Research Article

Assessment of Nutrition Competency of Graduating Agriculture Students in Ethiopia: A Cross-sectional Study

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ABSTRACT

Objective: To assess the level of nutrition-sensitive agriculture competencies of graduating midlevel animal and plant sciences students in Ethiopia and identify factors associated with the attainment of competencies.

Design: A cross-sectional study design using structured skills observation checklists, objective written questions, and structured questionnaires was employed.

Setting: Two agriculture technical vocational education and training colleges in the 2 regions of Ethiopia.

Participants: A total of 145 students were selected using stratified random sampling techniques from a population of 808 students with the response rate of 93%.

Main Outcome Measures: Nutrition-sensitive agriculture competency (knowledge and skills attributes) of graduating students.

Analysis: Bivariate and multivariable statistical analyses were used to examine the association between the variables of students' gender, age, department, institutional ownership, and perception of learning environment and their performance in nutrition competency.

Results: Combined scores showed that 49% of students demonstrated mastery of nutrition competencies. Gender and institutional ownership were associated with the performance of students ($P < .001$); male students and students at a federal institution performed better.

Conclusions and Implications: The study showed low performance of students in nutrition competency and suggested the need for strengthening the curriculum, building tutors' capacity, and providing additional support to female students and regional colleges.

Key Words: agriculture, curriculum, nutrition assessment, malnutrition, vocational education, competency (*J Nutr Educ Behav*. 2017;49:312-320.)

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INTRODUCTION

Despite considerable progress in reducing hunger globally, an estimated 795 million people remain chronically malnourished.[1] Globally, 5.9 million children aged <5 years died in 2015 and about 45% of all child deaths are linked to malnutrition.[2] According to a United Nations Children's Fund–World Health Organization–World Bank child malnutrition estimate, in 2014 more than one third of all stunted children aged <5 years lived in Africa, where the number of stunted children increased by 23% since 1990.[3] In Ethiopia, the 2014 Mini Demographic and Health Survey revealed that despite a substantial decline over the past 15 years, for all children aged <5 years, 40% were stunted, 9% were wasted, 25% were underweight, and 3% were obese or overweight.[4]

Remediation of the underlying causes of malnutrition requires action by different sectors, not just the health sector. The agriculture sector should be one of the key nutrition stakeholders in efforts to reduce malnutrition because it is responsible for ensuring food security.[5] However, evidence shows that whereas most agricultural interventions improve food security through increased food production, these interventions do not guarantee nutritional security unless they also diversify food production and consumption.[6]

To overcome the problem of malnutrition in Ethiopia, the government's

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national nutrition program includes nutrition-specific interventions that target adequate food intake and nutrient supplementation and nutrition-sensitive interventions. Nutrition-sensitive interventions focus on diversifying agricultural products, reducing post-harvest loss, and promoting homestead gardening and food-based approaches.[7] According to the Food and Agriculture Organization,[8] nutrition-sensitive agriculture puts nutritionally rich foods, dietary diversity, and food fortification at the heart of overcoming malnutrition and micronutrient deficiencies. Nutrition-sensitive interventions that invest extensively in human resources, especially in nutrition education, have a greater possibility of effecting positive nutritional change.[6,9-12] Given the shortage of trained nutrition service providers in countries affected by a high burden of stunting, increasing the number of trained frontline agriculture and health extension workers is essential to implementing nutrition-sensitive and nutrition-specific interventions.[9,10,13,14]

Different studies revealed that, despite the demand for a more robust nutrition workforce, in most regions of the world poor-quality training programs translate into delivery of poor-quality nutrition services.[10,15-17] "Fragmented, outdated, and static curricula that produce ill-equipped graduates"[18] have also contributed to poor-quality nutrition services. Traditional education systems often emphasize instilling knowledge over skills and the desired attitude. Recently, competency-based education garnered a lot of attention globally from policy makers and education reformers.[19] The 2 most common features of competency-based education are (1) a competency framework that is appropriate for the context, and (2) the use of competency assessments that provide clear evidence of graduates' knowledge and ability to do the job.[19] Competence is the quality or state of being functionally adequate or having sufficient knowledge and skill to perform a specific task, action, or function successfully.[20]

To support nutrition-sensitive agriculture, the Ethiopian government is committed to enhancing the capacity of higher-education institutions to provide high-quality preservice education in nutrition.[7] The Ethiopian Academy of Science[21] recommended the use of agricultural agents to promote nutrition at the household level, especially for children, women, and other vulnerable groups. Agriculture agents assist the farming community to maximize productivity through improved farming systems, increased application of fertilizer, introduction of new varieties and breeds, diversification of crops, and reduction of post-harvest loss, with the goal of positively affecting nutrition. However, there is no documentation regarding the current level of nutrition competencies of agriculture graduates in Ethiopia.

Through its Empowering New Generations to Improve Nutrition and Economic opportunities (ENGINE) project, the US Agency for International Development is supporting the government of Ethiopia to enhance the capacity of selected agriculture technical vocational education and training (ATVET) colleges to provide high-quality nutrition education in response to the local labor market's requirements.[22] To produce graduates who are competent in nutrition-sensitive agriculture practices, in December, 2012, core nutrition competencies were integrated into 14 courses in the plant and animal science departments (7 courses for each discipline, including Promotion of Safe Handling, Storage, Transportation and Preservation of Agricultural Food Products [plant and animal science]; Establishing Diversified Horticultural Crops; Animal Production and Marketing Management; and Handling and Processing of Milk). Courses from both departments' curricula were selected based on their nutrition-sensitive agriculture content. Plant and animal science students who were enrolled at ENGINE-supported institutions in September, 2012 and after passed through the revised curricula as part of a 3-year academic program designed to produce midlevel agriculture development agents.

To understand the gap between labor market requirements and graduates' competencies, this study assessed the nutrition-sensitive agriculture competencies of these graduating midlevel agriculture students and identified factors associated with their nutrition competency. The study also explored students' perception of their learning environment and the adequacy of their experience in preparing them to promote nutrition-sensitive agricultural practices and reduce malnutrition in Ethiopia.

METHOD

Study Design

The researchers employed a cross-sectional quantitative study design using structured questionnaires to assess the nutrition competency of students from 2 ATVET colleges in Ethiopia. The study used a stratified random sampling technique to create homogeneous subgroups to measure the competency level of plant and animal sciences students who assisted in the promotion of diversified agricultural production and consumption.

Study Population and Study Site

The study population included all 808 prospective 2015 graduating students of plant and animal science from 2 ENGINE-supported ATVET colleges located in Oromia and Southern Nation, Nationality and People Regions in Ethiopia. The study included Level III and Level IV plant and animal science students who were enrolled at the colleges for 2–3 years, and who expected to graduate at the diploma level to serve the community as frontline agriculture agents.

Sample Size and Sample Selection Procedures

A representative sample size was calculated using the assumptions for a 95% level of confidence, maximum variability of attributes related to the level of nutrition competency with a proportion of 0.5 (because there was no previous estimate of agricultural nutrition competency), a design effect of 1 because all target colleges were included in the study, an anticipated nonresponse rate of 10%, and ±15% relative errors (7.5% absolute margin of error). This resulted in an adjusted sample size of 156 animal and plant science graduating students. The adjusted sample size was allocated proportionally to each department (animal and plant science) using total prospective graduates (319 for animal science and 489 for plant science). This gave a sample size of 62 animal science graduating students and 94 plant science graduating students. In

each of the 2 institutions, 31 animal science and 47 plant science graduating students were randomly selected from the graduating class for an objective written examination, observation, and interview.

Data Collection Procedures

The study used 3 set of tools: structured skills observation checklists with 3 skill stations to assess graduating students' nutrition skills through direct observation; 35 objective written assessment questions to measure students' knowledge regarding nutrition; and a structured questionnaire to explore students' perception about the nutrition learning environment and their experience. The knowledge questions and skills sets were derived from core nutrition competencies defined for agriculture graduates. The knowledge questions and skills checklists were validated by administering both examinations to expert data collectors, scoring their performance, discussing flawed questions, and incorporating suggestions for review. Interrater reliability of scoring skills performance was also tested and discussed for improvement. Eight proficient agricultural instructors who had previous experience teaching classes on nutrition-sensitive agriculture were recruited as assessors. Assessors were trained for 2 days on the purpose of the study, research ethics such as beneficence/nonmaleficence, consent, data storage, and techniques for completing the 3 sets of data collection tools. Each assessor was assigned to an institution where she or he had no affiliation. The 3 sets of data collection tools were used sequentially. First, paper-based knowledge questions were administered in classrooms to all study participants. Then groups of 3 students rotated through the skills assessment session, with 1 student assigned to 1 skill station and rotating through all 3 skills stations. The skills stations covered promotion of nutrient-dense and diversified food production and consumption, counseling on nutrition-sensitive agricultural production and consumption, and categorizing agricultural products by major food groups. One assessor was assigned to each skill station to rate the performance of each student using a structured checklist with 6–8 steps or tasks on a 3-point Likert scale (performed = 2; partial = 1; and not performed = 0). After completing the rotation among the 3 skills stations, each student was interviewed by the assessor at the last skill station using a structured questionnaire to explore the student's perceptions of the learning environment and experience pertaining to nutrition-sensitive agriculture education. The questionnaire consisted of 7 questions (3 questions focused on the learning environment; the other 4 covered the learning experience). Data collection was conducted in June, 2015 before the beginning of the final examination period. The study team members supervised the data collection process. To avoid personal identifiers, a random unique identification number was assigned to each study participant.

Data Analysis

Data were cleaned before being entered into a computer. The data were double-entered into EpiData (version 2.0.2.28; EpiData Association, Odense, Denmark) and exported to SPSS (version 23; IBM Corporation, Armonk, NY; 2014) for further statistical analysis. Frequencies were used to detect outliers, missing values, and inconsistent variables.

The modified Angoff[23] method, an approach to setting a criterion-referenced passing point, was used to determine the passing score (mastery of the subject) for knowledge and skill competence. Before the data collection period, assessors agreed on a pass score for the competencies (skill and knowledge) by assuming a hypothetical borderline-competent, nutrition-sensitive agriculture practitioner's performance. Accordingly, 42% and 49% were set as the pass-fail cutoff points for determination of knowledge and skill competency, respectively. A competency level was calculated for each core domain (knowledge and skill) for each student. A score equal to or above the cutoff point in both domains was taken as demonstration of required nutrition competency. Each knowledge domain was further disaggregated by subcompetences and analyzed to identify areas that need emphasis. Similarly, students' perceptions of their learning environment and experiences were calculated as percentages using the 3–Likert point scale (yes = 2; partially = 1; and no = 0).

The researchers performed Pearson chi-square tests and independent sample *t* tests to detect statistical associations and differences in the competency of students based on sociodemographic and institution affiliation (federal or regional schools) variables and type of department (plant or animal science). Bivariate and multiple logistic regression analyses were performed to identify predictors of competency levels. The outcome variable was combined with the mean competency score (skill and knowledge) and categorized as pass = 1 if it was equal to or above the Angoff passing mark (42% and 49% for knowledge and skill competencies, respectively) and fail = 0 if it was below the passing mark. Predictors were students' gender, age, type of department, and perception of their learning environment and experience. $P \leq .25$ was used to select candidate predictor variables for the multiple logistic regression. $P \leq .05$ was used for all statistically significant tests.

Ethical Consideration

The researchers obtained approval from the Johns Hopkins Bloomberg School of Public Health Institutional Review Board and permission from training colleges to conduct the study. The purpose of the study, standard ethical issues (such as the right to participate or not), and data management were discussed with study participants. Informed verbal consent was obtained from all study participants before they took part in the assessment. To ensure students' privacy, all observations and interviews were carried out in private rooms where no one could see or overhear the interactions.

RESULTS

Sociodemographic Variables

A total of 145 agricultural students (61 female and 84 male) participated in this study; a 7% nonresponse rate was encountered owing to program overlap with final examinations and a school conference. About 55% of study participants were plant science students and a majority of the students (95.2%) were aged <25 years.

Nearly 45% of study participants were completing their third year and 55% were completing their second year of college study (Table 1).

Percentage of Students Who Demonstrated Desired Nutrition Competence

Knowledge assessment questions were composed of 35 questions from 5 subcompetencies that assessed students' knowledge of basic principles of human nutrition and their understanding of nutrition-sensitive agriculture concepts as they applied to diversified agricultural production and consumption. The mean composite score for the knowledge domain revealed that 51.7% of students scored equal to or above the pass mark (42%) (Table 2). Students scored the lowest in promotion of safe handling of agricultural food products. For the nutrition skills domain, which had 6–8 tasks/skill, 93.8% of study participants performed equal to or above the pass mark (49%). Students scored the highest in promotion of nutrient-dense and diversified food production and in counseling on nutrition-sensitive production and consumption (95% and 81%, respectively) and relatively lower in categorizing food items by major food groups (76%). Statistical analysis revealed that plant and animal science students did not differ significantly in the level of nutrition knowledge. However, plant science students performed better in 3 of 5 subcompetence areas of nutrition-sensitive agriculture. In categorizing agricultural food items by major food groups, plant science students scored significantly higher (83%) than did animal science students (68%) (P = .04). Nearly half of students (49%) demonstrated required nutrition competencies (knowledge and skill domain) above or equal to the pass score.

Agriculture Students' Perception of Their Learning Environment and Experience

A majority of the students perceived that the learning environment (instructors, classroom, and library) was inadequate (Table 3). Students' perceptions did not differ significantly between plant and animal science disciplines. Almost all students perceived that their curriculum lacked sufficient nutrition-related content and only 21.8% of the respondents perceived that their learning experience was adequate. However, there was a statistically significant difference between plant and animal science students regarding how they perceived the adequacy of their learning experience both in the classroom and at the practical site. Plant science students perceived the adequacy of the learning experience more positively than did animal science students (P = .001).

Table 1. Sociodemographic Characteristics of Plant and Animal Science Students Who Participated in the Study (n = 145)

		Type of Profession			
		Plant Science	Animal Science		
Demographics	**n**	**%**	**%**	**%**	***P***
Gender					
Female	61	42.1	32.5	53.8	.01[a]
Male	84	57.9	67.5	46.2	
Age, y					
<20	82	56.6	56.3	56.9	.81
20–24	56	38.6	40.0	36.9	–
>24	7	4.8	3.8	6.2	–
Ownership/affiliation					
Federal	79	54.5	58.8	49.2	.25
Regional	66	45.5	41.3	50.8	
Education at college, y					
2	80	55.2	58.8	50.8	.34
3	65	44.8	41.3	49.2	

[a]Statistically significant (P was computed using Pearson chi-square test).

Bivariate and Multiple Logistic Regression Analysis

Bivariate analysis showed that students' levels of competence were significantly associated with gender, institutional affiliation, perception of learning environment, and perception of learning experience (Table 4). Multivariable logistic regression analysis demonstrated that male students were more likely to have higher scores on nutrition-sensitive agriculture competence than were female students (adjusted odds ratio = 6.97; P < .001) and students at regional institutions were less likely to be competent compared with those at federal institutions (adjusted odds ratio = 0.05; P < .001).

DISCUSSION

Assessment of the nutrition competency of students graduating from 2 ATVET colleges in Ethiopia showed that only about half of students demonstrated required nutrition-sensitive agriculture competencies. This level of competence is not satisfactory if these graduates are expected to assist and promote nutrition-sensitive agricultural practices in farming communities and reduce malnutrition in Ethiopia.

Graduates' low levels of competence could be due to a lack of adequate nutrition-sensitive agriculture content in the curriculum, as perceived by 97.2% of students. A similar study conducted in Trinidad and Tobago showed that diploma agriculture graduates were underprepared for new areas required for food production in a modern environment, such as sustainable production, food safety, and value addition.[24] Low scores may also have reflected instructors' lack of familiarity with the concept of nutrition-sensitive agriculture. A multisectoral approach to nutrition was introduced in the 1970s, but then the focus shifted to a more narrow approach to nutrition in the 1980s and 1990s. A multisectoral approach was reintroduced only recently and may be a new concept for agriculture tutors.[25]

Students' knowledge scores were lowest in promotion of safe postharvest handling of agricultural food

Table 2. Percentage of Plant and Animal Science Students Who Demonstrated Desired Nutrition Competence (Scored Equal or Above Pass Mark for Knowledge and Skill Domains) (n = 145)

Competency Domain	Items/Tasks Assessed, n	n	Students (%) Total	Plant Science	Animal Science	*P*
Knowledge competencies						
Apply basic principles of human nutrition	13	60	41.4	40.0	43.1	.71
Assist in variety agricultural food production and promote use of diversified/complementary foods	13	65	44.8	50	38.5	.16
Promote safe handling of agricultural food products during storage, transportation, and preservation	3	17	11.7	16.3	6.2	.06
Promote nutrition through behavior-change communication and use of technology	5	78	53.8	57.5	49.2	.32
Use multisectoral collaboration and linkage	1	77	53.1	51.2	55.4	.62
Students who scored equal or above pass score on knowledge domain (35 items)		75	51.7	52.5	50.8	.84
Skill competencies						
Promotion of nutrient-dense and diversified food production and consumption	7	137	94.5	91.3	98.5	.06
Counseling on nutrition-sensitive agricultural production and consumption	8	117	80.7	81.3	80	.85
Categorizing agricultural products by major food groups	6	110	75.9	82.5	67.7	.04[a]
Students who scored equal or above pass score on skill domain (23 tasks)		136	93.8	95.0	92.3	.50
Percentage of students who demonstrated mastery of nutrition competencies		—	49.0	51.2	46.2	.54

[a]Statistically significant (*P* was from Pearson chi-square test of association).

products. Only about 1 in 10 students recognized the impact of proper post-harvest handling of agricultural products on nutritional outcomes. It could be that the colleges' curriculum did not include this important subject, which may be a new area for instructors. A study conducted in Nigeria showed that agriculture teachers thought they lacked competency in some areas of their curriculum that they thought were important.[26] This deficiency in competency of agriculture experts and tutors could partially explain the high level of post-harvest loss of agriculture products in sub-Saharan Africa, particularly in Ethiopia.[27] A study conducted in Burkina Faso also revealed that insufficient training of faculty members in nutrition, along with other factors, contributed to low scores of agriculture students on nutrition knowledge tests.[28]

Competency assessments of instructors would provide guidance regarding which subcomponents need to be strengthened so that continuing education courses could be offered to instructors and past graduates who work as agriculture agents. The authors of a study that looked at the political, institutional, and policy-related challenges related to nutrition-sensitive agricultural programs in South Asia and East Africa noted that capacity, particularly in agriculture extension programs, was a constraint, and that universities in both regions needed to strengthen their curricula.[29] One of that study's participants, who was from a quasigovernmental organization in Ethiopia, said that "knowledge needs to diffuse from the nutrition people to agriculture."[29]

Students' scores in the skills domain were superior to their knowledge scores. Almost all students (95%) were successful in promoting nutrient-dense and diversified agricultural food production and consumption. This is one task graduates are expected to perform upon graduation. However, their underlying knowledge of nutrition-sensitive agriculture (52% were competent) needs to be strengthened for the graduates to contribute as expected. Better performance in skills sets could result from instruction methods used in ATVET colleges, which allocate the majority of time to practical teaching.[22] Therefore, students' intensive hands-on exposure to different types of extension work could have improved their skills.

More than 70% of students perceived that their learning environment and experiences were inadequate to equip them with the desired nutrition-sensitive agriculture competencies. However, in the multiple logistic regression analysis, there was no association of students' level of competency and their perception of the learning experience and environment. The current findings contradict study results in Australia and India, where there was a positive association between students' perception and academic outcome and competence level of students.[30,31] However, the perception of plant and animal science students was significantly different regarding the adequacy of their learning experience and assessment of nutrition learning by their instructors. This could be because of the inherent nature of plant science courses, which encompass nutrition-sensitive agriculture concepts such as diversified production and consumption.

Table 3. Percentage Distribution of Plant and Animal Science Students With Regard to Their Perception of Learning Environment and Learning Experience (n = 145)

Learning Environment/Experience	Total n	Total %	Plant Science	Animal Science	*P*
Learning environment					
Adequate numbers of animal/plant science instructors					
Yes	80	55.2	55.0	55.4	.35
Partially	56	38.6	36.3	41.5	
No	9	6.2	8.8	3.1	
Availability of helpful classroom learning resources related to course of study					
Yes	55	38.5	41.0	35.4	.47
Partially	67	46.9	42.3	52.3	
No	21	14.7	16.7	12.3	
Adequately equipped library and practical teaching sites					
Yes	39	27.9	30.0	25.0	.55
Partially	58	41.4	37.5	46.7	
No	43	30.7	32.5	28.3	
Learning experience					
Instructors are effective facilitators of nutrition-sensitive agriculture learning					
Yes	63	44.4	51.9	35.4	.12
Partially	64	45.1	40.3	50.8	
No	15	10.6	7.8	13.8	
Instructors assess learning in area of nutrition-sensitive agriculture					
Yes	20	13.8	20.0	6.2	.01[a]
Partially	19	13.1	16.3	9.2	
No	106	73.1	63.8	84.6	
Adequate learning experience with regard to nutrition-sensitive agriculture					
Yes	31	21.8	25.6	17.2	.001[a]
Partially	57	40.1	51.3	26.6	
No	54	38.0	23.1	56.3	
Curriculum has sufficient nutrition-related content					
Yes	4	2.8	2.5	3.1	.95
Partially	30	21.0	20.3	21.9	
No	109	76.2	77.2	75.0	

[a]Statistically significant (*P* was from Pearson chi-square test of association).

The multiple logistics regression analysis revealed that gender and institutional affiliation were factors associated with the nutrition competency of graduating students. Results for studies in other countries varied: female students performed lower than, equal to, or better than their male classmates. Studies in Nigeria showed that agriculture education was an area where female and male students could perform the same.[32,33] In a study conducted in India that assessed clinical competency of nursing students, female students were more competent than male students.[31] The disparity seen in Ethiopian students may have resulted from the cumulative effects of sociocultural constraints that affect females' opportunities to be involved equally in education at all levels. This is evidenced by other studies conducted in Ethiopia that reported that female students' academic performance was lower than that of their male counterparts.[34-36]

The institutional affiliation with the federal government contributed positively to students' competency. This could be because there were more options at the federal level to provide overall technical assistance to ATVET colleges than at the regional level, and because of the ability of federal institutions to mobilize internal and external resources to create better environments for nutrition-sensitive agriculture education. Increased resources and technical assistance might be required for regional institutions to improve competency-based, nutrition-sensitive agriculture education.

Other factors such as age, department, and student perception of the learning environment were not significantly associated with the competence level of students in the current study. This is consistent with findings from studies conducted in India that assessed factors affecting teaching and learning in nursing education.[34]

Because of limited studies in the area of competence assessment of agriculture students and tutors in Ethiopia, the discussion of findings were inadequate. The study was conducted within a small number of institutions, so the findings may not be generalizable to all institutions in the country.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Because this is among few studies conducted on competence of agriculture graduates in Ethiopia, it is the authors' opinion that it generates valuable information about the nutrition competence of graduating mid-level agriculture students, and so can inform education policies for strengthening nutrition-sensitive agriculture education. A lack of essential nutrition-sensitive agriculture competencies by graduating agriculture agents hampers their contribution to multisectoral efforts to tackle malnutrition. Therefore, this study suggests that essential nutrition-sensitive agriculture competencies, such as diversified agricultural food production, promotion of safe post-harvest handling, and nutrition behavioral change and communication, need to be integrated into the agriculture curriculum. It is the authors' opinion that tutors need to be

Table 4. Logistic Regression Analysis of Factors Affecting Nutrition-Sensitive Agriculture Competencies of Plant and Animal Science Students Who Participated in Study (n = 145)

	Bivariate Regression Analysis			Multiple Regression Analysis		
Factors	**Odds Ratio**	**95% Confidence Interval**	***P***	**Adjusted Odds Ratio**	**95% Confidence Interval**	***P***
Gender (reference, female)						
Male	3.17	(1.58–6.32)	< .001[a]	6.97	(2.51–19.34)	< .001[a]
Department (reference, Plant Science)						
Animal Science	0.82	(0.42–1.57)	.54	–	–	–
Age, y (reference, <20 y)						
20–24	0.63	(0.32–1.25)	.19	0.606	(0.22–1.60)	0.31
>24	2.27	(0.42–12.3)	.34	2.08	(0.15–28.28)	0.58
Type of institution (affiliation) (reference, federal)						
Regional	0.10	(0.04–0.22)	< .001[a]	0.05	(0.01–0.17)	< .001[a]
Adequate learning experience (reference, yes)						
Partially	0.66	(0.26–1.61)	.36	0.95	(0.31–2.92)	0.30
No	0.32	(0.12–0.81)	.02[a]	1.60	(0.39–6.44)	0.51
Adequate learning environment (reference, yes)						
Partially	0.80	(0.35–1.81)	0.59	0.65	(0.22–1.92)	0.44
No	0.37	(0.15–0.91)	0.03[a]	0.48	(0.15–1.42)	0.18

[a]Statistically significant (*P* was from logistic regression).

trained on those competencies. Improvements should also be made in the learning environment, including increasing the availability of nutrition learning resources by adequately equipping library and practical teaching sites. Moreover, com petency areas (post-harvest handling, processing, and preservation) need due emphasis because they affect both nutrition outcomes and livelihoods.

> Lack of competency in areas of post-harvest handling and preservation may have contributed to high post-harvest loss and malnutrition in Ethiopia.

Further studies to determine tutors' competency would provide a focus for inservice and continuing education classes that could build the capacity of tutors as well as current agriculture agents. Additional studies should monitor the alignment among the country's nutrition programs, strategies, and education policy and outcomes. The findings might be used to strengthen nutrition-sensitive agricultural educations programs in other countries that use this approach to reduce malnutrition.

It is evident from other studies that gender is a factor affecting the educational performance of students in Ethiopia. Therefore, mainstreaming gender in the education system needs to be strengthened and institutions' application of gender-responsive instruction needs to be monitored and followed up. Special programs, such as gender-based study clubs that are supported by tutors, and special facilities, such as separate libraries for female students, may address what appears to be a gender-based disparity in performance.

> Gender remains a factor negatively affecting academic performance of female students at agriculture training colleges in Ethiopia.

Additional studies should examine why females are scoring lower on competency assessments in Ethiopia. Areas for investigation could include female participation in the classroom, at practical sites, and in informal knowledge exchanges, and their perception of campus safety and its effects on study habits.

Although Ethiopia had made good progress in its effort to reduce malnutrition, more work is needed. It is worth investing in building the capacity of agriculture institutions so that they can produce graduates with essential nutrition-sensitive agricultural competencies that are vital for concerted and multisectoral efforts to reduce malnutrition and improve nutrition for all of Ethiopia's citizens.

> A gap in nutrition-sensitive agriculture competency of agriculture agents may have contributed to the high burden of malnutrition in Ethiopia.

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CONFLICT OF INTEREST

The authors have not stated any conflicts of interest.