	Bangladesh	Food intake	345 households from 15 villages	Good consumption disparities reflect gender differentiation in the energy intensities of activities undertaken by men and women. Results indicate that households seem to exhibit some inequality aversion (that is, even though the rate of calorie reinforcement for adult males was high compared with adult females, males with a higher probability of getting more calories were also more likely to undertake highly energy-intensive work--work in which productivity is sensitive to health status).
26. Ely et al. 1991	Mexico	Food intake	Children >7 years old	The basic conclusion of this study is that it cannot be assumed that, simply because there has been a shortfall in the caloric consumption of an individual household member, that individual is at a greater risk of malnutrition. "Those household members with larger shortfalls eat less because they choose or are permitted to do less, not because their caloric intake has been restricted . . . Calories are not rationed in these households, although leisure may be" (p. 20). Hence, the use of shortfalls per se should not be used as an indicator of malnutrition or to identify target groups for nutrition intervention.
27. Gittelsohn 1991	Nepal	Quality and quantity of food consumed, food serving process, decisionmaking about food selection and preparation	767 individuals from 115 house-holds in six villages	Adult women discriminated against (late position in serving order, channeling of special foods, lower overall food intake) in terms of meeting requirements for energy, beta carotene, riboflavin, and vitamin C, but no sex difference in small children.
28. Bouis 1991	The Philippines (Bukidnon)	Food intake	448 households	Iron intakes are about the same for males and females, which implies much lower iron adequacy for females (80 percent higher requirements). Relative to calories (an equal distribution of calorie intake relative to activity pattern-adjusted requirements is assumed), vitamin A and vitamin C are reasonably equitably distributed across types of household members (based on age-sex adequacy ratios).

(continued)

Table 1 (continued)

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
29. Leonard 1991	Peru	Food intake and anthropometric data (height, weight, mid-arm circumference and triceps, and subscapular skinfold thicknesses)	101 individuals from 26 households of lower socioeconomic status (defined as households whose head did not have a steady source of off-farm income)	Adults (males more than females), rather than children, are subjected to higher levels of seasonal caloric stress. Sex differentials in dietary intake or physical status are not apparent among children (ages 12 years and under).
30. Bull 1991	United Kingdom	Food intake	22 males and 31 females in 13 families	"Men and young boys appeared to be receiving more than their "fair share" (of food), while women and girls over the age of 11 received less" (p. 422). Based on age-sex RDAs.
31. Warrier 1992	India	Food intake	Individuals disaggregated based on household income and ethnicity	Upper/middle caste groups favor sons more in food allocation than lower status groups and tribal groups.
32. Hardenbergh 1992	Madagascar	Food intake, anthropometry, mortality		This study of subsistence slash-and-burn cultivators near Ranomafana National Park in Madagascar found no evidence of gender bias against girls in mortality, anthropometry, or nutrient intake. The authors conclude that one implication of their findings, if accurate, is that the economic value to households of girls is more explicit and obvious in Sub-Saharan Africa than it is in Asia.
33. Bégin et al. 1992	Chad	Food intake (energy requirements allow for differences in physical activity), anthropometry	80 households	No intrahousehold results reported on food intake. Body mass index (BMI) varied significantly by season for adults under the age of 60. Women had lower BMIs than men in both the lean and harvest seasons.

(continued)

Table 1 (continued)

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
34. Miller 1992	Survey of literature on Intrahousehold food distribution in South Asia	Review	Review	Primary conclusions from this review of case studies: "daughter discrimination does not most characterize the poor, anywhere in India. If anything, greater disparities and malnutrition (and perhaps malnutrition-caused mortalities) are found among propertied groups, and among the more educated" (p. 9). In addition, there are many misunderstandings of the issues as a result of differences in approaches and findings. Even so, from the evidence that exists here, while there tend to be higher child mortality rates among the poor, it is not the case that female child mortality rates are consistently higher than those for males; in fact, a number of studies show more gender-egalitarian mortality among the poor. It does seem that daughters, especially in some countries, do put additional financial stress on families as a result of marriage and dowry costs, and not from food consumption.
35. Engle and Nieves 1993a	Guatemala	Food intake at midday meal	45 women with at least one child at local health centre's food supplementa-tion program	It was found that when mothers expressed a preference for males or for equality with regard to food allocation, these preferences were significantly associated with the actual allocation patterns, although those who stated a preference for equality tended to give a higher proportion of food to children.
36. Engle and Nieves 1993b	Guatemala	Food intake	45 households, 230 individuals	"Patterns for intrahousehold food distribution identified here are similar to those reported by other studies: slight underfeeding of adolescents, more protein for male head of household, and that the effect of including snacks is to diminish the differences between adult and child dietary adequacy" (p. 1610). Both male and female heads of household were more likely to have adequate diets compared to other household members.
37. Haddad, Kanbur, and Bouis 1993	The Philippines (Bukidnon)	Individual calorie intake 24-hour recall	448 households	This work illustrates the importance of estimating energy requirements for the study of intrahousehold calorie allocation. For a rural Philippine sample, the authors find that, once energy expenditures are accounted for, calorie intake shortfalls are equally borne within the family, irrespective of overall calorie adequacy. Using calorie adequacy based solely on age, gender, and physiological status, it appeared that children were receiving less than their required share of calories.

(continued)

Table 1 (continued)

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
38. Ahmed 1993	Bangladesh	24-hour food weighing/ adjusted calorie requirements for body weight and activity levels	553 households from eight widely dispersed sites	Calorie adequacy for male and female preschoolers is identical. Slightly higher calorie adequacy for boys in the 5-9 age-group compared to girls, but differences not significant (p. 37). The only statistically significant male-female differences were found among adults, with females having lower calorie adequacy levels.
39. Rao and Bloch 1993	Rural South India (not VLS)	Food intake of all members, typical intake	149 households	Results from the economic data suggest that there is a statistically negative association between wife-beating and the caloric consumption of the children in the household. ". . . wife-beating not only reduces the well-being of women but also adversely affects the caloric allocation within the family to children whose mothers are being beaten" (p. 25).
40. Harriss-White 1996	India VLS	Food intake	240 households from six villages	Cautionary tale on the measurement of intrahousehold food allocation. Harriss-White assesses the policy recommendations that emerge from four studies of intrahousehold nutrient distribution, each of which use data collected from the same set of study households in southern India. The studies differ in their conclusions for a number of reasons: the individual classifications of data (for example, different age-group classifications), different treatments of seasonality, different nutrients studied, different aggregations of households (for example, different hectare cutoffs on what constitutes a smallholder), and finally different groups of individuals studied. Harriss-White notes that the disagreements among the studies are not trivial in magnitude, and that a policymaker would be "right to be very intervention-averse in consequence."
41. Kumar and Bhattarai 1993	Bangladesh	Food intake	7,112 households	"Analysis of intrahousehold allocation of dietary calories in rural Bangladesh shows that, for the majority of individuals of all ages and sex, the degree of individual adequacy matches the degree of household adequacy. . . Also, females appear to be relatively favored in the over-18 age-group. . . Areas with better infrastructure development tend to have a better level of caloric adequacy for all age-groups, and for both males and females. . ." (p. 43).

(continued)

Table 1 (continued)

Study	Country	Measure of Food Consumption	Sample Type	Main Conclusion
42. Senauer and Garcia 1993	The Philippines (PILOT)	Food intake	840 households	It was found that women of child-bearing age are most likely to have inadequate levels of iron intake and that teenagers are the most likely to be poorly nourished, overall. "The intrahousehold allocation of food, in terms of calories, initially appears to favor adults. But after adjusting for activity level, the calorie adequacy of adults is lower than that of children."
43. Bouis and Peña 1996	The Philippines (Bukidnon)	Individual calorie intake 24-hour recall	448 households	The results indicate that young children (preschoolers) tend to be favored in terms of the patterns of intrahousehold allocation of food. This result is different when only the energy adequacy levels patterns are examined (both corrected and uncorrected). It was found that nutrients were generally fairly evenly distributed among the family members, regardless of age and sex. This was attributed to the fact that "even though preschoolers have diets preferable (in a nonnutrient sense) to those of other age and gender groups, the latter are compensated by greater proportions of less-preferred foods" (p. 20).

South Asia. Evidence for pro-male and pro-adult biases in food intake appear to be strongest in South Asia, although with considerable variation within the region. Working from the first panel of Table 2, of the 34 male-female comparisons, with no adjustment for activity and body weight, 11 show a pro-male bias, 4 show a pro-female bias, and 19 show neither sex as favored. The corresponding figures for the studies that do make these adjustments are 5, 1, and 16, respectively. Of the two adult-preschooler comparisons in the no-adjustment category, one is pro-adult and one shows neither age-group as favored. The adult-preschooler comparison in the adjusted calories category shows one pro-adult result.

While the evidence for a pro-male bias is not uniform, studies that adjust for body weight and activity suggest that food consumption disparities reflect sex differentiation in the levels of energy-intensive activities undertaken by men and women. In Bangladesh, households seem to exhibit some inequality aversion. The rate of calorie reinforcement for adult males, however, was high compared with adult females and males who had a higher probability of obtaining more calories were more likely to undertake highly energy-intensive work (Pitt, Rosenzweig, and Hassan 1990). In Nepal, while small children are not discriminated against, adult women are discriminated against in terms of meeting requirements for energy, beta carotene, riboflavin, and vitamin C. Mechanisms for discrimination include a late position in serving order, the channelling of special foods to men, and lower overall food intake. Boys may also be favored in India by being given first priority in breast-feeding and in food supplementation (Pettigrew 1986).

The results in South Asia also run counter to the trend of decreasing inequality as incomes increase, although inequality increases among the poor during the lean season (Behrman 1988a). In India, upper-middle caste groups favor sons more in food allocation than lower status groups and tribal groups (Warrier 1992). Indeed, Miller's (1992) review of the intrahousehold food distribution in South Asia also finds that greater disparities and malnutrition are found among propertied groups and among the more educated. Discrimination against daughters may reflect the additional financial stress on families as a result of marriage and dowry costs, and not from food consumption of the daughter, per se.

Southeast Asia. All the intrahousehold studies in this region are from the Philippines. In the unadjusted category, of the 16 male-female comparisons, 8 show a pro-male bias, none show a pro-female bias, and 8 show neither sex as favored. The pro-male bias disappears once body weight and activity are considered (the corresponding numbers are 0, 0, and 4, respectively). Of the nine adult-preschooler comparisons in the no-

Table 2 Bias reported by specific studies on food distribution within the household (from Table 1)

Region	Preschoolers: Male versus Female	Children: Male versus Female	Adolescents: Male versus Female	Adults: Male versus Female	Adults versus Children/Preschoolers	Special Groups Disadvantaged
	Comparisons When Energy Requirements ARE NOT Adjusted for Activity and Body Weight					
South Asia	Males favored (9,11,13,17,18,21,31) Females favored (11) Neither favored (1,20,21,23,24,27)	Males favored (31,38) Females favored (11) Neither favored (1,20,21,23,24)	Neither favored (1,20,21,23,24)	Males favored (11,27) Females favored (2,11) Neither favored (1,23,24)	Adults favored (39) Neither favored (1)	Pregnant *and* lactating women (1,6) Later born children in lean season (20, 21, 24)
Southeast Asia	Males favored (3,4) Neither favored (5,43)	Males favored (3) Neither favored (5,43)	Males favored (3) Neither favored (5,43)	Males favored (3,22,28,42) Neither favored (5,43)	Adults favored (3,5,22,28,42) Preschoolers favored (8,43) Children favored (10,28)	
Sub-Saharan Africa	Neither favored (32)	Neither favored (32)				
Latin America				Males favored (36)	Neither favored (36)	
	Comparison When Energy Requirements ARE Adjusted for Activity and Body Weight					
South Asia	Males favored (6,15) Neither favored (23,25,27,38)	Males favored (6) Neither favored (23,25,26,27,38)	Neither favored (23,25,26,27)	Males favored (27,38) Females favored (41) Neither favored (23,25,26)	Adults favored (15)	Pregnant/ lactating women (38)
Southeast Asia	Neither favored (37)	Neither favored (37)	Neither favored (37)	Neither favored (37)	Neither favored (37) Children favored (42)	
Sub-Saharan Africa						
Latin America	Neither favored (29)	Neither favored (29)			Children favored (29)	

Note: The number in parentheses refers to study number in Table 1.

Table 3 Totaling the bias reported by specific studies on food distribution within the household (from Table 2)

Region	Preschoolers: Male versus Female	Children: Male versus Female	Adolescents: Male versus Female	Adults: Male versus Female	Adults versus Children/Preschoolers	Special Groups Disadvantaged
	Comparisons When Energy Requirements ARE NOT Adjusted for Activity and Body Weight, by Number of Cases					
South Asia	Males favored: 7 Females favored: 1 Neither favored: 6	Males favored: 2 Females favored: 1 Neither favored: 5	Males favored: 0 Females favored: 0 Neither favored: 5	Males favored: 2 Females favored: 2 Neither favored: 3	Adults favored: 1 Preschoolers favored: 0 Neither favored: 1	Pregnant and lactating women: 2 Later-born children in lean season: 3
Southeast Asia	Males favored: 2 Females favored: 0 Neither favored: 2	Males favored: 1 Females favored: 0 Neither favored: 2	Males favored: 1 Females favored: 0 Neither favored: 2	Males favored: 4 Females favored: 0 Neither favored: 2	Adults favored: 5 Preschoolers favored: 2 Neither favored: 0 Children favored: 2	
Sub-Saharan Africa	Males favored: 0 Females favored: 0 Neither favored: 1	Males favored: 0 Females favored: 0 Neither favored: 1				
Latin America				Males favored: 1 Females favored: 0 Neither favored: 0	Adults favored: 0 Children favored: 0 Neither favored: 1	
Total	Males favored: 9 Females favored: 1 Neither favored: 9	Males favored: 3 Females favored: 1 Neither favored: 8	Males favored: 1 Females favored: 0 Neither favored: 7	Males favored: 7 Females favored: 2 Neither favored: 5	Adults favored: 5 Preschoolers favored: 3 Neither favored: 2 Children favored: 2	Pregnant and lactating women: 2 Later-born children In lean season: 3
	Comparisons When Energy Requirements ARE Adjusted for Activity and Body Weight, by Number of Cases					
South Asia	Males favored: 2 Females favored: 0 Neither favored: 4	Males favored: 1 Females favored: 0 Neither favored: 5	Males favored: 0 Females favored: 0 Neither favored: 4	Males favored: 2 Females favored: 1 Neither favored: 3	Adults favored: 1 Preschoolers favored: 0 Neither favored: 0	Pregnant/lactating women: 1
Southeast Asia	Males favored: 0 Females favored: 0 Neither favored: 1	Males favored: 0 Females favored: 0 Neither favored: 1	Males favored: 0 Females favored: 0 Neither favored: 1	Males favored: 0 Females favored: 0 Neither favored: 1	Adults favored: 0 Preschoolers favored: 0 Children favored: 1 Neither favored: 1	
Sub-Saharan Africa						
Latin America	Males favored: 0 Females favored: 0 Neither favored: 1	Males favored: 0 Females favored: 0 Neither favored: 1			Adults favored: 0 Preschoolers favored: 0 Children favored: 1 Neither favored: 0	
Total	Males favored: 2 Females favored: 0 Neither favored: 6	Males favored: 1 Females favored: 0 Neither favored: 7	Males favored: 0 Females favored: 0 Neither favored: 5	Males favored: 2 Females favored: 1 Neither favored: 4	Adults favored: 1 Preschoolers favored: 0 Children favored: 2 Neither favored: 1	Pregnant/lactating women: 1

adjustment category, five show a pro-adult bias and two show a pro-children bias. Of the two adult-child/preschooler comparisons in the adjusted category, one shows a pro-child/preschooler bias, while the other shows no favoritism by age.

These results are consistent with the relatively egalitarian household structure in the Philippines (Medina 1991), and they show the importance of taking energy requirements into account. For example, in a rural Philippine sample, using calorie adequacy based solely on age, sex, and physiological status, it appeared that children were receiving less than their required share of calories. Once energy expenditures are accounted for, however, calorie intake shortfalls are equally borne within the family, irrespective of overall calorie adequacy (Haddad, Kanbur, and Bouis 1993). Likewise, Senauer and Garcia (1993) found that the intrahousehold allocation of food, in terms of calories, initially appears to favor adults. But after adjusting for activity level, the calorie adequacy of adults is lower than that of children. In fact, women of child-bearing age are most likely to have inadequate levels of iron intake and teenagers are most likely to be poorly nourished overall. Bouis and Peña (1996) also find that even though preschoolers have diets preferable (in a nonnutrient sense) to those of other age and gender groups, the latter are compensated for by greater proportions of less-preferred foods, and thus, nutrients were, generally, fairly evenly distributed among the family members, regardless of age and sex.

Latin America. The single study with a male-female comparison for unadjusted calorie intakes shows a pro-male bias and the single preschooler adult comparison shows no differences. Where the pro-male bias is reported (Guatemala), more protein is allocated for the male heads of households and adolescents are slightly underfed (Engle and Nieves 1993b). For the three comparisons that use adjusted intakes (all from Peruvian data), two show neither sex as favored, while one shows children favored over adults. Indeed, these results support those of Pitt, Rosenzweig, and Hassan (1990) for Bangladesh: adults (males more than females), rather than children, are subjected to higher levels of seasonal caloric stress. Sex differentials in dietary intake or physical status are not apparent among children (aged 12 years and under).

Sub-Saharan Africa. In the two male-female comparisons within the unadjusted intake group, neither sex is favored. There are no studies that adjust for calorie adequacy, or that compare adult and preschooler intakes. Hardenbergh's (1992) study of subsistence slash-and-burn cultivators near Ranomafana National Park in Madagascar found no evidence of sex bias against girls in mortality, anthropometry, or nutrient intake. This may be because of a more explicit and obvious economic value to households of girls in Sub-Saharan Africa

than is the case in Asia. The study by Bégin et al. (1992) in Chad, however, finds that body mass index (BMI) varied significantly by season for adults under the age of 60 and that women had lower BMIs than men in both the lean and harvest seasons.

Conclusion. The summary of the results presented in Tables 1-3 is difficult for several reasons:

1. Only some of the studies control for activity pattern and body weight when calculating nutrient (particularly energy) requirements (studies 5, 14, 22, 24, 25, 26, 28, 36, 37, and 40), although it is not clear to what extent, a priori, this affects micronutrient requirements or the energy and nutrient requirements of preschoolers in general. The adjustment barely affects the pattern of results in South Asia, but it does seem to reduce the number of sex differences found in the Southeast Asia group.
2. Results differ by season (studies 19, 20, 23, and 28) with the greatest inequality during lean periods.
3. Results differ within the four broad regions used. For instance, Miller (1981) notes the differences between north (pro-male) and south (no sex preference) India.
4. Results differ by family composition. A number of studies (Miller 1981; Lloyd 1995) note that the first-born child is usually treated well, irrespective of its sex. It is later-born girls that are likely to face discrimination relative to brothers and relative to older sisters (Ware 1984).
5. Boy-girl discrimination is not necessarily a feature of the poorest of the poor (see, for example, Cowan and Dhanoa 1983).
6. Diets are not only evaluated by the households on the basis of nutrients, but also on the basis of variety and prestige foods.

The evidence concerning food distribution within the household suggests that, while there is some pro-male and pro-adult bias in terms of the quantity of food intake, this seems to be primarily located in South Asia, with considerable variation within that region. The differences arise due to a combination of an unequal distribution of food within the household, the unequal nature of food requirements within the household, and the unequal nature of the perceived requirements by age and sex. Thus, equal distribution of food within the household can lead to unequal distribution of nutrient adequacy within the household.

The conclusions here do not differ very much from those of Lipton (1983). Lipton notes the dearth of evidence regarding systematic age-sex differences in caloric adequacy in Africa or Latin America and provides counterexamples from Asia.

Distribution of Nonfood Health Inputs

Compared to food inputs into good nutrition, economic studies (including those at the International Food Policy Research Institute) have not examined the intrahousehold allocation of nonfood health inputs closely for gender bias.[3] Largely, this is due to the difficulty of measuring nonfood health inputs. The main problem is that self-reported measures of health and morbidity are routinely used by economists in behavioral models. There is, however, considerable evidence that self-reported measures do not accurately reflect clinical assessments of health status. More importantly, the differences between clinical and self-reported morbidity measures are not random (Butler et al. 1987). Often, self-reported morbidity increases with household income and educational status. The very poor only report "illness" when ill-health is severe; the less poor will report milder episodes of ill-health as "illness." One way around this is to focus more on specific self-reported limitations on functional activity such as walking, going to work, or undertaking "normal activities" (Schultz and Tansel 1995).

Table 4 presents a partial summary of studies from the literature. A full study of male-female differences in access to nonfood inputs such as health care, clean water, adequate sanitation, and caring behavior is beyond the scope of this paper.[4]

South Asia. Studies of sex bias in the intrahousehold allocation of nonfood health inputs in South Asia are few, relative to studies on the intrahousehold allocation of food, but appear to have stronger and more consistent results. Duration of breast-feeding, quantity

[3] Because breast-milk consumption is difficult to measure, the focus is more on duration and frequency of breast-feeding. For this reason, breast-feeding is classified in the nonfood category.

[4] IFPRI's research program is, however, placing a greater emphasis on access issues relating to water and sanitation (Hoddinott 1996) and caring behavior (Engle, Menon, and Haddad 1996).

Table 4 A partial summary of studies of the intrahousehold allocation of nonfood health inputs

Study	Country	Measure of Nutrition Input	Sample Type	Main Conclusion
Heller and Drake 1979	Colombia	Degree of diarrhea, age at weaning, per capita food expenditures	1,270 preschool children	There does not appear to be parental discrimination against girls with respect to the probability of illness. Regression-based.
Miller 1981	India	Breast-feeding duration	Preschool children	Breast-feeding duration is longer after a boy, in part, because there is less urgency to have another child after a boy.
Sabir and Ebrahim 1984	Pakistan	Breast-feeding, anthropometry	151 households—mostly laborer and artisan households	Longer breast-feeding for boys, boys are relatively heavier, girls are more stunted and wasted.
Das Gupta 1987	Indian Punjab	Food intake and utilization of medical care	400 households (approximately 2,400 individuals)	Wider sex differentials existed for medical care than in food allocation. Food allocation data indicate that, although infant girls and boys have approximately the same calorie intakes, the former are given more cereals while the latter have more milk and fats (highly valued and expensive foods) with their cereal.
Fauveau et al. 1990	Bangladesh	Diarrhea prevalence		This study showed that the potential for death due to diarrhoea among children who are severely malnourished was much greater than for those who are not severely malnourished. In addition, "the risk of dying from severe malnutrition was more than twice as high among girls as among boys" (p. 215).
Alderman and Gertler 1994	Pakistan	Utilization of health services	3,430 individuals from five regions	Lower income households seek care more often for boys than for girls. There is a itendency to use high quality providers (private doctors) more often for males than females. Differences disappear as income rises. Although the differences in health care are not dramatic, they pertain to an environment in which the price of health care is low. Moreover, most of the illness incidents from which their estimates are derived are the general day-to-day ailments to which children are susceptible. They suggest that the comparatively high price for life-threatening treatments that often require more expensive hospitalization may lead to even greater gender discrimination and possibly fatal delays in seeking care.
Bouis et al. 1993	The Philippines (Bukidnon)	Health care utilization	Adolescents (10-19 years old) from 448 rural households	Gender did not affect the probability of seeking any of the alternatives to traditional health care providers. However, compared to children, both male and female adolescents seem less likely to be brought to formal health care providers.
Haddad and Hoddinott 1994	Côte d'Ivoire	Health infrastructure (doctors per person, distance to health services)	Preschoolers < 72 months	Improvements in access to public service are gender-neutral in their effects on child health.

and quality of health care, and survival probabilities after diarrhea episodes are all reported to favor boys. Indeed, in India, breast-feeding duration is longer for boys, partly because there is less urgency to have another child after a boy (Miller 1981). Boys are heavier than girls of similar age and tend to be allocated more expensive foods than girls (Sabir and Ebrahim 1984; Das Gupta 1987). While the risk of dying from diarrhea is higher among the severely malnourished, the risk of dying from severe malnutrition is more than twice as high for girls than for boys (Faveau et al. 1990). In Pakistan, lower income households seek care more often for boys than girls, and are likely to use higher quality providers for boys (Alderman and Gertler 1996). This difference in frequency and quality of care, however, disappears as income increases.

Southeast Asia. The main result from the study by Bouis et al. (1993) in the Philippines is that there are no sex biases in seeking alternatives to traditional health care providers, but there may be some age biases in that adolescents seem less likely than children to receive health care.

Latin America. Heller and Drake (1979) report no boy-girl differences in terms of the degree of incidence and severity of diarrhea or age at weaning.

Sub-Saharan Africa. No evidence could be found that tested boy-girl differences in access to health care. Haddad and Hoddinott (1994) do, however, find that, in the Côte d'Ivoire, improvements in access to public health service are gender-neutral in their effects on child health.

Conclusions. Outside of South Asia, evidence of boy-girl discrimination in the allocation of nonfood health inputs is scarce. Within the South Asia region, the few studies that have examined this issue found strong evidence of pro-male biases.

Distribution of Adult Goods

Not every method for examining intrahousehold consumption bias relies on the availability of individual consumption data (see Table 5). An analysis of household expenditures on goods consumed exclusively by adults (an "adult good") has been proposed as a parsimonious technique for examining discrimination within households. The basic idea is, do parents reduce expenditures on these adult goods more severely for an extra girl than for an extra boy? This technique, however, relies on the existence of an adult good in the expenditure data. Usually, expenditures on these goods, such as

Table 5 A summary of studies of intrahousehold consumption bias, based on an "adult goods" analysis

Study	Country	Measure of Discrimination	Sample Type	Main Conclusion
Deaton 1989	Côte d'Ivoire	Adult goods	Nationally representative sample, 1985-86	No boy-girl discrimination on results from adult goods.
Subramanian and Deaton 1990	India	Adult goods	Representative sample from the State of Maharashtra, 1983	Some evidence of discrimination against girls under 5 from rural households.
Ahmad and Morduch 1993	Bangladesh	Adult goods, anthropometry	1988 household expenditure survey	No boy-girl discrimination on resultsfrom adult goods.
Dobbelsteen and Kooreman 1993	Peru	Adult goods	Nationally representative sample	No boy-girl discrimination on results from the single potential adult good (alcoholic beverages).
Haddad and Reardon 1993	Burkina Faso	Adult goods	Samples: Urban, rural—by low and high development potential, by upper and lower income groups	No boy-girl discrimination on results from adult goods, in any disaggregation.
Haddad and Hoddinott 1992	Côte d'Ivoire	Adult goods	Nationally representative	No boy-girl discrimination on results from adult goods. Some evidence sample, 1986-87 of discrimination against fostered versus nonfostered girls.
Bouis et al. 1993	The Philippines (Bukidnon)	Adult goods	448 rural households	Using a 2-to-12-year-old age group, no consistent pattern of discrimination could be found. Eighteen potential adult goods combinations are studied, but no tests for credibility of adult goods were performed, and there are no tests for any significant male-female differences on adult goods share.

tobacco or alcohol, are of a sensitive nature and are susceptible to misreporting. Random misreporting is not problematic for the regression analysis, but if misreporting is associated with another factor, such as income, education, or location, biased estimates will be generated.

South Asia. Subramanian and Deaton (1990) employ a representative sample of some 11,000 households from the State of Maharashtra, collected in 1983. They find some evidence of discrimination against girls under five years of age who live in rural households, but only in one (tobacco and *paan*) of the two identified adult goods (the other being alcohol).

Ahmad and Morduch (1993) use data from Bangladesh and find no boy-girl discrimination based on results from their adult goods analysis. Their study is richer than others in this genre, however, in that they are able to examine other dimensions of discrimination with the same data set. They also find that (1) there was 11 percent more males than females in their sample, and (2) an extra unit of money aided the health outcomes of boys significantly more than that of girls (in terms of weight-for-height and weight-for-age).

Southeast Asia. The only adult goods study that could be found for Southeast Asia is the study by Bouis et al. (1993), which did not select the most appropriate age-groups (that is, they selected a wide age range) and did not test if goods designated as "adult" were, in fact, credible adult goods. No sex differences were found.

Latin America. The evidence from Latin America is scarce. Dobbelsteen and Kooreman (1993) conducted an adult goods analysis on nationally representative Peruvian data, but they do not test whether their potential adult good (alcohol) is, in fact, a credible adult good. In addition, they do not use instrumental variable techniques when estimating the budget share equation for alcohol. At face value, their results indicate no boy-girl discrimination, but their results are difficult to interpret.

Sub-Saharan Africa. Deaton (1989), using data from the 1985-86 Côte d'Ivoire Living Standards Surveys (CILSS), found little evidence to support the hypothesis that boys are treated differently than girls with respect to the amount of adult goods expenditure foregone by the household.

Haddad and Hoddinott (1992) extend the adult goods analysis by refining the household demographic groups into offspring of household head and non-offspring children (who tend to be adopted or are residing with the family for school purposes). Of primary

interest is whether a child's sex or relationship to the head of household affects the magnitude of the decline in the budget shares of adult goods. Here, again, there is no evidence to reject the null hypothesis of no discrimination against girls. There is, however, some evidence of bias against fostered girls under the age of 6.

Haddad and Reardon (1993) disaggregate the adult goods-outlay equivalent analysis by agroecological zone and income group, but find little sex discrimination in Burkina Faso. They are unable to reject the null hypotheses that discrimination varies by the level of agricultural and nonagricultural economic opportunities for women, or by the level of household income.

Conclusions. Only in India (Subramanian and Deaton 1990) has this technique demonstrated such discrimination against girls. In contrast, similar analyses from Sub-Saharan Africa (Côte d'Ivoire and Burkina Faso) show no discrimination.

Ahmad and Morduch (1993) speculate as to the reasons for the discrepancies between the adult goods approach and the more direct approaches to measuring discrimination. They suggest three alternatives: (1) there is no bias in health inputs, but girls have greater physical needs than boys at certain ages; (2) there is no continuous bias but, at critical times, bias is demonstrated in favor of boys (such as in the provision of curative health care); and (3) there is sex bias, but the adult goods-outlay equivalent method cannot pick up important age/sex/birth-order interactions.

EVIDENCE ON OUTCOMES

Anthropometric Outcomes Within the Household

The study of human body measurements is not as straightforward as one might think. Issues of age misstatements and the use of appropriate reference standards need to be recognized. Potential inaccuracies in measures of anthropometric status across gender are of two types: (1) the underreporting of girls' ages; and (2) the use of inappropriate anthropometric reference standards.

In a society that puts a premium on the birth of a male, the birth of a female might be considered less of a family “event.” As a consequence, a girl's birth date might be less accurately remembered than a boy's. Moreover, there is a tendency to underestimate girls' ages. If stated age is less then actual age, the prevalence of low weight-for-age and height-for-age will be underestimated if they are based on reported female ages. The case for the systematic understatement of girls' ages, however, needs to be made more convincingly than it has been to date (Bouis and Mahmood 1993).

The use of anthropometric measures that are independent of age (such as weight-for-height) solves one potential source of misinterpretation, but not the problem of comparison across sex-specific anthropometric standards. For example, the simple comparison of male and female anthropometric Z-scores has been criticized because anthropometric standards used are different for boys and girls, and so "gender differences can only be identified *relative* to the standards" (Thomas 1991, 2). In other words, sex differences in the reference population cannot be factored out. One way of making Z-score comparisons across gender groups more meaningful for a given household is to rank standardized Z-scores within age and gender groups (Ross 1993). For households with more than one preschooler, the rankings can be compared. For example, what percentage of the preschoolers with the lowest Z-score ranking within their age-sex group are female?

Simple comparisons of age-specific anthropometric indicators across gender are confounded by doubts as to the applicability of sex-specific anthropometric standards, derived from one healthy population, to developing country populations. Many analysts try to control for these effects in regression equations where anthropometric outcomes are "explained" by a number of right-hand-side variables. Many authors find that, after controlling for individual, parental, household, and community characteristics, the sex of the preschooler has no impact on anthropometric outcomes. This should not come as a surprise; if sex is an important determinant of anthropometric status, it will be significant in its interactions with parental, household, and community characteristics. For example, will the provision of public services have a bigger impact on a boy's or a girl's anthropometric status? Will the provision of increased educational opportunities for girls have a bigger impact on a boy's or a girl's anthropometric status? One example of this type of analysis is provided by Haddad and Hoddinott (1994), as described in the section on nonfood inputs.

Table 6 presents results from studies of intrahousehold differences in anthropometric outcomes.

South Asia. The results regarding male-female differences in anthropometric outcomes for India are weak; one study (Nilsson and Nycander 1986) found different effects in each region studied. In Andhra Pradesh, there were no male-female differences for preschoolers, but in Tamil Nadu, girls were worse off. Another study on tribal groups in India (Christian et al. 1989) found that girls had significantly better nutritional status than boys. For Bangladesh, Ahmed (1993) found preschool girls to have lower levels of weight-for-age than male preschoolers, but the differences were not significant. Helen

Table 6 A summary of studies of within-household differences in anthropometric outcomes

Study	Country	Measure of Nutrition Status	Sample Type	Main Conclusion
Nilsson and Nycander 1986	India	Anthropometry (height-for-age)	Children in two villages	In Andhra Pradesh, the rate of undernutrition did not differ between the sexes. In Tamil Nadu, female malnutrition was more prevalent--more girls than boys were stunted.
Kennedy and Cogill 1987[a]	Kenya	Anthropometric measures	1,171 preschoolers	Girls (6-72 months) favored for weight-for-age, weight-for-height, height-for-age (regression results).
Horton 1988	The Philippines	Reduced forms on whether or not Z-score for height-for-age or weight-for-age are < 3 standard deviations below median	2,374 children < 15 years	"The results suggest that the effects of birth order on long-run nutritional status for children are considerably greater than those observed in current nutritional status. This suggests that the reason for birth-order effects is not that parents discriminate among children of different birth orders when deciding on the allocation of current resources. Rather, they are unable to allocate resources over time in such a way as to offset the inevitable advantages accruing to children in earlier birth order who are born when per capita resources . . . are greater" (p. 350).
Christian et al. 1989	Rural and tribal India	Anthropometry (weight-for-age)	4,223 children (0-6 years old)	Girls were found to have a significantly better nutritional status than boys. The same factors(for example, mother's nutritional knowledge, size of family, birth order) explained variability in both girls' and boys' nutritional status.
Kennedy 1989[a]	Kenya	Anthropometric measures	712 preschoolers	No sex difference for weight-for-age, height-for-age, weight-for-height (from regression).
von Braun, Hotchkiss, and Immink 1989[a]	Guatemala	Anthropometric measures	387 preschoolers	No sex difference (0-60 months) in weight-for-age, height-for-age, weight-for-height (from regression).
von Braun, Puetz, and Webb 1989[a]	The Gambia	Anthropometric measures	712 preschoolers	Girls (7-120 months) favored for height-for-age (regression results).
Bouis and Haddad 1990a[a], 1990b[a]	The Philippines	Anthropometric measures	448 households 1,118 preschoolers	Girls (6-60 months) favored for weight-for-height; girls in corn households favored for height-for-age.

(continued)

Table 6 (continued)

Study	Country	Measure of Nutrition Status	Sample Type	Main Conclusion
Thomas 1990b	Zimbabwe (national sample)	Anthropometry (height-for-age, weight-for-height)	4,201 women 15-49, 2,500 children 3-60 3 - 60 months	In the rural areas . . . "If the first born is a girl, she is likely to be significantly lighter (given height) than her female siblings; this is not true for sons" (p. 20). On de facto female-headed households,". . . children in (de facto) female-headed households are no worse off, on average, than children in households with a father present, at least in terms of anthropometric indicators" (p. 19). "Maternal education and household assets have the same effect on child health, whether or not the father is present in the household" (p. 20). ". . . fathers with some high school education have a large and significant impact on child height if they are at home, whereas the education of those away from home has a small and insignificant effect" (p. 19).
Pelletier, Msukwa, and Ramakrishnan 1991	Malawi	Anthropometry (weight and height) of all household members	530 households	Objectives: to test assumptions (1) "that the nutritional status of older household members is reflected in that of young children" and (2) "that the socioeconomic factors which are statistically associated with child nutritional status are similar to those associated with the status of older household members" (p. 127). The general finding was that assumption number 1 was better supported than assumption number 2.
Svedberg 1991	African countries	Differential weight ratio, differential height ratio, body mass index, height-for-age, weight-for-age, and weight-for-height	Secondary sources from 50 different data sets (data sets from 20 Sub-Saharan African countries)	The data are presented as a "comparison of anthropometric performance between males and females in three age-groups: preschool children, school children/adolescents, and adults" (p. 7). The paper, a comprehensive look at data from many African countries, appears to show that females do not have a nutritional disadvantage with respect to males. In fact, most of the data sets showed that there was a slight bias against males in terms of ages to be relatively shorter and lighter than females; there are relatively few cases where the opposite applies" (p. 14) Similar trends were found for infant mortality rates. With respect to economics, the bride price in Africa, unlike the dowry in India, is viewed as a financial asset. In addition, females tend to be more efficient than men when it comes to production of food.
Teklu, von Braun, and Zaki 1991[a]	Sudan	Anthropometric measures	30,000 preschoolers	Girls (0-60 months) favored for weight-for-age (regression results).

(continued)

Table 6 (continued)

Study	Country	Measure of Nutrition Status	Sample Type	Main Conclusion
Thomas 1991	Ghana	Child weight-for-height	Number of households: 3,200, 1987-88	Intergenerational effects tend to run along gender lines: father's education has a stronger effect on son's anthropometric status, and mother's education has a stronger effect on daughter's anthropometric status. Thomas finds that, in Ghana, women's education has a strong positive effect on their daughters' height but not on sons', and fathers' education has a positive effect on their sons' height but not on daughters'. Further, he states (p. 16), "relative to other mothers, the education of a woman who is better educated than her husband has a large and significant effect on her daughters' height." These results are consistent with the argument that better educated women are better placed to direct household resources towards commodities they prefer - in this case, daughters' health.
von Braun, de Haen, and Blanken 1991[a]	Rwanda	Anthropometric measures	238 preschoolers	Girls (6-72 months) favored for height-for-age, weight-for-age (regression results).
Schnepf 1992	Rwanda	Z-scores on weight-for-height and weight-for-age, mid-upper arm circumference	Preschool children	The female children studied had higher measures of malnutrition than males for each of the indicators in the rural sample, but only for chronic malnutrition (height-for-age) in the urban sample. The multivariate analysis, however, showed no sex differences in the nutritional status of the children.
Ahmed 1993[a]	Bangladesh	Z-score on weight-for-age	Preschool children	31.5 percent of girls have Z-score weight-for-age < -3, compared to 27.7 percent for boys. Differences not found to be statistically significant.
Alderman and Garcia 1993[a]	Pakistan	Anthropometric measures	880 households	No sex differences in weight-for-age, height-for-age, weight-for-height (from regression).
Basu 1993b	South Asia	Anthropometric indicators	Preschool children	Finds incidence of sex differentials in childhood nutritional levels in South Asia to be uneven.
Helen Keller International 1993	Bangladesh	Anthropometric indicators		Found higher rates of undernutrition among girls compared to boys. No information as to whether the differences are statistically significantly.
Johnson and Rogers 1993	Dominican Republic	Anthropometric indicators	Preschool children	Finds few significant differences in boy-girl nutrition status.
Vosti and Witcover 1993[a]	Ethiopia	Z-score on weight-for-age	0-72 months	Girls from lowest income tercile households do significantly better than boys in all seasons. Boys from highest income tercile households do significantly better than girls in all seasons. Multivariate analysis shows different Z-score weight-for-age determinants for boys and girls, but girls' Z-score weight-for-age is very poorly explained by the explanatory variables available.

[a] IFPRI study.

Keller International (1993) also found greater undernutrition among preschool girls in Bangladesh, but it is not clear whether this difference is significant by sex.

Southeast Asia. In the Philippines, Bouis and Haddad (1990a, 1990b) found no significant differences in preschooler anthropometric outcomes by sex. Horton (1988) found that earlier-born children are worse off than later-born children, due to the relative poverty of households early on in their life cycle.

Latin America. For Guatemala, von Braun, Hotchkiss, and Immink (1989) found no significance for a dummy variable for gender in regressions explaining Z-scores on weight-for-height, weight-for-age, and height-for-age.

Sub-Saharan Africa. Svedberg's (1991) survey shows that boys are slightly worse off, in terms of anthropometry, than girls. He hypothesizes that this reflects the payment of bride prices to girls' families in much of Sub-Saharan Africa (unlike dowries in South Asia, which are paid out by the family of the daughter). One other reason for this result, however, might be the use of biased external standards. Svedberg does investigate the use of external standards other than the U.S. National Center for Health Statistics (NCHS) standards—namely standards derived from well-to-do Nigerian and Kenyan samples—and finds the results sensitive to the choice of standards.

In Zimbabwe, Thomas (1990b) stresses how child gender interacts with birth order. If the first born is a girl, she has a lower weight-for-height than her female siblings; this is not true for boys. Thomas also finds that maternal characteristics (education) affect child anthropometrics equally strongly, regardless of whether the father is present; children in de facto female-headed households are no worse off, on average, than children in households with a father present. Father's education, however, affects child anthropometrics only if the father is at home.

In Ghana, intergenerational effects tend to run along gender lines; father's education has a stronger effect on sons' anthropometric status, and mother's education has a stronger effect on daughters' anthropometric status. Moreover, a woman who is better educated than her husband has a large and significant effect on her daughter’s height. These results are consistent with the argument that better-educated women are better placed to direct household resources towards commodities they prefer—in this case, daughters' health.

The IFPRI studies cited in Table 6 either find sex differences or find girls to have significantly higher Z-scores for height-for-age, weight-for-age, and weight-for-height.[5] To what extent is this a reflection of the use of external (NCHS) standards?

The Ethiopia study by Vosti and Witcover (1993) disaggregates preschoolers by gender for the purposes of the regression analyses. In terms of anthropometric measures, they find that girls from the poorest households do better than boys from the poorest households, in all seasons. For girls in the best-off households, the results are reversed. The authors find that the factors explaining anthropometric outcomes are very different for boys and girls in their sample.

In Malawi, Pelletier, Msukwa, and Ramakrishnan (1991) find no significant age or sex differences in anthropometric outcomes within the household. They test whether the nutritional status of older household members is reflected in that of young children, or whether socioeconomic factors that are statistically associated with child nutritional status are similar to those associated with the status of older household members. They found that the association of older household members' nutritional status with young children's nutrition was supported, while the second hypothesis was not.

In rural Rwanda, Schnepf (1992) finds that in terms of weight-for-age, height-for-age, and weight-for-height, female preschoolers are worse off than boys. In urban Rwanda, the anthropometric indices are similar for boys and girls, with the exception of Z-scores of height-for-age, which, again, are worse for girls.

Conclusions. The studies that show that females have worse anthropometric scores than males tend to come from South Asia. Studies from Africa, however, consistently show girls to be better-off than boys. Important caveats to all the results in this section include (1) the need to test the sensitivity of results to the choice of external standards, (2) the need to explore sex differences, controlling for birth order and age effects, and (3) the need to test whether the mechanisms that produce good nutritional status are different for boys and for girls.

Mortality Rate

Low female-to-male ratios in the countries of South Asia (950-970 females for every 1,000 males) (Oldenberg 1992) have been attributed to (1) a skewing of resources away from

[5] A more interesting analysis would be to interact gender with other health inputs to examine whether increases in these inputs will have gender-differentiated effects.

females to males (Sen and Drèze 1989), (2) an error in the measurement of nutrition outputs (see previous section), and (3) an error in the head-counting of females.

It has been suggested that the generation of inaccurate female-to-male head counts may be caused by (1) outmigrated males who are double counted and (2) the undercounting of females from outside enumerators (Miller 1992). In areas with high outmigration, it is conceivable that in a nationally representative sample, these migrants could be double counted. It is difficult for household surveys to define household membership by residence period so as to exclude counting an outmigrated male as a member of two households.[6] The undercounting of females is certainly plausible (the difficulty of enumerating females, even by females from the locale, is well known) but has not been rigorously tested.

All of the studies reported in Table 7, with the exception of Ram's (1984) cross-country study of aggregate data, are from South Asia.[7] Here, in spite of higher neonatal mortality rates for boys arising from inherently greater biological risks at birth, mortality of girls between 1-4 years of age is higher. Discrimination against girls is evidenced by higher mortality rates of girls born after other daughters, compared to sons born after other sons. Muhuri and Preston (1991) suggest that this is not primarily a result of cultural practices that treat all girls differently from boys, but rather from conscious, selective neglect of individual children. Indeed, parents appear to value diversity in gender composition. Girls with older brothers and boys with older sisters have relatively low levels of mortality, although the strong bias in favor of sons prevails.

Such patterns may be due to the disparity in economic returns to males and females. Rosenzweig and Schultz (1982) find that in India, a rise in the expected adult male employment rate increases the male-female survival differential. Likewise, Ram's (1984) study, using cross-section data for 118 countries for 1970 and cross-section and annual observations data of the United States, finds that higher Labour force participation rates of females results in the reallocation of household resources toward working females, which then leads to higher survival rates and a greater life span for females.

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[6] This explanation seems less plausible when high male outmigration and high female-to-male ratios coexist, as in Sub-Saharan Africa.

[7] This is not surprising, as Bangladesh, China, India, and Pakistan are the largest countries, containing more males than females (although between the four countries, they account for one-third of the world's population).

Table 7 A summary of studies of differential mortality rates by gender

Study	Country	Outcome	Sample Type	Main Conclusion
Chen, Huq, and d'Souza 1981	Bangladesh	Mortality, morbidity rates, health care utilization	130 Muslim families in six villages with children under 5 years of age	During the neonatal period, male children mortality rates were higher that those for females: "consistent with the established higher biological risk of male children" (p. 57). Between the ages of 1 to 4 years, the pattern is reversed such that the mortality rates of female children are higher than males.
Rosenzweig and Schultz 1982	India	Sex-specific survival differentials	1,331 children	". . . a rise in the expected adult male employment rate exacerbates the survival differential in favor of boys, other things equal . . ." (p. 809). Regression-based.
Ram 1984	Cross-country	Child mortality	Three sets of cross-section data for 118 countries for 1970, and cross-section and annual observations data of the United States	The results suggest that the effect of the higher participation rates of females in the work force is a shift in the allocation of household resources toward these working females, which then leads to higher survival rates and life span for females.
Das Gupta 1987	Indian Punjab	Mortality	400 households (approx. 2,400 individuals)	Daughters born after other daughters have significantly higher mortality rates than sons born after other sons. Also, rates of mortality are higher for both males and females among the landless, although the disparity between male and female rates is greater among the landed. Sex differentials seem to be stronger in this region compared to others in India, due to the exceptionally strong patrilineal and patrilocal societal structures—daughters have virtually no capacity for transferring resources to their natal home in later life. Economic hardship is not an important reason for male favoritism.

(continued)

Table 7 (continued)

Study	Country	Outcome	Sample Type	Main Conclusion
Muhuri and Preston 1991	Bangladesh	Mortality	Demographic and health survey in Matlab for the 1982 Census	"The fact that mortality is so much higher among girls with older sisters than among those without suggest that higher female mortality is not primarily a result of a general pattern of cultural practices that treats all girls differently from boys. Instead, it points to a pattern of conscious, selective neglect of individual children" (p. 431). A similar pattern emerged among male children and the "pattern does suggest that some parents also discriminate against late-born boys" (p. 431). Girls with older brothers and boys with older sisters, however, have relatively low levels of mortality. "These cross-sex results are further evidence that parents do not treat sons and daughters as perfect substitutes and that they pursue a child survival strategy aimed at securing some balance between male and female offspring, albeit with a strong bias toward sons" (p. 431).
Miller 1981	Review of North and South India	Mortality and a wide range of nutrition-related outcomes	Review	"These [reviewed] studies make clear that there are different patterns of mortality for boys and girls in North and South India: girls die at much higher rates than boys in the north, while death rates are more equal in the south. These statistics, gained through reliable studies of large groups over long periods of time, confirm the hypothesis that unbalanced juvenile sex ratios in the north are indeed the result of sex differentials in mortality" (p. 82).
Basu 1993a	Review of South Asia	Morbidity and mortality	Review	The paper distinguishes between two discriminatory effects that put females at a disadvantage: (1) effects due to consciously discriminatory behavior, and (2) those effects that are due to behavior not directly creating a sex differential in welfare outcomes, except in some sort of historical or institutional sense. These two sets of reasons necessitate different policy interventions. While women's economic potential is an important determinant of discrimination, culture and custom also count. The latter, usually an unintentional part of discriminatory behavior, is also the part that is less resistant to change from outside.

Conclusions. The studies show that (1) in some areas of South Asia, pro-male bias is reflected in higher female preschooler mortality rates, especially in the 1-to-4-year age range; (2) within-region variation in the mortality sex disparities, however, is large; (3) one should look for differences in mortality rates for children between the ages of 1 and 4 (male children are at a higher biological risk at birth); (4) again, birth order/family compositions are important to control for when one looks for sex differences; and (5) reasons for the mortality differentials among preschoolers are both economic (Rosenzweig and Schultz 1982; Ram 1984) and cultural (Das Gupta 1987). Either or both sets of reasons represent discrimination against females. As Basu (1993a) points out, however, in the short run, the economic reasons (access to good paying jobs and wage differentials for the same job) are more likely to be amenable to policy changes than are the cultural reasons. To the extent that institutions evolve over the long term, sustained changes in economic incentives toward increased labor market returns to females may lead to longer-run cultural and behavioral changes.

PUBLICATION BIAS: THE UNDERREPORTING OF NEGATIVE RESULTS

The review of the preceding literature review on intrahousehold outcomes found plenty of cases where the null hypothesis of no sex or age differential could not be rejected by the evidence at hand. However, how many studies that found no differences within the household (in some sense, a “negative” result) did not see the light of day?

To find no differences in poverty and nutrition within households when one is looking for those differences may be construed by some researchers as a negative result. Gould (1993, 10) is a reminder that "negative results end up, all too often, unpublished in manila folders within steel-drawer files, known only to those who did the work and quickly forgotten even by them." Gould was writing of scientific experiments, but social scientists can make hundreds of nonexperimental comparisons within each data set. How many intrahousehold differences are uncovered from the testing of the first hypothesis? How many reformulations of a hypothesis are undertaken before an “interesting story” can be reported?

This may be a serious problem in the study of intrahousehold resource allocation. It has been pointed out (Haddad, Hoddinott, and Alderman 1996) that any review of the comparative literature may be biased, since it is more likely that studies that report differences in productivity will be submitted for publication and, as a result, are more likely to be accepted. Such "publication bias" (Begg and Berlin 1988) is common to all scientific disciplines, but has been found to exaggerate the prevalence of studies that show differences between cognitive styles of men and women (Fausto-Sterling 1992). But the rejection of null hypotheses is sensitive to the particular hypothesis being tested. Harriss-White (1996) has pointed out (see Table 1) that studies using the same data set may arrive at different

conclusions due to differences in their null hypotheses, differences in classifying the data (for example, by age groups), differences in the treatment of seasonality, different nutrients studied, different aggregations of households, and different treatment of individuals. Since the disagreements between studies are not trivial, policymakers are, as one might expect, intervention-averse.

It may be more useful for policymakers if studies of nutrition and poverty identified the variables associated with systematic differences in a particular context. For example, when designing nutrition interventions, where differences by level of income are more important than differences by sex, targeting would be based on income. In contrast, when the major differences are by sex, as in South Asia, there is a stronger case for sex-specific targeting.

Future reviews of the intrahousehold literature should make every effort to document the findings of nondifferences as they appear in the "grey" literature of donor reports, dissertations, and working papers.

4. POVERTY AND GENDER BIAS

This section examines associations between poverty and gender bias. It reviews studies that address two main issues: (1) the representation of females in low-income households; and (2) poverty rates for female-headed households. Because of the sexual division of labor in most households and the demographic implications of female headship, the results of both types of studies will depend on the definition of income used and the use of per capita as opposed to per adult equivalent measures of household income.

A REVIEW OF TERMS

The Choice of Poverty Measure

There are many measures of poverty. In this paper, we measure poverty based on either an income or total expenditure variable. Other measures of poverty such as nutritional status are discussed in this paper, but are not referred to explicitly as "poverty measures." Of the income and expenditure measures, the Foster, Greer, and Thorbecke (1984) P_α class of poverty measures has been found useful for its ability to capture a range of value judgments on both the incidence and the depth of poverty.[8]

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[8] If real per capita household expenditures are ranked as follows:

The parameter α reflects the measure's sensitivity to the depth of poverty. If $\alpha = 0$ is chosen, no concern is exhibited about the depth of poverty, and P_0 corresponds to the fraction of individuals falling below the poverty line (the Head Count Index). If $\alpha = 1$, P_1 corresponds to the average shortfall from the poverty line (Poverty Gap Index). Values of $\alpha > 1$ in P_α calculations give more weight to the average income shortfalls of the poorest of the poor.

One key aspect of the P_α measure is its decomposability into different mutually exclusive and exhaustive subgroups such as, for example, male-headed and female-headed households. Thus, the measure is able to measure the contribution of different subgroups to overall poverty.

The Use of Adult Equivalents

When comparing groupings of individuals with very different demographic characteristics, the issue of adult equivalents becomes potentially important. For instance, compared to male-headed households, female-headed households may contain a higher percent of children. How sensitive are conclusions about headship and poverty to the use of adult equivalents as opposed to household size (which gives per capita measures)?

For Jamaica, Louat, van der Gaag, and Grosh (1993) use adult equivalency scales to measure the economic consumption of children of different ages as fractions of adult consumption. They use equivalent scales calculated by Deaton and Muellbauer (1986) for Sri Lanka and Indonesia. They assign a weight of 0.2 to children aged 0 to 6 years, of 0.3 to children aged 7 to 12 years, and of 0.5 to children aged 13 to less than 18 years. Persons greater than or equal to age 18 have a weight of 1.0. Their results depend significantly on whether they use per capita or per adult equivalent measures of income.

$$y_1 < y_2 \ldots\ldots < y_q < z < y_{q+1} \ldots\ldots < y_n,$$

where z is the poverty line, n is the total population, and q is the number of poor, then $P\alpha$ is given by

$$P_\alpha = 1/n \sum_{i=1}^{q} \left[\frac{(z - y_i)}{z} \right]^\alpha \qquad ; \alpha \geq 0.$$

The Definition of Income

If income is defined only in cash terms, the welfare of subsistence households will be underestimated. If subsistence production is positively associated with households where a large percentage of adults are female (which seems reasonable, at least in rural areas of South Asia), and if subsistence production is underestimated, these households may well be falsely associated with poverty. The use of total expenditure instead of measured income makes it easier to put a value on subsistence activities, at least to the extent that total expenditure is a realistic measure of "permanent income."

One important dimension of poverty that is not captured by total expenditure is time spent in nonwork or leisure activities. Lipton and Ravallion (1993) note that "women work longer than men to achieve the same level of living. The burden of the "double day"—market labor and domestic labor—is more severe for women. Female age-specific participation rates increase sharply as income falls towards severe poverty; yet, so do the ratios of children to adult women" (p. 33).

Reviews of formal time allocation studies confirm that, on average, women in developing countries put in more hours per day in nonleisure activities than do men (Juster and Stafford 1991). Not only are women actively engaged in agriculture and wage-generating activities, but a substantial amount of a woman's day is devoted to home production activities such as fetching water and fuelwood, preparing meals and child care. In addition, low-income women have longer working days than higher-income women, further exacerbating the poverty/malnutrition cycle. In many rural areas, domestic activities account for the largest proportion of women's time in any given day.[9]

Thus, if nonleisure time (through detailed time allocation data) could be incorporated into this definition of poverty, total expenditure per capita probably would understate poverty for households reliant on female labor. This type of analysis, however, is extremely rare, and all of the studies reported in the following sections are based on standard income or total expenditure measures that ignore this potentially gender-differentiated leisure time dimension of poverty.

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[9] For example, Haddad's (1991) gender-disaggregated analysis of Ghanaian data shows that in terms of time burdens, women are consistently worse-off than men. Reported female time loads are 15-25 percent higher than those of males. Moreover, the main source of the discrepancy is the much heavier commitment of women to household work. The general tendency is for women to spend 20 hours per week in this activity compared to the male contribution of 5 hours per week. Only one-third of this discrepancy is compensated for by a reduction in female time spent in employment outside the home, as women work about 27 hours to men's 31 hours for single jobholders, and 42 compared to 47 hours for multiple jobholders.

THE REPRESENTATION OF FEMALES IN LOW-INCOME HOUSEHOLDS

This most recent evidence on the association between gender and poverty is based on an empirical analysis of 11 data sets from 10 developing countries (Botswana, Côte d'Ivoire, Ethiopia, Ghana, Madagascar, Rwanda, Bangladesh, Indonesia, Nepal, and Honduras) (Quisumbing, Haddad, and Pêna 1995). The paper computes income- and expenditure-based poverty measures and investigates their sensitivity to the use of per capita and per adult equivalent units. It also tests for differences in poverty incidence between individuals in male- and female-headed households using stochastic dominance analysis.

The paper shows that for the per capita expenditure (income) measure, a greater proportion (P_0) of individuals in female-headed households lie below the 33-percentile poverty line in 7 out of 11 data sets, and the poverty gap (P_1) is likewise larger for persons in female-headed households in 7 out of 11 data sets. The exceptions are in Côte d'Ivoire, Rwanda, and Nepal, where the poverty measures are lower for female-headed households. Poverty measures are significantly (10 percent or less level of significance) larger for persons in female-headed households in five data sets for the headcount index (P_0) and in four data sets for the poverty gap index (P_1). The P_2 measure, which gives a larger weight to poorer families, is also larger for female-headed households in 8 out of 11 data sets. However, these differences are significant in only four data sets (urban and rural Ghana, Madagascar, and Bangladesh). In contrast, the depth of poverty is higher for male-headed households in Botswana, Rwanda, and Nepal.

Using per adult equivalent income measures, a larger proportion of individuals in female-headed households are poor in 8 out of 11 data sets. Differences between male- and female-headed households are statistically significant in five data sets for P_0. Based on the poverty gap index, individuals in female-headed households are worse-off in nine data sets; these differences are significant in five data sets. With respect to the depth of poverty, persons in female-headed households have larger shortfalls from the poverty line in nine data sets; these are significant in four. Poverty is more severe for individuals in male-headed households in Botswana and Rwanda.

Strict stochastic dominance analyses reveal that differences between male- and female-headed households among the very poor are not sufficiently large that one can conclude that one is *unambiguously* worse- or better-off, except for a few exceptions. When we use the method of endogenous bounds, persons in female-headed households in rural Ghana and Bangladesh are consistently worse-off, using two stochastic dominance criteria.

Earlier studies are summarized by region:

South Asia. One of the earliest analyses of the association between women and poverty (the so-called "feminization of poverty") was conducted by Visaria (1980a, 1980b), using data from the two Indian states of Gujurat and Maharashtra, Nepal, Peninsular Malaysia, Sri Lanka, and Taiwan. The tables presented include the percentage of females in households, ranked into deciles using a variety of income measures. Visaria concludes: "In terms of [women's] living standards measured in per capita terms, however, they [women] do not seem to be heavily overrepresented among the poor" (p. 202).

Southeast Asia. No quantitative studies of gender and income-based poverty measures could be found for Southeast Asia (except for the Malaysian analyses by Visaria [1980a, 1980b]).

Latin America. The study by Barros, Fox, and Mendonca in Brazil (1995) shows that female-headed households are overrepresented in low-income groups (see discussion below). However, the link between headship, household demographic composition, and poverty in Latin America (discussed below) suggests that this phenomenon may be due to lower numbers of labor market participants among poor women, rather than the number of adult females relative to adult males per se.

Sub-Saharan Africa. For Ghana, Haddad (1991) calculates poverty indices for males and females, for individuals in male- and female-headed households, and for individuals in households containing more, equal, and fewer adult males than adult females. For both the upper and lower poverty lines (below which lie 35.1 percent and 7.4 percent of the sample, respectively), the poverty share of each gender-disaggregated group is close to their representation in the sample. The largest discrepancies occur in households that contain more adult females than males: they contribute 38.5 percent of the sample, but their share of overall poverty is approximately 46 percent.

Conclusion. Subject to data availability, the use of household per capita income and expenditure measures does indicate that women are overrepresented in poor households in all regions, although the overrepresentation is not overly striking.

As a direct consequence of using per capita household expenditure measures, two caveats should be noted: (1) per capita measures will be understated for younger households with more children; and (2) per capita measures ignore intrahousehold income transfers. To ameliorate the first source of bias, it may be important for future analyses to use per adult equivalent measures of income or total expenditure. It is not clear how to address the second source of bias.

Finally, when interpreting poverty and gender data, it is also important to bear in mind that the burden of poverty may fall unequally on women rather than men.[10] For example, even if the data show no association between poverty (as measured by total expenditure per capita or by per adult equivalent) and sex discrimination, it seems clear that women work harder than men to achieve that measured parity.

FEMALE HEADSHIP: HOUSEHOLD COMPOSITION ISSUES

Sometimes it is difficult or expensive to collect or obtain detailed information on the demographic composition of households. If, however, a household can be readily identified—through a census or survey—as being headed by a woman, this may shed light on the number of potential labor market participants, with female-headed households having potentially fewer than male-headed households.

Heterogeneity of Headship Definitions

Typically, households are disaggregated according to the self-declared household head's sex. Other, more sophisticated, definitions of headship could be used (and should be used in subsequent analyses) that better reflect individual responsibilities and contributions towards household welfare. For example, the "working head" approach relies on time allocation data to locate the household member most heavily engaged in income-generating activities (Rosenhouse 1989). A similar approach is that of "cash head," which focuses on individual contributions to household cash income (Lloyd and Gage-Brandon 1993).

A less data-intensive approach is to disaggregate self-declared female-headship into *de facto* and *de jure* female-headed households. De facto female-headed households are those where the self-declared male head is absent for at least 50 percent of the time. Labor migration studies suggest that this type of de facto female-headed household is becoming increasingly common in Africa (Buvinic, Youssef, and von Elm 1978; Buvinic, Lycette, and McGreevey 1983). In these households, husbands or other male relatives may still play a role in basic decisionmaking and make varying contributions to household incomes. De jure female-headed households are those in which a woman is generally considered the legal and customary head of household. De jure households are usually headed by widows who are

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[10] Aggarwal (1986), for instance, has emphasized the need to go beyond counting how many people are below the poverty line and to examine whether inequalities exist in the distribution of the burden of poverty (in terms of food intakes relative to requirements, mortality rates, time devoted to work and rest) between male and female household members and between male- and female-headed households.

often the grandmother of the children in the household, by unmarried women, or by those who are divorced or separated.

It is important to remember that the "headship" concept is essentially an artifact of census-reporting. The artifact was usefully adapted to provide some insight into the vulnerability of female-headed households and their coping strategies. The census-derived headship label, however, bestows a false veneer of homogeneity upon male- and female-headed households (Rosenhouse 1989). Inevitably, as the number of self-declared female-headed households grows, so too does their heterogeneity. On the one hand, this should lead to a more careful appraisal of the role of reported female headship as a monitoring and targeting indicator (Buvinic and Gupta 1992). On the other hand, the increasing (and increasingly recognized) heterogeneity of female-headed (and male-headed) households provides more "windows" into the allocation of responsibilities and resources within the household.

Evidence

Buvinic and Gupta (1992) conducted a large review of the literature on female-headedness and poverty. The authors concluded that, of the 67 studies selected (the criteria for selection are not clear), 51 indicated that female-headed households are poorer than male-headed households (irrespective of geographic region). Their conclusions for policy are that "governments that wish to implement antipoverty programs with constrained budgets should seriously consider targeting female headship as an innovative and cost-effective policy option with potential spillover benefits" (p. 47).

There are three caveats to Buvinic and Gupta's results that are worth highlighting. First, given the heterogeneity of female-headed households, how does this cloud the relationship between female headship and poverty? Second, the depth of poverty should not be ignored: female-headed households may be disproportionately represented below the poverty line, but are they disproportionately represented among those households that are far below the poverty line? Third, female-headed households are likely to contain more children than male-headed households: do per capita income measures overstate poverty in female-headed households?

The importance of accounting for the heterogeneity of female-headed households is illustrated by Kennedy and Haddad (1994) for Kenya. Here, the de facto female-headed households are the poorest (a statistically significant difference) of any type of households (by total expenditure per capita), but de jure female-headed households are only slightly poorer than male-headed households.

Another example of the heterogeneity of female-headed households is given by DeGraff and Bilsborrow (1993) with data from Ecuador. First, they find that female-headed households, as a group, have per capita household incomes 10 percent lower than male-headed households. When, however, they disaggregate female-headed households into never-married, married, divorced and widowed, they find that the divorced and widowed groups have a higher per capita income than male-headed households. They conclude that "the results highlight the importance of distinguishing between those effects of female headship which arise because of differences in conditions, and those which arise because of differences in behavior of male and female household heads" (p. 20).

On the second and third caveats, evidence is scarce and will be supplemented by data from a later section of this paper. One study that speaks to both caveats, however, is from Louat, van der Gaag, and Grosh (1993) for Jamaica. When the authors use per capita total expenditure as a measure of welfare, they find 9 percent of people living in male-headed households to be below their chosen poverty line (10th percentile), compared with 11 percent in female-headed households. The difference is small, but statistically significant ($t = 4.28$). When the depth of poverty is taken into account, however, the poverty indices do not differ significantly by headship. Moreover, when the authors use adult equivalents to adjust total expenditure, none of the differences are significant for the 10-percent poverty line. For a higher poverty line with per capita total expenditure as the measure of welfare, all comparisons show a higher incidence of poverty among female-headed households. For the higher poverty line and per adult equivalent total expenditure, a significantly higher proportion of individuals from female-headed households are below the poverty line. But again, when the depth of poverty is taken into account, there are no significant differences by sex of head of household. The authors conclude: "Thus, though the results show a mixed picture and considerable sensitivity to the measurements and poverty lines used, they are by and large consistent with the notion that female headship is correlated with poverty."

The study by Barros, Fox, and Mendonca (1995) on approximately 20,000 households from three metropolitan regions in Brazil is relevant to the first and third caveats. The study shows that female-headed households, in all three regions, are disproportionately overrepresented in low per capita income groups, with the main proximate determinant being the lower earnings capacity of adults in this type of household. Female-headed households account for 17 to 22 percent of households, but account for 27 to 41 percent of all households in the lowest per capita income quintile. When the female-headed households are subdivided into those with minors (prevalence of 6 to 12 percent overall) and then further subdivided into those with minors and no other adults (2 to 4 percent overall), the results are more dramatic. For the lowest per capita income group, 20 to 35 percent of the households are

female-headed with minors, and 11-21 percent of the households are female-headed with minors and no other adults. This shows the heterogeneity of female-headed households. One should, however, be careful about the use of per capita measures for these comparisons. For example, female-headed households with minors that are classified as lower per capita income may simply contain more minors than those female-headed households with minors that are classified as higher per capita income.

Demographic Composition, Labor Markets, and Headship

Why are female-headed households more likely to be poor? Recent evidence suggests that this phenomenon is linked with the number of potential labor market participants (Sedlacek, Gutierrez, and Mohindra 1993). At an aggregate level, household poverty is associated with fewer income-generating members. The absence of a male head usually means that the household has one less labor market participant or income-generating member. In Sub-Saharan Africa, female-headed households have fewer household members in adult equivalent units (Quisumbing 1994, 18-19), which may exacerbate labor scarcity during the peak season. Evidence from Latin America indicates that poorer households tend to have fewer women workers than richer households (Sedlacek, Gutierrez, and Mohindra 1993) and that poorer women are somehow discouraged from participating in the labor force. For three Latin American countries (Brazil, Colombia, and Venezuela), higher participation rates of women are associated with higher household incomes. In India, Kochar (1995) finds that households are better able to ensure against crop income shocks, but not against demographic shocks, such as sickness of a male family member during peak season. This is because the labor market in South Asia is predominantly male, due to cultural restrictions against women working outside the home. Thus, relieving constraints to women's labor market participation, whether through legislation or provision of substitutes for women's time spent on domestic work (for example, child care) may help to break the link between female headship and poverty.

Conclusion

There is an association between female headship and poverty, but it is uneven and unpredictable, depending largely on the reasons for female headedness. Moreover, the use of female-headedness as a poverty-targeting indicator should not be adopted unless a superior predictor (candidates could include household size, number of labor market participants, access to land, or dependency ratio) cannot be found. Finally, it should be noted that a preoccupation with female-headship can distract policymakers from focusing on the

processes by which households become female-headed and the large number of poor individuals that reside in male-headed households.

FEMALE INCOME: HOUSEHOLD EXPENDITURE ISSUES

Before looking at the differential welfare effects of male and female income sources, male and female income needs to be measured with some confidence. But how easy is it to attribute income generation activities to different individuals? One can straightforwardly identify some individual contributions to household income. In poor rural societies, however, joint production activities (those that combine labor inputs of several household members) such as subsistence agriculture and off-farm enterprises may be an important source of overall household income. Hence, it is often difficult to identify individual income sources accurately.

One income source that is relatively easy to assign to individuals is nonlabor income: pensions, asset income, and government transfers. This component of income has the added advantage of being nondependent on current household decisions as to how individual labor is allocated, thus simplifying econometric investigation. If male and female nonlabor income streams are measured with error, however, and if that error is systematic and different by gender groups, then apparent differences in the impacts of male and female nonlabor income on, say, child nutrition, could be misleading. Moreover, if unearned income is derived from inherited assets, it may be correlated with other unobserved individual attributes (such as investments in the individual during childhood) (Strauss and Thomas 1995, 66).

A related problem with interpreting differential nonlabor income effects by gender is that the flow of income has not been adequately controlled for. Income that is received in small and frequent increments tends to be used for food and other basic needs, compared to lumpier seasonal income that tends to be spent on more expensive items (Hamilton, Popkin, and Spicer 1984; Tripp 1982). Perhaps it is not that women inherently spend money in different ways than men (reflecting different preferences or a certain division of labor in purchasing), but rather that women earn income in flows that ensure a higher propensity to purchase certain items (for example, daily food items for children). Hopkins, Levin, and Haddad (1994) allow for seasonal lumpiness of income in a household data set from Niger and still find that men's and women's income has a different impact on household food expenditures.[11]

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[11] A related issue is that income earners may not be income controllers. In female-headed households, it is likely that women earn and control most of the income. To date, there has been little work on understanding the magnitude and importance of this distinction.

Collectively, studies by Kumar (1979), Guyer (1980), Tripp (1982), Pahl (1983), Dwyer and Bruce (1988), and Blumberg (1991) provide compelling evidence that men and women spend income differently. Why is income systematically spent differently by men and women? A combination of a number of factors is likely to be responsible: (1) societal sex roles that cast women in the role of "gatekeepers"; (2) different preferences (women may prefer to spend more on children's food because they spend more time with them); (3) different constraints (women may spend more on food the higher the income they earn, because they have to purchase more expensive calories that take less time to prepare); or (4) that women earn money in flows that are more easily spent on food.

What, however, are the implications for household and preschooler nutritional status? Are the different expenditure patterns actually transformed into health improvements or are they canceled out by a reallocation of time and/or other health inputs?

It is not straightforward to isolate the independent effect of female income share on household expenditures and individual nutritional status. This is primarily because, in ordinary least-squares regressions with female income share as an explanatory variable, that variable's endogeneity will lead to a biased estimate of its independent effect. Female income share has to be predicted with variables that are not endogenous or choice variables. The data collected for econometric investigations, therefore, have to include extra information, such as prices and assets, in order to act as predictors of female income share.

South Asia. On the contribution of women to overall household income, quantitative evidence from this region of the world is scarce. This probably reflects problems with collecting sex-disaggregated income under the stigma often attached to female wage work in this part of the world.

In this light, Noponen's (1991) study of 300 households in Madras is a welcome addition to the literature on female income contribution. On average, total female earnings accounted for 42 percent of overall household income, while the corresponding figure for males was 48 percent (the remaining income was derived from joint production activities). This was despite male daily wages being 50 percent higher than female daily wages. The implied longer working week for women was confirmed by Noponen with time allocation data. Unfortunately, from the point of view of this study, she does not proceed to test for differential impacts of male and female income on expenditure patterns or nutrition outcomes. She does, however, demonstrate the critical contribution of women's income to overall household income, especially in times of limited economic opportunity; presumably, women's income will have at least as large an impact on nutrition outcomes as that of income earned by men.

Southeast Asia. The most comprehensive study from Southeast Asia on the impacts of female income on food and nutrition outcomes is by Garcia (1991). Using data from 841 households covering three sites in the Philippines, controlling for overall household total expenditures (a proxy for household income), female income share has a positive and significant association with household budget shares of milk, bread (reflecting an increasing demand for time-saving foods), pork, green leafy vegetables, medical care, and children's schooling. This translates into a positive and significant association with household calorie availability (derived from food expenditure information) and preschooler weight-for-age and a negative and significant association with the probability of preschooler fever and diarrhea.

Thomas and Chen (1993) use observations on approximately 14,000 Taiwanese households from 1980 to test the income pooling hypothesis. Holding per capita household income constant, they find that the share of income attributed to women has significant impact on the proportion of the household budget that is allocated to alcohol, cigarettes, education, and staples. These results hold for both earned (predicted) and unearned income.

Latin America. Engle's careful work in Guatemala on the relative importance of male and female income on child nutritional status provides strong qualitative evidence on the importance of both sources of income, particularly female income (Engle 1991; Engle and Nieves 1993a, 1993b). Unfortunately, for the endogeneity reasons cited above, Engle's quantitative results are associative rather than causal. Using a sample of 302 households from two peri-urban Guatemalan towns, where approximately half of the mothers had earned at least some income in the past 12 months, Engle and Nieves find slightly stronger associations between mother's income and preschooler weight-for-age and height-for-age as compared to the correlations for father's income. It is not clear if the differences are statistically significant (1993a, 1993b). Similarly, for a sample of preschoolers with working mothers, and controlling for overall household income per capita, Engle finds a positive significant association between the percentage of family income earned by the mother and height-for-age, weight-for-age, and weight-for-height.

Thomas (1990a, 1996) uses unearned income as a determinant of nutrient demand, child health, and child mortality in Brazil. This approach to testing the hypothesis of income pooling within the household focuses on nonlabor or unearned income flows accruing to different members of the household. If there is consensus within the household on how to allocate resources, that allocation will be based only on exogenous factors: prices (including wages) and total unearned income, irrespective of to whom it is accrued. Thomas finds, for example, that the effect on child survival probabilities is almost 20 times greater when

unearned income accrues to women rather than to men. For this data set, the identity of the unearned income recipient does seem to matter.

Two caveats, however, should be noted. First, unearned income may be measured with considerable error and this may confound tests of the equality of the impacts of men's and women's unearned income. Second, unearned income may not be entirely exogenous. For example, property income could be accumulated by savings out of past earnings and, consequently, could be a function of past labor supply decisions.

Sub-Saharan Africa. For a Ghanaian sample, Tripp (1982) indicates that women's authority within the household, as proxied by earnings from petty trading and education, respectively, is positively correlated with improved child anthropometric status. Tripp cautions, however, that this result may not be related to gender per se; rather, it may reflect differences in income flows that accrue to men and women. To date, none of the studies of female income share have convincingly controlled for this potentially confounding effect. For a sample of approximately 560 households in Rwanda, von Braun, de Haen and Blanken (1991) show that female cash income share is positively and significantly associated with household calories derived from food expenditure information.

For the Côte d'Ivoire, Hoddinott and Haddad (1995) show that the share of household cash income earned by women in the household has a positive and significant effect on the budget share for food. It has a negative and significant effect on meals eaten out, children's clothing, adult clothing, alcohol, and cigarettes. As mentioned earlier, in the absence of a potentially exogenous income component such as unearned income, it is important to predict the female income share variable. In the Côte d'Ivoire estimations (unlike in any of the other studies reported, excluding Thomas [1996]), the female income share is predicted. The predictors include the difference in educational attainment between the household head and the spouse, the proportion of household landholdings operated by adult women, the proportion of household own-business capital held by adult women, and the ratio of the spouse's education (or that of the eldest wife in a polygamous household) to the male head's education.

With the same data set, but with a focus on anthropometric outcomes as opposed to household expenditure patterns, Haddad and Hoddinott (1994) find that increases in the proportion of cash income accruing to women increases boys' height-for-age relative to that of girls, and that this effect is statistically significant.

Conclusion. There is strong evidence that women make large contributions to household cash and in-kind income in all regions studied. Women's income share does seem to be

associated with household expenditure patterns that are more child-oriented and with improved outcomes, such as the health and education of children. Association is not causality, however, and rigor (as exemplified by Thomas [1990a]) must be encouraged in future studies in this area.

5. CONCLUSIONS AND POLICY IMPLICATIONS

This section summarizes the conclusions from the review and draws out implications that are relevant for the design and implementation of nutrition interventions.

1. Subject to data availability, the use of household per capita income and expenditure measures does indicate that women are overrepresented in poor households in all regions, although the overrepresentation is not overly striking.

   This conclusion implies that targeting income, food, and nutrition interventions to poor households is an effective strategy for targeting poor women. If, however, it is relatively straightforward to target poor women directly—even those not in poor households, more efficient targeting mechanisms may exist (such as self-targeting mechanisms commonly found in public works schemes with the offering of program wages just below those found in the market).

2. There is an association between female headship and poverty, but it is uneven and unpredictable, depending largely on the reasons for female-headedness.

   The clear implication here is that the use of female-headedness as a targeting indicator for income, food, and nutrition programs in the absence of an understanding of how the household became female-headed is a risky proposition. It is the process by which households become female-headed that is the key targeting indicator. A household that has become female-headed due to the death of the husband is likely to be very different in terms of vulnerability and access to income from a household that has become female-headed due to the husband migrating for employment and remitting income back to the household.

3. There is strong evidence that women make large contributions to household cash and in-kind income, in all regions studied. Women's income share does seem to be associated with household expenditure patterns that are more child-oriented and to be associated with improved outcomes such as the health of children. Association is not

causality, however, and better methods must be encouraged in future studies in this area.

Women are important contributors to the household economy. This has important implications for the time requirements of income, food, and nutrition interventions, and the targeting of programs to women. First, if women's time is taken up in waiting for the delivery of nutrition and other services, there is an important trade-off in income earning opportunities. Second, if at all possible, programs, especially income-generation and food transfer programs, should be targeted to women. Women tend to spend the additional resources on ways that have a greater impact on child welfare and nutrition in particular.

4. The evidence on food distribution within the household suggests that, while there is some pro-male and pro-adult bias in terms of the quantity of food intake, it seems to be mainly located in South Asia, with considerable variation within that region. The measured extent of discrimination is sensitive to adjustments for energy expenditure and body mass. While some individuals within the household may receive a higher allocation of food, they may be engaged in energy-intensive activities in which performance depends on nutritional input. Inequality between boys and girls also seems to decrease with higher income, although there is some evidence to the contrary in South Asia, due to higher costs associated with girls (that is, dowries). Inequality may also be affected by seasonality, with lower inequality during the harvest as opposed to the lean season.

5. Outside of South Asia, evidence of boy-girl discrimination in the allocation of nonfood health inputs is scarce. Within the South Asia region, the few studies that have examined this issue found strong evidence of pro-male biases.

6. Only in India has the adult goods technique demonstrated discrimination against girls. In contrast, similar analyses from Sub-Saharan Africa (Côte d'Ivoire, Burkina Faso) show no discrimination.

7. When females do have worse anthropometric scores than males, the studies tend to come from South Asia. Studies from Africa consistently show girls to be better-off than boys.

The implication of conclusions (4–7) is that food and nutrition programs and interventions in South Asia need to pay special attention to boy-girl discrimination in the

allocation of food and nonfood inputs. Such discrimination may be entirely rational (at least in an economic sense) as far as the family is concerned, but it needs to be acknowledged in program design. If such intrahousehold inequalities are neglected, interventions may be unsuccessful. Suppose there is concern regarding the well-being of young girls in a particular rural area; specifically, there is a perception that they do not get enough food to eat. A possible policy response is the implementation of a school meals program in schools where girls are recorded as being particularly undernourished. However, the success of this intervention cannot be ascertained in the absence of information on the pattern of food allocation among household members. Households might respond to this program by reducing the amount of food girls receive at home (and increasing the amount of food consumed by other household members). Understanding the existing patterns of intrahousehold allocation of food is a necessary prerequisite in determining the effectiveness of such policy interventions.

Understanding existing patterns of intrahousehold allocation is a key step to formulating effective development policies. While policies may affect the intrahousehold allocation of resources, the existing intrahousehold allocation may lead to policy failure. Moreover, reallocation within the household may offset the effects of targeted interventions. What is needed is a two-pronged strategy. First, in the short run, it is important to understand and recognize the extant patterns of intrahousehold resource allocation so that the actual impact of policies and programs can match the intended impact. Second, in the medium to long run, policies need to improve the status of women by acknowledging the crucial role they play as gatekeepers to household food security and nutritional status and as major contributors to the overall household economy.

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