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**What Dimensions of Women's Empowerment in
Agriculture Matter for Nutrition-related
Practices and Outcomes in Ghana?**

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ABSTRACT

Policy interventions that improve women's status and reduce gender inequalities are expected to contribute to the well-being of not only the women themselves but also their children. Because women have the responsibility of caring for children and preparing food for the household in many societies, they play a critical role in efforts to sustainably improve children's nutritional status. This paper investigates linkages between women's empowerment in agriculture and the nutritional status of women and children using 2012 baseline data from the Feed the Future population-based survey in Ghana. The sample consists of 3,344 children and 3,640 women and is statistically representative of the northernmost regions of Ghana where the Feed the Future programs are operating. Using a new survey-based index, the Women's Empowerment in Agriculture Index, which directly measures women's empowerment, inclusion, and agency in the agriculture sector, we conduct individual-level analyses of nutrition practices and outcomes including infant and young child feeding practices; dietary diversity for women and children; children's height-for-age, weight-for-height, and weight-for-age z-scores; and women's body mass index. Results suggest that women's empowerment is more strongly associated with infant and young child feeding practices and only weakly associated with child nutrition status. Similarly, we find that women's empowerment in credit decisions is positively and significantly correlated with women's dietary diversity, but not body mass index. This suggests that improved nutritional status is not necessarily correlated with being empowered in all the domains of empowerment and that different domains may have different impacts on nutrition, consistent with other findings in the empowerment literature.

Keywords: women's empowerment; gender; agriculture; nutrition; Ghana

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1. INTRODUCTION

Policy interventions that improve women's status and reduce gender inequalities are expected to contribute to the well-being of not only the women themselves but also their children (Smith et al. 2003). Because women have the responsibility of caring for children and preparing food for the household in many societies, they play a critical role in efforts to sustainably improve children's nutritional status. In many societies, women also play an important role in agriculture, although this role has tended to be unrecognized (Dixon 1983) or incorrectly measured (Doss forthcoming).

Empirical papers on the relationship between women's empowerment and nutrition have used various approaches including cross-country analysis using country-level data on women's status and malnutrition (Smith and Haddad 2000; Smith et al. 2003); household and individual-level analyses using proxy measures of bargaining power such as income, assets, and education (Thomas 1994); and individual-level analyses using direct measures of empowerment such as mobility, decisionmaking, and attitudes toward verbal and physical abuse (Bhagowalia et al. 2012). However, with few exceptions (Sraboni et al. 2014; Malapit et al. 2013), most analyses of women's empowerment have concentrated on women's decisionmaking within the household or on their role in the reproductive sphere and neglected empowerment in productive domains. This is partly because of the paucity of internationally comparable measures and data that measure women's empowerment in productive domains. This paper, similar to Bhagowalia et al. (2012), uses a direct measurement of empowerment but focuses more closely on empowerment in the productive sphere, specifically in agriculture.

This paper investigates linkages between women's empowerment in agriculture and the nutritional status of women and children using 2012 baseline data from the Feed the Future Initiative's population-based survey in Ghana. Assessing women's empowerment in Ghana is a relevant issue, given the West African phenomenon of separate plots managed by men and women, the high degree of women's direct involvement in agriculture, and cultural concepts of "men's crops" and "women's crops," even if such distinctions are not immutable (Doss 2014). The sample consists of 3,344 children under five and 3,640 women ages 15 to 49 and is statistically representative of the northernmost regions of Ghana where the Feed the Future programs are operating. We use a new survey-based index, the Women's Empowerment in Agriculture Index (WEAI) (Alkire et al. 2013), which directly assesses women's empowerment across five domains in agriculture, namely, agricultural production, access to and control over productive resources, control over the use of income, leadership in the community, and time allocation. The aggregate women's empowerment score, evaluated over the five domains, reflects the extent to which women are empowered in these five domains. Comparing women's aggregate empowerment score with that of men enables us to assess the inequality between the achievements of women relative to the men in their households. In this paper, we focus on the women's aggregate empowerment score, one of the subindexes constituting WEAI, to assess to what extent, if any, women's empowerment in agriculture is linked with nutrition outcomes for women and children. We also use information about the decomposition of women's aggregate empowerment score to identify how specific domains and indicators are associated with nutrition. For dual-headed households where both male and female decisionmakers are present, we also use information about the empowerment gap between men and women to see how inequality within the household is associated with nutrition.

We conduct individual-level analyses of nutrition practices and outcomes including infant and young child feeding practices; dietary diversity for women and children; children's height-for-age z-scores (HAZ), weight-for-height z-scores (WHZ), and weight-for-age z-scores (WAZ); and women's body mass index (BMI). Regression results suggest that women's empowerment is strongly associated with infant and young child feeding practices and only weakly associated with child nutrition status. Greater parity between women and men in the household favors boys' HAZ and WAZ but is insignificant for girls. Credit decisionmaking emerges as an important correlate of girls' WHZ and women's dietary diversity, suggesting that increasing women's participation in credit decisions is associated with improved outcomes for both women and girls. However, we do not find any significant association between credit

decisionmaking and women's BMI, suggesting that that nutritional status itself may be affected by other factors outside the woman's direct control, such as morbidity or health status, sanitation, and access to health facilities. These findings also suggest that different domains of empowerment may have different impacts on nutrition, consistent with other findings in the empowerment literature (Kabeer 1999).

2. OVERVIEW OF THE WOMEN'S EMPOWERMENT IN AGRICULTURE INDEX

WEAI is a new survey-based tool designed to measure the empowerment, agency, and inclusion of women in agriculture using individual-level data collected by interviewing men and women within the same households. Initially designed as a monitoring and evaluation tool to track the performance of Feed the Future programs on women's empowerment in the agriculture sector, the index can also be used as a diagnostic to assess the general state of empowerment and gender parity in agriculture and identify the key areas in which empowerment needs to be strengthened (Alkire et al. 2013).

WEAI is an aggregate index reported at the country, regional, or program level and is composed of two subindexes: the five domains of empowerment (5DE) and the gender parity index (GPI). The 5DE assesses the degree to which women are empowered in the 5DE in agriculture, which include (1) decisions about agricultural production, (2) access to and decisionmaking power over productive resources, (3) control over use of income, (4) leadership roles within the community, and (5) time allocation. The 5DE is constructed from individual-level empowerment scores, which reflects each person's achievements in the five domains as measured by 10 indicators with their corresponding weights (Table 2.1). Each indicator measures whether an individual has surpassed a given threshold, or has adequate achievement, with respect to each indicator. A woman is defined as empowered if she has adequate achievements in four out of the five domains or has achieved adequacy in 80 percent or more of the weighted indicators.

Table 0.1 The domains, indicators, and weights in the Women's Empowerment in Agriculture Index

Domain	Indicator	Definition of Indicator	Weight
Production	Input in productive decisions	Sole or joint decisionmaking over food and cash-crop farming, livestock, and fisheries	1/10
	Autonomy in production	Autonomy in agricultural production (for example, which inputs to buy, crops to grow, livestock to raise)—reflects the extent to which the respondent's motivation for decisionmaking reflects his or her values rather than a desire to please others or avoid harm	1/10
Resources	Ownership of assets	Sole or joint ownership of major household assets	1/15
	Purchase, sale, or transfer of assets	Whether respondent participates in decision to buy, sell, or transfer assets	1/15
	Access to and decisions about credit	Access to and participation in decisionmaking concerning credit	1/15
Income	Control over use of income	Sole or joint control over income and expenditures	1/5
Leadership	Group member	Whether respondent is an active member in at least one economic or social group (for example, agricultural marketing, credit, water users' groups)	1/10
	Speaking in public	Whether the respondent is comfortable speaking in public concerning various issues such as intervening in a family dispute and ensuring proper payment of wages for public work programs	1/10
Time	Workload	Allocation of time to productive and domestic tasks	1/10
	Leisure	Satisfaction with the available time for leisure activities	1/10

Source: Alkire et al. (2013).

Unlike other women's empowerment measures that are based on interviewing a female respondent, WEAI is able to capture relative empowerment within households using survey data from both the primary adult male and primary adult female decisionmakers in the same household. This is captured in GPI, which reflects women's achievements in the five domains relative to the men in their households. Households are classified as having gender parity if either the woman is empowered (her

empowerment score is 80 percent or higher) or she is not empowered (her score is greater than or equal to the empowerment score of the primary male in her household).

All of these indexes have values ranging from 0 to 1, where higher values reflect greater empowerment. The overall WEAI is a weighted average of 5DE and GPI, with weights 0.9 and 0.1, respectively. While the overall WEAI is useful as a headline indicator, similar to how poverty indexes are used to track overall trends in poverty, a unique feature of WEAI is its decomposability, which allows us to disaggregate the 5DE achievements by domain and by indicator to see which specific areas contribute the most to both women's and men's disempowerment. More details about the methodology, piloting, and validation of WEAI are available in Alkire et al. (2013).

3. DATA, EMPIRICAL SPECIFICATION, AND VARIABLES

Country Context and Data

Ghana is a lower-middle-income country in West Africa with a per capita GDP of US\$1,604 in 2012; the country has experienced relatively high rates of economic growth and poverty reduction in the past two decades. Small-scale farmers, especially cash crop growers, benefited from increasing agricultural productivity (notably in cocoa) and rising incomes and consumption, while in rapidly growing urban areas characterized by growing service sectors, large numbers of the labor force, including migrants from rural areas, were absorbed in better-paying jobs in the formal and informal economy (World Bank 2013, i). Because farm productivity, output growth, and crop diversification has been greater in the south, and greater off-farm employment opportunities in the country's rapidly growing urban areas are also concentrated in the south (World Bank 2013, 9), poverty reduction has been much slower in the northern part of the country. Ghana also lags on key millennium development goals, such as maternal and infant mortality and access to improved sanitation methods, with large disparities in access to key health and education services between north and south and between income quintiles (World Bank 2013, i).

The country has three distinct agroecological zones: the coastal zone, the forest zone, and the savannah zone (Doss 2002). The savannah zone occupies most of the northern, and poorer, part of the country where Feed the Future programs operate and where our data are collected (Figure 3.1). Sorghum and millet are the dominant cereals in the drier areas of the savannah zone, with cassava, maize, and yams grown in areas with more rainfall (Doss 2002).

Women and girls are active in Ghana's agricultural sector. Females accounted for 49 percent of the economically active population in 2010, of which agriculture employed 49.3 percent (FAO 2011). As in other areas of West Africa, many women cultivate plots separate from those of men within the same household, and patterns of crop cultivation are gender based, with women traditionally considered to be cultivating food crops and men, cash crops, although these distinctions are by no means clear-cut or immutable (Doss 2002). Despite women's high degree of involvement in agriculture, however, a nationally representative survey about gender and assets in Ghana indicates that among married couples, most agricultural parcels (85 percent) are owned exclusively by the individual male, 9.8 percent by the individual female, and only 3.5 percent jointly (Deere et al. 2012). Ghana is also characterized by a "separate of property" regime within marriage, which does not recognize wives' contributions to the formation of marital property, and by inheritance regimes that are male biased (Deere et al. 2012; Quisumbing et al. 2001).

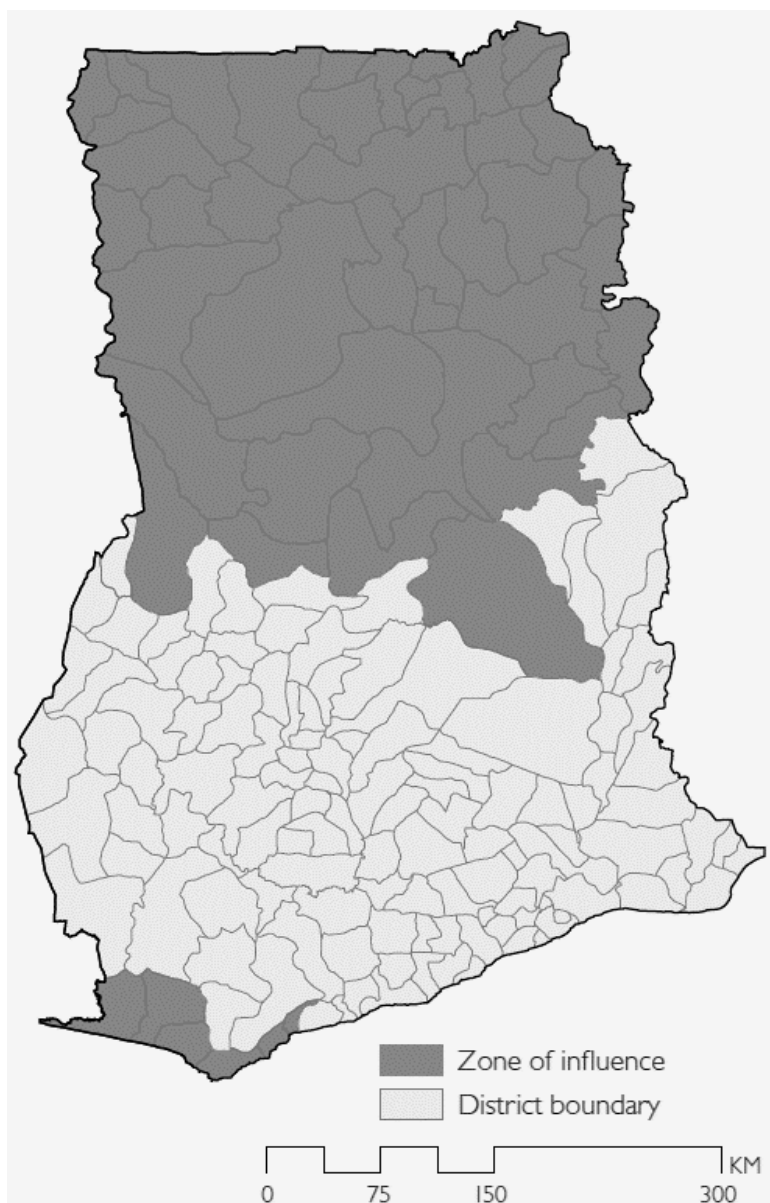
This paper uses the 2012 baseline population-based survey collected for the United States Agency for International Development (USAID)/Ghana's Feed the Future zone of influence (ZoI) within northern Ghana.¹ The survey is statistically representative of two strata of intervention: the agriculture-nutrition intervention area (strata I) and the agriculture-only intervention area (strata II). The sample included districts in the northern, upper west, and upper east regions as well as some areas within the Brong Ahafo region that fall above the eighth parallel in the ZoI (Figure 3.1). The survey was conducted by the Monitoring, Evaluation and Technical Support Services team including the US Department of Agriculture, University of Cape Coast, Kansas State University, and the Accra-based staff in partnership with the Institute of Statistical, Social and Economic Research of the University of Ghana as well as the Ghana Statistical Service.

The 2012 population-based survey uses a two-stage sampling methodology. Using the probability proportional to size method, 230 enumeration areas were selected during stage 1 from all the enumeration areas within the ZoI based on Ghana 2010 Census data. In the second stage, the Institute of Statistical, Social and Economic Research randomly sampled households from among those listed in each selected enumeration area. About 75 percent of the final sample of 4,410 households were in rural areas, totaling 3,317 households. Because WEAI was designed to measure empowerment in agriculture, in this paper we

¹This data description draws from METSS-Ghana (2012).

focus our analysis on 1,445 rural households with complete WEAI data for the principal adult female decisionmakers. This sample restriction avoids the potential misclassification of women as “disempowered” if they are not engaged in agricultural activities. About half of the final estimation sample (51 percent) is located in the northern region, 19 percent in the upper east region, 17 percent in the upper west region, and 13 percent in the Brong Ahafo region.

Figure 0.1 Ghana map: Feed the Future zone of influence



Source: Malapit et al. (2014).

Within our sample, 17 percent of households were female headed. Compared with the national averages reported in the 2008 Ghana Demographic and Health Survey (GDHS), the female respondents in our sample are older and have lower rates of literacy. Only a third of our female respondents are under 30, compared to 56 percent of females in the 2008 GDHS (Ghana Statistical Service 2009). In our sample, about 70 percent of women had ever attended school, similar to the rural average reported in the 2008 GDHS, but only 7 percent were literate, defined as having the ability to read and write in any language. On the other hand, the 2008 GDHS reports that about half of rural women can read and write, which includes about 45 percent of women who have at least some secondary education (Ghana Statistical Service 2009), whereas only 2 percent of our female respondents report completing secondary education. In the 2008 GDHS only women who never attended school or who attended only primary school were asked to read a simple sentence in the local language or in English to assess their literacy. Among rural women with no schooling or primary school, the literacy rate is similar to our sample, about 5 percent (Ghana Statistical Service 2009). The average household size in our sample was 6.4, with 1.4 males and 1.6 females aged 15 to 64. Reflecting the age structure of the population, the average household has 3 children under 15, and 0.2 members older than 65.

Empirical Specification

Nutritional outcomes, such as children's height for age, weight for height, and weight for age, are the result of both practices that contribute to good nutritional status (feeding practices, having a diverse diet) and other factors (morbidity or health status, sanitation and health facilities, and so forth). We hypothesize that women's empowerment affects both practices leading to good nutrition and the nutrition outcomes themselves. For simplicity, denote the nutrition practice and outcome vector as the vector N , which comprises practices P and outcomes O . To analyze the relationship between nutrition practices P , individual nutrition outcomes (O), and women's empowerment, we estimate the following equation using ordinary least squares:

$$N(P, O) = a_0 + a_1 \text{empowerment} + \mathbf{a}_2 \mathbf{I} + \mathbf{a}_3 \mathbf{H} + \varepsilon, \quad (1)$$

where \mathbf{I} is a vector of individual characteristics; \mathbf{H} is a vector of household characteristics; a_i , \mathbf{a}_2 , and \mathbf{a}_3 are the parameters to be estimated; and ε is an error term. Our key coefficient of interest is a_1 , which captures how women's empowerment is correlated with the nutrition practice or outcome, controlling for a conventional set of observable individual and household characteristics. We expect that women's empowerment is positively correlated with good feeding practices for both women and children and negatively correlated with malnutrition. We recognize that empowerment itself may be influenced by the woman's own characteristics as well as the characteristics of the household in which she and her children live; however, in the absence of suitable instruments in the data, we use ordinary least squares and interpret the estimated relationships as associative rather than causal.

For child-level nutrition practices and outcomes, pooling boys and girls in the same regression assumes that women's empowerment influences care and feeding behavior for boys and girls and their nutritional status in the same way. To test whether the coefficient a_1 differs for boys and girls, that is, whether women's empowerment has a differential impact on children by sex, we include a dummy variable for the sex of the child (= 1 if girl child) and also interact this dummy variable with the empowerment variable. The resulting equation to be estimated for child-level nutrition outcomes (O_C) is given by

$$O_C = b_0 + b_1 \text{empowerment} + b_2 \text{girl} + b_3 (\text{empowerment} \times \text{girl}) + \mathbf{b}_4 \mathbf{I} + \mathbf{b}_5 \mathbf{H} + v, \quad (2)$$

where b_i , \mathbf{b}_4 , and \mathbf{b}_5 are the parameters to be estimated and v is an error term. For boys, the relationship between women's empowerment and the nutrition outcome is given by b_1 . For girls, the impact of empowerment is the sum of the coefficient of the empowerment variable and the coefficient of the interaction term with the girl child dummy ($b_1 + b_3$). Equation 2 also nests the test of the differential

impact of empowerment on girls, which is represented by the coefficient on the interaction term, represented by b_3 . If b_3 is significantly different from zero, then this suggests that women's empowerment has differential effects on boys and girls.

Nutritional Practice and Outcome Variables

Information about infant and young child feeding practices is based on responses of mothers and caretakers of children under two years old regarding the child's breast-feeding status and feeding practices from the preceding 24 hours. Summary statistics for these indicators are presented in Table 3.1.

Infant and Young Child Feeding Practices

Indicators for breast-feeding and dietary quality include the following:

Exclusive breast-feeding: The World Health Organization (WHO) recommends exclusively breast-feeding infants during the child's first six months of life to achieve optimal growth, development, and health. A child aged zero to six months is defined as exclusively breast-fed if he or she did not consume any other liquids or foods other than breast milk in the preceding 24 hours of the survey. Of children in the relevant age group, 59 percent were exclusively breast-fed at the time of the survey (Table 3.1).

Dietary diversity score: This is the number of food groups consumed by a child aged 6 to 23 months in the last 24 hours out of seven food groups which include (1) grains, roots, and tubers; (2) legumes and nuts; (3) dairy products; (4) flesh foods; (5) eggs; (6) vitamin-A-rich fruits and vegetables; and (7) other fruits and vegetables (WHO 2010).

Minimum diet diversity: A child aged 6 to 23 months is defined as having the minimum diet diversity if, in the last 24 hours, he or she consumed at least four food groups out of the seven food groups if breast-fed and out of six food groups (excluding dairy products) if not breast-fed.

Minimum acceptable diet: A child aged 6 to 23 months is defined as having a minimum acceptable diet if he or she has consumed the minimum diet diversity and minimum meal frequency for solid, semisolid, and soft foods in the last 24 hours. Minimum meal frequency is defined as consuming at least two feedings for breast-fed children aged 6 to 8 months, at least three feedings for breast-fed children aged 9 to 23 months, and at least four feedings for non-breast-fed children aged 6 to 23 months, of which at least two feedings must be milk feeds (WHO 2008).

Children in our sample had a diet diversity score of 2.58 (out of 7.00), but only 30 percent satisfied the minimum diversity criterion of eating at least four out of seven food groups, and an even lower 14 percent had the minimum acceptable diet (Table 3.1). These results suggest a much lower rate of adequate feeding compared with the national averages of 46 percent and 31 percent of children receiving the minimum diet diversity and minimum acceptable diet, respectively (Ghana Statistical Service 2011), reflecting the higher rates of poverty and less diverse production portfolios in the northern savannah region. On average, girls are more likely to be exclusively breast-fed and consume better-quality diets than boys, although these differences are not statistically significant.

Table 0.1 Summary statistics

Variable	Observations	Mean	Standard Error	Minimum	Maximum
<i>Child outcomes and characteristics</i>					
<i>Practices</i>					
Breast-fed exclusively	145	0.59	0.05	0	1
Boys	85	0.58	0.06	0	1
Girls	60	0.60	0.08	0	1
Number of food groups consumed (out of 7)	395	2.58	0.10	0	7
Boys	189	2.55	0.16	0	7
Girls	206	2.63	0.16	0	7
Consumed minimum diet diversity (≥ 4 food groups)	395	0.30	0.03	0	1
Boys	189	0.27	0.04	0	1
Girls	206	0.32	0.04	0	1
Consumed minimum acceptable diet	395	0.14	0.02	0	1
Boys	189	0.12	0.03	0	1
Girls	206	0.15	0.03	0	1
<i>Nutrition outcomes</i>					
Height-for-age z-score	1,373	-1.53	0.10	-5.94	6
Boys	696	-1.58	0.11	-5.94	5.99
Girls	677	-1.48	0.15	-5.91	6
Weight-for-height z-score*	1,356	-0.19	0.08	-5.96	6
Boys	689	-0.07	0.09	-5.96	6
Girls	667	-0.31	0.11	-5.88	5.96
Weight-for-age z-score	1,422	-0.89	0.09	-5.98	5.99
Boys	724	-0.84	0.10	-5.98	5.96
Girls	698	-0.93	0.12	-5.72	5.68
<i>Child characteristics</i>					
Girl	1,422	0.51	0.01	0	1
Age in months	1,422	29.56	0.49	0	59
Mother's age in years	1,422	29.72	0.34	15	49
Mother's height (centimeters)	1,422	159.10	0.43	107.2	198.1
Mother can read and write	1,422	0.09	0.01	0	1
<i>Women's outcomes and characteristics</i>					
Number of food groups consumed (out of 9)	1,967	3.85	0.07	0	9
Body mass index	1,744	21.53	0.13	12.2	34.8
Age in years	1,967	29.96	0.32	15	49
Can read and write	1,967	0.15	0.01	0	1
<i>Women's empowerment indicators</i>					
Female empowerment score, = 1 if empowered	1,445	0.70	0.01	0	1
Average number of credit decisions	1,445	0.46	0.03	0	2
Total number of agricultural production decisions	1,445	3.45	0.12	0	9
Gender parity gap	1,117	0.19	0.01	0	1

Table 0.2 Continued

Variable	Observations	Mean	Standard Error	Minimum	Maximum
Household characteristics					
Primary female can read and write	1,445	0.07	0.01	0	1
Dual-adult household	1,445	0.77	0.02	0	1
Age of primary respondent	1,445	42.74	0.48	18	100
Number of literate male household members	1,445	0.68	0.04	0	8
Number of literate female household members	1,445	0.42	0.03	0	7
Household size	1,445	6.45	0.12	2	35
Dependency ratio	1,445	1.21	0.03	0	0.67
Per capita expenditure quintile 1	1,445	0.19	0.02	0	1
Per capita expenditure quintile 2	1,445	0.23	0.02	0	1
Per capita expenditure quintile 3	1,445	0.22	0.01	0	1
Per capita expenditure quintile 4	1,445	0.20	0.02	0	1
Per capita expenditure quintile 5	1,445	0.17	0.02	0	1
Brong Ahafo region	1,445	0.13	0.03	0	1
Northern region	1,445	0.51	0.04	0	1
Upper east region	1,445	0.19	0.04	0	1
Upper west region	1,445	0.17	0.04	0	1

Source: Authors' calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Statistics adjusted for sample design. *Among the child outcomes, only weight-for-height z-score is significantly different for boys and girls ($p < 10\%$).

Child Anthropometry

The key child nutrition outcomes are based on anthropometric z-scores for children under five, calculated using the 2006 WHO Child Growth Standards (WHO Multicentre Growth Reference Study Group 2006). These standardized indicators are useful for assessing the degree to which the physiological needs for growth and development are met during the crucial period of early childhood (WHO Multicentre Growth Reference Study Group 2006). We transform children's length/height and weight data using the *zscore06* Stata package (Leroy 2011; StataCorp 2011).

HAZ: A child's height-for-age measurement is a long-term indicator of nutritional status. A child is defined as stunted if his or her height-for-age measurement is two or more standard deviations below the median of the reference group.

WHZ: A child's weight-for-height measurement is sensitive to recent nutritional deficiencies leading to substantial weight loss, such as acute food shortage or severe illness. A child is defined as wasted if his or her weight-for-height measurement is two or more standard deviations below the median of the reference group.

WAZ: A child's weight for age summarizes a child's height-for-age and weight-for-height measurements, reflecting both acute and chronic malnutrition. A child is defined as underweight if his or her weight-for-age measurement is two standard deviations below the median of the reference group.

Mean anthropometric z-scores of children in our sample are negative, indicating that their weights and heights are lower than the median for other children of the same age and sex, a sign of nutritional deficiencies (Table 3.1). On average, girls have significantly lower WHZ compared with boys, although this does not result in a significant difference in the prevalence of wasting between boys and girls. Compared with nationally representative data for children under two, undernutrition in our sample is much more severe than in the rest of the country, again reflecting higher poverty rates in this region. The

2011 Ghana Multiple Indicator Cluster Survey reports that 18 percent of children are stunted, 10 percent are wasted, and 14 percent are underweight (Ghana Statistical Service 2011). In contrast, our sample shows that 41 percent of children are stunted, 20 percent are underweight, and 13 are underweight (not in table).

Women's Dietary Diversity and Anthropometry

For women of reproductive age (15–49 years old), we use the following practice and nutrition outcome indicators:

Dietary diversity score: This is the number of food groups consumed based on 24-hour recall using the following food groups: (1) starchy staples, (2) green leafy vegetables, (3) other vitamin-A-rich fruits and vegetables, (4) other fruits and vegetables, (5) organ meat, (6) meat and fish, (7) eggs, (8) legumes and nuts, and (9) milk and milk products (Kennedy, Ballard, and Dop 2011).

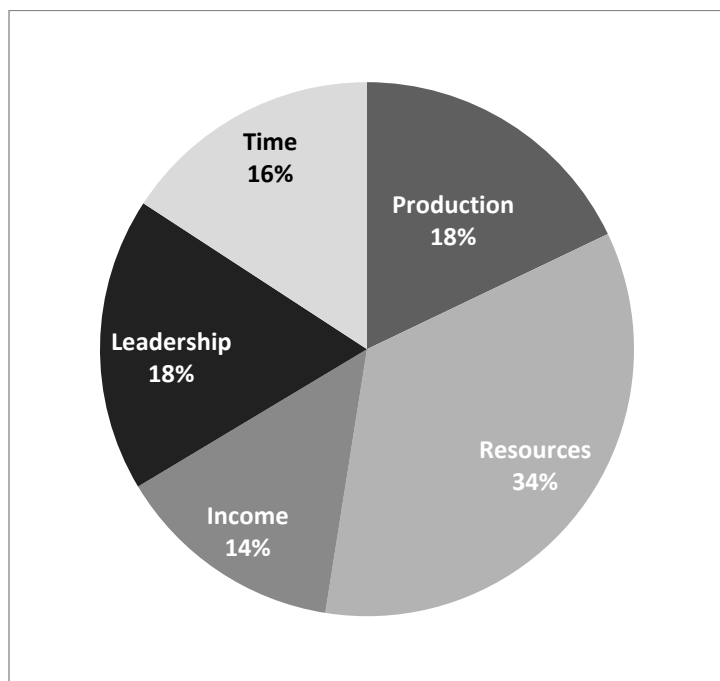
BMI: This indicator is obtained by taking the ratio of weight (in kilograms) to the square of height (in meters). A woman is considered underweight or thin if her BMI is less than 18.50 kilograms per square meters (WHO 1995). Our estimation sample excludes pregnant women.

The women in our sample consume close to four food groups (out of nine) on average and have a mean BMI of 21.5 (Table 3.1), which falls within the normal range (18.5–25.0). Similar to the child indicators, women's undernutrition in our sample is more pronounced compared to the rest of Ghana. The 2008 GDHS reports that at the national level, 9 percent of women ages 15 to 49 are considered thin (Ghana Statistical Service 2009), compared to 13 percent in our sample.

Key Independent Variables

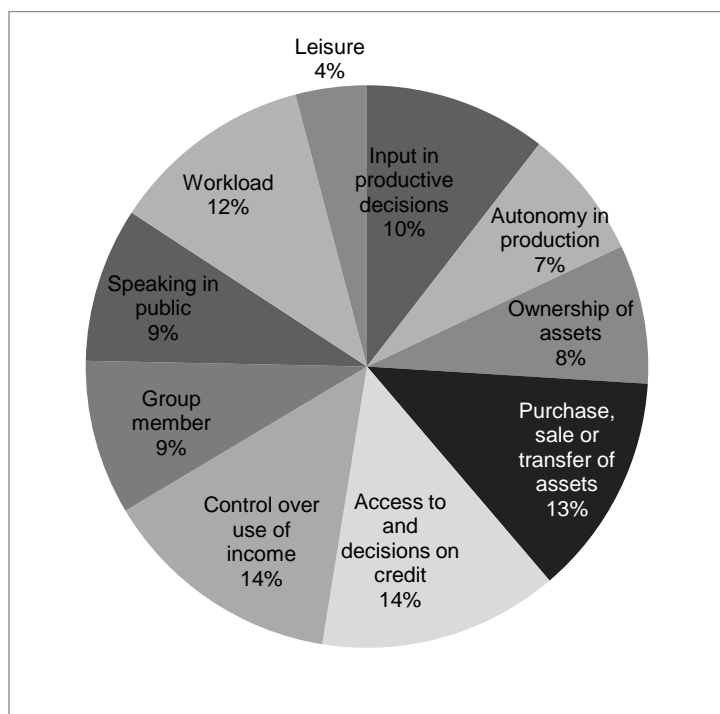
To measure women's empowerment, we use three alternative indicators. First, we use the female respondent's individual-level 5DE empowerment profile or score, which is the weighted average of the 10 indicators. Next, we use the findings from the WEAI diagnostics to identify the key domains, and the indicators within each key domain, on which to focus our analysis. Figure 3.2 shows that the *resources* and *production* domains have the highest contributions to women's disempowerment in northern Ghana. This implies that despite women's heavy involvement in agriculture, they are involved with limited control over resources, consistent with work by Deere et al. (2012) and limited decisionmaking power over agricultural activities. Figure 3.3 shows that *access to and decisions about credit* emerges as the key indicator that contributes the most to disempowerment in the resource domain while *input into productive decisions* is the most important indicator in the production domain. Based on this information, we use the underlying data that were used to construct these two indicators to represent empowerment in these domains. For the credit indicator, we use the average number of credit decisions where the female respondent has some input. We take the average of the different credit sources because a household that takes loans from multiple sources versus a single source is not necessarily more empowered in terms of access to resources. For input into production decisions, we use the total number of agricultural activities where the female respondent has some input into decisions or feels she can make decisions. In this case, it is reasonable to assume that input into decisions over into more types of agricultural activities implies greater empowerment in agricultural production. Last, for dual-headed households we are also interested in whether differences between the empowerment levels of men and women within households are associated with nutrition practices and outcomes. We use the gender parity gap component of GPI to measure relative empowerment between men and women in households where both the primary male and the primary female decisionmakers are present.

Figure 0.2 Contribution of each of the five domains to women’s disempowerment, northern savannah area, Ghana



Source: Authors’ calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Figure 0.3 Contribution of each of the 10 indicators to women’s disempowerment, northern savannah area, Ghana



Source: Authors’ calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

We use each alternative empowerment indicator as an explanatory variable on the right-hand side of the regression to see how the relationship varies with different specifications. Therefore, for each outcome, we estimate three alternative models:

Model 1—aggregate empowerment score: the empowerment score of the primary female respondent, equal to the weighted average of achievements in the 10 indicators if the respondent is disempowered and equal to 1 if the individual is empowered

Model 2—(resource domain) average number of credit decisions: the average number of credit decisions into which the female respondent has some input—if the respondent’s household did not borrow from any source in the past year, the average number of credit decisions is assumed to be zero

Model 3—(production domain) total number of agricultural decisions: the total number of agricultural activities where the female respondent has some input into decisions or feels she can make decisions

Model 4—gender parity gap: the difference in the male and female aggregate empowerment scores, equal to zero if the woman is empowered or if her empowerment score is greater than or equal to that of the male in her household

The first three empowerment measures (models 1–3) are increasing in empowerment, so higher numbers imply greater empowerment. On the other hand, a larger gender parity gap (model 4) indicates greater inequality between men and women in the household.

Control Variables

All models include conventional control variables including household characteristics (age and age squared of the primary respondent, household size, dependency ratio, per capita expenditure quintiles, and region dummies) and, if applicable, child characteristics (age and age squared, sex, mother’s age, mother’s height, and mother’s literacy) and woman characteristics (age and age squared, literacy). Summary statistics are presented in Table 3.1.

We recognize that the women’s empowerment variables are endogenous; however, the Ghana survey did not collect information about additional variables that could have been used to instrument the WEAI or its component indicators. In other work on Bangladesh (Sraboni et al. 2014), we have used instrumental variables regressions to account for endogeneity.

4. RESULTS

The results for infant and young child feeding practices, children's nutrition outcomes, and women's nutrition outcomes are summarized in Tables 4.1, 4.2, and 4.3, respectively. We discuss each set of results in turn. Recall that, for boys, the relationship between women's empowerment and the nutrition outcome is given by b_1 . For girls, the impact of women's empowerment is given by $(b_1 + b_3)$, and the coefficient on the interaction term b_3 indicates whether the women's empowerment measure has differential effects by child sex.

The regressions on infant and child feeding behavior reported in Table 4.1 are based on a smaller sample of children belonging to the 0 to 6 months and 6 to 23 months age groups. A strong association between women's empowerment and infant and young child feeding behaviors can be found only for girls. We find that the aggregate empowerment score, number of credit decisions, and gender parity gap are not significantly associated with the likelihood of exclusively breast-feeding either boys or girls. However, for girls, we do find a significant and positive correlation for the production decisions indicator, which suggests that girls are 8 percent more likely to be exclusively breast-fed in households where the female decisionmaker is more involved in production decisions.

As for children's diet quality outcomes, results show that none of the four empowerment indicators appears to be important for boys. For girls, credit decisionmaking is associated with a higher likelihood that girls consume a minimum acceptable diet but does not appear to be relevant for the other diet quality indicators. However, we find that the women's empowerment score is significant and *negatively* correlated with girls' diet diversity score, minimum diet diversity, and minimum acceptable diet, while the number of production decisions and gender parity gap are significantly associated with *less diverse* diets for girls. Note that the coefficients of the girl-interaction terms with the aggregate empowerment score and average number of credit decisions are insignificant, so we cannot reject the null hypothesis that aggregate empowerment and the number of credit decisions do not have differential impacts on boys' and girls' minimum diet diversity and minimum acceptable diet. However, the coefficients of the girl-interaction terms with the number of production decisions and the gender parity gap are highly significant, which suggests that these indicators have a differential impact on boys' and girls' diet diversity score and minimum diet diversity.

The negative relationships between empowerment indicators and diet quality run counter to our expectations, implying that girls in households where the principal female is more empowered in agriculture are more likely to consume less diverse and therefore lower-quality diets. A qualitative study by Davis, Darko, and Mukuria (2003) on complementary infant feeding practices in Ghana provides a possible explanation. They found that in the Kumasi area of Ghana, mothers of well-nourished infants considered porridge the main complementary food and believed that giving infants a wide variety of foods was unhealthy (Davis, Darko, and Mukuria 2003). On the other hand, if children rejected the food or had poor appetite due to illness, mothers were obliged to offer different foods to get the child to eat. Thus, malnourished (underweight) children were fed a wider variety of food, while well-nourished children typically received fewer types of food. In our sample, underweight girls on average consume more food groups (2.8 vs. 2.7 food groups) and are more likely to have the minimum diet diversity (46 vs. 34 percent) and minimum acceptable diet (26 vs. 17 percent) compared with well-nourished girls. However, the sample is quite small, and none of these differences is statistically significant.

Table 0.1 Results summary: Infant and young child feeding outcomes

Key variable	Children 0–6 months		Children 6–23 months	
	Exclusively breast-fed	Dietary diversity score	Minimum diet diversity	Minimum acceptable diet
	(1)	(2)	(3)	(4)
Model 1: Aggregate empowerment				
(1.a) Empowerment score	0.014 (0.251)	0.784 (0.611)	–0.055 (0.152)	–0.082 (0.128)
(1.b) Empowerment Score x Girl	0.035 (0.351)	–2.110*** (0.795)	–0.376 (0.229)	–0.122 (0.152)
(1.c) Girl	0.021 (0.265)	1.425** (0.574)	0.280 (0.172)	0.107 (0.115)
<i>Effect of empowerment on girls: (1.a) + (1.b)</i>	0.049	–1.326**	–0.431**	–0.204*
<i>p-value of F-test: (1.a) + (1.b) = 0</i>	.847	.013	.013	.060
N	145	395	395	395
Model 2: Resource domain				
(2.a) Average number of credit decisions	–0.068 (0.061)	0.123 (0.158)	–0.004 (0.043)	0.006 (0.033)
(2.b) Average Number of Credit Decisions x Girl	–0.008 (0.091)	0.166 (0.233)	0.056 (0.066)	0.068 (0.049)
(2.c) Girl	0.039 (0.096)	–0.044 (0.204)	0.008 (0.051)	0.004 (0.037)
<i>Effect of empowerment on girls: (2.a) + (2.b)</i>	–0.077	0.289	0.052	0.073*
<i>p-value of F-test: (2.a) + (2.b) = 0</i>	.289	.166	.355	.085
N	145	395	395	395
Model 3: Production domain				
(3.a) Number of agricultural production decisions	0.026 (0.021)	0.028 (0.049)	–0.009 (0.013)	–0.015 (0.010)
(3.b) Number of Agricultural Production Decisions x Girl	0.055* (0.030)	–0.162** (0.064)	–0.026* (0.016)	0.001 (0.013)
(3.c) Girl	–0.224 (0.146)	0.519* (0.292)	0.106 (0.077)	0.017 (0.064)
<i>Effect of empowerment on girls: (3.a) + (3.b)</i>	0.081***	–0.134***	–0.036***	–0.014
<i>p-value of F-test: (3.a) + (3.b) = 0</i>	.004	.002	.002	.173
N	145	395	395	395
Model 4: Gender parity				
(4.a) Gender parity gap	–0.157 (0.307)	–0.988 (0.768)	–0.122 (0.196)	–0.077 (0.140)
(4.b) Gender Parity Gap x Girl	–0.074 (0.525)	2.619*** (0.980)	0.688** (0.282)	0.259 (0.184)
(4.c) Girl	0.033 (0.149)	–0.546* (0.308)	–0.120 (0.079)	–0.029 (0.055)
<i>Effect of empowerment on girls: (4.a) + (4.b)</i>	–0.231	1.630***	0.565***	0.182
<i>p-value of F-test: (4.a) + (4.b) = 0</i>	.563	.006	.003	.192
N	115	311	311	311

Source: Authors' calculations using the 2012 Feed the Future Ghana survey METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. * $p < .1$. ** $p < .05$. *** $p < .01$.

Overall, we find that women’s empowerment is only weakly associated with children’s nutrition outcomes (Table 4.2). None of the women’s empowerment measures in models 1 through 3 is significantly correlated with boys’ nutritional status, but greater equality within the household (model 4) favors boys’ HAZ and WAZ. This suggests that a narrowing of the gender parity gap by 10 percentage points is associated with a 0.10 and 0.07 increase in boys’ HAZ and WAZ, respectively. For girls, we find that the estimated relationships between nutrition and empowerment have opposite signs for the aggregate empowerment score and the credit decisionmaking indicator. Results show that the aggregate empowerment score is *negative* and significantly correlated with WAZ, which implies that girls residing in more empowered households are more likely to experience nutrition deficiencies, contrary to our expectations. For example, a 0.10 increase in the empowerment score implies a 0.09 decline in girls’ WAZ. However, similar to our previous results in Table 4.1 the coefficient of the girl-interaction term with the aggregate empowerment score is insignificant, so we cannot reject the null hypothesis that women’s empowerment affects boys and girls equally.

Table 0.2 Results summary: Children’s nutrition outcomes, children ages 0 to 59 months

Key variable	Height for age (1)	Weight for height (2)	Weight for age (3)
Model 1: Aggregate empowerment			
(1.a) Empowerment score	0.759 (0.462)	0.080 (0.384)	0.129 (0.353)
(1.b) Empowerment Score × Girl	−1.217 (0.948)	−0.309 (0.522)	−1.006 (0.649)
(1.c) Girl	0.972 (0.610)	0.026 (0.392)	0.634 (0.417)
<i>Effect of empowerment on girls: (1.a) + (1.b)</i>	−0.457	−0.229	−0.877**
<i>p-value of F-test: (1.a) + (1.b) = 0</i>	.494	.537	.041
N	1,373	1,356	1,422
Model 2: Resource domain			
(2.a) Average number of credit decisions	0.173 (0.115)	0.060 (0.099)	0.017 (0.084)
(2.b) Average Number of Credit Decisions × Girl	−0.355* (0.212)	0.249* (0.148)	−0.053 (0.131)
(2.c) Girl	0.303* (0.169)	−0.277* (0.158)	−0.024 (0.107)
<i>Effect of empowerment on girls: (2.a) + (2.b)</i>	−0.181	0.309***	−0.036
<i>p-value of F-test: (2.a) + (2.b) = 0</i>	.320	.003	.753
N	1,373	1,356	1,422
Model 3: Production domain			
(3.a) Number of agricultural production decisions	−0.000 (0.036)	0.029 (0.033)	−0.029 (0.030)
(3.b) Number of Agricultural Production Decisions × Girl	−0.002 (0.049)	−0.035 (0.041)	0.001 (0.031)
(3.c) Girl	0.155 (0.267)	−0.059 (0.212)	−0.051 (0.163)
<i>Effect of empowerment on girls: (3.a) + (3.b)</i>	−0.002	−0.006	−0.028
<i>p-value of F-test: (3.a) + (3.b) = 0</i>	.953	.853	.347
N	1,373	1,356	1,422

Table 0.3 Continued

Key variable	Height for age (1)	Weight for height (2)	Weight for age (3)
Model 4: Gender parity			
(4.a) Gender parity gap	-1.055* (0.552)	-0.342 (0.432)	-0.716* (0.409)
(4.b) Gender Parity Gap × Girl	1.197 (0.941)	0.503 (0.662)	1.157* (0.702)
(4.c) Girl	-0.130 (0.311)	-0.400* (0.209)	-0.415* (0.229)
<i>Effect of empowerment on girls: (4.a) + (4.b)</i>	0.142	0.162	0.441
<i>p-value of F-test: (4.a) + (4.b) = 0</i>	.835	.728	.320
N	1,095	1,087	1,126

Source: Authors' calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. * $p < .1$. ** $p < .05$. *** $p < .01$.

On the other hand, we find a positive and significant association between girls' WHZ and women's average number of credit decisions. This may be partly reflecting the benefits from credit; in households where women are making credit decisions, there may be more scope for smoothing consumption, which might minimize the incidence of acute food shortages or severe disease that result in substantial weight loss. In terms of magnitudes, our results suggest that an additional credit decision made by the primary female increases girls' WHZ by 0.31, which is a fairly large effect. Note that in the WHZ regression, the coefficient of the interaction term between the girl child dummy and the average number of credit decisions is positive and significant, indicating that we can reject the null hypothesis that the average number of credit decisions affects boys and girls equally.

Last, our findings for women's nutrition suggest that women's empowerment in agriculture, as measured by the aggregate empowerment score and production decisionmaking as well as the relative empowerment between men and women within households, is not significantly associated with women's own nutrition—whether defined as inputs into her nutritional status or her nutritional status itself (Table 4.3). Only women's participation in credit decisions is positively and significantly correlated with women's dietary diversity score but does not appear to be correlated with BMI. Our finding on diet diversity suggests that individuals who have greater decisionmaking power in the household receive a larger share of the benefits from household resources, including nutritious food. On the other hand, consuming a balanced diet by itself does not guarantee nutritional well-being (Gillespie 2013), which could explain why empowerment might improve diet quality but not BMI. A woman's dietary intake interacts with her own health status, so factors relating to disease and malabsorption of nutrients could potentially negate the impact of higher diet diversity on nutritional status. In addition, both women's dietary intake and health status are themselves driven by other underlying household and community-level factors and processes, such as food security, access to health services, water and sanitation, and other feeding practices (UNICEF 1990; Gillespie 2013). Last, empowered women also may be exerting greater work effort in agricultural activities and therefore have higher caloric requirements that are not necessarily met by consuming a more diverse diet.

Table 0.4 Results summary: Women’s nutrition outcomes, women ages 15 to 49 years

Key Variable	Diet Diversity Score (1)	Body Mass Index (2)
Model 1: Aggregate empowerment		
Empowerment score	0.385 (0.272)	0.156 (0.400)
<i>N</i>	1,967	1,744
Model 2: Resource domain		
Average number of credit decisions	0.235*** (0.067)	-0.046 (0.107)
<i>N</i>	1,967	1,744
Model 3: Production domain		
Number of agricultural production decisions	-0.022 (0.014)	-0.004 (0.033)
<i>N</i>	1,967	1,744
Model 4: Gender parity		
Gender parity gap	-0.225 (0.291)	0.217 (0.501)
<i>N</i>	1,541	1,379

Source: Authors’ calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. * $p < .1$. ** $p < .05$. *** $p < .01$.

In general, we do not find significant correlations between the sex of the child and nutrition practices and outcomes, consistent with the lack of evidence on gender bias in nutritional status outside South Asia (Haddad et al. 1996). The only model where we find a significant overall effect of empowerment on girls is in the dietary diversity equation that uses the aggregate empowerment score as the measure of empowerment. This is consistent with the summary statistics on these dependent variables, where we also do not find significant differences in the average nutrition outcomes of girls and boys, save for WHZ. Our results also show that literate mothers are less likely to breast-feed their children exclusively and have children with lower HAZs. Mothers who can read and write are perhaps more likely to participate in income-generating activities and therefore have less time to devote to breast-feeding and optimal childcare practices. Nevertheless, it is the literacy of the primary female in the household that is linked to exclusive breast-feeding and nutritional status. This suggests that the primary female decisionmakers are influential regarding the feeding and care practices pertaining to children. On the other hand, literate women are more likely to consume more diverse diets but do not necessarily have higher BMI. Rather, it is the number of literate females in the household that is positively associated with BMI. Full results are available in the appendix.

5. CONCLUSION

In this paper, we show how a new survey-based index, WEAI, can be used to assess women's empowerment in agriculture and examine the relationships between specific indicators of empowerment and nutrition outcomes for women and children. Our results show that women's empowerment is more strongly associated with infant and young child feeding practices and only weakly associated with child nutrition status. Similarly, we find that women's empowerment, as measured by participation in credit decisions, is positively and significantly correlated with women's dietary diversity but not the likelihood of being underweight. This suggests that diet quality may not necessarily translate to improved nutrition status, which is possible if other factors such as disease contribute to poor absorption of nutrients and therefore negate the effects of improved diets. For women, greater empowerment may also entail greater work effort, which might increase caloric requirements and dampen improvements in BMI through more diverse diets. In addition, the extent to which good practices result in improved nutrition outcomes depends on other underlying household and community-level processes, such as food security, access to health services, water and sanitation, and childcare capacity and feeding practices (UNICEF 1990; Gillespie 2013).

We also find highly significant yet unexpected gender differences on the impact of empowerment measures, particularly on girls' dietary diversity. One possible explanation is that the dietary diversity score may be capturing poor appetite and illness among infants rather than diet quality because mothers tended to offer different foods only when children had been ill or had rejected food (Davis, Darko, and Mukuria 2003). However, this does not explain our mixed findings on girls' nutritional status, where the aggregate empowerment score predicted a decline in WAZ, while credit decisionmaking predicts an increase in girls' WHZ. Further research is needed to establish whether this practice applies to the northern Ghana context.

Credit decisionmaking emerges as an important correlate of girls' WHZ and women's dietary diversity, suggesting that increasing women's participation in credit decisions is associated with improved outcomes for both women and girls. This also suggests that making credit available for women is likely to improve nutrition for women and girls. Overall, our results also suggest that the domains of empowerment that are significant for women and children's diet and nutrition outcomes may not always overlap. This implies that improved nutrition is not necessarily correlated with being empowered in all the domains of empowerment and that different domains may have different impacts on nutrition, consistent with other findings in the empowerment literature (Kabeer 1999).

APPENDIX: SUPPLEMENTARY TABLES

Table A. 1 Full results: Children’s exclusive breast-feeding and dietary diversity score

Variable	Exclusively breast-fed, 0–6 Months				Dietary diversity Score, 6–23 Months			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Women’s empowerment indicators</i>								
Empowerment score	0.014 (0.251)				0.784 (0.611)			
Empowerment Score × Girl	0.035 (0.351)				−2.110*** (0.795)			
Average number of credit decisions		−0.068 (0.061)				0.123 (0.158)		
Average Number of Credit Decisions × Girl		−0.008 (0.091)				0.166 (0.233)		
Number of agricultural production decisions			0.026 (0.021)				0.028 (0.049)	
Number of Agricultural Production Decisions × Girl			0.055* (0.030)				−0.162** (0.064)	
Gender parity gap				−0.157 (0.307)				−0.988 (0.768)
Gender Parity Gap × Girl				−0.074 (0.525)				2.619*** (0.980)
<i>Child characteristics</i>								
Girl	0.021 (0.265)	0.039 (0.096)	−0.224 (0.146)	0.033 (0.149)	1.425** (0.574)	−0.044 (0.204)	0.519* (0.292)	−0.546* (0.308)
Age (months)	0.050 (0.110)	0.048 (0.105)	−0.023 (0.101)	−0.004 (0.127)	0.257** (0.129)	0.261** (0.121)	0.235* (0.125)	0.255* (0.153)
Age squared	−0.031 (0.021)	−0.029 (0.020)	−0.018 (0.019)	−0.020 (0.023)	−0.005 (0.004)	−0.005 (0.004)	−0.004 (0.004)	−0.004 (0.005)
Mother’s age (years)	0.046 (0.063)	0.064 (0.068)	0.026 (0.054)	0.016 (0.075)	−0.008 (0.090)	−0.055 (0.098)	−0.028 (0.089)	−0.057 (0.089)

Table A. 2 Continued

Variable	Exclusively breast-fed, 0–6 Months				Dietary diversity Score, 6–23 Months			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Child characteristics (continued)</i>								
Mother's age squared	–0.001 (0.001)	–0.001 (0.001)	–0.000 (0.001)	–0.000 (0.001)	0.000 (0.001)	0.001 (0.002)	0.000 (0.001)	0.001 (0.001)
Mother's height (centimeters)	0.004 (0.006)	0.005 (0.006)	0.001 (0.006)	0.004 (0.007)	–0.019** (0.009)	–0.018* (0.010)	–0.020** (0.009)	–0.028*** (0.009)
Mother can read and write	–0.860*** (0.203)	–0.712*** (0.238)	–0.814*** (0.180)	–0.160 (0.160)	0.185 (0.503)	0.314 (0.539)	0.212 (0.511)	–0.861 (0.679)
<i>Household characteristics</i>								
Primary female can read and write	0.729*** (0.247)	0.588** (0.279)	0.646*** (0.223)		0.529 (0.477)	0.359 (0.480)	0.484 (0.494)	1.583** (0.636)
Dual-adult household	0.023 (0.098)	0.040 (0.104)	0.075 (0.091)		0.085 (0.229)	0.200 (0.223)	0.109 (0.209)	
Age of primary respondent	–0.062*** (0.022)	–0.070*** (0.024)	–0.062*** (0.021)	–0.064** (0.032)	0.035 (0.035)	0.036 (0.033)	0.040 (0.036)	0.002 (0.051)
Age of primary respondent squared	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001** (0.000)	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)	–0.000 (0.000)
Number of literate male household members	0.045 (0.065)	0.048 (0.064)	0.034 (0.055)	0.024 (0.075)	–0.082 (0.122)	–0.061 (0.129)	–0.050 (0.123)	0.014 (0.126)
Number of literate female household members	0.102 (0.070)	0.108 (0.067)	0.117* (0.063)	0.022 (0.071)	–0.365 (0.229)	–0.373* (0.211)	–0.341 (0.219)	–0.495** (0.236)
Household size	0.041*** (0.015)	0.040*** (0.015)	0.032*** (0.012)	0.056*** (0.015)	–0.027 (0.050)	–0.033 (0.047)	–0.031 (0.049)	–0.049 (0.053)
Dependency ratio	–0.136*** (0.038)	–0.114*** (0.039)	–0.153*** (0.037)	–0.151** (0.074)	0.084 (0.112)	0.135 (0.121)	0.130 (0.109)	0.324* (0.168)
Per capita expenditure quintile 2	–0.192 (0.151)	–0.216 (0.135)	–0.174 (0.137)	–0.202 (0.182)	–0.036 (0.283)	–0.079 (0.304)	–0.036 (0.289)	0.145 (0.303)
Per capita expenditure quintile 3	–0.138 (0.160)	–0.130 (0.151)	–0.147 (0.119)	–0.026 (0.183)	0.199 (0.337)	0.086 (0.332)	0.229 (0.342)	0.218 (0.368)
Per capita expenditure quintile 4	–0.080 (0.141)	–0.094 (0.133)	–0.177 (0.114)	–0.009 (0.155)	0.108 (0.317)	0.005 (0.332)	0.136 (0.327)	0.097 (0.366)

Table A. 3 Continued

Variable	Exclusively breast-fed, 0–6 Months				Dietary diversity Score, 6–23 Months			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production Domain	Model 4: Gender Parity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Household characteristics (continued)</i>								
Per capita expenditure quintile 5	–0.176 (0.171)	–0.212 (0.160)	–0.268** (0.124)	–0.097 (0.194)	0.135 (0.337)	–0.028 (0.348)	0.139 (0.339)	0.097 (0.369)
Northern region	0.134 (0.170)	0.126 (0.170)	0.111 (0.154)	0.205 (0.208)	0.145 (0.306)	0.103 (0.309)	0.096 (0.307)	–0.047 (0.355)
Upper east region	–0.045 (0.180)	–0.064 (0.179)	–0.070 (0.169)	0.093 (0.221)	0.449 (0.386)	0.445 (0.404)	0.407 (0.383)	0.423 (0.423)
Upper west region	–0.105 (0.191)	–0.057 (0.181)	–0.105 (0.183)	0.007 (0.217)	0.808** (0.384)	0.834** (0.391)	0.749* (0.386)	0.960** (0.448)
<i>N</i>	145	145	145	115	395	395	395	311

Source: Authors' calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. * $p < .1$. ** $p < .05$. *** $p < .01$.

Table A. 4 Full results: Children’s minimum diet diversity and minimum acceptable diet, ages 6 to 23 months

Variable	Minimum diet diversity				Minimum acceptable diet			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Women's empowerment indicators</i>								
Empowerment score	-0.055 (0.152)				-0.082 (0.128)			
Empowerment Score x Girl	-0.376 (0.229)				-0.122 (0.152)			
Average number of credit decisions		-0.004 (0.043)				0.006 (0.033)		
Average Number of Credit Decisions x Girl		0.056 (0.066)				0.068 (0.049)		
Number of agricultural production decisions			-0.009 (0.013)				-0.015 (0.010)	
Number of Agricultural Production Decisions x Girl			-0.026* (0.016)				0.001 (0.013)	
Gender parity gap				-0.122 (0.196)				-0.077 (0.140)
Gender Parity Gap x Girl				0.688** (0.282)				0.259 (0.184)
<i>Child characteristics</i>								
Girl	0.280 (0.172)	0.008 (0.051)	0.106 (0.077)	-0.120 (0.079)	0.107 (0.115)	0.004 (0.037)	0.017 (0.064)	-0.029 (0.055)
Age (months)	0.030 (0.031)	0.031 (0.031)	0.026 (0.031)	0.065* (0.038)	0.021 (0.023)	0.026 (0.022)	0.020 (0.023)	0.031 (0.029)
Age squared	-0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)	-0.001 (0.001)
Mother's age (years)	-0.002 (0.029)	-0.008 (0.032)	-0.007 (0.029)	-0.015 (0.031)	0.007 (0.020)	0.002 (0.021)	0.004 (0.020)	-0.000 (0.022)
Mother's age squared	0.000 (0.000)	0.000 (0.001)	0.000 (0.000)	0.000 (0.001)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)

Table A. 5 Continued

Variable	Minimum diet diversity				Minimum acceptable diet			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Child characteristics (continued)</i>								
Mother's height (centimeters)	-0.004 (0.003)	-0.004 (0.003)	-0.004 (0.003)	-0.005 (0.003)	-0.005** (0.002)	-0.005* (0.003)	-0.005** (0.002)	-0.005* (0.003)
Mother can read and write	0.068 (0.173)	0.094 (0.180)	0.075 (0.171)	-0.084 (0.200)	-0.013 (0.134)	-0.007 (0.141)	-0.007 (0.134)	-0.170 (0.152)
<i>Household characteristics</i>								
Primary female can read and write	0.135 (0.174)	0.082 (0.167)	0.118 (0.169)	0.260 (0.202)	0.037 (0.112)	0.018 (0.118)	0.027 (0.114)	0.135 (0.127)
Dual-adult household	0.016 (0.059)	0.056 (0.060)	0.036 (0.056)		0.043 (0.052)	0.068 (0.050)	0.055 (0.049)	
Age of primary respondent	0.005 (0.009)	0.002 (0.009)	0.005 (0.010)	-0.010 (0.015)	-0.006 (0.008)	-0.009 (0.007)	-0.005 (0.008)	-0.013 (0.011)
Age of primary respondent squared	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Number of literate male household members	-0.029 (0.026)	-0.027 (0.028)	-0.024 (0.027)	-0.021 (0.029)	-0.033 (0.022)	-0.031 (0.022)	-0.033 (0.023)	-0.033 (0.026)
Number of literate female household members	-0.052 (0.040)	-0.048 (0.041)	-0.048 (0.041)	-0.044 (0.052)	0.010 (0.035)	0.009 (0.035)	0.011 (0.035)	0.022 (0.046)
Household size	-0.007 (0.007)	-0.008 (0.007)	-0.008 (0.008)	-0.004 (0.008)	-0.008 (0.005)	-0.008 (0.005)	-0.008 (0.005)	-0.009* (0.006)
Dependency ratio	-0.031 (0.028)	-0.028 (0.029)	-0.023 (0.027)	-0.028 (0.050)	-0.022 (0.025)	-0.018 (0.025)	-0.018 (0.024)	-0.021 (0.045)
Per capita expenditure quintile 2	0.030 (0.083)	0.028 (0.090)	0.045 (0.088)	0.117 (0.083)	0.059 (0.068)	0.064 (0.071)	0.069 (0.070)	0.053 (0.080)
Per capita expenditure quintile 3	0.058 (0.073)	0.024 (0.075)	0.067 (0.077)	0.076 (0.079)	0.032 (0.051)	0.007 (0.051)	0.037 (0.056)	-0.019 (0.058)
Per capita expenditure quintile 4	0.057 (0.077)	0.024 (0.078)	0.060 (0.081)	0.053 (0.085)	0.124** (0.059)	0.106* (0.059)	0.124** (0.060)	0.084 (0.069)

Table A. 6 Full results: Children’s minimum diet diversity and minimum acceptable diet, ages 6 to 23 months

Variable	Minimum diet diversity				Minimum acceptable diet			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Household characteristics (continued)</i>								
Per capita expenditure quintile 5	0.051 (0.089)	-0.006 (0.089)	0.050 (0.094)	0.024 (0.098)	0.017 (0.055)	-0.016 (0.055)	0.019 (0.058)	-0.032 (0.066)
Northern region	-0.024 (0.081)	-0.009 (0.076)	-0.014 (0.080)	-0.106 (0.101)	0.024 (0.045)	0.034 (0.043)	0.033 (0.043)	-0.017 (0.063)
Upper east region	0.142 (0.089)	0.151* (0.088)	0.144 (0.089)	0.086 (0.111)	0.000 (0.052)	0.009 (0.051)	0.006 (0.051)	-0.047 (0.072)
Upper west region	0.267** (0.107)	0.284*** (0.106)	0.256** (0.107)	0.231* (0.128)	0.210** (0.095)	0.222** (0.098)	0.207** (0.093)	0.216** (0.108)
<i>N</i>	395	395	395	311	395	395	395	311

Source: Authors’ calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. *p < .1. **p < .05. ***p < .01.

Table A. 7 Full results: Children's height-for-age z-score, ages 0 to 59 months

Variable	Height-for-age z-score			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)	(4)
<i>Women's empowerment indicators</i>				
Empowerment score	0.759 (0.462)			
Empowerment Score x Girl	-1.217 (0.948)			
Average number of credit decisions		0.173 (0.115)		
Average Number of Credit Decisions x Girl		-0.355* (0.212)		
Number of agricultural production decisions			-0.000 (0.036)	
Number of Agricultural Production Decisions x Girl			-0.002 (0.049)	
Gender parity gap				-1.055* (0.552)
Gender Parity Gap x Girl				1.197 (0.941)
<i>Child characteristics</i>				
Girl	0.972 (0.610)	0.303* (0.169)	0.155 (0.267)	-0.130 (0.311)
Age (months)	-0.087*** (0.018)	-0.085*** (0.018)	-0.085*** (0.019)	-0.075*** (0.021)
Age squared	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Mother's age (years)	-0.012 (0.061)	-0.025 (0.063)	-0.017 (0.062)	-0.094 (0.067)
Mother's age squared	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)
Mother's height (centimeters)	0.035*** (0.010)	0.034*** (0.010)	0.035*** (0.010)	0.028*** (0.010)
Mother can read and write	-0.560** (0.265)	-0.587** (0.260)	-0.563** (0.258)	-0.749** (0.342)
<i>Household characteristics</i>				
Primary female can read and write	0.568 (0.346)	0.604* (0.351)	0.590* (0.346)	0.805* (0.416)
Dual-adult household	-0.017 (0.170)	0.009 (0.160)	-0.016 (0.160)	
Age of primary respondent	-0.032 (0.024)	-0.033 (0.024)	-0.028 (0.024)	-0.013 (0.024)
Age of primary respondent squared	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)
Number of literate male household members	-0.075 (0.077)	-0.061 (0.080)	-0.070 (0.078)	-0.051 (0.092)

Table A. 8 Continued

Variable	Height-for-age z-score			
	Model 1: Aggregate Empowerment	Model 2: Resource Domain	Model 3: Production Domain	Model 4: Gender Parity
	(1)	(2)	(3)	(4)
<i>Household characteristics (continued)</i>				
Number of literate female household members	0.100 (0.104)	0.086 (0.104)	0.095 (0.106)	0.067 (0.132)
Household size	0.002 (0.019)	0.002 (0.018)	0.002 (0.018)	0.013 (0.021)
Dependency ratio	-0.056 (0.081)	-0.042 (0.075)	-0.046 (0.080)	-0.140 (0.116)
Per capita expenditure quintile 2	-0.315 (0.289)	-0.329 (0.291)	-0.308 (0.303)	-0.059 (0.331)
Per capita expenditure quintile 3	-0.185 (0.339)	-0.169 (0.347)	-0.172 (0.347)	-0.193 (0.382)
Per capita expenditure quintile 4	0.034 (0.335)	0.020 (0.332)	0.040 (0.348)	0.175 (0.387)
Per capita expenditure quintile 5	-0.262 (0.317)	-0.252 (0.309)	-0.236 (0.333)	-0.056 (0.407)
Northern region	-0.205 (0.215)	-0.226 (0.209)	-0.247 (0.211)	-0.274 (0.277)
Upper east region	-0.139 (0.228)	-0.145 (0.224)	-0.164 (0.224)	-0.262 (0.297)
Upper west region	0.219 (0.266)	0.208 (0.261)	0.217 (0.266)	0.189 (0.329)
<i>N</i>	1,373	1,373	1,373	1,095

Source: Authors' calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. * $p < .1$. ** $p < .05$. *** $p < .01$.

Table A. 9 Full results: Children's weight-for-height z-score, ages 0 to 59 months

Variable	Weight-for-height z-score			
	Model 1: Aggregate empowerment (1)	Model 2: Resource domain (2)	Model 3: Production domain (3)	Model 4: Gender parity (4)
<i>Women's empowerment indicators</i>				
Empowerment score	0.080 (0.384)			
Empowerment Score x Girl	-0.309 (0.522)			
Average number of credit decisions		0.060 (0.099)		
Average Number of Credit Decisions x Girl		0.249* (0.148)		
Number of agricultural production decisions			0.029 (0.033)	
Number of Agricultural Production Decisions x Girl			-0.035 (0.041)	
Gender parity gap				-0.342 (0.432)
Gender Parity Gap x Girl				0.503 (0.662)
<i>Child characteristics</i>				
Girl	0.026 (0.392)	-0.277* (0.158)	-0.059 (0.212)	-0.400* (0.209)
Age (months)	-0.005 (0.016)	-0.003 (0.016)	-0.005 (0.016)	-0.018 (0.019)
Age squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Mother's age (years)	-0.026 (0.065)	-0.029 (0.070)	-0.028 (0.065)	0.073 (0.074)
Mother's age squared	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.001 (0.001)
Mother's height (centimeters)	-0.003 (0.007)	-0.004 (0.007)	-0.003 (0.007)	-0.000 (0.009)
Mother can read and write	0.090 (0.307)	0.080 (0.326)	0.075 (0.310)	0.366 (0.345)
<i>Household characteristics</i>				
Primary female can read and write	0.750** (0.314)	0.759** (0.322)	0.761** (0.317)	0.556 (0.362)
Dual-adult household	-0.029 (0.160)	-0.018 (0.164)	-0.021 (0.159)	
Age of primary respondent	0.049** (0.021)	0.052** (0.022)	0.046** (0.022)	0.045** (0.021)
Age of primary respondent squared	-0.000* (0.000)	-0.000* (0.000)	-0.000* (0.000)	-0.000 (0.000)
Number of literate male household members	0.071 (0.090)	0.054 (0.088)	0.069 (0.087)	0.098 (0.096)
Number of literate female household members	-0.011 (0.111)	-0.017 (0.108)	-0.004 (0.112)	-0.079 (0.104)

Table A. 10 Continued

Variable	Weight-for-height z-score			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)	(4)
<i>Household characteristics (continued)</i>				
Household size	-0.051** (0.024)	-0.050** (0.024)	-0.052** (0.024)	-0.073** (0.029)
Dependency ratio	0.051 (0.096)	0.025 (0.093)	0.048 (0.094)	0.195** (0.098)
Per capita expenditure quintile 2	0.103 (0.324)	0.110 (0.302)	0.107 (0.325)	-0.064 (0.356)
Per capita expenditure quintile 3	0.241 (0.243)	0.212 (0.234)	0.233 (0.239)	0.123 (0.263)
Per capita expenditure quintile 4	0.080 (0.223)	0.079 (0.209)	0.078 (0.218)	0.038 (0.229)
Per capita expenditure quintile 5	0.134 (0.212)	0.111 (0.194)	0.114 (0.213)	-0.186 (0.249)
Northern region	-0.019 (0.244)	-0.034 (0.239)	-0.019 (0.239)	0.086 (0.295)
Upper east region	-0.087 (0.275)	-0.098 (0.275)	-0.100 (0.274)	0.164 (0.316)
Upper west region	0.407 (0.303)	0.379 (0.302)	0.404 (0.301)	0.499 (0.345)
<i>N</i>	1,356	1,356	1,356	1,087

Source: Authors' calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. * $p < .1$. ** $p < .05$.

Table A. 11 Full results: Children's weight-for-age z-score, ages 0 to 59 month

Variable	Weight-for-age z-score			
	Model 1: Aggregate empowerment (1)	Model 2: Resource domain (2)	Model 3: Production domain (3)	Model 4: Gender parity (4)
<i>Women's empowerment indicators</i>				
Empowerment score	0.129 (0.353)			
Empowerment Score × Girl	-1.006 (0.649)			
Average number of credit decisions		0.017 (0.084)		
Average Number of Credit Decisions × Girl		-0.053 (0.131)		
Number of agricultural production decisions			-0.029 (0.030)	
Number of Agricultural Production Decisions × Girl			0.001 (0.031)	
Gender parity gap				-0.716* (0.409)
Gender Parity Gap × Girl				1.157* (0.702)
<i>Child characteristics</i>				
Girl	0.634 (0.417)	-0.024 (0.107)	-0.051 (0.163)	-0.415* (0.229)
Age (months)	-0.043*** (0.012)	-0.041*** (0.012)	-0.041*** (0.012)	-0.050*** (0.012)
Age squared	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Mother's age (years)	0.008 (0.055)	0.006 (0.056)	0.008 (0.056)	0.004 (0.065)
Mother's age squared	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
Mother's height (centimeters)	0.013** (0.006)	0.012* (0.007)	0.013* (0.007)	0.011 (0.007)
Mother can read and write	-0.279 (0.322)	-0.297 (0.317)	-0.284 (0.320)	-0.351 (0.381)
<i>Household characteristics</i>				
Primary female can read and write	0.722** (0.296)	0.746*** (0.287)	0.738** (0.287)	0.855** (0.350)
Dual-adult household	-0.145 (0.155)	-0.109 (0.150)	-0.114 (0.149)	
Age of primary respondent	0.048*** (0.017)	0.045*** (0.017)	0.048*** (0.018)	0.052*** (0.020)
Age of primary respondent squared	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)	-0.000** (0.000)
Number of literate male household members	0.072 (0.084)	0.071 (0.085)	0.073 (0.083)	-0.016 (0.064)

Table A. 12 Continued

Variable	Weight-for-age z-score			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)	(4)
<i>Household characteristics (continued)</i>				
Number of literate female household members	0.025 (0.095)	0.017 (0.097)	0.010 (0.099)	-0.018 (0.101)
Household size	-0.009 (0.022)	-0.008 (0.022)	-0.007 (0.023)	-0.028 (0.023)
Dependency ratio	0.006 (0.081)	-0.007 (0.080)	0.001 (0.080)	0.050 (0.103)
Per capita expenditure quintile 2	0.345** (0.164)	0.366** (0.166)	0.374** (0.166)	0.324* (0.166)
Per capita expenditure quintile 3	0.329** (0.163)	0.325* (0.166)	0.337** (0.169)	0.195 (0.171)
Per capita expenditure quintile 4	0.272* (0.155)	0.272* (0.158)	0.291* (0.164)	0.286* (0.165)
Per capita expenditure quintile 5	0.309* (0.180)	0.294 (0.181)	0.333* (0.194)	0.152 (0.195)
Northern region	-0.057 (0.167)	-0.036 (0.168)	-0.044 (0.170)	-0.144 (0.176)
Upper east region	0.131 (0.224)	0.127 (0.226)	0.140 (0.229)	0.142 (0.268)
Upper west region	0.478** (0.229)	0.487** (0.233)	0.479** (0.235)	0.366 (0.239)
<i>N</i>	1,422	1,422	1,422	1,126

Source: Authors' calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. * $p < .1$. ** $p < .05$. *** $p < .01$.

Table A. 13 Full results: Women’s dietary diversity score and body mass index, ages 15 to 49 years

Variable	Dietary Diversity Score				Body Mass Index			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)		(4)	(5)	(6)	
<i>Women's empowerment indicators</i>								
Empowerment score	0.385 (0.272)				0.156 (0.400)			
Average number of credit decisions		0.235*** (0.067)				-0.046 (0.107)		
Number of agricultural production decisions			-0.022 (0.014)				-0.004 (0.033)	
Gender parity gap				-0.225 (0.291)				0.217 (0.501)
<i>Individual characteristics</i>								
Age	0.042 (0.043)	0.036 (0.040)	0.036 (0.042)	0.084 (0.051)	0.210** (0.096)	0.209** (0.096)	0.208** (0.097)	0.230** (0.109)
Age squared	-0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.001 (0.001)	-0.003** (0.002)	-0.003** (0.002)	-0.003** (0.002)	-0.003* (0.002)
Can read and write	0.691*** (0.177)	0.681*** (0.169)	0.729*** (0.180)	0.798*** (0.197)	-0.286 (0.294)	-0.267 (0.298)	-0.272 (0.295)	0.076 (0.322)
<i>Household characteristics</i>								
Primary female can read and write	-0.310 (0.235)	-0.282 (0.233)	-0.321 (0.236)	-0.262 (0.264)	0.472 (0.409)	0.462 (0.410)	0.472 (0.409)	-0.032 (0.479)
Dual-adult household	0.197 (0.136)	0.210* (0.128)	0.161 (0.132)		-0.531** (0.219)	-0.550*** (0.214)	-0.544** (0.214)	
Age of primary respondent	-0.039** (0.015)	-0.040*** (0.015)	-0.033** (0.016)	-0.031* (0.016)	0.002 (0.040)	0.004 (0.039)	0.004 (0.039)	0.012 (0.041)
Age of primary respondent squared	0.000** (0.000)	0.000** (0.000)	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Number of literate male household members	-0.007 (0.047)	-0.008 (0.046)	-0.001 (0.047)	-0.026 (0.047)	0.201** (0.100)	0.203** (0.100)	0.203** (0.100)	0.181 (0.117)

Table A. 14 Continued

Variable	Dietary Diversity Score				Body Mass Index			
	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity	Model 1: Aggregate empowerment	Model 2: Resource domain	Model 3: Production domain	Model 4: Gender parity
	(1)	(2)	(3)		(4)	(5)	(6)	
<i>Household characteristics (continued)</i>								
Number of literate female household members	0.127 (0.082)	0.115 (0.082)	0.130 (0.083)	0.130 (0.080)	0.324** (0.155)	0.330** (0.154)	0.325** (0.154)	0.312* (0.178)
Household size	0.012 (0.017)	0.013 (0.016)	0.011 (0.017)	0.000 (0.017)	-0.050 (0.030)	-0.051* (0.030)	-0.050* (0.030)	-0.040 (0.034)
Dependency ratio	0.146*** (0.056)	0.142** (0.057)	0.163*** (0.057)	0.128** (0.061)	0.099 (0.110)	0.106 (0.110)	0.105 (0.111)	0.115 (0.137)
Per capita expenditure quintile 2	0.293* (0.156)	0.285* (0.154)	0.286* (0.157)	0.213 (0.151)	0.530* (0.298)	0.525* (0.296)	0.526* (0.298)	0.497 (0.381)
Per capita expenditure quintile 3	0.631*** (0.174)	0.640*** (0.166)	0.639*** (0.174)	0.597*** (0.164)	0.428* (0.231)	0.432* (0.230)	0.431* (0.231)	0.741** (0.292)
Per capita expenditure quintile 4	0.936*** (0.164)	0.924*** (0.163)	0.955*** (0.164)	0.796*** (0.161)	0.573** (0.280)	0.582** (0.280)	0.580** (0.282)	0.528 (0.332)
Per capita expenditure quintile 5	1.318*** (0.189)	1.302*** (0.187)	1.342*** (0.188)	1.246*** (0.184)	1.301*** (0.323)	1.311*** (0.322)	1.307*** (0.326)	1.462*** (0.351)
Northern region	0.578*** (0.161)	0.540*** (0.148)	0.507*** (0.152)	0.427** (0.171)	-0.820** (0.340)	-0.844** (0.348)	-0.846** (0.345)	-0.974*** (0.367)
Upper east region	0.251 (0.194)	0.248 (0.197)	0.213 (0.193)	0.075 (0.216)	-1.397*** (0.392)	-1.410*** (0.395)	-1.409*** (0.396)	-1.617*** (0.435)
Upper west region	0.509*** (0.163)	0.465*** (0.159)	0.494*** (0.165)	0.233 (0.203)	-0.819* (0.490)	-0.811 (0.495)	-0.822* (0.490)	-1.062* (0.562)
<i>N</i>	1,967	1,967	1,967	1,541	1,744	1,744	1,744	1,379

Source: Authors' calculations using the 2012 Feed the Future Ghana survey (METSS-Ghana 2012).

Note: Robust standard errors are in parentheses. * $p < .1$. ** $p < .05$. *** $p < .01$.

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