Household market participation and stunting in preschool children in Lilongwe, Malawi

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Abstract

Background: Stunting among Malawian preschool children continues to be a concern.

Method: A cross-sectional survey of 251 semi-urban households, who participated in a community-supported preschool programme, was conducted.

Results: Of the 433 participating two- to five-year-old children, 34.4% had stunting. Children from families who grow tobacco were less likely than other children to have stunting (27.0% vs. 37.3%, p-value = 0.04). In contrast, children from families who grow a local type of cowpea *(khobwe)* had a higher rate of stunting than other children (46.8% vs. 32.9%, p-value = 0.01).

Conclusion: The study suggests that the increased income associated with household participation in the growing of globally marketable cash crops, as compared to the growing of local crops, may lead to increased nutritional benefits for children.

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Introduction

Inadequate childhood nutrition continues to be a significant problem in Malawi. Malawi's 2004 Demographic and Health Survey found that 48% of children under the age of five in Malawi had low height for age (stunting), 22% had low weight for age, and 5% had low weight for height (wasting).[1] Despite earlier scaled-up efforts to improve child health and nutrition, no significant improvements in the anthropometric status of Malawian children were observed between the Demographic and Health Surveys conducted in 1992 and 2004.[1] Stunting is a widely used indicator of growth restriction due to chronic or recurrent episodes of malnutrition. Stunting is associated with a plethora of negative short- and long-term health, and social effects. The goal of this study was to examine risk factors for stunting among preschool children enrolled in a community-based early childhood development programme.

Method

A cross-sectional survey of participants in the Early Childhood Development (ECD) programme run by the Kanengo AIDS Support Organization (KASO) in Lilongwe, Malawi, was conducted in September 2009. The ECD programme is a weekday morning educational programme, open to all preschool children between their second and sixth birthdays, regardless of household human immunodeficiency virus (HIV) status, who live near one of the four KASO centres that offer the ECD programme.

All of the households with children enrolled in the ECD programme were invited to participate in the study, after approval of the protocol by George Mason University (USA) and the Malawi National Health Sciences Research Committee.

Consenting adult caregivers of children enrolled in the ECD programme were interviewed in their homes in the local language, chiChewa. They were asked questions about child health and diet, nutritional knowledge and beliefs, and household characteristics, such as food availability and food security. Interviewers also measured the height, weight, and mid-upper arm circumference of each child. Weight was measured to the nearest 0.5 kg using a mechanical scale, height was measured to the nearest 0.5 cm using a metric measuring stick, and mid-upper arm circumference was measured to the nearest 0.5 cm using a metric tape measure. When available, the interviewer verified the child's birthday using the child's government-issued health passport.

The z-scores for child anthropometrics were computed using the NutStat programme within Epi Info, which compares child data with US Centers for Disease Control and Prevention (CDC)/World Health Organization (WHO) 1978 reference standards (since the revised 2004 WHO child reference standards have not yet been incorporated into NutStat). Stunting was defined as being two, or more, standard deviations below the mean height for age. Chi-square tests were used to compare rates of stunting among children with different characteristics. Age- and sex-adjusted multiple logistic regression models were fit to the data. First, regression models predicting stunting were fit for each predictor variable listed in Table I along with age and sex. Then, each predictor variable that was significant at the $\alpha = 0.10$ level in bivariate analysis, was included in a multivariate model along with age and sex.

Results

In total, 253 households were invited to participate in the survey, of which 251 households (99%) consented to participation. Of these 251 households, 56 had one child enrolled in the ECD programme, and 195 had two children enrolled, giving a total of 446 possible child participants. Of these, 13 were excluded because of incomplete information about the child's sex, age, or height, leaving a study population of 433 children.

Table I summarises the socio-economic characteristics of the participating households. Only two participating households had electricity. None of the households had running water in the home. Although HIV/acquired immune deficiency syndrome (AIDS) is a major

Table I: Household socio-economic characteristics and child stunting

Category		Percentage (%) with characteristic	Percentage (%) with characteristic with stunting	Percentage (%) without characteristic with stunting	P-value for chi-square test	Age- and sex-adjusted p-value	P-value for multivariate logistic regression model, including age, sex, and all other independent predictors of stunting
Household education	Head of household attended school	78.1	32.8	40.0	0.19	0.13	
	Head of household is able to write	76.0	32.8	39.4	0.22	0.15	
Household ownership	Radio	51.0	35.3	33.5	0.69	0.59	
	Cellular telephone	45.7	31.3	37.0	0.21	0.20	
	Chickens	38.6	28.7	38.0	0.05[a]	0.07[b]	0.27
	Bicycle	38.6	30.5	36.8	0.18	0.16	
	Goats	19.9	27.9	36.0	0.16	0.15	
	Sofa	8.8	21.1	35.7	0.07[b]	0.07[b]	0.07[b]
	Television	7.4	25.0	35.2	0.24	0.19	
	Pigs	7.4	31.3	34.7	0.70	0.78	
Household crops	Maize	73.9	33.4	37.2	0.47	0.66	
	Beans	41.8	34.8	34.1	0.88	0.81	
	Groundnuts	39.0	29.6	37.5	0.09[b]	0.16	
	Tobacco	28.2	27.0	37.3	0.04[a]	0.10[b]	0.04[a]
	Green vegetables	23.1	37.0	33.6	0.53	0.52	
	Soybeans	22.2	31.3	35.3	0.46	0.50	
	Sweet potatoes	21.0	30.8	35.4	0.41	0.54	
	Khobwe (cowpea)	10.9	46.8	32.9	0.06[b]	0.04[a]	0.01[a]
	Sugarcane	7.6	27.3	35.0	0.37	0.41	
	Tomatoes	5.8	32.0	34.6	0.79	0.94	
	Pumpkins	4.6	30.0	34.6	0.67	0.65	
	Zama (a local bean)	4.4	21.1	35.0	0.21	0.22	
	White potatoes	3.2	42.9	34.1	0.50	0.53	
	Cassava	2.8	33.3	34.4	0.94	0.94	
	None	26.3	36.8	33.5	0.52	0.52	
Child food intake (past 24 hours)	Any fruit or vegetable	94.5	33.3	54.2	0.04[a]	0.05[a]	0.44
	Oil	63.7	32.2	38.2	0.21	0.12	
	Beans	58.0	33.5	35.7	0.63	0.55	
	Fish	39.5	36.9	33.1	0.42	0.47	
	Sweets	27.8	31.7	35.7	0.43	0.33	
	Meat	25.3	26.6	37.3	0.04[a]	0.03[a]	0.05[a]
	Eggs	13.1	30.4	35.4	0.46	0.35	
	Milk	11.3	36.7	34.1	0.72	0.91	

a = p-value < 0.05, b = p-value < 0.10

health concern in Malawi, the majority of households participating in this survey did not report being directly affected by HIV/AIDS. Only three of the participating children were reported to have HIV infection, and only 25 children were reported to have a parent with HIV (even though 86% of the children's caregivers reported having undergone voluntary counselling and testing for HIV). None of the children were reported to be orphans, and only 14 were reported to have a deceased mother or father (with only two of those 14 reported to have died of HIV/AIDS). Maize was the most common crop grown by the households (74%, representing 100% of the households with a garden or farm), followed by beans (42%), groundnuts (39%) and tobacco (28%). As in much of southern Africa, a typical child's meal consists of maize-based porridge (known locally as *nsima*), and a relish (one or more side dishes such as beans, vegetables or meat).

The overall prevalence of stunting in the study population was 34.4%. Slightly more boys than girls had stunting (39.2% vs. 30.5%, p-value = 0.07), and the prevalence of stunting decreased with age from two to five years (45.1%, 29.7%, 34.1%, 28.9%; p-value = 0.06).

Even though the study population was relatively homogenous, there were several notable differences in nutritional status according to socio-economic status, after adjusting for the age and sex of the children. In particular, children from families who grow tobacco were less likely than other children to have stunting (27.0% vs. 37.3%, p-value = 0.04). Tobacco-growing households were more likely than other households to own livestock. However, in terms of household size, parental education, ownership of durable goods, or the children's reported diets based on a 24-hour dietary recall, there was no difference between tobacco-growing and other households. Thus, the difference in stunting prevalence between tobacco-growing and other households does not appear to be a result of socio-economic differences solely, but probably results from a combination of socio-economics and other factors, such as dietary access. In contrast, children from families who grow a local type of cowpea (*khobwe*), had a higher rate of stunting than other children (46.8% vs. 32.9%, p-value = 0.01). Although combination cropping was done, there was no difference in the rate of cowpea growing among tobacco-growing and non-tobacco-growing households (p-value = 0.24). There were no differences in household size, education or diet for *khobwe*-growing households compared to others, but *khobwe* growers were less likely to own a cellular telephone. The latter could indicate a reduced ability to participate in some agricultural markets in addition to indicating a lower disposable household income.[2] The associations between tobacco growing and stunting, and between *khobwe* growing and stunting, remained statistically significant after adjusting for differences in diet and household ownership among children with, and without, stunting. Household socio-economic characteristics and child stunting are tabulated in Table I.

Discussion

In this study, household production of tobacco was protective against stunting among preschool children. In contrast, growing *khobwe* was a risk factor, even though *khobwe* is typically considered to be both a source of nutrients and an income-generating activity for households.[3] Tobacco is Malawi's largest export, accounting for 6% of the gross domestic product (GDP), and 17% of the agricultural GDP.[4] Although only about 19% of smallholder farming households in Malawi grow tobacco, tobacco sales account for about 65% of household cash income in the rural areas near Lilongwe, where this study was conducted.[4,5] Most of this income is used to purchase food items.[4] If the income generated through the production and sale of export crops, such as tobacco exceeds the income for local market crops, such as *khobwe*, this may have a significant impact on household nutritional status, by increasing the ability to purchase nutritious foods for children. Although this study did not find significant differences in the foods children were reported to have eaten in the previous 24 hours, there may have been differences in food quantities or differences in seasonal access to nutritious foods between tobacco-growing and non-tobacco-growing households.

Previous studies carried out in Malawi have found that household educational achievement and household possessions are strong predictors of malnutrition, and that cash crops are important for improving the nutritional status of children.[1,6-8] Some of the previously identified socio-economic characteristics were not significant predictors of stunting in this new study, most likely because of the overall homogeneity of the study population. In particular, study participants uniformly lacked basic resources such as electricity and indoor plumbing, suggesting general poverty and limited cash flow. However, the socio-economic homogeneity also removed third variable effects that might otherwise have hidden the associations between tobacco, *khobwe* and stunting.

The high prevalence of stunting among Malawian preschool children demonstrates a need for improved nutritional interventions at the community level. The results of this study suggest that interventions targeted at increasing household market participation may lead to diets with an improved diversity of foods, food quantity, or consumption of in-season foods with high nutritive value. Through such dietary improvements, household market participation may reduce the risk of stunting and other forms of malnutrition. In particular, this study suggests that promotion of participation in global agricultural markets, rather than local markets, may increase household income, and contribute to improved child nutritional status. Future studies should further examine the influence of cash-cropping choices on child growth and nutrition.

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