5 Health and Nutrition Effects of Commercialization of Agriculture

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Introduction

One of the most contentious issues in the cash crop/food crop debate revolves around the impact of commercialization of agriculture on the health and nutritional status of women and children. This chapter examines the effects of commercialization of agriculture on preschoolers' health and nutritional status. The chapter also assesses the effects on women along the lines of the conceptual framework described in chapter 2.

It is typically assumed that increases in household income will ultimately result in health and nutritional benefits to individual household members. This income-mediated effect on health and nutrition operates through two main pathways. First, increased incomes can be used to purchase either a different mix of goods and services or more of the current market basket, for example, more access to health care, better housing, and so forth. This new or increased market basket could produce a positive health effect. Second, income-food consumption linkages, by improving an individual household member's energy or other nutrient intake, could improve nutritional status, which in turn could improve health. Each of these pathways will be examined in this chapter. Table 5.1 gives an overview on all case study findings as regards health and nutrition effects.

Morbidity and Nutritional Status of Preschoolers

No significant differences are detectable in the percentage of preschoolers who are ill from households that participate in cash crop production and households that do not participate in four of the case study settings: the Philippines, Kenya, Rwanda, and The Gambia (table 5.2). The high rates of illness among preschoolers in The Gambia and

TABLE 5.1 Overview for case study settings of health and nutrition effects

Country	Commercialization Scheme	Was There a Favorable Effect on Health and Nutrition?	Did Source of Income Affect Health and Nutrition?
Guatemala	Export vegetable—producing cooperative of Cuatro Pinos	Not much. The prevalence of weight deficiency and stunting was slightly less. But when households were longer in the cooperative, positive effect increased.	Yes, increased income decreased stunting and weight deficiency, but the effect was reduced at higher income levels. A higher off-farm nonagricultural income share is associated with reduced weight deficiency, with the effect being greater in the case of women-controlled income. Higher export-crop income share did not appear to have adverse effects on children's nutrition.
Philippines	Bukidnon Sugar Company	No, these children are significantly more stunted and experience diarrhea and fever more frequently.	No, it seems that higher-income households purchase nonfood items and higher-priced calories while their preschoolers have less than recommended intakes.
Papua New Guinea	Karimui Spice Company cardamom plantation (in adverse times)	Yes, generally, but those children whose mothers worked at the KSC did not fare as well as other Karimui children. As economic conditions worsened, the generally favorable trend reversed. Frequency of diarrhea was higher.	Availability of household food energy or the share of purchased food had insignificant effects on children's nutritional status. The prevalence of diarrhea had a very negative effect on children's weight-for-age and height-for-age.
India	Karnataka Dairy Development Project	Information not available.	Information not available.
Kenya	South Nyanza Sugar Company	No, there was no significant difference in total time ill or time ill with diarrhea. Also, no difference in the prevalence of stunting, wasting, or weight-for-age. No significant change in total time ill for women.	Income is not a significant determinant of illness for either preschoolers or women, at least in the short run. The health and sanitation environment had the greatest impact on preschooler growth. Children's height and weight are positively determined by preschooler caloric intake and negatively affected by time ill with diarrhea.

Kenya	Two rice schemes: Ahero Irrigation Scheme and West Kano Irrigation Scheme	General improvement in nutritional indicators as incomes get more diversified, but no difference in health conditions.	Yes, in terms of income diversification. Composition of income appears to be more important than level of income for household nutrition. Those farms mainly dependent on specialized income show symptoms of severe nutritional stress.
Rwanda	Potato production in the Gishwati forest area	Yes, the prevalence of malnutrition was lowered in households, and while the net effect on improving children's nutrition was small, it was present.	Yes, there is a positive relationship between income and nutritional improvement. Household health and sanitation conditions strongly determined children's nutritional status.
Zambia	Technological change in maize	Yes, for the children under 5 years, who do better with respect to the shorter-term weight-related measures. Improvements are not so evident for children aged 5–10 years. The prevalence of diarrheal diseases, malaria, and respiratory and other fevers appeared to be lower.	Information not available, but there does not appear to be a close relationship.
Malawi	Commercialization of maize and tobacco	Not much. There was no significant difference in nutritional status between children of tobacco growers and of nontobacco households.	Yes, income was positively associated with nutritional outcomes, with per capita income and per capita expenditures being the most powerful correlates of child stature. However, morbidity was largely independent of income and wealth. There was no significant effect of cash cropping on height-for-age of children. Levels of stunting were lower in female-headed than male-headed households.
Sierra Leone	Bo-Pujehun Rural Development Project-Tree crop promotion	No, children of commercialized farmers seem worse off than children of subsistence farmers.	Off-farm income had a positive effect on children's weight-for-age, but the share of tree crop income had a negative effect.
The Gambia	Jahally-Pacharr Smallholder Rice Project	Yes, especially for those children who were in a particularly bad nutritional situation, but there were intrahousehold biases. Women's fluctuations in weight are reduced and seasonal imbalances are leveled out.	Yes, a strong effect, via increased levels of and more stability in food consumption.

TABLE 5.2 Percentage of preschoolers in participant and nonparticipant households who were ill

	Percentage of Preschoolers Who Were Ill	
Country	Participants	Nonparticipants
Guatemala[a]	10.6*	16.1
Philippines[b]	31.5	28.0
Kenya[b]	89.6	87.7
Rwanda[c]	33.6	28.3
The Gambia[c]	78.8	80.3

SOURCE: Data sets of respective case studies.
NOTE: Includes all-round average for each child.
[a]Based on 72-hour recall.
[b]Based on two-week recall.
[c]Based on one-month recall.
*Significant at $p < .05$.

Kenya is due largely to malaria. However, the children of cooperative members of the smallholder export vegetable scheme (that is, cash crop-growing households) in Guatemala have a noticeably lower rate of illness than do the children of noncooperative members. This difference is due in part to a package of social and health services provided as part of the scheme. The positive health effect of participation in the agricultural cooperative will be explored later in the multivariate analyses.

Table 5.3 looks at the total time ill (all symptoms) and total time ill with diarrhea alone for preschoolers from participant and nonparticipant households. There is no definite pattern in the length of illness for preschoolers from participant or nonparticipant households.

Also, no definite pattern is observed for preschoolers in either the total time ill or the time ill with diarrhea alone when households are stratified by terciles of income. Preschoolers from the highest income category appear as likely to be sick, on average, as preschoolers from the lowest income category.

The effect of wealth on health patterns is also of research interest. Since all communities studied are overwhelmingly engaged in agriculture, landholdings per capita was used as a proxy for wealth. In this case, the pattern is not as clear-cut as was the income/morbidity stratification. In The Gambia, preschoolers in the top tercile of landholdings per capita are less likely to be sick when compared to preschoolers from the lowest category. However, this pattern does not exist in the other case studies: in Kenya, the Philippines, and Rwanda, increasing landholdings per capita is not associated with decreasing total morbidity.

When the morbidity data for preschoolers are disaggregated into age categories, children aged between 7 and 24 months are, with few exceptions, most likely to be sick. There are several reasons for this. This period corresponds to the period when children are weaned, first partially and then totally. Even if the breast-milk substitute is nutritionally comparable, the additional steps involved in preparing the food often introduce new pathogens into the children's environment. The fact that preschoolers also become much more mobile during this period further exposes them to a wider range of pathogens.

Commercialization can potentially influence preschooler nutritional status through a number of pathways. One of these is through the impact on child-feeding patterns. If increased demands are placed on a mother's time to provide agricultural labor for a specific cash crop, early weaning or the early introduction of solid foods for preschoolers, or both, can occur. However, no significant differences are found in the weaning age between participant and nonparticipant households (table 5.4). In all study countries, breast-feeding occurs for an extended period of time. Similarly, the age at which solid foods are first introduced to infants does

TABLE 5.3 Percentage of time that preschoolers are ill with any illness and with diarrhea in particular, participant and nonparticipant households

Country/Group[a]	Preschoolers		
	Sample Size	Any Illness (percent)	Diarrhea
Philippines[b]			
Participants	543	12.9	0.5
Nonparticipants	1,016	12.5	0.8
Kenya[b]			
Participants	291	28.2	4.8
Nonparticipants	446	28.5	3.8
Rwanda[c]			
Participants	311	12.4	5.6
Nonparticipants	279	12.3	5.7
Malawi[b]			
Participants	148	17.7	1.9
Nonparticipants	294	21.4	2.1
The Gambia[c]			
Participants	209	15.2	3.9
Nonparticipants	174	15.9	6.0

SOURCE: Data sets of respective case studies.

[a]The Guatemala case study had data only on the incidence of morbidity, not the total time ill.

[b]Based on two-week recall.

[c]Based on one-month recall.

TABLE 5.4 Age at which infants are totally weaned, participant and nonparticipant households

Country	Participants (months)	Nonparticipants
Guatemala	16.2	16.2
Philippines	14.2	13.7
Kenya	19.1	20.2
Rwanda	23.5	21.2

SOURCE: Data sets of respective case studies.

NOTE: Age in months weaned refers to the age when mother stopped breast-feeding completely. If child never breast-fed, age in months weaned equals 0. Data not available for The Gambia or Malawi.

not differ between the two groups. It is normally recommended that four to six months after birth, breast milk complements be added to an infant's diet. With the exception of Rwanda, where children receive solids later than in other countries, children in the study countries receive solids within this period. Thus, as table 5.4 suggests, entry of households into cash cropping schemes has not had detrimental effects on child-feeding patterns.

In general, the nutritional status indicators signal an improvement in the nutritional status—expressed in Z-scores[1]—when income increases. However, differences between participants and nonparticipants were not statistically significant in any case study setting. Neither were there any significant differences identified in weight-for-age or weight-for-height Z-scores between the two groups, stratified by income terciles.

Most of the case studies in this volume present anthropometric data for preschoolers of all ages combined into one group. It may be that the most pronounced effects of the commercialization process are on children born after the households have benefited from the increased income and/or on older children whose families have been involved in cash crop production for some time. The Kenya case study examined some of these issues by stratifying children into various age groups, and the results are similar to what is reported here (Kennedy 1993). More disaggregation of nutritional status data by age group would be useful in elucidating the process by which income-generating schemes do or do not have effects on health and nutritional status.

1. $$\text{Z-score} = \frac{(\text{Actual measurement} - \text{50 percentile standard})}{\text{Standard deviation of the standard}}$$

Based on National Center for Health Statistics Growth Standards.

Prevalence rates for stunting (less than 90 percent of height-for-age), wasting (less than 90 percent of weight-for-height), and malnutrition (less than 80 percent of weight-for-age) are shown in table 5.5. With the exception of The Gambia, there are no significant differences between participant and nonparticipant households in any of these indicators. In The Gambia, preschoolers from participant households are less stunted. Moreover, there is more wasting than stunting in The Gambia, unlike other countries. This is true for preschoolers from participant as well as nonparticipant households.

Z-scores for each nutritional-status indicator were also stratified by landholdings per capita for participant and nonparticipant households. In The Gambia, Guatemala, Kenya, and Rwanda study settings, there is no consistent pattern. In the Philippines and Malawi cases, however, children from the highest landholding tercile—whether cash cropping or not—have better Z-scores on all three nutritional status indicators when compared to children from the lowest landholding tercile.

Determinants of Morbidity and Nutritional Status of Preschoolers and Links to Commercialization

So far, the results on morbidity and nutritional status have been purely descriptive. However, the multivariate analysis conducted on the case studies reinforces the descriptive results. Table 5.6 presents the

TABLE 5.5 Prevalence of stunting, wasting, and malnutrition among preschoolers, participant and nonparticipant households

Country	Stunting[a]		Low Weight-for-Age[b]		Wasting[c]	
	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants
			(percent of preschoolers)			
Guatemala	66.7	72.8	47.2	49.8	6.3	6.9
Philippines	32.2	36.3	45.7	51.8	22.4	27.1
Kenya	24.3	25.3	20.1	23.3	12.3	16.3
Rwanda	18.6	24.0	11.3	11.5	4.5	3.9
Malawi	55.2	52.7	52.4	46.6	16.6	19.7
The Gambia	9.4	17.4	27.5	27.0	29.0	28.7

SOURCE: Data sets of respective case studies.

[a]Less than 90 percent below height-for-age standard.
[b]Less than 80 percent below weight-for-age standard.
[c]Less than 80 percent below weight-for-height standard.

TABLE 5.6 Selected coefficients for relationship between program participation, socioeconomic variables, and preschoolers' morbidity (all preschoolers)

	β Coefficient on Preschoolers' Total Time Ill					
Independent Variable	The Gambia	Guatemala	Kenya	Malawi	Philippines	Rwanda
Household income[a]	−6.06-05	−0.00025	−1.60−05	6.89−03	7.10−04	1.18−03
	(−0.899)	(−0.87)	(−0.20)	(0.50)	(1.67)	(1.60)
Mother's schooling	n.a.	n.a.	−0.25	−8.84−04	−2.28−03	−0.59
	n.a.	n.a.	(−1.18)	(−0.04)	(−0.99)	(−1.27)
Age of child (in months)	−2.54−03	−0.00051	−0.16	−0.20	−2.43	−0.21
	(−6.42)	(−0.073)	(−4.52)	(−5.41)	(−7.21)	(−4.00)
Household size	n.a.	n.a.	−0.36	5.88-0.5	−2.05	n.a.
	n.a.	n.a.	(2.35)	(0.0)	(−0.98)	n.a.
Participation dummy	5.31−03	−0.432	0.29	1.80	3.22	4.1
(1 = participants)	(0.33)	(−2.86)	(0.20)	(1.33)	(0.29)	(1.73)
Sample size	561	477	994	425	n.a.	585

NOTES: *t*-values in parentheses. The variable for morbidity equals all-round average for total time ill, except for Guatemala, where analysis is based on a probit analysis of incidence of illness.

[a]Total household expenditures used as a proxy for income for The Gambia, Guatemala, the Philippines, and Rwanda.

n.a. = Not available.

morbidity model for preschoolers in the six study settings of The Gambia, Guatemala, Kenya, Malawi, the Philippines, and Rwanda. Current income is not significantly associated with total illness in any of the six study countries. The same finding is obtained for morbidity for children less than 36 months of age. These findings are consistent with the absence of an income-morbidity relationship shown in the descriptive statistics above.

Age, however, is a significant determinant of illness in all study settings except Guatemala (table 5.6). As children get older, they are likely to be sick for a shorter period of time. This finding, again, is consistent with the descriptive analyses presented earlier. Note, however, that many of the very sick children have died, and, in a sense, an aging sample of preschoolers is biased toward "healthy" children.

Mother's schooling is not a significant predictor of preschooler morbidity in any of the case studies where data are available. However, the average level of education for women in all study areas was low (three to six years of schooling), with many women having no formal education. More variation in schooling may be needed in order to see a beneficial effect on children's health.

A separate dummy representing participation in commercialization schemes was included in the morbidity model. There are no negative effects of participation in commercialization schemes on children's health. In fact, in Guatemala, membership in the export crop–producing cooperative has a beneficial effect on children's health. This finding reinforces the data on incidence of illness presented in table 5.2. Planners of the cooperative in Guatemala attempted to maximize the welfare effects of commercialization through implementing a package of health and social services, partly funded out of cooperative profits. Table 5.6 suggests that the health of children of cooperative members has benefited partially as a result of this package.

The implications of the morbidity patterns of preschoolers for their nutritional status are explored in child-growth models. Tables 5.7 through 5.9 present results of the growth models for the various case studies. Given that household incomes had increased in all of the case studies partly as a result of the specific commercial agriculture schemes, one research interest was to trace through some of the effects of this increased household income on child nutrition.

In three of the five case studies for which caloric intake data are available, household and/or child energy consumption is a major determinant of linear growth. Similarly, household energy consumption is a significant determinant of gains in weight-for-age in Rwanda and The Gambia. In Kenya, Malawi, and the Philippines, child calorie consumption is a significant determinant of weight-for-age. In general, household

TABLE 5.7 Selected coefficients for preschooler growth model for height-for-age

	β Coefficient on Z-Scores for Height-for-Age					
Independent Variable	The Gambia	Guatemala	Kenya	Malawi	Rwanda	Philippines
Sex (1 = boy)	−0.29	−0.056	0.090	0.072	0.326	−0.03
	(−2.661)	(−0.52)	(1.09)	(0.95)	(3.30)	(−0.34)
Age (in months)	0.009	0.025	0.025	2.08−03	1.62−03	n.a.
	(3.26)	(4.67)	(8.10)	(0.88)	(0.589)	—
Calories[a]	0.069−03[b]	n.a.	2.42−04	1.30−04	1.35−04	2.1−04
	(1.02)		(1.96)	(1.32)	(2.79)	(3.35)
Mother's height	0.019	n.a.	0.026	0.022	0.02	0.038
	(2.41)		(3.69)	(2.97)	(2.39)	(5.53)
Total time ill	−0.796	n.a.	−0.02	9.28−03	−1.26−04	0.32
(percent)	(−2.63)		(−3.36)	(−3.06)	(−0.059)	(1.24)
Prior Z-score	n.a.	0.58	0.605	0.862	n.a.	n.a.
of preschooler		(11.48)	(20.67)	(25.72)	—	—

[a]Household calories used for The Gambia and Rwanda; child calories used for Kenya, the Philippines, and Malawi.
[b]A strong positive calorie-nutritional status relationship was identified for preschoolers weight-for-age and in analysis for populations, including children up to age ten also for height.
n.a. = Not available.

TABLE 5.8 Selected coefficients for preschooler growth model for weight-for-age

	β Coefficient on Z-Scores for Weight-for-Age					
Independent Variable	The Gambia[a]	Guatemala	Kenya	Malawi	Rwanda	Philippines
Sex (1 = boy)	6.019	0.048	0.03	0.146	0.269	−0.40
	(0.53)	(0.41)	(0.40)	(1.87)	(3.56)	(−7.07)
Age (in months)	1.799	0.29	0.01	−9.62−04	5.31−03	n.a.
	(0.78)	(5.71)	(6.21)	(−0.39)	(2.53)	—
Calories[b]	0.0161	−9.0−07	2.02−04	3.16−04	9.49−05	2.27−04
	(2.22)	(−0.23)	(2.13)	(3.08)	(2.57)	(5.93)
Mother's height	n.a.	n.a.	7.80−03	0.018	0.013	0.022
			(1.46)	(2.46)	(2.04)	(5.93)
Total time ill[c]	−3.16	n.a.	−0.014	−9.98−03	−5.90−03	−0.425
	(−1.79)		(−3.03)	(−3.29)	(−3.59)	(−2.66)
Prior Z-score	0.172	0.388	0.55	0.813	n.a.	n.a.
of preschooler	(4.19)	(8.05)	(20.09)	(19.21)	—	—

[a]In this model, the Z-score values are multiplied by 100; thus, the scale of parameters other than the prior Z-score is to be adjusted to compare with the other parameters in the table.
[b]Household calories used for The Gambia, Guatemala, and Rwanda; child calories used for Kenya, the Philippines, and Malawi.
[c]Time ill reflects diarrhea only in The Gambia model.
n.a. = Not available.

TABLE 5.9 Selected coefficients for preschooler growth model for weight-for-height

	β Coefficient on Z-Scores for Weight-for-Height					
Independent Variable	The Gambia	Guatemala	Kenya	Malawi	Rwanda	Philippines
Sex	0.058	0.178	−0.03	0.087	0.086	−0.067
	(0.75)	(1.80)	(0.47)	(0.98)	(1.34)	(−1.22)
Age (in months)	0.004	0.021	1.27−03	5.73−04	6.54−03	n.a.
	(2.15)	(4.46)	(0.51)	(0.20)	(3.68)	—
Calories[a]	−0.011−03	−4.0−05	1.10−04	3.37−04	4.46−05	1.52−04
	(−0.23)	(0.99)	(1.07)	(2.91)	(1.43)	(4.03)
Mother's height	0.0072	n.a.	6.3−03	4.67−03	7.69−03	9.44−03
	(1.29)	—	(1.09)	(0.58)	(1.41)	(2.28)
Total time ill	−0.32	n.a.	−7.09−03	−7.56−03	−6.69−03	−0.74
	(−1.48)	—	(−1.46)	(−2.12)	(−4.82)	(−4.68)
Prior Z-score of preschooler	n.a.	0.169	0.39	0.717	n.a.	n.a.
	—	(3.48)	(10.64)	(13.43)	—	—

[a]Household calories used for The Gambia, Guatemala, and Rwanda; child calories used for Kenya, Malawi, and the Philippines.
n.a. = Not available.

calorie consumption is less significant for improving short-term growth, that is, weight-for-height. However, in Malawi and the Philippines, child calorie consumption is a significant determinant of weight-for-height.

Prior height and weight information on preschoolers was available for four case studies.[2] For each growth model, it is clear that prior nutritional status of preschoolers is a major predictor of their growth in the later period. Preschoolers who were not doing well nutritionally in the earlier period continued to exhibit patterns of inadequate growth. The data from these longitudinal studies give credence to those who advocate growth faltering as one criterion for identifying at-risk children.

Increments in household income result in improvements in preschooler nutritional status (as measured by growth) via the income–household-calorie–child-calorie route. However, even where these linkages are significant, the magnitude of the effect is often small.

In the Philippines and Kenya case studies, information on preschoolers' caloric consumption was available, which was used to examine the household-income–child-calorie–child-growth linkages. In the Philippines, a doubling of household income would increase a preschooler's caloric intake by 9 percent and, in turn, would improve the average weight-for-height Z-score by 3.6 percent, from -0.63 to -0.61, on average. Even with a very substantial increase in income in the short run, in this case a doubling of income, the ultimate physiological effect on growth via the income–household-calorie–child-calorie route alone is weak.

Kenyan data suggest similar, weak income–child-calorie–growth linkages. A doubling of household income in this setting results in an approximate 4 percent increase in preschooler caloric intake, which would result in an approximate 7 percent improvement in the weight-for-height Z-score. Thus, as in the Philippines, these household-income–household-calorie–child-calorie–child-growth linkages, although statistically significant at each point, result in very small changes in growth.

These weak linkages are of concern for those preschoolers who are moderately and severely malnourished. A doubling of household income would not be sufficient to move these children from severe to moderate malnutrition or even from moderate to mild malnutrition.

As the regression results in tables 5.7 through 5.9 show, a major determinant of nutritional status in each case study is the morbidity patterns of the children. The lack of a significant income-morbidity relationship has already been discussed. Therefore, these data suggest that in order to enhance the income–child-growth effect, at least in the

2. The studies in Guatemala, Kenya, and Malawi were longitudinal studies; in The Gambia, such information was available from retrospective data.

short to medium term, the health infrastructure and sanitary environment must be addressed along with agricultural policies and programs.

Health and Nutritional Status of Women

One of the most volatile topics in the commercialization debate is the impact of cash cropping on women. A flavor of this controversy is revealed from a review by Irene Tinker:

> a recurring theme in all these studies [in her review] of new technology for cash crops is that, while cash incomes may have increased, nutritional levels tend to fall. The primary reason for this seemingly contradictory phenomenon is the fact that this income belongs to men (Tinker 1979).

The general theme of much of the literature is that the effect of commercialization of agriculture on women is negative.[3]

There is no significant difference in the mean body mass index (BMI) or the total time ill between women of different income categories, whether their households are participating or not in cash cropping (table 5.10). This finding may not be surprising since, as chapter 3 indicated, in each case study the specific cash crop was seen as a men's crop and the proceeds from that crop were viewed as men's income. Multivariate analysis for women's illness and women's BMI in Kenya, which found that household income was not a significant determinant of either morbidity or nutritional status (Kennedy 1989), reinforced this finding.

A more surprising finding from the Kenya case study is that, as women's own income increased, there was a significant decrease in their BMI (Kennedy 1989). This appears counterintuitive until the linkages between household income, women's income, and women's nutritional status are examined. For many Kenyan women in agricultural households, energy expenditures increase with an increase in their income. For many women, this increase in the energy intensity of activities is greater than the concurrent increase in their caloric intake.

Results from a number of the cash cropping case studies (chapters 16, 18, and 22) indicate that both the total amount and the control of income are important influences on household caloric intake. In Kenya, female-controlled income has a significant positive effect on household caloric intake; this effect is above and beyond the effect of household income on household food consumption. A number of other case studies reported in this volume also show an effect of female income on household caloric consumption that is over and above the pure household income effect. For example, in Rwanda, when income is held constant,

3. See von Braun and Kennedy (1986) for some of the pros and cons of this literature.

TABLE 5.10 Women's body mass index (BMI) and percent time ill, by income per capita tercile, participants and nonparticipants

Country[a]	Income Tercile	BMI		Total Time Ill (percent)
		Participants	Nonparticipants	
Philippines	1	21.0	21.0	3.1
	2	21.0	21.0	7.5
	3	22.0	21.0	7.9
Kenya	1	22.4	22.1	19.9
	2	21.5	22.1	23.5
	3	22.3	22.0	23.3
Rwanda	1	23.4	23.1	23.8
	2	23.4	22.8	20.4
	3	23.1	22.4	29.2
Malawi	1	20.2	20.6	n.a.
	2	21.0	21.4	n.a.
	3	21.8	21.0	n.a.
The Gambia	1	21.5	20.8	11.6
	2	21.1	20.3	17.0
	3	20.4	20.6	15.5

SOURCE: Data sets of respective case studies.

NOTE: Body mass index (BMI) = weight (in kilograms)/height (in meters) squared.

[a]Data not available for Guatemala.

n.a. = Not available.

female-headed households consume 377 calories per adult-equivalent per day more than male-headed households. This effect is most pronounced in the lowest income groups. Similarly, in The Gambia, the share of cereal production under the control of women adds 322 calories per adult-equivalent per day to household energy consumption.

The influence of female-controlled income on household caloric intake seems to be most consistent and dramatic in the African case studies.[4] This may be because it is within the African context that income streams and expenditure responsibilities are still most highly differentiated by gender. In Malawi, a detailed comparison of the expenditures of household heads showed that most females allocated a higher share of their budget to food and a lower share to both drinks (between one-quarter and one-half of the share allocated by male heads) and agricultural inputs, mainly fertilizer. It appears that when total

4. The percentage of female-controlled income was not significant in the household consumption function specified for Malawi.

income is low, female-headed households tend to allocate a higher share of their expenditures to food than do male-headed households.

Control of income seems to be related more to the gender of the household head than to cash cropping per se. For example, in Kenya, the percentage of income that is female controlled is similar in male-headed sugarcane-producing households (43 percent) and in male-headed nonsugarcane-producing households (42 percent). Female-headed households, on the other hand, whether sugarcane- or nonsugarcane-producing, control approximately 63 percent of total household income.

What are the implications of gender of head of household for child-level outcomes? Earlier, we saw that there were minimal differences in the health and nutritional status of preschoolers from cash-cropping and non-cash-cropping households. What if households are disaggregated by the gender of the household head? This exercise can be performed for the Kenya and Malawi case studies.

Table 5.11 looks at child-level outcomes for households disaggregated by their participation in cash-cropping schemes and by the gender of the household head. In Kenya, the female-headed household category has been subdivided into de jure (the legal head of household is a woman) and de facto (in practice the head of household is a woman; the male head of household is absent). On many measures of child health and nutrition, children from male-headed households, whether or not these households are participating in cash-cropping schemes, have similar outcomes. However, there are differences in child health and nutrition outcomes in female-headed households when these households are disaggregated by their cash-cropping status. If it is assumed that many of the positive effects of development on child welfare are income mediated, particularly if the income is controlled by women, it would be predicted that higher-income households would do better in producing child health or child nutrition. In these cases, the assumption would be that female-headed cash-cropping households should have a preferential preschooler health and nutrition status. This assumption only holds true in certain cases.

Preschoolers in Kenya from sugar-producing, de facto female-headed households have a lower prevalence of total illness and diarrhea than do children from non-sugar-producing, de facto female-headed households. Some of the lower prevalence of illness of preschoolers from de facto female-headed sugar producers is associated with their higher household incomes. It is curious that this effect is not observed in the de jure female-headed sugar-producing households. One reason is that the female heads of de jure households are typically not the mothers of the preschoolers. In Kenya, and to a lesser extent to Malawi, many of these de jure female household heads are the grandmothers. It is therefore not

TABLE 5.11 Time ill, caloric intake, and nutritional status of preschoolers by gender of head of household and cash crop production, Kenya and Malawi

	Kenya								Malawi			
	Male		All Female		De jure Female		De facto Female		Male		Female	
Item	Sugar Farmers	Non-sugar Farmers	Sugar Farmers	Non-sugar Farmers	Sugar Farmers	Non-sugar Farmers	Sugar Farmers	Non-sugar Farmers	Tobacco Farmers	Non-tobacco Farmers	Tobacco Farmers	Non-tobacco Farmers
Total time ill (percent)	28.66	28.77	29.01	27.32	30.83	26.64	26.96	28.66	18.8	23.8	26.1	22.3
Time ill with diarrhea (percent)	4.67	3.57	3.66	4.83	5.26	3.93	1.85	6.58	1.8	1.9	1.8	1.9
Child caloric adequacy (percent)	59.92	57.34	52.78	59.47	51.21	57.16	54.51	63.71	67.9	72.2	66.6	70.4
Percent weight-for-age Z-score less than −2	19.6	19.0	15.7	15.9	20.4	14.1	10.4	19.5	27.5	29.0	27.3	23.1
Percent height-for-age Z-score less than −2	41.0	41.0	36.0	31.9	37.0	33.3	34.8	28.9	63.7	61.3	45.5	57.1
Percent weight-for-height Z-score less than −2	2.3	1.9	4.0	5.0	5.6	3.7	2.2	7.9	2.2	0.0	0.0	0.0
Household expenditures per capita[a]	2,872.74	2,517.02	2,729.57	2,343.96	3,011.24	2,482.12	2,331.92	2,059.00	80.42	81.51	61.55	72.74

SOURCE: Data sets of respective case studies.

[a]In Kenyan shillings and Malawian kwacha, respectively.

necessarily the case that the increased income received by the household and/or the female head will benefit the individual preschooler. In fact, in Kenya, preschoolers in de jure female-headed sugar-producing households are ill for longer periods of time and have longer bouts of diarrhea. The increased income associated with sugarcane production has not benefited the children. This finding reinforces the earlier discussion that income-morbidity links tend to be weak.

In Kenya, there are no significant differences in the prevalence of stunting, wasting, or malnutrition between cash-cropping and non-cash-cropping male-headed households. This finding is consistent with the analyses presented earlier. Comparing children from all female-headed households in Kenya to children from male-headed households, the preschoolers in the female-headed household group do better on the longer-term measures of nutritional status. A different pattern emerges, however, when we examine different types of female-headed households in Kenya. The de jure female-headed households, that is, those households in which women are considered the legal head, show differences in anthropometric indicators between sugar and nonsugar producers. Preschoolers from de jure female-headed non-sugar-producing households have lower rates of stunting (low height-for-age) and malnutrition (weight-for-age less than -2 Z-scores) than children from sugar-producing de jure female-headed households. In contrast, preschoolers from de facto female-headed sugar-producing households have lower rates of malnutrition based on weight-for-age than preschoolers from non sugarcane-producing de facto female-headed households. Further analysis for Kenya showed that children in de facto female-headed households capture a larger share of household calories than children from male-headed or de jure female-headed households.

In Malawi, because of small sample sizes, it was only possible to compare male-headed households to all female-headed households combined; preschoolers from female-headed households—whether producing tobacco or not—have lower rates of stunting than preschoolers from male-headed households.

The results of table 5.11 suggest that it is not female headedness per se that imparts a nutritional benefit to preschoolers but, rather, it appears to be a complex interaction of female headship, expenditure patterns, and time use that leads to different health and nutrition outcomes in preschoolers (Kennedy and Peters 1992).

Conclusions

None of the case studies reported here shows a clear negative effect of the commercial agriculture schemes on children's health and nutri-

tional status. Not only were negative effects not observed in the rather food-oriented Gambian and Rwandan commercialization schemes, but they were also not observed in the very nonfood, cash crop–oriented Kenyan, Malawian, Philippine, and Guatemalan cases. This point is emphasized, since there exists a belief that cash cropping tends to have adverse effects on children.

However, the increases in income that are associated with participation in the various commercial agriculture schemes are not found to decrease child morbidity, at least in the short and medium run captured by the studies. It may seem counterintuitive that very significant increases in income do not translate into a decrease in the total length of illness. These data need to be interpreted cautiously. As already discussed (see chapter 4), there is a tendency in some case studies for more commercialized households to spend, at the same income levels, a slightly higher proportion of their income on nonfood expenditures. The impact of these new expenditure patterns will depend on the items purchased. There are two broad categories of nonfood expenditures: those with no expected health or nutrition benefits, such as certain types of consumer goods (jewelry, radios, alcohol), and those with potential health impacts. The second category can be further subdivided into those expenditures with short-term effects and those with long-term effects. Obvious expenditures, such as for deworming or other preventive health items, could be expected to have an immediate impact on health, observable even in the very short term. However, increased income in participant households is often spent on items such as improved housing and education. While these expenditures may produce health benefits in the long term, in the short term, they are not associated with changes in morbidity patterns. The present case studies may not have fully captured longer-term benefits. A scenario can be envisioned in which increased expenditures on education—particularly of girls—in the longer term would be likely to result in changes in fertility patterns, which in turn would influence neonatal outcomes and ultimately result in improved infant health. Because of the relatively short time frame of the case studies reported in this volume, these sorts of linkages could not be identified.

In each of the study sites, the health and sanitation environment is poor, and infant mortality and malnutrition rates are high. While increases in income would be expected to bring about improvements in overall health and welfare in the longer term, in the short term it appears that increases in income must be combined with public action to improve the health environment in order to have a significant effect on preschooler morbidity. This is not to argue that income is not important, but rather that when agricultural policies and programs are being

planned, attention should be given simultaneously to health and sanitation conditions in rural areas. The complementaries between increased income and an improved health and sanitation environment should be stressed so that the potential effects of commercial agriculture schemes on overall welfare can be enhanced.

Even in households where food availability is greater than energy requirements, preschoolers often consume well below their apparent energy requirements. The reasons for inadequate preschooler energy consumption in situations where income and household food supplies seem not to be constrained are not addressed directly by the case studies. However, two explanations are plausible. First, the communities in which the commercial agriculture schemes have been implemented are ones in which malnutrition is endemic. There may not be an awareness on the part of households that malnutrition is in fact a problem, since their children look like most other children in the community. If primary caretakers do not perceive a nutritional need, then there would be no reason for them to assume that their children need more food.

Second, most of the case studies concentrated on evaluating the nutritional status of children aged up to six years. However, two of the case studies, Guatemala and The Gambia, also included a cohort of children up to ten years of age. Growth models indicated that in Guatemala there was no significant association between household energy intake and child growth, but when growth data for children between the ages of six and ten years are analyzed, the opposite finding emerges. In this group of older children, increases in household caloric intake result in positive impacts on child growth (von Braun, Hotchkiss, and Immink 1989). Why, then, do we not see the same household-calorie–child-growth association in younger children? It is very likely that chronically sick preschoolers, because of a generalized anorexia, feel satiated before their "true" caloric needs have been met. It is also not surprising that parents would not assume that children need more food if the children have indicated that they have had enough food.

The schemes, as implemented, are not associated with increased preschool malnutrition. Therefore, accusations that the introduction of cash-cropping schemes is usually associated with a deterioration in nutritional status are not borne out by data from the case studies included in this chapter. However, a recently completed study in Guatemala, following the same households and the same children surveyed in 1984–85, indicated that children from households participating in an export vegetable cooperative in the Western Highlands did significantly better on some measures of nutritional status than children from the noncooperative households (Immink et al. 1992). These data indicate that some

gains in nutritional status associated with participation in the cooperative were maintained in the longer term.

Household income is a key determinant of household caloric consumption. However, beyond total household income, female-controlled income has a positive and significant effect on household food intake in many cases. Female-controlled income is more likely than male-controlled income to be spent on food. Therefore, household food security, in a number of case studies in this volume, appears to be influenced by both the total amount of household income and the proportion of income controlled by women.

Female headedness, per se, does not impart a nutritional benefit, since not all types of female-headed households show lower rates of preschooler malnutrition when compared to male-headed households. The better nutritional status of children in de facto female-headed households, particularly the non-cash-cropping group, appears to be due to a preferential treatment in the allocation of incremental calories to children. The increased allocation of household calories to preschoolers is due to something other than increasing household income. In fact, in an analysis for the Kenyan case, the household income variable had a marginally significant but negative effect on the proportion of calories going to children. This would reinforce a statement made earlier that, as household income increases, preschooler food intake does not increase as rapidly as household food intake.

Increased household income in rural areas, based on agricultural growth (which also includes the smallest farmers and the landless), can make a major contribution to solving the hunger problem. However, it cannot in itself provide a complete solution in the problem of preschooler malnutrition.

Hunger and malnutrition are not synonymous. While insufficient food intake at the household level and, in particular, the child level, is one precipitating cause of malnutrition, it is not the only cause. The results from the six case studies presented in this chapter indicate that morbidity patterns are a key cause of malnutrition in preschoolers. In order for income-generating policies such as commercialization of agriculture to have dramatic effects on improving health and reducing malnutrition in the short to medium term, attention must be given to health, sanitation, and environmental issues as complementary components of agriculture policies and programs.